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1. I. Increase in mass II. Differentiation III. Increase in number of individuals IV. Response to stimuli
Which two points are known as the twin characteristics of growth?
(a) I and II (b) I and IV (c) II and III (d) I and III

2. Cell division occurs _____ in plants and _____ in animals
(a) Continuously, only upto a certain age (b) Only upto a certain age, continuously
(c) Continuously, never (d) Once, twice

3. Generally growth and reproduction are –
(a) Mutually inclusive events (b) Mutually exclusive events
(c) Either a or b (d) None

4. Match the Column I with Column II –

Column I	Column II
A. *Planaria*	I. Binary fission
B. Fungi	II. Asexual spores
C. Yeast	III. Budding
D. *Hydra*	IV. True regeneration
E. *Amoeba*	V. Fragmentation
F. Species Plantarum and Systema Naturae	VI. Linnaeus

(a) A - I, B - II, C - III, D - IV, E - VI, F - V (b) A - IV, B - II, V, C - III, D - III, E - I, F - VI
(c) A - III, B - II, C - IV, D - III, E - VI, F - I (d) A - II, B - III, C - I, D - IV, E - II, F - VI

5. Which set of organisms multiply by fragmentation?
(a) Earthworm, *Amoeba*, fungi (b) Earthworm, fungi, bacteria
(c) Fungi, filamentous algae, protonema of mosses (d) *Amoeba*, *Hydra*, bacteria

6. Which of the following organisms do not reproduce?
(a) Mules (b) Sterile worker bees (c) both a and b (d) None

7. Metabolic reactions take place –
(a) In isolated cell-free systems (b) In living systems
(c) Both a and b (d) Either a or b

8. Organisms that can respond to stimuli are –
(a) Eukaryotes only (b) Prokaryotes only
(c) Both Prokaryotes and eukaryotes (d) Those with a well developed nervous system

9. I. Growth II. Reproduction III. Response to stimuli IV. Metabolism V. Cellular organisation
Which of the above features are generally characteristic of life?
(a) I, II, IV, V (b) All (c) II, III, IV (d) I, II, III, V

10. Growth, development and functioning of living body is due to –
(a) Order (b) Homeostasis (c) Metabolism (d) Adaptations

11. Which type of organisation is found in only living beings –
(a) Atomic (b) Molecular (c) Mixture (d) Subcellular

12. Organisation levels in living beings are –
(a) Subcellular → cellular → individual → community → population
(b) Atomic → molecular → subcellular → cellular → tissue → organ → individual

(c) Individual → population → organ system → tissue → cellular → molecular → atomic
(d) Atomic → molecular → tissue → individual → ecosystem → community

13. Given below are assertion and reason. Point out if both are true and the reason is correct explanation (I), both are true but reason is not correct explanation (II), assertion is true but reason is wrong (III) and both are wrong (IV).
Assertion – Death is regarded as the most regulatory process on earth.
Reason – It avoids over-crowding caused by continuous reproduction.
(a) I (b) II (c) III (d) IV

14. Biological organisation begins at –
(a) Cellular level (b) Atomic level
(c) Organismic level (d) Submicroscopic molecular level

15. A living organism can be exceptionally differentiated from a nonliving thing on the basis of its ability for –
(a) reproduction (b) Growth and movement
(c) Responsiveness to touch (d) Interaction with environment and progressive evolution

16. Linnaeus evolved a system of nomenclature called –
(a) Mononomial (b) Vernacular (c) Binomial (d) Polynomial

17. Which one is the species?
(a) Carnivora (b) *Canis* (c) familiaris (d) *Canis familiaris*

18. Binomial nomenclature seems to be difficult because a scientific name is derived from –
(a) English (b) Sanskrit (c) Latin (d) French

19. Two plants are taxonomically related if –
(a) They store carbohydrate in the same type of molecule
(b) Both obtain energy from hydrolysis of ATP into ADP and inorganic phosphate
(c) Both have similarly lobed palmate leaves
(d) Both have pinnately veined leaves

20. A group of plants or animals with similar traits of any rank is –
(a) Species (b) Genus (c) Order (d) Taxon

21. Binomal nomenclature means –
(a) One name given by two scientists
(b) One scientific name consisting of a generic and specific epithet
(c) Two names, one latinised, other of a person
(d) Two names, one scientific, other local

22. Basic unit or smallest taxon of taxonomy / classification is –
(a) Species (b) Kingdom (c) Family (d) Variety

23. Father of taxonomy is –
(a) De Candolle (b) Hooker (c) Linnaeus (d) Aristotle

24. A scientist connected with the study of variations, evolution and origin along with classification is known as –
(a) Classical taxonomist (b) Herbal taxonomist (c) Modern taxonomist (d) New taxonomist

25. Linnaeus system of classification was based on –
(a) Morphology (b) Ecology (c) Embryology (d) Cytology

26. First act in taxonomy is –
(a) Description (b) Identification (c) Naming (d) Classification

27. Taxonomy based on determination of genetic relationships is –
(a) Cytotaxonomy (b) Numerical taxonomy
(c) Biochemical taxonomy (d) Experimental taxonomy.

28. A group of interbreeding organisms is –
(a) Genus (b) Family (c) Order (d) Species.

29. A taxon is –
(a) A group of related families
(b) A group of related species
(c) A type of living organisms
(d) A taxonomic group of any ranking.

30. Branch connected with nomenclature, identification and classification is –
(a) Ecology (b) Taxonomy (c) Morphology (d) Physiology.

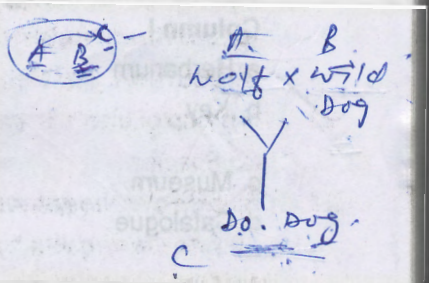
31. Sequence of taxonomic categories is –
(a) Class — Phylum — Tribe — Order —Family — Genus —Species
(b) Division — Class — Family — Tribe —Order — Genus — Species
(c) Division — Class — Order — Family —Tribe — Genus — Species
(d) Phylum — Order — Class — Tribe —Family— Genus — Species.

32. The third name in trinomial nomenclature is –
(a) Species (b) Subgenus (c) Subspecies (d) Ecotype.

33. In nomenclature –
(a) Both genus and species are printed in italics
(b) Genus and species may be of same name
(c) Both in genus & species, the first letter is capital
(d) Genus is written after the species.

34. In fish, *Catla catla* the specific name is identical with the generic name, thus it is an example of
(a) antonym (b) tautonym (c) synonym (d) homonym

35. Species A and species B are in the same phylum. Species A and species C, but not species B, are in the same order. From this information you can conclude that _____.
(a) species C could be in the same class as species A and B
(b) all three species are members of the same genus
(c) all three species are not members of the same phylum
(d) species A and species B are in the same family



36. Which one of the following is not a correct statement?
(a) Herbarium houses dried, pressed and preserved plant specimens
(b) Botanical gardens have collection of living plants for reference
(c) A museum has collection of photographs of plants and animals
(d) Key is a taxonomic aid for identification of specimens

37. Mayer's biological concepts of species is mainly based on
(a) Morphological traits
(b) Reproductive isolation
(c) Modes of reproduction
(d) Morphology and reproduction.

38. In the following flow diagram, identify the correct categories.

Angiospermae ← C ← B ← D ← A ← E ← Species

I. Wheat and mango belongs to same category B.
II. Potato, brinjal and makoi belong to same category E.
III. Muscidae, anacardiaceae and angiospermae belong to category A.
IV. Gorilla, gibbon and chimpanzee belongs to same category D.
V. Dicotyledonae and monocotyledonae belongs to category C.
Select the correct statement :
(a) IV, II, III (b) I, III, V (c) II, IV (d) V, II, IV

39. Recognise the following flow diagram and the find correct option according to taxonomic hierarchy.

Angiospermae ← **C** ← **B** ← **A** ← ***Mangifera***

(a) A is comparable to muscidae while B is at the same level as that of primata
(b) C includes all the angiosperms having two cotyledons in their seeds
(c) For wheat A is poaceae, B is poales and C is monocotyledonae
(d) All of the above are correct statements.

40. Recognise the following flow diagram and find the correct option according to taxonomic hierarchy.

Angiospermae ← **Dicotyledonae** ← **B** ← **A** ← ***Petunia***

(a) A - Sapindales, B - Anacardiaceae
(b) A - Polymoniales, B - Convolvulaceae
(c) A - Polymoniales, B - Solanaceae
(d) A - Solanaceae, B - Polymoniales

41. Which of the following statements best describes "emergent properties"?
(a) The properties of individual molecules which perform a specific chemical function.
(b) The function of a group of molecules is more than the abilities of a single molecule in the group.
(c) The magical interaction of molecules in water.
(d) All of these statements are examples of "emergent properties

42. "Properties of cellular organelles are not present in the molecular constituents of the organelle but arise as a result of interactions among the molecular components comprising the organelle. These interactions result in emergent properties at a higher level of organisation".
The above statement best describes the
(a) emergent properties
(b) Individual properties
(c) synergestic properties
(d) None

43. Match the items given in Column I with those in Column II and select the correct option given below:

Column I	Column II
a. Herbarium	(i) It is a place having a collection of preserved plants and animals
b. Key	(ii) A list that enumerates methodically all the species found in an area with brief description aiding identification
c. Museum	(iii) Is a place where dried and pressed plant specimens mounted on sheets are kept
d. Catalogue	(iv) A booklet containing a list of characters and their alternates which are helpful in identification of various taxa.

	a	b	c	d
(a)	(ii)	(iv)	(iii)	(i)
(b)	(iii)	(ii)	(i)	(iv)
(c)	(i)	(iv)	(iii)	(ii)
(d)	(iii)	(iv)	(i)	(ii)

44. A taxonomic key used to identify organisms is labeled: dichotomous
(a) phylogenetic key
(b) evergreen key
(c) dichotomous key
(d) none of the above

45. Which one of the following has least similar characters?
(a) Family
(b) Class
(c) Genus
(d) Species

46. On which of the following, five kingdom classification is based –
(a) Cell wall
(b) Genetic material
(c) Types of organelles
(d) Mode of nutrition

47. Number of criteria used in classifying organisms in five-kingdom classification is –
(a) 5
(b) 4
(c) 3
(d) 2

48. Which of the following is less general in characters as compared to genus –
(a) Species
(b) Family
(c) Class
(d) Division

49. What is correct?
(a) APIS INDICA (b) Trypansoma gambiense
(c) Ficus Bengalensis (d) *Mangifera indica*

50. Descending arrangement of categories is called –
(a) Classification (b) Taxonomy (c) Hierarchy (d) Key

51. *Nicotiana* is –
(a) Variety (b) Subspecies (c) Species (d) Genus

52. Which one is odd/not a category?
(a) Species (b) Class (c) Phylum (d) Glumaceae / Malvaceae

53. In hierarchical classification, class is interpolated between –
(a) Family and genus (b) Phylum and order (c) Order and family (d) Kingdom and phylum

54. The disadvantage of using common names for species is that:
(a) the names may change
(b) one name does not apply universally
(c) one species may have several common names and one common name may be applied to two species
(d) all of the above

55. Place of keeping and studying dry plants is –
(a) Arboretum (b) Museum (c) Vasculum (d) Herbarium

56. Hierarchy of categories of Carolus Linnaeus had categories except –
(a) Genus and species (b) Order and class (c) Kingdom and class (d) Phylum and family

57. An important function of botanical garden is –
(a) Providing beautiful area for recreation
(b) One can observe tropical plants over there
(c) They allow ex-situ conservation of germ plasm
(d) They provide natural habitat to wildlife

58. Two plants belong to same species if they –
(a) Have more than 90% similar genes
(b) Look similar and possess identical secondary metabolites
(c) Have similar number of chromosomes
(d) Can reproduce freely with each other and form seeds

59. The given table gives the classification of a wheat plant.

Kingdom	**Plantae**
Division	Angiospermae
i	Monocotyledonae
ii	Poales
Family	*iii*

(a) i-Genus; ii-Class; iii-Poaceae (b) i-Class; ii-Order; iii-Poaceae
(c) i-Genus; ii-Class; iii-Solanaceae (d) i-Class; ii-Order; iii-Solanaceae

60. In *Oryza sativa, sativa* stands for –
(a) Name of species (b) Specific nomenclature
(c) Specific epithet (d) Species

61. An organism is in the same class but not in the same family. It may belong to same
(a) Genus (b) Species (c) Variety (d) Order

62. Largest herbarium in India is at –
(a) National Botanical Garden, Lucknow (b) Lloyd Botanical garden, Darjeeling
(c) Forest Research Institute, Dehradun (d) Indian Botanical Garden, Sibpur

63. The famous botanical garden of Kew is located in –
(a) India (b) England (c) Germany (d) France

64. Related genera belong to same –
(a) Variety (b) Family (c) Species (d) None of these

65. Which is not applicable to biological species concept?
(a) Hybridisation (b) Reproductive isolation
(c) Natural selection (d) Gene pool

66. Which taxonomic aid gives comprehensive account of complete compiled information of a genus or family at a particular time?
(a) Taxonomic key (b) Herbarium (c) Monograph (d) Flora

67. ICBN is –
(a) International Code of Biological Naming (b) International Code of Botanical Nomenclature
(c) Internal Class of Biological Nomenclature (d) International Classification of Biological Nomenclature

68. Who did write "*Species Plantarum*" and provide a basis for classification of plants?
(a) Carolus Linnaeus (b) Charles Darwin (c) Robert Hooke (d) Leeuwenhoek

69. Identify the true statements from below –
I. Father of taxonomy is John Ray
II. *Homo sapiens* is the scientific name of man
III. A taxon is a group of related plants or animals.
IV. Basic unit or lowest taxnomic category is species.
V. The first step in taxonomy is naming.
VI. Modern classification is based on phylogeny
VII. First time binomial nomenclature was written in latin
VIII. The number of species that are known and described, range between 1.7 - 1.8 million
(a) I, II, III and IV (b) II, IV, VI, VII and VIII
(c) I, III, V and VII (d) II, III, V and VI

70. Classification systems have many uses. Which of the following is not a goal of biological classification?
(a) To depict convergent evolution
(b) To clarify relationships among organisms
(c) To help us remember organisms and their traits
(d) To clearly identify organisms being studied

71. Taxonomic systems used by biologists are hierarchical; that is,
(a) taxonomic groups reflect shared characters, not evolutionary relationships.
(b) each higher taxonomic group contains all the groups below it.
(c) taxonomic groups reflect common habitats.
(d) a hierarchy of traits is used to establish classifications.

72. Classification systems serve four important roles. Which of the following is not one of those roles?
(a) To help us remember characteristics of a large number of different things
(b) To help us identify shared traits, such as hair, mammary glands and constant high body temperature in mammals
(c) To reveal the harmony of nature
(d) To provide stable, unique, unequivocal names for organisms and to help reconstruct evolutionary pathways

73. In referring to an organism in writing, such as in a newspaper, textbook, or lab report, which of these rules should be followed?
1. Underline or italicize genus
2. Underline or italicize species
3. First letter of species should be uppercase
4. First letter of genus should be uppercase
(a) 1, 2, 4 (b) 1, 2, 3 (c) 2, 3, 4 (d) 1, 3, 4

74. Which of the following statements about classification is not true?
I. Members of a family are less similar than members of an included genus
II. An order has more members than the number of members in an included genus
III. Families have more members than phyla
IV. Members of a family share a common ancestor in the more distant past than members of an included genus
V. The number of species in a taxon depends on their relative degree of similarity.
(a) Only III (b) Only IV (c) Only V (d) None

75. Select the true statement for reproduction.
I. It is not an all-exclusive defining characteristic of living organisms
II. It is not an all-inclusive defining characteristic of living organisms
III. It is an all-inclusive defining characteristic of plants and fungi only
IV. Photoperiod affects reproduction in seasonal plant breeders only.
V. Photoperiod affects reproduction in seasonal breeders both plants and animals
VI. Photoperiod has no role in reproduction
(a) II and V (b) III and IV (c) IV and VI (d) All

76. Reproduction is synonymous with growth / cell division in –
I. Bacteria II. *Hydra* III. *Planaria* IV. Unicellular algae V. *Amoeba*
(a) I, III and V (b) I, II and IV (c) I, IV and V (d) All

77. Choose the correct statement–
(a) Growth in multicellular organisms cannot take place in *in vitro* culture.
(b) Growth by cell division in unicellular organisms can be observed in *in vivo* culture.
(c) Growth by cell division in unicellular organisms can be observed in *in vitro* culture.
(d) Growth by cell division in unicellular organisms cannot be observed by any method.

78. Which one of the following constitutes the two best reasons for distinguishing the living from the non living?
(a) Growth and locomotion (b) Irritability and locomotion
(c) Respiration and excretion (d) Reproduction and locomotion

79. Which of the following biological processes do not operate within the life span of a given organism ?
(a) Birth and nutrition (b) Growth and maturation
(c) Metabolism and excretion (d) Decomposition and mineralization

80. The life can be attempted to be defined as a peculiar series of functions associated with
(a) Transformation and utilization of energy
(b) Transmission and utilization of genetic information
(c) Metabolism and response to the environmental variations
(d) All of the above.

81. The process called evolution, exhibited by the living organisms is the manifestation of
(a) Only short term changes in the environment
(b) Reasonably long term changes in the environment
(c) A fully stable conditions of the environment
(d) The own desire of the organism to change the environment.

82. The living organisms of all hierarchial levels share in common, which one of the following features?
(a) Nature of protoplasmic constituent (b) Method of cell division
(c) Degree of body organization (d) Mode of nutrition.

83. Mark the incorrect statement concerning life
(a) It is a self-regulated thermodynamic system.
(b) It is capable of catalyzing the metabolic reactions

(c) It is capable of self perpetuation from generation to generation without DNA duplication
(d) It is simply impossible without energy.

84. Which one of the following aspects is an exclusive characteristic of living things?
(a) Isolated metabolic reactions occur *in vitro*
(b) Increase in mass from inside only
(c) Perception of events happening in the environment and their memory
(d) Increase in mass by accumulation of material both on surface as well as internally

85. Which of the following is self-conscious?
(a) Human being (b) Tiger (c) Lion (d) *Amoeba*

86. Living organisms can be unexceptionally distinguished from the nonliving thing on the basis of their ability for –
(a) Reproduction
(b) Growth and movement
(c) Interaction with environment and progressive evolution
(d) responsiveness to touch

87. All living organism present, past and future are
(a) Not linked to any extent
(b) Linked to one another in their cell membrane
(c) Linked to one another by the sharing of the common genetic materials, but to varying degrees.
(d) Linked to another by the sharing of the common genetic materials to 100% extent

88. Choose the correct one
I. Growth cannot be taken as a defining property of living organism.
II. Dead organism does not grow.
III. Reproduction cannot be an all inclusive defining characteristic of living organisms.
IV. No nonliving object is capable of replicating itself.
V. Metabolism in a test tube is nonliving.
VI. Metabolism is a defining feature of all living organism.
(a) I and III (b) All except V (c) All except III (d) All

89. Properties of tissues
(a) Are present in the constituent cells
(b) Are due to similar cells in them
(c) Are due to their similar origin
(d) Arise as a result of interactions among the constituent cells

90. Which of the following statement is false?
(a) Properties of cellular organelles are present in the molecular constituents of the organelles
(b) Interactions among the molecular components of the organelles result into properties of cell organelles
(c) Biology is the story of life on earth
(d) Biology is the story of evolution of living organisms on earth

91. The growth and reproduction are mutually exclusive events in
(a) Plants only (b) Animals only (c) Higher animal and plants (d) Lower organisms

92. The sum total of chemical reactions occurring in our body is called
(a) Metabolism (b) Homeostasis (c) Irritability (d) Catabolism

93. Mark the correct statement
(a) Only living organisms grow (b) Plants grow only up to a certain age
(c) The growth in living organisms is from inside (d) All of these

94. Which of the following multiply by the process of fragmentation?
(a) Planaria (b) Filamentous algae (c) Fungi (d) All of these

95. Given below is the botanical name of mango. Mark the option in which the name is correctly written
(a) Magnifera Indica (b) Mangifera indica (c) *Mangifera Indica* (d) *Mangifera indica*

96. Identify the correct sequence of taxonomic categories
(a) Species-order-kingdom-phylum (b) Species-family-genus-class
(c) Genus-species-order-phylum (d) Species-genus-order-phylum

97. Which of the following options represents the correct classification for the given animal?

	Phylum	Class	Order	Family	Genus	Species
(a)	Chordata	Vertebrata	Chiroptera	Felidae	*Canis*	*tigris*
(b)	Chordata	Mammalia	Camivora	Felidae	*Panthera*	*tigris*
(c)	Vertebrata	Mammalia	Camivora	Felidae	*Panthera*	*tigris*
(d)	Mammalia	Felidae	Camivora	Feliaceae	*Panthera*	*Leo*

98. The 'Birds' taxonomically represent
(a) Family (b) Order (c) Class (d) Phylum

99. The Indian Botanical garden is located in
(a) Howrah (b) Lucknow (c) Mumbai (d) Mysore

100. Following taxonomic aid provides information for the identification of names of species found in an area
(a) Monograph (b) Manual (c) Memoir (d) Periodical

101. Why did Linneous choose Latin language for Binomial Nomenclature?
(a) Because this language was scientific (b) Because this language was modern
(c) Because this language was dead (d) Because this language was ancient

102. The binomial nomenclature was given by
(a) Lamarck (b) Ernst Mayr (c) Carolus Linnaeus (d) Cuvier

103. Which one of the following organisms is scientifically correctly named, correctly printed according to the International Rules of Nomenclature and correctly described?
(a) Musca domestica - The common house lizard, a reptile
(b) Plasmodium falciparum - A protozoan pathogen causing the most serious type of malaria
(c) Felis tigris - The Indian tiger, well protected in Gir forests.
(d) E.coli - Full name *Entamoeba coli, a* commonly occurring bacterium in human intestine

104. Exclusive character of human being, which separate human from other organism is –
(a) Consciousness (b) Self regulation (c) Self Consciousness (d) Both (b) and (c)

105. Who has been called as "The Darwin of 20th century and Alexander Agassiz professor of Zoology Emeritus". He was awarded the triple crown of biology also
(a) Linnaens (b) Mayr (c) Mayers (d) Aristotle

106. Which one has real existence?
(a) Phylum (b) Class (c) Genus (d) Species

107. Sensitivity is the
(a) Ability to grow (b) Ability to reproduce
(c) Ability to detect changes in the environment (d) Ability to capture sunlight

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108. Homeostasis is
(a) Tendency to change with change in environment (b) Tendency to resist change / self regulatory mechanism
(c) Disturbance in regulatory control (d) Plants and animal extracts used in homeopathy.

109. Carnivora includes
(a) Group of organisms belonging to related genera (b) Group of organisms belonging to related species
(c) Group of organisms belonging to related families (d) Group of organisms which are similar in all features

110. Different organisms belonging to different orders are placed in a single class due to the fact that
(a) They have all similar morphological and reproductive characters
(b) They have similar place of origin
(c) They share a common habitat
(d) They have few similar or common characters

111. Botanical gardens consist of
(a) Dried and preserved plant specimens (b) Living plants and animals specimens
(c) Living plants specimens (d) Dead specimens of plants are preserved in jars

112. Select the odd one out w.r.t. Botanical gardens
(a) Collection of living plants for reference (b) Indian Botanical garden is at Howrah
(c) It is a method of ex-situ study (d) Collections of preserved plants and animals specimens

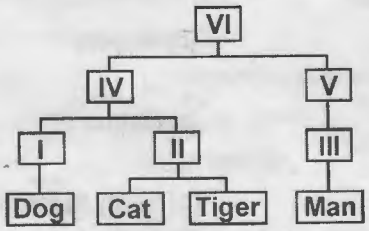
113. Read the following statements carefully and select correct option
(i) In zoological parks, conditions similar to natural habitats are provided to animals
(ii) Keys are generally analytical in nature
(iii) In herbarium sheet, local names are not mentioned
(iv) Taxonomical aids are useful in knowing bioresources
(a) Only (i) and (ii) (b) (i) , (iii) and (iv)
(c) (i), (ii) and (iv) (d) All of the above

114. Nomenclature is very must in taxonomy which of the following is not correct about scientific nomenclature?
(a) They ensure that each organism has only one name
(b) They also ensure that such a name has not been used for any other known organism
(c) Scientific nomenclature is a standardised naming system
(d) Different countries of the world use different kinds of scientific nomenclature system

115. In potato, brinjal, makoi, lion and leopard. How many species, genera and families are there?

	Species	Genus	Family
(a)	Five	Three	Two
(b)	Four	Two	Three
(c)	Five	Two	Two
(d)	Four	Three	Two

116. Recognise the following flow diagram and the find correct option according to taxonomic hierarchy.



	I	II	III	IV	V	VI
(a)	*Canis*	*Felis*	*Homo*	Felidae	Hominidae	Primata
(b)	Canidae	Felidae	Hominidae	Camivora	Primata	Mammalia
(c)	Canidae	Felidae	Homonidae	Camivora	Mammalia	Chordata
(d)	*Canis*	*Felis*	*Homo*	Camivora	Primata	Mammalia

117. Who gave the nomenclature according to which humans are called *Homo sapiens?*
(a) Darwin (b) Mendel (c) Aristotle (d) Linnaeus

118. Which is highest in the hierarchy of taxonomic category?
(a) Genus (b) Family (c) Order (d) Class

119. Which of the following is correctly matched with its particular taxonomic category?
(a) *Triticum aestivum* – Species (b) Fishes – Pisces – Phylum
(c) Man – Primate – Family (d) Mango – Sapindales – Class

120. Most obvious and technically complicated feature of all living organism.
(a) Metabolism (b) Growth (c) Replication (d) Ability to sense their environment

121. Select out incorrect statement.
(a) Herbaria serve as quick referral system in taxonomy
(b) Monographs contains information on any one taxon
(c) Manual provide the index to the plant species found in particular area
(d) Separate taxonomic Keys are required for each taxonomic category.

122. Which of the following statements is / are correct about Herbarium?
(a) It is a store house of collected plant specimens that are dried and preserved on sheets.
(b) Herbarium sheets contain information about date and place of collection, names family, collector's name, etc.
(c) It serves as quick referral systems in taxonomical studies.
(d) All of these

123. The label of a herbarium sheet does not carry information on :
(a) Local names (b) height of the plant (c) date of collection (d) name of collector

124. Study the four statements (A–D) given below and select the two correct ones out of them :
(A) Definition of biological species was given by Ernst Mayr.
(B) Photoperiod does not affect reproduction in plants.
(C) Binomial nomenclature system was given by R.H. Whittaker.
(D) In unicellular organisms, reproduction is synonymous with growth.
The two correct statements are
(a) A and D (b) A and B (c) B and C (d) C and D

125. Tautonym is :
(a) Unscientific explanation of a phenomenon (b) Common name used as scientific name
(c) Non-latinised name (d) Same name for genus and species

126. An organism's ability to detect stimuli from either the internal or external environment is called
(a) natural selection. (b) evolution. (c) mutation. (d) responsiveness.

127. Which of the following is a characteristic of living organisms?
(a) Have membrane-bound organelles (b) Maintenance and regulation of internal conditions
(c) Ability to produce energy (d) Have a nucleus

128. All of the following are true of all living organisms EXCEPT that they
(a) are made of cells. (b) can reproduce themselves.
(c) can grow. (d) possess either DNA or RNA.

Living World

129. Consider the following (A to D) and find out the correct sequence of taxonomical categories.

A. Petunia
B. Polymoniales
C. Dicotyledonae
D. Solanaceae

(a) A → D → B → C (b) C → D → B → A (c) A → B → C → D (d) C → B → A → D

130. A group of very closely related species that share a number of similar traits is called a(an)

(a) phylum (b) order (c) genus (d) class

131. Systematics is the

(a) Branch of biology concerned with evolutionary relationships among organisms
(b) Branch of biology concerned with the scientific classification of organisms
(c) Branch of biology concerned with the diversity of life
(d) Branched of biology concerned with the study of multicellular organisms.

132. A group of interbreeding individuals that is reproductively isolated from other groups is called a(n)

(a) phylum (b) organism (c) family (d) species

133. An animal phylum is defined on the basis of

(a) the uniqueness of its DNA content (b) the uniqueness of its body plan
(c) its type of body plan symmetry (d) its fundamental habitat (aquatic, terrestrial, etc.)

134. Which one of the following categories of taxonomic classification is the least inclusive?

(a) class (b) family (c) genus (d) order

135. Which of the following levels in the hierarchy of biology organization includes all of the other levels in the list?

(a) Cells (b) Biological molecules
(c) Atoms (d) Tissues

136. Two species belonging to the same class must also belong to the same

(a) species (b) order (c) genus (d) phylum

137. Arrange the following taxa to form the correct sequence of classification of man :

(i) Primata
(ii) Chordata
(iii) Mammalia
(iv) Hominidae

(a) i, iii, iv, ii (b) ii, iii, i, iv (c) iv, ii, i, iii (d) iii, ii, iv, i

138. A species can be distinguished from the other closely related species on the basis of

(a) Common ancestor (b) Distinct morphological features
(c) Sharing a common gene pool (d) Being biologically interfertile

139. Information on any one phylum, class, order is related to the :–

(a) Flora (b) Manuals (c) Monograph (d) Key

140. Which of the following is the correct sequence in the increasing order of complexity ?

(a) molecules, tissues, community, population (b) cell, tissues, community, population
(c) tissues, organisms, population, community (d) molecules, tissues, community, cells

141. The total words in binomial nomenclature are

(a) 5 (b) 3 (c) 2 (d) 4

142. Two organisms of same class but different families will be kept under the same

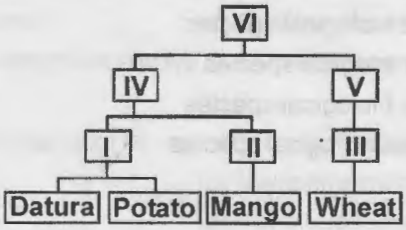
(a) genera (b) species (c) order (d) family

143. Which of the following will form a new species?

(a) interbreeding (b) variations

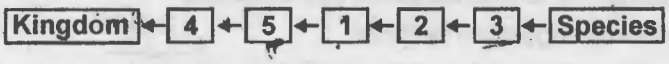
(c) differential reproduction (d) none of the above

144. Recognise the following flow diagram and the find correct option according to taxonomic hierarchy.



	I	II	III	IV	V	VI
(a)	Polymoniales	Sapindales	Poales	Dicotyledonae	Monocotyledonae	Angiospermae
(b)	Solanaceae	Anacardiaceae	Poaceae	Polymoniales	Poales	Angiospermae
(c)	Solanum	*Mangifera*	*Triticum*	Dicotyledonae	Monocotyledonae	Plantae
(d)	Polymoniales	Sapindales	Poales	Angiospermae	Monocotyledonae	Plantae

145. In the following flow diagram, identify the correct categories according to the taxonomic hierarchy.



I. Primata, diptera and carnivora belong to category 1.

II. *Petunia, Datura* and *Solanum* belongs to same category 2.

III. Angiospermae belongs to category 5.

IV. Man and dog shows maximum similarity at category 4.

V. Category 3 is same for lion, tiger and leopard.

Select the correct statement :

(a) I, II, IV, V (b) II, III, IV, V (c) I, II, III (d) I, II, V

146. Nomenclature is governed by certain universal rules. Which one of the following is contrary to the rules of nomenclature?

(a) Biological names can be written in any language

(b) The first word in a biological name represents the genus name, and the second is a specific epithet

(c) The names are written in Latin and are italicised

(d) When written by hand, the names are to be underlined

147. Who is known as Darwin of 20th Century?

(a) R. H. Whittaker (b) D. J. Ivanowsky (c) Ernst Mayr (d) T. O. Diener

148. Extrinsic and intrinsic growth are found respectively in –

(a) Mountain, Boulders (b) Humans, Mango tree (c) House fly, Mountains (d) Sand mounds, Moss

149. Scientific name of "brinjal" is standarised through rules given in :-

(a) ICZN (b) ICNB (c) ICBN (d) ICNCP

150. Match the column-I with column-II :-

Column-I	Column-II
(A) Systerma Naturae	(i) Julian Huxley
(B) Genera Plantarum	(ii) Binomial system for plants
(C) Species Plantarum	(iii) Sexual Classification
(D) New Systematics	(iv) Binomial system for animals. .

	A	B	C	D		A	B	C	D
(a)	iii	ii	i	iv	(b)	iv	iii	ii	i
(c)	iv	i	iii	ii	(d)	ii	i	iii	iv

151. According to species concept cauliflower, cabbage, knol-khol are :-
(a) Three taxonomic species and one biological species.
(b) One taxonomic species and one biological species.
(c) One taxonomic species and three biological species .
(d) Three taxonomic species and three biological species

152. Felis + Panthera ⟶ A
Solanaceae + Convolvulaceae ⟶ B.'
Identify A and B and choose-the correct option:- ~
(a) A = canidae, B = Poales
(b) A = Felidae, B = Polymoniales
(c) A = Felidae, B = Sapindales
(d) A = Canidae, B = Polymoniales

153. As we go from kingdom to species, the number of common characteristic goes on-
(a) Decreasing
(b) Increasing
(c) Remain same
(d) First increasing then decreasing

154. Which of the following statement is not correct about cyanobacteria?
(a) The name cyanobacteria was suggested by ICBN
(b) They were the first organisms that produced O_2 on earth.
(c) They have pigments for photosynthesis.
(d) They are not always of; blue green colour.

155. Herbarium sheets are arranged according to the system of classification and should have information about
(a) Time and place of collection, English, local and botanical names, phylum, collector's name
(b) Date and time of collection, English, local and botanical names, class, collector's name
(c) Date and place of collection, English, local and botanical names, order, collector's name
(d) Date and place of collection, English, local and botanical names, family, collector's name

156. Botanical gardens and Zoological parks have a collection of
(a) Endemic living species only
(b) Exotic living species only
(c) Endemic and exotic living species
(d) Only loyal plants and animals

157. Select incorrect statement w.r.t. growth
(a) Increase in body mass is criterion for growth in non-living objects
(b) Animals grow upto a certain age
(c) Growth in plants is definite always
(d) In living organisms, growth is from inside

158. Go through the following statements carefully.
I. Common and generic names are similar in case of *Gorilla*.
II. A non-obligate component of hierarchy of categories used by Linnaeus was Variety.
III. Species has a real existence.
IV. Correlated characters are similar traits found in all species of a genus.

How many of the above statement(s) is / are incorrect.

(a) All (b) 2 (c) 3 (d) 0

159. The practical purpose of classification of living organisms is to

(a) facilitate identification of unknown organisms. (b) explain the origin of living organisms.

(c) trace the evolution of living organisms. (d) name the living organisms.

160. In five kingdom classification, which single kingdom contains blue-green algae, nitrogen fixing bacteria and methanogenic archaebacteria –

(a) Monera (b) Protista (c) Plantae (d) Fungi

161. Taxanomy helps agriculturists because it aids in

(a) evolution of new species (b) Plant protection

(c) Complete study of plant behaviours (d) All of the above

162. The number of obligate categories which are always used in a taxonomic hierarchy are

(a) 7 (b) 5 (c) 3 (d) 8

163. Select the correctly written scientific name of Mango which was first described by Carolus Linnaeus :

(a) *Mangifera indica Car. Linn.* (b) *Mangifera indica Linn.*

(c) *Mangifera indica* (d) Mangifera Indica

164. The contrasting characteristics generally in a pair used for identification of animals in Taxonomic Key are referred to as :

(a) Alternate (b) Lead (c) Couplet (d) Doublet

1

LIVING WORLD

1. d	2. a	3. b	4. b	5. c	6. c	7. c	8. c	9. b	10. c
11. d	12. b	13. a	14. d	15. a	16. c	17. d	18. c	19. a	20. d
21. b	22. a	23. c	24. c	25. a	26. b	27. d	28. d	29. d	30. b
31. c	32. c	33. a	34. b	35. a	36. c	37. b	38. c	39. d	40. d
41. b	42. a	43. d	44. c	45. b	46. d	47. a	48. a	49. d	50. c
51. d	52. d	53. b	54. d	55. d	56. d	57. c	58. d	59. b	60. c
61. d	62. d	63. b	64. b	65. a	66. c	67. b	68. a	69. b	70. a
71. b	72. c	73. a	74. a	75. a	76. c	77. c	78. c	79. d	80. d
81. b	82. a	83. c	84. c	85. a	86. c	87. c	88. b	89. d	90. a
91. c	92. a	93. c	94. d	95. d	96. d	97. b	98. c	99. a	100. b
101. c	102. c	103. b	104. c	105. b	106. d	107. c	108. b	109. c	110. d
111. c	112. d	113. c	114. d	115. c	116. b	117. d	118. d	119. a	120. d
121. c	122. d	123. b	124. a	125. d	126. d	127. b	128. d	129. a	130. c
131. a	132. d	133. b	134. c	135. d	136. d	137. b	138. b	139. c	140. c
141. c	142. c	143. c	144. a	145. d	146. a	147. c	148. d	149. c	150. b
151. c	152. b	153. b	154. a	155. d	156. c	157. c	158. d	159. a	160. a
161. b	162. a	163. b	164. c						

2 BIOLOGICAL CLASSIFICATION

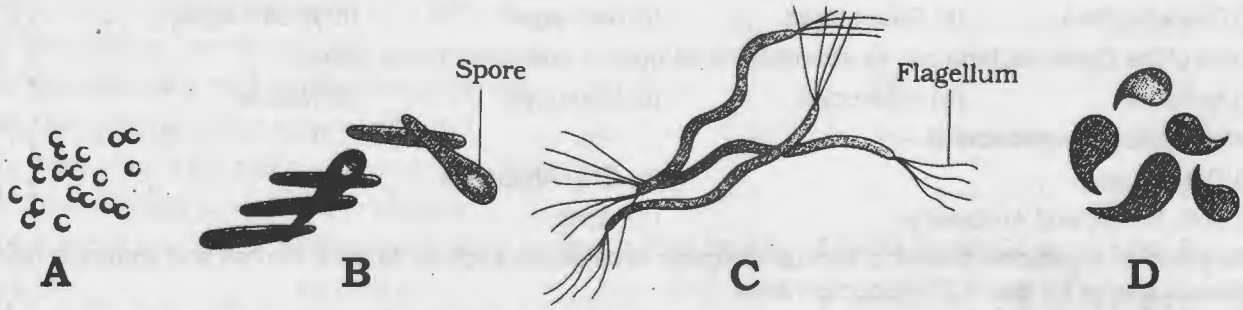
1. Which one is the most abundant microorganism?
(a) Bacteria (b) Protozoan (c) Viruses (d) Protists

2. Bacteria occur –
(a) In water only (b) In soil only (c) As parasite (d) Everywhere

3. Based upon the shape bacteria are grouped under how many categories?
(a) 2 (b) 3 (c) 4 (d) 5

4. Which of the following bacteria are comma-shaped –
(a) *Coccus* (b) Vibrio (c) *Bacillus* (d) *Clostridium*

5. Identify the names of the different bacteria according to the shapes –



(a) A - Cocci, B - Bacilli, C - Spirilla, D - Vibrio (b) A - Bacilli, B - Cocci, C - Spirilla, D - Vibrio
(c) A - Spirilla, B - Bacilli, C - Cocci, D - Vibrio (d) A - Spirilla, B - Vibrio, C - Cocci, D - Bacilli

6. Which of the following statement is correct about bacteria?
(a) Bacteria are simple in both structure and behaviour
(b) Bacteria are complex in structure as well as behaviour
(c) Bacteria are complex in structure but simple in behaviour
(d) Bacteria are simple in structure but complex in behaviour

7. Which of the following organisms show the most extensive metabolic diversity?
(a) Algae (b) Fungi (c) Bacteria (d) Bryophytes

8. Most of the bacteria are –
(a) Autotrophs (b) Chemoautotrophs (c) Heterotroph (d) Parasites

9. Which of the following are autotrophs?
(a) Photosynthetic bacteria (b) Chemosynthetic bacteria
(c) *Archaebacteria* (d) Both a and b

10. Which of the following statements is wrong about *Archaebacteria*?
(a) They live in some of the most harsh habitats (b) They are recently evolved group
(c) Cell wall is peptidoglycanless (d) They are unlike most other bacteria

11. Which of the following areas or conditions would be favoured by thermoacidophiles?
(a) The stomach of many herbivores (b) Hot, alkaline
(c) Hot, sulphur springs (d) Deep sea valconic

12. Which is not correct about methanogens?
(a) They are archaebacteria
(b) They live in marshy areas
(c) Methane is their preferred carbon source

(d) They are present in guts of several ruminant animals (cow, buffaloes) and they produce biogas (CH_4) from the dung of these animals

13. An archean that lives in extremely salty condition is referred to as a –
(a) Thermophile (b) Halophiles (c) Thermoacidophile (d) Methanogen

14. Eubacteria include –
(a) Bacteria and Archaebacteria (b) Cyanobacteria + Archaebacteria
(c) Bacteria and Blue green algae (d) Bacteria + Eukaryote

15. All Eubacteria have –
(a) Cell wall (b) Flagella (c) Heterocyst (d) All the above

16. Cyanobacteria / Blue green algae are –
(a) Unicellular only (b) Colonial only (c) Filamentous only (d) Unicellular, Colonial or filamentous

17. Cyanobacteria are –
(a) Only fresh water (b) Only marine (c) Only terrestrial (d) Aquatic and terrestrial

18. Which ones forms bloom in polluted water mostly –
(a) Cyanobacteria (b) Green algae (c) Red algae (d) Brown algae

19. Some of the Cyanobacteria can fix atmospheric nitrogen in specialised cells called –
(a) Akinetes (b) Heterocyst (c) Homocyst (d) Nodule

20. Heterocystous cyanobacteria –
(a) Only *Nostoc* (b) Only *Anabaena*
(c) Both *Nostoc* and *Anabaena* (d) Vibrio

21. The group of organisms oxidising various inorganic substances such as nitrates, nitrites and ammonia using the released energy for their ATP production are –
(a) Chemoheterotrophic bacteria (b) Chemosynthetic autotrophic bacteria
(c) Photoautotrophic bacteria (d) Saprophytic bacteria

22. Which of the following play a great role in recycling nutrients like N, P, and S –
(a) Chemosynthetic autotrophic bacteria (b) Parasitic bacteria
(c) Photoautotrophic bacteria (d) Cyanobacteria

23. Cyanobacteria have
(a) Chl a similar to plant including green algae (b) Distinct from chlorophyll of plants
(c) Bacteriochlorophyll (d) Bacteriorhodopsin

24. The majority of bacteria are –
(a) Photoautotrophs (b) Chemoautotrophs
(c) Chemoheterotrophs / decomposers (d) Disease causing

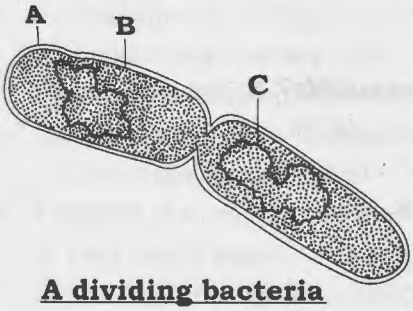
25. Bacteria participate in –
(a) Many industrial and commercial processes
(b) N_2-fixation in legume roots
(c) Disease producing in plants, animals and human beings
(d) All

26. All of the following diseases cause by bacteria except –
(a) Flu (b) Cholera (c) Tetanus (d) Typhoid

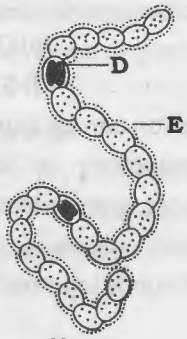
27. Citrus canker is _____ disease –
(a) Bacterial (b) Viral (c) Fungal (d) Mycoplasmal

28. Bacteria reproduce mainly by –
(a) Endospores formation (b) Zoospores formation
(c) Fission (d) Sexual method

29. Identify the blanks in the following figures –



A dividing bacteria



Nostoc

(a) A - Cell wall, B - Cell membrane, C - Heterocyst, D - DNA, E - Mucilagenous sheath
(b) A - Cell wall, B - Cell membrane, C - DNA, D - Heterocyst, E - Mucilagenous sheath
(c) A - Mucilagenous sheath, B - Cell membrane, C - DNA, D - Heterocyst, E - Cell wall
(d) A - Cell membrane, B - Cell wall, C - DNA, D - Heterocyst, E - Mucilagenous sheath

30. Which of the following statements is correct –
I. Mycoplasma has no cell wall
II. Mycoplasma is the smallest living organism
III. Mycoplasma cannot survive without O_2
IV. Mycoplasma are pathogenic in animals and plants
V. True sexuality is not found in bacteria
VI. A sort of sexual reproduction by adopting a primitive DNA transfer from one bacterium to the other occurs
(a) All (b) Only III (c) I, II, IV, V, VI (d) I, III, VI

31. Protista includes –
(a) Unicellular prokaryotes (b) Unicellular eukaryotes
(c) Bacteriophages (d) B.G.A

32. Which of the following kingdoms has no well defined boundaries?
(a) Monera (b) Protista (c) Fungi (d) Metaphyta and Metazoa

33. Members of Protista are primarily –
(a) Parasites (b) terrestrial (c) Aquatic (d) Photosynthetic

34. Nearly all protists are –
(a) Aerobic (b) Anaerobic (c) Aerobic or anaerobic (d) Photosynthetic

35. Nutritionally, protists are –
(a) Photoautotrophs (b) Heterotrophs
(c) Mixotrophs (d) Photoautotrophs, heterotrophs or autotrophs

36. Based upon the modes of nutrition, protists are grouped into –
(a) Plant-like protists (algae) and ingestive, animal-like protists (protozoa); and absorptive, fungus like protists
(b) Chrysophytes, Dinoflagellates and Euglenoids only
(c) Slime moulds and fungi only
(d) Flagellated protozoans and sporozoans only

37. Which of the following are placed under Protista –
(a) Chryosophytes and Dinoflagellates (b) Euglenoids
(c) Slime moulds and protozoans (d) All

38. Locomotory structures in protists are –
(a) Flagella (b) Cilia (c) Pseudopodia (d) All

39. Protista form a link with –
(a) Plants only (b) Animals only (c) Fungi only (d) Plants, animals and fungi

40. Chrysophytes include –
(a) Diatoms and desmids (golden algae) (b) Dinoflagellates
(c) Euglenoids (d) Slime moulds

41. Which of the following modes of reproduction can be found in at least some protists?
(a) Binary fission (b) Sexual reproduction (c) Spore formation (d) All

42. Select the following statement that does not apply to diatoms –
(a) Diatom cell wall may be impregnated with silicon
(b) Cell wall is made up of 2 half-shells fit tightly together
(c) Diatom is a chrysophyte
(d) Diatom is multiflagellate

43. Silica gel (Keieselghur) / Diatomite / Diatomaceous earth is obtained by –
(a) Diatoms (b) Dinoflagellates (c) Euglenoids (d) Brown algae

44. The diatoms do not easily decay like most of the other algae because –
(a) They have highly siliceous wall (b) They have water proof cells
(c) Their cell wall are mucilaginous (d) Cell wall is virus-resistant

45. Diatomaceous earth is used for all except –
(a) Polishing (b) Filteration of oils and syrups
(c) Sound and fire proof room (d) Biogas

46. Chrysophytes are –
(a) Planktons (b) Nektons (c) Benthonic (d) Active swimmers

47. Chief producers in ocean are –
(a) Dinoflagellates (b) Diatoms (c) Euglenoids (d) Green algae

48. Photosynthetic protists are –
(a) Euglenoids, Diatoms and Dinoflagellates (b) Euglenoids and slime moulds
(c) Diatoms and Zooflagellates (d) Desmide + Ciliates

49. Dinoflagellates are mostly –
(a) Marine (b) Fresh water (c) terrestrial (d) Saprophytes

50. Red tides in warm coastal water develop due to super abundance of –
(a) Dinoflagellates (b) Euglenoid forms (c) Diatoms and desmids (d) *Chlamydomonas nivalis*

51. Red tide is caused by –
(a) *Ceretium* (b) *Noctiluca* (c) *Gonyaulax* (d) All of these

52. Dinoflagellates have –
(a) A single flagellum in the transverse groove between the cell plates
(b) A single flagellum in the longitudinal groove between the cell plates
(c) Two flagella one lies longitudinally and the other transversely in a furrow between the wall plates
(d) No flagella

53. In which of the following the cell wall has stiff cellulose plate on the outer surface –
(a) Dinoflagellates (b) Desmids (c) Diatoms (d) Euglenoids

54. Which of the following releases toxins that may even kill other marine animals like fishes –
(a) *Gonyaulax* (b) *Paramecium* (c) Euglenoids (d) Sporozoans

55. Euglenoids e.g. *Euglena* are found –
(a) In fresh running water (b) In fresh stagnant water
(c) In marine environment (d) In both fresh and marine water

56. Which of the following statements about *Euglena* is true?
(a) Euglenoids are flagellates

(b) *Euglena* placed in continuous darkness lose their photosynthetic activity and die
(c) The pigments of *Euglena* are quite different from those of green plants
(d) *Euglena* is a marine protist

57. Which of the following statement is true about *Euglena*?
(a) They show flagellar locomotion (b) They have a rigid cell wall
(c) They have no chloroplast (d) They are obligate autotroph

58. I. Instead of a cell wall they have a protein rich pellicle making their body flexible.
II. They have 2 flagella, a short and a long one.
III. They have mixotrophic nutrition
IV. In light they are photosynthetic, but act as heterotroph (predating other smaller organism) when they are in dark.
V. They are connecting link between plants and animals.
The above statements are assigned to –
(a) Dinoflagellates (b) Slime mould (c) Desmids and Diatoms (d) *Euglena*

59. Slime moulds –
(a) Are parasite (b) Do not produce spores
(c) Do not produce fruiting bodies (d) Saprophytic protists

60. The slimy mass of protoplasm with nuclei forms the body of slime mould is called –
(a) Plasmodium (b) Myxamoeba (c) Sporocytes (d) Periplasmodium

61. Which of the following is correct about the slime mould?
I. Its thalloid body, plasmodium, has pseudopodia for locomotion and ingulfing organic matter
II. During unfavourable conditions plasmodium differentiates and produces fruiting bodies, sporangium
III. Spores possess no true cell wall. Correct
IV. They are dispersed by air current.
V. Being extremely resistant, spores survive for many years
VI. Plasmodium can grow upto several feet.
(a) I, II, IV, V, VI (b) I, II, III (c) I, II, III, VI (d) II, III, VI

62. Protozoans are not included in kingdom Animalia because –
(a) Mostly asymmetrical (b) Unicellular eukaryotes (c) Heterotrophic nature (d) Multicellular prokaryotes

63. All protozoans are –
(a) Saprophytes only (b) Parasites only
(c) Predators only (d) Heterotrophs (parasites or predator) only

64. Which of the following is considered to be primitive relatives of animals –
(a) Dinoflagellates (b) Slime moulds (c) Protozoa (d) Protochordata

65. How many major groups protozoan have?
(a) 3 (b) 4 (c) 2 (d) 8

66. Which of the following are protozoans?
(a) Diatoms, flagellates, ciliates (b) Desmids, flagellates, ciliates
(c) Amoeboid, flagellates, ciliates, sporozoans (d) *Amoeba*, *Paramecium*, dinoflagellates, *Plasmodium*

67. Which of the following statements is wrong about the amoeboid protozoans?
(a) they live in freshwater, sea water or moist soil (b) *Amoeba* has pseudopodia for locomotion and capture prey.
(c) *Entamoeba* show holozoic nutrition (d) Marine forms are shelled with silica

68. Flagellated protozoans are –
(a) Free living (b) Parasites
(c) Either free living or parasites (d) Pseudopodia

69. Which one is correct about *Trypanosoma*?

(a) They are flagellated protozoan (b) They are parasite
(c) They cause sleeping sickness (d) All

70. *Paramecium* –
(a) Is a ciliated protozoan
(b) Shows water current maintained by cilia which helps the food to be steered into gullet
(c) Has a cavity (gullet) that opens to the outside of the cell surface
(d) All

71. *Plasmodium* (malarial parasite) is –
(a) Sporozoan (b) Ciliated protozoan (c) Flagellated protozoan (d) Amoeboid protozoan

72. Which of the following always produce an infectious spore like stage in their life cycles?
(a) Ciliated protozoans (b) Flagellated protozoans
(c) Sporozoans (d) None

73. Mode of nutrition in fungi is –
(a) Parasitic (b) Saprophytic (c) Autotrophic (d) Heterotrophic

74. All of the following are fungi except –
(a) Yeast (b) *Penicillium* (c) *Plasmodium* (d) *Puccinia*

75. Which of the following is odd?
(a) Toad stool (b) *Puccinia* (c) *Alternaria* (d) Mushroom

76. Cell walls of all fungi consist of the polysaccharide –
(a) Chitin (b) Cellulose (c) Silica (d) Pectin

77. The body of multicellular fungus is called a –
(a) Monokaryon (b) Hyphae (c) Rhizoids (d) Dikaryon

78. The cells of the body of a multicellular fungus are organised into rapidly growing individual filaments called –
(a) Mycelium (b) Rhizoids (c) Hyphae (d) Dikaryon

79. Which one is unicellular fungus?
(a) *Puccinia* (b) Toad stool (c) *Penicillium* (d) Yeast

80. Coenocytic hypha is –
(a) Uninucleate hypha (b) Multicellular hypha
(c) Multinucleate hypha without septae (d) Hypha in coelom

81. Many fungi are _____ associating with photosynthetic organisms to form mycorrhizae or lichens –
(a) Parasitic (b) Symbiotic (c) Photosynthetic (d) Saprobic

82. Fungi can be parasites on –
(a) Animals (b) Human being (c) Plants (d) All

83. Fungi prefer to grow in –
(a) Cold and dry places (b) Hot and dry places (c) Sea water (d) Warm and humid places

84. Fungi occur –
(a) in air and soil (b) In water
(c) On plants and animals (d) All

85. Fungi show a great diversity in –
(a) Morphology (b) Habitat (c) Both a and b (d) Nutrition

86. Reproduction in fungi can take place by all of the following vegetative methods except –
(a) Gemmae (b) Fragmentation (c) Fission (d) Budding

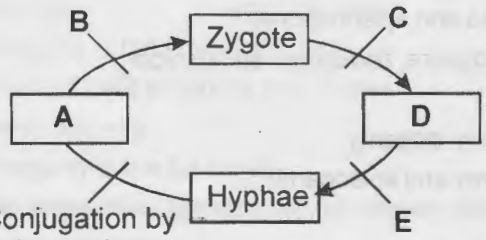
87. Fungi show asexual reproduction by all of the following spores except –
(a) Conidia (b) Oospore (c) Sporangiospore (d) Zoospores

88. Sexual reproduction in fungi is by all of the following except –

(a) Oospores (b) Ascopores (c) Zoospores (d) Basidiospores

89. Select the correct statements below that correctly apply to the Kingdom Fungi –
(a) Some fungi form beneficial interrelationships with plants
(b) Certain fungi are natural sources of antibiotics
(c) The fungal life cycle typically includes a spore stage
(d) All

90.



The above diagram shows a generalized life cycle of a fungus. The appropriate terms for A to E are –

	A	B	C	D	E
(a)	Mycelium	Mitosis	Meiosis	Fertilization	Spore
(b)	Fertilization	Meiosis	Mitosis	Dikaryotic cell	Amitosis
(c)	Dikaryotic phase	Fertilization	Meiosis	Spores	Mitosis
(d)	Meiosis	Mitosis	Spore	Fertilization	Fertilization

91. When a moist bread is kept exposed in air, it becomes mouldy and black because –
(a) Spores are present (b) Spores are present in the bread
(c) Spores are in the air (d) The bread gets decomposed

92. Which of the following is the correct sequence of 3 steps in the sexual cycle of fungi –
(a) Mitosis → Meiosis → Fertilization (b) Plasmogamy → Karyogamy → Meiosis
(c) Meiosis → Plasmogamy → Karyogamy (d) Karyogamy → Plasmogamy → Meiosis

93. Fungi are classified on the basis of –
(a) Morphology of mycelium (b) Mode of spore formation
(c) Development of fruiting bodies (d) All

94. Dikaryophase / Dikaryon formation is a specific characteristic of –
(a) All fungi (b) Phycomycetes and ascomycetes
(c) Only basidiomycetes (d) Ascomycetes and basidiomycetes

95. Coenocytic, multinucleate and branched mycelial habit is found in –
(a) Basidiomycetes (b) Phycomycetes (c) Ascomycetes (d) Deuteromycetes

96.

Column I	Column II
A. Phycomycetes	I. Sac fungi
B. Ascomycetes	II. Algal fungi
C. Basidiomycetes	III. Fungi imperfecti
D. Deuteromycetes	IV. Club fungi

The correct matching is –
(a) A - II, B - I, C - IV, D - III (b) A - II, B - IV, C - I, D - III
(c) A - IV, B - I, C - II, D - III (d) A - IV, B - III, C - II, D - I

97. Members of phycomycetes are found –
I. In aquatic habitat
II On decaying wood

III. On moist and damp places
IV. As obligate parasite on plants
(a) None of the above (b) I and IV (c) II and III (d) All of the above

98. In phycomycetes asexual reproduction occurs by –
(a) Zoospores (motile) (b) Aplanospores (non-motile)
(c) Both (d) Aplanogamete

99. Which of the following spores are produced endogenously?
(a) Zoospores and Conidia (b) Conidia and aplanospores
(c) Aplanospores and zoospores (d) Aplanospore, zoospores and conidia

100. In Phycomycetes sexual reproduction occurs by –
(a) Isogamy and Anisogamy (b) Isogamy, oogamy
(c) Isogamy, anisogamy and oogamy (d) Oogamy and anisogamy

101. All the following belong to phycomycetes except –
(a) *Penicillium* (b) *Rhizopus* (bread mould)
(c) *Mucor* (d) *Albugo*

102. Which of the following is parasite on mustard?
(a) *Albugo* (b) *Puccinia* (c) Yeast (d) *Ustilago*

103. Which of the following is false about ascomycetes
(a) Mode of nutrition saprophytic, decomposer, coprophilous (growing on dung) and parasitic
(b) Includes unicellular (e.g. yeast) and multicellular forms
(c) Mycelium is coenocytic
(d) *Aspergillus*, *Claviceps*, *Neurospora* are important members of Ascomycetes

104. I. It includes unicellular as well as multicellular fungi
II. In multicellular forms hyphae are branched and septate
III. Conidiophore produces conidia (spores) exogenously in chain
IV. Sexual spores are ascopores produced endogenously in Ascus
V. Fruiting body is called ascocarp
Which of the above characters are shown by –
(a) Phycomycetes (b) Sac fungi (c) Club fungi (d) Fungi imperfecti

105. Which of the following are edible ascomycetes delicacies?
(a) Morels + Mushroom (b) Truffles + Toadstool (c) Morels + Trufles (d) Puffball + Mushroom

106. Which of the following is used extensively in biochemical and genetical work?
(a) *Agaricus* (b) *Alternaria* (c) *Neurospora* (d) *Mucor*

107. Which of the following ascomycetes is the source of antibiotic?
(a) *Neurospora* (b) *Penicillium* (c) *Claviceps* (d) None

108. Basidiomycetes include –
(a) Mushroom, Toadstool, Puffball and bracket fungi
(b) Smut fungi and rust fungi
(c) Both a and b
(d) Bread mould, sac fungi and algal fungi

109. Which of the following are common parasite basidiomycetes
(a) *Puccinia* (rust) and *Ustilago* (smut) (b) Bracket fungi
(c) Puffballs (d) *Agaricus* (mushroom)

110. Where does meiosis occur in mushroom?
(a) Basidiospore (b) Basidium (c) Basidiocarp (d) Ascus mother cell

111. I. Mycelium is branched and septate
II. No asexual spores are generally formed
III. Vegetative reproduction by fragmentation is common
IV. Sex organs are absent but sexual reproduction takes place by somatogamy
V. Karyogamy and meiosis occur in basidium to form haploid exogenous 4 basidiospores
VI. Basidia are arranged in basidiocarp.
The above characters are assigned to –
(a) Sac fungi (b) Club fungi (c) Algal fungi (d) Fungi imperfecti

112. Plasmogamy is the fusion of –
(a) 2 haploid cells including their nuclei (b) 2 haploid cells without nuclear fission
(c) Sperm and egg (d) Sperm with 2 polar nuclei

113. Somatogamy is the fusion of –
(a) Two vegetative / somatic cell, of different strain / genotypes to form dikaryotic cell
(b) Sperm with egg
(c) 2 somatic cell having identical strain
(d) Egg with egg

114. Which of the following is false about deuteromycetes?
(a) They reproduce only by asexual spores (conidia) (b) Mycelium is branched and septate
(c) They have only parasitic forms (d) They have no sexual stage (perfect stage)

115. Which of the following is correct about class Deuteromycetes?
(a) Some members are saprophytes or parasites
(b) A large number of members are decomposers of litter and help in mineral cycling
(c) *Alternaria*, *Colletotrichum* and *Trichoderma* are deuteromycetes
(d) All

116. Sexual reproduction is found in all except –
(a) Deuteromycetes (b) Ascomycetes (c) Phycomycetes (d) Basidiomycetes

117. If sexual stage is discovered in a member of deuteromycetes, it is moved to –
(a) Phycomycetes (b) Basidiomycetes (c) Ascomycetes (d) Both b and c

118. Select the false statement(s) –
(a) Kingdom Plantae includes multicellular chlorophyll containing organisms
(b) Plantae includes Bryophytes to Angiosperms; but not algae
(c) Plantae shows alternation of generation (between gametophytic [N] phase and sporophytic phase [2N])
(d) All

119. Which of the following pair(s) is false?
(a) Bladderwort - insectivorous (b) Venus fly trap - insectivorous
(c) *Cuscuta* - Saprophytic (d) Cell wall of plant cell - mainly cellulosic

120. Kingdom Animalia is characterised by –
(a) Heterotrophic eukaryotic multicellular organisms having no cell wall in their cells
(b) Reserve food - glycogen or fat
(c) Holozoic nutrition
(d) All

121. In the five kingdom classification of Whittaker there is –
(a) No mention of viruses (b) Mention of lichens
(c) No mention of viroids (d) No mention of viruses, viroids and lichens

122. Viruses did not find a place in classification since –

(a) They are not truly living (b) They are obligate parasite
(c) They are cellular (d) They are hyperparasite

123. Common cold / flu is –
(a) A viral disease (b) A bacterial disease (c) A mycoplasmal disease (d) A fungal disease

124. Which is absent in viruses?
(a) Nucleic acid (b) Protoplasm (c) Protein (d) a and c

125. The viruses are non-cellular organisms that are characterised by –
(a) Having no nucleic acid
(b) Having an active structure outside the living cell
(c) Having an inert crystalline structure outside the cell
(d) Their hyperactivity outside the cell

126. Term virus means –
(a) Non-cellular (b) A parasite (c) A killer (d) Venom or poison

127. Term virus was given by –
(a) D. J. Ivanowsky (b) Pasteur (c) Beijerinek (d) Stanley

128. The scientist who first crystallized TMV was –
(a) Ivanowsky (b) Pasteur (c) Robertson (d) Stanley

129. Chemically viruses are –
(a) Glycoproteins (b) Glycolipid (c) Nucleoproteins (d) Lipopolysaccharides

130. TMV was discovered by –
(a) Mayer (b) Ivanowsky (c) Towrt (d) Pasteur

131. The concept of *Contagium vivum fluidum* (infectious living fluid) for virus was given –
(a) Mayer (b) Beijerinck (c) Pasteur (d) Ivanowsky

132. Which of the following statements is false about viruses –
(a) Viruses are obligate parasites
(b) Viruses can multiply only when they are inside the living cells
(c) Viruses cannot pass bacterial proof filters
(d) Viruses are made up of protein + DNA or RNA (nerver both DNA and RNA)

133. Which is the infectious component of the virus?
(a) Lipid (b) Protein (c) Nucleic acid (d) b and c

134. Viruses have proteins and
(a) ds DNA or ssRNA (b) ssRNA or ds RNA (c) DNA and RNA (d) ds or ss RNA / DNA

135. In general plant viruses have –
(a) Single strand RNA (b) dsRNA (c) ssDNA (d) dsRNS

136. Animal viruses have –
(a) ssRNA (b) dsRNA (c) dsDNA or ssDNA (d) a or b or c

137. The genetic material for most of the bacteriophages is –
(a) ssRNA (b) dsRNA (c) dsDNA (d) ssDNA

138. The protein of viruses is called –
(a) Capsid (b) Capsomere (c) Core (d) Envelope

139. The subunit of capsid is called –
(a) Core (b) Nucleotide (c) Amino acid (d) Capsomere

140. All are the viral diseases except –
(a) AIDS and mumps (b) Small pox and herpes (c) Influenza (d) Cholera

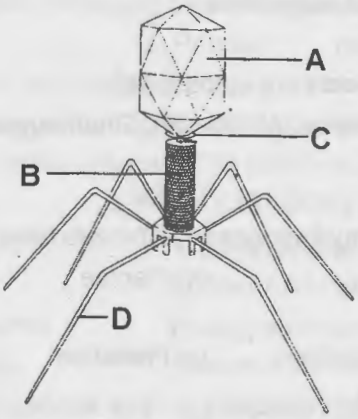
141. In plants mosaic formation, leaf rolling and curling, yellowing and vein clearing dwarfing and stunted growth are symptoms of –

(a) Bacterial diseases (b) Mycoplasmal diseases
(c) Viral diseases (d) Fungal diseases

142. In 1971 T. O. Diener discovered a new infectious agent that was smaller than viruses –
I. It causes potato spindle tuber disease
II. It is free RNA
III. Molecular wt. of RNA is low
The above statements are assigned to –
(a) Viruses (b) Viroids (c) Virulent (d) *Mycoplasma*

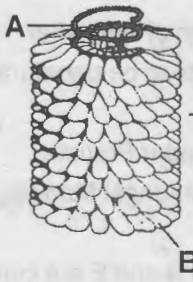
143. Lichens are composite organism made up of a fungus and a photosynthetic alga. Which of the following statements is wrong about lichen?
(a) Lichens are sensitive to air pollution because they have no way to excrete toxic substances
(b) Algal partner (phycobiont) and fungal partner (mycobiont) live mutually
(c) Algae prepare food for fungi and fungi provide shelter and absorb water + minerals for algal partner
(d) None

144. Given below is the diagram of a bacteriophage. In which one of the options all the four parts A, B, C and D are correct?



	A	B	C	D
(a)	Tail fibres	Head	Sheath	Collar
(b)	Sheath	Collar	Head	Tail fibres
(c)	Head	Sheath	Collar	Tail fibres
(d)	Collar	Tail fibres	Head	Sheath

145. Given below is the diagram of a virus. In which one of the options A, B and C are correct?



Type of virus - C

	A	B	C
(a)	RNA	Capsid	Tobacco Mosaic Virus
(b)	DNA	Capsil	Tobacco Mosaic Virus
(c)	RNA	Lipid	Tobacco Mosaic Virus
(d)	RNA	Protein	HIV

Biological Classification

146. Observe the following figures and identify them.

A B C

(a) A - *Euglena*, B - *Paramecium*, C - *Agaricus* (b) A - *Euglena*, B - *Planaria*, C - *Agaricus*
(c) A - *Planaria*, B - *Paramecium*, C - *Agaricus* (d) A - *Euglena*, B - *Paramecium*, C - *Aspergillus*

147. Organisms called Methanogens are most abundant in a
(a) Hot spring (b) Sulphur rock (c) Cattle yard (d) Polluted stream

148. Which one among the following statements is **NOT** correct?
(a) Contractile vacuoles regulate osmoregulation in marine protozoans
(b) Euglena is a holophytic protozoan
(c) Trypanasoma belongs to the class Mastigophora
(d) Class sporozoa includes *plasmodium*.

149. How many organisms in the list given below *are autotrophs?*
Lactobacillus, Nostoc, Chara, Nitrosomonas, Nitrobacter, Streptomyces, Sacharomyces, Trypanosoma, Porphyra, Wolfia
(a) Four (b) Five (c) Six (d) Three

150. In the five-kingdom classification, *Chlamydomonas* and *Chlorella* have been included in :
(a) Protista (b) Algae (c) Plantae (d) Monera

151. *Cuscuta* is an example of :
(a) Ectoparasitism (b) Brood parasitism (c) Predation (d) Endoparasitism

152. Which of the following option is correct :-
(A) In basidiomycetes class asexual spores are generally not found.
(B) Yeast are a unicellular fungi.
(C) Fungi are divided into different ciasses on the basis of morphology of mycellium and sexual reproduction.
(D) Branched, aseptate and multinucleate mycelium are found in club fungi.
(a) B, C and D are correct (b) A, C and D are incorrect
(c) A, B and C are correct (d) A and D are incorrect

153. Consider the following statements.
A. Viruses are excluded from five kingdom classification of Whittaker.
B. Kingdom Protista of Whittaker's classification seems to be unnatural.
C. Maximum nutritional diversity is found in Monera.
D. In five kingdom classification, *Euglena* is included under Protista.
E. Algae are distributed in five kingdom classification amongst Monera, Plantae and Protista.
Of the above statements
(a) A and B are correct (b) C and D are correct (c) B and E are correct (d) All are correct

154. The beautiful diatoms and desmids are placed under
(a) chrysophytes (b) dinoflagellates (c) euglenoids (d) slime moulds.

155. The cyanobacteria are also referred to as
(a) proists (b) golden algae (c) Slime moulds (d) blue green algae

156. Which statement is wrong for viruses
(a) All are parasites

(b) All of them have helical symmetry
(c) They have ability to synthesize nucleic acids and proteins
(d) Antibiotics have no effect on them

157. Which of the following are likely to be present in deep sea water?
(a) Eubacteria (b) Blue-green algae (c) Saprophytic fungi (d) Archaebacteria

158. Select the wrong statement:
(a) Isogametes are similar in structure, function and behaviour
(b) Anisogametes differ either in structure, function or behaviour
(c) In Oomycetes female gamete is smaller and motile, while male gamete is larger and non-motile.
(d) Chlamydomonas exhibits both isogamy and anisogamy and Fucus shows oogamy

159. Pigment-containing membranous extensions in some cyanobacteria are :
(a) Heterocysts (b) Basal bodies (c) Pneumatophores (d) Chromatophores

160. Whittaker proposed –
(a) Two kingdom classification (b) Five kingdom classification
(c) Four kingdom classification (d) Three kingdom classification.

161. In Whittaker's classification, non-nucleated unicellular organisms/prokaryotes are included under –
(a) Plantae (b) Monera (c) Protista (d) Animalia.

162. In Whittaker's five kingdom classification, eukaryotes are assigned to –
(a) All the five kingdoms (b) Only four kingdoms (c) Only three kingdoms (d) Only two kingdoms

163. Which one of the following sets of items in the options (a - d) are correctly categorised with one exception in it?

	ITEMS	CATEGORY	EXCEPTION
(a)	UAA, UAG, UGA	Stop codons	UAG
(b)	Kangaroo, Koala, Wombat	Australian marsupials	Wombat
(c)	Plasmodium, Cuscuta, Trypanosoma	Protozoan parasites	Cuscuta
(d)	Typhoid, Pneumonia, Diphtheria	Bacterial diseases	Diphtheria

164. Five kingdom system of classification suggested by R.H. Whittaker is not based on :
(a) Presence or absence of a well defined nucleus. (b) Mode of reproduction.
(c) Mode of nutrition. (d) Complexity of body organisation.

165. Archaebacteria differ from eubacteria in :
(a) Cell membrane (b) Mode of nutrition (c) Cell shape (d) Mode of reproduction

166. Which of the following shows coiled RNA strand and capsomeres?
(a) Polio virus (b) Tobacco mosaic virus (c) Measles virus (d) Retrovirus

167. Viruses have :-
(a) DNA enclosed in a protein coat (b) Prokaryotic nucleus
(c) Single chromosome (d) Both DNA and RNA

168. The motile bacteria are able to move by :-
(a) Fimbriae (b) Flagella (c) Cilia (d) Pili

169. Which one of the following is true for fungi?
(a) They are phagotrophs (b) They lack a rigid cell wall
(c) They are heterotrophs (d) They lack nuclear membrane

170. Specialized cells for fixing atmospheric nitrogen in Nostoc are
(a) Akinetes (b) Heterocysts (c) Hormogonia (d) Nodules

171. Phototrophs and chemotrophs are defined on the basis of their
(a) energy source (b) requirement of organic and inorganic substances
(c) metabolism (d) structure

172. Multicellular organism with holophytic nutrition belong to how many kingdoms in Whittaker system?
(a) One (b) Two (c) Three (d) Five

173. Multicelluar with loose tissue body organization is a characteristic feature of
(a) Monera (b) Protista (c) Plantae (d) Fungi

174. The Cyanobacteria of great nutritional value being marketed today is
(a)Serytonema (b) Spirogyra (c)Spirulina (d) Stigonema

175. What is true for cyanobacteria?
(a) oxygenic with nitrogenase (b) oxygenic without nitrogenase
(c) non oxygenic with nitrogenase (d) non oxygenic without nitrogenase.

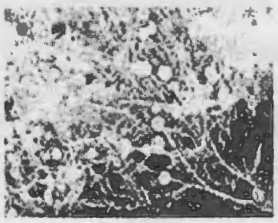
176. Select incorrect statement w.r.t eubacteria
(a) Have very simple structure (b) Peptidoglycan nature of cell wall
(c) Heterotrophs are most abundant in nature (d) Show most simple metabolic diversity

177. Archaeabacteria do not show
(a) Peptidoglycan in cell wall (b) Introns in DNA
(c) Branched chain lipids in cell membrane (d) Ribosomal protein with high acidic nature

178. Thermoacidophiles are capable of withstanding extremely low pH and high temperature due to the
(a) Presence of branched chain lipid in cell membrane
(b) Presence of resistant enzyme which can operate in basic condition
(c) Presence of higher concentration of KCl in their cell
(d) More than one option is correct

179. The name of the class is based on sexual structure as the site of karyogamy and meiosis in
(a) Phycomycetes and Actinomycetes (b) Deuteromycetes and Zygomycetes
(c) Ascomycetes and Basidiomycetes (d) Basidiomycetes and Actinomycetes

180. Identify A, B and C in given diagram.


A


B


C

(a) A - *Mucor*; B - *Aspergillus*; C - *Agaricus*. (b) A - *Mucor*; B - *Agaricus*; C - *Aspergillus*.
(c) A - *Agaricus*; B - *Mucor*; C - *Aspergillus*. (d) A - *Agaricus*; B - *Aspergillus*; C - *Mucor*.

181. Decomposers (microconsumers) are assigned to how many kingdoms of Whittaker?
(a) 1 (b) 2 (c) 3 (d) 4

182. Go through the following characters. How many of them are used to classify the organisms according to five kingdom system of classification?
Cell structure, flagellation, mode of nutrition, reproduction, phylogenetic relationship, pigmentation.
(a) 6 (b) 4 (c) 5 (d) 3

183. A study of diverse organisms like plants, animals or fungi show similar pattern regarding
(a) External morphology (b) Internal structure (c) Physiology (d) Sexual mode of reproduction

184. Choose the correct statement.

(a) All the members of Phycomycetes are facultative parasites on plants

(b) Fusion of protoplasm between two motile or non-motile gametes is called plasmogamy

(c) Kingdom Plantae includes all eukaryotic chlorophyll containing organisms and non-chlorophyll organisms and are called plants.

(d) *Trichoderma* belongs to basidiomycetes.

185. Which of the following characters belongs to the kingdom Monera?

(a) Eukaryotic (b) Heterotrophic

(c) Multicellular (d) Presence of cell walls made of cellulose

186. Match the following and choose the correct combination from the options given.

Column I	Column II
A. Saprophytic protists	(i) Trypanosoma
B. Golden algae	(ii) Plasmodium
C. Malarial parasite	(iii) Desmids
D. Sleeping sickness is caused by	(iv) Slime moulds

(a) A - (i), B - (ii), C - (iii), D - (iv)

(b) A - (ii), B - (iii), C - (iv), D - (i)

(c) A - (iv), B - (iii), C - (ii), D - (i)

(d) A - (iii), B - (iv), C - (ii), D - (i)

187. Of the following statements which are not relevant to archaebacteria?

A. They live in some of the most harsh habitats.

B. They are present in the gut of several ruminant animals

C. They are characterised by the presence of a rigid cellulosic cell wall

D. They include mycoplasma.

E. They are also referred to as blue-green algae.

(a) A, B and C (b) A, C and E (c) C, D and E (d) A, C and D

188. Which of the following is wrongly matched?

(a) T. O. Diener – Viroids are found to be a free DNA.

(b) W. M. Stanley – Crystallised proteins

(c) M. W. Beijerinck – *Contagium vivum fluidum*

(d) D. J. Ivanowsky – Microbes smaller than a bacteria cause mosaic disease of tobacco

189. The structure of *E. coli* chromosomal DNA is

(a) Double stranded, right handed and circular (b) Single stranded, right handed and circular

(c) Double stranded, left handed and linear (d) Double stranded, left handed and circular

190. The organisms which completely lack a cell wall and can live without oxygen are

(a) Mycoplasmas (b) Archaebacteria (c) Methanogens (d) Thermoacidophiles

191. Which one of the following cocci appears like grapes under miscroscope?

(a) Streptococci (b) Diplococci (c) Staphylococci (d) Pneumococci

192. Green phytoplanktons are kept in which kingdom of five kingdom classification system?

(a) Kingdom – Monera (b) Kingdom – Protista (c) Kingdom – Plantae (d) Kingdom – Fungi

193. True nucleus is absent in

(a) *Vaucheria* (b) *Volvox* (c) *Anabaena* (d) *Mucor*

194. Which one of the followings matches is correct?

(a)	*Mucor*	Reproduction by Conjugation	Ascomycetes
(b)	*Agaricus*	Parasitic fungus	Basidiomycetes
(c)	*Phytophthora*	Aseptate mycelium	Basidiomycetes
(d)	*Alternaria*	Sexual reproduction absent	Deuteromycetes

195. The guts of cow and buffalo possess
(a) Methanogens (b) Cyanobacteria (c) *Fucus sp.* (d) *Chlorella sp.*

196. The imperfect fungi which are decomposers of litter and help in mineral cycling belong to
(a) Phycomycetes (b) Ascomycetes (c) Deuteromycetes (d) Basidiomycetes

197. Select the wrong statement
(a) The term '*Contagium vivum fluidum*' was coined by M. W. Beijerinck
(b) Mosaic disease in tobacco and AIDS in human being are caused by viruses
(c) The viroids were discovered by D. J. Ivanowsky
(d) W. M. Stanley showed that viruses could be crystallised

198. Choose the wrong statement.
(a) Morels and truffles are poisonous mushrooms
(b) Yeast is unicellular and useful in fermentation
(c) *Penicillium* is multicellular and produces antibiotics
(d) *Neurospora* is used in the study of biochemical genetics

199. Pick up the wrong statement.
(a) Some fungi are edible
(b) Nuclear membrane is present in Monera
(c) Cell wall is absent in Animals
(d) Protists have photosynthetic and heterotrophic modes of nutrition

200. In which group of organisms the cell walls from two thin overlapping shells which fit together?
(a) Dinoflagellates (b) Slime moulds (c) Chrysophytes (d) Euglenoids

201. Fungus prefer to grow in
(a) Warm and humid places (b) Cold and humid places
(c) Warm and cold places (d) Warm, cold and humid places

202. Which of the following statements is wrong for viroids?
(a) They lack a protein coat (b) They are smaller than viruses
(c) They cause infections (d) Their RNA is of high molecular weight

203. One of the major components of cell wall of most fungi is :-
(a) Chitin (b) Peptidoglycan (c) Cellulose (d) Hemicellulose

204. Which one of the following statements is wrong ?
(a) Cyanobacteria are also called blue-green algae (b) Golden algae are also called desmids
(c) Eubacteria are also called false bacteria (d) Phycomycetes are also called algal fungi

205. The primitive prokaryotes responsible for the production of biogas from the dung of ruminant animals, include the :-
(a) Halophiles (b) Thermoacidiophiles (c) Methanogens (d) Eubacteria

206. Chrysophytes, Euglenoids, Dinoflagellates and Slime moulds are included in the kingdom :-
(a) Monera (b) Protista (c) Fungi (d) Animalia

207. Which of the following is not correctly matched?
(a) Ascomycetes - Sac fungi (b) Neurospora - Drosophila of plant kingdom
(c) Claviceps purpurea - Ergotin drug (d) Lycoperdon - Bracket fungi

208. Which one of the following is wrong for fungi ?
(a) They are heterotrophic (b) They are both unicellular and multicellular
(c) They are eukaryotic (d) All fungi possess a purely cellulosic cell wall

209. Methanogens belong to :
(a) Dinoflagellates (b) Slime moulds (c) Eubacteria (d) Archaebacteria

210. Select the wrong statement :
(a) Diatoms are chief producers in the oceans (b) Diatoms are microscopic and float passively in water
(c) The walls of diatoms are easily destructible (d) 'Diatomaceous earth' is formed by the cell walls of diatoms.

211. The genome of Influenza virus is a :
(a) Single-stranded RNA(–) strain (b) Single-stranded RNA(+)
(c) Double-stranded RNA (d) Single-stranded DNA

212. Viral genome incorporated into host DNA is called :
(a) Prophase (b) Prophage (c) Bacteriophage (d) None of these

213. Production of zoospores is the characteristics of the members of
(a) Ascomycetes (b) Phycomycetes (c) Basiomycetes (d) Deuteromycetes

214. In Whittaker's five kingdom classification unicellular eukaryotes primarily aquatic & having various cell organelles constitute–
(a) Monera (b) Protista (c) Animalia (d) Plantae

215.

Characters	**5 kingdom system**	
	Monera	**Protista**
Cell type	**A**	Eukaryotic
Cell wall	Non cellulosic	**B**
Nuclear membrane	Absent	**C**
Body organisation	Cellular	Cellular
Mode of nutrition	**D**	Autotrophic and heterotrophic

Identify A, B, C and D in the above table :-

	A	**B**	**C**	**D**
(a)	Eukaryotic	Absent	Absent	Autotrophic.
(b)	Prokaryotic	Present in all	Absent	Autotrophic and heterotrophic
(c)	Prokaryotic	Present in some	Present	Autotrophic and heterotrophic
(d)	Prokaryotic & Mesokaryotic	Present	Absent	Heterotrophic

216. How many frem the followings belong to deuteromycetes?
Albugo, Puccinia, Colletotrichum, Ustilago, Aspergillus, Saccharomyces, Rhizopus, Alternaria, Neurospora, Agaricus.
(a) One (b) Three (c) Two (d) Four

217. The number of sets of chromosomes in a dikaryotic cell
(a) is greater than diploid cell (b) is lesser than diploid cell
(c) is equal to diploid cell (d) none of these

218. What is the exact name of the main primary pigment in all plant like protista?
(a) chlorophyll a (b) chlorophyll b (c) chlorophyll c (d) chlorophyll d

219. Recent evidence suggests that these two groups of organisms, which traditionally have been grouped together in the same kingdom, should be separated into two different kingdoms. The groups are
(a) Prokaryotes and eukaryotes. (b) Algae and protozoans
(c) Archaebacteria and eubacteria. (d) unicellular algae and seaweed

220. Which of the following groups make up an important part of the phytoplankton?
(a) Phaeophyta (b) Foraminifera (c) Rhodophyta (d) Dinoflagellata

Biological Classification

221. Which one of the following statements about viruses is true?
(a) Viruses are the most primitive life-forms
(b) Viruses are certainly primitive life-forms, but not the most primitive
(c) All viruses have DNA cores, although the DNA can be single-stranded or double-stranded.
(d) Viruses have a nucleic acid-based genome enclosed in a protein coat

222. The infectious substance of prions is
(a) protein (b) glycophosphate (c) RNA (d) DNA

223. Viruses are considered to be
(a) non-living (b) primitive precursors of bacteria
(c) very small bacteria (d) primitive organisms

224. The only structural pattern that has been found among isometric viruses is
(a) icosahedral (b) spherical (c) helical , (d) tetrahedral

225. _____ are small naked fragments of RNA that infect plant cells.
(a) Prions (b) Nucleons (c) Prophages (d) Viroids

226. An example of an emerging virus is
(a) Herpes (b) polio (c) rubella (d) Ebola

227. Viruses are most conveniently thought of as
(a) lost chromosomes (b) the most primitive bacteria
(c) particles of genomes (d) prions

228. The first virus to be purified was the
(a) flu virus (b) tobacco mosaic virus (c) smallpox virus (d) polio virus

229. Of the viruses listed below, the most lethal is
(a) influenza (b) Ebola (c) measles (d) herpes simplex

230. Viruses have an overall structure that is
(a) spherical, isometric (b) isometric, icosahedron
(c) spherical, helical (d) spherical, isometric, icosahedron, helical

231. Go through the following statements :
I. Viruses are more closely related to chemical matter than to a living organism.
II. Viruses and bacteria are the only infectious agents found in plants and animals
III. All viruses are obligate parasites of cells, the majority do not cause disease.
IV. Viruses cannot be observed using a light microscope.
Which one is correct option?
(a) I and II are correct (b) II and III are correct (c) II and IV are correct (d) I, III and IV are correct

232. Most types of virus particles show which types of symmetries?
(a) Complex and helical (b) Cuboid and helical (c) Bilateral and helical (d) Complex and bilateral

233. Which of the following are found in extreme saline conditions ?
(a) Eubacteria (b) Cyanobacteria (c) Mycobacteria (d) Archaebacteria

234. Viroids differ from viruses in having;
(a) DNA molecules without protein coat (b) RNA molecules with protein coat
(c) RNA molecules without protein coat (d) DNA molecules with protein coat

235. No virus can evolve to target mammalian red blood cells because of the:
(a) small size with a biconcave shape. (b) high concentration of oxygen.
(c) lack of aerobic pathway to generate ATP. (d) lack of nuclear material.

Biological Classification

236. Extremophiles are characteristic of which of the following groups?
(a) Archaebacteria (b) Eubacteria (c) Chordata (d) Arthropods

237. Which of the following is not a Kingdom?
(a) Protista (b) Animalia (c) Plantae (d) Mammalia

238. Find the incorrect statement about fungi –
(a) They show a great diversity in morphology and habitats
(b) Fungi are cosmopolitan and occur in air, water, soil and as parasite also
(c) They prefer to grow in cold and dry places
(d) With the exception of yeasts, fungi are filamentous

239. The classification system have undergone several changes over a period of time, why?
(a) Because the criteria for classification changed, now they are based to trace the developmental history.
(b) Because over time an attempt has been made to evolve such classification which are based on phylogeny
(c) Because ove time an attempt has been made to evolve such classification system which are based only on human evolution mainly
(d) Because over time an attempt has been made to evolve such system which are based on histological and cytological studies

240. The basidiocarp bearing saprophytic fungi are :
(a) *Agaricus, Puccinia* (b) *Albugo, Mucor*
(c) *Aspergillus, Neurospora* (d) *Amanita, Ganoderma*

241. Which among the following is not a prokaryote?
(a) Nostoc (b) Mycobacterium (c) Saccharomyces (d) Oscillatoria

242. Select the wrong statement :
(a) Pseudopodia are locomotory and feeding structures in Sporozoans
(b) Mushrooms belong to Basidiomycetes
(c) Cell wall is present in members of Fungi and Plantae
(d) Mitochondria are the powerhouse of the cell in all kingdoms except Monera

243. After karyogamy followed by meiosis, spores are produced exogenously in
(a) Agaricus (b) Alternaria (c) Neurospora (d) Saccharomyces

244. Ciliates differ from all other protozoans in
(a) using pseudopodia for capturing prey (b) having a contractile vacuole for removing excess water
(c) using flagella for locomotion (d) having two types of nuclei

245. Which of the following organisms are known as chief producers in the oceans?
(a) Cyanobacteria (b) Diatoms (c) Dinoflagellates (d) Euglenoids

246. Two morphologically similar populations are intersterile. They belong to –
(a) One species (b) Two biospecies (c) Two sibling species (d) None of the above

247. Distinction of prokaryota and eukaryota is mainly based on –
(a) Nucleus only (b) Cell organelles only (c) Chromosome only (d) All of the above

248. On the basis of nucleus, virus should be placed under –
(a) Prokaryotes (b) Eukaryotes (c) Both A and B (d) None of the above

249. Which is incorrect about *E.coli*

(a) It is diploid

(b) It is found in human intestine

(c) Transformation, Transduction, Conjugation can show

(d) Can be used in Recombinant DNA technology

250. Which of the following is correct

(a) Cyanobacteria makes mycorrhiza Which absorbs phosphate from soil

(b) Azotobacter is symbiotic nitorgen fixing bacteria

(c) In paddy field, cyanobacteria is used to decrease soil microbes

(d) Methanobacterium feed cellulose in anaerobic condition

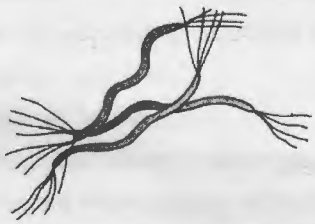
251. Match the column-I with column-II and choose correct option.

Column-I	Column-II
A. Prions	i. Free infectious RNA
B. Viroid	ii. Protein
C. Gemini viruses	iii. Single stranded RNA
D. Retro viruses	iv. Single stranded DNA

Options:

(a) A-i, B-ii, C-iii, D-iv (b) A-ii, B-i, C-iv, D-iii (c) A-iii, B-i, C-iv, D-ii (d) A-i, B-iv, C-iii, D-ii

252. Identify which of the following is not correctly matched :-

Column-I	Column-II	Column-III
A. 	Cocci	*E.coli*
B. 	Bacilli	*Treponema*
C. 	Spirilla	*Spirillum volutans*
D 	Vibrio	*Vibrio cholerae*

(a) B and C (b) A and B (c) A, B and C (d) Only C

253. Read the following four statements (A-D) carefully:-

(A) Mycoplasma can not survive without oxygen

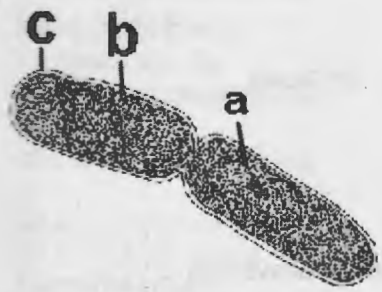
(B) Mycoplasma are the smallest living cells known.

(C) Bacteria completely lack a cell wall

(D) Bacteria reproduce mainly by fission

How many of the above statements are correct ?

(a) one (b) two (c) three (d) four



By observing the figure answer the following questions :-

(A) Identify the figure

(B) Identify the parts labelled a, b and c

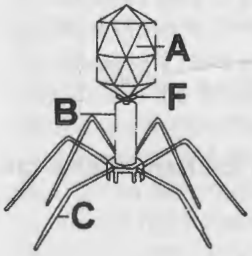
	A	B
(a)	Dividing *Euglena*	a - Pellicle b - Cell membrane c - DNA
(b)	Dividing bacterial cell	a - DNA b - Cell membrane c - Cell wall
(c)	*Paramoecium*	a - DNA , b - Cell membrane c - Glycocalyx
(d)	*Mycoplasma*	a - Mesosome b - Cell membrane c - Cell wall

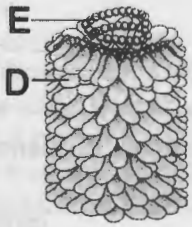
255. In the list given below maximum members are of which kingdom'?

Rhizobium, Azolla, Ascobolus, Golden Algae, Euglena, Frankia, Nostoc, Anthoceros, Oscillatoria, Rumenococcus.

(a) Protista (b) Monera (c) Fungi (d) Plantae

256. Identify (B), (D) and (F) in these figures:





(a) B = Collar, D = RNA, F = Sheath (b) B = Capsid, D = Sheath, F = DNA

(c) B = Sheath, D = Capsid, F = Collar (d) B = Sheath, D = Capsid, F = RNA

257. Read the following statements carefully

(A) Viruses are smaller than bacteria

(B) Viruses' are always made up of DNA and protein only

(C) Viruses contain approximately 5% RNA and 95% DNA, .

(D) Viruses contain nucleic acid so they are capable of protein synthesis independently.

How many of the above statements is / are correct?

(a) A and B (b) A, B and D (c) B and C (d) A only

258. Read the following statements carefully :-

(A) Members of protista are primarily aquatic

(B) Majority of protists have cilia as well as flagella

(C) Most of dinoflagellates have two flagella, one lies longitudinally and the other transversely

(D) The spores of slime moulds are extremely resistant but survive onlyforone month.

How many of the above statements are incorrect?

(a) one (b) two (c) four (d) three

259. Identify "A" diagram and select the right option giving some of the features correctly?

"A"

	I	II	III
(a)	A = *Paramoecium*	Saprophytic	Pellicle makes the body flexible
(b)	A = *Euglena*	Autotroph & heterotroph	Pigments are identical to higher plants
(c)	A = *Euglena*	Heterotroph	They have a gullet that opens to the outside of the cell surface.
(d)	A = *Trypanosoma*	Heterotroph	They have one long flagellum

260. Mixotrophic nutrition is present in -

(a) slime moulds (b) Euglenoids (c) diatoms (d) dinoflagellates

261. Which of the following is not correctly matched?

	Name		Stored food
(a)	Diatoms	-	Chrysolaminarin and fat
(b)	Euglenoids	-	Paramylum and fat
(c)	Dinoflagellates	-	Starch
(d)	Slime moulds	-	Fucoxanthin

262. Kingdom protista includes how many from the followings?

Dinoflagellates, Deuteromycetes, Protozoans, Phycomycetes, Euglenoids, Lichen, Slime moulds, Archaebacteria, Ascomycetes, Chrysophytes.

(a) Three (b) Six (c) Four (d) Five

263. How many from the followings have cell wall in anyone form of their life cycle?

Golden Algae, *Euglena, Entamoeba, Gonyaulax, Mycoplasma*, Slime mould, *Trypanosoma, Sporozoa, Albugo, Paramoecium.*

(a) Five (b) Six (c) Four (d) Three

264. The protista have

(a) only free nucleic acid aggregates

(b) membrane bound nucleoproteins lying embeded in the cyloplasm

(c) gene containing nucleoperoteins condensed together loose mass

(d) nucleoprotein in direct contact with the rest of the substance

265. Match the following

(a) Potato spindle	(i) Virus
(b) Cr-Jacob disease (CJD)	(ii) Viroid
(c) Cholera	(iii) Prion
(d) Leaf rolling and curling	(iv) Bacteria

(a) a – i, b–ii, c–iii, d –iv
(b) a – iv, b–iii, c–ii, d –i
(c) a – ii, b–iii, c–iv, d –i
(d) a – iv, b–i, c–iii, d –ii

266. Match the column:

Column-I	Column-II
(i) Tricoderma	(a) Deuteromycetes
(ii) Yeast	(b) Basidiomycetes
(iii) Bread mould	(c) phycomycetes
(iv) Smut	(d) Ascomycetes

(a) i–d, ii–a, iii–c, iv–b
(b) i–a, ii–d, iii–b, iv–c
(c) i–a, ii–d, iii–c, iv–b
(d) i–a, ii–c, iii–b, iv–d

267. Which of the following is against the rules of ICBN?
(a) Generic and specific names should be written starting with small letters.
(b) Hand written scientific names should be underlined.
(c) Every species should have a generic name and a specific epithet.
(d) Scientific names are in Latin and should be italized.

268. Mad cow disease in cattle is caused by an organism which has :
(a) Free DNA without protein coat
(b) Inert crystalline structure
(c) Abnormally folded protein
(d) Free RNA without protein coat

269. Which of the following statements is correct?
(a) Lichens are not good pollution indicators.
(b) Lichens do not grow in polluted areas.
(c) Algal component of lichens is called mycobiont
(d) Fungal component of lichens is called phycobiont.

270. Match the organisms in column I with habitats in column II.

Column-I	Column-II
A. Halophiles	(i) Hot springs
B. Thermoacidophiles	(ii) Aquatic environment
C. Methanogens	(iii) Guts of ruminants
D. Cyanobacteria	(iv) Salty areas

Select the correct answer from the options given below :
(a) A.-(ii), B.-(iv), C.-(iii), D.-(i)
(b) A.-(iv), B.-(i), C.-(iii), D.-(ii)
(c) A.-(i), B.-(ii), C.-(iii), D.-(iv)
(d) A.-(iii), B.-(iv), C.-(ii), D.-(i)

271. Pinus seed cannot germinate and established without fungal association. This is because :
(a) its embryo is immature.
(b) it has obligate association with mycorrhizae.
(c) it has very hard seed coat.
(d) its seeds contain inhibitors that present germination.

272. Which is of the following statements is incorrect?
(a) Morels and truffles are edible delicacies.
(b) Claviceps is a source of many alkaloids and LSD.
(c) Conidia are produced exogenously and ascospores endogenously.
(d) Yeasts have filamentous bodies with long thread-like hyphae.

273. Match Column - I Column - II

Column - I	Column - II
A. Saprophyte	(i) Symbiotic association of fungi with plant roots
B. Parasite	(ii) Decomposition of dead organic materials
C. Lichens	(iii)Living on living plants or animals
D. Mycorrhiza	(iv) Symbiotic association of algae and fungi

Choose the correct answer from the option given below

	A.	B.	C.	D.
(a)	(i)	(ii)	(iii)	(iv)
(b)	(iii)	(ii)	(i)	(iv)
(c)	(ii)	(i)	(iii)	(iv)
(d)	(ii)	(iii)	(iv)	(i)

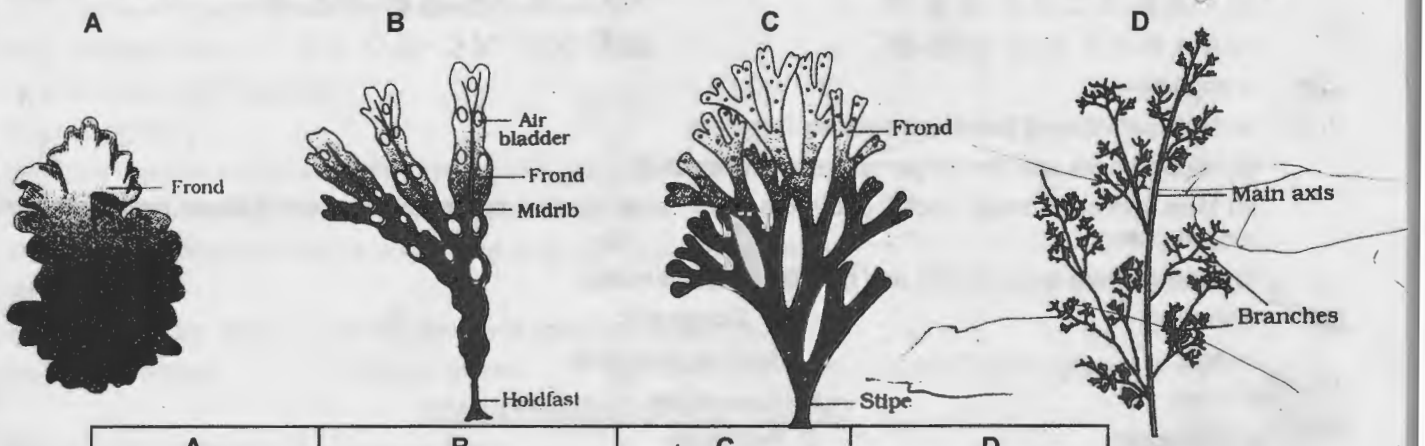
2 BIOLOGICAL CLASSIFICATION

1. a	2. d	3. c	4. b	5. a	6. d	7. c	8. c	9. d	10. b
11. c	12. c	13. b	14. c	15. a	16. d	17. d	18. a	19. b	20. c
21. b	22. a	23. a	24. c	25. d	26. a	27. a	28. c	29. b	30. c
31. b	32. b	33. c	34. a	35. d	36. a	37. d	38. d	39. d	40. a
41. d	42. d	43. a	44. a	45. d	46. a	47. b	48. a	49. a	50. a
51. c	52. c	53. a	54. a	55. b	56. a	57. a	58. d	59. d	60. a
61. a	62. b	63. d	64. c	65. b	66. c	67. c	68. c	69. d	70. d
71. a	72. c	73. d	74. c	75. c	76. a	77. b	78. c	79. d	80. c
81. b	82. d	83. d	84. d	85. c	86. a	87. b	88. c	89. d	90. c
91. c	92. b	93. d	94. d	95. b	96. a	97. d	98. c	99. c	100. c
101. a	102. a	103. c	104. b	105. c	106. c	107. b	108. c	109. a	110. b
111. b	112. b	113. a	114. c	115. d	116. a	117. d	118. b	119. c	120. d
121. d	122. a	123. a	124. b	125. c	126. d	127. b	128. d	129. c	130. b
131. b	132. c	133. c	134. d	135. a	136. d	137. c	138. a	139. d	140. d
141. c	142. b	143. d	144. c	145. a	146. a	147. c	148. a	149. c	150. a
151. a	152. c	153. d	154. a	155. d	156. b	157. d	158. c	159. d	160. b
161. b	162. b	163. c	164. b	165. a	166. b	167. a	168. b	169. c	170. b
171. a	172. a	173. d	174. c	175.a	176. d	177. a	178. a	179. c	180. a
181. c	182.b	183. d	184. b	185. b	186. c	187. c	188. a	189. a	190. a
191. c	192. b	193. c	194. d	195. a	196. c	197. c	198. a	199. b	200. c
201.a	202. d	203. a	204. c	205. c	206. b	207. d	208. d	209. d	210. c
211. a	212. b	213 b	214. b	215. c	216. c	217. c	218. a	219. c	220. d
221. d	222. a	223. a	224. a	225. d	226. d	227. c	228. b	229. b	230. d
231. d	232. b	233. d	234. c	235. d	236. a	237. d	238. c	239. a	240. d
241. c	242. a	243. a	244. d	245. b	246. c	247. d	248. d	249. a	250. d
251. b	252. c	253. b	254. b	255. b	256. c	257. d	258. b	259. b	260. b
261. d	262. d	263. c	264. b	265. c	266. c	267. a	268. c	269. b	270. b
271. b	272. d	273. d							

3 PLANT KINGDOM

ALGAE

Examine the figures A, B, C, D. In which one of the four options all the items A, B, C and D are correct



	A	B	C	D
(a)	*Porphyra*	*Fucus*	*Dictyota*	*Polysiphonia*
(b)	*Polysiphonia*	*Porphyra*	*Dictyota*	*Fucus*
(c)	*Fucus*	*Dictyota*	*Porphyra*	*Polysiphonia*
(d)	*Porphyra*	*Polysiphonia*	*Fucus*	*Dictyota*

Algae are mostly –
(a) Aquatic (b) Terrestrial (c) Parasite (d) Lithophytes

Algae are –
(a) Chlorophyllous autotroph (b) Thylloid
(c) Both (d) Archegoniate

Select the correct options about algae –
(a) Some algae are associated with fungi (in lichen) and animals (on sloth bear)
(b) Great range in form and size
(c) Reproduce by vegetative, asexual and sexual method
(d) All

Asexual reproduction occurs by production of different types of spores in algae. The most common type of spore is –
(a) Aplanospore (b) Zoospore (c) Hyphospore (d) Chlamydospores

The flagellate / motile spore is called –
(a) Aplanospore (b) Zoospore (c) Hyphospore (d) Chlamydospore

In algae we find –
(a) Isogamy (b) Anisogamy (c) Oogamy (d) All

Chlamydomonas shows –
(a) Isogamy (b) Anisogamy (c) Both (d) Akinetes formation

Oogamy is seen in –
(a) *Volvox* (b) *Fucus* (c) Both (d) *Spirogyra*

Flagellate isogametes as well as flagellate anisogametes are produced by –
(a) *Spirogyra* (b) *Fucus* (c) Angiosperms (d) *Chlamydomonas*

11. | Column I | Column II |
|---|---|
| A. *Ulothrix* | I. Unicellular |
| B. *Spirogyra* | II. Filamentous |
| C. *Chlamydomonas* | III. Colonial form |
| D. *Volvox* | IV. Kelps |
| E. Some giant marine forms | |

Which combination is correct?

(a) A - II, B - II, C - I, D - III, E - IV (b) A - I, B - II, C - III, D - IV, E - IV

(c) A - I, B - I, C - II, D - III, E - IV (d) A - IV, B - IV, C - III, D - II, E - I

12. In oogamy –

(a) Male gamete and female gamete are flagellate

(b) Male gamete and female gamete are non-flagellate

(c) Male gamete is small, motile and produced in large number but female gamete is single passive or static and produced singly

(d) Male gamete is non-motile and female gamete is motile

13. | Column I | Column II |
|---|---|
| A. Agar | I. *Gelidium, Gracilaria* |
| B. Algin | II. Brown algae |
| C. Carrageen | III. Red algae |
| D. *Chlorella & Spirullina* | IV. Single cell protein, used food supplements by space travellers |

Choose the correct combination –

(a) A - I, B - II, C - III, D - IV (b) A - IV, B - III, C - II, D - I

(c) A - II, B - I, C - III, D - IV (d) A - III, B - II, C - I, D - IV

14. At least a half of the total CO_2 fixation on earth is carried out through photosynthesis by –

(a) Angiosperms (b) Lycopods (c) Algae (d) Bryophytes

15. In aquatic ecosystems which one(s) is of paramount importance as primary producer in food chain?

(a) Algae (b) Angiosperms (c) *Pistia* (d) *Gelidium*

16. Choose the correct statement –

(a) Many species of *Porphyra*, *Laminaria* and *Sargassum* are among 70 species of marine algae used as food.

(b) Agar is used to grow microbes and in preparations of ice-creams and jellies.

(c) Algae are useful to man in a variety of way

(d) All

GREEN ALGAE

17. The members of class chlorophyceae are commonly called –

(a) Red Algae (b) Blue green algae (c) Green Algae (d) Brown algae

18. The plant body of green algae may be –

(a) Unicellular (b) Colonial (c) Filamentous (d) All

19. The major pigments in green algae are _____ and _____; and stored food is _____ –

(a) Chl a, Chl d, Starch (b) Chl a, Chl c, Floridean starch

(c) Chl a, Chl b, Starch (d) Chl a, Chl c, mannitol

20. In green algae we meet which type of chloroplasts –

(a) Spiral and reticulate (b) Plate like and cup shaped

(c) Discoid (d) All

21. Pyrenoids are present in _____ in most of the green algae –

(a) Mitochondria (b) Chloroplast (c) In cytosol (d) In nucleus

22. Pyrenoid contains –
(a) Polysaccharide + Lipid (b) Starch + Lipid
(c) Protein + Starch (d) Starch + Glycogen

23. No of pyrenoids in members of green algae –
(a) Always 1 (b) Always 2 (c) One to many (d) Always many

24. Green algae have cell wall made up of –
(a) Outer layer of pectose and inner layer of cellulose
(b) Inner layer of pectose and outer layer of cell wall
(c) Cellulose + Algin
(d) Cellulose + Peptidoglycan

25. In green algae –
(a) Some members show vegetative reproduction by fragmentation
(b) Asexual reproduction by production of various spores
(c) Sexual reproduction may be isogamous, anisogamous or oogamous.
(d) All

26. *Chlamydomonas*, *Volvox*, *Ulothrix*, *Spirogyra and Chara* belong to –
(a) Phaeophyceae (b) Rhodophyceae (c) Chlorophyceae (d) Cyanophyceae

PHAEOPHYCEAE (BROWN ALGAE)

27. Which pigments are found in brown algae?
(a) Chl a, Chl c (b) Chl a, Chl d
(c) Chl a, Chl c and Fucoxanthin (d) Chl a, Phycoerythrin

28. The members of phaeophyceae or brown algae are found primarily in –
(a) Fresh water (b) Marine habitat (c) Terrestrial habitat (d) On rock

29. Laminarin and Mannitol, reserve food in brown algae are –
(a) Lipids (b) Complex carbohydrate
(c) Proteins (d) Lipoprotein

30. *Laminaria*, *Ectocarpus*, *Dictyota*, *Sargassum* and *Fucus* are the examples –
(a) Red algae (b) B. G. A (c) Brown Algae (d) Green algae

31. Which of the following is not a feature of the brown algae?
(a) Multicellularity and large size (b) Almost exclusively marine
(c) Attached forms have hold fast (d) Most common pigment is chl b

32. Multicellular brown algae make up this group. The brown algae are composed of either branched filaments (e.g. *Ectocarpus*) or Leaf like out growth (*Laminaria*) Giant kelps may reach upto 100m long. These brown algae are placed under class –
(a) Rhodophyceae (b) Phaeophyceae (c) Chlorophyceae (d) Chrysophyceae

33. The brown algae have pigments –
(a) Chl a, Chl c, Carotene, fucoxanthin (b) Chl a, chl b, fucoxanthin
(c) Chl a, chl d, fucoxanthin (d) Chla + Chl d + phycoerythrin

34. Usually plant body of brown algae consists of –
(a) Hold fast (b) Stipe (c) Frond (d) All

35. In most of the brown algae asexual reproduction takes place by –
(a) Auxospores
(b) Aplanospores
(c) Pear shaped / pyriform biflagellate zoospores (have lateral, unequal flagella)
(d) Multiflagellate zoospore

36. In brown algae the gametes are –

(a) Only isogametes
(b) Only coenaplanogamete
(c) Only multiflagellate gamete
(d) Pyriform / pea shaped gametes having unequal 2 laterally attached flagella

37. Which one is correct about sexual reproduction in brown algae?
(a) Sexual reproduction may be isogamous, anisogamous or oogamous
(b) In isogamy and anisogamy fertilization is external (in water)
(c) In oogamy fertilization occurs in oogonium
(d) All are correct

RHODOPHYCEAE (RED ALGAE)

38. Which of the following is correct?
(a) In brown algae as well as red algae vegetative reproduction takes place by fragmentation
(b) In red algae algal predominant pigment is r-phycoerythrin
(c) Reserved food, floridean starch in red algae is very similar to amylopectin and glycogen in structure
(d) All are correct

39. Chl a + Chl d + r-phycoerythrin are the pigments in the members of –
(a) Rhodophyceae (b) Phaeophyceae (c) Chlorophyceae (d) Cyanophyceae

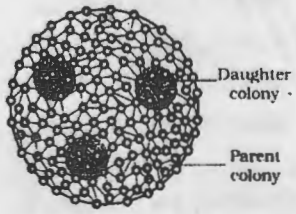
40. Which of the following statements does not characterize the red algae –
(a) Floridean starch (reserve food)
(b) Both spores and gametes are nonmotile
(c) Post fertilization development is like other algae
(d) Red algae can vary their ratio of photosynthetic pigments depending upon the light conditions

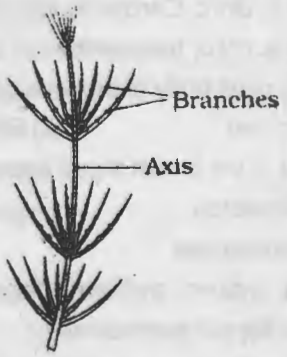
41. *Porphyra* and *Polysiphonia* belong to –
(a) Chlorophyceae (b) Rhodophyceae (c) Xanthophyceae (d) Phaeophyceae

42. I. Green algae occur in fresh water, brackish water salt water.
II. Habitat of Brown algae-fresh water (rare), brackish water, salt water
III. Some red algae are found in fresh water, mostly occur in salt water, some are in brackish water
IV. Most of the red algae are multicellular.
V. Red algae may occur in both well lighted regions close to water-surface and also at great depths in oceans where light penetration is little.
VI. Cell wall of red algae consists of cellulose + polysulphate easters.
VII. 2 - 8, equal and apical flagella in green algae
(a) All are correct (b) All are false (c) I and VI are correct (d) II, III and V are correct

43. Examine the figures A, B, C, D. In which one of the four options all the items, A, B, C and D are correct

A B C D





	A	B	C	D
(a)	*Volvox*	*Chlamydomonas*	*Laminaria*	*Chara*
(b)	*Chara*	*Laminaria*	*Volvox*	*Chlamydomonas*
(c)	*Laminaria*	*Volvox*	*Chlamydomonas*	*Chara*
(d)	*Chlamydomonas*	*Chara*	*Laminaria*	*Volvox*

BRYOPHYTES

44. Bryophytes include –
(a) Mosses (b) Lycopods (c) Horse tail (d) Liverworts + mosses

45. Bryophytes mostly grow –
(a) in dry area
(b) In snow
(c) In moist shaded areas in hills, damp + humid + shaded localities
(d) In water

46. Bryophytes are called "Amphibians of the plant kingdom" because –
(a) They are found in only water
(b) Plants live in soil but are dependent on water for sexual reproduction
(c) It needs water for spores formation
(d) Water is essential for its survival

47. Plant body of bryophyte is –
(a) Less differentiated than that of algae
(b) Equally differentiated to that of Algae
(c) More differentiated to that of algae
(d) Is not differentiated at all

48. The plant body of bryophytes is thallus-like and prostate or erect, and attached to substratum by –
(a) Unicellular roots (b) Multicellular roots
(c) Unicellular or multicellular rhizoids (d) Adhesive

49. The plant body of all bryophytes are gametophyte, haploid and thallus like having –
(a) Root + Stem + Leaf (b) No root + no stem + no leaf
(c) Xylem and phloem (d) Wood

50. The gametophytes in bryophytes produces biflagellate gametes (antherozoids) in _____ and produces ovum (female gamete) in _____.
(a) Antheridium, carpogonium (b) Anther, ovary
(c) Archegonium, antheridium (d) Antheridium, archegonium

51. Choose the correct option –
(a) In bryophytes sexual reproduction is oogamous type
(b) Sex organs are unicellular in algae and fungi but multicellular in bryophytes to angiosperms
(c) Archegonium is flask shaped
(d) All

52. Which is the prominent phase in the life cycle of bryophytes –
(a) Gametophyte (b) Sporophyte (c) Seta (d) Sporogonium

53. Gametophytic generation is dominant in –
(a) Gymnosperms (b) Bryophyte (c) Pteridophytes (d) Angiosperms

54. Choose the incorrect statement for bryophyte –

(a) Zygote does not undergo meiosis immediately (b) Zygote produces embryo which changes into sporophyte
(c) Bryophytes are of little economic importance (d) Bryophytes are of great economic importance

55. Which is the correct statement about bryophytes?
(a) Sporophyte is multicellular, not free living but attached with plant body (gametophyte) for nourishment from it
(b) Some cells of the sporophyte undergo meiosis to produce haploid homospores
(c) Spores germinate to produce gametophyte
(d) All

56. *Sphagnum* is used as a packing material for transportion of living materials because of its –
(a) Acidic nature as it does not undergo decay (b) Creeping capacity
(c) Water holding capacity (d) Both a and c

57. *Sphagnum* is also called –
(a) Bog or peat moss (b) Club moss (c) Spike moss (d) Reindeer moss

58. Sphagnum (a moss) provides –
(a) oil (b) Peat (fuel) (c) Agar (d) Antibiotics

59. Mosses are of great ecological importance because of –
(a) Its contribution to prevent soil erosion (b) Its contribution in ecological succession
(c) Both (d) Its capability to remove CO from the atmosphere

60. The mosses which form dense extensive mats on the soil prevents –
(a) Uprooting of trees (b) Soil erosion (c) Falling of leaves (d) Evaporation of water from the soil

61. Bryophytes are not characterised by –
(a) Well developed root system and vascular tissue (b) Rhizoids
(c) Alternation of generation (d) Presence of chlorophyll

62. Bryophytes show –
(a) Asexual reproduction and zygotic meiosis immediately
(b) Asexual reproduction and sporic meiosis
(c) No asexual reproduction but sporic meiosis
(d) Gametophytic dominance and zygotic meiosis immediately

63. Gemmae are multicellular green structures for vegetative propagation. These are found in gemma cups in –
(a) *Riccia* thallus (b) *Marchantia* thallus (c) *Funaria* protonema (d) *Fern* prothallus

64. A true moss is that –
(a) Which has leafy, radially symmetrical body and grows in tufts. Plant body has an axis with spirally arranged leaves
(b) Which has a protonema stage and multicellular rhizoids with oblique septa
(c) Both a and b
(d) Which has vascular tissues

65. *Funaria* requires water because –
(a) fertilization occurs in water only (b) *Funaria* is a hydrophyte
(c) plants dry up and die without water (d) no branching and sex organs cannot develop without water

66. *Sphagnum* is also called peat moss because –
(a) It grows in acidic marshes (bog) and helps in peat formation
(b) It is found in peat
(b) it decays to form peat
(d) it fossilized quickly

67. Which one is correct about *Marchantia* (Liverwort)?
(a) Plant body is monoecious or dioecious (b) Sporophyte is differentiated into foot, seta and capsule
(c) Spore germinates to produce thallus (d) All

68. Which one is not a true moss –
(a) Nest moss (b) *Funaria* (c) *Sphagnum* (d) *Polytrichum*

69. Asexual reproduction in liverworts takes place by –
(a) Fragmentation of thalli + gemmae formation (b) Gemmae formation + Diploid spores formation
(c) Spores formation + isogamy (d) Fragmentation + zoospores formation

70. In mosses gametophyte has 2 stages. What are these stages?
(a) 1st stage is sporogonium phase and 2nd protonema stage
(b) 1st stage is protonema and the second stage is leafy stage
(c) 1st stage is gemmae formation and 2nd one is meiosis
(d) 1st stage is zygote and 2nd one is Spore mother cell

71. Protonema –
(a) Is a stage of gametophytic generation
(b) Is a creeping, green, branched stages and developes directly from a spore
(c) Produces lateral bud which forms leafy plant body
(d) All

72. In mosses asexual reproduction occurs by –
(a) fragmentation and budding in the secondary protonema
(b) Gemmae and adventious bud formation
(c) Gemmae and tubers formation
(d) By multiflagellate spores formation

73. The sporophyte in mosses is –
(a) Less elaborated than that in liverworts (b) More elaborated than that in liverworts
(c) Equally elaborated than that in liverworts (d) Independent of gametophyte

74. Spores dispersal in mosses occurs by –
(a) simple mechanism (b) elaters (c) elaterophores (d) elaborate mechanism

75. In bryophytes meiosis occurs in –
(a) Spores (b) Gametes mother cells
(c) Gametes (d) Spore mother cells in capsule / sporophyte / sporogonium

76. Multicellular sporophytic phase is expected in the life cycle of –
(a) Euglenoids (b) Green algae (c) Diatoms (d) Bryophytes

77. You are given an unknown plants to study in the laboratory. You find that it has chlorophyll, no xylem. Its multicellular sex organs are enclosed in a layer of jacket cells. Its gametophyte stage is free living. The plant probably belongs to–
(a) Chlorophyceae (b) Bryophyte (c) Pteridophyte (d) Gymnosperm

78. Place the following groups of plants in order, beginning with those that first appeared on the earth and progressing toward those that appeared most recently in time –
(a) Gymnosperms, angiosperms, ferns, moss, algae
(b) Algae, moss, ferns, gymnosperms, angiosperms
(c) Moss, algae, ferns, angiosperms, gymnosperms
(d) Algae, ferns, angiosperms, gymnosperms, Moss

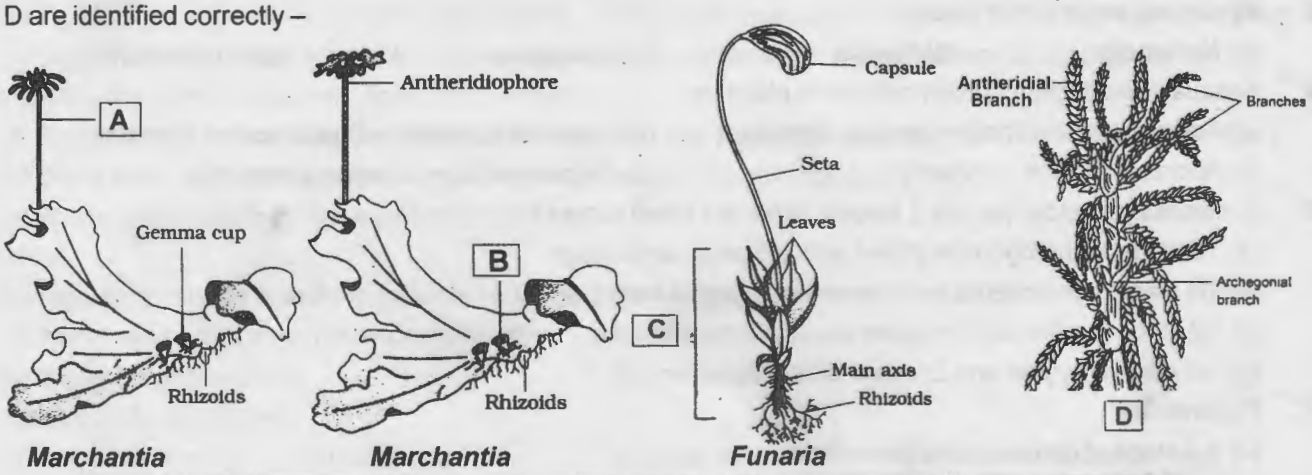
79. A moss sperm moves by means of –
(a) Cilia (b) 3 flagella (c) 2 flagella (d) Many flagella

80. The embryonic development in bryophyte takes place in the –
(a) Protonema (b) Sporangium (c) Antheridium (d) Archegonium

81. In alternation of generations the sporophyte generation is _____ and the gametophyte generation is –
(a) N, 2N (b) 2N, 2N (c) 2N, N (d) N, N

82. Examine the figures (A-D) given below and select the right option out of (a) - (d) , in which all the four items A, B, C and

D are identified correctly –



Marchantia ***Marchantia*** ***Funaria***

	A	B	C	D
(a)	Gemma cup	Archegoniophore	Sporophyte	*Sphagnum*
(b)	Archegoniophore	Gemma cup	Gametophyte	*Sphagnum*
(c)	Archegonia	Antheridia	Gemma cup	*Sphagnum*
(d)	Antheridia	Archegonia	Gemma cup	*Sphagnum*

PTERIDOPHYTES

83. Horse tails and ferns are –
(a) Bryophytes (b) Pteridophytes (c) Gymnosperms (d) Hornworts

84. What is the importance of pteridophytes?
(a) They are used for medicinal purposes
(b) They are used as soil binders
(c) They are frequently grown as ornamental plants
(d) All

85. Which one of the following is considered first terrestrial plants to be evolved having xylem and phloem?
(a) Bryophyte (b) Gymnosperms (c) Pteridophytes (d) Angiosperms

86. Choose the incorrect statement –
(a) All pteridophytes are found in cool, damp, shady places
(b) Some pteridophytes may flourish well in sandy-soil condition
(c) Most of the pteridophytes are found in cool, damp, shady place
(d) A very few pteridophytes are hydrophytes

87. The pteridophytes are mostly –
(a) Heterosporous (b) homosporous (c) Aquatic (d) Trees

88. Plant body in pteridophyte is –
(a) Sporophyte (2N) having no root, stem and leaf (b) Gametophyte (N) having root, stem and leaf
(c) Gametophyte having no root stem and leaf (d) Sporophyte (2N) having true root, stem and leaf

89. Choose the correct option –
(a) *Selaginella* has small leaves (microphylls) (b) *Selaginella* has large leaves (megaphylls)
(c) Ferns have megaphylls (d) Both a and c

90. Leaves bearing sporangium are sporophyll. In some pteridophytes sporophylls form compact structure called –
(a) Sporocarp (b) Strobilus or cone (c) Spike (d) Flower

91. Cone is found in –
(a) *Equisetum* (b) *Salvinia* (c) *Selaginella* (d) a and c

92. Prothallus in pteridophyte is –
(a) Nonvascular, haploid, multicellular small mostly photosynthetic thalloid gametophyte
(b) Vascular, N, Multicellular sporophyte
(c) 2N, Free-living gametophyte
(d) Is thallus / plant body in same pteridophytes

93. In pteridophytes spore germinates to produce –
(a) Sporophyte (b) Synangium (c) Prothallus (d) Sporocarp

94. Which one is wrongly matched?
(a) Gemma cups – Marchantia (b) Biflagellate zoospores – Brown algae
(c) Uniflagellate gametes – Polysiphonia (d) Unicellular organism – Chlorella

95. The main differentiating factor between non-vascular and vascular plants is –
(a) Lack of gametophyte (b) Spore production
(c) The presence of tracheids (d) All

96. In pteridophytes prothallus produces –
(a) Sporangia (b) Antheridia and archegonia
(c) Vascular tissues (d) Root, stem and leaf

97. The heterosporous pteridophytes are –
(a) *Lycopodium* and *Pteris* (b) *Selaginella* and *Psilotum*
(c) *Selaginella* and *Salvinia* (d) *Dryopteris* and *Adiantum*

98. The sporophyte is dominant phase in –
(a) Pteridophytes (b) Gymnosperms (c) Angiosperms (d) All

99. In homosporous pteridophyte the gametophyte is –
(a) Vascular (b) Monoecious (c) Dioecious (d) Dependent on sporophyte

100. In heterosporous pteridophytes the gametophyte –
(a) May be monoecious or dioecious (b) Is always dioecious
(c) Is vascular (d) Has root and leaves, hence independent

101. Which one is correct about heterosporous pteridophytes?
(a) microspore and megaspores develop into the male and the female gametophytes respectively
(b) The female gametophyte are retained on the parent sporophyte for variable period
(c) The development of the zygote into the embryo takes place within female gametophyte
(d) All

102.

Column I (Classes)	Column II Examples
A. Psilotopsida	I. *Dryopteris, Pteris, Adiantum*
B. Lycopsida	II. *Equisetum*
C. Sphenopsida	III. *Selaginella*
D. Pteropsida	IV. *Lycopodium*
	V. *Psilotum*

The correct combination is –
(a) A - V, B - III, IV, C - II, D - I (b) A - I, B - II, C - III, D - IV
(c) A - IV, B - III, C - II, D - I (d) A - III, IV, B - V, C - I, D - II

GYMNOSPERM

103. Which of the following group does not have free living gametophyte –
(a) Bryophytes only (b) Pteridophytes only
(c) Gymnosperms only (d) Gymnosperms + Angiosperms

104. Seed plants are all –
(a) Heterosporous (b) Dioecious (c) Monoecious (d) Homosporous

105. Why are gymnosperms referred to as "naked seed plants"?
(a) They lack ovule (b) They lack ovaries
(c) They have no seed coat (d) The embryo is unprotected

106. The product(s) of fertilization in gymnosperms is / are _____ and in angiosperms is / are _____ –
(a) Endosperm, embryo and endosperm (b) Embryo, endosperm and embryo
(c) Embryo, embryo (d) Embryo, endosperm

107. In gymnosperms ovule –
(a) Is not enclosed before fertilization but enclosed after fertilization
(b) Remains enclosed before fertilization only
(c) Is not enclosed by any ovary wall and remains exposed, both before and after fertilization
(d) Is never formed

108. Gymnosperms include –
(a) Medium sized trees (b) Tall tree (c) Shrubs (d) All

109. Which is the tallest gymnospermic plant?
(a) Redwood tree *Sequoia* (b) *Pinus*
(c) *Ginkgo* (d) *Cycas*

110. In gymnosperms roots are generally –
(a) Fibrous root (b) Adventitious root (c) Tap root (d) Prop root

111. In which of the following gymnosperms corolloid root having N_2-fixing cyanobacteria (*Nostoc*) is found –
(a) *Pinus* (b) *Ginkgo* (c) *Cycas* (d) *Cedrus*

112. Mycorrhizal root (having symbiotic fungi) is found –
(a) *Pinus* (b) *Ginkgo* (c) *Cycas* (d) None

113. Which one is not the characteristic of *Cycas*?
(a) Unbranched stem
(b) Compound leaves (pinnate)
(c) Dioecious (male and female cone on separate plants)
(d) Non-archegoniate

114. Branched stem is found in –
(a) *Cycas* + *Pinus* (b) *Cycas* + *Cedrus* (c) *Pinus* + *Cedrus* (d) *Cycas* only

115. The leaves of gymnosperms are well-adapted to withstand extremes of temperature, humidity and wind. In conifers what are the xerophytic characters?
(a) Needle like leaves (b) Thick cuticle (c) Sunken stomata (d) All

116. All are archegoniate except –
(a) Bryophytes (b) Angiosperms (c) Pteridophytes (d) Gymnosperms

117. Which one is conifer?
(a) *Gnetum* (b) *Cycas* (c) *Pinus* (d) All

118. Which one is correct about *Pinus*?
(a) Monoecious – Male (microsporangiate) and female (megasporangiate) cones are produced on same plant
(b) Monoecious – Male and female sporophylls born on same strobilus
(c) Dioecious – Male and female cones are produced on different plants

(d) Monoecious – Micro and megasporocarp develop on same plant

119. Megasporangium (Nucellus) is –
(a) Anther (b) Ovary (c) Ovule (d) Megaspore mother cell

120. The nucellus is protected by envelopes (integument) and this composite structure is called –
(a) Antheridium (b) Ovule (c) Ovary (d) Megaspore mother cell

121. Megaspore mother cell is differentiated from one of the cells of the –
(a) Nucellus (b) Ovary (c) megaspore (d) Microspore

122. Megaspore mother cell undergoes _____ division to form megaspore –
(a) Mitotic (b) Meiotic (c) Amitotic (d) Dinomitotic

123. Megaspore develops into multicellular structure called –
(a) Male gametophyte (b) Female gamete (c) Female gametophyte (d) Megaspore mother cell

124. In gymnosperms, the female gametophyte is retained within –
(a) Ovary (b) Microsporangiate cone
(c) Archegonia (d) Megasporangium or ovule

125. Pollen grain is –
(a) Female gamete (b) Reduced male gametophyte
(c) Megaspore (d) Male cone

126. The development of pollen grains occurs within –
(a) Ovary (b) Ovule (c) Megasporangium (d) Microsporangium

127. Which one is correct about male and female gametophyte?
(a) In bryophytes and pteridophytes they have independent free-living existence
(b) In gymnosperms and angiosperms they have no independent free-living existence
(c) Both a and b
(d) In bryophytes, pteridophytes and angiosperms they have free-living life. They remain in sporangia which are retained on sporophytes

128. Where are the female sex organs / archegonia (2 or more in number) found in –
(a) Microgametophyte (b) Megagametophyte (c) Microsporangium (d) Antheridia

129. In gymnosperms male gametophyte –
(a) Is highly developed
(b) Has an independent life
(c) Is highly reduced and confined to only a limited number of cells
(d) Is produced in macrosporangiate cone

130. In gymnosperms pollination takes place by –
(a) Wind (b) Water (c) insects (d) Animals

131. In gymnospermic plants, during pollination pollen grains are transferred to –
(a) Stigma (b) On archegonia (c) On ovary (d) Micropyle end of ovule

132. Resin and turpentine are obtained from –
(a) Teak (b) Eucalyptus (c) Oak (d) Pine

133. Chilgoza used as fruit is obtained from –
(a) *Pinus gerardiana* (b) *Cycas* (c) *Gnetum* (d) Angiosperm

134. Sago is obtained from –
(a) *Cycas revoluta* (b) *Pinus* (c) *Cedrus* (d) *Gnetum*

135. Red wood of china is obtained from –
(a) *Cycas revoluta* (b) *Pinus longifolia* (c) *Gnetum* (d) *Cedrus*

136. Source of Canada balsam (a mounting agent to make permanent slide) is obtained from –
(a) *Abies* (b) *Pinus* (c) *Cedrus* (d) Angiosperm

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137. Ephedrine obtained from the stem of *Ephedra* is given to cure –
(a) Asthma (b) Respiratory disorder (c) Cold and cough (d) All of the above

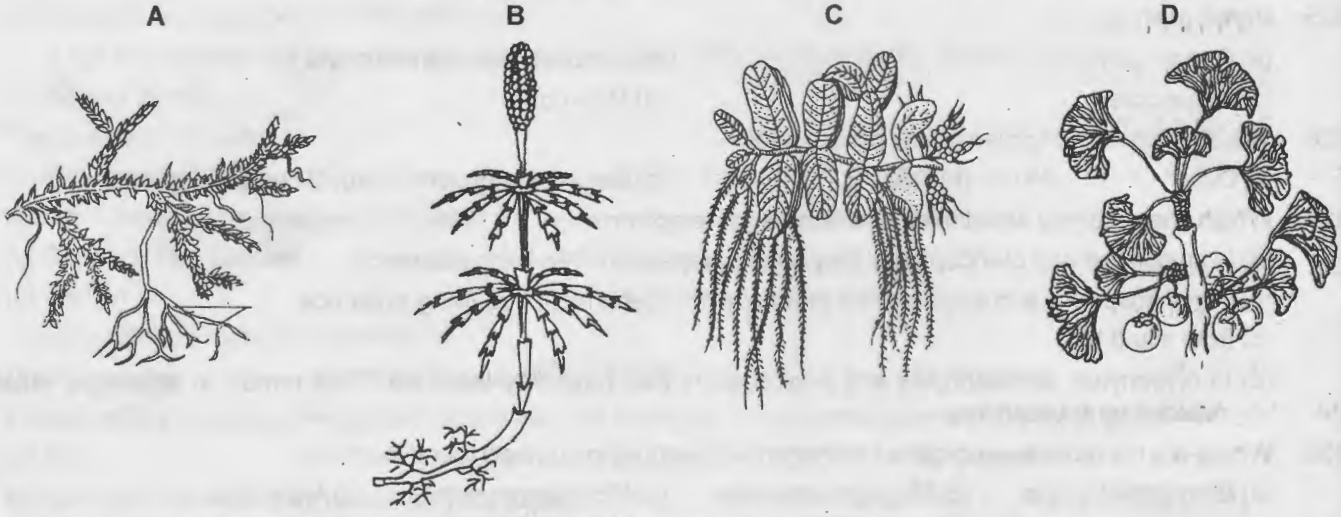
138. Cedar wood oil is obtained from –
(a) *Pinus* (b) *Ginkgo* (c) *Juniperus* (d) *Cycas*

139. Which one is the source of wood –
(a) *Pinus roxburghii* (P. longifolia / chirpine) (b) *Cedrus* (c) *Abies, Sequoia* (d) All

140. Which one forms coal?
(a) *Fern* + *Cycas* (b) Fern + *Cycadofilicales* or pteridospermales
(c) *Ginkgo* + *Cedrus* (d) *Cycas* + *Pinus*

141. The correct sequence of the ploidy in moss protonemal cell, primary endosperm nucleus in dicots, leaf cell of a moss, prothallus cell of a fern, gemma cell in *Marchantia*, meristematic cell of monocot, ovum of liverwort, and zygote of fern–
(a) N, 3N, N, N, N, 2N, N, 2N (b) 3N, 2N, N, N, N, 2N, N, N
(c) 2N, 3N, 2N, N, N, N, N, N (d) N, 3N, N, N, N, N, 2N, 2N

142. Examine the figures A, B, C and D. In which one of the four options all the items, A, B, C and D are correct?



	A	B	C	D
(a)	*Equisetum*	*Ginkgo*	*Selaginella*	*Lycopodium*
(b)	*Selaginella*	*Equisetum*	*Salvinia*	*Ginkgo*
(c)	*Funaria*	*Adiantum*	*Salvinia*	*Riccia*
(d)	*Chara*	*Marchantia*	*Fucus*	*Pinus*

143. Phylogeny and inter-relationship found between taxa on the basis of number, type and arrangement of chromosomes is –
(a) Cytotaxonomy (b) Chromotaxonomy (c) Karyotaxonomy (d) Chemotaxonomy

144. Cytotaxonomy is connected with –
(a) Chemical composition of cytoplasm (b) Cell organelles
(c) Cytochromes (d) Shape and size of cells

145. Natural system of classification is based on –
(a) Ontogeny (b) Phylogeny (c) Morphology (d) Morphology and affinities.

146. A system of classification in which a large number of traits are considered is –
(a) Artificial system (b) Phylogenetic system (c) Synthetic system (d) Natural system.

147. In artificial system, the organisms are classified on the basis of –
(a) All the possible characters
(b) Phylogenetic trends

(c) A few characters

(d) Anatomical, cytological and biochemical traits alongwith morphological traits.

148. Natural system of classification differs from artificial system in

(a) Employing only one floral trait (b) Taking only one vegetative trait

(c) Bringing out similarities and dissimilarities (d) Developing evolutionary trends.

149. Plant classification proposed by Carolus Linnaeus was artificial because it was based on –

(a) Only a few morphological characters

(b) Evolutionary tendencies which are diverse

(c) Anatomical characters which are adaptive in nature

(d) Physiological traits alongwith morphological characters

150. Phylogenetic system brings out –

(a) Reproductive similarities

(b) Grouping according to morphological characters

(c) Grouping on the basis of increasing complexities

(d) Grouping according to evolutionary trends and genetic relationships

151. System of classification used by Linnaeus was –

(a) Natural system (b) Artificial system (c) Phylogenetic system (d) Asexual system

152. Phylogenetic system of classification was proposed by –

(a) Hutchinson / Engler and Prantl (b) Bentham and Hooker

(c) Linnaeus (d) Santapau

153. Karyotaxonomy is based on –

(a) Trinomial nomenclature (b) Organic evolution

(c) Number of chromosomes (d) Bands formed on chromosomes

154. Chemotaxonomy is connected with –

(a) Classification of chemicals found in plants (b) Use of phytochemical data in systematic botany.

(c) Application of chemicals on herbarium sheets (d) Use of statistical methods in chemical yielding plants

155. Phenetic classification is based on –

(a) Ancestral lineage of existing organisms (b) Observable characteristics of existing organisms

(c) Dendrograms based on DNA characteristics (d) Sexual characteristics

156. Natural system of classification was proposed by –

(a) Bentham and Hooker (b) Hutchinson (c) Whittaker (d) Engler and Prantl

157. Phylogenetic system of classification is based on –

(a) Morphological features (b) Chemical constituents

(c) Evolutionary relationships (d) Floral characters

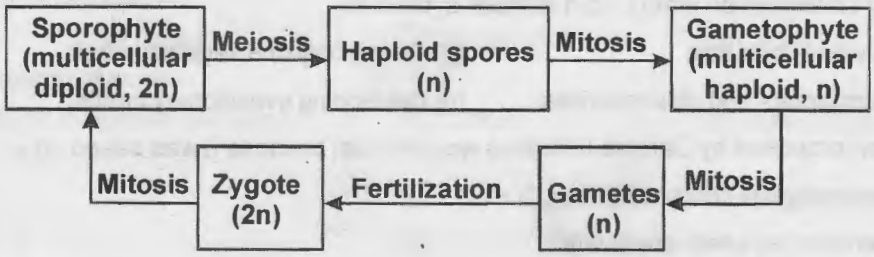
158. System of classification that employs numerical data to evaluate similarities and differences is known as –

(a) Cytotaxonomy (b) Biosystematics (c) Phenetics (d) Chemotaxonomy

159. Classification based on a few morphological characters is –

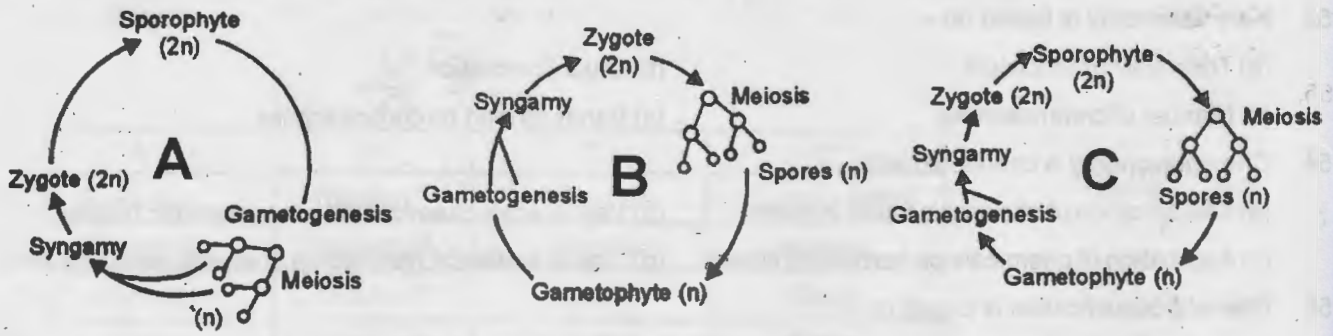
(a) Artificial (b) Natural (c) Phylogenetic (d) Both b and c

160. This is the figure showing life cycle of a plant If this belongs to life cycle of bryophytes, pteridophytes and gymnosperms, what will be respective A and B in their life cycle –



	A	B
(a)	Bryophytes :	sporangium, capsule
	Pteridophytes :	strobili, sporangia
	Gymnosperms :	flowers, cones
(b)	Bryophytes :	capsule, protonema (gametophores)
	Pteridophytes :	sporangia, cones, sporophyll
	Gymnosperms :	megasporangia and microsporangia
(c)	Bryophytes :	protonema, gametophores
	Pteridophytes :	strobili, sporangia
	Gymnosperms:	flowers, cones
(d)	Bryophytes :	strobili, capsule
	Peteridophytes :	cones, sporangia
	Gymnosperms :	flowers, cones

161. Which of the following correctly represents the type of life cycle patterns from the options given?



(a) A - Diplontic, B - Haplodiplontic, C - Haplontic (b) A - Haplodiplontic, B - Haplontic, C - Diplontic
(c) A - Haplontic, B - Diplontic, C - Haplodiplontic (d) A - Diplontic, B - Haplontic, C - Haplodiplontic

162. Match the following –

Column I	Column II
A. Haplontic life cycle	I. Bryophytes, Pteridophytes, *Ectocarpus*, *Polysiphonia*, kelps.
B. Diplontic life cycle	II. Seed bearing plants (Gymnosperm and Angiosperm), *Fucus*.
C. Haplo-diplontic life cycle	III. Many algae (*Volvox, Spirogyra*, and some species of *Chlamydomonas*).

(a) A - III, B - II, C - I (b) A - I, B - II, C - III (c) A - II, B - I, C - III (d) A - III, B - I, C - II

163. The major difference between the mosses and ferns is:
(a) Ferns lack alternation of generation while mosses show the same.
(b) Mosses are facultative aerobes while ferns are obligate aerobes.
(c) Vascular bundles of ferns show xylem vessels while those of mosses lack it.
(d) Sporophytes of ferns live much longer as compared to the sporophytes of mosses.

164.

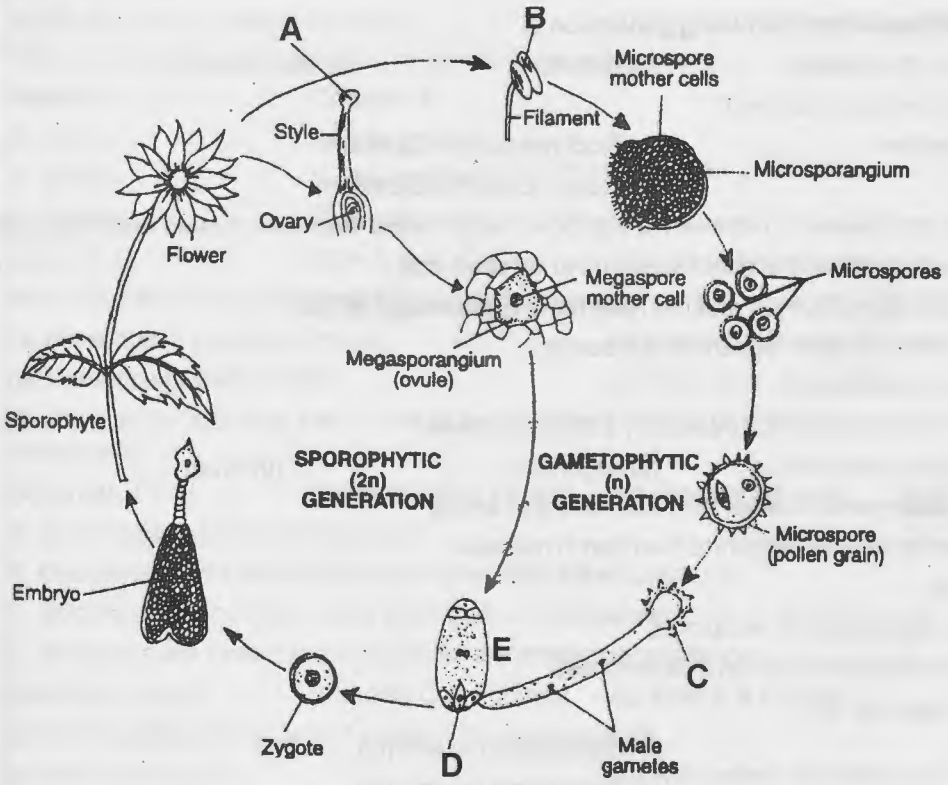


Fig. Life cycle of an angiosperm.

A, B, C, D and E are respectively –

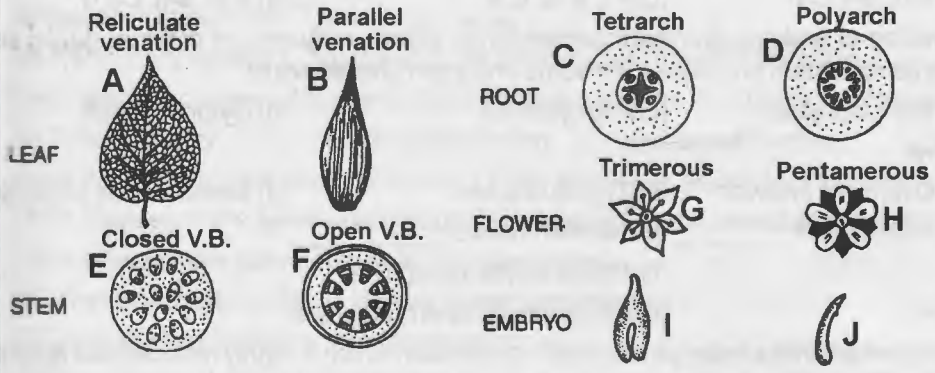
(a) Stigma, Anther, Male gametophyte, Egg and Female gametophyte

(b) Stigma, Anther, Female gametophyte, Egg and Male gametophyte

(c) Stigma, Anther, Male gametophyte, Fertilized egg and Female gametophyte

(d) Stigma, Anther, Embryo sac, Egg and Female gametophyte

165.



Dicot and Monocot characters are respectively –

(a) A, C, F, H, I; and B, D, E, G, J

(b) A, D, F, H, I; and B, C, E, G, J

(c) A, C, E, G, I; and B, D, F, H, J

(d) B, C, F, H, I; and A, D, E, G, J

166. Archegoniophore is present in

(a) *Funaria* (b) *Marchantia* (c) *Chara* (d) *Adiantum*

167. Compared with the gametophytes of the bryophytes the gametophytes of vascular plants tend to be

(a) Smaller and to have smaller sex organs

(b) Smaller but to have larger sex organs

(c) Larger but to have smaller sex organs

(d) Larger and to haver larger sex organs

168. The gametophyte is not an independent, free-living generation in
(a) *Pinus* (b) *Polytrichum* (c) *Adiantum* (d) *Marchantia*

169. Which one of the following is wrongly matched?
(a) *Cassia* – Imbricate aestivation (b) Root pressure – Guttation
(c) *Puccinia* – Smut (d) Root – Exarch protoxylem

170. *Selaginella* and *Salvinia* are considered to represent a significant step toward evolution of seed habit because
(a) Megaspores possess endosperm and embryo surrounded by seed coat
(b) Embryo develops in female gametophyte which is retained on parent sporophyte
(c) Female gametophyte is free and gets dispersed like seeds
(d) Female gametophyte lacks archegonia

171. Among the following, which structure is not functionally similar to others ?
(a) antheridium (b) archegonium (c) oogonium (d) ovum

172. Consider the following four statements whether they are correct or wrong :
(A) The sporophyte in liverworts is more elaborate than that in mosses
(B) *Salvinia* is heterosporous
(C) The life-cycle in all seed-bearing plants is diplontic
(D) In *Pinus* male and female cones are born on different trees
The two ***wrong*** statements together are :
(a) Statements (A) and (C) (b) Statements (A) and (D)
(c) Statements (B) and (C) (d) Statements (A) and (B)

173. In angiosperms, functional megaspore develops into :
(a) Embryo sac (b) Ovule (c) Endosperm (d) Pollen sac

174. Match the column I with column II and select a correct option.

Column I	Column II
A. Natural system of classification	I. Evolutionary relationships between various organisms.
B. Phylogenetic system of classfication	II. Mainly on androecium structure
C. Artificial system of classification given by Linnaeus	III. Natural affinities among the organisms

(a) A-I, B-II, C-III (b) A-III, B-I, C-II (c) A-I, B-III, C-II (d) A-III, B-II, C-I

175. Multicellular sex organs, formation of embryo, dominant gametophytic phase, requirement of water during sexual reproduction and absence of true root, stem and leaves are some important characters of
(a) Bryophytes (b) Pteridophytes (c) Angiosperms (d) Gymnosperms

176. Identify odd one w.r.t ploidy level
(a) Leaf cell of a dicot (b) Ovum of a liverwort (c) Zygote of a fern (d) Meristem cell of monocot

177. Heterospory is found in some members of _____ and all members of _____.
(a) Bryophyta, Pteridophyta (b) Pteridophyta, Bryophyta
(c) Bryophyta, Gymnospermae (d) Pteridophyta, Spermatophyta

178. In gymnosperms, microspore develops into a male gametophytic generation which is highly reduced and is confined to only a limited number of cells. This reduced gametophyte is known as
(a) Pollen grain (b) Endosperm (c) Prothallus (d) Embryo sac

179. Gemmae are the specialised structures produced in liverworts. These are
(a) Non-green, multicellular, asexual buds develop in gemma cups
(b) Green, multicellular, asexual buds develop in gemma cups
(c) Non-green, multicellular, diploid, sexual spores
(d) Green, unicellular, diploid, sexual spores

180. Horsetails and ferns
(a) Lack archegonia (b) Possess vascular tissues in main plant body

(c) Show diplontic type of life cycle (d) Do not produce motile male gametes

181. Match the column I with column II and select correct option

Column I	Column II
A. *Pteris*	I. Gymnosperm
B. *Wolfia*	II. Pteridophyte
C. *Cedrus*	III. Angiosperm

(a) A-I, B-III, C-II (b) A-II, B-III, C-I (c) A-III, B-II, C-I (d) A-II, B-I, C-III

182. Which of the following statement for conifers is correct?

(a) Presence of sunken stomata (b) Absence of needle shaped leaves

(b) Presence of thick cuticle (d) More than one option is correct

183. In which of the following pair of plants the male and female gametophytes do not have an independent free living existence?

(a) *Cycas, Pinus* (b) *Marchantia, Cycas* (c) *Salvinia, Funaria* (d) *Sphagnum, Dryopteris*

184. A. Gymnosperms are heterosporous.

B. Bryophytes have well developed vessels and sieve tubes.

C. Strobilus is found in the main plant body of Equisetum.

D. Antheridia are absent but archegonia are present in bryophytes.

(a) All are correct (b) A and C are correct (c) Only A is correct (d) B and C are correct

185. In the life cycle of *Funaria* first stage of the gametophyte

(a) Bears sex organs (b) Is branched and frequently filamentous

(c) Possesses spirally arranged leaves (d) Develops directly from zygote

186. Consider the following statements –

A. Sea Weeds include phaeophyceae and rhodophyceae.

B. Red algae differs from green and brown algae in not having any flagellate stage.

C. Bryophytes absorb most of their water through above-ground structures.

D. Bryophytes seldom reach a height of more than 20 cm because they lacks vascular system, roots and mechanical tissues.

E. The gametophyte in the life cycle of a fern is independent and autotrophic.

In the above statements

(a) A and B are correct (b) B and C are correct (c) C and D are correct (d) All are correct.

187. Each character is given equal importance and at the same time hundred of characters can be considered in

(a) Cytotaxonomy (b) Morphotaxonomy (c) Chemotaxonomy (d) Numerical taxonomy

188. Read the following five statements (A - E) and answer as asked next to them.

(A) In *Equisetum* the female gametophyte is retained on the parent sporophyte.

(B) In *Ginkgo* male gametophyte is not independent.

(C) The sporophyte in *Riccia is* more developed than that in *Polytrichum*.

(D) Sexual reproduction in *Volvox* is isogamous.

(E) The spores of slime molds lack cell walls.

How many of the above statements are correct ?

(a) Two (b) Three (c) Four (d) One

189. Which one of the following pairs is wrongly matched?

(a) *Ginkgo* – Archegonia (b) *Salvinia* – Prothallus (c) Viroids – RNA (d) Mustard – Synergids

190. Cycas and Adiantum resemble each other in having:

(a) Seeds (b) Motile Sperms (c) Cambium (d) Vessels

191. Go through the following statements –

A. The plant group that produces spores and embryo but lacks vascular tissues and seeds is pteridophyta.

B. In *Cycas*, pollination is by wind.

C. in *Dryopteris*, the antherozoids are multiflagellate spirally coiled.

D. Algae are important. We should study them because they may become important constituent of future food for human beings.

E. Gymnosperms do not have vessels, sieve tubes and companion cells.

How many statement is wrong.

(a) 1 (b) 2 (c) 4 (d) 5

192. Which one of the following is common to multicellular fungi, filamentous algae and protonema of mosses

(a) Diplontic life cycle (b) Members of kingdom plantae

(c) Mode of Nutrition (d) Multiplication by fragmentation

193. Gymnosperms are characterized by the

(a) absence of seeds (b) presence of flowers

(c) presence of seeds in cones (d) absence of vascular tissues

194. Which one of the follwing is a correct statement

(a) In Pteridophyte gametophyte has a protonemal and leafy stage

(b) In gymnosperms female gametophyte is free-living

(c) Antheridiophores and archegoniophores are present in pteridophytes.

(d) Origin of seed habit can be traced in pteridophytes

195. Go through the statements –

A. Oogamous sexual reproduction involves fusion of motile and nonmotile gametes.

B. A bryophyte of considerable economic importance is *Sphagnum*.

C. In *Selaginella* sporophyte is dominant.

D. The term prothallus is used for reduced gametophyte

E. Iodine can be obtained from *Porphyra*.

Which of the above statement is correct?

(a) A, B, E only (b) B, C, E only (c) A, D, E only (d) A, B, C, D only

196. Which one of the following is a correct statement?

(a) Fronds are found in Bryophytes. (b) Heterocysts are found in *Nostoc*.

(c) Diatoms produce basidiospores. (d) Multiciliated sperms are found in Angiosperms.

197. In the prothallus of a vascular cryptogam, the antherozoids and eggs mature at different times. As a result:

(a) There is high degree of sterility (b) There is no change in success rate of fertilization

(c) Self fertilization is prevented (d) One can conclude that the plant is apomictic

198. Winged pollen grains are present in

(a) Mango (b) Cycas (c) Mustard (d) Pinus

199. In which of the following, all listed genera belong to the same class of algae

(a) *Porphyra, Ectocarpus, Ulothrix* (b) *Volvox, Spirogyra, Chlamydomonas*

(c) *Chara, Fucus, Polysiphonia* (d) *Sargassum, Laminaria, Gracilaria*

200. In a moss the sporophyte

(a) Arises from a spore produced from the gametophyte

(b) produces gametes that give rise to the gametophyte

(c) is partially parasitic on the gametophyte

(d) Manufactures food for itself, as well as for the gametophyte

201. Isogamous condition with non-flagellated gametes is found in:

(a) *Chlamydomonas* (b) *Spirogyra* (c) *Volvox* (d) *Fucus*

202 Besides paddy fields, cyanobacteria are also found inside vegetative Part of:

(a) *Pinus* (b) *Cycas* (c) *Equisetum* (d) *Psilotum*

203. Read the following statements (A - E) and answer question which follows them:
(A) In liverworts, mosses, and ferns gametophytes are free - living
(B) Gymnosperms and some ferns are heterosporous
(C) Sexual reproduction in *Fucus*, *Volvox* and *Albugo* is oogamous
(D) The sporophyte in liverworts is more elaborate than that in mosses
(E) Both, *Pinus* and *Marchantia* are dioecious
How many of the above statements are correct?
(a) One (b) Two (c) Three (d) Four

204. Which one of the following shows isogamy with non-flagellated gametes?
(a) *Sargassum* (b) *Ectocarpus* (c) *Ulothrix* (d) *Spirogyra*

205. Which one of the following is wrong about Chara?
(a) Upper oogonium and lower round antheridium. (b) Globule and nucule present on the same plant.
(c) Upper antheridium and lower oogonium (d) Globule is male reproductive structure

206. Which of the following is responsible for peat formation ?
(a) *Marchanita* (b) *Riccia* (c) *Funaria* (d) *Sphagnum*

207. Male gametopyte with least number of cell is present in :
(a) *Pteris* (b) *Funaria* (c) *Lilium* (d) *Pinus*

208. Match the storage products listed under Column-I with the organisms given under Column-II. Choose the appropriate option from the given choices.

Column-I	Column-II
A. Glycogen	p. *Sargassum*
B. Pyrenoids	q. *Nostoc*
C. Laminarin and mannitol	r. *Polysiphonia*
D. Floridean starch	s. *Spirogyra*
	t. *Agaricus*

(a) A - t, B - s, C - p, D - r (b) A - r, B - s, C - p, D - t
(c) A - q, B - p, C - s, D - r (d) A - s, B - r, C - t, D - q

209. *Marchantia* is considered as a heterothallic plant because it is
(a) monoecious (b) heterogametic (c) dioecious (d) bisexual

210. The plant body is thalloid in
(a) *Funaria* (b) *Sphagnum* (c) *Salvinia* (d) *Marchantia*

211. What is common in all the three, *Funaria*, *Dryopteris* and *Ginkgo*?
(a) Independent sporophyte (b) Presence of archegonia
(c) Well developed vascular tissues (d) Independent gametophyte

212. Which one of the following is wrongly matched?
(a) *Nostoc*-Water blooms (b) *Spirogyra*-Motile gametes
(c) *Sargassum*-Chlorophyll c (d) Basidiomycetes-Puffballs

213. Syngamy can occur outside the body of the organism in
(a) Fungi (b) Mosses (c) Algae (d) Ferns

214. Which one of the following is the unique feature of angiosperms?
(a) haploid endosperm (b) Circinate vernation (c) Coralloid roots (d) Double fertilization

215. Besides water, light and a few nutrients, what do algae need in order to grow?
(a) Carbon dioxide (b) Methane

(c) Uranium (d) Ozone

216. What kinds of water can algae grow in?

(a) Saltwater (b) Freshwater

(c) Polluted water (d) All of the above

217. Which of the following statement is incorrect regarding bryophytes?

(a) The female sex organ is flask shaped (b) The antherozoids are released into water

(c) The antherozoids are biflagellated (d) Zygote formed undergoes meiosis immediately

218. Pteridophytes are also called

(a) Vascular amphibians of plant kingdom (b) First tracheophytes

(c) Botanical snakes (d) All of these

219. A. Companion cells and sieve tubes are absent in pteridophytes

B. Gametophyte of pteridophytes require cool, dry and shady places to grow

C. Prothallus is found in *Dryopteris*

(a) Only C is correct (b) Only A is correct (c) A and B are correct (d) Only B is incorrect

220. Find the correct option w.r.t pteropsida

(a) *Selaginella* (b) *Equisetum* (c) *Dryopteris* (d) *Lycopodium*

221. In which of the following fertilization or reproduction is possible without water –

(a) *Ulothrix* (b) *Dryopteris* (c) *Funaria* (d) *Cycas*

222. In gymnosperms, the endosperm is formed by the

(a) Fusion of one male gamete with two polar nuclei

(b) Fusion of one male gamete with one polar nuclei

(c) Fusion of male gamete with the egg

(d) Germination of a megaspore

223. Which of the following is not correct?

(a) Non flagellated unicellular algae – *Chlorella*

(b) Leaf like algae – *Laminaria*

(c) Maidan hair fern / walking fern – *Adiantum*

(d) Brown algae – *Batrachospermum*

224. Which of the following generations occur in seed of gymnosperms?

(a) Two gametophytic generation

(b) One sporophytic and one gametophytic

(c) Two sporophytic and one gametophytic generation

(d) Three sporophytic generation

225. In which of the following groups of plants does the description given below fits –

they have no roots, flower and seeds, the plant body is characterised by a forked shoot, ribbon like green thallus or sometimes erect shoot and female reproductive organ is archegonia.

(a) Gymnosperm (b) Bryophyta (c) Pteridophyta (d) Angiosperm

226. Seed ferns belong to

(a) Pteridophyta (b) Gymnosperm (c) In both pteridophyta and gymnosperm (d) Bryophyta

227. Which structures can be observed in the life cycle of vascular cryptogames?

(a) Gemmae, Prothallus, Archegonium

(b) Vascular tissue, Prothallus, Ovule formation

(c) Double fertilisation, Haploid endosperm, Vascular tissue

(d) Prothallus, Archegonium, Vascular tissue

228. How many plants in the list given below are the members of nonvascular embryophytes?

Spirogyra, Volvox, Fucus, Polysiphonia, Polytrichum, Sphagnum, Marchantia, Funaria, Selaginella, Equisetum

(a) Six (b) Three (c) Four (d) Five

229. Some characters / structures are given below. How many of them are found in both bryophyta and pteridophyta?

A. Archegonium

B. Protonema

C. Embryo

D. Ovule

E. Vascular tissue

F. Antheridium

Option –

(a) Two (b) Three (c) Four (d) Five

230. According to five kingdom system of classification Chlamydomonas, *Chlorella* and Yeast should be placed under

(a) Prostista (b) Plantae (c) Fungi (d) Animalia

231. Find the correct from the following –

(A) *Ectocarpus, Dictyota, Laminaria* are brown algae.

(B) *Marchantia, Funaria, Sphagnum* are liver worts.

(C) *Selaginella, Pteris, Lycopodium* are member of Lycopsida.

(D) *Wolfia, Eucalyptus, Mangifera* are angiosperms.

(a) A, B (b) B, C (c) C, D (d) A, D

232. List of some pteridophytes are given below.

Selaginella, Salvinia, Lycopodium, Psilotum, Dryopteris, Marsilea, Azolla, Pteridium.

How many of the above plants are homosporous fern?

(a) Three (b) Two (c) Four (d) Five

233. Read the following statements and give answer.

A. Heterospory is found in all members of pteropsida.

B. *Selaginella* is advance among pteridophytes as it approaches towards the seed formation.

C. *Pinus* leaves are monomorphic, pinnate compound and have sunken stomata as adaptation against transpiration.

D. Sporic meiosis is characteristic of life cycle in many organisms like *Volvox, Chlamydomonas* and *Ulothrix*.

(a) All are incorrect (b) Both B and C are correct

(c) Only B is correct (d) Only D is incorrect

234. Pick out the statement that does not apply to bryophytes.
(a) Include the ferns and horsetails
(b) Thallus is a gametophyte
(c) Sporophyte shows foot, seta and capsule
(d) Gemmae help in reproduction

235. Which one of the following considered important in the development of seed habit?
(a) Homospory (b) Heterospory
(c) Dependent sporophyte (d) Free living gametophyte

236. Select the wrong statement.
(a) Indigofera is used as a dye.
(b) Ashwagandha is a medicinal plant.
(c) Seeds are non-endospermous in Fabaceae.
(d) Ovary superior, bicarpellary with ovules on axile placentation in Liliaceae.

237. Pick out the wrong statement.
(a) Gymnosperms lack vessels in their xylem.
(b) The cell wall of parenchyma is made up of pectin
(c) The first formed primary xylem elements are called protoxylem.
(d) Gymnosperms have albuminous cells and have sieve cells in their phloem.

238. Pick out the wrong statement.
A. Apoplast is the system of adjacent cell walls that is continuous throughout the plant.
B. Endodermis is impervious to water molecules.
C. Pinus seeds germinate and establish without the presence of mycorrhizae.
(a) A and B (b) B and C (c) C only (d) B only

239. From internal fertilization point of view, which of the following plant group is the odd one:–
(a) Algae (b) Bryophytes (c) Pteridophytes (d) Gymnosperms

240. Which of the following statements is correct?
(a) Leaf is a lateral outgrowth of stem developed endogenously at the node.
(b) Seeds of flowering plants vary in shape, size and period of viability
(c) Members of family Liliaceae are annual trees
(d) Floral formula provides information about placentation and arrangement of sepals

241. *Sequoia* plant differs from *Eucalyptus* in
(a) Having many celled female gametophytes
(b) Ovules lie exposed on the ovary
(c) Presence of non-motile male gametophytes
(d) having stigma and style in pistil.

242. The spreading of living pteridophytes is limited and restricted to narrow geographical regions because
(a) They need water for the syngamy of motile female and male gametes
(b) Prothallus requires cool, damp and shady places to grow

(c) They are frequently grown as ornamentals

(d) More than one option is correct.

243. Sporophyte is multicellular but attached to the photosynthetic gametophyte and derives nourishment from it in the life cycle of

(a) *Ficus, Sphagnum* (b) *Polytrichum, Porella* (c) *Ulothrix, Funaria* (d) *Spirogyra, Marchantia*

244. Sexual reproduction shows considerable variation in the type and formation of sex cells in genus.

(a) *Chlamydomonas* (b) *Pinus* (c) *Porphyra* (d) *Solanum*

245. Which is not a Bryophyta?

(a) Hepaticopsida (b) Anthocerotopsida (c) Bryopsida (d) Lycopsida

246. This provides brown colour to the algae.

(a) Chlorophyll-a (b) Phycocyanin (c) fucoxanthin (d) chlorophyll-b

247. Which one of the following statements is wrong?

(a) *Chlorella and Spirulina* are used as space food (b) Mannitol is stored food in Rhodophyceae

(c) Algin and carrageenan are products of algae (d) Agar-agar is obtained from *Gelidum* and *Gracilaria*

248. Male gametes are flagellated in

(a) *Ectocarpus* (b) *Spirogyra* (c) *Polysiphonia* (d) *Anabaena*

249. Read the following five statements (A to E) and select the option with all correct statements.

A. Mosses and lichens are the first organisms to colonise a bare rock

B. *Selaginella* is a homosporous pteridophyte

C. Coralloid roots in *Cycas* have VAM.

D. Main plant body in bryophytes is gametophytic, whereas in pteridophytes it is sporophytic.

E. In gymnosperms, male and female gametophytes are present within sporangia located on sporophyte.

(a) A, D and E (b) B, C and E (c) A, C and D (d) B, C and D

250. In which of the following, gametophyte is not independent free living?

(a) *Pteris* (b) *Pinus* (c) *Funaria* (d) *Marchantia*

251. Which one is a wrong statement?

(a) Haploid endosperm is typical feature of Gymnosperms.

(b) Brown algae have chlorophyll a and c and fucoxanthin.

(c) Archegonia are found in Bryophyta, Pteridophyta and Gymnosperms.

(d) *Mucor* has biflagellate zoospores.

252. Mosses are gregarious because they –

(a) Have vascular tissue. (b) Have indirect germination of spores.

(c) Have direct germination of spore. (d) Have S. M. C

253. Select the correct statement :-

(a) Gymnosperms are both homosporous and heterosporous

(b) Salvinia, Ginkgo and Pinus all are gymnosperms

(c) Sequoia is one of the tallest trees

(d) The leaves of gymnosperms are not well adapted to extremes of climate

254. In bryophytes and pteridophytes, transport of male gametes requires :-

(a) Wind (b) Insects (c) Birds (d) Water

255. Conifers are adapated to tolerate extreme environmental conditions because of :

(a) thick cuticle (b) presence of vessels (c) broad hardy leaves (d) superficial stomata

256. Which one of the following statements is wrong ?
(a) *Agar-agar* is obtained from *Gelidium* and *Gracilaria*
(b) *Laminaria* and *Sargassum* are used as food
(c) Algae increase the level of dissolved oxygen in the immediate environment
(d) Algin is obtained from red algae, and carrageenan from brown algae.

257. Which of the following statements is correct?
(a) Horsetails are gymnosperms
(b) Selaginella is heterosporous, while Salvinia is homosporous
(c) Ovules are not enclosed by ovary wall in gymnosperms
(d) Stems are usually unbranched in both Cycas and Cedrus.

258. In algae syngamy take place where :–
(a) In archaegonium (b) In water (c) In ovary (d) In the soil

259. During alternation of generations in seaweeds, spores give rise to _____.
(a) gametes (b) gametophytes (c) sporophytes (d) sporozoids

260. The reproductive cells involved in asexual reproduction in seaweeds that undego alternation of generations are called
(a) spores (b) sperm (c) gametes (d) eggs

261. An example of colonial alga is :
(a) Volvox (b) Ulothrix (c) Spirogyra (d) Chlorella

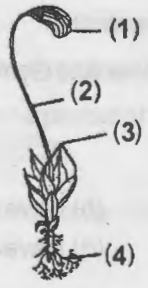
262. Zygotic meiosis is characteristic of;
(a) Fucus (b) Funaria (c) Chlamydomonas (d) Marchantia

263. Life cycle of Ectocarpus and Fucus respectively are:
(a) Diplontic, Haplodiplontic (b) Haplodiplontic, Diplontic
(c) Haplodiplontic, Haplontic (d) Haplontic, Diplontic

264. Select the mismatch
(a) Cycas – Dioecious (b) Salvinia – Heterosporous
(c) Equisetum – Homosporous (d) Pinus – Dioecious

265. Double fertilization is exhibited by :
(a) Algae (b) Fungi (c) Angiosperms (d) Gymnosperms

266. Given picture is of a bryophyte. The correct ploidy levels of the indicated structures are :



(a) (1) : 2n, (2) : 2n, (3) : n, (4) : n (b) (1) : n, (2) : n, (3) : n, (4) : 2n
(c) (1) : 2n, (2) : n, (3) : n, (4) : 2n (d) (1) : 2n, (2) : n, (3) : 2n, (4) : 2n

267. Natural system of classification of flowering plants is based on similarities and differences in –
i. Flower morphology
ii. Sequence of nucleotides in mitochondrial DNA
iii. Nature and arrangement of vascular strands
iv. Fruit and seed morphology
(a) i, iii and iv (b) i and iv only (c) only ii (d) only i

268. Most common asexual spores among algae is

(a) Parthenospores (b) Akinetes (c) Aplanospores (d) Zoospores

269. Naked seeded plants differ from bryophytes and pteridophytes in

(a) Possessing true stem, root and leaves

(b) Absence of fertilisation through pollen tube

(c) Absence of independent free living gametophytes

(d) Presence of non-integumented megasporangium

270. Evolutionary important character of *Selaginella* is

(a) heterosporous nature (b) rhizophore (c) strobili (d) ligule.

271. Which one has the largest gametpophyte?

(a) *Cycas* (b) Angiosperm (c) *Selaginella* (d) Moss

272. Go through the following statements.

I. *Cycas* has largest ovule, sperm and male cone.

II. *Selaginella* has ligule.

III. Algae will be the source of future food.

IV. *Cycas* does not have a well organized female flower.

V. It becomes quite evident that Selaginella has considerably advanced towards the seed habit in a few species, but its approach to the true seed is not complete.

How many statement(s) is/are correct?

(a) 1 (b) 2 (c) 3 (d) 4

273. Heterospory and development of the zygotes into young embryos within female gametophytes it is precursor to the:

(a) Seed habits (b) Terrestrial habits (c) Bryophytes (d) All of these

274. A plant has Anaemophylly, unitegmic, orthrotropus ovule and haploid endosperm. This plant belongs to :

(a) Pteridophyte (b) Gymnosperms (c) Angiosperm (d) Mossess

275. After fertilization on the entire megasporngium used as dry fruits in case of

(a) *Cycas* (b) *Pinus rauxberghi* (c) *Pinus girardiana* (d) *Cedrus*

276. A green alga having fixed number of cells in it's thallus is called

(a) Coenobium (b) Daughter cell (c) Heterocyst (d) Harmogonia

277. Apogeotropic roots in *Cycas* look like corals of anthozoans (coelenterata) showing mutual association with :–

(a) Cyanobacteria (b) Bacteria (c) Fungi (d) Obligate parasite

278. Common ancestor of cycads and dicotyledons is :

(a) Seed ferns (b) Lycopods (c) Psilophyton (d) Conifers

279. Read the following statements and select how many is/are correct:

I. In Cycas and Pinus gametophytes are not free-living.

II. Ferns and some gymnosperms are heterosporous

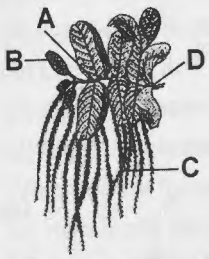
III. Sexual reproduction in volvox, gracilaria and gelidium is oogamus

IV. Spores in Funaria are formed after meiosis

V. Both Cycas and Marchantia are dioecious.

Select correct one:

(a) One (b) Two (c) Three (d) Four

280. 

In above diagram, the lebelling 'C' is

(a) Leaf (b) Internodal eongation

(c) Third leaf is modified into root (d) Rhizoid

281. Which of the following group does not represent monocot

Apricot, mango, guava, apple, coconut, strawberry

(a) Apricot, mango, Guava (b) Apple, strawberry, coconut

(c) Coconut, apple, cashewnut (d) Coconut, strawberry, mango

282. Flagellated male gametes are present in all the three of which one of the following sets?

(a) *Riccia, Dryopteris,* and *Cycas* (b) *Anthoceros, Funaria* and *Spirogyra*

(c) *Fucus, Marsilea* and *Calotropis* (d) *Zygenema, Saprolegnia* and *Hydrilla*

283. Which of the following set of plants exhibit homospory and homophilly?

(a) *Selaginella, Salvinia, Azolla* (b) *Equisetum, Dryopteris, Lycopodium*

(c) *Selaginella, Dryopteris, Adiantum* (d) *Salvinia, Equisetum, Azolla*

284. "Natural classification" is the best classification system because :-

(a) It involves few vegetative characters. (b) It involves only two morphologital characters.

(c) It involves complete morphological characters. (d) It involves the economic importance of the plants.

285. From evolutionary point of view, retention of the female gametophyte with developing young embryo on the parent sporophyte for some time, is first observed in :

(a) Liverworts (b) Mosses (c) Pteridophytes (d) Gymnosperms

3

PLANT KINGDOM

1. a	2. a	3. c	4. d	5. b	6. b	7. d	8. c	9. c	10. d
11. a	12. c	13. a	14. c	15. a	16. d	17. c	18. d	19. c	20. d
21. b	22. c	23. c	24. a	25. d	26. c	27. c	28. b	29. b	30. c
31. d	32. b	33. a	34. d	35. c	36. d	37. d	38. d	39. a	40. c
41. b	42. a	43. a	44. d	45. c	46. b	47. c	48. c	49. b	50. d
51. d	52. a	53. b	54. d	55. d	56. d	57. a	58. b	59. c	60. b
61. a	62. b	63. b	64. c	65. a	66. a	67. d	68. a	69. a	70. b
71. d	72. a	73. b	74. d	75. d	76. d	77. b	78. b	79. c	80. d
81. c	82. b	83. b	84. d	85. c	86. a	87. b	88. d	89. d	90. b
91. d	92. a	93. c	94. c	95. c	96. b	97. c	98. d	99. b	100. b
101. d	102. a	103. d	104. a	105. b	106. b	107. c	108. d	109. a	110. c
111. c	112. a	113. d	114. c	115. d	116. b	117. c	118. a	119. c	120. b
121. a	122. b	123. c	124. d	125. b	126. d	127. c	128. b	129. c	130. a
131. d	132. d	133. a	134. a	135. b	136. a	137. d	138. c	139. d	140. b
141. a	142. b	143. c	144. b	145. d	146. d	147. c	148. c	149. a	150. d
151. b	152. a	153. d	154. b	155. b	156. a	157. c	158. c	159. a	160. b
161. d	162. a	163. d	164. a	165. a	166. b	167. a	168. a	169. c	170. b
171. a	172. b	173. a	174. b	175. a	176. b	177. d	178. a	179. b	180. b
181. b	182. d	183. a	184. b	185.b	186. d	187. d	188. d	189. b	190. b
191. a	192. d	193. c	194. d	195. d	196.b	197. c	198. d	199. b	200. c
201. b	202. b	203. c	204. d	205. c	206. d	207. c	208. a	209. c	210. d
211. b	212. b	213. c	214. d	215. a	216. d	217. d	218. d	219. d	220. c
221. d	222. d	223. d	224. c	225. b	226. b	227. d	228. c	229. b	230. a
231. d	232. c	233. c	234. a	235. b	236. d	237. b	238. c	239.a	240. b
241. a	242. d	243. b	244. a	245. d	246. c	247. b	248. a	249. a	250. b
251. d	252. b	253. c	254. d	255. a	256. d	257. c	258. b	259. b	260. a
261. a	262. c	263. b	264. d	265. c	266. a	267. a	268. d	269. c	270. a
271. d	272. d	273. a	274. b	275 c	276. a	277. a	278. a	279. d	280. c
281. a	282. a	283. b	284. c	285. c					

4 ANIMAL KINGDOM

1. Which one is correct?
I. Sponges : Cellular level of organization
II. Cnidaria : Tissue level of organization
III. Platyhelminthes : Organ level of organization
IV. Annelids, Arthropods, Molluscs, Echinoderms and Chordates : Organ system level of organization
(a) All are correct (b) II and IV are correct (c) II and III are correct (d) I and II are correct

2. Choose the false option –
(a) Sponges : Mostly asymmetrical
(b) Cnidaria, Ctenophora and Adult Echinoderms : Radial symmetry
(c) Annelids, Arthropods, Molluscs and Chordates : Bilateral symmetry
(d) None of the above

3. Diploblastic and Triploblastic are terms that describe –
(a) The number of invagination during development
(b) The number of heads during development
(c) The number of tissue layers during embryonic developments
(d) The number of cell types during development

4. An undifferentiated layer present between ectoderm and endoderm is called –
(a) Mesoglea (b) Mesoderm (c) Mesentery (d) Parenchyma

5. Which one is correct?
I. Diploblastic : Porifera, Coelenterates
II. Triploblastic : Platyhelminthes to chordates
III. Acoelomata : Porifers, Coelenterates, Platyhelminthes
IV. Pseudocoelomata : Aschelminthes / Round worms
V. Eucoelomata : Annelids to chordates
(a) All are false (b) All are correct
(c) I, II and V are correct (d) Only V is correct

6. Metamerism is the characteristic of –
(a) Platyhelminthes (b) Mollusca (c) Porifera (d) Annelida (e.g. earthworm)

7. Metamerism refers to –
(a) Mesoblastic development
(b) Occurrence of mesoderm
(c) Segmentation where external divisions correspond to internal divisions
(d) Metastasis

8. Which one is correct?
(a) Notochord is ectodermal in origin present in some animal
(b) Notochord is a mesodermally derived rod like structure formed on the dorsal side in embryonic development of some animals
(c) Porifera to Echinodermata are non-chordates
(d) b and c

9. Water exits from sponges through the –
(a) Osculum (b) Ostia (c) Spicules (d) Choanocytes

10. Sponges are –
(a) Mostly asymmetrical and usually marine (b) Primitive multicellular with cellular grade of organization
(c) Members of porifera (d) All

11. I. Tissue absent
II. Internal fertilization
III. Development is indirect (larval stage is present)
IV. Spongocoelate with ostia (many) and single osculum and canal system
V. Sexes are hermaphrodite.
The above characteristics belong to which of following –
(a) Cnidaria (b) Porifera (sponges) (c) Platyhelminthes (d) Ctenophora

12. Spongocoel and canal are lined by –
(a) Porocytes (b) Choanocytes / Collar cells
(c) Spicules (d) Amoebocytes

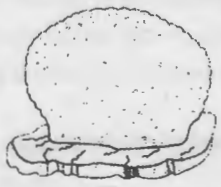
13. Water → Ostia → Spongocoel → Osculum
The above pathway of water helps in –
(a) Food gathering (b) Respiratory exchange
(c) Removal of waste (d) All

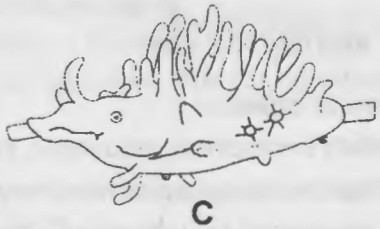
14. Fresh water sponge is –
(a) Sycon (*Scypha*) (b) Spongilla
(c) Euspongia (Bath sponges) (d) All

15. Sponges show –
(a) Intracellular digestion (b) A skeleton made up of spicules or spongia fibres
(c) Asexual reproduction by fragmentation (d) All

16. Examine the figures A, B and C. In which one of the four options all the items, A, B and C are correct?


A


B


C

	A	B	C
(a)	*Sycon*	*Euspongia*	*Spongilla*
(b)	*Euspongia*	*Spongilla*	*Sycon*
(c)	*Spngilla*	*Sycon*	*Euspongia*
(d)	*Euspongia*	*Sycon*	*Spongilla*

17. Which of the following characteristics is not associated with members of Cnidaria / Coelenterate?
(a) Alternation of generation (metagenesis between polyp and Medusa)
(b) Nematocysts, Gastrovascular cavity, extracellular + intracellular digestion
(c) Nematocyst / Cnidoblast
(d) Triploblastic forms

18. Which of the following is not a characteristic of the cnidarians?
(a) A central gastrovascular cavity with a single opening, hypostome
(b) Mostly marine, sessile or free swimming, radially symmetrical

(c) Show cellular level of organization
(d) Show tissue level of organization

19. Which of the following is true about the cnidoblasts / cnidocytes?
(a) They are present on tentacles and the body
(b) They are used for anchorage, defence and for capture the prey
(c) They contain stinging capsule or nematocysts
(d) All

20. Some cnidarian like coral e.g. *Meandrina* (Brain Coral) exoskeleton is composed of –
(a) Silicious (b) $CaCO_3$ (c) Chitinous (d) Proteinaceous

21. Polyp is cylindrical and sessile. It is seen in –
(a) *Hydra* (b) *Adamsia* (c) Both a and b (d) *Aurelia* (Jelly fish)

22. Medusa is umbrella shaped and free swimming. Which one has no medusa?
(a) *Hydra* (b) *Adamsia* (c) Both a and b (d) *Aurelia*

23. The metagenesis is seen in –
(a) Hydra (b) Adamsia (sea anemone)
(c) Aurelia (d) Obelia

24. The incorrect match –
(a) Portuguese man of war – *Physalia* (b) *Pennatula* – Sea pen
(c) *Gorgonia* – Sea Fan (d) *Hydra* – Sea Cucumber

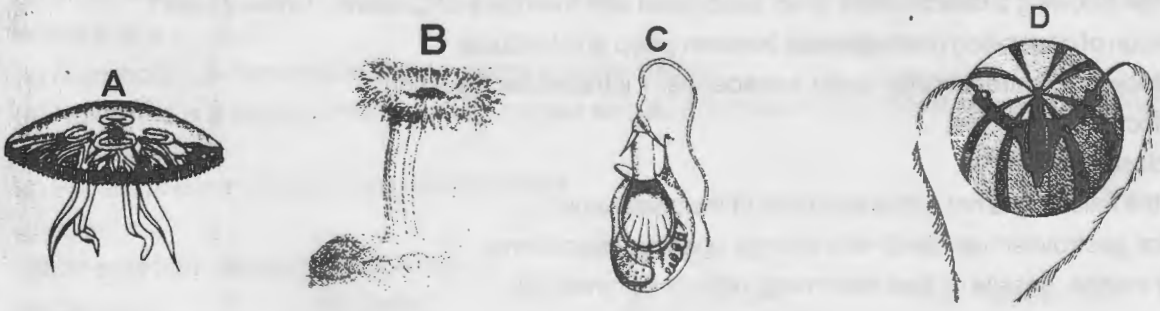
25. Comb jellies or sea walnuts are placed under –
(a) Cnidaria (b) Ctenophora (c) Echinodermata (d) Annelida

26. Select the correct one(s) for ctenophora –
(a) They have similarities with cnidaria
(b) They have 8 external rows of ciliated comb plates for locomotion
(c) Bioluminescence
(d) All

27. I. Extracellular and intracellular digestion
II. Exclusively marine, radially symmetrical, diploblastic, tissue level of organization
III. Bisexual, external fertilization and indirect development
IV. No asexual reproduction
V. Presence of 8 comb plates
The above characters are shown by –
(a) Cnidaria (b) Porifera (c) Ctenophora (d) Rotifers

28. *Pleurobrachia* and *Ctenoplana* are –
(a) Sponges (b) Ctenophores (c) Flatworms (d) Roundworms

29. Examine the figures A, B, C and D. In which one of the four options all the items, A, B, C and D are correct?



	A	B	C	D
(a)	*Pleurobrachia*	*Cnidoblast*	*Aurelia*	*Adamsia*
(b)	*Aurelia*	*Adamsia*	*Cnidoblast*	*Pleurobrachia*
(c)	*Cnidoblast*	*Pleurobrachia*	*Adamsia*	*Aurelia*
(d)	*Adamsia*	*Aurelia*	*Pleurobrachia*	*Cnidoblast*

Platyhelminthes are –
(a) Roundworms (b) Flatworms (c) Blindworms (d) Pinworms

Which of the following is not characteristic to platyhelminthes?
(a) Triploblastic (b) Acoelomate (c) Bilateral symmetry (d) Parasitism exclusively

What is common among tapeworms (*Taenia*), *Fasciola* (liver fluke) and *Planaria*?
(a) All are coelomate (b) All are found in gut
(c) All have flattened bodies (d) All are free living

Choose the correct option for flatworms –
(a) Flame cells are excretory organ and osmoregulatory (b) Mostly endoparasites
(c) Bisexual, internal fertilization, many larval stage (d) All

Parasitic adaptations of flatworms is –
(a) Hooks and suckers are present (b) Absorption of food through body surface
(c) Both a and b (d) Complex digestive system

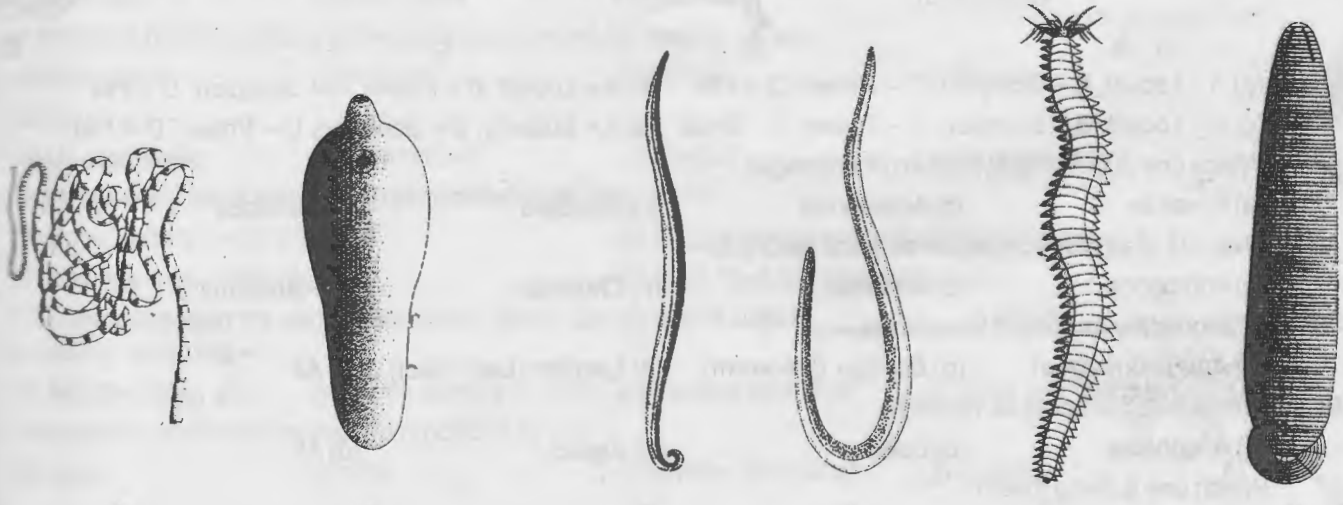
Which one is not a Aschelminthes?
(a) *Ascaris* (Roundworm) (b) *Wuchereria* (Filarial worm)
(c) *Ancylostoma* (Hookworm) (d) Flatworm

Common character between flatworms, roundworms and earthworms is –
(a) Parasitism (b) Acoelomate nature (c) Triploblastic (d) Pseudocoelomate

Aschelminthes are –
(a) Free-living, aquatic, terrestrial or parasites in animals and plants
(b) With complete alimentary canal with muscular pharynx; Excretory tube with pore
(c) Are dioecious; showing sexual dimorphism, internal fertilization, direct or indirect development
(d) All

Aschelminthes are called roundworms because –
(a) Their larvae are round in shape (b) Their body is round like disc
(c) Their stomach is round shaped (d) Their thread like body is circular in cross section

Examine the figures A, B, C, D, E and F. In which one of the four options all the items, A, B, C, D, E and F are correct?



A B C D E F

(a) A – Tape worm; B – Liver fluke; C – Female Roundworm; D – Male Roundworm; E – *Hirudinaria;* F – *Nereis*
(b) A – Tape worm; B – Liver fluke; C – Male Roundworm; D – Female Roundworm; E – *Hirudinaria;* F – *Nereis*
(c) A – Tape worm; B – Liver fluke; C – Female Roundworm; D – Male Roundworm; E – *Nereis*; F – *Hirudinaria*
(d) A – Tape worm; B – Liver fluke; C – Male Roundworm; D – Female Roundworm; E – *Nereis*; F – *Hirudinaria*

40. The phylum name Annelida is based on –
(a) Nephridia (b) Metameres / segments
(c) Parapodia (d) Antenna

41. True coelom appeared first in the course of evolution of –
(a) Aschelminthes (b) Chordata (c) Echinodermata (d) Annelida

42. Which one is blood sucker –
(a) *Nereis* (b) *Pheretima* (Earthworm)
(c) *Hirudinaria* (Leech) (d) All

43. Choose the correct option –
(a) A closed circular system – Annelida (b) Nereis – Aquatic, Dioecious
(c) *Pheretima* and Leech – Monoecious (d) All

44. A feature absent in annelids is –
(a) Nephridia (Osmoregulatory + excretory organ).
(b) Lateral swimming appendages in aquatic forms like Nereis
(c) Longitudinal and circular muscles helping in locomotion
(d) Pseudocoelom

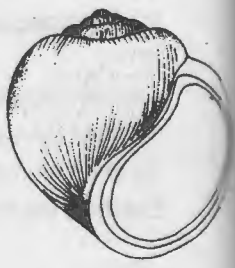
45. Annelids –
(a) Are aquatic (marine, freshwater), terrestrial, freeliving and sometimes parasite
(b) Have neural system which consists of paired ganglia connected by lateral nerves to double ventral nerve cord
(c) Non-segmented
(d) a and b

46. Examine the figures A, B, C and D. In which one of the four options all the items, A, B, C and D are correct?


A


B


C


D

(a) A – Locust, B – Scorpion, C – Prawn, D – *Pila* (b) A – Locust, B – Prawn, C – Scorpion, D – *Pila*
(c) A – Locust, B – Scorpion, C – Prawn, D – Snail (d) A – Butterfly, B – Scorpion, C – Prawn, D – *Pila*

47. Which one is the largest phylum of animalia?
(a) Annelida (b) Arthropoda (c) Chordata (d) Mollusca

48. Over 2/3 of all named species on earth belong to –
(a) Arthropoda (b) Annelida (c) Chordata (d) Flatworms

49. Economically important insects are –
(a) *Apis* (Honey bee) (b) *Bombyx* (Silkworm) (c) *Laccifer* (Lac insect) (d) All

50. Which mosquito acts as vector?
(a) *Anopheles* (b) *Culex* (c) *Aedes* (d) All

51. Which one is living fossil?
(a) *Limulus* (King crab) (b) *Locusta* (Locust) - a gregarious pest

(c) Both (d) None

52. Arthropods have sense organs like –
(a) Antennae (b) Simple and compound eyes
(c) Statocysts for balance (d) All

53. In Arthropods respiratory organs are –
(a) Gills (b) Book Gills
(c) Book lungs or Trachea (d) All

54. You have discovered an animal having following characters like –
Triploblastic, bilateral symmetry coelomate, chitinous exoskeleton, head + Thorax and abdomen as body parts, jointed appendages
You would like to place the animal under –
(a) Tetrapoda (b) Arthropoda (c) Annelida (d) Hemichordata

55. In Arthropods excretion takes place through –
(a) General body surface (b) Flame cells (c) Malpighian tubules (d) Nephridia

56. Arthropods –
(a) Are mostly dioecious
(b) Are mostly oviparous
(c) Show usually internal fertilization and direct or indirect development
(d) All

57. Go through the following diagram –

A – Identify the animal
B – Name the phylum to which it belong
(a) A - *Balanoglossus,* B – Hemichordata (b) A - *Balanoglossus,* B – Cephalochordata
(c) A - *Balanoglossus,* B – Urochordata (d) A - *Nereis,* B – Annelida

58. Which one is the second largest animal phylum?
(a) Mollusca (b) Arthopoda (c) Chordata (d) Cnidaria

59. In Molluscs mouth contains a file like rasping organ for feeding called –
(a) Operculum (b) Mantle (c) Hump (d) Radula

60. Molluscs are –
(a) Unsegmented (b) Soft bodied (c) Shelled (d) All of the above

61. The main body parts common to all molluscs are the –
(a) Foot, Radula and the Mantle (b) Foot, Visceral mass (hump) and mantle
(c) Visceral mass, Mantle, shell (d) Foot, Radula, Visceral mass

62. The space between the visceral hump and dorsal spongy skin is called _____ in which _____ are present in case of molluscs –
(a) Mantle cavity, gill (b) Body cavity and shell (c) Viscera and shell (d) Shell and Viscera

63. The precious commercial pearl is produced by –
(b) Unio (b) *Pila* (c) Oyster (*Pinctada*) (d) Octopus

64. Which is a Mollusca?
(a) Sea Mouse (b) Sea Hare (*Aplysia*) (c) Sea cow (d) Sea Horse

65. The genera of Mollusca with wrong common name is –
(a) *Dentalium* – Tusk Shell (b) *Sepia* – Cuttlefish
(c) *Loligo* – Squid (d) *Pila* – Chiton

66. Which one is false fish?
(a) Cuttlefish (b) *Octopus* (Devil fish) (c) *Myxine* (Hag fish) (d) All

67. Which one is false?
(a) In molluscs Gills have respiratory and excretory functions
(b) In molluscs the head has sensory tentacles
(c) Molluscs are dioecious, oviparous with indirect development
(d) None

68. Examine the figures A, B and C. In which one of the four options, all the items, A, B and C are correct?

A B C

(a) A – *Octopus*, B – *Ascidia*, C – *Ophiura* (b) A – *Octopus*, B – *Asterias*, C – *Ascidia*
(c) A – *Octopus*, B – *Asterias*, C – *Ophiura* (d) A – *Ophiura*, B – *Asterias*, C – *Octopus*

69. Which one is wrong combination?
(a) Mollusca – *Pila* (Apple snail), *Chaetopleura* (Chiton)
(b) Echinodermata – *Echinus* (Sea urchin), *Antedon* (Sea lily), *Cucumaria* (Sea cucumber)
(c) Echinodermata – Spiny bodied
(d) None

70. Which one is exclusively marine?
(a) Echinodermata (b) Hemichordata (c) Protochordates (d) All

71. Water vascular system and tube feet is the characteristic of –
(a) Arthropoda (b) Echinodermata (c) Molluscs (d) Bony fishes

72. Spiny skinned animals with radial symmetry in adult and bilateral in larva belong to –
(a) Echinodermata (b) Arthropoda (c) Mollusca (d) Annelida

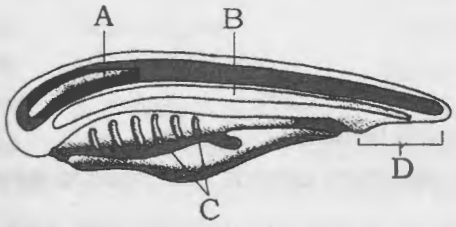
73. The most distinctive feature of Echinodermata is the water vascular system which helps in –
(a) Locomotion (b) Capture and transport food
(c) Respiration (d) All

74. The endoskeleton of animals of Echinodermata consists of –
(a) Silica (b) $CaCO_3$ (c) Protein (d) Spongin

75. I. Excretory system absent.
II. Dioecious, external fertilization, indirect development with free swimming larva
III. Water vascular system is present
IV. Unsegmented body
V. Complete digestive system with ventral mouth and anus on dorsal or upper side
The above characters are associated with animals of –

(a) Mollusca (b) Hemichordata (c) Echinodermata (d) Annelida

Animals belonging to phylum Chordata are fundamentally characterised by the presence of structure noted as A, B, C and D. Identify A, B, C and D –



(a) A - Notochord, B - Nerve cord, C - Gill slits, D - Post-anal part
(b) A - Nerve cord, B - Notochord, C - Gill slits, D - Post-anal part
(c) A - Nerve cord, B - Notochord, C - Post-anal part, D - Gill slits
(d) A - Nerve cord, B - Gill slits, C - Notochord, D - Post-anal part

Which one is a link between chordates and nonchordates?

(a) *Sphenodon* (b) *Balanoglossus* (c) *Crocodilia* (d) None

The body of *Balanoglossus* consists of –

(a) Proboscis (b) A collar (c) Trunk (d) All

Hemichordates have –

(a) Open type of circulatory system (b) Respiration by gill
(c) Proboscis gland / glomerulus as excretory organ (d) All

Which of the following statements is correct?

(a) Now hemichordate has been placed under nonchordates because of absence of notochord
(b) *Saccoglossus* is a hemichordate
(c) Hemichordate is worm-like marine animal
(d) All

Observe the following diagrams and click the correct option with their respective classes –

Fig. (A) *Petromyzon*

Fig. (B) *Scoliodon*

Fig. (C) *Pristis*

(a) A - *Cyclostomata*, B - *Chondrichthyes*, C - *Chondrichthyes*
(b) A - *Osteichthyes*, B - *Chondrichthyes*, C - *Chondrichthyes*
(c) A - *Osteichthyes*, B - *Chondrichthyes*, C - *Osteichthyes*
(d) A - *Osteichthyes*, B - *Chondrichthyes*, C - *Cyclostomata*

Which of the following is not found in the phylum chordata?

(a) A dorsal hollow nerve chord (b) Lateral paired gill slits during development
(c) A notochord at some stage of development (d) An external skeleton

Which of the following is not a characteristic unique to all members of phylum chordata?

(a) A notochord, a dorsal hollow nerve cord (b) A ventral heart
(c) An endoskeleton (d) Vertebrate

Which of the following traits is not shared by both the hemichordata and chordata?

(a) Notochord (b) Gills (c) Bilateral symmetry (d) Coelomate condition

Chordata includes all except –

(a) Urochordata (b) Hemichordata (c) Cephalochordata (d) Vertebrata

Protochordates includes –

(a) Urochordata + Hemichordata (b) Hemichordata + Vertebrata

(C) Vertebrate + Cephalochordata (d) Urochordata + Cephalochordata

87. Chordates have –

(a) Dorsal, hollow and single CNS (b) Ventral heart

(c) Post-anal tail (d) All

88. Which of the following statement is correct?

I. In Urochordates like *Ascidia*, *Salpa*, *Doliolum* notochord is present in only larval tail.

II. In cephalochordates like *Branchiostoma* (Amphioxus or Lancelet) notochord extends from head to tail and is persistent throughout the life

III. All vertebrates are chordates but all chordates are not vertebrates

IV. Notochord is replaced by vertebral column

(a) All are correct (b) Only II and IV are correct

(c) All are wrong (d) Only II is wrong

89. Observe the following diagrams and tick the correct option with their respective classes –

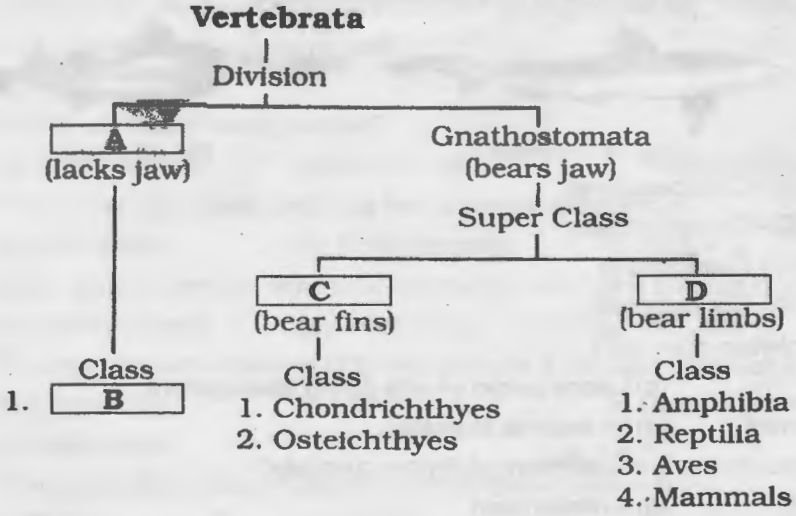
Fig. (A) *Hippocampus*

Fig. (B) *Catla*

(a) A - Bony fish, B - Bony fish (b) A - Bony fish, B - Cartilage fish

(c) A - Cartilage fish, B - Cartilage fish (d) A - Cartilage fish, B - Hag fish

90. Go through the following flowchart for division of subphylum vertebrata –



Fill up the gaps A to D.

	A	B	C	D
(a)	Agnatha	Cyclostomata	Pisces	Tetrapods
(b)	Agnatha	Pisces	Cyclostomata	Tetrapods
(c)	Agnatha	Tetrapods	Cyclostomes	Pisces
(d)	Agnatha	Pisces	Tetrapods	Cyclostomes

91. Choose the correct option in respect of characteristics to respective group.

	Cyclostomes	Chondrichthyes	Osteichthyes
I.	Sucking mouth	Ventral Mouth	Terminal mouth
II.	Scale absent	Placoid scale	Cycloid / Ctenoid scale
III.	Marine	Marine	Fresh water / Marine
IV.	6-15 pairs of gills	5-7 pairs of gills without operculum	4 pairs of gills with operculum

(a) I and II are correct (b) I and IV are correct (c) All are correct (d) Only III is correct

92. Which of the following characters are correct about the *Cyclostomata*?
(a) All living members of the class *Cyclostomata* are ectoparasites on some fishes
(b) Cranium and Vertebral column are cartilaginous
(c) No paired fins
(d) All

93. Which one(s) is not cartilaginous fish?
(a) *Carcharodon* (Great white shark), *Trygon* (Sting ray)
(b) *Exocoetus* (Flying fish), *Catla* (Katla), *Clarias* (Magur)
(c) *Scoliodon* (Dog fish)
(d) *Pristis* (Saw fish)

94. Following are few examples of bony fishes. Find out the marine bony fishes –
(a) Flying fish (b) *Hippocampus* (Sea Horse)
(c) Both a, b (d) *Labeo* (Rohu), *Catla*, *Clarias*

95. Which of the following you would like to select bony fishes for aquarium?
(a) *Betta* (fighting fish), *Pterophyllum* (Angel fish) (b) Sea horse
(c) Dog fish (d) Saw fish

96. Lamprey (*Petromyzon*) and *Myxine* (Hag fish) are marine but migrate for spawning to fresh water, after that dies within few day. They belong to –
(a) Chondrichthyes (b) *Osteichthyes* (c) Agnatha / Cyclostomata (d) Amphibia

97.

Column I	Column II
A. Cartilaginous fishes	I. Usually external fertilization
B. Bony fishes	II. Internal fertilization
	III. Mostly oviparous
	IV. Many are viviparous
	V. Direct development

The correct match between column I and II is –
(a) A - I, III, V B - I, II
(b) A - II, IV B - I, III, V
(c) A - III, V B - I, II, IV
(d) A - I, II, IV B - III, V

98. Which of the following is not a characteristic of class chondrichthyes?
(a) Gill slits are separate and without operculum (b) They are predaceous
(c) Airbladder is present (d) Notochord is persistent throughout the life

99. Shark, *Torpedo* (Electric ray) and *Trygon* (Sting ray) are cartilaginous fishes and belong to class
(a) Cyclostomata (b) Chondrichthyes (c) Osteichthyes (d) Amphibia

100. Toothed shaped scales are –
(a) Cycloid (b) Ctenoid (c) Ganoid (d) Placoid

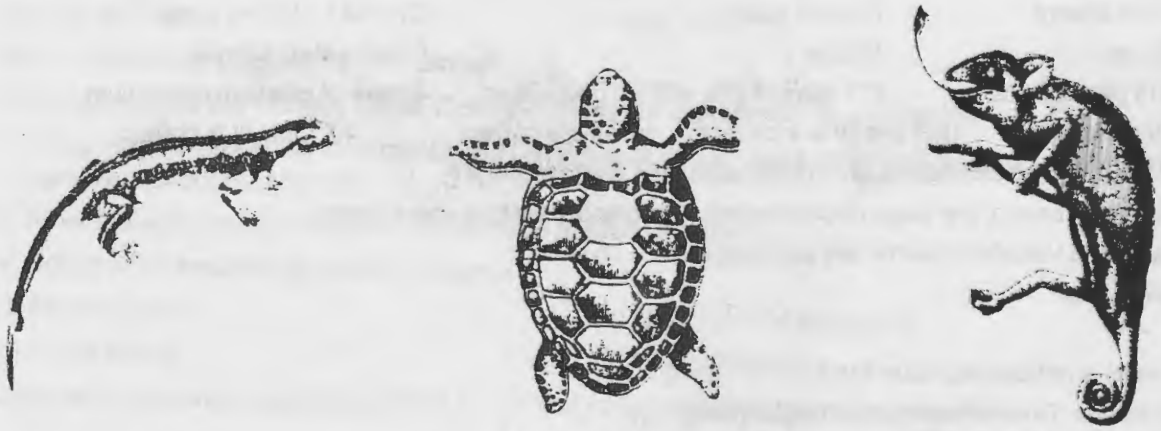
101. Bony fishes can stay at any particular depth in water without spending energy due to –
(a) Operculum (b) Neuromuscles (c) Pneumatic bones (d) Swim bladder

102. Which one is false?

(a) Both cartilaginous and bony fishes are dioecious (b) Cartilaginous fishes show sexual dimorphism

(c) Male cartilaginous fish has claspers (d) Female cartilaginous fish has claspers

103.



A B C

Which of the following options is correct for name of above animals and their respective classes?

(a) A - *Salamandra*, Amphibia; B - *Chelone*, Reptilia; C - *Chameleon,* Reptilia

(b) A - *Salamandra*, Reptilia; B - *Chelone*, Reptilia; C - *Chameleon,* Reptilia

(c) A - *Salamandra*, Amphibia; B - *Chelone*, Amphibia; C - *Chameleon,* Amphibia

(d) A - *Salamandra*, Urochordata; B - *Chelone*, Cephalochordata; C - *Chameleon,* Hemichordata

104. Which of the following traits is not characteristic of amphibians?

(a) Skin is moist and without scales

(b) Cloaca is present

(c) Dioecious, external fertilization, oviparous, indirect development

(d) Amniotic egg is present

105. Which one is limbless amphibia?

(a) *Bufo* (Toad) (b) *Rana* (Frog) (c) *Salamandra* (d) *Ichthyophis*

106. Which one is a tree frog?

(a) *Hyla* (b) Toad (c) *Bufo* (d) *Salamander*

107. All are cold blooded animals except –

(a) Fishes, Amphibia, reptiles (b) Birds and Mammals

(c) Only mammals (d) Only birds

108. Amphibia shares with reptiles in all of the following characters except –

(a) Tympanum represents the ear (b) External fertilization and indirect development

(c) Dioecious, oviparous (d) Cold blooded or poikilotherms

109. Amphibia

I. Has body – divisible into head and trunk. Tail is present in some amphibians.

II. Show respiration by gills, lungs and through skin

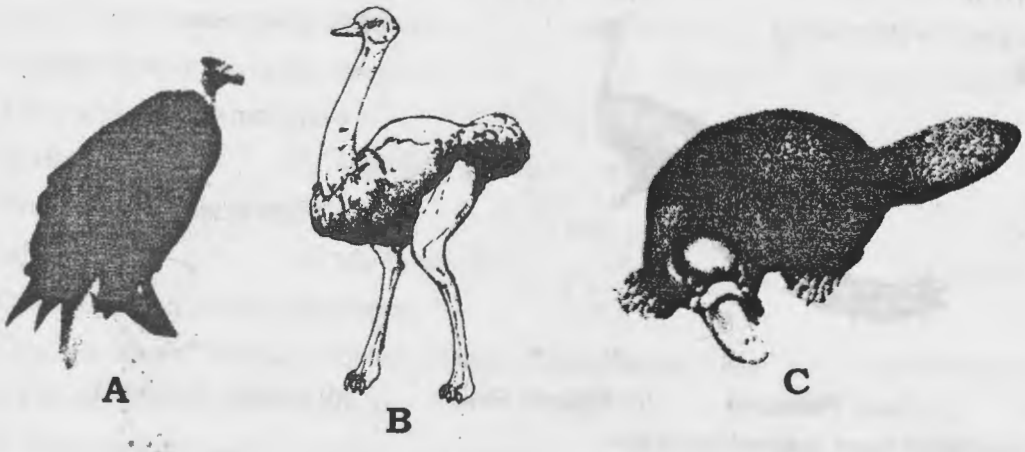
III. Has scales in all its members

IV. Can lead dual life (aquatic and terrestrial)

V. Has eye lids

(a) All are correct (b) I and IV are correct (c) Only III is wrong (d) Only II is wrong

110. Which of the following options is correct for name of below animals and their respective classes?



(a) A - *Neophron*, Aves, B - *Struthio*, Aves; C - *Ornithorhynchus*, Mammalia
(b) A - *Neophron*, Aves, B - *Struthio*, Mammalia; C - *Ornithorhynchus*, Mammalia
(c) A - *Neophron*, Aves, B - *Struthio*, Aves; C - *Ornithorhynchus*, Aves
(d) A - *Neophron*, Aves, B - *Struthio*, Reptilia; C - *Ornithorhynchus*, Mammalia

111. Reptiles and Aves (Birds) show similarities in all except –
(a) Dioecious forms
(b) Oviparous, internal fertilization
(c) Creeping / Crawling locomotion
(d) Direct development

112. Common trait among reptiles, fishes and amphibia is –
(a) Gill (b) Scales (c) Laying eggs (d) Shelled

113. The name (*Reptilia*) refers to their –
(a) Creeping or crawling mode of locomotion
(b) Scales.
(c) Tympanum
(d) None

114. Choose the false option –
(a) Most reptiles are terrestrial
(b) Reptiles have 3 or 3.5 chambered heart except crocodile (has 4 chambered heart)
(c) Snakes and lizards shed their skins as skin cast
(d) Reptiles are viviparous

115. I. Body is covered by dry and cornified skin, epidermal scales or scutes.
II. They have no external ear
III. Crawling / creeping habit
IV. 3 chambered heart
The above characters are associated with –
(a) Reptile (b) Bird (c) Amphibia (d) Mammals

116. Which is poisonous snake?
(a) *Naja* / Cobra (b) *Bangarus* / Krait (c) *Vipera* / Viper (d) All

117.

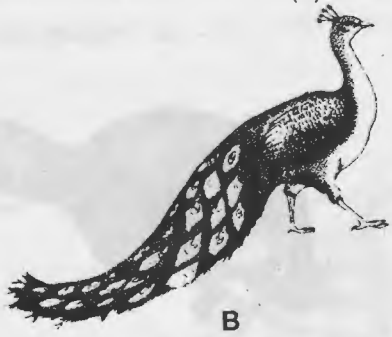
Column I	Column II
A. *Testudo*	I. Tortoise
B. *Calotes*	II. Garden lizard
C. *Alligator*	III. Wall lizard
D. *Hemidactylus*	IV. Alligator

The correct matching is –

(a) A - I, B - II, C - III, D - IV
(b) A - I, B - II, C - IV, D - III
(c) A - II, B - I, C - III, D - IV
(d) A - IV, B - III, C - II, D - I

118.

A



B

A and B animals are respectively –
(a) *Psittacula, Pavo* (b) *Pavo, Psittacula* (c) *Testudo, Pavo* (d) *Calotes, Psittacula*

119. Pneumatic bone, 4 chambered heart, feathers occur in –
(a) Reptiles (b) Mammals (c) Aves (d) Cyclostomata

120. Select the odd number from the list –
(a) *Corvus* (crow) (b) *Columba* (pigeon) (c) *Bufo* (d) *Neophron* (vulture)

121. Select the odd number from the list –
(a) *Aptenodytes* (penguin) (b) *Pavo* (Peacock) (c) *Calotes* (d) *Psittacula* (parrot)

122. Vertebrates having air sacs connected to lungs for supplement respiration are –
(a) Birds (b) Reptiles (c) Mammals (d) Amphibia

123. In which group are animals more alike?
(a) Birds (b) Mammals (c) Amphibia (d) Reptiles

124. Evidence for the reptilian origin of birds is the occurrence of –
(a) Scales (b) Beak (c) Feathers (d) Hairs

125. 4 chambered heart is in –
(a) All reptiles (b) All birds + crocodile + all mammals
(c) Only Mammals (d) Frog

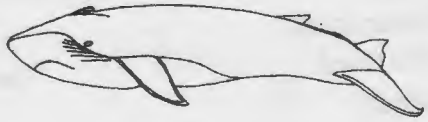
126. Birds have bipedal locomotion as it –
(a) Increases rate of locomotion (b) Spare fore limbs for flight
(c) Reduces weight (d) Has no fore limbs

127. Which of the following characters does not fit for aves?
(a) Skin is dry, without glands except oil / preen glands at the bare of tail
(b) Alimentary canal has 2 additional chambers, crop and gizzard
(c) Hind limbs are modified for walking, swimming or clasping. Fore limbs are modified into wings
(d) Beak has teeth

128. Which one is flightless bird?
(a) *Struthio* (Ostrich) (b) Penguin (c) Both (d) *Psittacula*

129.

A



B

C

A, B and C animals are respectively –

(a) *Pteropus, Balaenoptera, Macropus* (b) *Macropus, Balaenoptera, Pteropus*

(c) *Balaenoptera, Pteropus, Macropus* (d) *Balaenoptera, Macropus, Pteropus*

130. A trait is found in all mammals –

(a) Hair (b) Mammary glands (c) 4 chambered heart (d) All

131. Pinna / external ear is found in –

(a) Reptiles (b) Mammals (c) Aves (d) Insects

132. Go through the following characters –

I. Heterodont and Thecodont (different types of teeth present in jaw)

II. Homiothermous (warm blooded)

III. Pulmonary respiration (respiration by lungs)

IV. Hairs

V. The most unique character is the presence of mammary glands

VI. Dioecious, internal fertilization mostly viviparous

All above characters are assigned to –

(a) Reptiles (b) Mammals (c) Aves (d) Cyclostomes

133. Which one is the oviparous mammal?

(a) *Macropus* (Kangaroo) (b) *Panthera*

(c) *Ornithoryhynchus* (Platypus) (d) Whale

134. Which is viviparous (give birth to young ones)?

(a) Kangaroo, Dolphin (Delphinus) flying fox (Pteropus), Blue whale

(b) Lion, Bat, whale, ostrich

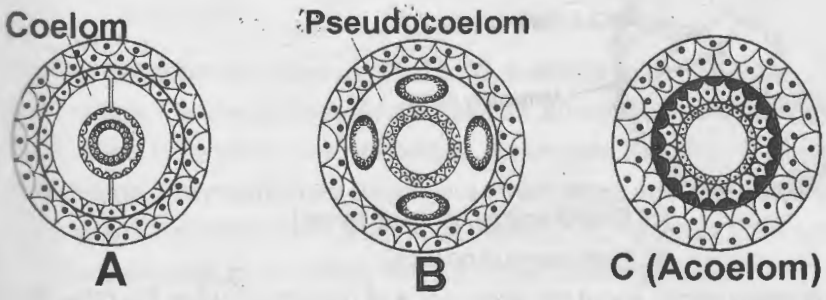
(c) Platypus, Penguin, Bat

(d) Shrew, bat, Cat, Corvus

135. Flying mammal is –

(a) *Ornithorhynchus* (b) *Macropus* (Kangaroo) (c) *Pteropus* (Bat) (d) Dolphin

136.



A, B and C are found in –

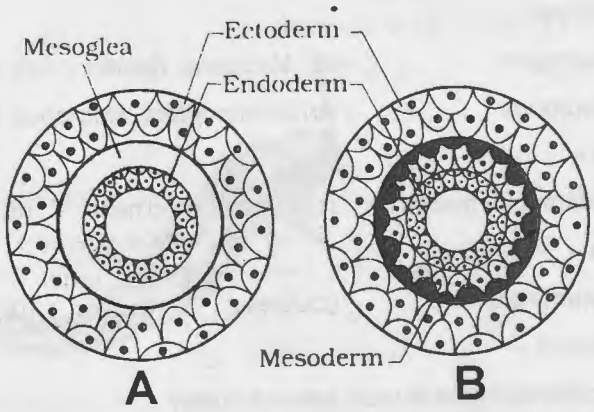
(a) Annelids, Aschelminthes, Platyhelminthes respectively

(b) Platyhelminthes, Annelids, Aschelminthes respectively

(c) Aschelminthes, Platyhelminthes, Annelids respectively

(d) Sponges, Aschelminthes, Platyhelminthes respectively

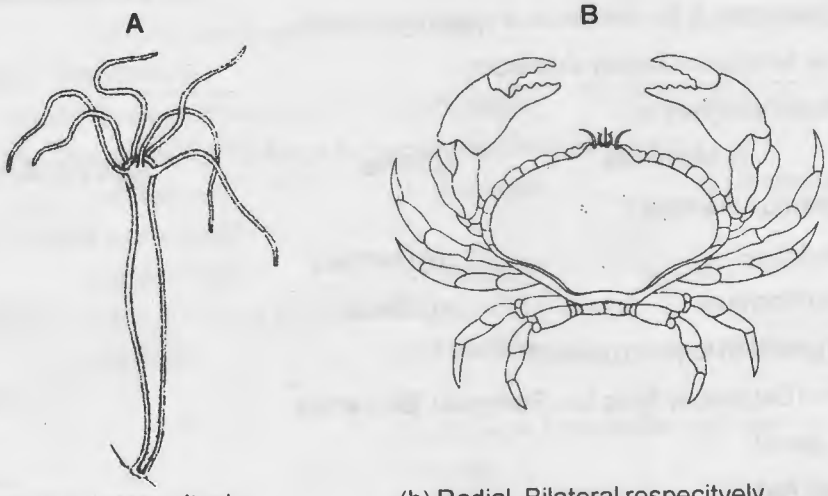
137.



The above diagram shows the germ layers. The animals having structures shown in the figure are respectively called–

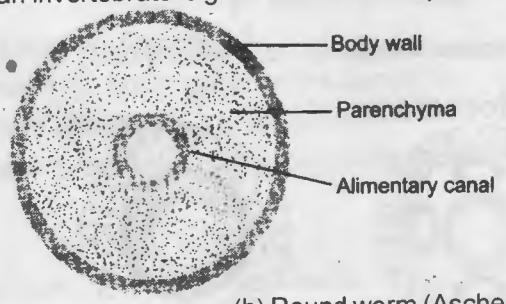
(a) Diploblastic, Triploblastic
(b) Triploblastic, Diploblastic
(c) Diploblastic, Diploblastic
(d) Triploblastic, Triploblastic

138. Animal A and B show symmetry –



(a) Bilateral, Asymmetrical respecitvely
(b) Radial, Bilateral respecitvely
(c) Bilateral, Bilateral respecitvely
(d) Radial, Radial respecitvely

139. The cross section of the body of an invertebrate is given below. Identify the animal which has this body plan.



(a) Cockroach (Arthropoda)
(b) Round worm (Aschelminthes)
(c) *Planaria* (Platyhelminthes)
(d) Earthworm (Annelida)

140. Which one of the following statements is totally wrong about the occurrence of *notochord*, while the other three are correct?

(a) It is present only in larval tail in Ascidians
(b) It is replaced by a vertebral column in adult frog
(c) It is absent throughout life in humans from the very beginning
(d) It is present throughout life in *Amphioxus*

141. Which one of the following groups of animals is correctly matched with its characteristic feature without an exception?

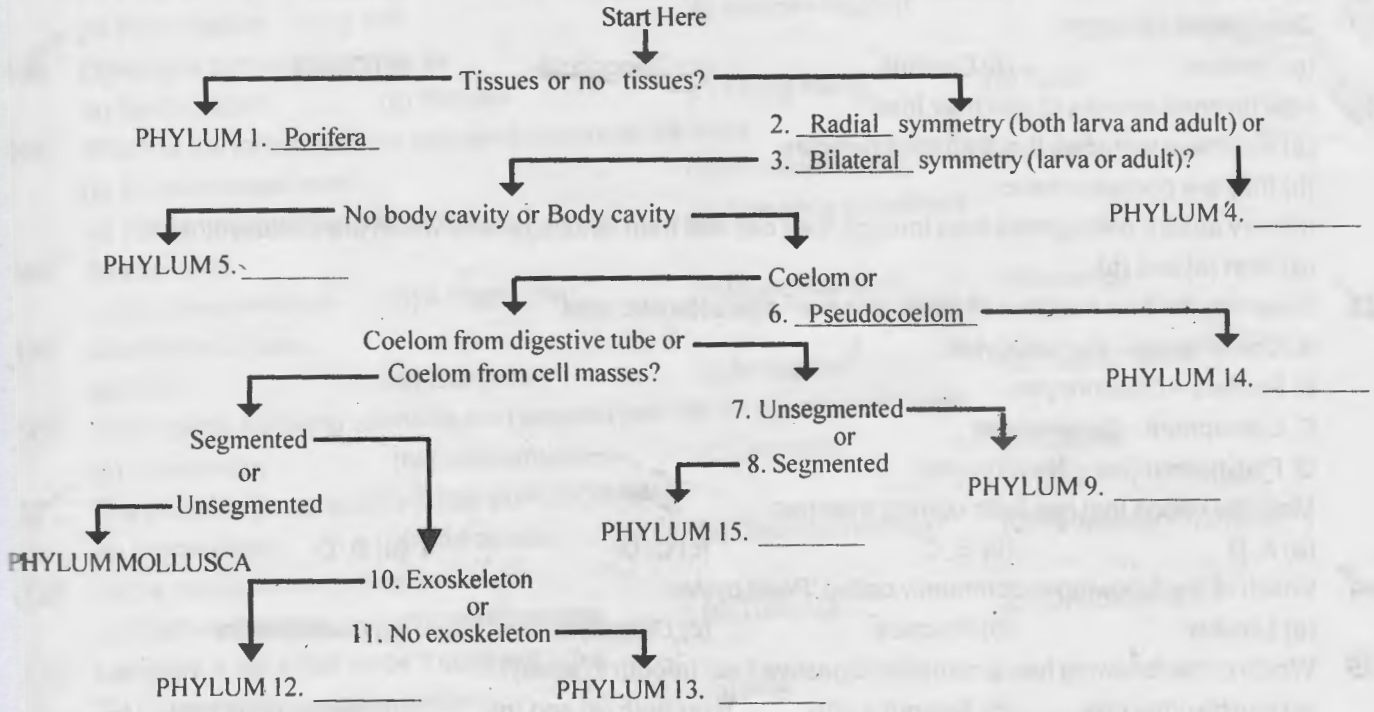
(a) reptilia : possess 3-chambered heart -with an incompletely divided ventricle. ,
(b) chordata : possess a mouth with an upper and a lower jaw
(c) chondrichthyes : possess cartilaginous endoskeleton.
(d) mammalia : give birth to young ones.

135. Which one of the following animals is correctly matched with its particular taxonomic category?
(a) tiger-*tigris*, species (b) cuttlefish-molluscs, class
(c) humans-primata, family (d) housefly-Musca, order.

136. In which one of the following the genus name, its two characters and its class/phylum are correctly matched ?

	Genus name	Two characters	Class / Phylum
(a)	*Ascaris*	(i) body segmented. (ii) males and females distinct	annelida
(b)	*Salamandra*	(i) a tympanum represents ear. (ii) fertilization is external	amphibia
(c)	*Pteropus*	(i) skin possesses hair. (ii) oviparous	mammalia
(d)	*Aurelia*	(i) cnidoblasts. (ii) organ level of organization	coelenterate

137. The following flow chart summerises the evolutionary relationships and characteristics of the major phyla of animals.



The correct order of phyla 4, 5, 14, 12, 13, 9 and 15 is
(a) Cnidaria, Platyhelminthes, Aschelminthes, Arthropoda, Annelida, Echinodermata and Chordata respectively
(b) Rotifers, Platyhelminthes, Nematoda, Arthropoda, Annelida, Echinodermata and Chordata respectively
(c) Cnidaria, Platyhelminthes, Nematoda, Arthropoda, Annelida, Chordata and Echinodermata respectively
(d) Cnidaria, Aschelminthes, Nematoda, Arthropoda, Annelida, Echinodermata and Chordata respectively

138. What will you look for to identify the sex of the following?
(a) Female *Ascaris* – sharply curved poster end
(b) Male frog – a copulatory pad on the first digit of the hind limb
(c) Female cockroach – anal cerci
(d) Male shark – claspers borne on pelvic fins.

146. The member of following phylum represent cellular level of organization
(a) Cnidaria (b) Porifera (c) Protozoa (d) Both (a) and (b)

147. Mark the incorrect statement for the Phyla, platyhelminthes to Echinodermata.

(a) All groups represent organ/organ–system level of organization
(b) All are triploblastic
(c) All are eukaryote
(d) None of these

148. When any plane passing through the central axis of the body divides the organism into two identical halves, the organism is called
(a) Radially symmetrical (b) Bilaterally symmetrical
(c) Asymmetrical (d) Metamerically segmented

149. In Platyhelminthes
(a) The embryonic layers, ectoderm and endoderm, are separated by mesoglea
(b) The body is asymmetrical
(c) There is tissue level of organization
(d) The body cavity is absent

150. The organisms belonging to following phylum are (true) coelomate
(a) Arthropoda (b) Aschelminthes (c) Ctenophora (d) Platyhelminthes

151. Comb jellies belong to
(a) Porifera (b) Cnidaria (c) Ctenophora (d) Corals

152. How do coral animals obtain their food?
(a) they have tentacles that trap food particles
(b) they are photosynthetic
(c) they absorb predigested food through their cell wall from dinoflagellates which are photosynthetic
(d) Both (a) and (b)

153. Given are the four matches of phyla with their characteristic cells
A. Coelenterata – Nematocytes
B. Porifera – Choanocytes
C. Ctenophora – Solenocytes
D. Platyhelminthes – Nephrocytes
Mark the option that has both correct matches
(a) A, B (b) B, C (c) C, D (d) B, D

154. Which of the following is commonly called 'Pearl oyster'
(a) *Limulus* (b) *Pinctada* (c) *Dentalium* (d) *Chaetopleura*

155. Which of the following has a complete digestive tract (mouth to anus)?
(a) roundworms only (b) flatworms only (c) Both (a) and (b) (d) neither (a) nor (b)

156. The phenomenon of metagenesis occur in
(a) *Taenia* (b) *Aurelia* (c) *Obelia* (d) *Musca*

157. Which of the following organism is correctly matched with its common name ?
(a) *Aurelia*-comb jelly (b) *Adamsia* - sea anemone
(c) *Ancylostoma* - pin worm (d) *Aplysia* - sea mouse

158. The members of following phylum are exclusively marine, radially symmetrical and diploblastic
(a) Porifera (b) Echinodermata (c) Ctenophora (d) Hemichordata

159. Given below are three statements regarding Aschelminthes
A. They are bilaterally symmetrical and triploblastic
B. They are dioecious
C. All are plants or animals' parasites
Mark the option that has both the correct statements
(a) A, B (b) A, C (c) B, C (d) None

160. Which statement regarding *Nereis* is wrong ?
(a) It has nephridium for excretion (b) It is metamerically segmented
(c) It is monoecious (d) It has parapodia for swimming

161. In chordates the notochord is
(a) Mesodermal and dorsal to nerve cord (b) Endodermal and dorsal to nerve cord
(c) Mesodermal and ventral to nerve cord (d) Endodermal and ventral to nerve cord

162. Which set has the two members of the same phylum?
(a) Cuttle fish and jelly fish (b) Tape worm and earthworm
(c) Dog fish and dolphin (d) Sea mouse and sea lion

163. Following is an oviparous mammal
(a) *Delphinus* (b) *Ornithorhynchus* (c) *Macropus* (d) *Elephas*

164. Which of the following feature of bony fish is missing in cartilaginous fishes
(a) Operculum (b) Placoid scales (c) Poikilothermic (d) Unpaired fins

165. Mark the correct match of the animal and its common name
(a) Trygon - dog fish (b) Ascidia - lancelet
(c) Pterophyllum - flying fish (d) Myxine - hagfish

166. *Chelone* is commonly known as
(a) Garden lizard (b) Tortoise (c) Flying lizard (d) Turtle

167. Which of the following is the exclusive feature of the birds
(a) 4 - chambered heart (b) Homoeothermic
(c) Fore limbs modified into wings (d) Presence of feathers

168. Sea horse is
(a) A marine mammal (b) A marine fish (c) Hippopotamus (d) Antelope

169. Sharks do not have
(a) Teeth (b) Claspers (c) Air bladder (d) Ventral mouth

170. Which of the following animal is cold blooded and has 4 - chambered heart
(a) Salamander (b) *Ornithorhynchus* (c) Crocodile (d) *Calotes*

171. The following group is not a subphylum of Chordata
(a) Urochordata (b) Tetrapoda (c) Cephalochordata (d) Vertebrata

172. *Salpa* and *Doliolum* belong to
(a) Cephalochordata (b) Hemichordata (c) Tunicata (d) Cyclostomata

173. Lamprey is not a fish since it does not have
(a) Closed blood vascular system (b) Fins
(c) Body scales (d) Cranium and vertebral column

174. Following chordata is not a vertebrate
(a) *Branchiostoma* (b) Petromyzon (c) Salamander (d) *Bufo*

175. The scientific name of Ostrich is
(a) *Neophron* (b) *Aptenodytes* (c) *Pavo* (d) *Struthio*

176. The members of which group do not exhibit metamerism
(a) Pisces (b) Aves (c) Arthropoda (d) Mollusca

177. The cyclostomes are
(a) Marine and non migratory (b) Fresh water form and non migratory
(c) Marine and migrate to fresh water for spawning (d) Fresh water form and migrate to sea for spawning

178. Crocodile and penguin are similar to Whale and Dogfish in which one of the following features ?
(a) Possess a solid single stranded central nervous system

(b) Lay eggs and guard them till they hatch
(c) Possess bony skeleton
(d) Have gill slits at some stage

179. Chordates posses all of the following features at some point of development **EXCEPT** _____.
(a) a dorsal hollow nerve cord (b) a notochord
(c) pharyngeal gill slits (d) Amnion

180. All mammals :
(a) Give birth to live young (b) Have a thick coat of hairs
(c) nourish their young ones (d) have a uterus

181. Which of the following is affected by temperature changes in the environment?
(a) *Struthio* (b) *Balaenoptera* (c) *Camelus* (d) *Ichthyophis*

182. Mark the incorrect match
(a) Placoid scales : *Trygon* (b) Operculum : *Labeo*
(c) Air bladder : *Torpedo* (d) Viviparous : *Scoliodon*

183. Which of the following class is incorrectly matched with its general characters?
(a) Cyclostomata : Lack jaws and paired fins and body is covered with placoid scales.
(b) Osteichthyes : Four pairs of gills are covered with an operculum and skin is covered with cycloid scales.
(c) Reptilia : Tympanum represents ear and fertilisation is internal.
(d) Aves : Endoskeleton is fully ossified and long bones are hollow with air cavities called as pneumatic bones.

184. Which of the following is / are not characteristics of the class Osteichthyes?
I. Body is streamlined and mouth is terminal.
II. Gills are covered by operculum.
III. Skin covered with cycloid and placoid scales
IV. Many of them are viviparous
(a) IV only (b) III and IV only (c) I, III and IV only (d) I and IV only

185. Match item in column I with those given in column II.

Column I	Column II
A. Protochordata	I. Delphinus
B. Limbless amphibia	II. Myxine
C. Oviparous mammal	III. Ornithorhynchus
D. Aquatic mammal	IV. Doliolum
E. Jawless vertebrate	V. Ichthyophis

(a) A-V, B-IV, C-III, D-I, E-II (b) A-IV, B-V, C-III, D-I, E-II
(c) A-IV, B-V, C-III, D-II, E-I (d) A-V, B-III, C-I, D-II, E-IV

186. Which of the following can maintain high and constant body temperature?
I. Chameleon II. Struthio III. Pteropus IV. Clarias
(a) I, II, III and IV (b) III only (c) II and III only (d) II, III and IV only

187. Which of the following is correct w.r.t. classification of *Myxine*?
(a) Chordata, Agnatha, Pisces, Cyclostomata
(b) Chordata, Vertebrata, Agnatha, Cyclostomata
(c) Chordata, Vertebrata, Gnathostomata, Chondrichthyes
(d) Chordata, Vertebrata, Gnathostomata, tetrapoda

188. Which one of the following pairs of animals are similar to each other pertaining to the feature stated against them?
(a) *Pteropus* and *Ornithorhynchus* - Viviparity
(b) Garden lizard and Crocodile - Three chambered heart

(c) *Ascaris* and *Ancylostoma* - Metameric segmentation

(d) Sea horse and Flying fish - Cold blooded (poikilothermous)

189. Which one of the following categories of animals, is correctly described with no single exception in it?

(a) All reptiles possess scales, have a three chambered heart and are cold blooded (poikilothermous)

(b) All bony fishes have four pairs of gills and an operculum on each side.

(c) All sponges are marine and have collared cells.

(d) All mammals are viviparous and possess diaphragm for breathing

190. An aquatic living fossil, with ancient origin and many primitive characters which respires through book gills is

(a) Limulus (b) Cancer (c) Lucifer (d) Daphnia.

191. Which is the only phylum in the kingdom animalia without any nerve cell?

(a) Porifera (b) Coelenterate (c) Annelids (d) Nematode.

192. Which of the following animal belongs to the phylum molluscs?

(a) Devil fish (b) Dog fish (c) Silver fish (d) Jelly fish.

193. In which one of the following the genus name, its two charcters and its phylum are not correctly matched, whereas the remaining three are correct?

	Genus name	Two characters	Phylum
(a)	*Pila* - apple snail	(i) Body Segmented; (ii) Mouth with Radula	Mollusca
(b)	*Asterias*	(i) Spiny Skinned; (ii) Water vascular system	Echinodermata
(c)	*Sycon*	(i) Pore bearing; (ii) Canal system	Porifera
(d)	*Periplaneta*	(i) Jointed appendages; (ii) Chitinous exoskeleton	Arthropoda

194. Match the name of the animal (column I), with on characteristics (column II), and the phylum/class (column III) to which it belongs :

	Column I	Column II	Column III
(1)	Petromyzon	ectoparasite	Cyclostomata
(2)	*Ichthyophis*	terrestrial	Reptilia
(3)	Limulus	body covered by chitinous exoskeleton	Pisces
(4)	Adamsia	radially symmetrical	Porifera

(a) Option (1) (b) Option (2) (c) Option (3) (d) Option (4)

195. Which of the following are correctly matched with respect to their taxonomic classification?

(a) Flying fish, cuttlefish, silverfish - Pisces

(b) Centipede, millipede, spider, scorpion - Insecta

(c) House fly, butterfly, tsetsefly, silverfish - Insecta

(d) Spiny anteater, sea urchin, sea cucumber - Echinodermata

196. Which group of animals belong to the same phylum?

(a) Malarial parasite, Amoeba, Mosquito (b) Earthworm, Pinworm, Tapeworm

(c) Prawn, Scorpion, Locusta (d) Sponge, Sea anemone, Starfish

197. One of the representatives of Phylum Arthropoda is:

(a) cuttlefish (b) silverfish (c) pufferfish (d) flying fish

198. Birds differ from bats in absence of

(a) 4-chambered heart and homoiothermy. (b) Homoiothermy and ear pinna.

(c) Diaphragm and mammary gland. (d) Trachea and pulmonary gland

199. Select the Taxon mentioned that represents both marine and fresh water species :-

(a) Echinoderms (b) Ctenophora (c) Cephalochordata (d) Cnidaria

200. Which one of the following living organisms completely lacks a cell wall?

(a) Cyanobacteria (b) Sea – fan(Gorgonia) (c) Saccharomyces (d) Blue–green algae

201. Planaria possess high capacity of :-

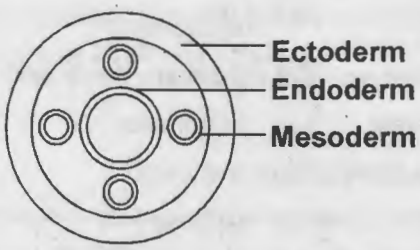
(a) Metamorphosis (b) Regeneration

(c) Alternation of generation (d) Bioluminescence

202. A marine cartilaginous fish that can produce electric current is :-

(a) Pristis (b) Torpedo (c) Trygon (d) Scoliodon

203. The kind of coelom represented in the diagram given below is characteristic of



(a) roundworm (b) earthworm (c) tapeworm (d) cockroach

204. The characteristics of class Reptilia are:

(a) Body covered with dry and cornified skin, scales over the body are epidermal, they do not have external ears

(b) Body covered with moist skin which is devoid of scales, the ear is represented by a tympanum, alimentary canal, urinary and reproductive tracts open into a common cloaca

(c) Fresh water animals with bony endoskeleton, air-bladder to regulate buoyancy

(d) Marine animals with cartilaginous endoskeleton, body covered with placoid scales

205. Which one of the following animals is correctly matched with its one characteristics and the taxon?

	Animal	Characteristic	Taxon
(a)	Duckbilled platypus	Oviparous	Mammalian
(b)	Millipede	Ventral nerve cord	Mammals
(c)	Sea Anemone	Triploblastic	Cnidaria
(d)	Silverfish	Pectoral and Pelvic fins	Chordata

206. Which one of the following groups of animals reproduces only by sexual means?

(a) Ctenophora (b) Cnidaria (c) Porifera (d) Protozoa

207. Select the option which shows correct matching of animal with excretory organs and excretory product

	Animal	Excretory organs	Excretory product
(a)	Housefly	Renal tubules	Uric acid
(b)	*Labeo* (Rohu)	Nephridial tubes	Ammonia
(c)	Salamander	Kidney	Urea
(d)	Peacock	Kidney	Urea

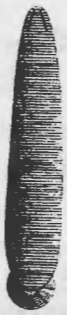
208. Here two basic body forms of cnidarians are given –

(a) A and B are free swimming forms
(b) A and B are sessile form
(c) A produce B asexually and B form the A sexually
(d) B produce A asexually and A form the B sexually

209. How many organisms in the list given below respire through gills
Sponges, Coelenterates, Flatworms, Aquatic arthropods, Molluscs, Fishes, Tadpoles, Reptiles, Aves, Mammals
(a) Three (b) Six (c) Two (d) Four

210. Which one of the statement is true?
(a) All organ system level animals have tube within tube plan
(b) All blind sac animals contain bigerminal conditions
(c) Animals having radial symmetry contain blind sac body plan
(d) All chordates are vertebrates but all vertebrates are not chordates.

211. How many informations are correct about given animal?



(i) Triploblastic, bilateral symmetry
(ii) Metamerically segmented and coelomate animals
(iii) Dioecious
(iv) Closed circulatory systems present
(v) Lateral appendages parapodia present
(a) Five (b) Four (c) Two (d) Three

212.

A

B

C

D

(a) All these animals are aquatic, free living.
(b) All are true coelomates
(c) "A" has radial symmetry but remaining have bilateral symmetry
(d) A is monoecious but remaining are dioecious.

213. Read four statements (I - IV) given below.
I. Polyp is sessile and cylindrical form.
II. Medusa is free swimming and umbrella shaped.
III. Medusae are produced sexually by polyp.
IV. Polyps are produced asexually by medusae.
How many statements are not incorrect –
(a) One (b) Two (c) Three (d) Four

214. Some animals are given in the list below –
Asterias, Pila, Echinus, Antedon, Pinctada, Cucumaria, Octopus, Loligo, Ophiura, Dentalium.
How many animals among these are related to the second largest phylum of animals?
(a) Two (b) Three (c) Four (d) Five

215. Bird differs from bat in the absence of
(a) Homoiothermy (b) Four chambered heart (c) Syrinx (d) Diaphragm

216. Which of the following pairs are correctly matched -
(A) Flame cells - Taenia, Fasciola
(B) Notochord - Balanoglossus
(C) Metagenesis - Physalia and Obelia
(D) Open circulatory system - Apis, Pila and Laccifer
(a) A, B and C (b) A and C (c) A, C and D (d) A and B

217. Among the organisms depicted in figure below which of the following character is common to all?

A. 
B. 
C. 
D. 

(a) Tube within tube body plan (b) Triploblastic free living animals
(c) Respiration by general body surface (d) Nerve cord is ventral, double and solid

218. Identify the given animal and choose the correct option.

(a) The skin is tough, containing minute placoid scales
(b) It has four pairs of gills which are covered by air bladder
(c) Fertilisation is external and is oviparous
(d) Mouth is located ventrally and jaws are very powerful.

219. Read the statements regarding echinoderms.
(i) All are marine with organ system level of organisation.
(ii) Adults are bilaterally symmetrical
(iii) They are dioecious
(iv) Fertilisation is internal and indirect development is observed
(v) Triploblastic and acoelomate animals.
Choose the correct option.
(a) (i) and (iii) are correct (b) (v) alone is correct (c) (i), (iii) and (v) are correct (d) (i) and (v) are correct

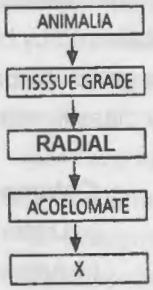
220.

Organ	Phylum	Function
Parapodia	Annelida	A
B	Ctenophora	Locomotion
C	Mollusca	Rasping organ
Malpighian tubules	Arthropoda	D
Cnidoblasts	Coelenterata	E

From the above table find out the missing organ or function – A, B, C, D and E respectively.
(a) A - swimming, B - comb plates, C - radula, D - excretion, E - defense

(b) A - defense, B - radula, C - comb plates, D - excretion, E - swimming
(c) A defense, B - radula, C - comb plates, D - swimming, E - excretion
(d) A - protection, B - parapodia, C - visceral mass, D - locomotion, E - excretion.

221. Identify the Phylum X.



(a) Hemichordata (b) Aschelminthes (c) Platyhelminthes (d) Ctenophora

222. Which one of the following matching pairs is wrong?
(a) Mollusca – Pseudocoel (b) Cnidaria – Nematocyst
(c) Annelida – Chloragogen cells (d) Echinodermata – Water vascular system

223. Which one of the following matching pairs is wrong?
(a) Shell fish – Pisces (b) Silver fish – Arthropoda
(c) Cuttle fish – Mollusca (d) Starfish – Echinodermata

224. Which one of the following is not a characteristic feature of mammals
(a) Diphyodont tooth (b) Ten pairs of cranial nerves
(c) Seven cervical vertebrae (d) Left aortic arch in the circulatory system

225. Which of the following endoparasites of humans does show viviparity?
(a) *Trichinella spiralis* (b) *Ascaris lumbricoides* (c) *Ancylostoma duodenale* (d) *Enterobius vermicularis*

226. Which of the following characteristics is mainly responsible for diversification of insects on land?
(a) Exoskeleton (b) Eyes (c) Segmentation (d) Bilateral symmetry

227. Which of the following animals is not viviparous?
(a) Platypus (b) Whale (c) Flying fox (Bat) (d) Elephant

228. Which of the following represents the correct combination without any exception?

Characteristics	Class
(a) Sucking and circular mouth; jaws absent, integument without scales; paired appendages	Cyclostomata
(b) Body covered with feathers; skin moist & glandular, fore-limbs form wings; lungs with air sacs	Aves
(c) Mammary gland; hair on body; pinnae; two pairs of limbs	Mammalia
(d) Mouth ventral; gills without operculum; skin with placoid scales; persistent notochord	Chondrichthyes

229. Body having meshwork of cells, internal cavities lined with food filtering flagellated cells and indirect development are the characteristics of Phylum.
(a) Mollusca (b) Protozoa (c) Coelenterata (d) Porifera

230. A jawless fish, which lays eggs in fresh water and whose ammocoetes larvae after metamorphosis return to the ocean is
(a) *Periplaneta* (b) *Petromyzon* (c) *Eptatretus* (d) *Hydra*

231. Which of the following featrues is not present in the Phylum - Arthropoda ?
(a) Chitinous exoskeleton (b) Metameric segmentation
(c) Parapodia (d) Jointed appendages

232. Which is the National Aquatic Animal of India ?
(a) Gangetic shark (b) River dolphin (c) Blue whale (d) Sea-horse

233. Which of the following characteristic features always holds true for the corresponding group of animals?
(a) Cartilaginous endoskeleton – Chondrichthyes
(b) Viviparous – Mammalia
(c) Possess a mouth with an upper and a lower jaw – Chordata
(d) 3 - chambered heart with one incompletely divided ventricle – Reptilia

234. Which one of the following characteristics is not shared by birds and mammals ?
(a) Ossified endoskeleton (b) Breathing using lungs (c) Viviparity (d) Warm blooded nature

235. Match Column – I with Column – II for housefly classification and select the correct option using the codes given below :

	Column-I	Column-II
	a. Family	(i) Diptera
	b. Order	(ii) Arthropoda
	c. Class	(iii) Muscidae
	d. Phylum	(iv) Insecta

Codes :

	a	b	c	d		a	b	c	d
(a)	iv	iii	ii	i	(b)	iv	ii	i	iii
(c)	iii	i	iv	ii	(d)	iii	ii	iv	i

236. Choose the correct statement.
(a) All reptiles have a three–chambered heart. (b) All pisces have gills covered by an operculum.
(c) All mammals are viviparous. (d) All cyclostomes do not possess jaws and paired fins.

237. Which one of the following features is common to Earthworm, Butterfly, Spider and Prawn ?
(a) Setae (b) Antenae (c) Ventral nerve cord (d) Nephridia

238. Echinococcus is an example of
(a) Nemathelminthes (b) Platyhelminthes (c) Bacteria (d) Protista.

239. The group Chordata is most closely related evolutionarily to the group
(a) Arthropoda (b) Echinodermata (c) Mollusca (d) Annelida

240. Which of the following is characteristic of the Chondrichthyes?
(a) Jaws can open 180 degrees. (b) They do not have scales.
(c) Skeleton is composed mostly of bone (d) All of the above

241. The scales found on sharks are known as
(a) Placoid scales (b) Ganoid scales
(c) Ptenoid scales (d) None of the above : Sharks don't have scales

242. Most mammals are characterized by
(a) having hair
(b) nourishing young with milk from mammary glands
(c) development of offspring within their mother's uterus
(d) All of the above

243. Which characteristic of many different animal groups is associated with bilateral symmetry?
(a) Cephalization (b) Sessile life style (c) Autotrophy (d) Radial body plan

244. Which of the following is a key evolutionary innovation of the Insecta?
(a) The keratinized cuticle (b) Forelimbs developed as wings
(c) Segmented body form (d) Winged flight

245. Which of the following is not a character uniting all chordates?
(a) Notochord (b) Spinal column
(c) Dorsal, hollow nerve tube (d) Pharyngeal slits

246. Vertebrates generally have all of the following characteristics, except
(a) Cephalization (b) Spinal columns
(c) A chitinous endoskeleton (d) A closed circulatory system

247. The basic adaptation of birds is winged flight. Which one of the following structural changes in birds is not closely related to flight?
(a) Good hearing (b) Good eyesight
(c) Good muscular coordination (d) Hollow bones

248. All mammals have all of the following traits, except
(a) Amnion (b) Chorion (c) Placenta (d) hair

249. An important characteristic that Hemichordates share with Chordates is :
(a) Ventral tubular nerve cord (b) Pharynx with gill slits
(c) Pharynx without gill slits (d) Absence of notochord

250. Which of the following represents order of 'Horse' ?
(a) Perissodactyla (b) Caballus (c) Ferus (d) Equidae

251. In case of poriferans, the spongocoel is lined with flagellated cells called:
(a) oscula (b) choanocytes (c) mesenchymal cells (d) ostia

252. Choose the correct combination of the animals 1 and 2 with the feature that differentiates them.

	Animal 1	Animal 2	Feature
(a)	Lizard	Tiger	Amniotic egg
(b)	Shark	Frog	Lungs
(c)	Tiger	Gorilla	Hair
(d)	Gorilla	Human	Loss of tail

253. The set of annelid characters that are share by leeches is -
(i) setae for locomotion
(ii) metameric segmentation
(iii) indeterminate number of segments
(iv) presence of clitellum
(v) hermaphroditism
(a) i, ii and iii (b) ii, iii and iv (c) only iv (d) only ii and v

254. How many characters in the list given below are true regarding echinodermata.
I. Endoskeleton of calcareous ossicles.
II. Mostly marine.
III. Larva are radially symmetrical.
IV. Fertilisation is generally external.
V. Mouth is on dorsal side and anus on ventral side.
VI. Excretory organ is gills.
VII. Development is indirect.
(a) Two (b) Three (c) Four (d) Five

255. Identify the vertebrate group of animals characterized by crop and gizzard in its digestive system
(a) Aves (b) Reptilia (c) Amphibia (d) Osteichthyes

256. Which one of these animals is not a homeotherm?
(a) Camelus (b) Chelone (c) Macropus (d) Psittacula

257. Which of the following animals does not undergo metamorphosis?
(a) Moth (b) Tunicate (c) Earthworm (d) Starfish

258. In which disease does mosquito transmitted pathogen cause chronic inflammation of lymphatic vessels?
(a) Ringworm disease (b) Ascariasis (c) Elephantiasis (d) Amoebiasis

259. Select the correct matching.

	Phylum	Character	Example
(a)	Hemichordata	Notochord	*Balanoglossus*
(b)	Mollusca	Radula	*Dentalium*
(c)	Platyhelminthes	Coelomate	*Dugesia*
(d)	Coelenterata	All marine	*Hydra*

260. Which of the following option is correct?

(a) Osteichthyes – 4 pairs of gill slits covered by operculum

(a) Chondrichthyes – 6-15 pairs of gill slits

(c) Arthropoda – Metamerism and excretion by nephridia

(d) Platyhelminthes – Bilateral symmetry & coelomate e.g., *Taenia* and *Fasciola*

261. Which of the following is correct

(a) *Macropus* – Ear pinna, body hairs, 4 chambered heart

(b) *Pavo* – Long bones ossified, fore limbs modified to wings

(c) *Ichthyophis* – Covering on eyelids, Scales present

(d) *Limulus* – Chitinous exoskeleton, 3 pair of legs

262. Which among the following belong to same phyla?

(a) *Physalia*, *obelia*, *Pleurobranchia* – Coelenterata

(b) *Bombyx*, *Palaemon*, *Limulus* – Arthropoda

(c) Star fish, jelly fish, Sea urchin – Echinodermata

(d) Cuttle fish, devil fish, *Patella* – mollusca

263. Which is **wrong** w.r.t figure given below?

(a) *Salamandra* (b) Tympanum (c) Anus (d) Heart 3-chambered

264. Which is **true** w.r.t figure?

(a) Operculum (b) True lungs (c) Electric organ (d) Poison sting at tail

265. Select the group of animals in which jointed appandages are found?

(a) *Limulus, Apis and Laccifer* (b) *Limulus, Neries and Laccifer*

(c) *Locust, Flae and Snail* (d) *Apis, Laccifer and Unio*

266. Which of the following option is correct regarding animal kingdom?

	Phylum	Symmetry	Example	Characteristic property
(a)	Cocelentrata	Bilateral	Hydra	Aquatic, Marine
(b)	Annelida	Bilateral	Ancylostama	Hooks and Suckers present
(c)	Platyhelminthes	Bilateral	Planaria	High regeneration capacity
(d)	Mollusca	Radial	Pinctada	Aquatic

267. Which of the following have internal fertilization?
(a) Sea urchin (b) Platypus (c) Frog (d) Labeo

268. Which of the following is correctly matched with its characters?

	Animal	Phylum	Character
(a)	Planara	Platyhelminthes	Regeneration
(b)	Pleurobrachia	Cndaria	Combplate
(c)	Adamsia	Annelida	Cnidoblast
(d)	Pheretina	Aschehninthes	Flame cell

269. Animal of which phylum have hooks and suckers and are endoparasite on other animals
(a) Platyhelminthes (b) Annelida (c) Ascheminthes (d) Arthropoda

270. Acoelomate animals with flame cells are :
(a) Platyhelminthes (b) Annelida (c) Ascheminthes (d) Arthropoda

271. Consider following features
I. Organ system level of organisation
II. Bilateral symmetry
III. True coelomates with segmentation of body
Select the correct option of animal groups which possess all the above characteristics
(a) Annelida, Arthropoda and Chordata (b) Annelida, Arthropoda and Mollusca
(c) Arthropoda, Mollusca and Chordata (d) Annelida, Mollusca and Chordata

272. Which of the following statements is incorrect?
(a) Viroids lack a protein coat. (b) Viruses are obligate parasites.
(c) Infective constituent in viruses is the protein coat. (d) Prions consist of abnormally folded proteins.

273. Match the following organisms with their respective characteristics :

I. Pila	(i) Flame cells
II. Bombyx	(ii) Comb plates
III. Pleurobrachia	(iii)Radula
IV. Taenia	(iv) Malpighian tubules

Select the correct option from the following :

	I.	II.	III.	IV.
(a)	(iii)	(ii)	(i)	(iv)
(b)	(iii)	(iv)	(ii)	(i)
(c)	(ii)	(iv)	(iii)	(i)
(d)	(iii)	(ii)	(iv)	(i)

274. Match the following genera with their respective phylum :

1. Ophiura	(i) Mollusca
2. Physalia	(ii) Platyhelminthes
3. Pinctada	(iii)Echinodermata
4. Planaria	(iv) Coelenterata

Select the correct option :
(a) 1.-(iii), 2.-(iv), 3.-(ii), 4.-(i) (b) 1.-(iv), 2.-(i), 3.-(iii), 4.-(ii)
(c) 1.-(iii), 2.-(iv), 3.-(i), 4.-(ii) (d) 1.-(i), 2.-(iii), 3.-(iv), 4.-(ii)

276. Which of the following animals are true coelomates with bilateral symmetry ?
(a) Annelids (b) Adult Echinoderms (c) Aschelminthes (d) Platyhelminthes

4

ANIMAL KINGDOM

1. a	2. d	3. c	4. a	5. b	6. d	7. c	8. d	9. a	10. d
11. b	12. b	13. d	14. b	15. d	16. a	17. d	18. c	19. d	20. b
21. c	22. c	23. d	24. d	25. b	26. d	27. c	28. b	29. b	30. b
31. d	32. c	33. d	34. c	35. d	36. c	37. d	38. d	39. d	40. b
41. d	42. c	43. d	44. d	45. d	46. a	47. b	48. a	49. d	50. d
51. a	52. d	53. d	54. b	55. c	56. d	57. a	58. a	59. d	60. d
61. b	62. a	63. c	64. b	65. d	66. d	67. d	68. c	69. d	70. d
71. b	72. a	73. d	74. b	75. c	76. b	77. b	78. d	79. d	80. d
81. a	82. d	83. d	84. a	85. b	86. d	87. d	88. a	89. a	90. a
91. c	92. d	93. b	94. c	95. a	96. c	97. b	98. c	99. b	100. d
101. d	102. d	103. a	104. d	105. d	106. a	107. b	108. b	109. c	110. a
111. c	112. c	113. a	114. d	115. a	116. d	117. b	118. a	119. c	120. c
121. c	122. a	123. a	124. a	125. b	126. b	127. d	128. c	129. a	130. d
131. b	132. b	133. c	134. a	135. c	136. a	137. a	138 b	139. c	140. c
141. c	142. a	143. b	144. a	145. d	146. b	147. d	148. a	149. d	150. a
151. c	152. a	153. a	154. b	155. a	156. c	157. b	158. c	159. a	160. c
161. a	162. c	163. b	164. a	165. d	166. d	167. d	168. b	169. c	170. c
171. b	172. c	173. c	174. a	175. d	176. d	177. c	178. d	179. d	180. c
181. d	182. c	183. a	184. b	185. b	186. c	187. b	188. d	189. b	190. a
191. a	192. a	193. a	194. a	195. c	196. c	197. b	198. c	199. d	200. b
201. b	202. b	203 a	204. a	205. a	206. a	207. c	208. d	209. d	210. a
211. d	212. d	213. b	214. d	215. d	216. c	217. d	218. c	219. a	220. a
221. d	222. a	223. a	224. b	225. a	226. a	227. a	228. d	229. d	230. b
231. c	232. b	233. a	234. c	235. c	236. d	237. c	238. b	239. b	240. a
241. a	242. d	243. a	244. d	245. b	246. c	247. a	248. c	249. b	250. a
251. b	252. b	253. d	254. b	255. a	256. b	257. c	258. c	259. b	260. a
261. a	262. b	263. c	264. a	265. a	266. c	267. b	268. a	269. a	270. a
271. a	272. c	273. b	274. c	275. a					

5 MORPHOLOGY OF FLOWERING PLANT

Roots developing from plant parts other than radicle are –
(a) Epiphyllous (b) Epicaulous (c) Adventitious (d) Fibrous

Primary roots and its branches constitute –
(a) Adventitious root system (b) Tap root system
(c) Fibrous roots (d) Seminal roots

In monocotyledonous plants e.g. wheat, the primary root is short lived and is replaced by a large number of roots. These roots originate from the base of the stem and constitute the –
(a) Prop roots (b) Pneumatophores (c) Napiform (d) Fibrous roots

Root formed from prolongation of radicle is –
(a) Primary root (b) Secondary root (c) Tertiary root (d) Seminal root

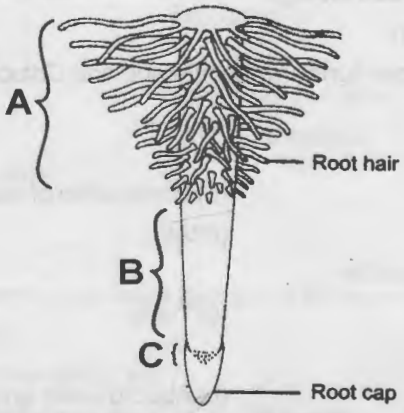
Adventitious roots are adventitious in their –
(a) Function (b) Position (c) Place of origin (d) Internal structure

Root is distinguishable from stem in –
(a) Having a root cap (b) having root hairs (c) Absence of nodes and internodes (d) All of the above

Pneumatophores are useful in –
(a) Respiration (b) Transpiration (c) Guttation (d) Protein synthesis

Root hairs develop from –
(a) Region of maturation (b) Zone of elongation (c) Meristematic region (d) Region of mature cells

Regions of root from base to root tip are –
(a) Maturation zone - Cell division zone - Elongation zone
(b) Maturation zone - Elongation zone - Cell division zone
(c) Cell division zone - Elongation zone - Maturation zone
(d) Elongation zone - Cell division zone - Maturation zone



The above figure is related to the root-tip. Identify zones A, B and C
(a) A - zone of elongation, B - zone of meiosis, C - zone of mitosis
(b) A - zone of maturation, B - zone of meristematic activity, C - zone of elongation
(c) A - zone of mitosis, B - zone of elongation, C - zone of root cap
(d) A - region of maturation, B - region of elongation, C - meristematic activity

Root is meant for –
(a) The fixation of plant (b) Absorption of water (c) Storage of food (d) All of the above

Stilt roots grow from –

(a) Lower internodes (b) Lower nodes (c) Upper nodes (d) Upper internodes

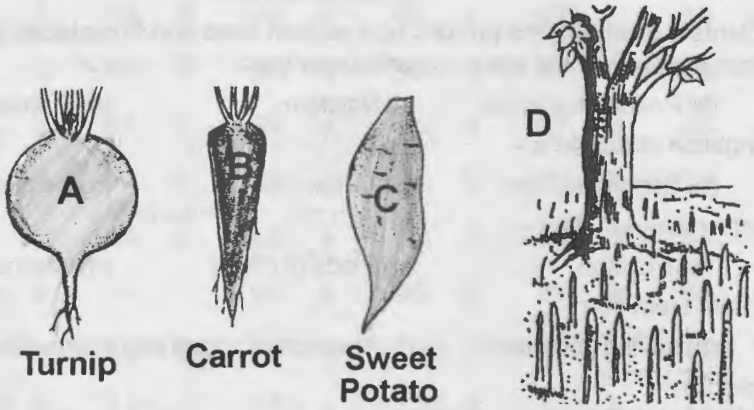
13. Stilt roots are reported from –
(a) Maize (b) Radish (c) Mango, Ginger (d) *Bryophyllum*

14. Prop or pillar roots in Banyan tree are –
(a) Fasciculated roots (b) Tap roots (c) Adventitious roots (d) Secondary roots

15. A few millimeters above the root cap is the region of –
(a) Elongation (b) Maturation (c) Meristematic activity (d) Root hairs

16. Pneumatophores are found in plants growing in swampy areas. Such roots are seen in –
(a) *Ficus* (b) *Colocasia* (c) *Rhizophora* (d) *Alstonia*

17.



Which of the following is incorrect about A, B, C and D –
(a) Tap roots of carrot, turnip and adventitious root of sweet potato, get swollen and store food
(b) Pneumatophores help to get oxygen for respiration
(c) Pneumatophore is found in the plants that grow in sandy soil.
(d) A, B and C are underground roots but D grows vertically upwards

18. Which of the following is correct –
(a) In *Asparagus*, root is modified for food storage
(b) Prop root is for mechanical support
(c) Underground stems of potato, ginger, turmeric, zaminkand and *Colocasia* are modified to store food in them
(d) All

19. Function of stem is –
(a) To bear leaves and branches (b) Conduction of water and minerals
(c) Conduction and storage of food (d) All

20. One of the following is not a root vegetable –
(a) Sweet potato (b) Potato (c) Turnip (d) Carrot

21. Primary function of stem is to –
(a) Bear and hold leaves (b) Absorb water and minerals
(c) Fixation of plants (d) Help in vegetative reproduction

22. The stem develops from –
(a) Hypocotyl (b) Epicotyl (c) Radicle (d) Plumule

23. Stem tendrils (climbing in function) develop from axillary bud. Stem tendrils are in all of the following except –
(a) Cucumber (b) *Citrus* (c) Pumpkin (d) Watermelon and gravevines

24. Thorn of *Citrus* and *Bougainvillea* is modified –
(a) Stem (b) Root (c) Leaf (d) Inflorescence

25. Thorn develops from –

(a) Root (b) Leaf (c) Axillary bud (D) Peduncle

26. Some plants of arid regions modify their stems into flattened (*Opuntia*), or fleshy cylindrical (*Euphorbia*) green structures called –
(a) Phyllode (b) Rhizome (c) Phylloclade (d) Cladode

27. In Banana, Pineapple and *Chrysanthemum*, the lateral branches originate from the basal and underground portion of mainstem and then come obliquely upward giving rise to leafy shoots. These branches are called –
(a) Runner (b) Sucker (c) Napiform (d) Phylloclade

28. Offset is one internode long runner and its each node bears rosette of leaves and a tuft of roots. It is found in aquatic plants like –
(a) *Hydrilla* (b) *Pistia* (c) *Eichhornia* (d) Both b and c

29. In plants like Jasmine and Mint, a slender lateral branch arises from the base of main axis and after growing aerially for some time arch downwards to touch the ground and forms new plant. Such lateral branches are called –
(a) Offset (b) Sucker (c) Stolon (d) Scramblers

30. In which of the following plants, underground stems spread to new niches and when older parts die new plants are formed –
(a) *Pistia* (b) Grasses and strawberry
(c) *Crocus* (d) None of these

31. Leaves –
(a) originate from shoot apical meristem
(b) Are arranged in an acropetal order
(c) Are the most important vegetative organs for photosynthesis
(d) All

32. Which of the following is correct?
(a) The leaf is a lateral, generally flattened structure on stem
(b) A typical leaf consists of three main parts (leafbase, petiole and lamina)
(c) Stipule is the lateral appendage of leafbase
(d) All

33. Presence of sheathing leafbase covering the stem partially or wholly is the characteristic of certain –
(a) Monocots (b) Fern (c) *Cycas* (d) Coconut

34. Leafbase is swollen to form pulvinus in –
(a) Some leguminous plants (b) Some crucifers
(c) Some monocots (d) Some cycads

35. What is the function of thin flexible petiole?
(a) It helps the plant to climb
(b) It increases the rate of respiration
(c) It allows leaf blade / lamina to flutter in wind there by cooling the leaf and bringing fresh air to leaf surface
(d) It decreases the rate of transpiration

36. Which of the following statements is false about leaf?
(a) A leaf is said to be simple, when its lamina is entire or when incised, the incisions do not touch the midrib
(b) A leaf is said to be compound when the incisions of lamina reach upto the midrib breaking into a number of leaflets
(c) Leaf is the most important vegetative organ for photosynthesis
(d) Leaf is not a transpiratory organ

37. Multifoliate compound leaf (Palmate compound leaf) is found in –
(a) Tamarind (b) Silkcotton (*Bombax*) (c) *Moringa* (d) Rose

38. In a Pinnate compound leaf (as seen in Neem) a number of leaflets are present on a common axis, the rachis. The rachis represents the –

(a) Vein (b) Veinlet (c) Mid rib (d) Petiole

39. Match Column I with Column II –

Column I	Column II
A. Bud in the axil of leaf	I. Pitcher plant and Venus Fly trap
B. Bud is absent in the axil of leaflets	II. *Cacti*
C. Spines (modified leaves)	III. Compound leaf
D. Leaves modified to catch insects	IV. Simple leaf
E. Fleshy leaves with stored food	V. Garlic and onion

	A	B	C	D	E
(a)	I	II	III	IV	V
(b)	V	IV	III	II	I
(c)	IV	III	II	I	V
(d)	IV	II	III	I	V

40. Arrangement of leaves on stem or its branches is called –

(a) Phyllotaxy (b) Venation (c) Vernation (d) Heterophylly

41. Palmate compound leaf is the one in which the leaflets develop from a common point i.e. at the tip of –

(a) Rachis (b) Branch of rachis (c) Petiole (d) peduncle

42. In which of the following plants, the leaves are small and short-lived, the petioles expand and become photosynthetic to form phyllode

(a) Pitcher plant (b) *Bombax* (c) Australian *Acacia* (d) *Centella*

43. Leaves are modified into tendrils in –

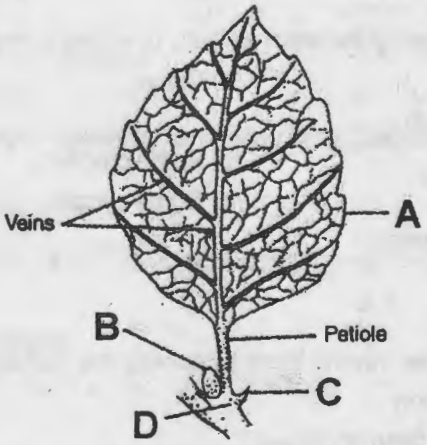
(a) *Parkinsonia* (b) Pea (c) *Ranunculus* (d) *Oxalis*

44. Identify the order where plants show alternate, opposite and whorled phyllotaxy –

(a) China rose, *Calotropis* and *Nerium* (b) China rose, *Nerium* and *Calotropis*

(c) *Nerium* , *Calotropis* and China rose (d) *Calotropis*, China rose and *Nerium*

45.



Given below is the diagram of a typical leaf. In which of the following all the four parts labelled as A, B, C and D are correctly identified –

	A	B	C	D
(a)	Lamina	Axillary bud	Stipule	Leaf base
(b)	Lamina	Stipule	Axillary bud	Leaf base
(c)	Lamina	Axillary bud	Stipule	Pedicel
(d)	Leaflet	Axillary bud	Stipule	Leaf base

46. Arrangement of flowers on floral axis is called –
(a) Placentation (b) Phyllotaxy (c) Inflorescence (d) Angiology

47. Inflorescence is meant for –
(a) Bearing flower
(b) Ensuring cross pollination
(c) Protection of flower
(d) Fruits formation

48. Racemose inflorescence is identified by –
(a) Acropetal arrangement of flowers on peduncle
(b) Presence of sessile flowers
(c) Continuous growth of main axis
(d) a and c

49. Cymose inflorescence is identified by –
(a) Basipetal arrangement of flowers on the main axis (peduncle)
(b) The limited growth of the main axis as main axis terminates in a flower
(c) Both a and b
(d) Presence of sessile flower

50. 

Identify A and B inflorescence –
(a) A - Cymose, B - Racemose
(b) A - Racemose, B - Cymose
(c) A - Racemose, B - Racemose
(d) A - Cymose, B - Cymose

51. A flower is –
(a) A modified shoot
(b) The reproductive unit in angiosperms
(c) The reproductive unit of gymnosperms
(d) a and b

52. Which of the following perianths are found?
(a) Lily (b) China rose (c) Rose (d) Pea

53. Which of the following flowers is not actinomorphic (radially symmetry)?
(a) Mustard (b) *Datura* (c) Chilli (d) Pea

54. Choose the incorrect match –
(a) Zygomorphic flowers (Bilateral symmetry) – pea, gulmohur, bean, *Cassia*
(b) Asymmetric (irregular flower) – *Canna*
(c) Inferior ovary – pea
(d) Superior ovary / Hypogynous flower – mustard, china rose and brinjal

55. Which of the following is an incorrect match?
(a) Perigynous flower – Plum, rose and peach
(b) Monadelphous - Pea
(c) Epigynous flower – Guava, cucumber, and ray florets of sunflower
(d) Polyadelphous – *Citrus*

56. Didynamous (2 long and 2 short stamens) condition is seen in –
(a) *Salvia*, Tulsi (b) Litchi, pea (c) Mustard, onion (d) *Datura, mango*

57. Tetradynamous (2 short and 4 long stamens) condition is seen in –
(a) *Salvia* (b) Mustard (c) *Datura* (d) China rose

58. Match the Column I with Column II –

Column I	Column II
A. Gamosepalous	I. Flower of lily
B. Polysepalous	II. Sterile anther
C. Gamopetalous	III. Free petals
D. Polypelatous	IV. Free sepals
E. Epiphyllous	V. Fused petals
F. Staminode	VI. Fused sepals

	A	B	C	D	E	F
(a)	IV	V	III	I	VI	II
(b)	IV	V	III	I	II	VI
(c)	VI	IV	V	III	I	II
(d)	VI	IV	V	III	II	I

59. Epiphyllous condition is indicated by –

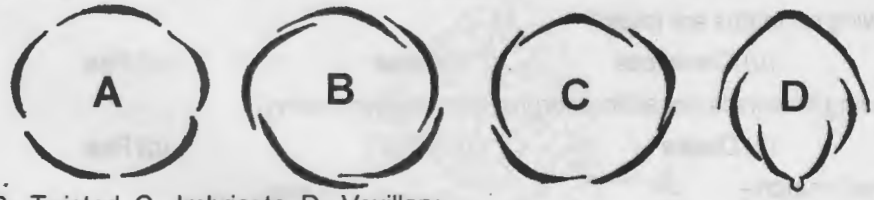
(a) C A (b) A G (c) K C (d) P A

60. Match the Column I with Column II –

Column I (Aestivation in Corolla)	Column II (Examples)
A. Valvate	I. China rose, Lady's finger, cotton
B. Twisted	II. *Calotropis*
C. Imbricate	III. *Cassia*, Gulmohur
D. Vexillary (papillionaceous)	IV. Pea, Beans

(a) A - II, B - I, C - III, D - IV (b) A - II, B - I, C - IV, D - III
(c) A - I, B - II, C - III, D - IV (d) A - II, B - IV, C - I, D - III

61. Identify the types of aestivation shown in the following diagram –



(a) A - Valvate, B - Twisted, C - Imbricate, D - Vexillary
(b) A - Vexillary, B - Valvate, C - Twisted, D - Imbricate
(c) A - Imbricate, B - Vexillary, C - Valvate, D - Twisted
(d) A - Twisted, B - Imbricate, C - Vexillary, D - Valvate

62. Name the petals A, B, and C in vexillary aestivation shown in the above figure –

(a) A - Standard, B - Wing, C - Perianth (b) A - Standard, B - Keel, C - Wing
(c) A - Wing, B - Keel, C - Wing (d) A - Standard, B - Wing, C - Keel

63. Match the Column I with Column II –

Column I	Column II
A. Calyx	I. Carpel or carpels
B. Corolla	II. Group of stamen
C. Androecium	III. Group of petals
D. Gyanoecium	IV. Group of sepals

(a) A - IV, B - III, C - II, D - I (b) A - I, B - II, C - III, D - IV (c) A - IV, B - II, C - III, D - I (d) A - I, B - III, C - II, D - IV

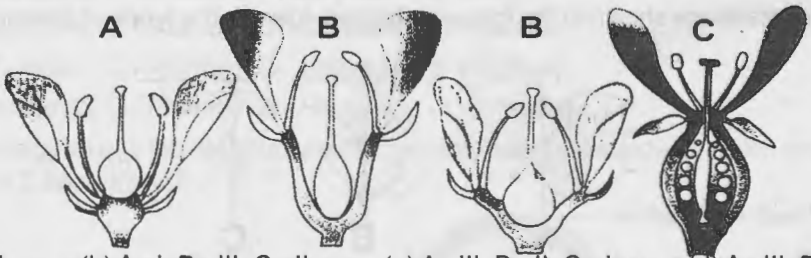
64. Match the Column I with Column II

Column I	Column II
A. Hypogynous flower	I. Margin of thalamus grows enclosing ovary completely and getting fused with it, the other parts of flower arise above the ovary
B. Perigynous flower	II. Gynoecium is situated in the centre and other parts of flower are located on the rim of thalamus almost at the same level
C. Epigynous flower	III. Gynoecium occupies the highest position while other parts are below it.

	A	B	C
(a)	I	II	III
(b)	III	II	I
(c)	III	I	II
(d)	I	III	II

65. Match the following figures with I, II and III –

I - Hypogynous flower II - Perigynous flower III - Epigynous flower



(a) A - I, B - II, C - III (b) A - I, B - III, C - II (c) A - III, B - II, C - I (d) A - III, B - I, C - II

66. Pollen receptor in gynoecium is its –
(a) Ovary (b) Style (c) Stigma (d) Thalamus

67. Which of the following statements is incorrect?
(a) Gynoecium (female reproductive part of the flower) is made up of one or more carpels
(b) A carpel consists of stigma, style and ovary
(c) Stigma connects with ovule (d) Style connects the ovary to the stigma

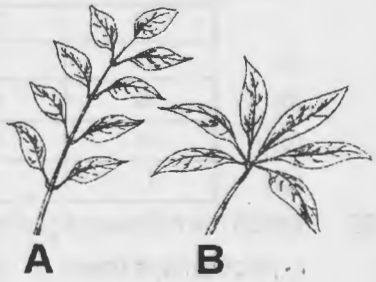
68. Match the Column I and Column II with Column III –

Column I	Column II	Column III
A. Marginal	I. 	1. Sunflower. Marigold
B. Axile	II. 	2. *Dianthus, Primrose*
C. Parietal	III. 	3. Mustard, *Argemone*
D. Free Central	IV. 	4. China rose, Tomato, Lemon
E. Basal	V. 	5. Pea

(a) A - V, 5; B - II, 4; C - I, 3; D - III, 2; E - IV, 1 (b) A - I, 5; B - II, 4; C - III, 3; D - IV, 2; E - V, 1
(c) A - V, 1; B - II, 4; C - I, 2; D - III, 3; E - IV, 5 (d) A - V, 1; B - III, 2; C - II, 4; D - I, 5; E - IV, 3

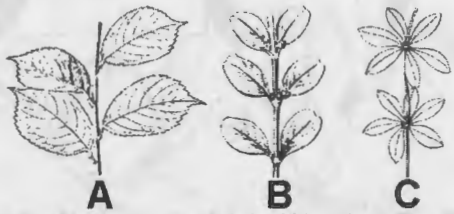
69. Which of the following combinations is false?
(a) Apocarpous - Carpels free - Lotus, Rose
(b) Syncarpous - Carpels fused - Mustard, tomato
(c) Placenta - arrangement of ovules within ovary
(d) Arrangement of ovules within ovary - ovulation

70. Identify A and B leaves –



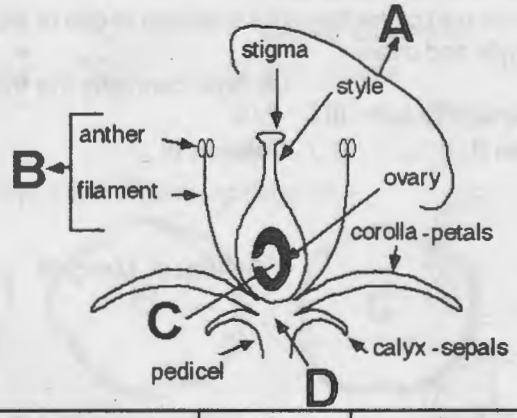
(a) A - Pinnately compound leaf, B - Palmately compound leaf
(b) A - Palmately compound leaf, B - Pinnately compound leaf
(c) A - Pinnately compound leaf, B - Pinnately compound leaf
(d) A - Palmately compound leaf, B - Palmately compound leaf

71. Different types of phyllotaxy are shown in the following figures. Identify the types of phyllotaxy (A, B and C).



(a) A - Alternate, B - Opposite, C - Whorled (b) A - Whorled, B - Opposite, C - Alternate
(c) A - Alternate, B - Whorled, C - Opposite (d) A - Whorled, B - Alternate, C - Opposite

72. Given below is the diagram of a typical flower. In which one of the options all the four parts A, B, C and D are correct?



	A	B	C	D
(a)	Gynoecium	Megasporophyll	Ovule	Thalamus
(b)	Gynoecium	Stamen	Seed	Thalamus
(c)	Microsporophyll	Stamen	Ovule	Thalamus
(d)	Gynoecium	Stamen	Ovule	Thalamus

73. Parts of the fruit : Figure - I — Mango, Figure - II — Coconut are shown in the following diagram. A, B, C and D are respectively –

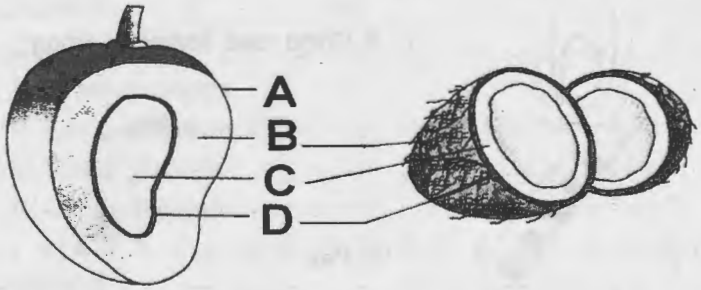
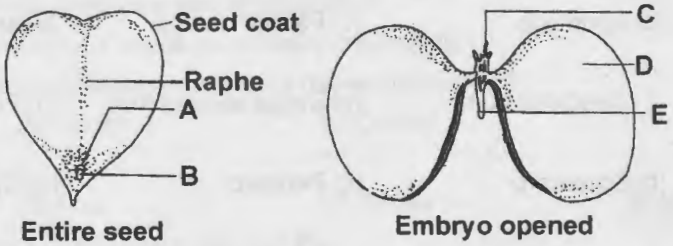


Figure - I **Figure - II**

(a) Epicarp, Mesocarp, Seed, Endocarp (b) Epicarp, Mesocarp, Ovule, Endocarp

(c) Epicarp, Mesocarp, Ovary, Endocarp (d) Epicarp, Mesocarp, Embryo, Endocarp

74. Given below is the diagram of a typical structure of dicotyledonous seeds. In which one of the options all the five parts A, B, C, D and E are correct?



Entire seed Embryo opened

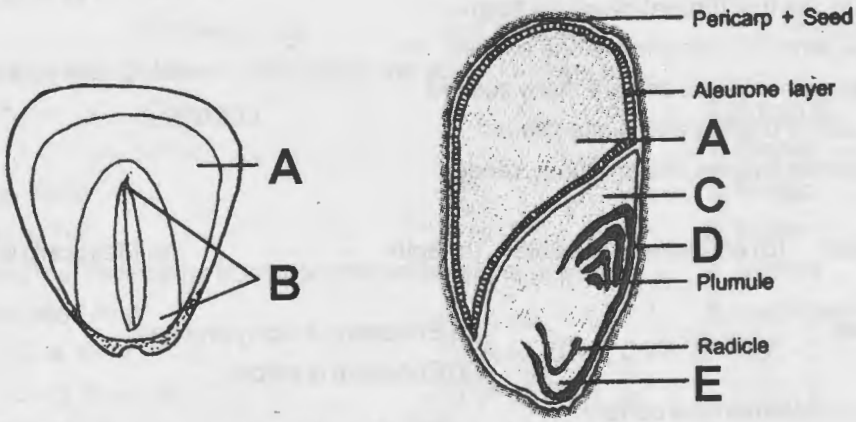
(a) A - Hilum, B - Micropyle, C - Radicle, D - Cotyledon, E - Plumule

(b) A - Hilum, B - Micropyle, C - Plumule, D - Cotyledon, E - Radicle

(c) A - Micropyle, B - Hilum, C - Plumule, D - Cotyledon, E - Radicle

(d) A - Hilum, B - Micropyle, C - Plumule, D - Radicle, E - Cotyledon

75. Given below is the diagram of a typical structure of monocotyledonous seeds. In which one of the options all the five parts A, B, C, D and E are correct?



(a) A - Endosperm, B - Embryo, C - Scutellum, D - Coleorrhiza, E - Coleoptile

(b) A - Embryo, B - Endosperm, C - Scutellum, D - Coleoptile, E - Coleorrhiza

(c) A - Endosperm, B - Embryo, C - Scutellum, D - Coleoptile, E - Coleorrhiza

(d) A - Embryo, B - Endosperm, C - Scutellum, D - Coleorrhiza, E - Coleoptile

76. In marginal placentation, the ovules are arranged –

(a) Along the inner wall of the carpel in a syncarpous ovary

(b) Along the margin of single carpel

(c) In the middle of the ovary

(d) To the base of the ovary

77. Axile placentation is found in syncarpous ovaries. In this placentation the ovules are arranged along the –

(a) Base of the ovary (b) Margin of the ovary

(c) Axis in the centre of the ovary (d) None of the above

78. In a multicarpellary syncarpous unilocular ovary, if the ovules are arranged in a column (in the centre) this is defined as–

(a) Marginal placentation (b) Parietal placentation (c) Axile placentation (d) Free central placentation

79. Basal placentation develops when the ovary has –

(a) Single ovule (b) Many ovules (c) Many locules (d) Single ovule in each locule

80. Ovary is one chambered but it may be two or more chambered due to formation of the false septa and ovules develop on the inner wall of the ovary or on peripheral part. In this case placentation is –
(a) Parietal (b) Marginal (c) Axile (d) Basal

81. The fruit is a characteristic of –
(a) Gymnosperms only (b) Dicots only (c) Monocots only (d) Flowering plants only

82. The formation of fruit from ovary without fertilization is called –
(a) Parthenogenesis (b) Apomixis (c) Parthenocarpy (d) Amphimixis

83. Parthenocarpic fruit is a –
(a) Seeded fruit (b) Seedless fruit (c) Single seeded fruit (d) Fruit of no use

84. The wall of fruit is called –
(a) Epicarp (b) Sporocarp (c) Pericarp (d) Cytocarp

85. Pericarp is –
(a) Always dry (b) Always fleshy (c) May be dry or fleshy (d) Neither fleshy nor dry

86. Thick and fleshy pericarp is differentiated into –
(a) Epicarp and endocarp
(b) Epicarp, mesocarp and endocarp
(c) Epicarp and sporocarp
(d) Sporocarp and cystocarp

87. In mango and coconut, fruit is known as a
(a) Legume (b) Drupe (c) Nut (d) Cystocarp

88. In mango and coconut, the fruit (drupe) develops from –
(a) Monocarpellary superior ovaries and are one seeded
(b) Monocarpellary superior ovaries and are many seeded
(c) Polycarpellary superior ovaries and is one seeded
(d) Polycarpellary superior ovaries and are many seeded

89. In coconut –
(a) Mesocarp is fibrous (b) endosperm is edible (c) Both (d) Mesocarp is edible

90. In mango –
(a) Mesocarp is edible
(b) Endocarp is stony and hard
(c) Both a and b
(d) Endocarp is edible

91. Which of the following statements is correct?
(a) The ovules after fertilization, develop into seeds
(b) A seed consists of a seed coat and an embryo
(c) The embryo consists of a radicle, an embryonal axis and one or 2 cotyledons
(d) All

92. One cotyledon is found in –
(a) Wheat and maize (b) Gram and pea (c) Bean and gram (d) Ground nut and pea

93. The seedcoat has 2 layers, the outer _____ and inner _____. The _____ is a scar on th seedcoat through which the developing seeds are attached to the fruit. Above the _____ is a small pore calle the _____.
(a) Testa, tegmen, hilum, hilum, micropyle
(b) Tegmen, testa, hilum, hilum, micropyle
(c) Testa, tegmen, micropyle, micropyle, hilum
(d) Tegmen, testa, micropyle, micropyle, hilum

94. At the two ends of the embryonal axis, are present in dicot seeds –
(a) The endosperm
(b) Coleorrhiza and coleoptile
(c) Radicle and plumule
(d) Epicarp

95. In castor, the food storing tissue is –
(a) Cotyledon (b) Endosperm (c) Testa (d) Tegmen

96. Which of the following is not non-endospermous seed (in matured condition)?

(a) Bean, gram, pea (b) Coconut, cereals (e.g. maize)
(c) Both (d) Mango

97. Find out the false statement –
(a) In dicotyledonous seeds, cotyledons are often fleshy and full of reserve food
(b) Generally, mocotyledonous seeds are endospermic
(c) Generally, dicotyledonous seeds are non-endospermic
(d) Most of the monocotyledonous seeds have fleshy cotyledons

98. Which of the following monocotyledonous seeds is non-endospermic?
(a) Maize (b) Coconut (c) Orchid (d) Wheat

99. Maize grain is a –
(a) Seed (b) Fruit (c) Flower (d) Inflorescence

100. The aleurone layer in maize grain is specially rich in –
(A) Proteins (b) Starch (c) Lipids (d) Auxins

101. The structure coleorrhiza in a maize grain is the covering of –
(a) Radicle (b) Plumule (c) Scutellum (d) Aleurone layer

102. In a cereal grain, the single cotyledon (shield shaped) of embryo is represented by –
(a) Coleoptile (b) Coleorhiza (c) Scutellum (d) Prophyll

103. Plumule is covered by –
(a) Root cap (b) Coleorrhiza (c) Coleoptile (d) Hypocotyl

104. Match the Column I with Column II and choose the correct answers –

Column I	Column II
A. Coleorrhiza	1. Grapes
B. Food storing tissue	2. Mango
C. Parthenocarpic fruit	3. Maize
D. Single seeded fruit developing from monocarpellary superior ovary	4. Radicle
E. Membranous seed coat	5. Endosperm

(a) A - 3, B - 1, C -4, D - 2, E - 5 (b) A - 4, B - 2, C - 5, D - 1, E - 3
(c) A - 5, B - 1, C - 3, D - 4, E - 2 (d) A - 4, B - 5, C - 1, D - 2, E - 3

105. Scutellum is the first leaf of –
(a) Monocot (b) Dicot (c) Gymnosperm (d) Pteridophytes

106. Match the Column I with Column II –

Column I	Column II
A. Pneumatophores	(i) Encloses radicle
B. Stilt roots	(ii) Ovary is inferior
C. Outer layer of seed coat of a dicotyledonous seed	(iii) Ovary is superior
D. Coleoptile	(iv) Brinjal
E. Hypogynous condition	(v) *Rhizophora*
F. Epipetalous condition	(vi) Maize
G. Coleorrhiza	(vii) Encloses plumule
H. Epigynous condition	(viii) Testa
I. Inner layer of seed coat of a dicotyledonous seed	(ix) Tegmen

(a) A - (iv), B - (v), C - (viii), D - (vii), E - (vi), F - (iii), G - (i), H - (ii), I - (ix)
(b) A - (v), B - (vi), C - (viii), D - (vii), E - (iii), F - (iv), G - (i), H - (ii), I - (ix)
(c) A - (i), B - (ii), C - (iii), D - (vii), E - (vi), F - (v), G - (iv), H - (viii), I - (ix)
(d) A - (ix), B - (viii), C - (vii), D - (vi), E - (i), F - (ii), G - (iii), H - (iv), I - (v)

107. Match the Column I with Column II –

Column I	Column II
A. Edible mesocarp	(i) Coconut
B. Endospermous seed	(ii) Mango
C. Fibrous mesocarp	(iii) Bean
D. Non endospermous seed	(iv) Castor
E. Ovules	(v) Future fruit
F. Ovary	(vi) Future seed

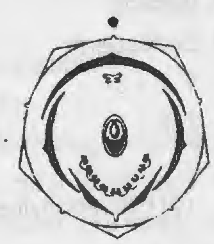
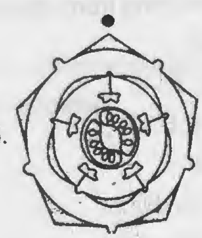
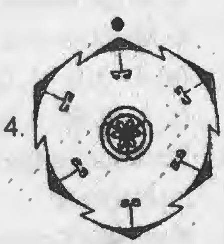
(a) A - (ii), B - (iv), C - (vi), D - (i), E - (iii), F - (v)
(b) A - (i), B - (iii), C - (v), D - (ii), E - (iv), F - (vi)
(c) A - (vi), B - (v), C - (iv), D - (iii), E - (ii), F - (i)
(d) A - (ii), B - (iv), C - (i), D - (iii), E - (vi), F - (v)

108. Find out the False statement from below ones –
I. Calyx and corolla are reproductive organs of a flower.
II. Zygomorphic flower can be divided into two equal radial halves in any radial plane.
III. Flowers without bracts are termed as bracteate.
IV. Parthenocarpic fruit is formed after fertilization of the ovary.
V. In legumes seed is non-endospermic.
VI. Ovary is inferior in Fabaceae.
VII. A fertile stamen is called staminode.
VIII. Radical buds develop on roots.
(a) I, II, III, IV, VI, VII (b) I, II, V, VIII (c) III, IV, VIII (d) IV, V, VIII

109. Match the Column I and Column II with Column III –

Column I A. Brassicaceae B. Fabaceae C. Solanaceae D. Liliaceae

Column II I. Br $\oplus ⚥ \widehat{P_{3+3} A_{3+3}} \underline{G}_{(3)}$ II. $\oplus ⚥ K_{(5)} \widehat{C_{(5)} A_5} \underline{G}_2$ III. $\% ⚥ K_{(5)} C_{1+2+(2)} A_{(9)+1} \underline{G}_1$ IV. $\oplus ⚥ K_{2+2} C_4 A_{2+4} \underline{G}_{(2)}$

Column III 1.  2.  3.  4. 

(a) A - IV, 2; B - III, 1; C - II, 3; D - I, 4
(b) A - IV, 1; B - III, 2; C - II, 3; D - I, 4
(c) A - IV, 2; B - III, 1; C - II, 4; D - I, 3
(d) A - IV, 2; B - III, 3; C - II, 1; D - I, 4

110. Zygomorphic condition can be represented as –
(a) $\oplus$ (b) % (c) P (d) G

111. Syncarpous, hypogynous, trilocular ovary with axile placentation is found in –
(a) Liliaceae (b) Cucurbitaceae (c) Ranunculaceae (d) None of these

112. One of the following statement is not applicable to Solanaceae –
(a) Adnation (epipetalous) (b) Swollen axile placenta
(c) Bicarpellary superior ovary (d) Monocarpellary superior ovary

113. Pentamerous, actinomorphic flowers, bicarpellary ovary with oblique septa and fruit as a capsule or berry a characteristic feature of –
(a) Liliaceae (b) Asteraceae (c) Brassicaceae (d) Solanaceae

114. Which of the following is characteristic feature of Fabaceae?
(a) Descending imbricate, ten stamens, diadelphious, ovary inferior
(b) Sepals five, gamosepalous, imbricate aestivation, axile placentation

(c) Monocarpellary, ovary inferior, style long, slightly bent at the apex

(d) Zygomorphic flowers, vexillary aestivation in corolla, monocarpellary, ovary superior, diadelphous, ten stamens, many ovules, placentation marginal

115. In floral formula, (K) denotes –

(a) Polysepalous (b) Gamosepalous (c) Polypetalous (d) Gamopetalous

116. Androecium in *Hibiscus* is –

(a) Didynamous, monothecous (b) Monoadelphous and monothecous

(c) Diadelphous and bithecous (d) Polyadelphous and monothecous

117. Trimerous flowers, superior ovary axile placentation is characteristic of –

(a) Liliaceae (b) Papilionaceae (c) Cucurbitaceae (d) Solanaceae

118. Which of the following represents the floral characters of *Liliaceae*?

(a) Six tepals, zygomorphic, six stamens, bilocular ovary, axile placentation

(b) Tetramerous, actinomorphic, polyphyllous, unilocular ovary, axile placentation

(c) Trimerous, actinomorphic, polyandrous, superior ovary, axile placentation

(d) Bisexual, zygomorphic, gamophyllous, inferior ovary, marginal placentation

119. The number and arrangement of stamens in a Papillionaceous taxon is –

(a) A_{10} (b) A_{α} (c) $A_{(9)+1}$ (d) A_5

120. To which family does pulse belong?

(a) Gramineae (b) Solanaceae (c) Liliaceae (d) Leguminosae

121. Belladona is the drug alkaloid extracted from the leaves of –

(a) *Datura stramonium* (b) *Solanum tuberosum*

(c) *Atropa belladona,* Solanaceae (d) *Rauwolfia serpentina*

122. Following diagram shows the cohesion of stamens. It is the characteristic of pulse family. Identify the type of cohesion–

(a) Monoadelphous (b) Diadelphous (c) Polyadelphous (d) Synandrous

123. Neel is obtained from –

(a) *Crocus sativus* (b) *Haematoxylon compechianum*

(c) *Indigofera tinctoria* (d) *Aconitum heterophyllum*

124.

***Pisum sativum* (pea)**

***Solanum nigrum* (mokoi)**

***Allium cepa* (onion)**

The above species belong to which of the following families respectively –

(a) Liliaceae, Compositae, Malvaceae (b) Fabaceae, Solanaceae, Liliaceae

(c) Compositae, Malvaceae, Liliaceae (d) Solanaceae, Fabaceae, Liliaceae

125. Choose the correct description of the flower depicted in the floral diagram given below –

(a) United, valvate sepals; free, imbricate petals; free stamens; unilocular ovary with axile placenta
(b) United, valvate sepals; free, twisted petals; free stamens; unilocular ovary with marginal placenta
(c) United, valvate sepals; free, imbricate petals; free stamens; unilocular ovary with marginal placenta
(d) United, valvate sepal; free , imbricate petals, epipetalous stamens; unilocular ovary with marginal placenta

126. Which of the following members of family Solanaceae is fumigatory?
(a) Chilli, *Petunia* (b) Tobacco (c) *Belladona* (d) Tomato, brinjal, potato

127. Which of the following is a subfamily of family Leguminosae?
(a) Papiliionoideae / Fabaceae (b) Solanaceae
(c) Liliaceae (d) None

128. Which of the following is a monocot family?
(a) Solanaceae (b) Fabaceae (c) Liliaceae (d) None

129. Match the Column I with Column II –

Column I (Members of Fabaceae)	**Column II (Economic importance)**
A. Gram, sem, moong, soyabean	I. Medicine
B. Soyabean, groundnut	II. Ornamentals
C. Indigofera	III. Fodder
D. Sunhemp	IV. Fibres
E. *Sesbania, Trifolium*	V. Dye
F. Lupin, Sweet pea	VI. Edible oil
G. Muliathi	VII. Pulses

(a) A - I, B - II, C - III, D - IV, E - V, F - VI, G - VII (b) A - VII, B - VI, C - V, D - IV, E - III, F - II, G - I
(c) A - II, B - IV, C - VI, D - I, E - III, F - V, G - VII (d) A - I, B - III, C - V, D - VII, E - II, F - IV, G - VI

130. Which of the following is not the member of Liliaceae –
(a) Tulip, *Gloriosa, Aloe* (b) *Colchicum* (c) *Pisum* (d) *Asparagus*

131. Which of the following is a medicinal plant –
(a) *Aloe* (b) *Asparagus* (c) *Colchicum* (d) Tulip

132. Colchicine is obtained from a member of –
(a) Solanaceae (b) Liliaceae (c) Fabaceae (D) Brassicaceae

133. A dot on the top of the floral diagram indicates –
(a) Stem (b) Mother axis (c) Father axis (d) Floral plarts

134. $\underline{G}$ and $\overline{G}$ indicate indicate –
(a) Epigynous and hypogynous flowers (b) Superior ovary and inferior ovary
(c) Presence and absence of gynoecium (d) Fused and free gynoecium

135. $\oplus$ and % indicate –
(a) Zygomorphic and actinomorphic flowers (b) Actinomorphic and zygomorphic flowers
(c) Hypogynous and epigynous flowers (d) None

136. The character of flower which is represented by floral formula but not by floral diagram is –
(a) Aestivation (b) Placentation
(c) Position of gynoecium (d) Adhesion of stamen

137. A longitudinal or vertical section of the flower indicates –
(a) Type of pollination (b) Arrangement of members in a whorl
(c) Number of floral parts in whorls (d) Manner of insertion of parts in different whorls

138. Thalamus is –
(a) Base of flower (b) Base of ovary (c) Modification of pollen (d) modification of petal

139. The character of flower which is represented by floral diagram but not by floral formula is –
(a) Aestivation and placentation (b) Position of gynoecium and adhesion of stamen
(c) Fused sepals (d) Fused petals

140. Persistent calyx is the character of plants belonging to
(a) Solanaceae (b) Malvaceae (c) Cruciferae (d) Asteraceae

141. The "Eyes" of the potato tuber are
(a) Axillary buds (b) Root buds (c) Flower buds (d) Shoot buds

142. Which one of the following statements is correct?
(a) Flower of tulip is a modified shoot (b) In tomato, fruit is a capsule
(c) Seeds of orchids have oil-rich endosperms (d) Placentation in *primose* is basal

143. The correct floral formula of chilli is
(a) Br $\oplus \delta ♀ \widehat{P_{3+3}} A_{3+3} \underline{G}_{(3)}$ (b) $\oplus \delta ♀ K_{(5)} \widehat{C_{(5)}} A_5 \underline{G}_2$ (c) $\% \delta ♀ K_{(5)} C_{1+2+(2)} A_{(9)+1} \underline{G}_1$ (d) $\oplus \delta ♀ K_{2+2} C_4 A_{2+4} \underline{G}_{(2)}$

144. The ovary is half inferior in flowers of
(a) Guava (b) Peach (c) Cucumber (d) Cotton

145. Flowers are Zygomorphic in
(a) Datura (b) Mustard (c) Gulmohur (d) Tomato

146. Whorled, simple leaves with reticulate venation are present in :
(a) *Calotropis* (b) Neem (c) China Rose (d) *Alstonia*

147. Sweet potato is homologous to :
(a) Potato (b) Colocasia (c) Ginger (d) Turnip

148. Which one of the following organisms is correctly matched with its three characteristics ?
(a) Pea : C_3 pathway, Endospermic seed, Vexillary aestivation
(b) Tomato : Twisted aestivation, Axile placentation, Berry
(c) Onion : Bulb, Imbricate aestivation, Axile placentation
(d) Maize : C_3 pathway, Closed vascular bundles, Scutellum

149. How many plants in the list given below have marginal placentation ?
Mustard, Gram, Tulip, *Asparagus*, Arhar, Sun hemp, Chilli, Colchicine, Onion, Moong, Pea, Tobacco, Lupin
(a) Four (b) Five (c) Six (d) Three

150. Read the following four statements (A-D):
(A) Both, photophosphorylation and oxidative phosphorylation involve uphill transport of protons across the membrane.
(B) In dicot stems, a new cambium originates from cells of pericycle at the time of secondary growth.

(C) Stamens in flowers of *Gloriosa* and *Petunia* are polyandrous.
(D) Symbiotic nitrogen-fixers occur in free-living state also in soil.
How many of the above statements are right ?
(a) Two (b) Three (c) Four (d) One

151. Cymose inflorescence is present in :
(a) *Solanum* (b) *Sesbania* (c) *Trifolium* (d) *Brassica*

152. Phyllode is present in :
(a) Asparagus (b) Euphorbia (c) Australian Acacia (d) Opuntia

153. Which one of the following is correctly matched
(a) Onion - Bulb (b) Ginger - Sucker
(c) Chlamydomonas - Conidia (d) Yeast - Zoospores

154. How many plants in the list given below have composite fruits that develop from an inflorescence Walnut, pop radish, fig, pineapple, apple, tomato, mulberry
(a) Four (b) Five (c) Two (d) Three

155. The coconut water and the edible part of coconut are equivalent to :
(a) Endosperm (b) Endocarp (c) Mesocarp (d) Embryo

156. Vexillary aestivation is characteristic of the family
(a) Fabaceae (b) Asteraceae (c) Solanaceae (d) Brassicaceae

157. Among bitter gourd, mustard, brinjal, pumpkin, china rose, lupin, cucumber, sunnhemp, gram, guava, bean, ch plum, *Petunia*, tomato, rose, *Withania*, potato, onion, *Aloe* and tulip how many plants have hypogynous flower?
(a) Six (b) Ten (c) Fifteen (d) Eighteen

158. In china rose the flowers are :
(a) Actinomorphic, hypogynous with twisted aestivation
(b) Actinomorphic, epigynous with valvate aestivation
(c) Zygomorphic, hypogynous with imbricate aestivation
(d) Zygomorphic, Epigynous with twisted aestivation

159. Seed coat is not thin, membranous in:
(a) Maize (b) Coconut (c) Groundnut (d) Gram

160. Banana is vegetatively propagated by
(a) tubers (b) rhizomes (c) bulbs (d) Phyllode.

161. Placenta and pericarp are both edible portions in:
(a) Apple (b) Banana (c) Tomato (d) Potato

162. When the margins of sepals or petals overlap one another without any particular direction, the condition is termed a
(a) Vexillary (b) Imbricate (c) Twisted (d) Valvate

163. Which one of the following statements is correct?
(a) The seed in grasses is not endospermic.
(b) Mango is a parthenocarpic fruit.
(c) A proteinaceous aleurone layer is present in maize grain.
(d) A sterile pistil is called a staminode.

164. An example of edible underground stem is :
(a) Carrot (b) Groundnut (c) Sweet potato (d) Potato

165. An aggregate fruit is one which develops from :
(a) Multicarpellary syncarpous gynoecium (b) Multicarpellary apocarpus gynoecium
(c) Complete inflorescence (d) Multicarpellary superior ovary

166. Non-albuminous seed is produced in :-
(a) Maize (b) Castor (c) Wheat (d) Pea

167. Identify the set of characteristics related to plants belonging to family Fabaceae from the following.
(a) Papilionaceous corolla, axile placentation and leguminous fruit.
(b) Actinomorphic flower, syncarpous ovary and marginal placentation.
(c) Vexillary aestivation of corolla, diadelphous stamens and monocarpellary, unilocular ovary.
(d) Persistent calyx, epipetalous stamens and leguminous fruit.

168. Match the vegetative propagules listed under Column - I with the plants given under Column - II choose the appropriate option from the given choices.

Column - I	Column - II
A. Rhizome	p. *Agave*
B. Offset	q. *Bryophyllum*
C. Sucker	r. *Ginger.*
D. Leaf buds	s. *Chrysanthemum*
	t. *Eichhornia*

(a) A - r, B - t, C - s, D - q
(b) A - r, B - s, C - p, D - q
(c) A - q, B - p, C - t, D - s
(d) A - s, B - t, C - q, D - r

169. The common characteristics between tomato and potato will be maximum at the level of their
(a) Genus (b) Family (c) Order (d) Division

170. Among flowers of *Calotropis*, tulip, *Sesbania*, *Asparagus*, Colchicine, Sweet pea, *Petunia*, *Indigofera*, Mustard, Soybean, Tobacco and groundnut how many plants have corolla with valvate aestivation?
(a) Five (b) Six (c) Seven (d) Eight

171. How many plants among China rose, *Ocimum*, sunflower, mustard, *Alstonia*, guava, *Calotropis* and *Nerium* (Oleander) have opposite phyllotaxy?
(a) Two (b) Three (c) Four (d) Five

172. In a cymose inflorescence the main axis
(a) Terminates in a flower
(b) Has unlimited growth
(c) Bears a solitary flower
(d) Has unlimited growth but lateral branches end in flowers

173. Inflorescence is racemose in
(a) Soyabean (b) Brinjal (c) Tulip (d) *Aloe*

174. Albuminous seeds store their reserve food mainly in
(a) Perisperm (b) Endosperm (c) Cotyledons (d) Hypocotyl

175. The partial floral formula of a flower is K(5)C5A(∞)$\underline{G}$(5). Which of the following set of information is conveyed here?
(a) Gamosepalous, polypetalous, syncarpous and superior ovary
(b) Polysepalous, polypetalous, syncarpous and inferior ovary
(c) Gamosepalous, gamopetalous, polycarpous and superior ovary
(d) Gamosepalous, polypetalous, syncarpous and inferior ovary

176. Out of following structures how many come under vegetative propagules?
Zoospores, Conidia, Gemmules, Runners, Tubers, Offset, Rhizomes
(a) 4 (b) 6 (c) 3 (d) 7

177. Which among the following are wrong statements?
I. In cymose inflorescence flowers are borne in a basipetal manner.
II. In rose, flowers are epigynous.
III. In *Alstonia*, the phyllotaxy is whorled.
IV. Potato is an underground root for food storage.

(a) I and II (b) II and III (c) II and IV (d) I and IV

178. In one plant, underground stems are modified to store food and in another plant, the stem tendrils devel axillary buds to help plants climb. They are

(a) ginger, cucumber (b) carrot, jasmine

(c) sweet potato, *Bougainvillea* (d) *Opuntia, Eichhornia*

179. Consider the following statements.

A. In leguminous plants, leaf base becomes swollen, called pulvinus.

B. The fleshy leaves of onion and garlic store food.

C. The buds in Australian *Acacia* tree become green and synthesise food.

D. In *Alstonia*, leaves show alternate phyllotaxy.

Of the above statements.

(a) B and D are correct (b) A and C are correct (c) A and B are correct (d) A and D are correct

180. Which of these is an example for a zygomorphic flower with diadelphous stamens and marginal placentatic

(a) Pea (b) Lemon (c) Brinjal (d) Cucumber

181. Select the wrongly matched pair.

(a) Fibre – Sunhemp (b) Spice – Belladonna (c) Edible oil – Groundnut (d) Fodder – *Trifolium*

182. Match the modification in Column I with the part modified in Column II and choose the right option.

Column I	Column II
A. Pneumatophores in Rhizophora	(i) Axillary buds
B. Tendrils in pea	(ii) Roots
C. Thorns in *Citrus*	(iii) Leaves

(a) A – (ii), B – (i), C – (iii) (b) A – (iii), B – (i), C – (ii)

(c) A – (iii), B – (ii), C – (i) (d) A – (ii), B – (iii), C – (i)

183. In ginger, vegetative propagation occurs through

(a) bulbils (b) runners (c) rhizome (d) offsets

184. Keel is the characteristic feature of flower of

(a) *Aloe* (b) Tomato (c) Tulip (d) *Indigofera*

185. Transmission tissue is characteristic feature of

(a) Dry stigma (b) Wet stigma (c) Hollow style (d) Solid style

186. Axile placentation is present in

(a) Pea, China rose (b) *Argemone, Brassica* (c) *Dianthus, Mangifera* (d) Lemon, China rose

187. Which one of the following fruits is parthenocarpic?

(a) Jackfruit (b) Banana (c) Brinjal (d) Apple

188. Roots play insignificant role in absorption of water in

(a) Pea (b) Wheat (c) Sunflower (d) *Pistia*

189. Flowers are unisexual in

(a) China rose (b) Onion (c) Pea (d) Cucumber

190. Gynoecium occupies the highest position while other parts are situated below in

(a) Mustard (b) China rose (c) Brinjal (d) All of the above

191. The standard petal of a papilionaceous corolla is also called :

(a) Carina (b) Pappus (c) Vexillum (d) Corona

192. Tricarpellary syncarpous gynoecium is found in flowers of :

(a) Liliaceae (b) Solanaceae (c) Fabaceae (d) Poaceae

193. Which of the following is not a stem modification?
(a) Pitcher of Nepenthes (b) Thorns of citrus (c) Tendrils of cucumber (d) Flattened structures of Opuntia

194. Stems modified into flat green organs performing the functions of leaves are known as :-
(a) Cladodes (b) Phyllodes (c) Phylloclades (d) Scales

195. Match column-I with column-II and select the correct option using the codes given below :

	Column-I	Column-II
	(a) Pistils fused together	(i) Gametogenesis
	(b) Formation of gametes	(ii) Pistillate
	(c) Hyphae of higher Ascomycetes	(iii) Syncarpous
	(d) Unisexual female flower	(iv) Dikaryotic

	a	b	c	d
(a)	i	ii	iv	iii
(b)	iii	i	iv	ii
(c)	iv	iii	i	ii
(d)	ii	i	iv	iii

196. The term 'polyadelphous' is related to :-
(a) Corolla (b) Calyx (c) Gynoecium (d) Androecium

197. How many plants among Indigofera, Sesbania, Salvia, Allium, Aloe, mustard, groundnut, radish, gram and turnip have stamens with different lengths in their flowers ?
(a) Five (b) Six (c) Three (d) Four

198. Radial symmetry is found in the flowers of :-
(a) *Pisum* (b) *Cassia* (c) *Brassica* (d) *Trifolium*

199. Free-central placentation is found in :-
(a) *Brassica* (b) *Citrus* (c) *Dianthus* (d) *Argemone*

200. Which one of the following statements in not correct?
(a) In potato, banana and ginger, the plantlets arise from the internodes present in the modified stem.
(b) Water hyacinth, growing in the standing water, drains oxygen from water that leads to the death of fishes.
(c) Offspring produced by the asexual reproduction are called clone
(d) Microscopic, motile asexual reproductive structures are called zoospores.

201. Coconut fruit is a :
(a) Berry (b) Nut (c) Capsule (d) Drupe

202. In Bougainvillea thorns are the modifications of :
(a) Adventitious root (b) Stem (c) Leaf (d) Stipules

203. Root hairs develop from the region of :
(a) Elongation (b) root cap (c) Meristematic activity (d) Maturation

204. Plants which produce characteristic pneumatophores and show vivipary belong to :
(a) Halophytes (b) Psammophytes (c) Hydrophytes (d) Mesophytes

205. The morphological nature of the edible part of coconut is:
(a) Cotyledon (b) Endosperm (c) Pericarp (d) Perisperm

206. Plants with inferior ovary always bear :
(a) pseudocarps (b) berries (c) aggregate fruits (d) seedless fruits

207. Which of the following is the correct combination of merits of an inflorescence?
(i) Flowers can be unisexual
(ii) Increased efficiency of pollination
(iii) During flower and fruit development they provide nutrients to the developing flowers and fruits.

(iv) Attract pollinators easily

(a) i, ii and iv (b) ii, iii and iv (c) ii and iii (d) ii and iv

208. Identify the correct statement :

(a) Hypogynous flowers have inferior ovary (b) Perigynous flowers have inferior ovary

(c) Hypogynous flowers have superior ovary (d) Epigynous flowers have superior ovary

209. How many of the given features are related to *Gloriosa*?

Six tepals, Mrginal Placentation, Seed endospermic, φ, $C_{(5)}$ A_5, $\underline{G}_{(3)}$

(a) Three (b) Six (c) Four (d) Five

210. Distinguishing feature of angiospermic family Solanaceae are all, except

(a) Syncarpous ovary with swollen placenta (b) Synandrous epipetalous stamens

(c) Persistent calyx with valvate aestivation (d) Berry or capsule fruits with many endospermous seeds

211. Androecium of Papilionaceae and Malvaceae family is :

(a) Monadelphous and Diadelphous (b) Diadelphous and Monadelphous

(c) Diadelphous and Polyadelphous (d) Monadelphous and Polyadelphous

212. Which of the following statement is correct?

(a) In tomato fruit is a capsule (b) Seeds of orchids have oily endosperm

(c) Placentation in *Dianthus* is free central (d) Tetradynamous condition is found in pea

213. Root shows negative geotropism in :

Pothos (b) Ficus (c) Rhizophora (d) Grasses

214. Which of the following statements are correct for Euphorbia?

I. Leaves modified in to spines

II. Stem modified into leaf like organ

III. Cyathium inflorescence

IV. Ratio of male and female flowers is one : many respectively

(a) I, II, III and IV (b) I, II and III (c) Only I (d) Only III and IV

215. Pneumatophores occur in

(a) Carnivorous plants (b) Free-floating hydrophytes

(c) Halophytes (d) Submerged hydrophytes

216. Sweet potato is a modified

(a) Tap root (b) Adventitious root (c) Stem (d) Rhizome

217. Floral features are commonly used for identification of angiosperms because

(a) Reproductive parts are more conservative (b) Flowers can be safely pressured

(c) Flowers are nice to work with (d) Flowers have various colours and scents

218. Which of the following group of plants have non endospermic seed?

(a) Pea, Bean, Castor, Wheat (b) Gram, Bean, Orchid, Pea

(c) Gram, Bean, Castor, Wheat (d) Orchid, Pea, Castor, Wheat

219. How any plant in the list given below axile placentation.

Mustard, Gram, Tulip, Sunhemp, Chilli, Colchicine, Tomato, Lemon, Argemone, China rose, Dianthus, Sunflower.

(a) Six (b) Three (c) Four (d) Five

220. Aggregate fruit develops from :-

(a) Multicarpellary, apocarpous gynoecium (b) Syncarpous ovary .

(c) Multicarpellary, syncarpous gynoecium (d) Monocarpellary ovary

221. Match the following and choose correct option.

Group A	Group B
(A) Monadelphous androecium	(i) Liliaceae
(B) Diadelphous androecium	(ii) Solanaceae
(C) Epipetalous stamens	(iii) Fabaceae
(D) Epiphyllous stamens	(iv) Malvaceae

Options :-

	A	B	C	D		A	B	C	D
(a)	(iv)	(iii)	(i)	(ii)	(b)	(iv)	(iii)	(ii)	(i)
(c)	(iii)	(iv)	(ii)	(i)	(d)	(iii)	(ii)	(iv)	(i)

222. Natural system of classification of following plant is based on similarities and differences in –

I. Flower morphology

II. Sequence of nucleotides in mitochondrial DNA.

III. Nature and arrangement of vascular strands.

IV. Fruit and seed morphology.

(a) I, II and IV (b) I and IV only (c) Only II (d) Only I

223. A dicotyledenous plant bears flowers but never produces fruits and seeds. The most probable cause for the above situation is

(a) Plant is dioecious and bears only pistillate flowers

(b) Plant is dioecious and bears both pistillate and staminate flowers

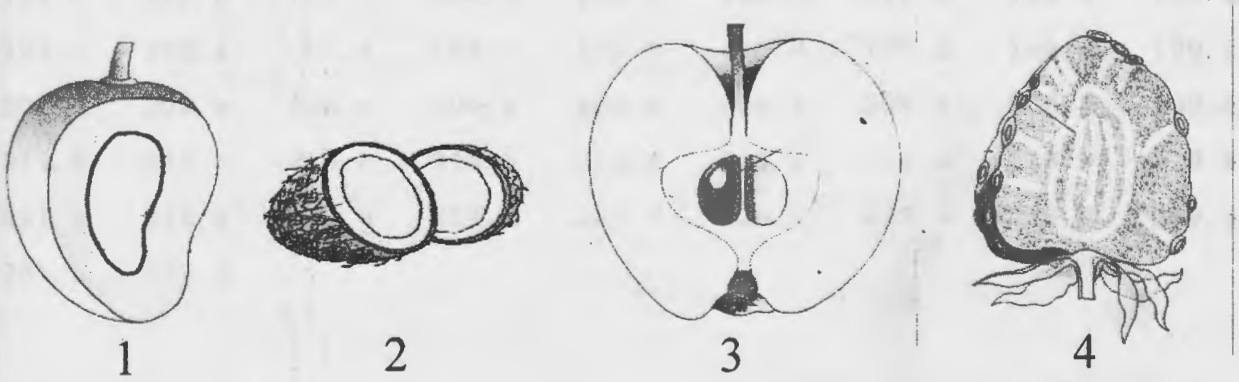
(c) Plant is monoecious

(d) Plant is dioecious and bears only staminate flowers

224. In the left vascular bundles are found in the

(a) Veins (b) Palisade parenchyma (c) Spongy parenchyma (d) All

225. Identify which of the following fruits are false fruit?



1 2 3 4

(a) 1,2,3,4 (b) 2,3,4 (c) 1,2,3 (d) 3,4

226. Find incorrect match:

(a) Fleshy leaves – onion (b) Underground stem – Turmeric

(c) Racemose – *Solanum* (d) Phylloclade – *Euphorbia*

227. Match the following:

(a) Siliqua	(i) *Lycopersicum esculentum*
(b) Caryopsis	(ii) *Triticum aestivum*
(c) Berry	(iii) *Helianthus annuus*
(d) Cypsela	(iv) *Brassica campestris*

(a) a-ii, b-i, c-iii, d-iv (b) a-i, b-ii, c-iii, d-iv (c) a-iv, b-ii, c-i, d-iii (d) a-iii, b-ii, c-i, d-iv

228. Match the placental types (column-I) with their examples (column-II).

Column-I	Column-II
A. Basal	(i) Mustard
B. Axile	(ii) China rose
C. Parietal	(iii)Dianthus
D. Free central	(iv) Sunflower

Choose the correct answer from the following options :

(a) A.-(iii), B.-(iv), C.-(i), D.-(ii) (b) A.-(ii), B.-(iii), C.-(iv), D.-(i)
(c) A.-(i), B.-(ii), C.-(iii), D.-(iv) (d) A.-(iv), B.-(ii), C.-(i), D.-(iii)

229. Which of the following shows whorled phyllotaxy?
(a) *Calotropis* (b) Mustard (c) China rose (d) *Alstonia*

230. Bicarpellary ovary with obliquely placed septum is seen in :
(a) *Sesbania* (b) *Brassica* (c) Aloe (d) *Solanum*

231. Placentation in which ovules develop on the inner wall of the ovary or in peripheral part, is
(a) Basal (b) Axile (c) Parietal (d) Free central

232. What is the site of perception of photoperiod necessary for induction of flowering in plants?
(a) Lateral buds (b) Pulvinus (c) Shoot apex (d) Leaves

5 MORPHOLOGY OF FLOWERING PLANT

1. c	2. b	3. d	4. a	5. c	6. d	7. a	8. a	9. b	10. d
11. d	12. b	13. a	14. c	15. c	16. c	17. c	18. d	19. d	20. b
21. a	22. d	23. b	24. a	25. c	26. c	27. b	28. d	29. c	30. b
31. d	32. d	33. a	34. a	35. c	36. d	37. b	38. c	39. c	40. a
41. c	42. c	43. b	44. a	45. a	46. c	47. b	48. d	49. c	50. b
51. d	52. a	53. d	54. c	55. b	56. a	57. b	58. c	59. d	60. a
61. a	62. d	63. a	64. b	65. a	66. c	67. c	68. a	69. d	70. a
71. a	72. d	73. a	74. b	75. c	76. b	77. c	78. d	79. a	80. a
81. d	82. c	83. b	84. c	85. c	86. b	87. b	88. a	89. c	90. c
91. d	92. a	93. a	94. c	95. b	96. b	97. d	98. c	99. b	100. a
101. a	102. c	103. c	104. d	105. a	106. b	107. d	108. a	109. a	110. b
111. a	112. d	113. d	114. d	115. b	116. b	117. a	118. c	119. c	120. d
121. c	122. b	123. c	124. b	125. c	126. b	127. a	128. c	129. b	130. c
131. a	132. b	133. b	134. b	135. b	136. c	137. d	138. a	139. a	140. a
141. a	142. a	143. b	144. b	145. c	146. d	147. d	148. c	149. c	150. a
151. a	152. c	153. a	154. d	155. a	156. a	157. c	158. a	159. b	160. b
161. c	162. b	163. c	164. d	165. b	166. d	167. c	168.a	169. b	170. c
171. b	172. a	173. a	174. b	175. a	176. a	177. c	178.a	179. c	180. a
181. b	182. d	183. c	184. d	185. d	186. d	187. b	188. d	189. d	190. d
191. c	192. a	193. a	194. c	195. b	196. d	197. d	198. c	199. c	200. a
201. d	202. b	203. d	204. a	205. b	206. a	207. b	208. c	209. c	210. b
211. b	212. c	213. c	214. b	215. c	216. b	217. a	218. b	219. a	220. a
221. b	222. a	223. d	224. a	225. d	226. b	227. c	228. d	229. d	230. d
231. c	232. d								

6 ANATOMY OF FLOWERING PLANTS

1. Which one is correct?
   (a) Anatomy – Internal morphology, study of internal structure
   (b) Tissue – A group of cells having a common origin and usually performing a common function
   (c) Permanent tissue has more power of mitosis
   (d) a and b
2. Which one produces primary tissues?
   (a) Apical meristem (b) Root apical meristem (c) Shoot apical meristem (d) Lateral meristem
3. Meristems are present in –
   (a) Root apex and shoot apex (b) Bases of leaves
   (c) Axillary buds (d) All
4. During formation of leaves and elongation of stem, some cells 'left behind' from the shoot apical meristem, constitute _____.
   (a) Lateral meristem (b) Axillary bud (c) Cork cambium (d) Fascicular cambium
5. A branch or a flower is developed in the axil of leaves by –
   (a) Apical bud (b) Axillary bud (c) Apical meristem (d) Shoot apical meristem
6. Which one is correct about intercalary meristem?
   (a) It occurs between mature tissues
   (b) It occurs in grasses and regenerate parts removed by grazing herbivores
   (c) It is a primary meristem
   (d) All
7. All are lateral meristems except –
   (a) Fascicular / vascular cambium (b) Interfascicular cambium
   (c) Apical and intercalary meristem (d) Phellogen
8. Secondary tissues are produced by all except –
   (a) Fascicular cambium (b) Interfascicular cambium
   (c) Apical meristem (d) Phellogen
9. Permanent tissue consists of cells having no power of cell division. Such tissues are formed by –
   (a) Primary meristem (b) Cork cambium
   (c) Fascicular and interfascicular cambium (d) All
10. Primary tissues of a plant
    (a) Add to the length of roots and shoots (b) Add to the diameter of existing roots and shoots
    (c) Are found only in the embryo (d) Are found only in the seedling
11. Secondary tissues of a plant –
    (a) Add to the length of roots and shoots (b) Add to the diameter of existing roots and shoots
    (c) Are found only in the embryo (d) Are found only in the seedling
12. Cells of permanent tissues are specialised –
    (a) Functionally (b) Only structurally
    (c) Both structurally and functionally (d) For mitosis
13. During the formation of the primary plant body, specific regions of the apical meristem produce –
    (a) Dermal tissues (b) Ground tissues (c) Vascular tissues (d) All
14. Apical meristems and intercalary meristem are primary meristem because they –

(a) Are disintegrated after primary growth of plant
(b) Are disintegrated after secondary growth of plant
(c) Appear early in life of a plant and contribute to the formation of the primary plant body
(d) None

15. Meristem helps in –
(a) Absorption of water (b) Growth of plants (c) Absorption of minerals (d) Transpiration

16. Grass stem elongates after initial growth due to –
(a) Lateral meristem (b) Secondary meristem (c) Intercalary meristem (d) Apical meristem

17. Meristematic activity occurs at –
(a) Vascular tissue (b) Stem apex (c) Leaf (d) Root hair

18. Root apex is subterminal because it is –
(a) Covered with root hair (b) Covered with root cap
(c) Covered with epidermis (d) Under the soil

19. Axillary and terminal buds develop by activity of –
(a) Lateral meristem (b) Intercalary meristem (c) Apical meristem (d) Parenchyma

20. Which one is secondary lateral meristem?
(a) Intercalary (b) Cork cambium (c) Interfascicular cambium (d) Both b and c

21. Which one is correct?
(a) Permanent tissues having all cells similar in structure and function are simple tissues
(b) Permanent tissues having different types of cell are complex tissue
(c) Parenchyma, collenchyma and sclerenchyma are simple tissue
(d) All

22. I. Forms major component within organs
II. Cell wall - thin, cellulosic
III. Shape of cells - generally isodiametric
IV. Intercellular space – Present / absent
V. Photosynthetic, storage or secretory in function
The above characters are attributed to –
(a) Collenchyma (b) Parenchyma (c) Sclerenchyma (d) Vascular tissue

23. I. Occur as layers or patches
II. Cell wall – Unevenly thickened due to pectocellulosic deposition
III. Cells – Spherical, oval or polygonal
IV. Often has chloroplast
V. Living mechanical tissue
VI. Occur in hypodermis of young dicot stem and petiole
The characters are shown by which of the following tissues –
(a) Parenchyma (b) Collenchyma (c) Sclerenchyma (d) Vascular tissue

24. Root hairs are present in –
(a) Zone of cell division (b) Zone of cell elongation (c) Zone of maturation (d) Root cap

25. Dead cells with narrow lumen, lignified cell wall with a few or numerous pits and serving a mechanical function only are called –
(a) Collenchyma (b) Xylem (c) Aerenchyma (d) Sclerenchyma

26. Fibres and sclereids are the types of –
(a) Parenchyma (b) Collenchyma (c) Sclerenchyma (d) Xylem

27. The dead, elongated cells having lignified thick cell wall occurring in groups, with tapering ends and serving a mechanical function are called –

(a) Fibres (b) Vessels (c) Tracheids (d) Collenchyma

28. Which of the following statements is incorrect about sclereids (stone cells)
(a) Variously shaped
(b) Highly thickened + lignified cell wall and lumen is narrow
(c) Commonly found in the fruits, wall of nuts, seed coats of legumes and leaves
(d) They are types of parenchyma

29. Xylem –
(a) Functions as conducting tissue for water and minerals from root to the stem and leaves
(b) Provides mechanical strength to plant parts
(c) Both
(d) Is absent in pteridophytes

30. Xylem in angiosperms consists of how many types of elements?
(a) 4 (b) 3 (c) 2 (d) 1

31. Angiospermic xylem consists of –
(a) Vessels + Tracheids only (b) Tracheids + Fibres only
(c) Vessel, tracheids, fibres and parenchyma (d) Parenchyma and fibres only

32. In pteridophytes and gymnosperms, xylem consists of all except –
(a) Vessel (b) Tracheid (c) Fibre (d) Parenchyma

33. Tracheid, vessel and sclereids are similar in that they all –
(a) Lack secondary walls (b) Conduct water and minerals
(c) Function when dead (d) Have open ends

34. In each vascular bundle, the tissue nearest to the centre of the stem is –
(a) Phloem (b) Fibres (c) Vascular cambium (d) Xylem

35. Conducting cells called _____ elements are the part of xylem where water and minerals are transported –
(a) Tracheary (b) Vascular (c) Vessel (d) Phloem

36. Unlike tracheids, vessel elements –
(a) Function when dead (b) Are spindle shaped
(c) Are found primarily in gymnosperms (d) Lose part or all of the end walls

37. The _____ is the centermost tissue in a dicot stem.
(a) Pith (b) Xylem (c) Phloem (d) Pericycle

38. Tracheids and vessel elements –
(a) Die before they become functional (b) Are important constituents of all plants
(c) Are found in the secondary plant body (d) Are without lignified cell wall

39. How many tissues are present within dicot root having cortex, endodermis, pericycle, pith, xylem and phloem?
(a) 5 (b) 6 (c) 3 (d) 12

40. I. Multicellular with wide lumen
II. They consist of vertical rows of cells with cross wall dissolved
III. Discontinuous lumen due to presence of end walls
IV. They are dead
V. Cell walls are lignified
VI. Long, cylindrical tube-like structure
VII. Elongated cells with tapering ends
Match the above characters with –
A. Vessel
B. Tracheid

(a) A - I, II, IV, V, VI; B - III, IV, V, VII (b) A - III, IV, V, VII; B - I, II, IV, V, VI
(c) A - I, IV, V, VII; B - III, II, IV, V, VII (d) A - I, II, III, IV; B - II, V, VI, VII

41. Which of the following is the living element of xylem –
(a) Fibre (b) Parenchyma (c) Tracheid (d) Vessel

42. Xylem parenchyma stores –
(a) Starch (b) Fat (c) Tannins (d) All

43. Ray parenchymatous cells –
(a) Are living (b) Are dead
(c) Perform radial conduction of water (d) a and c

44. In angiosperm phloem –
(a) Both the sieve tube elements and companion cells have nuclei
(b) Sieve tube elements have nuclei but companion cells do not
(c) The companion cells have nuclei but the sieve tube elements do not
(d) Neither the companion cells nor sieve tube elements have nuclei

45. Sieve tube members have sieve plates where they join with other sieve tube members. Which of the following best describes the sieve plates?
(a) Sieve plates are necessary to allow conduction between sieve tube cells
(b) Sieve plates allow joining of cytoplasm between adjacent tube cells
(c) Sieve plates are the perforated end walls of sieve tubes
(d) All

46. The living and non-lignified component of vascular bundle is / are –
(a) Vessel and tracheids (b) Vessel and phloem
(c) Wood fibre and phloem (d) Wood parenchyma and sieve tube

47. Match the Column I with Column II –

Column I	Column II
I. Sieve tube	A. Gymnospermic phloem
II. Companion cell	B. Angiospermic phloem
III. Albuminous cells	
IV. Sieve cell	
V. Parenchyma	
VI. Fibre	

(a) A = I, II, V, VI; B = III, IV, V, VI (b) A = I, III, IV, V, VI; B = II, III, IV, V, VI
(c) A = III, IV, V, VI; B = I, II, V, VI (d) A = I, V, VI; B = II, III, IV

48. I. Sieve tube or sieve cell is living but enucleate.
II. Xylem and phloem constitute the vascular bundle.
III. First formed xylem element and phloem element are called metaxylem and metaphloem respectively.
IV. Phloem fibres are generally absent in primary phloem.
V. Phloem parenchyma is absent in most of the monocots.
Which of the above statements is wrong?
(a) I, II, V (b) III (c) IV, V (d) III, IV

49. Which of the following statements is incorrect about companion cell?
(a) It is a specialised parenchymatous cell
(b) Its nucleus controls the function of sieve tube
(c) It helps in maintaining the pressure gradient in sieve tube
(d) It is present in all vascular plants having phloem

50. Heterogeneous tissues are –
(a) vascular and cork cambia (b) Xylem and phloem elements
(c) Dermal layer and ground tissue (d) Parenchyma and sclerenchyma

51. At maturity, sieve tubes do not possess –
(a) Cell wall (b) Nucleus (c) Cytoplasm (d) Vacuoles

52. Sieve tube is –
(a) Multicellular, vessel like structure
(b) Provided with porous septa
(c) The main conducting element for translocation of food
(d) All of the above

53. Complex tissue comprises –
(a) Xylem and phloem (b) Heterogeneous tissue (c) Conductive tissue (d) All of these

54. Albuminous cells of gymnosperms are equivalent to –
(a) Sieve tubes (b) Sieve cells (c) Companion cells (d) Cork cambium

55. Companion cells are associated with –
(a) Sieve cells (b) Sieve tubes (c) Albuminous cells (d) Vessels

56. Sieve tubes are best suited for translocation of solutes because –
(a) They are much broader than long (b) They possess no end wall
(c) They have higher number of pits (d) They possess interconnected lumen

57. Grittiness of fruit in pears is due to –
(a) Presence of Silica (b) Presence of stone cells / sclereids
(c) Presence of raphids (d) Formation of cystolith

58. Which of the following statements about the phloem parenchyma is false?
(a) It is an elongated, spindle-shaped, nucleate cell having dense cytoplasm
(b) Its cell wall is composed of non-cellulosic material
(c) It has pits through which plasmodesmata connections exist between the cells
(d) Besides food, it stores resins, tannins, latex etc.

59. I. Sclerenchymatous cells
II. Much elongated, unbranched and tapering ends
III. Needle like shape
IV. Cell wall thick
V. Dead cells
VI. Found in secondary phloem
Which of the following cells is defined by the above characters?
(a) Sieve tube (b) Phloem parenchyma
(c) Phloem fibre / bast fibre (d) Companion or albuminous cell

60. Which of the following bast fibres is of great commercial value?
(a) Jute (b) Flax (c) Hemp (d) All

61. A mature sieve tube –
(a) Possesses a peripheral cytoplasm and no nucleus
(b) Has a large vacuole
(c) Is connected with companion cells by pit fields present between their common longitudinal wall
(d) All

62. On the basis of location and function, how many types of the tissue system are found in vascular plants
(a) 2 (b) 3 (c) 4 (d) 5

63. Epidermis is derived from –
(a) Ground meristem (b) Procambium (c) Protoderm (d) Corpus

64. The primary function of epidermis is –
(a) Protection (b) Photosynthesis
(c) Conduction of water and solute (d) Mechanical support

65. Epidermis consists of _____ and is _____ (layered) –
(a) Sclerenchyma, multilayered (b) Collenchyma, single layered
(c) Parenchyma, multilayered (d) Parenchyma, single-layered

66. Excessive loss of water is prevented by –
(a) Epidermis (b) Endodermis (c) Cortex (d) Xylem

67. Trichomes, hairs, stomata etc are included under –
(a) Ground tissue system (b) Vascular tissue system
(c) Epidermal tissue system (d) None

68. Stomata develop from –
(a) Dermal tissue (b) Ground tissue (c) Accessory tissue (d) Vascular tissue

69. Guard cells differ from epidermal cells in having
(a) Specific shape (b) Chloroplast
(c) Heterogeneous nature of cell wall (d) All

70. Which of the following statements is false?
I. Epidermal cell has small amount of cytoplasm and a large vacuole
II. Waxy layer cuticle is absent in roots
III. Root hairs are unicellular, while stem hairs / trichomes are multicellular
IV. Trichomes - branched / unbranched, soft / stiff and secretory or transpiration preventive
V. Guard cells are dumbell-shaped in dicots, and bean-shaped in monocots (e.g. grass)
(a) I (b) IV (c) III (d) V

71. The stomatal apparatus includes –
(a) Only stomatal aperture
(b) Stomatal aperture and guard cells
(c) Only guard cells
(d) Stomatal aperture, guard cells and surrounding subsidiary cells

72. Which one is wrong about the guard cells?
(a) They are modified ground tissue
(b) They are chlorophyllous
(c) Their outer wall is thin and inner wall is highly thickened
(d) They regulate stomatal movement for transpiration and gaseous exchange

73. Sometimes a few epidermal cells in the vicinity of guard cells become specialized in their shape and size and are known as –
(a) Stomatal aperture (b) Trichomal cell (c) Subsidiary cells (d) Stomata

74. How many shoot apical meristematic zones are expected in a twig of a plant possessing 9 branches, 39 leaves?
(a) 9 (b) 39 (c) 10 (d) 8

75. Ground / fundamental tissue system is made up of –
(a) Parenchyma (b) Collenchyma (c) Sclerenchyma (d) All

76. Ground tissue includes –
(a) Cortex + pericycle (b) Pith (c) Medullary ray (d) All

77. In leaves, ground tissue consists of –

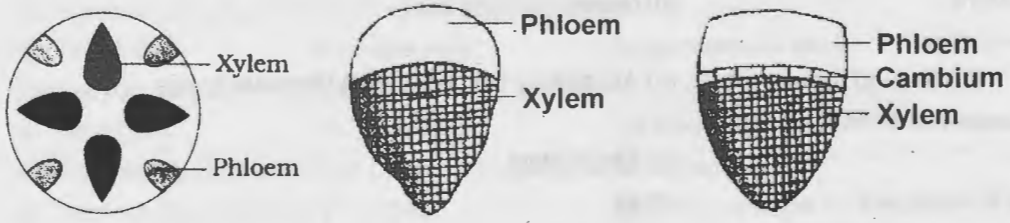
(a) Mesophyll (b) Epidermis (c) Vascular tissues (d) Guard cells

78. Pit pairs allow plasmodesmata to travel through –
(a) The primary cell wall (b) The secondary cell wall
(c) Both the primary and secondary cell wall (d) Neither primary nor secondary cell wall

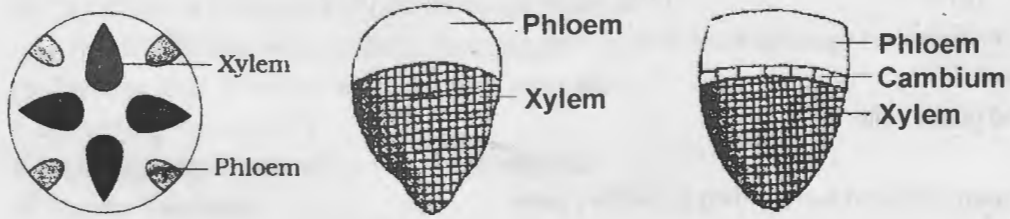
79. One of the primary function of the ground tissue in a plant is –
(a) Photosynthesis (b) To protect the plant (c) To anchor the plant (d) Water and sugar conduction

80. In the development of a root, the protoderm gives rise to the –
(a) Cortex (b) Root hair (c) Endodermis (d) Pith

81. Plant cells that are photosynthetically active are found in the _____ layer of leaf and are _____ cells –
(a) Epidermis, Parenchymatous (b) Mesophyll, Parenchymatous
(c) Mesophyll, Sclerenchymatous (d) Aerenchyma, Collenchymatous

82. 

What type of vascular bundles are A, B and C?
(a) Radial; close collateral conjoint; open collateral cojoint
(b) Close collateral conjoint; open collateral conjoint; Radial
(c) Open collateral conjoint; Close collateral conjoint; Radial
(d) Bicollateral; Concentric; Radial

83. 

These three types of vascular bundles (A, B and C) are present in –
(a) Stem. root, leaf (b) Root, stem, leaf
(c) Root, monocot stem and leaf, dicot stem (d) Monocot stem and leaf, dicot root, monocot leaf

84. Xylem and phloem are present on the same radius, such a vascular bundle is called –
(a) Radial (b) Bicollateral (c) Concentric (d) Conjoint

85. When xylem and phloem are arranged in an alternate manner on separate radii, such a vascular bundle is called –
(a) Radial (b) Bicollateral (c) Concentric (d) Conjoint

86. Vascular bundle having cambium between the xylem and phloem is called –
(a) Close vascular bundle (b) Open vascular bundle
(c) Conjoint vascular bundle (d) Radial vascular bundle

87. Vascular bundle without cambium is called –
(a) Close vascular bundle (b) Open vascular bundle
(c) Conjoint vascular bundle (d) Radial vascular bundle

88. Which one is not the part of stele?

(a) Pericycle (b) Pith (c) Vascular bundle (d) Cortex

89. In dicot root, initiation of lateral root, and vascular cambium during secondary growth takes place from –
(a) Cortex (b) Epidermis (c) Pericycle (d) Xylem

90. The innermost layer or last layer of cortex is called –
(a) Pericycle (b) Conjunctive tissue (c) Endodermis (d) Exodermis

91. I. Unicellular hair
II. Endodermis with passage cells
III. Pith-small / inconspicuous
IV. Radial vascular Bundle
V. Xylem-exarch
VI. 2 - 4 xylem and phloem
The above description refers to which of the following –
(a) Monocot root (b) Dicot root (c) Monocot stem (d) Dicot stem

92. Monocot root differs from dicot root in having –
(a) Polyarch xylem bundles (b) Large and well developed pith
(c) Both (d) Radial vascular Bundle and exarch xylem

93. In root, the tangential as well as radial walls of the barrel-shaped endodermal cells have a deposition of water impermeable, waxy material-suberin in the form of –
(a) Cuticle strips (b) Protein strips (c) Casparian strips (d) Silicious strips

94. In dicot stem –
(a) Vascular bundles are conjoint, open and arranged in a ring
(b) Xylem is endarch
(c) Collenchymatous hypodermis
(d) All

95. Well developed pith is seen in –
(a) Monocot root and monocot stem (b) Dicot root and dicot stem
(c) Monocot root and dicot stem (d) Dicot root and monocot stem

96. Which one is false about monocot stem?
I. Vascular bundles – scattered, conjoint, close, surrounded by sclerenchymatous bundle sheath and with water cavity
II. Hypodermis is sclerenchymatous
III. Peripheral vascular bundles – Smaller than centrally placed ones
IV. Ground tissue is differentiated into cortex, pericycle, pith, etc
V. Homogeneous parenchymatous ground tissues
(a) I, III, V (b) III, IV (c) IV (d) V

97. Which one is correct about the dicot stem?
(a) Pericycle consists of semilunar sclerenchymatous patches above the phloem and few layers of parenchyma alternatively
(b) It does not show secondary growth
(c) Endodermis is rich in starch, so this is also called starch sheath
(d) a and c

98. **Column I**
I. Leaf is hypostomatic
II. Mesophyll is differentiated into palisade and spongy parenchyma
III. Leaf is amphistomatic
IV. Vascular bundle = conjoint and close

V. Mesophyll consists of only spongy parenchyma
VI. Epidermis is cuticularised
VII. Vascular bundles of different sizes
VIII. Vascular bundle of similar size

Column II

A. Dicotyledonous / Dorsiventral leaf
B. Monocotyledonous / Monocot leaf

Which is correctly matched –

(a) A = I, IV, V, VI, VII; B = II, III, IV, VI, VIII
(b) A = I, II, IV, VI, VII; B = III, IV, V, VI, VIII
(c) A = III, IV, V, VI, VIII; B = I, II, IV, VI, VII
(d) A = I, IV, V, VIII; B = II, III, IV, VI, VII

99. In leaves, protoxylem elements –
(a) Face towards adaxial side
(b) Face towards abaxial surface
(c) Are surrounded by metaxylem
(d) Are scattered in the middle

100. In dorsiventral leaf, location of palisade tissue and phloem respectively is –
(a) Adaxial and abaxial (b) Abaxial and adaxial (c) Adaxial and adaxial (d) Abaxial and abaxial

101. In stem, starch sheath is equivalent to –
(a) Pericycle (b) Endodermis (c) Bundle sheath (d) Bundle cap

102. Which one is correct?
(a) In dorsiventral leaf, stomata are on lower (abaxial) surface
(b) Protoxylem disintegrates to produce lacuna (lysigenous) in monocot stem
(c) Reticulate venation in dicot leaf, parallel venation in monocot leaf
(d) All

103. A T.S. of dicot stem is stained with iodine with proper procedure. Which of the following structures are expected to show blue colour –
(a) Endodermis (b) Cortex (c) Pericycle (d) Phloem

104. In dicot stem lateral branch comes out from –
(a) Pericycle (b) Cortex (c) Pith (d) Epidermis

105. Which one is correct about bulliform / motor cell?
(a) It is seen in grasses
(b) It is large-sized, thin-walled colourless, vacuolate cells on the adaxial surface
(c) It helps in rolling of leaf to minimise water loss when it is flaccid
(d) All

106. In young dicot stem, cambium is –
(a) Single layered (b) 2 layered (c) Multilayered (d) Absent

107. During secondary growth, a complete ring is formed by –
(a) Only fascicular cambia
(b) Only interfascicular cambia
(c) Fascicular (vascular) cambia and interfascicular cambia
(d) Fascicular cambia + Phellogen

108. Interfascicular cambia originate from cells of –
(a) Medullary ray (b) Cortex (c) Endodermis (d) Fascicular cambia

109. Vascular cambium forms xylem on the inside and phloem on the outside due to –
(a) Differential action of hormones
(b) Intrafascicular nature
(c) Shearing force of wind
(d) Effect of growth

110. Secondary xylem is –
(a) Exarch (b) Endarch (c) Mesarch (d) None

111. Secondary growth occurs due to activity of –
(a) Cork cambium (b) Interfascicular cambium
(c) Vascular cambium (d) Both a and c

112. Amount of secondary xylem formed from cambium is –
(a) 8 times more than phloem (b) 8 - 10 times more than phloem
(c) 2 times more than phloem (d) Equal to secondary phloem

113. Which one is correct about the secondary growth?
(a) Youngest secondary phloem is just outside the cambium while youngest secondary xylem inside the cambium
(b) Oldest secondary phloem is just inside the primary phloem while oldest secondary xylem is just above pith
(c) Secondary medullary ray passes through both secondary xylem and secondary phloem
(d) All

114. Which one is a false statement?
(a) The 1^{o} and 2^{o} phloem get gradually crushed due to the continued formation and accumulation of 2^{o} xylem
(b) 1^{o} xylem remains more or less intact in or near the centre
(c) Secondary growth is increase in length of the axis
(d) None

115.

Column I	Column II
A. Spring wood or early wood	I. Lighter in colour
B. Autumn wood or late wood	II. Density high
	III. Density low
	IV. Darker in colour
	V. Larger number of xylary elements
	VI. Vessels with wider cavity
	VII. Lesser number of xylary elements
	VIII. Vessels with small cavity

Which of the following matching is correct?
(a) A = II, IV, VII, VIII; B = I, III, V, VI (b) A = I, II, VII, VIII; B = III, IV, V, VI
(c) A = I, III, V, VI; B = II, IV, VII, VIII (d) A = I, III, VII, VIII; B = II, IV, V, VI

116. Widening of tree trunk is mostly due to the activity of –
(a) Phelloderm (b) Fascicular cambium (c) 1^{o} xylem (d) 2^{o} phloem

117. Moving from the centre of tree trunk outward, the order of vascular tissues is –
(a) 1^{o} xylem → 2^{o} xylem → vascular cambium → 2^{o} phloem → 1^{o} phloem
(b) 2^{o} xylem → 1^{o} xylem → vascular cambium → 1^{o} phloem → 2^{o} phloem
(c) 1^{o} xylem → 2^{o} phloem → 2^{o} xylem → 2^{o} phloem → vascular cambium
(d) 1^{o} xylem → 1^{o} phloem → vascular cambium → 2^{o} phloem → 2^{o} xylem

118. Which of the following statements regarding the formation of annual ring is false?
(a) Annual rings are formed as a result of seasonal environmental conditions
(b) Tracheids / Vessel elements are larger during periods when water is abundant
(c) Tracheids / Vessels elements have thicker wall during periods of water deprivation
(d) Wood formed in the previous years is darker than newer wood

119. The activity of cambium is under the control of –
(a) Many physiological factors (b) Many environmental factors
(c) both (d) Only photoperiod

120. One cannot determine the age of a tree by its rings, if that tree is located in which of the following forest
(a) Tropical deciduous (b) Tropical evergreen

(c) Temperate evergreen (d) Temperate deciduous

121. Annual rings are bands of –
(a) Secondary xylem and vascular rays (b) Secondary phloem and vascular rays
(c) Secondary vascular tissues (d) Cork and vascular cortex

122. Annual or growth rings consist of –
(a) Alternate rings of heart and early wood (b) Alternate rings of sapwood and heart wood
(c) Alternate rings of early and late wood (d) Alternate rings of porous and non-porous wood

123. Autumn wood or late wood is formed –
(a) In winter (b) In spring (c) Throughout the year (d) In rainy season

124. Early wood is formed –
(a) In winter (b) In spring (c) Throughout the year (d) In Autumn

125. In spring season cambium is _____ active and produces _____ wood.
(a) More, late (b) More, early (c) Less, late (d) less, early

126. In winter season, cambium is _____ active and produces _____ wood.
(a) More, late (b) More, early (c) Less, late (autumn) (d) less, early

127. Which is true about heart wood / Duramen?
(i) It does not help in water + mineral conduction
(ii) It is dark coloured but soft
(iii) It has tracheary elements filled with tannins, resins, gums, oil, etc.
(iv) It is a peripheral part
(v) Sensitive to microbes + insects, hence least durable
(a) I, III (b) II, III (c) IV, V (d) III, IV

128. Which is false about sap wood (Alburnum)?
(a) It is peripheral part, lighter in colour
(b) It is involved in ascent of sap
(c) It is sensitive to microbes + insects as it has no deposition of resins, gum, tannins, etc.
(d) None

129. Which one is correct about the cork cambium / phellogen?
(a) Usually cortex of stem forms it during secondary growth of stem
(b) It is a couple of layers thick
(c) It is made up of thin-walled rectangular cells
(d) All

130. Phellogen cuts –
(a) Cork / phellogen inside and secondary cortex (phelloderm) outside
(b) Cork outside and phelloderm inside
(c) Both cork and phelloderm inside
(d) Both cork and phelloderm outside

131. Cork is impervious to water due to –
(a) Silica in cell wall (b) $CaCO_3$ in cell wall (c) Suberin in cell wall (d) Cuticle in cell wall

132. The collective term for phelloderm (secondary cortex), cork cambium (phellogen) and cork (phellem) is –
(a) Pericycle (b) Periderm (c) Protoderm (d) Procambium

133. Annual rings are seen in temperate zone trees because –
(a) Xylem cell size varies with season (b) Heart wood cells alternate with sap wood cells
(c) Xylem activity varies with season (d) Resin is deposited in the rings in the stem

134. Bark includes –

(a) All tissues exterior to vascular cambium (b) Periderm + Secondary phloem
(c) Both living and dead tissues (d) All

135. Bark includes –
(a) Cork + Phellogen + Phelloderm + Secondary phloem (b) Periderm only
(c) Secondary xylem + Secondary phloem (d) Secondary xylem + Cambial ring + Secondary phloem

136. At places, the cork contains aerating pores called –
(a) Stomata (b) Lenticels (c) Hydathode (d) Pneumatophore

137. A lenticel has loosely arranged parenchymatous cells on the outer side. These cells, cut off by phellogen are called–
(a) Complimentary cells (b) Epithem (c) Aerenchyma (d) Sclerenchyma

138. Lenticels are spongy regions on the surface of some woody old stem that function in –
(a) Gaseous exchange (b) Transpiration (c) Both (d) Water conservation

139. Bark formed early in the season is called _____ bark and towards the end is called _____ bark.
(a) hard, soft (b) Soft, hard (c) Scaly, ring (d) ring, scaly

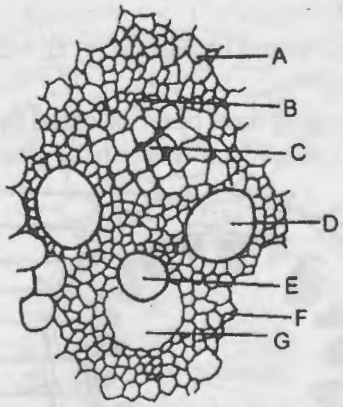
140. In dicot root, the cambium is –
(a) Completely primary in origin (b) Completely secondary in origin
(c) Primary as well as secondary in origin (d) Derived from endodermis

141. In dicot root showing secondary growth, cork is _____ formed –
(a) Inner to endodermis and external to primary phloem (b) Outer to endodermis and inner to primary cortex
(c) Inner to endodermis and outer to pericycle (d) external to primary cortex

142. When secondary growth in thickness is initiated in a dicot root, which of the following happens first?
(a) Portion of conjunctive parenchyma present below the phloem bundle forms cells of vascular cambium
(b) Portion of pericycle above the protoxylem becomes meristematic and forms vascular cambial cells
(c) Both
(d) Cambial initials between the xylem and phloem divide

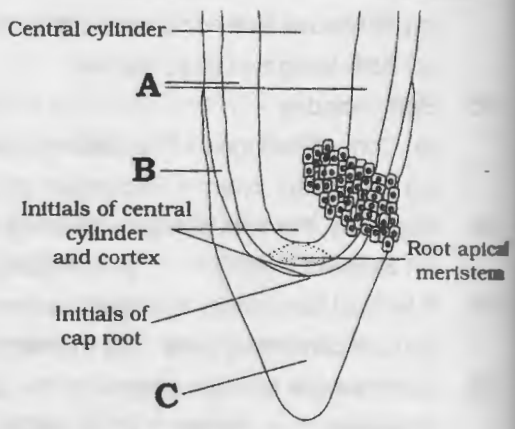
143. In dicot root, cork cambium is formed by –
(a) Cortex (b) hypodermis (c) Pericycle (d) Epidermis

144. In the diagram of the cross-section of the vascular bundle of monocot stem given aside, different parts have been indicated by alphabets ; choose the answer in which these alphabets have been correctly matched with the parts which they indicate



(a) A = Bundle sheath, B = Broken phloem, C = Metaphloem, D = Metaxylem, E = Protoxylem, F = Xylem parenchyma, G = Lysigenous cavity
(b) A = Bundle cap, B = Metaphloem, C = Protophloem, D = Protoxylem, E = Metaxylem, F = Lysigenous cavity, G = Xylem parenchyma
(c) A = Bundle sheath, B = Primary phloem, C = Secondary phloem, D = Primary xylem, E = Secondary xylem, F = Xylem fibres, G = Hydathode
(d) A = Bundle cap, B = Metaxylem, C = Metaphloem, D = Protoxylem, E = Protophloem, F = Lysigenous cavity, G = Xylem parenchyma.

145. Refer to the accompanying figure and identify the structures indicated in the drawing of root apex.



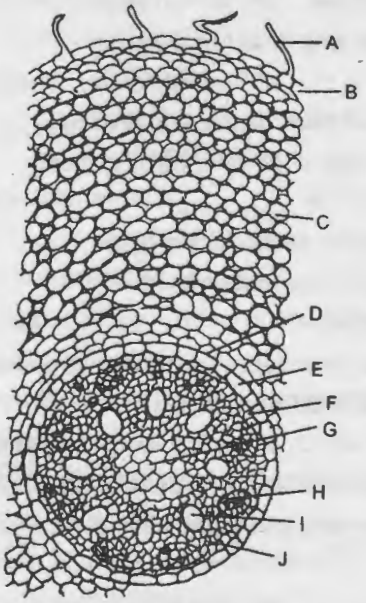
(a) A - Vascular structure, B - Protoderm, C - Root cap

(b) A - Cortex, B - Endodermis, C - Root cap

(c) A - Cortex, B - Protoderm, C - Root cap

(d) A - Tunica, B - Protoderm, C - Root cap

146. TS of monocot root is given below, certain parts have been indicated by alphabets, choose the answer in which these alphabets have been correctly matched with the parts which they indicate –



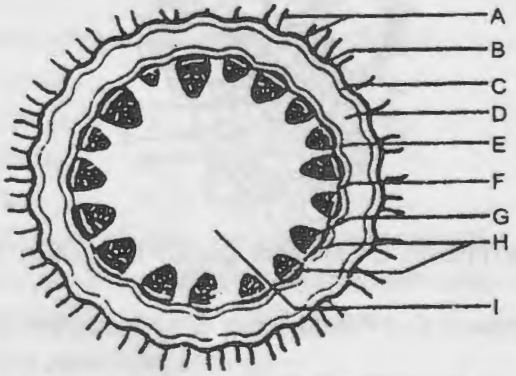
(a) A = Root hair, B = Epiblema, C = Cortex, D = Endodermis, E = Passage cell, F = Pericycle, G = Pith H = Phloem, I = Metaxylem, J = Protoxylem

(b) A = Root hair, B = Epiblema, C = Cortex, D = Endodermis, E = Passage cell, F = Pith, G = Pericycle, H = Metaxylem, I = Phloem, J = Protoxylem

(c) A = Root hair, B = Epiblema, C = Cortex, D = Endodermis, E = Pericycle, F = Passage cell, G = Phloem, H = Pith, I = Protoxylem, J = Metaxylem

(d) A = Root hair, B = Cortex, C = Epiblema, D = Pericycle, E = Endodermis, F = Pith, G = Passage cell, H = Phloem, I = Protoxylem , J = Metaxylem.

147. T.S. of dicot stem is given below, certain parts have been indicated by alphabets. Choose the answer in which these alphabets have been correctly matched with the parts which they indicate



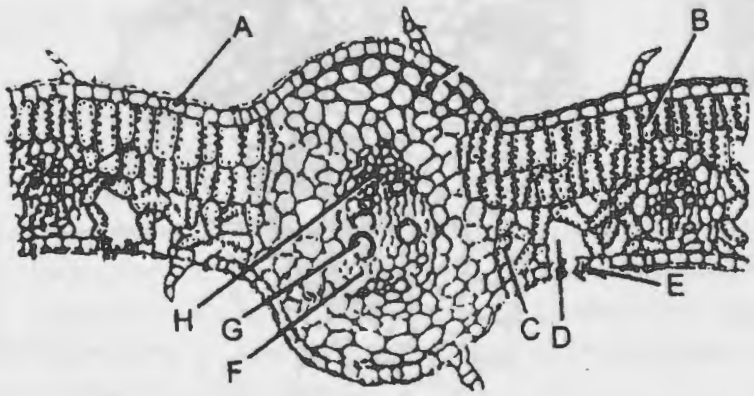
(a) A = Epidermis, B = Epidermal hairs, C = Parenchyma, D = Starch Sheath E = Hypodermis (collenchyma), F = Vascular bundle, G = Bundle cap, H = Medulla or pith, I = Medullary rays

(b) A = Epidermal hairs, B = Epidermis C = Hypodermis (Collenchyma), D= Parenchyma, E = Starch sheath, F = Bundle cap G = Vascular bundle, H = Medullary rays, I = Medulla or pith

(c) A = Epidermal hairs, B = Epidermis, C = Hypodermis (collenchyma), D =Starch sheath, E = Parenchyma, F = Vascular bundle, G = Bundle cap, H = Medulla or pith, I = Medullary rays,

(d) A= Epidermal hairs, B = Epidermis C = Parenchyma, D = Hypodermis (collenchyma) E = Starch sheath, F = Vascular bundle G = Bundle cap, H = Medulla or pith I = Medullary rays

148. TS of dicot leaf passing through the midrib is given below, certain parts have been indicated by alphabets. Choose the answer in which these alphabets have been correctly matched with the parts which they indicate.



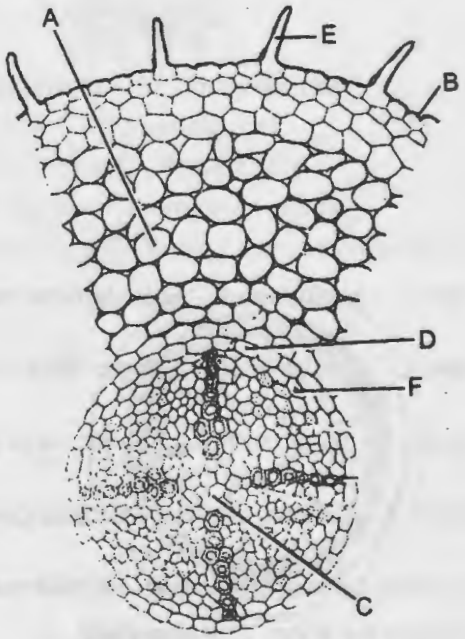
(a) A = Epidermis, B = Spongy Parenchyma, C = Palisade Parenchyma, D = Stomata, E =Guard cells, F = Phloem, G = Metaxylem, H = Protoxylem,

(b) A = Epidermis, B = Palisade parenchyma, C = Spongy Parenchyma, D = Sub stomatal cavity, E = Guard cells, F = Phloem, G = Metaxylem, H = Protoxylem

(c) A = Epidermis, B= Palisade parenchyma, C = Spongy parenchyma, D = Stomata, E = Guard cells, F = Endodermis, G = Xylem, H = Phloem

(d) A= Epidermis, B =Palisade parenchyma, C = Spongy parenchyma, D = Stomata, E = Guard Cells, F = Phloem, G = Metaxylem, H = Protoxylem.

149. TS of dicot root is given below, certain parts have been indicated by alphabets, choose the answer in which these alphabets have been correctly matched with the parts which they indicate.



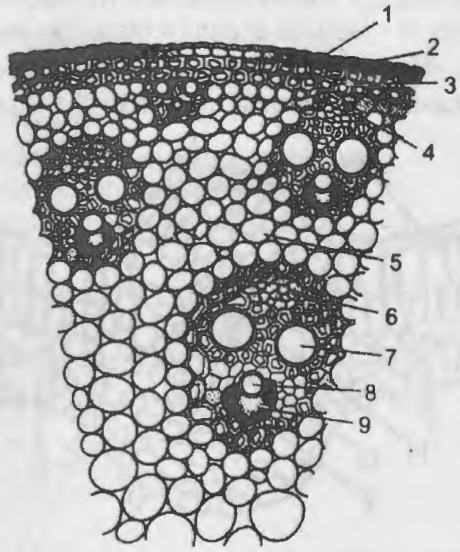
(a) A = Epiblema, B = Root hair, C = Cortex, D = Endodermis, E = Pith, F = Pericycle

(b) A = Cortex, B = Pith, C = Epiblema, D = Endodermis, E = Root hair, F = Pericycle

(c) A = Epiblema, B = Endodermis, C = Cortex, D = Root hair, E = Pith, F = Pericycle

(d) A = Cortex, B = Epiblema, C = Pith, D = Endodermis, E = Root hair, F = Pericycle

150. T.S. of monocot stem is given below, certain parts have been indicated by alphabets. Choose the answer in whic these alphabets have been correctly matched with the parts which they indicate –



(a) 1 - Cuticle, 2 - Epidermis, 3 - Sclerenchymatous hypodermis, 4 - Sclerenchymatous sheath, 5 - Parenchymatou sheath, 6 - Phloem, 7 - Metaxylem, 8 - Protoxylem, 9 - Water cavity

(b) 1 - Cuticle, 2 - Epidermis, 3 - Sclerenchymatous sheath, 4 - Sclerenchymatous hypodermis, 5 - Parenchymatou sheath, 6 - Phloem, 7 - Metaxylem, 8 - Protoxylem, 9 - Water cavity

(c) 1 - Cuticle, 2 - Epidermis, 3 - Sclerenchymatous hypodermis, 4 - Sclerenchymatous sheath, 5 - Parenchymatou sheath, 6 - Phloem, 7 - Protoxylem, 8 - Metaxylem, 9 - Water cavity

(d) 1 - Cuticle, 2 - Epidermis, 3 - Sclerenchymatous hypodermis, 4 - Sclerenchymatous sheath, 5 - Parenchymatou sheath, 6 - Protoxylem, 7 - Metaxylem, 8 - Phloem, 9 - Water cavity

151. T.S. of monocot leaf is given below, certain parts have been indicated by alphabets. Choose the answer in which these alphabets have been correctly matched with the parts which they indicate –

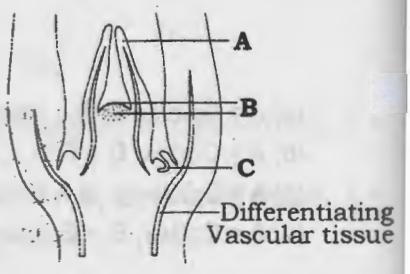
(a) A - Adaxial epidermis, B - Xylem, C - Mesophyll, D - Sub-stomatal cavity, E - Abaxial epidermis, F - Phloem, G - Stoma

(b) A - Abaxial epidermis, B - Xylem, C - Mesophyll, D - Sub-stomatal cavity, E - Adaxial epidermis, F - Phloem, G - Stoma

(c) A - Adaxial epidermis, B - Phloem, C - Mesophyll, D - Sub-stomatal cavity, E - Abaxial epidermis, F - Xylem, G - Stoma

(d) A - Adaxial epidermis, B - Xylem, C - Stoma, D - Sub-stomatal cavity, E - Abaxial epidermis, F - Phloem, G - Mesophyll

152. Refer to the accompanying figure and identify the structures indicated in the drawing.



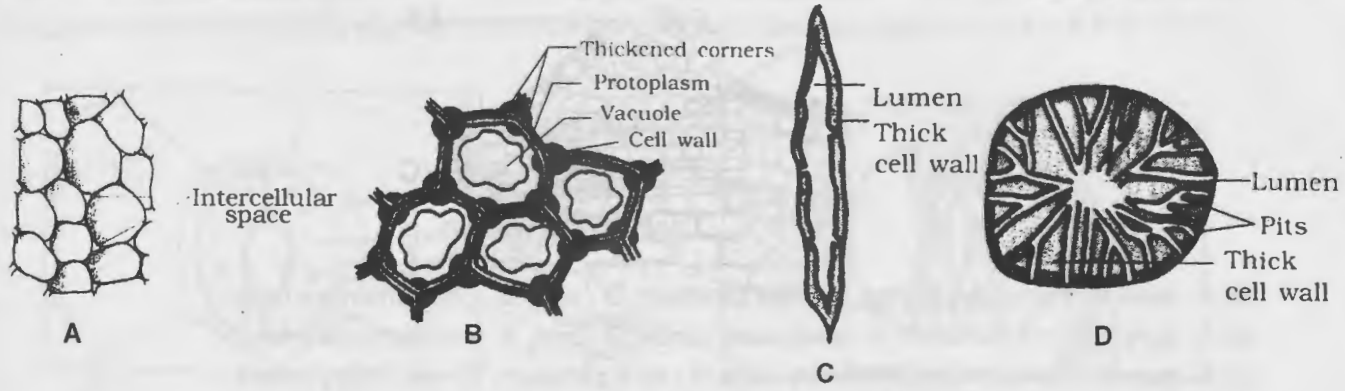
(a) A - Leaf primordium, B - Shoot apical meristem, C - Axillary bud

(b) A - Leaf primordium, B - Shoot apical meristem, C - Apical bud

(c) A - Root hair primordium, B - Root apical meristem, C -Axillary bud

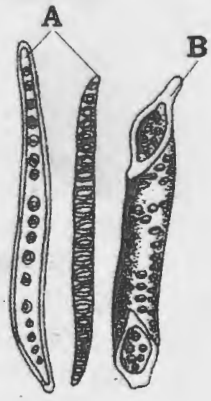
(d) A - Root hair primordium, B - Root apical meristem, C - Terminal bud

153. Refer to the accompanying figures and identify the types of simple tissue indicated by A, B, C and D –



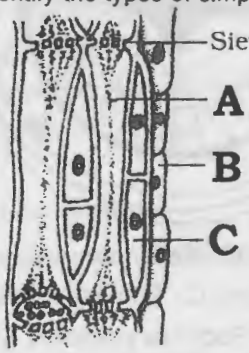
(a) A - Parenchyma, B - Collenchyma, C - fibre (Sclerenchyma), D - sclereid (Sclerenchyma)
(b) A - Collenchyma, B - Parenchyma, C - fibre (Sclerenchyma), D - sclereid (Sclerenchyma)
(c) A - Parenchyma, B - Collenchyma, C - sclereid (Sclerenchyma), D - fibre (Sclerenchyma)
(d) A - Collenchyma, B - Parenchyma, C - sclereid (Sclerenchyma), D - fibre (Sclerenchyma)

154. Refer to the accompanying figures and identify A and B –



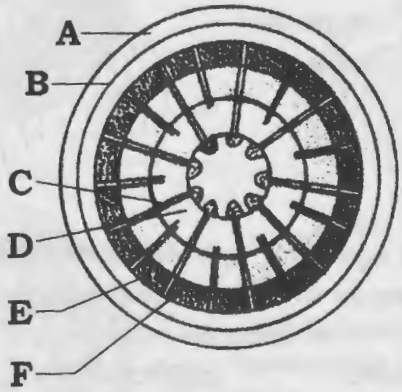
(a) A - Tracheid, B - Vessel
(b) A - Vessel, B - Tracheid
(c) A - Fibre, B - Tracheid
(d) A - Fibre, B - Sclereid

155. Refer to the accompanying figures and identify the types of simple tissue indicated by A, B and C –



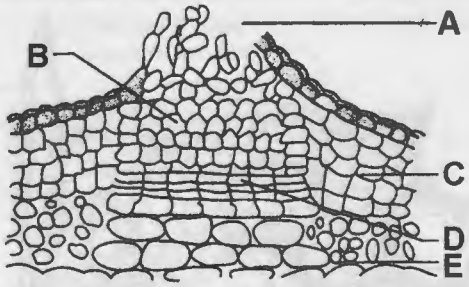
(a) A - Sieve tube, B - Phloem parenchyma, C - Companion cell
(b) A - Vessel, B - Xylem parenchyma, C - Companion cell
(c) A - Sieve tube, B - Phloem parenchyma, C - Phloem fibre
(d) A - Sieve tube, B - Companion cell, C - Phloem parenchyma

156. Refer to the figure showing secondary growth in dicot stem, and identify A to F –



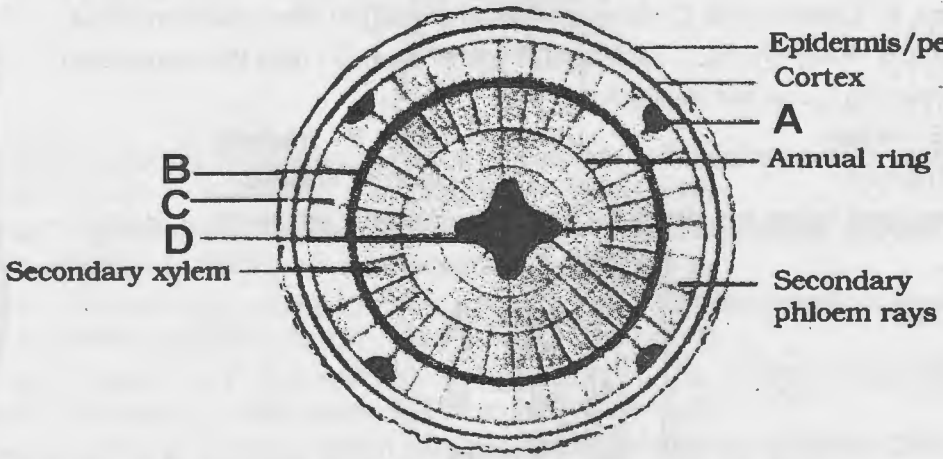
(a) A - Phellem, B - Phellogen, C - Medullary rays, D - Secondary xylem, E - Secondary phloem, F - Cambium ring
(b) A - Phellem, B - Phellogen, C - Medullary rays, D - Secondary phloem, E - Secondary xylem, F - Cambium ring
(c) A - Phellogen, B - Phellem, C - Medullary rays, D - Secondary xylem, E - Secondary phloem, F - Cambium ring
(d) A - Phellem, B - Phellogen, C - Cambium ring, D - Secondary xylem, E - Secondary phloem, F - Medullary rays

157. Choose the correct combination of labelling a lenticel.



(a) A - pore, B - secondary cortex, C - cork cambium, D - cork, E - complimentary cells.
(b) A - pore, B - cork cambium, C - secondary cortex, D - cork, E - complimentary cells.
(c) A - pore, B - cork, C - complimentary cells, D - cork cambium, E - secondary cortex.
(d) A - pore, B - complimentary cells, C - cork, D - cork cambium, E - secondary cortex.

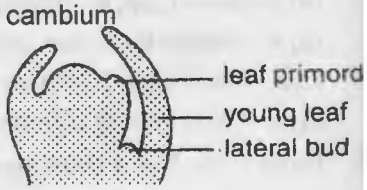
158. Given diagram is old typical dicot root.



(a) A - Primary phloem, B - Vascular cambium, C - Secondary phloem, D - Primary xylem
(b) A - Secondary phloem, B - Vascular cambium, C - Primary phloem, D - Primary xylem
(c) A - Primary phloem, B - Primary xylem, C - Secondary phloem, D - Vascular cambium
(d) A - Secondary phloem, B - Primary xylem, C - Primary phloem, D - Vascular cambium

159. The digram opposite shows a longitudinal section through a shoot apex.

Which of the diagrams below shows the correct appearance of this shoot apex at the formation of the next leaf primordium?



(a) 
(b) 
(c) 
(d) 

160. Ground tissue includes
(a) All tissues internal to endodermis
(b) All tissues external to endodermis
(c) All tissues except epidermis and vascular bundles
(d) Epidermis and cortex

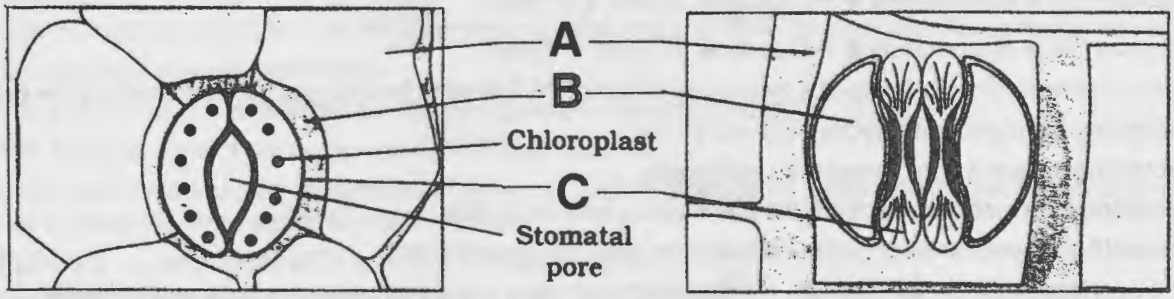
161. In land plants the guard cells differ from other epidermal cells in having
(a) Chloroplasts (b) Cytoskeleton (c) Mitochondria (d) Endoplasmic reticulum

162. The cork cambium, cork and secondary cortex are collectively called
(a) Phellem (b) Phelloderm (c) Phellogen (d) Periderm

163. Compared to sclerenchyma, collenchyma cells

(a) Have more secondary cell wall materials (b) Are used to support the plant
(c) Less flexible (d) Are more flexible

164. The given diagram represents stomatal apparatus in dicots and monocots. Identify A, B and C.



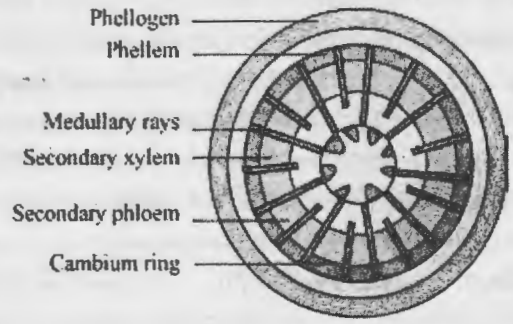
(a) A - Epidermal cells; B - Subsidiary cells; C - Guard cells (b) A - Guard cells; B - Subsidiary cells; C - Epidermal cells
(c) A - Guard cells; B - Epidermal cells; C - Subsidiary cells (d) A - Subsidiary cells; B - Epidermal cells; C - Guard cells

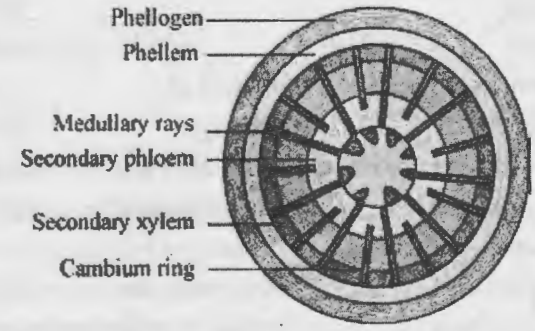
165. Function of companion cells is :
(a) Providing energy to sieve elements for active transport
(b) Providing water to phloem
(c) Loading of sucrose into sieve elements by passive transport
(d) Loading of sucrose into sieve elements

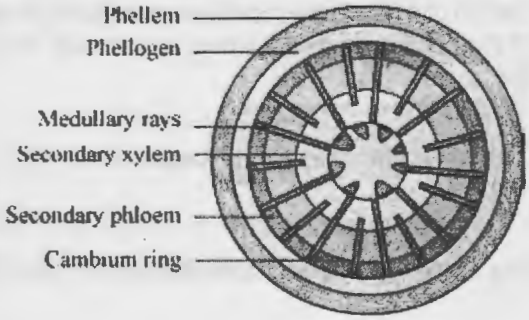
166. Some vascular bundles are described as open because these :
(a) are surrounded by pericycle but no endodermis
(b) are capable of producing secondary xylem and phloem
(c) possess conjunctive tissue between xylem and phloem
(d) are not surrounded by pericycle

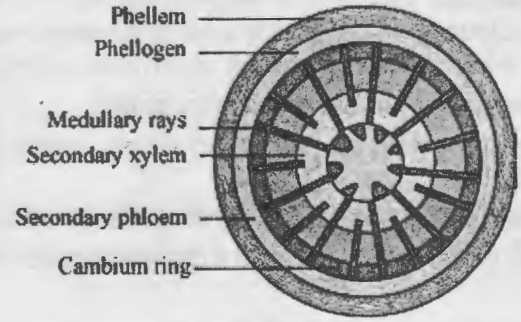
167. In root-stem transition region the vascular bundles are
(a) radial (b) conjoint (c) collateral (d) none

168. Which figure of dicot stem is correctly labelled?

(a)


(b)


(c)


(d)


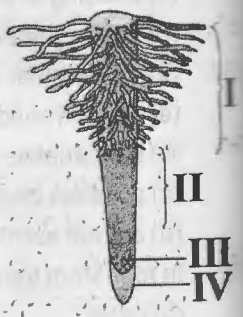
169. Which sequence correctly illustrates the arrangement of layers from outside to inside in a dicot stem?
(a) Hypodermis ➧ Endodermis ➧ Pericycle ➧ Phloem ➧ Xylem
(b) Endodermis ➧ Hypodermis ➧ Pericycle ➧ Xylem ➧ Phloem
(c) Hypodermis ➧ Endodermis ➧ Pericycle ➧ Xylem ➧ Phloem
(d) Endodermis ➧ Hypodermis ➧ Pericycle ➧ Phloem ➧ Xylem

170. Epidermis is the surface covering of a plant body. Which of the following functions is not performed by the epidermis?
(a) Protecting the plant from mechanical injury
(b) Protecting the plant from invasion by pathogens
(c) Preventing the loss of water from the plant, along with the cuticle
(d) Preventing the exchange of gases between the plant and environment

171. ____I____ is an example of ____II____ meristem that helps in the formation of woody axis in plants.
The information in which alternative completes the given statement?
(a) I-Apical meristem; II-primary
(b) I-Apical meristem; II-secondary
(c) I-Interfascicular cambium; II-primary
(d) I-Interfascicular cambium; II-secondary

172. Dicot stem differs from dicot root in
(a) presence of cortex
(b) absence of endodermis
(c) absence of pericycle
(d) position of protoxylem

173. The figure illustrates the various regions of the root.
The T. S. of which part is the best to study anatomical characters of a root?
(a) Part-I
(b) Part-II
(c) Part-III
(d) Part-IV



174. As compared to a dicot root, a monocot root has :
(a) More abundant secondary xylem
(b) Many xylem bundles
(c) Inconspicuous annual rings
(d) Relatively thicker periderm

175. Radial conduction of water takes place by
(a) vessels
(b) vessels and trachieds
(c) phloem
(d) ray parenchyma cells.

176. The common bottle cork is a product of :
(a) Dermatogen (b) Phellogen (c) Xylem (d) Vascular Cambium

177. Companion cells are closely associated with :
(a) Sieve elements (b) Vessel elements (c) Trichomes (d) Guard cells

178. Closed vascular bundles lack
(a) Ground tissue (b) conjunctive tissue (c) Cambium (d) Pith

179. Water containing cavities in vascular bundles are found in :
(a) Sunflower (b) Maize (c) Cycas (d) Pinus

180. Fifteen years ago, your parents hung a swing from the lower branch of a large tree growing in your yard. When you go and sit in it today, you realize it is exactly the same height off the ground as it was when you first sat in it 15 years ago. The reason the swing has not grown taller as the tree has grown is that
(a) the tree trunk is showing secondary growth.
(b) the tree trunk is part of the primary growth system of the plant, but elongation is no longer occurring in that part of the tree.
(c) trees lack apical meristems and so do not get taller.
(d) you are hallucinating, because it is impossible for the swing not to have gotten taller as the tree grew.

181. If you were to relocate the pericycle of a plant root to the epidermal layer, how would it affect root growth?
(a) Secondary growth in the mature region of the root would not occur.
(b) The root apical meristem would produce vascular tissue in place of dermal tissue.
(c) Nothing would change, because the pericycle is normally located near the epidermal layer of the root.
(d) Lateral roots would grow from the outer region of the root and fail to connect with the vascular tissue.

182. Go through the following statements.
I. The word meristem is derived from Greek, meristos meaning divided.
II. The stele consists of pericycle, vascular bundle and pith.
III. During secondary growth the amount of secondary xylem produced is more than the secondary phloem becuase the cambium is more active on the inner side.
IV. Palm is a monocot plant so it does not increase in girth.
V. The Book *"Anatomy of Seed Plants"* by Katherine Esau is referred to as Webster's of plant biology.
How many of the above statements are correct?
(a) One (b) Two (c) Three (d) Four

183. Interfascicular cambium develops from the cells of :
(a) Medullary rays (b) Xylem parenchyma (c) Endodermis (d) Pericycle

184. Lenticels are involved in :
(a) Transpiration (b) Gaseous exchange (c) Food transport (d) Photosynthesis

185. Age of a tree can be estimated by :
(a) its height and girth (b) biomass
(c) number of annual rings (d) diameter of its heartwood

186. You are given a fairly old piece of dicot stem and a dicot root. Which of the following anatomical structures will you use to distinguish between the two?
(a) Secondary xylem (b) Secondary phloem (c) Protoxylem (d) Cortical cells

187. Tracheids differ from other tracheary elements in :
(a) having casparian strips (b) being imperforate
(c) lacking nucleus (d) being lignified

188. Which of the following statements is not true for stomatal apparatus?
(a) Inner walls of guard cells are thick
(b) Guard cells invariably possess chloroplasts and mitochondria
(c) Guard cells are always surrounded by subsidiary cells
(d) Stomata are involved in gaseous exchange

189. Meristematic tissue responsible for increase in girth of tree trunk is
(a) Apical meristem (b) Intercalary meristem (c) Lateral meristem (d) Phellogen

190. Which of the following tissues provide maximum mechanical support to plant organs?
(a) Sclerenchyma (b) Collenchyma (c) Parenchyma (d) Aerenchyma

191. Identify the tissue not formed during secondary growth in plants.
(a) phellogen (b) wood (c) phellem (d) pericycle.

192. Given figure does not explain –

(a) Terminal position of shoot apical meristem (b) Acropetalous arrangement of leaves on stem
(c) Origin of axillary buds (d) Origin of root cap.

193. A cross section of a plant material shows four xylem patches alternating with same number of phloem patches a in the xylem protoxylem is pointed towards periphery. In the centre of stele a small pith is present.
The plant material is
(a) Young dicot stem (b) Young dicot root (c) Monocot stem (d) Monocot root.

194. Radial vascular bundle, exarch xylem, large pith, collenchymatous hypodermis.
How many of the above items are for a young dicot stem?
(a) 2 (b) 3 (c) 4 (d) 1

195. Radial vascular bundle, exarch xylem large pith, passage cell.
How many of the above items are for a young dicot root?
(a) 2 (b) 3 (c) 4 (d) 5

196. Phloem in angiosperms differs from the phloem of pteridophytes and gymnosperms in having –
(a) Tyloses in phloem cells (b) Sieve tube
(c) Sieve cells (d) Albuminous cells

197. Select the characters which are not applicable to the anatomy of dicot roots?
A. Conjunctive tissue present.
B. Presence of protein compounds in the casparian strips.
C. Polyarch xylem bundles.
D. Presence of pericycle.
(a) A and B (b) B and D (c) C and D (d) B and C

198. Match the following –

A. Collenchyma	(i) Specialised epidermal cells.
B. Subsidiary cells	(ii) Mechanical support for growing plants.
C. Casparian strips	(iii) Mesophyll tissue of dicot leaf.
D. Spongy parenchyma	(iv) Suberin deposition in the radial walls of endodermis

(a) A - (ii), B - (i), C - (iv), D - (iii) (b) A - (ii), B - (iii), C - (iv), D - (i)
(c) A - (i), B - (ii), C - (iii), D - (iv) (d) A - (iv), B - (i), C - (ii), D - (iii)

199. Go through the following statements.
I. Meristems are / have devoid of thickening in cell wall.
II. During the formation of leaves and elongation of stem, some cells are left behind from the shoot apical merist and they constitute axillary bud.
III. Removed parts of grasses by the grazing herbivores are regenerated fast by intercalary meristems.
IV. Vascular cambium is completely secondary in origin w.r.t. dicot stem.
How many statement(s) is/are wrong?
(a) 1 (b) 2 (c) 3 (d) 4

200. Read the given statements and select option representing correct statements.
A. Anatomy deals with internal structure but not the functional organisation of plants.
B. Tissue arises as a result of interactions among the constituent cells
C. Properties of tissues are present in constituent cells.
D. Tissue is a group of ontogenetically and functionally similar cells but structurally may be similar or dissimila
(a) A and C (b) A and D (c) B and D (d) B and C

201. Mark the correct statement w.r.t. simple permanent tissues.
(a) Do not occur below epidermis.
(b) Permanent tissues with structurally different types of cells.
(c) Permanent tissue with structurally and functionally similar cells
(d) Required for food storage and conduction of sap from root to stems.

202. Which one of the following features is not associated with ground tissue system?
(a) It consists of complex permanent tissues.
(b) Made up of living and dead permanent tissues
(c) Consists of thin walled chloroplast containing cells in leaves
(d) It does not include epidermis and vascular bundles.

203. The tangential as well as radial walls of the endodermal cells have a deposition of water-impermeable waxy materials in
(a) Maize stem (b) Mango stem (c) China rose root (d) Citrus leaf

204. Interfascicular cambium is
A. Functionally secondary meristem but ontogenetically primary meristem.
B. Differentiated medullary cells.
C. Dedifferentiated cells adjoining to intrafascicular cambium.
D. Lateral meristem formed in steler region.
Find out the correct option.
(a) A and B (b) B and C (c) C and D (d) A, C and D

205. How many of the given function/s can be performed by collenchyma?
Mechanical support, Photosynthesis, Secretion, Translocation of organic foods.
(a) One (b) Two (c) Three (d) Four

206. If you are given a piece of young stem of a plant from your school garden, after microscopy of T. S. which of the following anatomical character would you ascertain whether it is a monocot stem or a dicot stem?
(a) Polyarch xylem (b) Type of vascular bundles
(c) Endarch xylem (d) Secondary permanent tissue

207. A major characteristic of monocot root is the presence of
(a) Vasculature without cambium
(b) Cambium sandwiched between phloem and xylem along the radius
(c) Open vascular bundles
(d) Scattered vascular bundles

208. Vascular bundles in monocotyledons are considered closed because
(a) There are no vessels with perforations (b) Xylem is surrounded all around by phloem
(c) A bundle sheath surrounds each bundle (d) Cambium is absent

209. Read the different components from I to IV in the list given below and tell the correct order of the components with reference to their arrangement from outer side to inner side in a woody dicot stem.
I. Secondary cortex II. Wood III. Secondary phloem IV. Phellem
The correct order is
(a) IV, I, III, II (b) IV, III, I, II (c) III, IV, II, I (d) I, II, IV, III

210. Sclerenchymatous hypodermis, starch sheath, scattered vascular bundles, presence of water containing cavity in vascular bundles, conjoint vascular bundles, exarch xylem, intrafascicular cambium. Out of these features how many are found in maize stem?
(a) 3 (b) 4 (c) 2 (d) 6

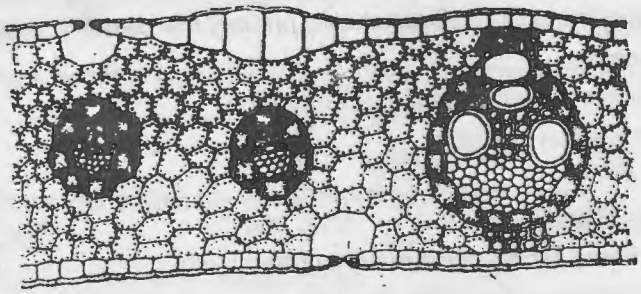
211. Specialised epidermal cells surrounding the guard cells are called :-
(a) Complementary cells (b) Subsidiary cells (c) Bulliform cells (d) Lenticels

212. Cortex is the region found between :-
(a) Endodermis and pith (b) Endodermis and vascular bundle
(c) Epidermis and stele (d) Pericycle and endodermis

213. The balloon-shaped structures called tyloses :-
(a) Are extensions of xylem parenchyma cells into vessels
(b) Are linked to the ascent of sap through xylem vessels
(c) Originate in the lumen of vessels
(d) Characterize the sapwood

214. Companion cells are associated with :
(a) Axial parenchyma (b) Ray parenchyma (c) Seive tubes (d) Seive cells

215. Refer to the given diagram showing a cross section of leaf.



Which of the following statements are not correct regarding this?
I. It is an isobilateral leaf.
II. The leaf shows reticulate venation.
III. The leaf may exhibit kranz anatomy.
IV. Such type of leaf may be present in plants undergoing C_4 pathway.
V. Mesophyll is differentiated into palisade and spongy parenchyma.
VI. Such type of leaf is found in hydrophytes.
VII. Such type of leaf is found in members of Family Poaceae.
(a) I, II and IV (b) I, III, IV and VII (c) II, V and VI (d) III, V, VI and VII

216. The vascular cambium normally gives rise to :
(a) Primary phloem (b) Secondary xylem (c) Periderm (d) Phelloderm

217. Which of the following is made up of dead cells?
(a) Collenchyma (b) Phellem (c) Phloem (d) Xylem parenchyma

218. Identify the wrong statement in context of heartwood:
(a) It is highly durable
(b) It conducts water and minerals efficiently
(c) It comprises dead elements with highly lignified walls
(d) Organic compounds are deposited in it

219. Ram was studing anatomy of young roots of maize, mangolia, pine and money plant. He forgot to label the slides he finds only sieve cells without sieve tubes and companion cells, this slide has to be of:
(a) Pine (b) Money plant (c) magnolia (d) Maize.

220. Meristematic tissues have all these except :
(a) Tubulin (b) Aspartine (c) Adenine (d) Lignin

221. Stele in a monocot stem
(a) Includes all tissues inner side of endodermis (b) Consists internal phloem with parenchyma
(c) Consist of open vascular bundles (d) Does not possess pericycle and pith

222. Axillary bud develop by activity of :
(a) Lateral meristem (b) Shoot Apical meristem
(c) Root Apical meristem (d) Intercalary meristem

223. Passage cells are found in
(a) Epidermis (b) Hypodermis (c) Pericycle (d) Endodermis

224. What is the most common type of permanent tissue found in almost all plants?
(a) Sclerenchyma (b) Collenchyma (c) Xylem (d) Parenchyma

225. Most distinct annual rings are found in the wood of :
(a) Deciduous temperate plants (b) Evergreen temperature plants
(c) Deciduous tropical plants (d) Evergreen tropical plants

226. With increase in the total leaf area of a plant, there will be a corresponding increase in the
(a) number of metaxylem vessels (b) cross sectional area of phloem
(c) xylem : phloem ratio (d) number of protoxylem vessels

227. Which of the following statements are the functions of a medullary ray in plants ?
(i) storage of food
(ii) secondary growth
(iii) transmission of water and food
(iv) seat of origin of inter-fascicular cambium
(a) i, ii and iii (b) i, iii and iv (c) ii, iii and iv (d) only i and iii

228. Stomata in grass leaf are
(a) Rectangular (b) Kidney shaped (c) Dumb-bell shaped (d) Barrel shaped

229. Secondary xylem and phloem in dicot stem are produced by
(a) Phellogen (b) Vascular cambium (c) Apical meristems (d) Axillary meristems

230. Casparian strips occur in
(a) Cortex (b) Pericycle (c) Epidermis (d) Endodermis

231. Plants having little or no secondary growth are
(a) Conifers (b) Deciduous angiosperms (c) Grasses (d) Cycads

232. Go through the following statements.
I. Sap-wood is inner nonfunctional part of secondary xylem.
II. The best method to determine the age of tree is to measure its diameter.
III. Radial vascular bundles occur in stem.
IV. Wood is common name of secondary xylem.
V. Vascular bundles in dicot stem are open, collateral, endarch.
How many of the above statements are correct?
(a) One (b) Two (c) Three (d) Four

233. A transverse section of stem is stained first with safranin and then with fast green following the usual schedule of double staining for the preparation of a permanent slide. What would be the colour of the stained xylem and phloem?
(a) Red and green (b) Green and red (c) Orange and yellow (d) Purple and orange

234. The youngest layer of secondary xylem lies
(a) Between pith and primary xylem (b) Just outside the vascular cambium
(c) Just inside the vascular cambium (d) Just inside the cork cambium

235. Grass leaves curl inwards during very dry weather. Select the most appropriate reason from the following :
(a) Closure of stomata (b) Flaccidity of bulliform cells
(c) Shrinkage of air spaces in spongy mesophyll (d) Tyloses in vessels

236. Which of the statements given below is not true about formation of Annual Rings in trees?
(1) Annual ring is a combination of spring wood and autumn wood produced in a year
(2) Differential activity of cambium causes light and dark bands of tissue early and late wood respectively.
(3) Activity of cambium depends upon variation in climate.
(4) Annual rings are not prominent in trees of temperate region.

237. In the dicot root the vascular cambium originates from :
(a) Intrafascicular and interfascicular tissue in a ring
(b) Tissue located below the phloem bundles and a portion of pericycle tissue above protoxylem.
(c) Cortical region
(d) Parenchyma between endodermis and pericycle

238. Regeneration of damaged growing grass following grazing is largely due to :
(a) Secondary meristem (b) Lateral meristem
(c) Apical meristem (d) Intercalary meristem

6 ANATOMY OF FLOWERING PLANTS

1. d	2. a	3. d	4. b	5. b	6. d	7. c	8. c	9. d	10. a
11. b	12. c	13. d	14. c	15. b	16. c	17. b	18. b	19. c	20. d
21. d	22. b	23. b	24. c	25. d	26. c	27. a	28. d	29. c	30. a
31. c	32. a	33. c	34. d	35. a	36. d	37. b	38. a	39. c	40. a
41. b	42. d	43. d	44. c	45. d	46. d	47. c	48. b	49. d	50. b
51. b	52. d	53. d	54. c	55. b	56. d	57. b	58. b	59. c	60. d
61. d	62. b	63. c	64. a	65. d	66. a	67. c	68. a	69. d	70. d
71. d	72. a	73. c	74. c	75. d	76. d	77. a	78. a	79. a	80. b
81. b	82. a	83. c	84. d	85. a	86. b	87. a	88. d	89. c	90. c
91. b	92. c	93. c	94. d	95. c	96. c	97. d	98. b	99. a	100. a
101. b	102. d	103. a	104. b	105. d	106. a	107. c	108. a	109. a	110. d
111. d	112. b	113. d	114. c	115. c	116. b	117. a	118. d	119. c	120. b
121. a	122. c	123. a	124. b	125. b	126. c	127. a	128. d	129. d	130. b
131. c	132. b	133. a	134. d	135. a	136. b	137. a	138. c	139. b	140. b
141. a	142. c	143. c	144. a	145. c	146. a	147. b	148. b	149. d	150. a
151. a	152. a	153. a	154. a	155. a	156. a	157. d	158.a	159. d	160. c
161. a	162. d	163. d	164. a	165. d	166. b	167. d	168. c	169. a	170. d
171. d	172. d	173. a	174. b	175. d	176. b	177. a	178. c	179. b	180. a
181. d	182. d	183. a	184 b	185. c	186. c	187. b	188. c	189. c	190. a
191. d	192. d	193. b	194. a	195. b	196. b	197. d	198. a	199. a	200. c
201. c	202. a	203. c	204. c	205. b	206. b	207. a	208. d	209. a	210. b
211. b	212. c	213. a	214. c	215. c	216. b	217. b	218. b	219. a	220. d
221. d	222. b	223. d	224. d	225. a	226. c	227. b	228. c	229. b	230. d
231. c	232. b	233. a	234. c	235. b	236. d	237. b	238. d		

7 STRUCTURAL ORGANIZATION IN ANIMALS

1. A group of similar cells together associated with cell products, specialized for the performance of a common func in multicellular animals constitutes –
(a) Body (b) Tissue (c) Organ (d) System

2. Animal tissues are broadly classified into 4 types on the basis of –
(a) Structures and functions (b) Structures and origins
(c) Functions and origin (d) Origin only

3. Which of the following is not associated with epithelium?
(a) Cells are compactly packed with little intercellular space
(b) It is highly vascularized
(c) It forms covering or lining of external and internal surfaces
(d) It helps in protection, secretion, absorption, respiration, etc.

4. Simple epithelium (consists of single layer) functions as a lining for –
(a) Body cavity (b) Ducts (c) Tubes (d) All

5. Which of the following statement is correct about squamous epithelium?
(a) It consists of a single thin layer of flattened cells with irregular boundaries.
(b) It is found in the wall of blood vessel, air sac of lungs, etc.
(c) It is involved in many functions like forming a diffusion, boundary
(d) All

6. The cuboidal epithelium –
(a) Is composed of a single layer of cube-like cells
(b) Is commonly found in ducts of gland and tubular parts in kidney. It is associated with microvilli in PCT
(c) Takes part in secretion and absorption
(d) All

7. Which of the following is false about columnar epithelium?
I. It is made of tall and slender cells
II. Free surface may have microvilli
III. They are found in stomach and intestine and help in secretion and absorption
IV. Ciliated epithelium is mainly present in hollow structure like bronchioles and fallopian tubes / oviducts
V. They have apical nuclei
(a) Only I (b) Only V (c) Only II and IV (d) Only II and III

8. Which type of tissue forms glands?
(a) Nervous (b) Epithelium (c) Muscular (d) Connective

9. Epithelia are involved in all except –
(a) Protection (b) Connection (c) Secretion or excretion (d) Absorption

10. Goblet cells (in GIT) are a type of –
(a) Multicellular gland (b) Unicellular gland (c) Intercellular gland (d) Salivary gland

11. The inability to absorb nutrients may be due to damage of which type of epithelium –
(a) Stratified squamous (b) Simple cuboidal (c) Simple columnar (d) Simple squamous

12. Which of the following levels of structure encompasses all the other?
(a) Tissue (b) Cell (c) Organism (d) Organ or system

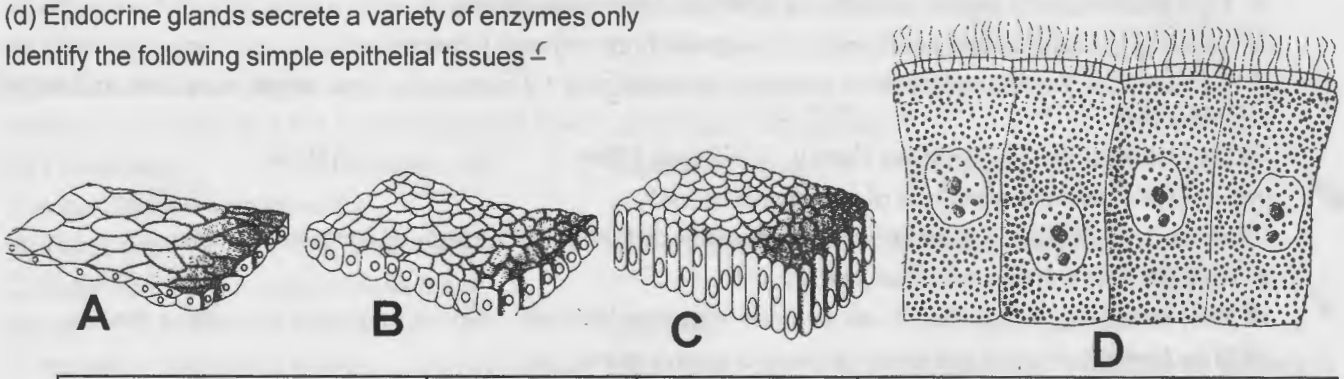
13. The terms squamous and cuboidal apply to the _____ of cells in _____ tissue –

(a) Location, connection (b) Shape, connection (c) Location, nerve (d) Shape, epithelial

14. The 200 different cell types identified in humans are classified into the four tissue types –
(a) Blood, connective, muscle, nerve (b) Epithelia, supportive, nerve, muscle
(c) Connective, muscle, epithelial, nerve (d) Supportive, connective, nerve, blood

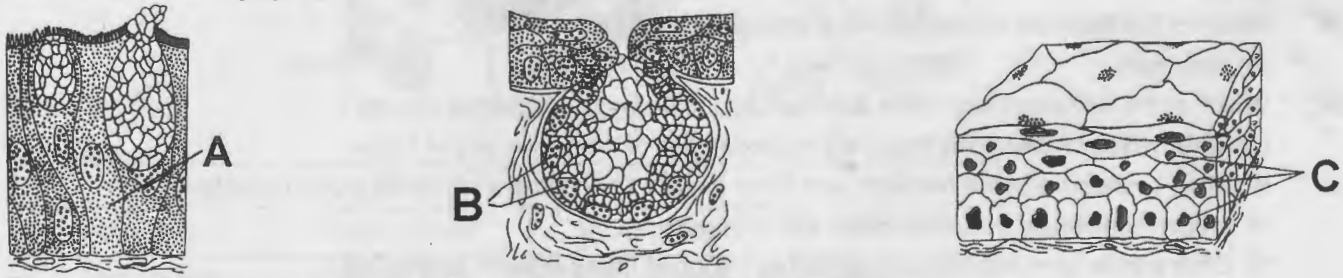
15. Which of the following statements is false about the glands?
(a) Goblet cells secrete mucus
(b) Exocrine glands possess duct for secretion of mucus, milk, saliva, earwax, digestive enzymes, oil and other cell products
(c) Glandular epithelium consists of specialized columnar or cuboidal cells
(d) Endocrine glands secrete a variety of enzymes only

16. Identify the following simple epithelial tissues –



	A	B	C	D
(a)	Cuboidal	Squamous	Columnar	Ciliated column
(b)	Squamous	Cuboidal	Columnar	Ciliated columnar
(c)	Pseudostratified squamous	Cuboidal	Columnar	Ciliated columnar
(d)	Squamous	Cuboidal	Columnar	Pseudostratified columnar (ciliated)

17. Observe the following figures –



Figures A and B indicate glands while Figure C indicates specific type of tissues
Identify these figure –

	A	B	C
(a)	Unicellular gland	Multicellular gland	Compound epithelium
(b)	Unicellular gland	Multicellular gland	Pseudostratified epithelium
(c)	Multicellular gland	Unicellular gland	Pseudostratified epithelium
(d)	Unicellular gland	Goblet gland	Pseudostratified epithelium

18. Which of the following statement is false about the compound epithelium?
I. It consists of several layers
II. It covers the dry surface of the skin, the moist surface of buccal cavity, pharynx, inner lining of ducts of salivary glands and pancreatic ducts
III. It provides protection against chemical and mechanical stresses
IV. Being multilayered it has a great role in secretion and absorption

(a) Only III (b) Only IV (c) Only I and IV (d) Only II

19. Adjacent epithelial cells are joined together by –
(a) Desmosomes (b) Oxysomes (c) Desmonemes (d) Plasmodesmata

20. Cell junction called tight, adhering and gap junctions are found mainly in –
(a) Connective tissue (b) Epithelial tissue (c) Muscular tissue (d) Nervous tissue

21. Which of the following statements about cell junctions is false?
I. All the cells of the epithelium are held together with little intercellular materials
II. In almost all animal tissues specialized junctions provide both structural and functional link between its individual cells
III. Tight junctions help to stop substances from leaking across a tissue
IV. Adhering junctions provide cementing to keep neighbouring cells together
V. Gap junctions provide cytoplasmic channels between cells for passage of ions, small molecules and sometimes big molecules
(a) Only II and III (b) Only I and II (c) Only V (d) None

22. Which of the following is not true of connective tissue?
I. Connective tissues are most abundant and widely distributed in the body of complex animals
II. They connect and support other tissues
III. They include such diverse tissues as bone, cartilage, tendons, adipose and loose connective tissues
IV. They form the internal and external lining of many organs
V. In all connective tissues except blood, the cells secrete fibres of structural proteins called collagen or elastin
(a) Only IV (b) Only V (c) Only I and II (d) Only III and V

23. Which of the following contains the largest quantity of extracellular materials?
(a) Striated muscles (b) Areolar connective tissue
(c) Striated epithelium (d) Myelinated nerve fibres

24. The major constituent of connective tissue is –
(a) Lipid (b) Carbohydrate (c) Cholesterol (d) Collagen

25. Which of the following cells are found in areolar connective tissue?
(a) Mast cells (b) Macrophage (c) Fibroblast (d) All

26. Which of the following statements is correct about the loose connective tissues?
I. Areolar tissue and adipose tissue are the examples of loose connective tissue
II. Loose connective tissue has cells and fibres loosely arranged in a semifluid ground substance
III. Areolar connective tissue connects skin with muscles
IV. Often areolar connective tissue serves as a support frame work for epithelium
(a) All (b) Only II (c) Only III (d) Only I, II and IV

27. Role of adipose cells in adipose tissue is to –
(a) Dissolve fat (b) Produce fat (c) Store fat (d) None of these

28. Which of the following is false?
(a) Adipose tissue is located mainly below skin (b) Tendon consists of white fibrous tissue
(c) Tendon connects a bone with another bone (d) Ligaments connect a bone with another bone

29. The function of dense regular connective tissue is –
(a) Elastic coil (b) Binding and support
(c) Encapsulation of blood vessel (d) All

30. Tendons and ligaments are the examples of –
(a) Bone (b) Cartilage
(c) Dense regular connective tissue (d) Dense irregular connective tissue

31. In dense regular connective tissue –
(a) fibres are loosely packed (b) Fibres are tightly packed

(c) Bundles of fibres run parallel (d) Both b and c

32. Which of the following statements about the dense irregular connective tissue is correct?
(a) In such tissue, fibres are densely packed
(b) Such tissue has fibroblast and many fibres (mostly collagen) that are oriented differently
(c) It is present in skin
(d) All

33. Which of the following is specialized connective tissue?
(a) Cartilage (b) Bone (c) Blood (d) All

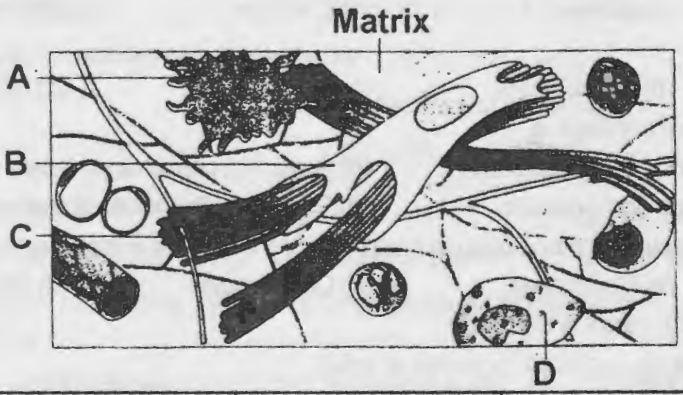
34. Which of the following are the three basic components of all type of connective tissues except blood?
(a) Cells, fibres and ground substances (b) Fibroblast, reticular fibres and collagen
(c) Mast cells, lymphocytes and adipocyte (d) Arteries, veins and capillaries

35. Which of the following is the predominant cell type in connective tissue proper?
(a) Fibroblasts (b) Lymphocytes (c) macrophages (d) Mast cells

36. Collagen fibres are secreted by –
(a) Fibroblast (b) Mast cells (c) Histocyte (d) Macrophages

37. Collagen fibres of connective tissue are –
(a) red (b) Yellow (c) White (d) Transparent

38. In the below diagram of areolar connective tissue, the different cells and parts have been indicated by alphabets. Choose the answer in which these alphabets correctly match with the parts and cells they indicate –



	A	B	C	D
(a)	Adipocyte	Collagen fibres	Microfilament	Mast cells
(b)	Macrophage	Collagen fibres	Microfilament	Mast cells
(c)	Macrophage	Collagen fibres	Microtubule	RBC
(d)	Macrophage	Fibroblast	Collagen fibres	Mast cells

39. Identify figure - I and II respectively –

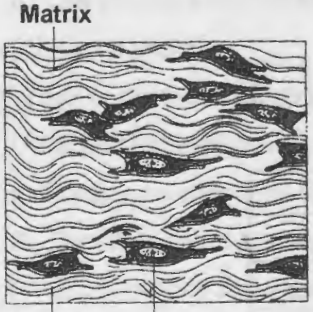


Fig. I

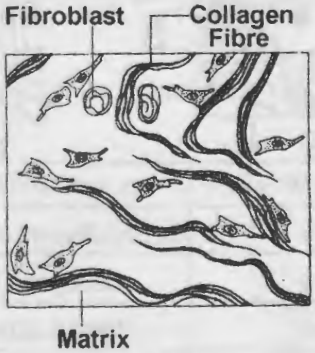
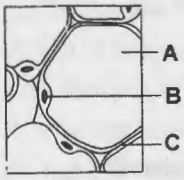


Fig. II

(a) Dense regular connective tissue, dense irregular connective tissue
(b) Dense irregular connective tissue, dense regular connective tissue
(c) Adipose tissue, specialised connective tissue
(d) Connective tissue proper, specialized connective tissue

40.



In above diagram of adipose tissue, identify A, B and C

	A	B	C
(a)	Vacuole	Fat	Cell membrane
(b)	Cytoplasm	Fat	Cell membrane
(c)	Nucleus	Fat	Cell membrane
(d)	Fat storage area	Nucleus	Cell membrane

41. Cartilage is produced by –
(a) Fibroblast (b) Osteoblast (c) Chondrocytes (d) Epithelial cells

42. Adipocytes are mainly present in –
(a) Bones (b) Nerves (c) Cartilage (d) Connective tissue

43. Bone forming cells are –
(a) Osteoclasts (b) Osteoblasts (c) Chondroblast (d) Chondroclasts

44. The intercellular material of cartilage is –
(a) Hollow, pliable and resists compression (b) Solid, not pliable and resists compression
(c) Solid, pliable and resists compression (d) Solid, pliable and does not resist compression

45. Cells of cartilage (chondrocyte) are enclosed in small cavities within the matrix secreted by –
(a) Osteolast (b) Osteoblast (c) Chondrocyte (d) Chondroclasts

46. Which of the following statements is correct?
(a) Most of the cartilage is not replaced by bones in adult
(b) Cartilage is present in nose-tip, intervertebral disc, limbs and hands in adult, outer ear joints
(c) Cartilage has no rich blood supply but bone has.
(d) b and c

47. Identify figure - I and II, structures A and B respectively? Figures are related with specialised connective tissues –

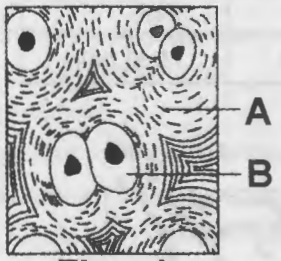


Fig. - I

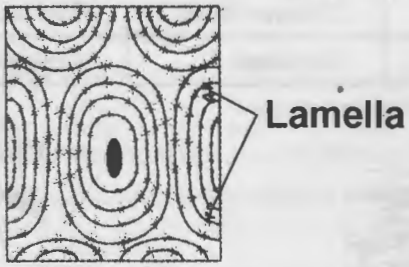
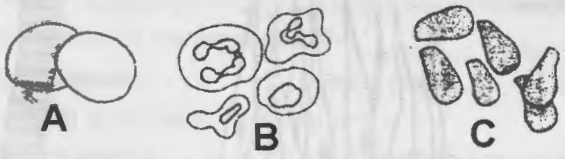


Fig. - II

	Fig. I	Fig. II	A	B
(a)	Cartilage	Bone	Collagen	Chondrocyte
(b)	Cartilage	Bone	Collagen	Chondroclast
(c)	Cartilage	Bone	Microtubule	Chondroclast
(d)	Bone	Cartilage	Collagen fibres	Osteoblast

48. Identify the following cells in a specialised connective tissue –



	A	B	C
(a)	Macrophage	Adipocyte	Platelets
(b)	WBC	RBC	Platelets
(c)	RBC	WBC	Platelets
(d)	Adipocyte	Chondroclast	Platelets

49. Bone marrow in some bones is important for –
(a) Production of RBCs (b) Breakdown of RBC (c) Production of WBC (d) Breakdown of WBCs

50. A lacuna of bone contains _____ osteocyte(s) –
(a) One (b) Two (c) Many (d) 2 pairs

51. Bones have a _____ and _____ ground substance, rich in _____ salts and _____ fibres –
(a) Soft, pliable, Ca, collagen (b) Hard, pliable, Ca, collagen
(c) Hard, non-pliable, Ca, collagen (d) Hard, pliable, Fe, collagen

52. Which of the following salts predominate in bone matrix?
(a) NaCl (b) Magnesium phosphate
(c) Calcium phosphate (d) $CaCO_3$

53. Cytoplasm in the muscle fibre is called as –
(a) Sarcoplasm (b) Sarcolemma (c) Neuroplasm (d) Sarcosome

54. Each muscle is composed of many long, cylindrical fibres arranged in parallel arrays. These fibres are composed of numerous fine fibrils, called –
(a) Microfilament (b) Myofibrils (c) Microtubule (d) Sarcoplasm

55. In a typical muscle, such as the biceps, _____ muscle fibres are bundled together in a parallel manner –
(a) Striped (b) Smooth (c) Cardiac (d) None of the above

56. Which of the following statements is false about the muscles?
(a) Wall of blood vessels, stomach and intestine contain striated muscles
(b) The smooth muscle fibres are fusiform
(c) Cell junctions hold smooth muscle fibres together and they are bundled together in a connective tissue sheath
(d) Both a and b

57. Which of the following statements is correct about the cardiac muscles?
I. It is present in heart only
II. The plasma membranes of adjacent cardiac cells interlock at intercalated disc
III. The intercalated disc contains desmosome (adhering and gap junction)
IV. Gap junctions allow the cardiac cells to contract as a unit
(a) All (b) None (c) II and IV only (d) I and II only

58. Go through the following figures.

Fig. A

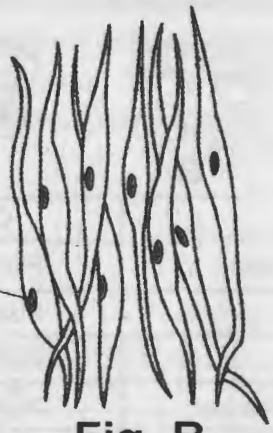


Fig. B

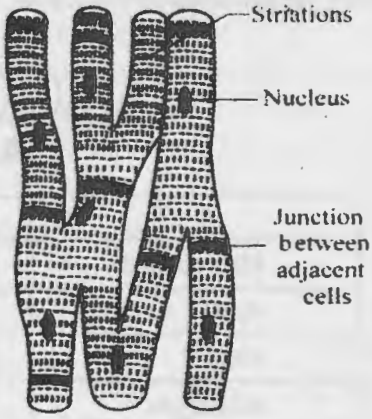


Fig. C

Identify these muscles (A, B and C)

(a) A - Smooth muscles, B - Striated muscle, C - Cardiac muscle

(b) A - Cardiac muscles, B - Smooth muscle, C - Striated muscle

(c) A - Striated muscles, B - Smooth muscle, C - Cardiac muscle

(d) A - Involuntary muscles, B - Voluntary muscle, C - Heart muscle

59. Nervous tissue is made up of neurons and neuroglial cells. Point out which of the following statement about these cells is false –

I. Neuroglia make up more than one-half the volume of neural tissue in our body

II. Neuroglia protect and support neurons

III. When a neuron is suitably stimulated, an electrical disturbance is generated which swiftly travels along its cytosol

IV. This disturbance at the neuron endings triggers stimulation or inhibition of adjacent neurons or other cells

(a) Only I and IV (b) Only II and III (c) Only III (d) Only IV

60. Our heart consists of which type of tissue?

(a) Epithelial tissue (b) Connective tissue

(c) Muscular tissue and neural tissue (d) All

EARTHWORM

61. Earthworm (*Pheretima*) lives in a burrow mainly to –

(a) procure food (b) Copulate (c) Avoid enemies (d) Get moistured

62. In the gardens, the earthworms can be traced by –

(a) Analysis of the salinity of soil (b) Analysis of the alkalinity of soil

(c) By their fecal deposition (worm casts) (d) Analysis of the fertility of soil

63. The common Indian earthworms are –

(a) *Pheretima* and *Lumbricus* (b) *Pheretima* and *Hirudo*

(c) *Pheretima* and *Aphrodile* (d) *Pheretima* and *Polygordius*

64. Total number of segments (metameres) in *Pheretima* is –

(a) 50 - 70 (b) 300 - 325 (c) 100 - 120 (d) 150 - 200

65. The dorsal surface of body of earthworm is marked by median mid line. This line is due to –

(a) Dorsal nerve cord (b) Dorsal blood vessel (c) Supraintestinal duct (d) Supraoesophageal blood vessel

66. Earthworm does not have –

(a) A distinct head (b) Excretory organ (c) Alimentary canal (d) Reproductive organ

67. Segment of earthworm bearing mouth is –

(a) Clitellar (b) Prostomium (c) Peristomium (d) Deuterostomium

68. The prostomium in earthworm –
(a) Is sensory in function (b) Is a fleshy lobefold overhanging the mouth
(c) Serves to open cracks in the soil during crawling (d) All of the above are correct

69. Ventral surface of earthworm is marked by the presence of –
(a) Digestive canal (b) Blood vessel (c) Genital pores (d) Hearts

70. The clitellum (glandular tissue band) is present in the segment –
(a) 11, 12 and 13 (b) 14, 15 and 16 (c) 13, 14 and 15 (d) 16, 17 and 18

71. Due to presence of clitellum, the body is divisible into _____ parts –
(a) 2 (b) 3 (c) 4 (d) 5

72. 4 pairs of spermathecal pores are situated on ventro-lateral sides of intersegmental grooves –
(a) 5/6, 6/7, 7/8, 8/9 (b) 6/7, 7/8, 8/9, 9/10
(c) 14/15, 15/16, 16/17, 17/18 (d) 26/27, 28/29, 30/31, 32/34

73. The female genital pore in earthworm is present in mid-ventral line of segment –
(a) 18th (b) 14th (c) 12th (d) 10th

74. A pair of male genital pores are present on the ventrolateral side of the segment –
(a) 18th (b) 14th (c) 12th (d) 10th

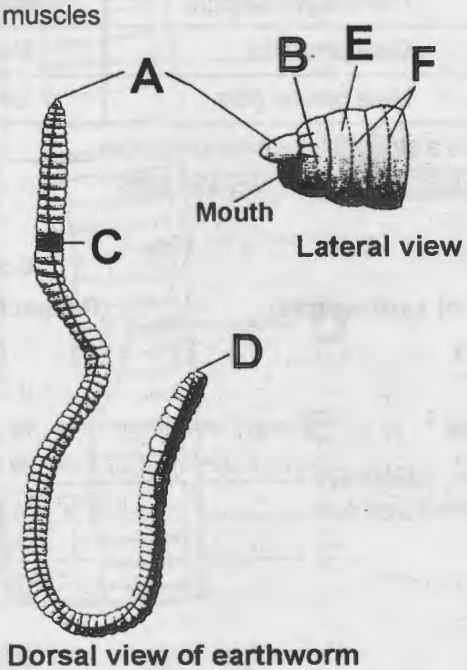
75. In earthworm, genital papillae occur in segments –
(a) 16 and 17 (b) 16 and 18 (c) 17 and 18 (d) 17 and 19

76. Segments having no setae in earthworm are –
(a) First (b) Last (c) Clitellar (d) First, last and clitellar

77. Setae in earthworm –
(a) Are S-shaped and can be extended and retracted
(b) Have principal role in locomotion
(c) Are embedded in the epidermal pits in the middle of segments
(d) All are correct

78. Which of the following layers you will find in the body wall of earthworm (from outside to inside) –
(a) Noncellular cuticle, epidermis, circular muscles, longitudinal muscle, coelomic epithelium
(b) Cuticle, epidermis, longitudinal muscles, circular muscles, coelomic epithelium
(c) Cuticle, epidermis, coelomic epithelium, circular muscle, longitudinal muscle
(d) Cuticle, epidermis, peritoneum muscles

79.



Dorsal view of earthworm

Go through the above figure. Identify A to F –

	A	B	C	D	E	F
(a)	Peristomium	Prostomium	Clitellum	Anus	Metameres	Ring of setae
(b)	Prostomium	Peristomium	Clitellum	Anus	Metameres	Ring of setae
(c)	Prostomium	Peristomium	Endosteum	Anus	Metameres	Ring of setae
(d)	Prostomium	Peristomium	Endosteum	Cloaca	Metameres	Ring of setae

80. Observe the ventral-view of earthworm and identify A to C –

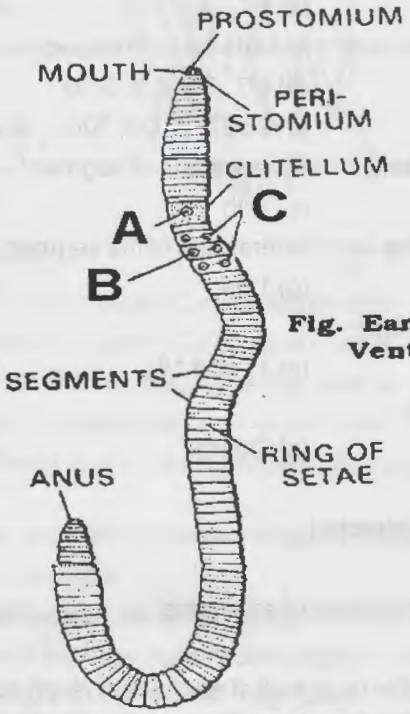


Fig. Earthworm : Ventral view

	A	B	C
(a)	Excretory pore	Female genital pore	Male genital pore
(b)	Male genital pore	Female genital pore	Genital papilla
(c)	Female genital pore	Genital papilla	Male genital pore
(d)	Female genital pore	Male genital pore	Genital papilla

81. The alimentary canal in earthworm is a straight tube extending from _____ segment to _____ segment –

(a) 3rd, last (b) 3rd, 46th (c) 4th, 46th (d) 1st, last

82. Match the column I with column II –

Column I (parts of alimentary canal of earthworms)	**Column II (Respective segments)**
A. Buccal cavity	I. 1 - 3
B. Pharynx	II. 3 - 4
C. Oesophagus	III. 5 - 7
D. Gizzard	IV. 8 - 9
E. Stomach	V. 9 - 14
F. Intestine	VI. 15 to last
G. Typhlosole	VII. 26 - 35

	A	B	C	D	E	F	G
(a)	I	II	III	IV	V	VI	VII
(b)	I	II	III	V	IV	VI	VII
(c)	I	II	III	IV	V	VII	VI
(d)	I	II	III	V	IV	VII	VI

83. In *Pheretima*, lymph glands lie in the segments –
(a) 4, 5 and 6 (b) 7, 8 and 9 (c) 14, 15 and 16 (d) 26th and behind

84. How many lymph glands are present in *Pheretima*?
(a) Many (b) 3 pairs (c) 4 pairs (d) 9 pairs

85. The role of typhlosole in earthworm is to –
(a) Emulsify fat (b) Control blood flow (c) Increase absorptive area (d) Release digestive juice

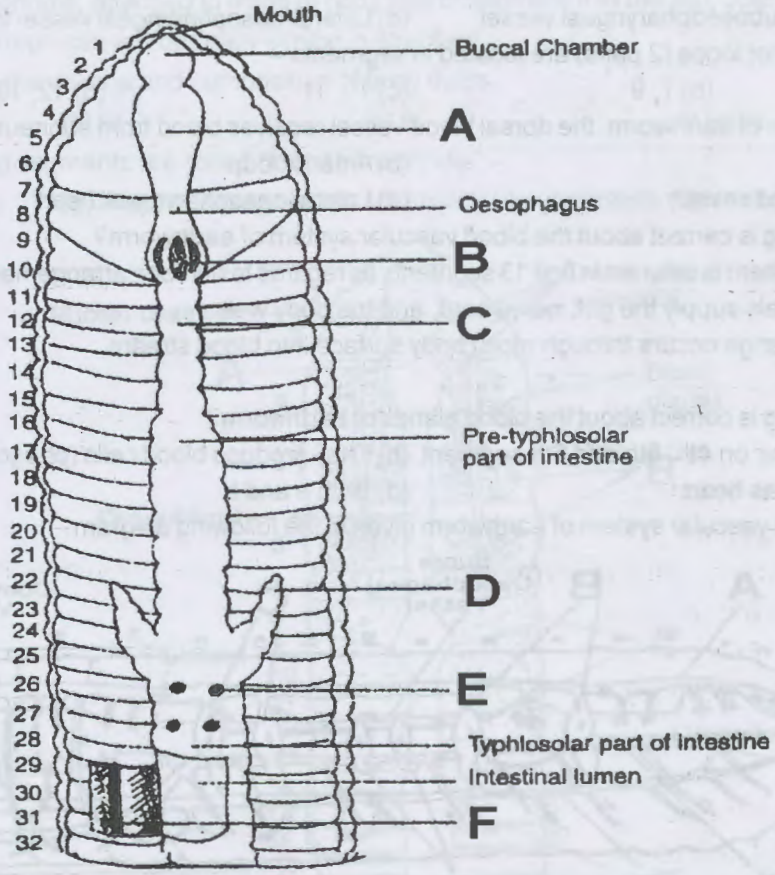
86. Gizzard in earthworm serves for –
(a) Excretion (b) Crushing food (c) Secreting slime (d) Food absorption

87. Calciferous glands in stomach –
(a) Secrete enzymes (b) Secrete hormone
(c) Neutralize the humic acid present in humus (d) Purifies blood

88. Intestinal caecae (one pair) project from the intestine on segment –
(a) 26 (b) 18 (c) 30 (d) 40

89. The most muscular part of the alimentary canal of earthworm is –
(a) Crop (b) Stomach (c) Gizzard (d) Intestine

90.



Choose the correct option of labelling from the options given –

	A	B	C	D	E	F
(a)	Pharynx	Stomach	Gizzard	Caecae	Lymph gland	Typhlosole
(b)	Gizzard	Pharynx	Stomach	Caecae	Lymph gland	Typhlosole
(c)	Pharynx	Gizzard	Stomach	Caecae	Lymph gland	Typhlosole
(d)	Pharynx	Gizzard	Stomach	Liver	Villi	Typhlosole

91. Earthworm feeds on –
(a) Soil (b) Grass (c) Humus (d) Insects

92. Blood is red (due to haemoglobin) but without RBCs. Such blood is found in –
(a) Frog (b) Earthworm (c) Rabbit (c) Cockroach

93. In *Pheretima*, haemoglobin –
(a) Is absent (b) Is dissolved in plasma (c) Is in RBCs (d) Occurs in phagocytes

94. Blood vascular system in earthworm is of –
(a) Open type (b) Closed type (c) Portal type (d) None of these

95. Earthworm has –
(a) No heart (b) 4 pairs of hearts (c) Lateral hearts (d) Both b and c are correct

96. How many lateral "hearts" are found in earthworm?
(a) 1 pair (b) 6 pairs (c) 4 pairs (d) 3 pairs

97. Hearts in earthworm occur in segments –
(a) 6, 7 and 9, 10 (b) 9, 10 and 14, 15 (c) 7, 9 and 12, 13 (d) None of these

98. Lateral-oesopharyngeal heart in the earthworm are situated in segment –
(a) 7 and 9 (b) 9 and 10 (c) 12 and 13 (d) 10 and 11

99. Lateral-oesopharyngeal hearts in earthworm connect –
(a) Dorsal vessel to ventral vessel (b) Dorsal vessel to subneural vessel
(c) Dorsal vessel to suboesopharyngeal vessel (d) Lateral-oesopharyngeal vessel to subneural vessel

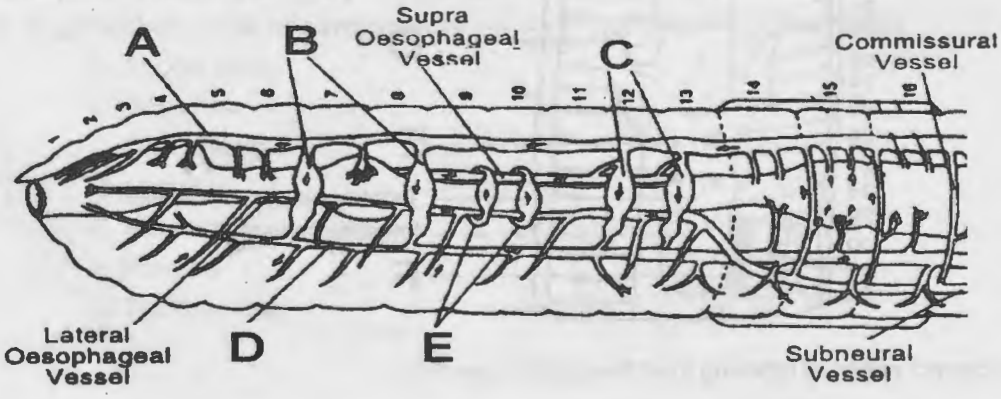
100. In earthworms, anterior loops (2 pairs) are located in segments –
(a) 14, 18 (b) 7, 9 (c) 10, 11 (d) 12, 13

101. In the posterior region of earthworm, the dorsal blood vessel receives blood from subneural vessel through –
(a) lateral heart (b) Anterior loop
(c) Commissural blood vessel (d) Lateral-oesopharyngeal heart

102. Which of the following is correct about the blood vascular system of earthworm?
(a) Blood vascular system is different in first 13 segments as regards to number, arrangement and nature of blood vess
(b) Small blood vessels supply the gut, nerve cord, and the body wall
(c) Respiratory exchange occurs through moist body surface into blood stream
(d) All

103. Which of the following is correct about the blood glands of earthworm?
(a) Blood glands occur on 4th, 5th and 6th segment (b) They produce blood cells (phagocytic) and haemoglobin
(c) Blood glands act as heart (d) Both a and b

104. Go through the blood vascular system of earthworm given in the following diagram –



	A	B	C	D	E
(a)	Dorsal vessel	Lateral hearts	Lateral-oesopharyngeal hearts	Ventral vessel	Anterior loop
(b)	Ventral vessel	Lateral hearts	Lateral-oesopharyngeal hearts	Dorsal vessel	Anterior loop
(c)	Dorsal vessel	Lateral Hearts	Anterior loop	Ventral vessel	Lateral-oesopharyngeal heart
(d)	Ventral vessel	Lateral vessel	Anterior loop	Dorsal Vessel	Lateral-oesopharyngeal heart

105. Excretory organs of earthworm are –
(a) Nephridia (b) Gizzard (c) Green gland (d) Solenocytes

106. Nephridia are present in all the segments of earthworm except –
(a) Last segment (b) First 3 segments (c) First 2 segments (d) First and last segments

107. In earthworm, the nephridia collect nitrogenous wastes from –
(a) Skin (b) Blood (c) Coelomic fluid (d) None of these

108. Pharyngeal nephridia are present as three pairs of tufts in the segments –
(a) 6, 7, 8 (b) 5, 6, 7 (c) 4, 5, 6 (d) 1, 2, 3

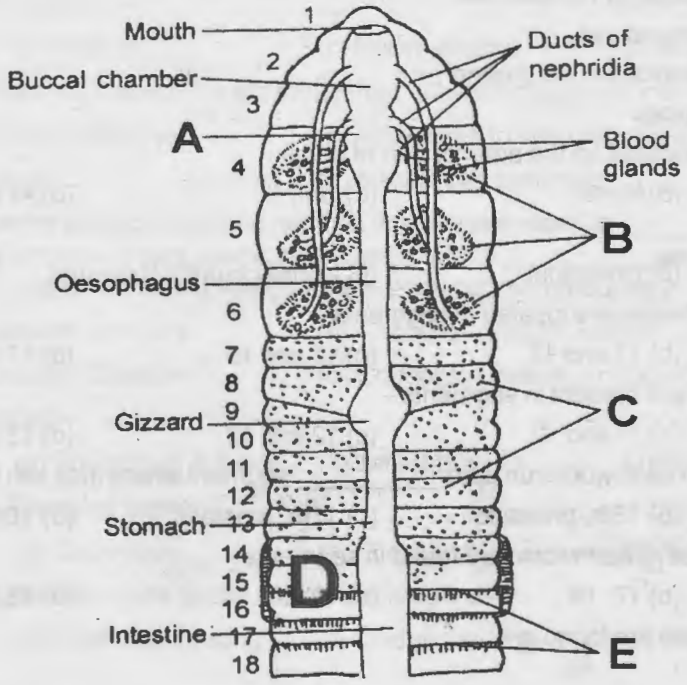
109. Excretion is exonephric by which of the following nephridia?
(a) Pharyngeal nephridia (b) Septal nephridia
(c) Integumentary nephridia (d) Integumentary and pharyngeal nephridia

110. Excretion is enteronephric by which of the following nephridia –
(a) Integumentary and septal nephridia (b) Integumentary and pharyngeal
(c) Integumentary, septal and pharyngeal nephridia (d) Septal and pharyngeal nephridia

111. Which of the following is correct about excretion in earthworm?
I. Earthworm is mainly ureotelic
II. Septal nephridia, present on both sides of intersegmental septa of segment 15 to the last, open into intestine
III. Integumentary nephridia, attached to lining of body wall of segment 3 to the last, open on the body surface.
IV. Different types of nephridia are basically similar in structure
V. Nephridia regulate the volume and composition of body fluids
(a) All (b) IV (c) III (d) None

112. Which of the following segments are called "forest of nephridia" –
(a) Clitellar segments (b) Preclitellar segments (c) Postclitellar segments (d) None

113.



I. Septal nephridia
II. Pharynx
III. Forest of integumentary nephridia
IV. Integumentary nephridia
V. Tufts of pharyngeal nephridia

Identify the structures labelled A to E in the diagram given above from the list I to V –

	A	B	C	D	E
(a)	II	I	III	IV	V
(b)	II	V	IV	III	I
(c)	II	IV	V	I	III
(d)	II	III	IV	I	V

114. Nerve ring of earthworm is formed surrounding –
(a) Pharynx (b) Gizzard (c) Stomach (d) None

115. Nerve cord of *Pheretima* is –
(a) Paired, solid and ventral (b) Paired, solid and dorsal
(c) Single, solid and dorsal (d) Single, hollow and dorsal

116. Which of the following is false about the nervous system of earthworm?
I. Nervous system is basically represented by ganglia arranged on ventral nerve cord.
II. In 3rd and 4th segment, the nerve cord bifurcates and joins the cerebral ganglia dorsally to form a nerve ring
III. In earthworm neurons are sensory, motor and adjustar
IV. The cerebral ganglia alongwith other nerves in the ring integrate sensory input as well as command muscular responses of the body
(a) All (b) Only IV (c) Only III (d) None

117. Earthworm has –
(a) No eyes (b) 2 eyes (c) Many eyes (d) 1 eye

118. Earthworm has no special sense organs, still they are sensitive to –
(a) Light and sound (b) Touch and sound (c) Touch, taste and light (d) Touch, taste, light and vibration

119. Which of the following is false about earthworm –
I. Earthworms can distinguish light intensities
II. Earthworms have compound eye
III. Earthworm can feel vibrations in the ground
IV. They have chemoreceptors
V. The sense organs are located on the anterior part of body
(a) All (b) None (c) Only II (d) All except II

120. *Pheretima* is –
(a) Sterile (b) Unisexual (c) Hermaphrodite / bisexual (d) Non metameric

121. In earthworm, two pair of testes are located in segments –
(a) 10 and 11 (b) 12 and 13 (c) 14 and 15 (d) 17 and 18

122. In earthworm, testis sacs are present in segments –
(a) 10 and 11 (b) 11 and 12 (c) 12 and 13 (d) 13 and 14

123. Vasa deferentia of testis in earthworm run upto _____ segment where they join the _____ duct –
(a) 17th, accessory (b) 18th, prostatic (c) 17th, prostatic (d) 18th, accessory

124. 2 pairs of accessory glands in earthworm are found in segments –
(a) 17, 18 (b) 17, 19 (c) 19, 20 (d) 18, 19

125. Spermathecae in earthworm are found in –

(a) 6, 7, 8, 9 (b) 4, 5, 6, 7 (c) 11, 12, 13, 14 (d) 15, 16, 17, 18

126. Seminal vesicles in earthworm lie in the segments –
(a) 11, 12 (b) 12, 13 (c) 10, 11 (d) 13, 14

127. Prostate glands in earthworm are present in segments –
(a) 16 to 25 (b) 17 to 20 (c) 20 - 25 (d) 25 - 30

128. In earthworm, the prostatic secretion is helpful for –
(a) Formation of eggs (b) Activation of sperms (c) Formation of sperms (d) Formation of spermatophore

129. The glands which open into the genital papillae in earthworm are –
(a) Prostate glands (b) Albumin gland (c) Cowper's gland (d) Accessory glands

130. In *Pheretima*, the glands that help in binding the worms during copulation are –
(a) Prostate gland (b) Albumin glands (c) Accessory glands (d) Mucous glands

131. Function of spermathecae in earthworm is to –
(a) Receive spermatogonia for maturation (b) Secrete substances that form the cocoons
(c) Receive sperms during copulation for storage (d) Receive fertilized ova for embryonic development

132. In earthworm, the common prostate and spermatic duct / vasa deferentia open to the _____ by a pair of _____ genital pore on the ventro-lateral side of the _____ segment.
(a) Exterior, male, 16th (b) Exterior female, 16th (c) Exterior, male, 18th (d) Exterior, female, 18th

133. In earthworm ovaries are attached at the inter-segmental septum of –
(a) 12th & 14th segments (b) 12th & 13th segments (c) 13th & 14th segments (d) 14th & 15th segment

134. Ovarian funnel is a ciliated funnel that lies behind each ovary in segment –
(a) 13th (b) 14th (c) 15th (d) 16th

135. The two oviducts unite and open ventrally on _____ segment by a female genital pore –
(a) 13th (b) 14th (c) 15th (d) 16th

136. In a copulating pair of earthworms, which of the two processes take place?
(a) Internal fertilization and cross fertilization (b) Cross fertilization and reciprocal fertilization
(c) External fertilization and internal fertilization (d) Reciprocal fertilization and internal fertilization

137. Fertilization in earthworm occurs in –
(a) Cocoon (b) Coelom (c) Spermathecae (d) Seminal vesicles

138. During copulation in earthworms, the sperms are transferred between copulating individuals from –
(a) Female genital pore to spermathecae (b) Male pores to spermathecae
(c) Spermathecae to cocoons (d) Male pores to outside

139. In earthworm, mature sperms and egg cells and nutrition fluid are deposited in _____ produced by the gland cells of _____. Fertilization and development occur within _____ which are deposited in soil. After fertilization, _____ slip off the worm. After 3 weeks, each cocoon produces 2 - 20 (average 4) baby worms.
(a) Clitellum, cocoons, clitellum, cocoons (b) Cocoons, clitelum, cocoon, clitellum
(c) Clitellum, Clitellum, Cocoon, Clitellum (d) Cocoons, clitellum, cocoons, cocoons

140. *Pheretima* is useful in making –
(a) Bait for fishing (b) Soil porous & fertile (c) Laboratory use (d) All

141. Which one is known as a "Friend of farmers"?
(a) *Rana* (b) Cockroach (c) *Pheretima* (d) Rat

142. The process of increasing fertility of soil by the earthworm is called –
(a) Vermicomposting (b) Chemicomposting (c) Chemimanuring (d) Percolation

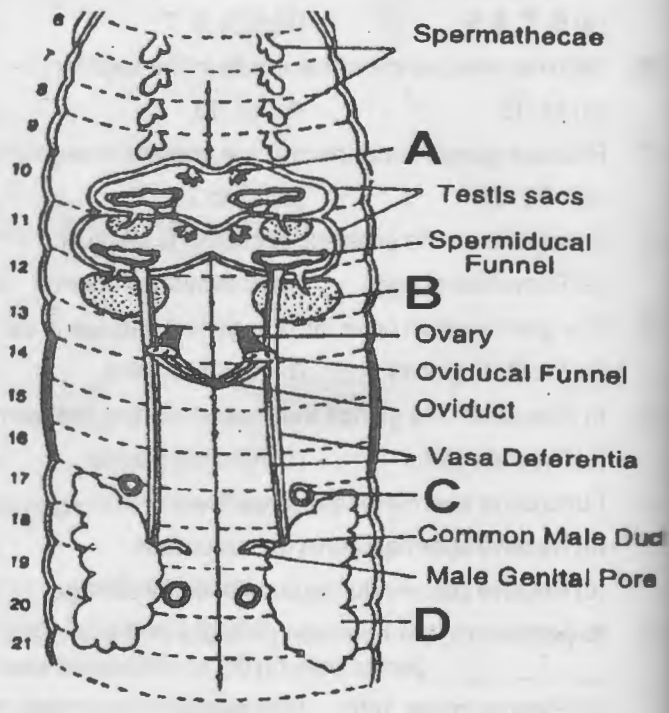
143. Identify A to D in the figure –

(a) A - Testis
B - Seminal vesicle
C - Accessory gland
D - Prostate gland

(b) A - Seminal vesicle
B - Testis
C - Accessory gland
D - Prostate gland

(c) A - Testis
B - Seminal vesicle
C - Prostate gland
D - Accessory gland

(d) A - Seminal vesicle
B - Testis,
C - Prostate gland
D - Accessory gland



COCKROACH

144. *Periplaneta* belongs to –

(a) Class Insecta of Phylum Arthropoda (b) Class Insecta of Phylum Annelida
(c) Class Insecta of Phylum of Mollusca (d) Class Insecta of Platyhelminthes

145. Which of the following is correct as regard to cockroach?

(a) Nocturnal, fossorial, monoecious, coelomate (b) Omnivorous, fossorial, dioecious, coelomate
(c) Omnivorous, fossorial, monoecious, coelomate (d) Omnivorous, fossorial, monoecious, pseudocoelomate

146. Cockroach is –

(a) Not a pest but a vector of several diseases (b) A pest but not vector of any disease
(c) A serious pest and vector of several diseases (d) Is neither a pest nor a vector of diseases

147. The body of cockroach is segmented and divisible into –

(a) Head and thorax (b) Head and abdomen (c) Abdomen and thorax (d) Head, thorax and abdomen

148. Exoskeleton of cockroach is formed of –

(a) Keratin (b) Amino acids (c) Chitinous cuticle (d) Non-chitinous cuticle

149. In cockroach, the body, inspite of being covered by an exoskeleton of strong chitinous cuticle remains flexible due to–

(a) Tergites (b) Sternites
(c) Pleurites (d) Arthrodial membrane or Articular membrane

150. In each segment of cockroach, the exoskeleton has hardened plates called –

(a) Sclerites (b) Arthrodial membrane (c) Ossicles (d) None

151. The dorsal sclerites and ventral sclerites are called –

(a) Sternites and tergites respectively (b) Tergites and sternites respectively
(c) Sternites and pleurites respectively (d) Tergites and pleurites respectively

152.

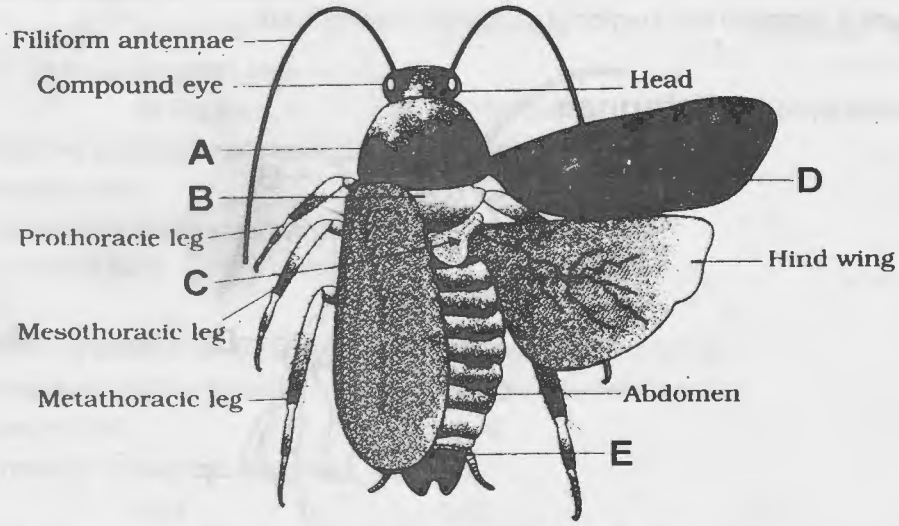


Figure — External features of cockroach

Identify A to E.

	A	B	C	D	E
(a)	Pronotum	Mesothorax	Metathorax	Tegmina	Pleura
(b)	Pronotum	Mesothorax	Metathorax	Tegmina	Sterna
(c)	Pronotum	Mesothorax	Metathorax	Tegmina	Anal cerci
(d)	Pronotum	Mesothorax	Metathorax	Tegmina	Anal style

153. The head of cockroach consists of fusion of _____ segments –

(a) 6 (b) 10 (c) 14 (d) 18

154. In cockroach, head can move in all directions due to –

(a) Absence of neck (b) Fusion of all 6 segments of head

(c) Flexible neck (d) Head is small and light in weight

155. In cockroach, a pair of antennae arises from membranous socket. Antennae are –

(a) Without any sensory receptors

(b) Many segmented

(c) Sensory receptors that help in monitoring the environment

(d) b and c are correct

156. Mouth parts of cockroach are –

(a) Sponging type (b) Biting and sucking type

(c) Biting and chewing type (d) Piercing and sucking type

157. Tongue of cockroach is –

(a) Labrum (b) Mandibles (c) Labium (d) hypopharynx

158. Mandibles of cockroach are –

(a) Long and pointed (b) Short without teeth

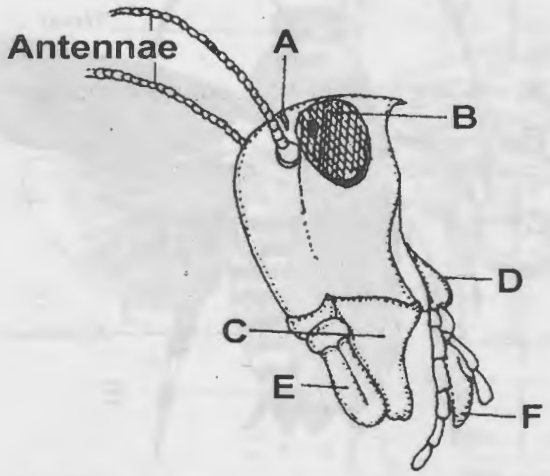
(c) Perforated, syringe like (d) With grinding and incising regions

159. In cockroach mouth part consists of a labrum, a pair of mandibles, a pair of maxillae and a labium. Labrum and labium act as –

(a) Upper and lower jaws respectively (b) Lower and upper jaws respectively

(c) Upper jaw and lips respectively (d) Upper and lower lips respectively

160. The following figure is related to head region of cockroach. Identify A to F.



	A	B	C	D	E	F
(a)	Compound eye	Cellus	Maxilla	Mandible	Labrum	Labium
(b)	Ocellus	Compound eye	Mandible	Maxilla	Labrum	Labium
(c)	Ocellus	Compound eye	Mandible	Maxilla	Labium	Labrum
(d)	Ocellus	Compound eye	Maxilla	Mandible	Labium	Labrum

161.

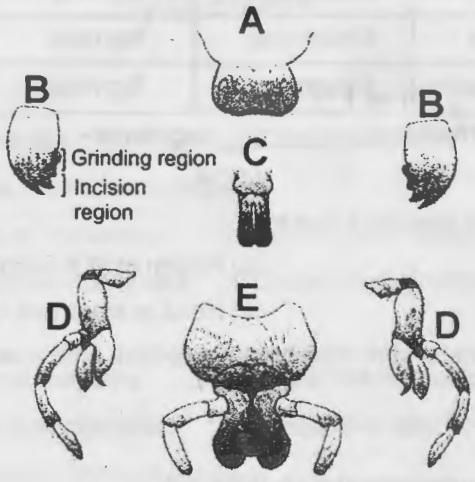


Fig. Mouthparts of cockroach.

The above figure is related with mouth parts of cockroach. Identify A to E –

	A	B	C	D	E
(a)	Maxilla	Hypopharynx	Labium	Mandible	Labrum
(b)	Mandible	Labium	Maxilla	Labrum	Hypopharynx
(c)	Labrum	Mandible	Hypopharynx	Maxilla	Labium
(d)	Labium	Hypopharynx	Labrum	Maxilla	Mandible

162. The two pairs of wings in *Periplaneta* are situated on –
(a) Prothorax and metathorax (b) Prothorax and mesothorax
(c) Mesothorax and Metathorax (d) Metathorax and first abdominal segment

163. In cockroach, wings are absent in –
(a) Prothorax (b) Mesothorax (c) Metathorax (d) None of these

164. Forewings of cockroach are articulated to –
(a) Prothorax (b) Metathorax (c) mesothorax (d) First abdominal segment

165. In cockroach, the first pair of wings are known as –

(a) Terga (b) Sterna (c) Tegmina (d) halteres

166. Metathoracic wings in cockroaches are –
(a) Halteres (b) Tegmina (c) Hemielytra (d) None of these

167. Which of the following statements are correct about the forewings in cockroach?
(a) They are mesothoracic
(b) They are opaque, dark and leathery and cover hindwing when at rest
(c) They are not used in flight
(d) All

168. Which of the following statements are correct about the hindwings in cockroach?
(a) They are transparent and membranous (b) They are metathoracic
(c) They are used in flight (d) All

169. In cockroach, thorax is divided into how many segments?
(a) 3 (b) 4 (c) 5 (d) 6

170. The abdomen in both male and female cockroach consists of –
(a) 10 segments (b) 8 segments (c) 12 segments (d) 18 segments

171. In female cockroach, 7th sternum is –
(a) Annular (b) Filamentous (c) Boat shaped (d) Spiral

172. In female cockroach, 7th sternum together with 8th and 9th sterna forms –
(a) A brood / genital pouch (b) Anal cercus
(c) Anal style (d) None

173. Anterior part of genital pouch in female cockroach contains –
(a) Gonopore (b) Spermathecal pores (c) Collateral glands (d) All

174. Stink glands are found in cockroach :
(a) 6/7 Thorasic segment (b) 6/7 Abdominal segment
(c) 5/6 Abdominal segment (d) 4/5 Abdominal segment

175. Which of the following is correct about cockroach?
(a) Sexual dimorphism is distinct
(b) The anal styles are present on 9th sternite of male only
(c) In both sexes the 10th segment bears a pair of jointed filamentous structures called anal cerci
(d) All

176. Male cockroach has –
(a) Dorsal anus, ventral genital pore and gonapophysis
(b) Ventral anus, dorsal genital pore and gonapophysis
(c) Dorsal anus, ventral genital pore but no gonapophysis
(d) Dorsal anus, ventral genital pore, gonapophysis but no anal styles

177. The largest part of the alimentary canal of cockroach is –
(a) Crop (b) Rectum (c) Gizzard (d) Ileum

178. Which part of alimentary canal of cockroach contributes to crushing food?
(a) Crop (b) Rectum (c) Gizzard (d) Ileum

179. The gizzard or proventriculus has an outer layer of thick muscles and thick inner cuticle forming _____ highly chitinous plates called teeth –
(a) 3 (b) 6 (c) 9 (d) 12

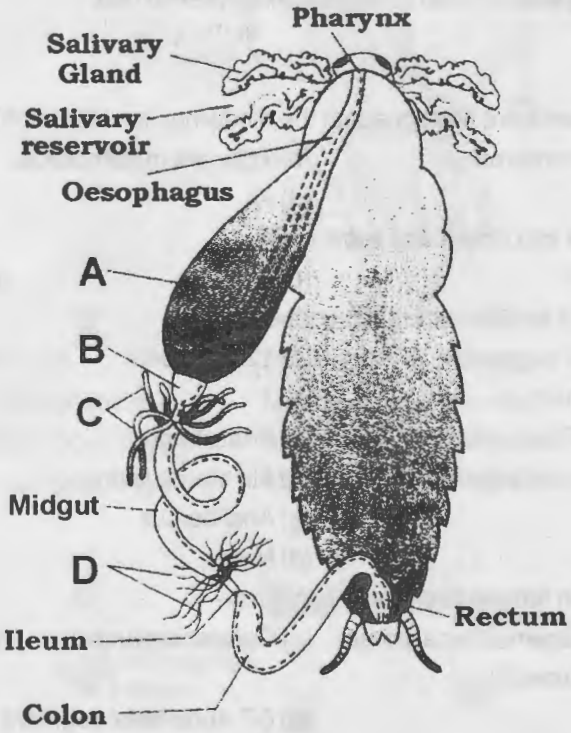
180. A ring of 6 - 8 blind tubules called hepatic / gastric caecae are present at –
(a) Fore gut (b) Hindgut (c) midgut (d) junction of foregut and midgut

181. The hepatic caecae in cockroach –
(a) Store excess food (b) Produce digestive enzymes

(c) Absorb fully digested food (d) Are helpful in egestion

182. Which of the following is correct about the alimentary canal of cockroach?
(a) The entire fore gut is lined by cuticle
(b) Hindgut is broader than midgut
(c) Hindgut is differentiated into ileum, colon and rectum
(d) All

183.



Identify structures A to D –

	A	B	C	D
(a)	Gizzard	Crop	Hepatic caecae	Malpighian tubules
(b)	Crop	Gizzard	Hepatic caecae	Malpighian tubules
(c)	Crop	Gizzard	Malpighian tubules	Hepatic caecae
(d)	Gizzard	Crop	Malpighian tubules	Hepatic caecae

184. Open blood vascular system without haemoglobin is found in –
(a) Earthworm (b) Frog (c) Rat (d) Cockroach

185. The position of heart in cockroach is –
(a) Lateral (b) Dorsal
(c) Ventral (d) Mid-dorsal line of thorax and abdomen

186. Which of the following is a character of cockroach?
(a) Reduced wing (b) Cocoon formation (c) 13-chambered heart (d) Absence of salivary gland

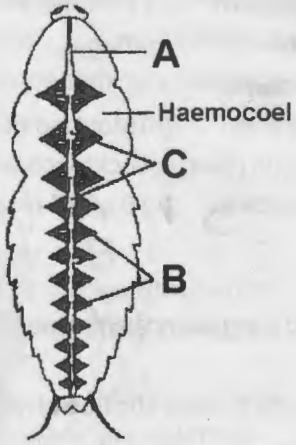
187. Heart of cockroach is –
(a) Membranous (b) Muscular and tube like
(c) Absent (d) Filled with blood having RBC

188. Which of the following is false about the heart of cockroach?
(a) It is differentiated into funnel shaped chambers with ostia on either side
(b) It is myogenic
(c) Blood from sinuses enter the heart through ostia and is pumped anteriorly to sinuses again
(d) Alary muscles are related to heart

189. The principal function of blood vascular system in cockroach is –
(a) Transport of heat (b) Transport of oxygen
(c) Transport of enzyme (d) Distribution of digested food + Transport of excretory products

190. Which of the following is correct?
(a) In cockroach, blood vessels are poorly developed and open into haemocoel
(b) In cockroach, visceral organs located in haemocoel are bathed in blood (haemolymph)
(c) The haemolymph consists of colourless plasma and haemocytes
(d) All

191.



The above figure shows open circulatory system of cockroach. Identify A, B and C

	A	B	C
(a)	Posterior aorta	Alary muscles	Chambers of heart
(b)	Anterior aorta	Ciliary muscles	Chambers of heart
(c)	Anterior aorta	Alary muscles	Chambers of heart
(d)	Anterior aorta	Circular muscles	Chambers of heart

192. The respiratory system in the body of cockroach consists of –
(a) Bronchi (b) Bronchioles (c) Network of trachea (d) Haemocyanin

193. Number of spiracles in cockroach are –
(a) 2 pairs on thorax and 8 pairs on abdomen (b) 3 pairs on thorax and 7 pairs on abdomen
(c) 3 pairs on thorax and 9 pairs on abdomen (d) 1 pair on thorax and 6 pairs on abdomen

194. Spiracles in cockroach are small holes present on _____ side of body.
(a) Dorsal (b) Ventral (c) Lateral (d) Mid-dorsal

195. The blood of cockroach contains no respiratory pigment. It means that –
(a) Respiration is anaerobic (b) Cockroach has no respiration
(c) Oxygen goes into tissues with H_2O from outside (d) Oxygen goes directly into tissues through tracheal system

196. Which of the following is false regarding the respiratory system of cockroach?
(a) Opening of spiracles is regulated by sphincters (b) Exchange of gases takes place at the tracheoles by diffusion
(c) Oxygen carrying respiratory pigment is haemoerythrin (d) Trachea has non-collapsible wall

197. The excretory organs in cockroach are –
(a) Green glands (b) Hepatic caecae (c) Malpighian tubules (d) Malpighian corpuscles

198. Cockroach is –
(a) Uricotelic (b) Ureotelic (c) Ammonotelic (d) Guanotelic

199. Malpighian tubules remove excretory products from –
(a) haemolymph (b) Gut (c) Both a and b (d) Kidney

200. Malpighian tubules in cockroach open at the junction of –

(a) Gizzard and midgut (b) Midgut and ileum (hind gut)
(c) Ileum and colon (d) Colon and rectum

201. The main excretory product in cockroach is –
(a) Urea (b) Ammonia (c) Guanine (d) Uric acid

202. In addition to Malpighian tubules, which of the following also helps in excretion in cockroach –
(a) Nephrocytes (b) Urecose glands (c) Fat body (d) All

203. Go through the paragraph – "It is lined by glandular and ciliated cells. It absorbs nitrogenous waste products fro haemocoel and convert them into uric acid which is excreted out through the hindgut". The above functions are relate to which of the following structures in cockroach?
(a) Trachea (b) Hepatic caecae (c) Terga (d) Malpighian tubules

204. Common feature of earthworm and cockroach is –
(a) Hermaphrodism (b) Ventral nerve cord (c) Moulting of cuticle (d) Excretion by nephridia

205. Number of thoracic and abdominal ganglia (in pairs) in cockroach are –
(a) 3 and 6 respectively (b) 3 and 3 respectively (c) 6 and 6 respectively (d) 6 and 3 respectively

206. The nervous system in cockroach –
(a) Is spread throughout the body
(b) Is represented by segmentally arranged ganglia and ventral nerve cord
(c) Both a and b are correct
(d) Consists of supra-oesopharyngeal ganglia in head and dorsal nerve cord

207. In cockroach, the brain is represented by –
(a) Supra-oesopharyngeal ganglion (b) Basal ganglion
(c) Sub-oesopharyngeal ganglion (d) Ventral nerve cord

208. If the head of cockroach is cut off, it will still live for as long as one week. It is because of –
(a) Body is covered with a hard chitinous exoskeleton (b) Head holds a bit of nervous system
(c) Head is of no use (d) Food capturing apparatus is found elsewhere

209. In cockroach, supra-oesopharyngeal ganglion supplies nerves to –
(a) Compound eyes (b) Antennae (c) Both (d) Abdomen area

210. The visual unit of cockroach are –
(a) Ocelli (b) Ctenidia (c) Ommatidia (d) Rhabdoma

211. In cockroach, each compound eye consists of about –
(a) 200 hexagonal ommatidia (b) 2000 hexagonal ommatidia
(c) 20000 hexagonal ommatidia (d) 20 hexagonal ommatidia

212. Which of the following is correct of mosaic vision in cockroach?
(a) With the help of several ommatidia, a cockroach receives several images of an object
(b) It is with more sensitivity but has less resolution
(c) Being common during night, it is called nocturnal vision also
(d) All

213. Besides eyes and antenna which of the following is the sense organ in cockroach?
(a) Maxillary palps (b) Labial palps (c) Anal cerci (d) All

214. Cockroach are –
(a) Dioecious and without sexual dimorphism (b) Monoecious and without sexual dimorphism
(c) Monoecious and with sexual dimorphism (d) Dioecious with sexual dimorphism

215. In male cockroach, a pair of testis are located one on each lateral side in the abdominal segment –
(a) 6th - 10th (b) 6th - 8th (c) 4th - 6th (d) 10th - 12th

216. In male cockroach, from each testis arises a thin vas deferens, which open into _____ through seminal vesicle –
(a) Anal cercus (b) Caudal style (c) Collateral gland (d) Ejaculatory duct

217. In male cockroach, the ejaculatory duct opens into a pore situated ventral to anus. This pore is –
(a) Gonopore (b) Genital papilla (c) Nephridiopore (d) Peristomium

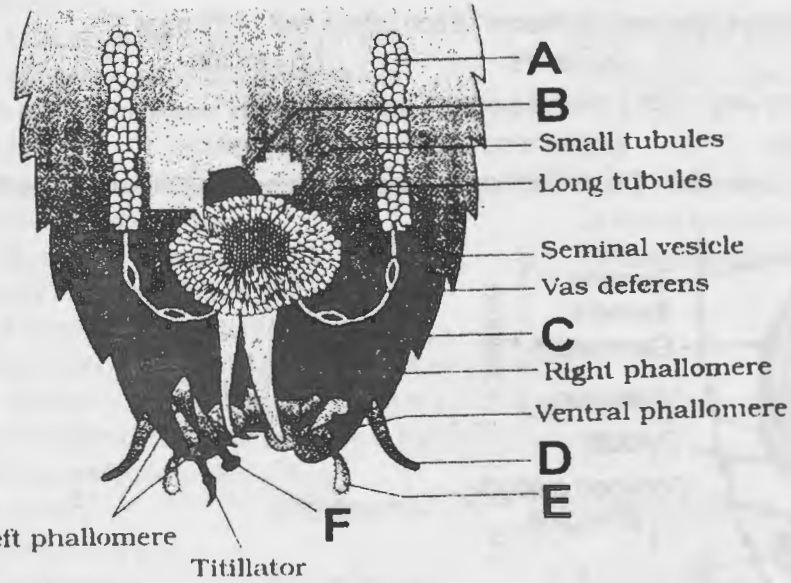
218. In male cockroach, mushroom gland, acting as an accessory reproductive gland, is situated in the abdominal segments –
(a) 4th - 5th (b) 6th - 7th (c) 7th - 8th (d) 8th - 10th

219. Chitinous asymmetrical structures, called male gonapophyses or phallomere represent external genitalia. They surround male gonopore. The male cockroach has –
(a) 2 phallomeres (b) 3 phallomeres (c) 4 phallomeres (d) 5 phallomeres

220. During copulation, cockroach transfers male gametes in the form of –
(a) Sperms (b) Spermatophore (c) Seminal vesicles (d) Spermatid

221. In male cockroach, the sperms are stored in the seminal vesicles and are glued together in the form of bundles called–
(a) Phallic gland (b) Spermatophores (c) Spermathecae (d) Spermatogonia

222.



Identify A to F in above diagram –

	A	B	C	D	E	F
(a)	Testis	Collateral gland	Ejaculatory duct	Anal cercus	Caudal style	Pseudopenis
(b)	Testis	Collateral gland	Ejaculatory duct	Terga	Caudal style	Pseudopenis
(c)	Testis	Phallic gland	Ejaculatory duct	Anal cercus	Caudal style	Pseudopenis
(d)	Testis	Phallic gland	Ejaculatory duct	Caudal style	Anal cercus	Pseudopenis

223. The ovaries of cockroach are located in the abdominal segments –
(a) 2 - 6 (b) 5 - 6 (c) 1 - 2 (d) 5 - 8

224. Each ovary of cockroach consists of how many ovarian tubules / ovarioles –
(a) 6 (b) 8 (c) 10 (d) 12

225. In female cockroach, two oviducts from each side open into a common oviduct / vagina which opens into the genital chamber. A pair of which structures located in the 6th segment opens in the genital chamber?
(a) Spermathecae (b) Gonapophyses (c) Ejaculatory duct (d) Pseudopenis

226. The function of spermathecae is –
(a) Stores egg (b) Stores sperm
(c) Helps in ootheca formation (d) Secretes an odoriferous fluid

227. Collateral glands are present in –
(a) Male cockroach (b) Female cockroach (c) In both (d) Absent in cockroach

228. Eggs of cockroach are fertilized in –
(a) Cocoon (b) Ootheca (c) Fallopian tube (d) Genital pouch of female

229. Collateral glands of cockroach help in –
(a) Fertilization (b) Formation of ootheca (c) Copulation (d) Formation of oothecal chamber

230. Ootheca of cockroach has how many fertilized eggs?
(a) 14 - 16 (b) 20 - 25 (c) 25 - 30 (d) 30 - 40

231. Development of *Periplanata americana* is –
(a) Ametabolous (b) Paurometabolous (c) Hemimetabolous (d) Holometabolous

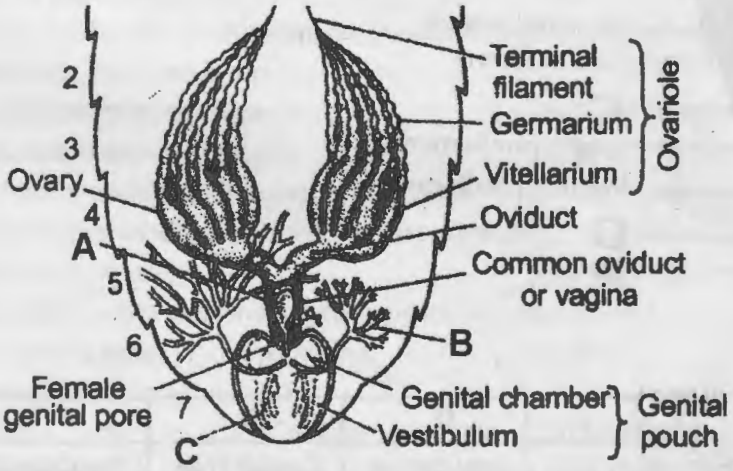
232. Young cockroach is called –
(a) Maggot (b) Nymph (c) Ephyra (d) Pupa

233. In cockroach, the nymph grows by moulting / ecdysis about how many times to reach the adult form?
(a) 16 (b) 13 (c) 3 (d) 18

234. On an average, female cockroach produces how many oothecae? Each ooteca has 14-16 eggs –
(a) 9 - 10 (b) 14 - 16 (c) 50 - 75 (d) 75 - 100

235. In cockroach life cycle, the nymph looks very much similar like adult. The nymph –
(a) lacks wing (b) Has wings (c) Has wing pads (d) a and c

236. Figure refers to repr. system of female cockroach. The correct labellings indicated by alphabets are respectively –



(a) A - Spermatheca, B - Collateral glands, C - Gonapophyses
(b) A - Phallic gland, B - Collateral glands, C - Gonapophyses
(c) A - Spermatheca, B - Seminal vesicle, C - Gonapophyses
(d) A - Spermatheca, B - Collateral glands, C - Tegmina

FROG

237. Bull frog of India is –
(a) *Rana tigrina* (b) *Rana esculenta* (c) *Rana styvatica* (d) All

238. Frogs belonging to class _____ of phylum chordata are _____ animals and show hibernation in _____ and aestivation in _____.
(a) Hemichordata, poikilothermic, winter, summer (b) Amphibia, poikilothermic, summer, rainy season
(c) Amphibia, poikilothermic, winter, summer (d) Amphibia, warmblooded, winter, summer

239. The frogs have the ability to change the colour to hide them from enemies (camouflage). This protective coloration is called –
(a) Mimicry (b) Antagonism (c) Burrowing (d) Symbiosis

240. The body of frog is divisible into –
(a) Head and trunk (b) Head, neck, trunk and tail

(c) Head, neck, thorax, abdomen and tail (d) Head, trunk and tail

241. Neck is absent in frog. This helps in –
(a) Respiration (b) Catching prey (c) Jumping on ground (d) Swimming in water

242. Which of the following is false about the frog?
I. Eyes are bulged out and covered by a nictitating membrane that protects them while in water
II. On either side of the eyes a membranous tympanum (ear) receives sound signals
III. The forelimbs and hind limbs help in swimming, walking, leaping and burrowing
IV. The hind limbs end in five digits and they are larger and muscular than fore limbs that end in four digits
V. Feet have webbed digits that help in swimming
VI. Frogs exhibit sexual dimorphism
(a) Only I and VI (b) Only III (c) Only IV and V (d) None

243. Both male and female frogs have –
(a) Long hindlimbs with five webbed fingers (b) Short forelimbs with four unwebbed fingers
(c) Both a and b (d) External ears

244. Frog has –
(a) 5 fingers in hand and 5 toes in foot (b) 5 fingers in hand and 4 toes in foot
(c) 4 fingers in hand and 5 toes in foot (d) 6 fingers in hand and 5 toes in foot

245. The number of fingers in the hindlimbs of frog is –
(a) 4 (b) 5 (c) 6 (d) 7

246. The glands present in the skin of frogs are –
(a) Sweat and mucous (b) Sweat and mammary
(c) Sweat and sebaceous (d) Mucous and poisonous

247. One of the main function of frog's skin is –
(a) Diffusion of respiratory gases
(b) Absorption of ultraviolet rays to produce vitamin D
(c) Storage of excess food in the form of subcutaneous fat
(d) Excretion of nitrogenous waste in the form of uric acid

248. What is not found in skin of frog?
(a) Scales (b) Epidermis (c) Poison glands (d) Mucous glands

249. The adult frog is –
(a) Herbivorous (b) Carnivorous (c) Omnivorous (d) None of these

250. The structure present in man but absent in frog is –
(a) Pancreas (b) Salivary gland (c) Thyroid gland (d) Adrenal gland

251. In frog, digestion of fats occurs mostly in –
(a) Rectum (b) Stomach (c) Duodenum (d) Small intestine

252. In frog, food is captured by –
(a) Trilobed tongue (b) Bilobed tongue (c) Tentacles (d) Limbs

253. In frog, undigested solid wastes pass out through –
(a) Anus (b) Cloaca (c) Kidney (d) Genital pore

254. In frog, which one of the following opens into the duodenum?
(a) Pancreatic duct (b) Bile duct (c) Hepatic duct (d) Hepato-pancreatic duct

255. Which of the following is false about the respiration of frog?
(a) Frogs respire on land and in water by the same method
(b) In water, skin acts as aquatic respiratory organ (Cutaneous respiration)
(c) Dissolved oxygen in water is exchanged through the skin by diffusion
(d) On land, the buccal cavity, skin and lungs act as respiratory organs

256. Which one is correct about the respiration of frog?
I. In frog, cutaneous and pulmonary respiration are found
II. A pair of elongated pink hollow lungs are found in thorax
III. Atmospheric O_2 ⟶ Nostril ⟶ Buccal cavity ⟶ Lungs

IV. During aestivation and hibernation, gaseous exchange takes place through skin.

(a) All (b) I, II, III (c) III (d) None

257. In frog, cutaneous respiration occurs –
(a) Always (b) Only on land
(c) Only in water (d) Only during aestivation or hibernation

258. RBC of frog is –
(a) Oval and nucleate (b) Circular and nucleate (c) Oval and enucleate (d) Biconcave and enucleate

259. Amphibian heart is –
(a) 2-chambered (b) 3-chambered (c) 4-chambered (d) 5-chambered

260. Heart of frog differs from that of man by the presence of –
(a) Auricle (b) Ventricle
(c) Sinus venosus and truncus arteriosus (d) Pericardium

261. Amphibian heart consists of –
(a) Two auricles and one ventricle (b) One auricle and two ventricles
(c) Two auricles and two ventricles (d) One sinus venosus, one auricle and 2 ventricles

262. In frog, ventricle opens into _____ on the _____ side of heart –
(a) Sinus venosus, dorsal (b) Sinus venosus, ventral (c) Conus arteriosus, ventral (d) Conus arteriosus, dorsal

263. In frog, a triangular structure called _____ joins the right _____ –
(a) Conus arteriosus, ventricle (b) Conus arteriosus, auricle
(c) Sinus venosus, auricle (d) Sinus venosus, ventricle

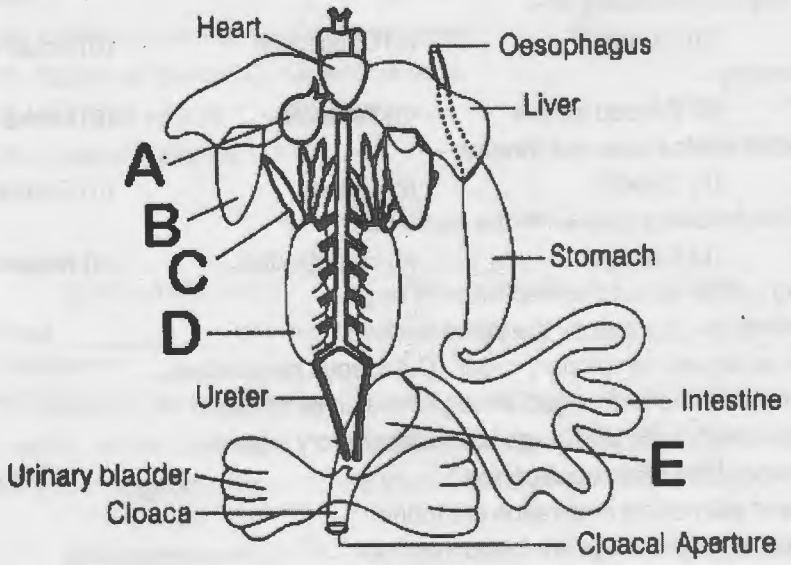
264. In frog, which of the following receives blood through vena cava?
(a) Sinus venosus (b) Conus arteriosus (c) Auricle (d) Ventricle

265. Which of the following special venous system is present in frog?
(a) Hepatic portal system (b) Renal portal system
(c) Both a and b (d) Neither hepatic nor renal portal system is present

266. Which of the following is incorrect about the portal venous system?
(a) Hepatic portal vein exists between liver and intestine
(b) Hepatic vein exists between both the lobes of liver
(c) Renal portal occurs between the kidney and lower parts of body
(d) All

267. In frog, lymphatic system consists of –
(a) Lymph (b) Lymph channels (c) Lymph nodes (d) All

268.



The above figure is associated with diagrammatic representation of internal organs of frog. Identify A to E

	A	B	C	D	E
(a)	Gall bladder	Lung	Ovary	Testis	Rectum
(b)	Gall bladder	Lung	Fat bodies	Testis	Rectum
(c)	Gall bladder	Lung	Testis	Kidney	Rectum
(d)	Gall bladder	Lung	Fat bodies	Kidney	Rectum

269. In frog, the excretory system consists of –
(a) Kidneys, ureters and urinary bladder only (b) Kidneys and urinary bladder only
(c) Kidneys, ureters, urinary bladder and cloaca only (d) Kidneys and cloaca only

270. In frog, urinary bladder is –
(a) Absent (b) Paired (c) Bilobed (d) Pentalobed

271. Frog is –
(a) Ammonotelic (b) Uricotelic (c) Ureotelic (d) Guanotelic

272. Chief nitrogenous waste product in frog is –
(a) Ammonia (b) Urea (c) Uric acid (d) Allantoin

273. In frog, the ureter acts as urinogenital duct in –
(a) Male (b) Female (c) Male or female (d) Neither in male nor female

274. In frog, how many pairs of cranial nerves are found?
(a) 10 (b) 12 (c) 8 (d) 31

275. The medulla oblongata passes out through –
(a) Foramen magnum (b) Foramen obturator (c) Foramen of Magentie (d) None of the above

276. Which of the following is false about the nervous system of frog?
(a) Fore-brain includes paired olfactory lobes, paired cerebral hemispheres and unpaired diencephelon
(b) Mid-brain comprises paired optic lobes and paired crura cerebri
(c) Hind-brain comprises cerebellum and medulla oblongata
(d) There are 9 pairs of spinal nerves

277. Frog has sense organs like sensory papillae (for touch), taste buds, nasal epithelium (smell), eyes, tympanum with internal ear (for hearing) out of these, which of the following is well-organised structure?
(a) Eyes and internal ears (b) Eyes and sensory papillae
(c) Internal ears and taste buds (d) Taste buds and sensory papillae

278. In frog, all are cellular aggregations around nerve endings except –
(a) Sensory papillae (b) Taste buds (c) Nasal epithelium (d) Eyes and internal ear

279. Frog shows sexual dimorphism. Male frog can be distinguished from female one in having –
(a) Sound producing vocal sac (b) Copulatory pad on the first digit of the fore arm
(c) Cloaca (d) a and b

280. Mesorchium in frog refers to –
(a) Fold of peritoneum between kidney and testis (b) Internal tissue of kidney
(c) Internal tissue of testis (d) Capsule of kidney

281. In male frog, 10 - 12 vasa efferentia (arising from testis) enter the kidney and open into –
(a) urinogenital duct (b) Seminal vesicle (c) Bidder's canal (d) Spermatophore

282. Bidder's canal is meant for passage of –
(a) Ova (b) Urine (c) Sperms (d) All of these

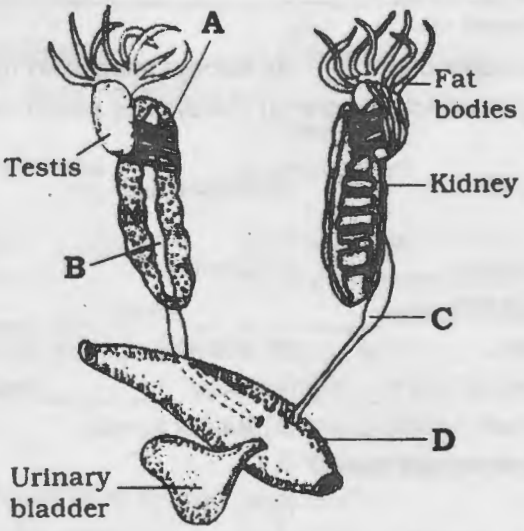
283. Which of the following sequences is correct for the passage of sperms in frog (male) –
(a) Testis ⟶ Bidder's canal ⟶ Vasa efferentia ⟶ Urinogenital duct ⟶ cloaca ⟶ cloacal aperture
(b) Testis ⟶ Vasa efferentia ⟶ Bidder's canal ⟶ Urinogenital duct ⟶ cloaca ⟶ cloacal aperture

(c) Testis ⟶ Urinogenital duct ⟶ Bidder's canal ⟶ Vasa efferentia ⟶ cloaca ⟶ cloacal aperture
(d) Testis ⟶ Vasa efferentia ⟶ Urinogenital duct ⟶ Bidder's canal ⟶ cloaca ⟶ cloacal aperture

284. In male frog, cloaca is used to pass out –
(a) Faecal matter only (b) Urine only (c) Sperms only (d) Faeces, urine and sperm

285. Bidder's canal in frog is found in –
(a) Liver (b) Testis (c) Ovary (d) Kidney

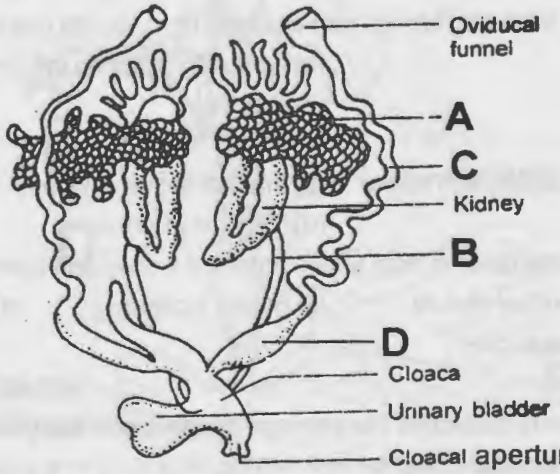
286. Go through the following figure indicating the male reproductive system of frog. Identify A to D –



	A	B	C	D
(a)	Bidder's canal	Adrenal gland	Urinogenital duct	Rectum
(b)	Bidder's canal	Adrenal gland	Urinogenital duct	Cloaca
(c)	Vasa efferentia	Adrenal gland	Urinogenital duct	Cloaca
(d)	Vasa efferentia	Thyroid gland	Urinogenital duct	Cloaca

287. For female frog, which of the following is false?
I. One pair of ovaries is situated near kidneys
II. Ovary has functional connection with kidney
III. Convulated, tubular, ciliated and glandular oviduct arises from ovary and opens into cloaca
IV. Oviduct and ureter open separately into the cloaca
V. A female frog can lay 2500 - 3000 ova at a time
(a) I and III (b) only II (c) I and IV (d) IV and V

288.



The above figure is related with female reproductive system of frog. Identify A to D –

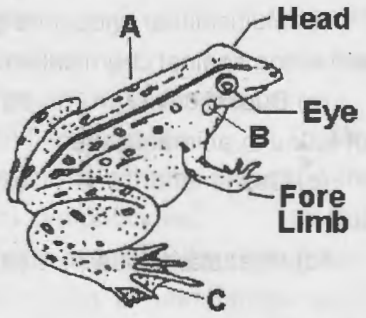
	A	B	C	D
(a)	Ovary	Ureter	Oviduct	Ovisac
(b)	Ovary	Urinogenital duct	Bidder's canal	Ovisac
(c)	Ovary	Urinogenital duct	Ovisac	Oviduct
(d)	Ovary	Urinogenital duct	Bidder's canal	Oviduct

289. Which of the following is false?
(a) Fertilization is external (in water) in frog.
(b) In frog, development involves larval stage called tadpole
(c) Tadpole undergo metamorphosis to form the adult
(d) Development in frog is direct

290. Why frog is suitable for classroom studies?
(a) It is easy to collect and least expensive
(b) Its size is convenient for dissection
(c) It is non-poisonous
(d) All

291. Which of the following is the use of frog?
(a) Legs of frog are used as food
(b) Frog is suitable for classroom studies
(c) Frogs maintain ecological balance because they serve as an important link of food chain and food web
(d) All

292. Identify A, B and C respectively –



(a) Trunk, Tympanum, Web
(b) Neck, Brown eye spot, Web
(c) Trunk, Tympanum, Hind limb
(d) Neck, Tympanum, Hindlimb

293. Which of the following is correct?
(a) In earthworm body wall's epidermis consists of a single layer of columnar epithelial cells which contain secretory gland cells
(b) Myocardium is contractile heart tissue
(c) A connective sheath surrounds skeletal muscle
(d) All

294. Intercalated disc / communication junctions in myocardium allow the cells to contract as a unit. It means :
(a) When a cell receives a signal to contract, its neighbours are stimulated to contract.
(b) All myocardial fibres of heart contract at the same time.
(c) Only a single myocardial cell contract.
(d) Contractile stimuli cannot cross from one cell to another.

295. One very special feature in the earthworm *Pheretima* is that :
(a) fertilization of eggs occurs inside the body
(b) The typhlosole greatly increases the effective absorption area of the digested food in the intestine
(c) The S-shaped setae embedded in the integument are the defensive weapons used against the enemies
(d) It has a long dorsal tubular heart

296. The ciliated columnar epithelial cells in humans are known to occur in
(a) Fallopian tubes and urethra (b) Eustachian tube and stomach lining
(c) Bronchioles and Fallopian tubes (d) Bile duct and oesophagus

297. Out of the four basic types of tissues, which is not the one ?
(a) Muscular tissue (b) Skeletal tissue (c) Neural tissue (d) Epithelial tissue

298. The outside or inside lining of a body organ is formed by
(a) Epithelial tissue (b) neural tissue
(c) Muscular tissue (d) Variable and differs from organ to organ

299. The epithelium of air sacs of lungs and the walls of blood vessels is
(a) Simple cuboidal epithelium (b) Simple squamous epithelium
(c) Stratified squamous epithelium (d) Simple columnar epithelium

300. The function of following epithelium is not secretion and absorption
(a) Simple cuboidal epithelium (b) Simple columnar epithelium
(c) Simple squamous epithelium (d) Brush bordered epithelium

301. The inner surface of hollow tubes, like bronchioles and fallopian tubes, have
(a) Brush bordered epithelium (b) Stratified squamous epithelium
(c) Ciliated epithelium (d) Simple cuboidal epithelium

302. Goblet glands are
(a) Unicellular exocrine glands of intestine (b) Unicellular endocrine glands of intestine
(c) Multicellular exocrine glands of gut (d) Multicellular endocrine glands of gut

303. The epithelium of following structure provides protection against chemical and mechanical stresses
(a) Skin (b) Pharynx (c) Buccal cavity (d) All of these

304. Which of the following type of cell junction is not found in animal tissues
(a) Desmosome (b) Tight junction (c) Gap junction (d) Plasmodesmata

305. Following is the most abundant tissue in animals
(a) Epithelial tissue (b) Neural tissue (c) Muscular tissue (d) Connective tissue

306. Dermis of skin has
(a) Loose connective tissue (b) Dense regular c.t.
(c) Dense Irregular c.t. (d) Epithelial tissue

307. Mast cells are associated with
(a) Exocrine glands (b) Endocrine glands
(c) Areolar connective tissue (d) Neural tissue

308. In all connective tissues except the following the cells secretes the fibres of collagen or elastin protein
(a) Bone (b) Cartilage
(c) Areolar connective tissue (d) Fluid connective tissue

309. The fibres of the following muscles are fusiform and do not show striations
(a) Skeletal muscles (b) Cardiac muscles (c) Both of these (d) Smooth muscles

310. The chondrocytes of connective tissue are
(a) fibre secreting cells (b) Bone forming cells (c) Cartilage cells (d) Bone eating cells

311. Muscles of intestine and blood vessels are
(a) Involuntary and smooth (b) Voluntary and smooth
(c) Involuntary and striated (d) Voluntary and striated

312. Intercalated discs are the communication junctions between the cells of
(a) Cardiac muscles (b) Striped muscles
(c) Adipose tissue (d) Nerve and Striated muscles

313. Neuroglia are
(a) Excitable cells of neural tissue (b) Supporting and non-excitable cells of neural tissue
(c) Two to three times in volume of neural tissue (d) Protective and excitable cells of neural tissue

314. The following are the major proteins of plasma
(a) Globulin, Bilirubin and fibrinogen (b) Haemoglobin, fibrinogen and albumin
(c) Globulin, albumin and Haemoglobin (d) Albumin, globulin and fibrinogen

315. Consider the following three statements and mark the right options
A. The plasma without clotting factor is called semen
B. Thymus is called the graveyard of RBCs
C. Thrombocytes are the cell fragments produced from megakaryocytes
(a) Only A is correct (b) Both A and C are correct
(c) Both B and C are correct (d) Only C is correct

316. Albumin in plasma helps in
(a) Osmotic balance (b) Defense mechanism
(c) Blood clotting (d) Nourishing the blood elements

317. RBCs in human are
(a) Biconcave and nucleated (b) Biconvex and nucleated
(c) Biconcave and enucleated (d) Biconvex and enucleated

318. The most and the least abundant leucocytes are respectively
(a) Neutrophils and basophils (b) Lymphocytes and monocytes
(c) Lymphocytes and basophils (d) Neutrophils and monocytes

319. Histamine, serotonin and heparin are secreted by
(a) Thrombocytes (b) Lymphocytes (c) Monocytes (d) Basophils

320. B and T forms, responsible for the immune response are the type of
(a) Thrombocytes (b) Lymphocytes (c) Eosinophils (d) Granulocytes

321. Read the following statements and mark the right option
A. A healthy person has 12 to 16 g. of haemoglobin per 100 ml of blood.
B. The number of platelets in a normal individual is 1.5 lac to 3.5 lac per mm of blood
C. Eosinophils are involved in allergic reactions
(a) Only B is correct (b) Only B and C are correct
(c) Only A and C are correct (d) All A, B and C are correct

322. The haemoglobin content per 100 ml of blood of a normal healthy human adult is
(a) 5 - 11 g (b) 25 - 30 g (c) 17 - 20 g (d) 12 - 16 g

323. Which of the following is correctly stated as happens in the common cockroach?
(a) The food is grinding by mandibles an gizzard.
(b) Malpighian tubules are excretory organ projecting out from the colon.
(c) Oxygen is transported by haemoglobin blood.
(d) Nitrogenous excretory product is urea.

324. The cells lining the blood vessels belong to the category of
(a) Columnar epithelium (b) Connective tissue (c) Smooth muscle tissue (d) Squamous epithelium

325. With reference to the external features of cockroach which among the following statements is **NOT** correct
(a) It has pulvillus between claws (b) Gonapophysis help in copulation
(c) Fore wings are elytra (d) Hind wings are protective and are not useful in flight

326. Which one is correct?
I. Vermicompost is an organic Biofertilizer.

II. Worm castings of the earthworms are of manurial value.

III. The nitrogenous wastes and other secretions of this worm also form important plant food. The process of increasing fertility of soil by earthworm is called vermicomposting.

(a) All are correct (b) Only statement I is correct

(c) Only statement II is correct (d) Only statement III is correct

327. Vermicompost is eco-friendly because _____

(a) earth worms consume less food and produce vermicompost

(b) earth worms consume leftovers and produce vermicompost

(c) earth worms consume microbes and vermicompost is microbe free

(d) vermicompost does not alter soil quality as that of synthetic fertilizers.

328. Which one among the following components of vermicompost contains plant growth factors ?

(a) Microbes (b) Humic acid (c) Nitrogen (d) Phosphorous

329. Frogs differ from humans in possessing :

(a) paired cerebral hemispheres (b) hepatic portal system

(c) nucleated red blood cells (d) thyroid as well as parathyroid

330. Consider the following four statements (A-D) related to the common frog *Rana trigrina*, and select the correct option stating which ones are **true (T)** and which ones are **false (F)**.

Statements :

(A) On dry land it would die due to lack of O_2 if its mouth is forcibly kept closed for a few days

(B) It has four-chambered heart

(C) On dry land it turns uricotelic from ureotelic

(D) Its life-history is carried out in pond water

Options :

	(A)	(B)	(C)	(D)
(a)	T	F	F	T
(b)	T	T	F	F
(c)	F	F	T	T
(d)	F	T	T	F

331. Which one of the following structures in *Pheretima* is ***correctly*** matched with its function ?

(a) Clitellum – secretes cocoon (b) Gizzard – absorbs digested food

(c) Setae – defence against predators (d) Typhlosole – storage of extra nutrients

332. The type of muscles present in our :

(a) *heart* are involuntary and unstriated smooth muscles

(b) *intestine* are striated and involuntary

(c) *thigh* are striated and voluntary

(d) *upper arm* are smooth muscle fibres fusiform in shape

333. The mouth parts of cockroach consist of ___*i*___, which forms the upper lip and ___*ii*___, which acts as the lower lip

(a) i-labrum; ii-labium (b) i-labrum; ii-maxilla (c) i-maxilla; ii-mandible (d) i-mandible; ii-labrum

334. In ___*i*___, the collagen fibres are present in rows between parallel bundles of fibres. It is an example of dense ___*ii*___ connective tissue.

(a) i-cartilage; ii-regular (b) i-cartilage; ii-irregular (c) i-tendon; ii-irregular (d) i-tendon; ii-regular

335. In the mouth parts of a cockroach, the labium forms ___*i*___ while ___*ii*___ acts as a tongue.

(a) i-upper lip; ii-maxilla (b) i-upper lip; ii-hypopharynx

(c) i-lower lip; ii-maxilla (d) i-lower lip; ii-hypopharynx

336. In dense ___i___ tissues, fibroblasts and collagen are arranged differently. These tissues are present in the ___ii___

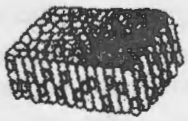
(a) i-regular; ii-skin (b) i-irregular; ii-skin (c) i-regular; ii-tendons (d) i-irregular; ii-tendons

337. ___i___ and adipose tissues are examples of ___ii___ connective tissues.

(a) i-Areolar; ii-loose (b) i-Tendons; ii-dense (c) i-Tendons; ii-loose (d) i-Areolar; ii-dense

338. The supportive skeletal structures in the human external ears and in the nose tip are examples of :
(a) ligament (b) areolar tissue (c) bone (d) cartilage

339. The four sketches (A, B, C and D) given below, represent four different types of animal tissues. Which one of these is correctly identified in the options given, along with its correct location and function?

A  B  C  D 

	Tissue	Location	Function
(a) B -	Glandular epithelium	Intestine	Secretion
(b) C -	Collagen fibres	Cartilage	Attach skeletal muscles to bones
(c) D -	Smooth muscle tissue	Heart	Heart contraction
(d) A -	Columnar epithelium	Nephron	Secretion and absorption

340. Which one of the following salts predominates in bone matrix?
(a) Sodium chloride (b) Magnesium phosphate (c) Calcium phosphate (d) Sodium carbonate.

341. The nerve chord in earthworm originates from
(a) supra-pharyngeal ganglia and has a fused pair of ganglia in each segment from the 3th to the last
(b) supra-pharyngeal ganglia and has a fused pair of ganglia in each segment from the 4th to the last
(c) sub-pharyngeal ganglia and has fused pair of ganglia in each segment from the 5th to the last
(d) sub-pharyngeal ganglia and has a fused pair of -ganglia in each segment from the 6th to the last.

342. *Pheretima* and its close relatives derive nourishment from :
(a) sugarcane roots (b) decaying fallen leaves and soil organic matter.
(c) soil insects (d) small pieces of fresh fallen leaves of maize, etc.

343. Compared to those of humans, the erythrocytes in frog are
(a) Without nucleus but with haemoglobin (b) nucleated and with haemoglobin
(c) very much smaller and fewer (d) nucleated and without haemoglobin.

344. Select the correct statement from the ones given below with respect to Periplaneta americana.
(a) Nervous system located dorsally, consists of segmentally arranged ganglia joined by a pair of longitudinal connectives.
(b) Males bear a pair of short thread like anal styles.
(c) There are 16 very long Malpighian tubules present at the junctions of midgut and hindgut.
(d) Grinding of food is carried out only by the mouth parts.

345. What external changes are visible after the last moult of a cockroach nymph?
(a) Anal cerci develop (b) Both fore wings and hind wings develop
(c) Labium develops (d) Mandibles become harder

346. Choose the correctly matched pair :-
(a) Tendon – Specialized connective tissue (b) Adipose tissue – Dense connective tissue
(c) Areolar tissue – Loose connective tissue (d) Cartilage – Loose connective tissue

347. **Statement A :** The section of collaterial gland forms the egg case in cockroach.
Statement B : The development in cockroach is hemimetabolous.
(a) Statement A is correct and statement B is wrong.
(b) Both the statements A and b are correct and B is the reason for A.
(c) Statement B is correct and statement A is wrong.
(d) Both statements A and B are correct and B is not the reason for A.

348. Identify the tissue shown in the diagram and match with its characteristics and its location

(a) Skeletal muscle, shows striations and closely attached with the bones of the limbs

(b) Smooth muscles, show branching, found in the walls of the heart

(c) Cardiac muscles, unbranched muscles, found in the walls of the heart

(d) Striated muscles, tapering at both-ends, attached with the bones of the ribs

349. Select the correct option with respect to cockroaches

(a) The fore wings are tegmina which are used in flight

(b) Malpighian tubules convert nitrogenous wastes into urea

(c) Males bear short anal styles not present in females

(d) Nervous system comprises of a dorsal nervecord and ten pairs of ganglion

350. Which one of the following is one of the paths followed by air/O_2 during respiration in an adult male Periplaneta americana as it enters the animal body?

(a) Hypopharynx, mouth, pharynx, trachea, tissues

(b) Spiracle in metathorax, trachea, tracheoles, oxygen diffuses into cells

(c) Mouth, bronchial tube, trachea, oxygen enters cells

(d) Spiracles in prothorax, tracheoles, trachea, oxygen diffuses into cells

351. What is true about cockroach?

(a) Ureotelic animal (b) Entire foregut is lined by cuticle

(c) Male have spermatheca in 6th segment (d) Female have caudal style

352. Consider the following statements (A - D) related to Periplaneta americana and select the correct option stating which ones are true (T) and which ones are false (F).

Statements :

A. In male cockroach, 10th segment bears a pair of short, thread like anal styles which are absent in female.

B. The first pair of wings arise from mesothorax and are used in flight.

C. Opening of 10 pairs abdominal spiracles is regulated by sphincters.

D. In male cockroach, a mushroom gland is present in the 6th - 7th abdominal segments.

	A	B	C	D		A	B	C	D
(a)	T	F	F	T	(b)	T	F	T	T
(c)	T	F	T	F	(d)	F	F	F	T

353. Some cells of connective tissue are given below

A. Fibroblast B. Mast cell C. Chondrocytes

D. Macrophage E. Osteocytes F. Plasma cells

How many of them are present in lacuna?

(a) Three (b) Two (c) Four (d) Five

354. The terga, sterna and pleura of cockroach body are joined by

(a) Arthrodial membrane (b) Cartilage (c) Cementing glue (d) Muscular tissue

355. The body cells in cockroach discharge their nitrogenous waste in the haemolymph mainly in the form of
(a) Urea (b) Calcium carbonate (c) Ammonia (d) Potassium urate

356. The function of the gap junction is to
(a) Separate two cells from each other
(b) Stop substance from leaking across a tissue
(c) Performing cementing to keep neighbouring cells together
(d) Facilitate communication between adjoining cells by connecting the cytoplasm for rapid transfer of ions, small molecules and some large molecules.

357. Which of the following features is not present in Periplaneta americana ?
(a) Schizocoelom as body cavity
(b) Indeterminate and radial cleavage during embryonic development
(c) Exoskeleton composed of N-acetylglucosamine
(d) Metamerically segmented body

358. In male cockroaches, sperms are stored in which part of the reproductive system?
(a) Testes (b) Vas deferens (c) Seminal vesicles (d) Mushroom glands

359. Smooth muscles are :-
(a) Involuntary, cylindrical, striated (b) Voluntary, spindle–shaped, uninucleate
(c) Involuntary, fusiform, non-striated (d) Voluntary, multinucleate, cylindrical

360. The cells in the human body are in contact with an internal environment consisting of
(a) Blood (b) Connective tissue (c) Interstitial fluid (d) Matrix

361. Connective tissue includes the following types of tissues.
(a) nervous and connective (b) epithelium and muscle
(c) muscle and nervous (d) lymph and cartilage

362. Cells are to tissues as tissues are to
(a) membranes. (b) organelles. (c) organs. (d) organisms.

363. The epithelium best adapted for a body surface subject to abrasion is
(a) stratified columnar. (b) simple squamous. (c) stratified squamous. (d) simple cuboidal.

364. Which of the following tissues lines the kidney ducts?
(a) smooth muscle (b) adipose (c) epithelial (d) nervous

365. What do fibroblasts secret?
(a) fats (b) calcium phosphate for bone
(c) interstitial fluids (d) proteins for connective fibers

366. Select the correct route for the passage of sperms in male frogs:
(a) Testes → Vasa efferentia → Kidney → Seminal Vesicle → Urinogenital duct → Cloaca
(b) Testes → Vasa efferentia → Bidder's canal → Ureter → Cloaca
(c) Testes → Vasa efferentia → Kidney → Bidder's canal → Urinogenital duct → Cloaca
(d) Testes → Bidder's canal → Kidney → Vasa efferentia → Urinogenital duct → Cloaca

367. Which of the following structures facilitate the transport of materials between two cells?
i. Desmosome
ii. Tight junction
iii. Gap junction
iv. Plasmodesmata
(a) i & ii only (b) ii & iv only (c) I, iii & iv only (d) i, ii & iii only

368. The three types of muscle tissue are
(a) Cardiac, Smooth, Cartilage (b) Cardiac, Skeletal, Cartilage
(c) Nervous, Skeletal, Cardiac (d) Cardiac, Skeletal, Smooth

369. Name the animal tissue, which are most abundant and widely distributed in the body of complex animals
(a) Epithelial (b) Muscular (c) Connective (d) Neural

370. In arthropodes which of the following is not true
(a) Circulatory system is of open type and are dioecious
(b) Eyes are compound and simple both type
(c) Fertilisation is external only
(d) They are mostly oviparous with direct or indirect development

371. Involuntary muscles are not found in
(a) iris (b) bronchi of the lungs (c) tongue (d) heart

372. Which of the following features is used to identify a male cockroach from a female cockroach?
(a) Forewings with darker tegmina (b) Presence of caudal styles
(c) Presence of a boat shaped sternum on the 9th abdominal segment (d) Presence of anal cerci

373. Select the correct matching–
(a) Cuboidal epithelium - Alveolar wall (b) Columnar epithelium - Stomach
(c) Ciliated epithelium - Intestine (d) Squamous epithelium - Germinal epithelium

374. In smooth and cardiac muscles, cell junctions are represented by –
(a) Gap junction (b) Desmosomes (c) Tight junction (d) Zonula occuludens

375. Arthrodial membrane is found is found in ___A___ and the function of ___B___. Select the option with correct representation of A and B respectively :
(a) Earthworm, Respiration (b) Frog , Articulation
(c) Cockroach, Circulation (d) Cockroach, Joining / Articulation

376. Which of these epithelia can stretch to increase the volume of the organ base on internal water pressure
(a) Simple squamous epithelia (b) Simple columnar epithelia
(c) Transitional epithelia (d) Stratified columnar epithelia

377. Ligaments and tendons are
(a) Connective tissue (b) Muscular tissue (c) Fibrous connective tissue (d) Skeletal tissue

378. Mark the correct one
(a) Labeo – Internal fertilization (b) Frog – Internal fertilization
(c) Birds – external fertilization (d) Balaenoptera – internal fertilization

379. Choose the correct statement for *Periplaneta americana*
(a) It has 6 muscular hearts (b) It has 10 thoracic segments
(c) Anal style is present in both male and female (d) It is nocturnal and present in damp places

380. The ciliated epithelial cells are required to move particles or mucus in a specific direction. In humans, these cells are mainly present in
(a) Bile duct and Bronchioles (b) Fallopian tubes and Pancreatic duct
(c) Eustachian tube and Salivary duct (d) Bronchioles and Fallopian tubes

381. Match the following cell structure with its characteristic feature :

(A) Tight junctions	(i) Cement neighbouring cells together to form sheet
(B) Adhering	(ii) Transmit junctions information through chemical to another cells
(C) Gap junctions	(iii) Establish a barrier to prevent leakage of fluid across epithelial cells
(D) Synaptic	(iv) Cytoplasmic junctions channels to facilitate communication between adjacent cells

Select correct option from the following :
(a) (A)-(iv), (B)-(iii), (C)-(i), (D)-(ii) (c) (A)-(ii), (B)-(iv), (C)-(i), (D)-(iii)
(c) (A)-(iv), (B)-(ii), (C)-(i),,(D)-(iii) (d) (A)-(iii), (B)-(i), (C)-(iv), (D)-(ii)

382. Which of the following statements is INCORRECT ?
(a) Female cockroach possesses sixteen ovarioles in the ovaries.
(b) Cockroaches exhibit mosaic vision with less sensitivity and more resolution.
(c) A mushroom-shaped gland is present in the 6th-7th abdominal segments of male cockroach.
(d) A pair of spermatheca is present in the 6th segment of female cockroach

7 STRUCTURAL ORGANIZATION IN ANIMALS

1. b	2. a	3. b	4. d	5. d	6. d	7. b	8. b	9. b	10. b
11. c	12. c	13. d	14. c	15. d	16. b	17. a	18. b	19. a	20. b
21. d	22. a	23. b	24. d	25. d	26. a	27. c	28. c	29. b	30. c
31. d	32. d	33. d	34. a	35. a	36. a	37. c	38. d	39. a	40. d
41. c	42. d	43. b	44. c	45. c	46. d	47. a	48. c	49. a	50. a
51. c	52. c	53. a	54. b	55. a	56. a	57. a	58. c	59. c	60. d
61. d	62. c	63. a	64. c	65. b	66. a	67. c	68. d	69. c	70. b
71. b	72. a	73. b	74. a	75. d	76. d	77. d	78. a	79. b	80. d
81. d	82. a	83. d	84. a	85. c	86. b	87. c	88. a	89. c	90. c
91. c	92. b	93. b	94. b	95. d	96. c	97. c	98. c	99. a	100. c
101. c	102. d	103. d	104. a	105. a	106. b	107. c	108. c	109. c	110. d
111. a	112. a	113. b	114. a	115. a	116. d	117. a	118. d	119. c	120. c
121. a	122. a	123. b	124. b	125. a	126. a	127. b	128. b	129. d	130. c
131. c	132. c	133. b	134. a	135. b	136. b	137. a	138. b	139. d	140. d
141. c	142. a	143. a	144. a	145. b	146. c	147. d	148. c	149. d	150. a
151. b	152. c	153. a	154. c	155. d	156. c	157. d	158. d	159. d	160. b
161. c	162. c	163. a	164. c	165. c	166. d	167. d	168. d	169. a	170. a
171. c	172. a	173. d	174. c	175. d	176. a	177. a	178. c	179. b	180. d
181. b	182. d	183. b	184. d	185. d	186. c	187. b	188. b	189. d	190. d
191. c	192. c	193. a	194. c	195. d	196. c	197. c	198. a	199. a	200. b
201. d	202. d	203. d	204. b	205. a	206. c	207. a	208. b	209. c	210. c
211. b	212. d	213. d	214. d	215. c	216. d	217. a	218. b	219. b	220. b
221. b	222. c	223. a	224. b	225. a	226. b	227. b	228. d	229. b	230. a
231. b	232. b	233. b	234. a	235. d	236. a	237. a	238. c	239. a	240. a
241. c	242. d	243. c	244. c	245. b	246. d	247. a	248. a	249. b	250. b
251. d	252. b	253. b	254. d	255. a	256. a	257. a	258. a	259. b	260. c
261. a	262. c	263. c	264. a	265. c	266. b	267. d	268. d	269. c	270. c
271. c	272. b	273. a	274. a	275. a	276. a	277. a	278. d	279. d	280. a
281. c	282. c	283. b	284. d	285. d	286. c	287. b	288. a	289. d	290. d
291. d	292. a	293. d	294. a	295. b	296. c	297. b	298. a	299. b	300. c
301. c	302. a	303. d	304. d	305. d	306. c	307. c	308. d	309. d	310. c
311. a	312. a	313. b	314. d	315. d	316. a	317. c	318. a	319. d	320. b
321. d	322. d	323. a	324. d	325. d	326. a	327. d	328. b	329. c	330. a
331. a	332. c	333. a	334. d	335. d	336. b	337. a	338. d	339. a	340. c
341. c	342. b	343. b	344. b	345. b	346. c	347. a	348. a	349. c	350. b
351. b	352. d	353. b	354. a	355. d	356. d	357. b	358. c	359. c	360. c
361. d	362. c	363. c	364. c	365. d	366. c	367. c	368. d	369. c	370. c
371. c	372. b	373. b	374. a	375. d	376. c	377. c	378. d	379. d	380. d
381. d	382. b								

SOLUTION

174. Stink gland In most Heteroptera, glands that produce fluids believed to be distasteful to potential predators. In the immature stages (nymphs) these are situated between the abdominal tergites, but in adults they are in the metathorax.

8 CELL : THE UNIT OF LIFE

1. Unicellular organisms are –
(a) Not capable of independent existence because they cannot perform all the essential functions of life
(b) Not capable of independent existence but they can perform all the essential vital functions
(c) Are capable of independent existence and perform all the essential vital functions
(d) Are capable to lead independent existence but they perform some vital functions

2. Select the incorrect statement –
(a) Any thing less than a complete structure of a cell does not ensure independent living
(b) Anton Von Leeuwenhock first saw and described a living cell
(c) Robert Brown discovered cell
(d) Cell is the basic unit of structure and function of all organisms

3. Cell is the fundamental structural and functional unit of all living organisms is evidenced by the facts like –
(a) Any thing less than a complete structure of a cell does not ensure independent living
(b) Subcellular components can regenerate whole cell
(c) A cell arises by fusion of two cells
(d) All cells are totipotent

4. Select the right option which relates to Schwann regarding the following statement –
I. He reported that cells have a thin outer layer which is today known as plasma membrane
II. Cell wall is a unique character of the plant cell
III. Body of plants and animals are composed of cells and products of cells
(a) All are correct (b) Only III is correct (c) II and III are correct (d) All are incorrect

5. Which of the following statements was not explained in the cell theory given jointly by Schleiden and Schwann?
(a) All living organisms are composed of cells and products of cells
(b) Cell is the structural and functional unit of living organisms
(c) Explanation of formation of new cells
(d) None

6. Choose the wrong option –
(a) Mycoplasma is the smallest cell (0.3 μm in length) (b) Bacteria are 3 to 5 μm
(c) The largest cell is the egg of an ostrich (d) Nerve cells are some of the smallest cells

7. I. The shape of the cells may vary with the function they perform
II. Human RBC is about 7.0 μm in diameter
III. Cytoplasm is the main arena of cellular activities
IV. Various chemical reactions occur in cytoplasm to keep the cell in the living state
(a) All are correct (b) Only I and II are correct
(c) Only IV is correct (d) All are wrong

8. Go through the following statements and then select correct option(s) for prokaryotic cells –
I. They are generally smaller than eukaryotic cells
II. They multiply more rapidly than the eukaryotic cells
III. They are presented by bacteria, B. G. A, mycoplasma and PPLO (Pleuro Pneumonia like organism)
(a) All (b) II and III (c) Only III (d) I and III

9. All the statements are correct except –
(a) The organization of the prokaryotic cells is fundamentally similar

(b) Prokaryotes show a wide variety of shapes and functions
(c) Few prokaryotes have cell walls
(d) There is no well-defined nucleus

10. Organization of a cell has not been achieved in –
(a) Bacteria (b) Bacteriophage (c) *Amoeba* (d) Diatom

11. Which of the following is (are) exception(s) to the cell theory –
(a) Viruses (b) Viriods (c) Prions (d) All

12. Arrange the following cells in an ascending order of their sizes –
I. Mycoplasma II. Ostrich egg III. Human RBC IV. Bacteria
(a) I, II, III, IV (b) I, IV, III, II (c) II, IV, I, III (d) IV, III, II, I

13. Match the column I with column II correctly –

Column I	Column II
Various types of cell and organism	Size
I. Typical bacteria	A. 10 - 20 μm
II. Viruses	B. 1 - 2 μm
III. PPLO	C. 0.1 μm
IV. A typical eukaryotic cells	D. 0.02 - 0.2 μm

(a) I - B, II - D, III - C, IV - A (b) I - A, II - B, III - C, IV - D
(c) I - D, II - C, III - B, IV - A (d) I - B, II - D, III - A, IV - C

14. Which of the following is not a characteristic of prokaryotic cell –
(a) Mesosome (b) Circular DNA
(c) Photosynthetic membrane system (d) Membrane bound organelles

15. Which of the following statements concerning prokaryotes is / are true?
(a) Because prokaryotes do not contain organelles, they cannot photosynthesize or carry out cellular respiration
(b) Prokaryotes have no chromosomes and therefore lack DNA
(c) Prokaryotic flagella are similar in structure to eukaryotic flagella
(d) None of the above

16. All of the following statements are correct about plasmids except –
(a) they are extrachromosomal DNA
(b) They are smaller, circular, double stranded naked DNA that confer certain unique phenotypic characters to some bacteria like resistance to antibiotics
(c) They are used in genetic engineering
(d) It helps in the replication of nucleoid

17. Which one is correct about mesosome?
(a) A characteristic of bacteria (b) Infolding of cell membrane
(c) May be in the form of vesicles, tubules or lamellae (d) All

18. I. It is the extension of plasma membrane into the cytoplasm
II. It helps in cell wall formation, DNA replication, helps in respiration, secretion processes, increases the surface area of plasma membrane and enzymatic contents, also helps in cytokinesis.
III. It is the characteristic of bacterial cells.
The above features are attributed to bacterial –
(a) Nucleoid (b) Plasmid (c) Mesosome (d) Pilus

19. Most prokaryotic cells, particularly the bacterial cells, have
(a) A chemically simple cell envelope (b) A chemically complex cell envelope
(c) No cell envelope (d) Cell envelope only in the form a cell membrane

20. Most of the bacterial cell envelope consists of –
(a) Only the cell membrane (b) The cell wall and cell membrane
(c) A tightly bound 3 layered structure (d) Only glycocalyx

21. Which one is correct about the bacterial cell envelope?
(a) The outmost cell wall followed by glycocalyx and then plasma membrane
(b) The outer most glycocalyx followed by plasma membrane and then cell wall
(c) The outermost glycocalyx followed by cell wall and plasma membrane
(d) Cell envelope is chemically very simple and consists of only plasma membrane

22. Which of the following pairs is mismatched?
(a) Glycocalyx - may be capsule or slime layer
(b) Pili - Reproduction
(c) Cell wall - Protective, determines shape, prevents from bursting
(d) Flagella, Pilli and Fimbriae - Surface structures of bacterial cell

23. Which is mismatched pair?
(a) Capsule - Thick and tough glycocalyx (b) Slime layer - Loose glycocalyx
(c) Pili - Motility organ (d) Bacterial cells - Motile or nonmotile

24. Which of the following is not true about fimbriae?
(a) they are composed of protein (b) They may be used for attachme
(c) They are small bristle like fibres sprouting out of the bacterial cell (d) They form pellicle

25. Which is false?
(a) Bacterial glycocalyx differs in composition and thickness among different bacteria
(b) Bacterial envelope has a 3 layered structure and each layer has a distinct function but they act as a sing protective unit
(c) Bacteria are organelleless and sans ribosomes
(d) Number and arrangement of flagella are variable in bacteria

26. Bacteria can be classified into 2 groups on the basis of –
(a) Differences in the cell envelopes
(b) The manner in which they respond to the staining procedure developed by Gram
(c) Occurrence of pili
(d) a and b

27. Bacterial flagellum consists of all of the following parts except –
(a) Filament (b) Microtubule (c) Hook (d) Basal body

28. Select the incorrect statement –
(a) Filament of the bacterial flagella is the longest part and extends from the cell surface to the outside
(b) In prokaryotes, ribosomes (70S) are associated with plasma membrane
(c) Size of prokaryotic ribosomes (70S) is 15 nm x 20 nm
(d) None

29. Select the incorrect statement about prokaryotic ribosomes –
(a) 50S and 30S subunits unite to form 70S ribosomes
(b) Polysome / polyribosome consists of many ribosomes only
(c) Ribosome is the site of protein synthesis
(d) Polysome indicate the synthesis of identical polypeptide in multiple copies

30. Which of the following statement is false for prokaryotic cell inclusions?
(a) These are storage granules in the cytoplasm (b) They are membranous
(c) Phosphate granules, cyanophycean granules and glycogen granules are the examples of cell inclusions
(d) Gas vacuole is found in B.G.A and purple and green photosynthetic bacteria

31. The eukaryotes include –
(a) Fungi (b) Protists (c) Plants and animals (d) All

32. If you removed the fimbriae from a bacterial cell, which of the following would you expect to happen?
(a) The bacteria could no longer swim
(b) The bacteria would not adhere to the host tissue
(c) Transportation of molecules across the membrane would stop
(d) The shape of bacteria would change

33. There is an extensive compartmentalization of cytoplasm through membrane bound organelles in all except –
(a) Prokaryotes (b) Diatoms (c) Plants and fungi (d) Animals

34. Plant cells differ from animal cells in having –
(a) large vacuole, plastid and cell wall (b) Cell wall, plastid, centriole
(c) Cell wall, plastid and mitochondria (d) Cell membrane, plastid and cell wall

35. Cell membrane is absent in living –
(a) Prokaryotic cells (b) RBC (c) Mesophyll cell (d) None

36. The detailed structure of the membrane was studied in the 1950s only after the advent of the –
(a) Phase contrast microscope (b) Electrophoresis (c) Electron microscope (d) DNA probes

37. The best material for the study of structure of cell membrane is –
(a) RBC of human (b) RBC of frog (c) Kidney cell (d) Muscle cell

38. Biochemical investigation reveals that the cell membrane is composed of –
(a) Proteins + Lipids only (b) Carbohydrate + Protein only
(c) Carbohydrate + Lipids + Proteins (d) Carbohydrate + lipids only

39. In cell membrane, lipids are arranged in a –
(a) Bilayer (b) Monolayer
(c) Multilayer (d) Unilayer at some places and bilayers at other places

40. The most abundant lipid in the cell membrane is –
(a) Cutin (b) Cholesterol (c) Steroid (d) Phospholipid / phosphoglycerides

41. Lipids are arranged within the membrane with –
(a) Polar heads towards innerside and the hydrophobic tails towards outerside
(b) Both heads and tails towards outerside
(c) Heads towards outerside and tail towards inside
(d) Both heads and tails towards innerside

42. Why tail of lipids in the membrane are towards inner part?
(a) The tail is non polar hydrocarbon and so protected within an aqueous environment
(b) The tail is polar hydrocarbon and so is protected from aqueous environment
(c) The nonpolar or hydrophobic hydrocarbon tails of lipid, being on inner side ensures their protection from aqueous environment
(d) The tail is hydrophilic so it tends to be located in the aqueous inner side of membrane

43. Which of the following statement is incorrect about the plasma membrane?
(a) The ratio of proteins and lipid varies considerably in different cell types
(b) 52% protein and 40% lipids are in the membrane of human RBC
(c) The arrangement of proteins (P) and lipids (L) is L–P–P–L
(d) Head of lipid (fatty acid) is hydrophilic

44. The molecules in a membrane that limit its permeability are the –
(a) Carbohydrates (b) Phospholipids (c) Proteins (d) Water

45. An improved model of cell membrane, a widely accepted model is the –
(a) Unit membrane model (b) Fluid mosaic model (c) Danielli and Davson's model (d) Robertson's model

46. Who proposed the fluid mosaic model of plasma membrane in 1972?
(a) Singer and Nicolson (b) Robertson (c) Robert Brown (d) Camillo Golgi

47. Which of the following statements is not true about the cell membrane?
(a) It is present in both plant and animal cells (b) Lipid is present in it as bilayer
(c) Proteins may be peripheral or integral in it (d) carbohydrates are never found in it

48. According to the fluid mosaic model of the cell membrane, the proteins are located –
(a) In a continuous layer over the outer surface of the membrane only
(b) In a continuous layer over the inner surface only
(c) In discontinuous arrangement, both on the surface (as peripheral proteins) and in the interior of the membrane (as integral proteins)
(d) In the middle of the membrane, between the lipid layers only

49. According to the modern concept, cell membrane is –
(a) Solid (b) Quasifluid (c) Fluid (d) Solidified sheath

50. The fluid mosaic model explains –
(a) Only structural aspects of cell membrane (b) Only functional aspects of cell membrane
(c) Both structural and functional aspects of cell membrane (d) Only fluidity of membrane

51. Integral cell membrane proteins –
(a) Are partially embedded in lipid layers
(b) Are completely embedded in lipid layers
(c) Show lateral but not vertical movements within bilayer of lipid
(d) All

52. Select the incorrect statement –
(a) A membrane is a mosaic or composite of diverse lipid and proteins
(b) In 2003, the chemistry Nobel Prize was awarded for work on aquaporins
(c) A membrane is held together primarily by hydrophobic attraction
(d) Proteins, not lipids, are responsible for fluid behaviour

53. Fluid nature of membrane is able to explain –
(a) Cell growth, cell division (b) Formation of intercellular junction
(c) Secretion and permeation of various substances across membrane (d) All

54. Plasma membrane is –
(a) Semipermeable (b) permeable (c) Selective / differentially permeable (d) Impermeable

55. Cell membrane is selective permeable. This means that it –
(a) Allows all materials to pass through (b) Allows only water to pass through
(c) Allow only certain materials to pass through (d) Allow only ions to pass through

56. Which one is false about osmosis?
(a) It is a specific form of diffusion
(b) It refers to the movement of water along its concentration gradient
(c) It is a passive movement of water (d) It occurs through a carrier protein and needs ATP

57. Neutral solutes may move across the membrane by a process of simple _____, _____ concentration gradients (from higher to lower concentration)
(a) method, against (b) transport, along (c) Diffusion, along (d) Active transport, against

58. The polar molecules –
(a) Can pass through bilayers of lipid of plasma membrane
(b) Cannot pass through bilayers of lipid of plasma membrane
(c) Need carrier proteins of the membrane to facilitate their transport across the membrane
(d) b and c

59. What would you expect to happen if you removed the cell wall from a plant cell and placed it into a drop of water –
(a) The cell would begin to grow (b) The cell would shrink
(c) The cell would burst (d) Nothing would happen

60. Algal cell wall consists of –
(a) Cellulose (b) Galactans (c) Mannans and minerals like $CaCO_3$ (d) All

61. The cell wall of plants consists of –
(a) Cellulose (b) hemicellulose (c) Pectins and proteins (d) All

62. A cell without cell wall would also lack –
(a) Mitochondria (b) Chloroplast (c) ER (d) biomembrane

63. Which statement about the plant cell wall is not true?
(a) Its principal chemical composition is polysaccharide (b) It is rigid
(c) It completely isolates adjacent cells (d) All

64 Middle lamellae –
(a) Mainly consists of Ca-pectate (b) Holds different neighbouring cells together
(c) Is formed as cell plate during cytokinesis (d) All

65. A mutant cell, unable to manufacture cellulose would be unable to –
(a) Build a cell wall (b) Capture sunlight (c) Store food (d) Divide

66. The innermost portion of a mature plant cell wall is the –
(a) Primary cell wall (b) Plasma membrane (c) Secondary cell wall (d) Plasmodesmata

67. Choose the false statement –
(a) The 1^o cell wall of young cell is capable of growth
(b) Growth of 1^o cell wall diminishes as the cell matures
(c) 1^o cell wall is very non-elastic
(d) Secondary cell wall is thicker, stronger and positioned between the 1^o cell wall and cell membrane

68. Choose the correct statement –
(a) The secondary cell wall forms when the growth of cell stops
(b) The secondary wall is inextensible
(c) Plasmodesmata consists of a fine pore / canal in the cell wall and middle lamella. It is a cytoplasmic bridge among neighbouring cells
(d) All

69. ER, GB, lysosome and vacuoles are components of endomembranous system because –
(a) Their structures are distinct (b) Their functions are distinct
(c) Their functions are coordinated (d) All

70. Read the following statements (A - D) and answer as asked next to them.
A. Mitochondria and chloroplast are energy transducers
B. The functions of mitochondria, chloroplast and peroxisome are not coordinated with ER, GB, lysosome and vacuoles, so they are a part of the endomembranous system
C. Internal compartmentalization causes the division of labour within eukaryotic cells that greatly increases overall cellular function
D. Prokaryotic cells have various types of cell organelles.
How many of the above statements are correct?
(a) One (b) Three (c) Four (d) Two

71. Which of the following cell organelles were discovered after the introduction of electron microscope?
(a) Mitochondria (b) Endoplasmic Reticulum (c) Ribosomes (d) Both b and c

72. Endoplasmic reticulum is called RER when it has _____ on its surface –
(a) Elementary particles (b) Ribosomes (c) Oxysome (d) Quantasomes

73. Cholesterol is synthesised by –
(a) Eggs (b) SER (c) RER (d) Golgi Body

74. Ribosomes are found in all except –
(a) Bacteria (b) Mitochondria and chloroplast (c) RER (d) GB

75. The proteins that will function outside the cytosol are made by –
(a) GB (b) Ribosomes in mitochondria (c) Ribosomes on RER (d) Ribosomes in the nucleus

76. The membrane of the ER are continuous with the membrane of –
(a) Nucleus (b) Golgi body (c) Membrane of mitochondria (d) Membrane of plastid

77. The SER is the major site of synthesis of –
(a) Lipid (b) Protein
(c) Lipid, steroidal hormones and glycogen metabolism (d) Protein and lipid

78. A cell, which is very active in the synthesis and secretion of proteins, would be expected to have –
(a) Equal amount of RER and SER (b) More SER than RER
(c) More RER than SER (d) More GB and no RER

79. "The cytoplasm of animal and plant cells is transversed by a network of tiny tubular membranous system that divides the intracellular space into 2 compartments (Luminal inside the membranous system) and extraluminal (Cytoplasmic) compartment."
The above statement is attributed to –
(a) ER (b) GB (c) Plasma membrane (d) Nuclear membrane

80. Packing of substances for export from the cell occurs in the
(a) SER (b) GB (c) Lysosome (d) Nucleolus

81. Which of the following cell organelles are named after the name of discoverer?
(a) ER (b) DNA (c) GB (d) ATP

82. Name of the densely stained reticular structure (near the nucleus) having many parallely stacked flat, disc-shaped cisternae of 0.5 μm to 1.0 μm diameter is –
(a) ER (b) GB (c) Lysosome (d) Microfilament

83. A. Varied number of cisternae are present in a GB
B. Golgi cisternae are concentrically arranged near the nucleus
C. GB shows polarity - Cis / proximal / forming / Concave face near nucleus and distal / Convex / Trans / Maturation face
D. The Cis and trans face are inter connected
E. Both the faces are similar
Which of the above statements about GB is / are false?
(a) Only C and E (b) Only D (c) Only D and E (d) Only C

84. Which of the following is the correct sequence / route of the secretory product?
(a) ER → Vesicles → Cis region of GB → Trans region of GB → Vesicle → Plasma membrane
(b) RER → GB → Lysosome → Nuclear membrane → Plasma membrane
(c) ER → Vesicles → Trans region of GB → Cis region of GB → Vesicles → Plasma membrane
(d) Lysosome → ER → GB → Vesicles → Cell membrane

85. Which one is the important site of synthesis of glycoprotein and glycolipid?
(a) GB (b) RER (c) Lysosome (d) None

86. Which of the following is correct about GB?
(a) GB is structurally and biochemically polarized
(b) The main function of GB is packing of materials, to be delivered to the intracellular targets or secreted outside (produced by RER or SER or both)
(c) The products that travel through GB are usually modified as they move from one cisternae to another cisternae
(d) All

87. A distinctive feature of the lysosome is that it has –
(a) A lower pH than the cytoplasm (b) A higher pH than the cytoplasm
(c) A reduced hydrolase activity (d) Double membraned envelope

88. Which of the following enzymes is absent in lysosome?
(a) Lipases and proteases (b) carbohydrase
(c) Polymerases (d) Nuclease

89. The Golgi apparatus (Dictyosome) –
(a) Is found in animal cells only (b) Is found in prokaryotes only
(c) Is the site of rapid ATP production (d) Packages and modifies proteins

90. Which statement about the ER is not true?
(a) It is of two types, rough and smooth (b) It is a network of tubes and flattened sacs
(c) Some of it is sprinkled with ribosome (d) it is found in all living cells

91. Which of the following is correct for the origin of lysosome (L)?
(a) ER → GB → L (b) GB → ER → L
(c) Nucleus → GB → L (d) Mitochondria → ER → GB → L

92. Of the following structures of a plant cell, the one that most often has the greatest volume is the –
(a) Vacuole (b) Lysosome (c) Glyoxysome (d) Ribosome

93. I. It contains water, sap, excretory product and other unwanted materials
II. It is bound by a single membrane called tonoplast
III. In plant cells, it can occupy upto 90% of cellular volume
IV. Its content forms cell sap
V. It maintains turgor pressure
The above features are attributed to –
(a) Lysosome (b) Vacuole (c) Peroxisome vacuole (d) Food

94. Which one is correct –
(a) In *Amoeba,* contractile vacuole is important for excretion and osmoregulation
(b) In many cells as in protists, food vacuoles are formed by engulfing the food particles
(c) Both a and b
(d) Vacuole is always large sized in all cells of plant

95. The concentration of a number of ions and other materials is higher in vacuoles than those in cytoplasm – why?
(a) Tonoplast has a number of active transport system that pumps ions into vacuole from cytoplasm
(b) Through osmosis, a large amount of ions go continuously to vacuole from cytoplasm
(c) Cytoplasmic ions enter the vacuole through osmotic flow of water
(d) Vacuole is always engaged in the hydrolysis of salts into their ions

96. The DNA is located in the _____ of _____.
(a) Cristae, mitochondria (b) Matrix, mitochondria
(c) Intermembrane space, mitochondria (d) Grana, chloroplast

97. RNA is found in all of the following structures except –
(a) Prokaryotic cell (b) Nucleus, chloroplast and mitochondria
(c) Vacuole (d) Ribosomes, HIV, TMV

98. Which of the following cell organelle(s) is / are double membrane bound?
(a) Nucleus (b) Chloroplast (c) Mitochondria (d) All

99. Which of the following statement is incorrect?
(a) Mitochondria, unless specifically stained are not easily visible under the microscope
(b) Physiological activity of cells determines the number of mitochondria per cell
(c) Mitochondrion, a power house of cell has DNA, RNA, ribosomes and enzyme. So it can survive outside the cell
(d) Mitochondria divide by fission

100. Both the membranes of a mitochondrion are –
(a) Structurally different but functionally similar (b) Structurally as well as functionally different
(c) Structurally similar but functionally different (d) Structurally as well as functionally similar

101. Choose the correct statements –
I. Mitochondria and Chloroplast transfer energy
II. Mitochondrion is a power-house of cell as it produces most of the cellular ATP
III. Mitochondria and chloroplast are found in all eukaryotic cells
IV. Mitochondria are the sites of anaerobic respiration
V. The matrix of mitochondria posses a single linear DNA, many RNA molecules, 80S ribosomes
(a) IV and V (b) I, II (c) II, IV and V (d) III and V

102. The matrix of which cell organelle has single circular DNA molecule, a few RNA, 70S ribosomes and components required for protein synthesis and aerobic respiration –
(a) Chloroplast (b) Golgi Body (c) Mitochondrion (d) ER

103. I. Sausage shaped / cylindrical
II. Diameter 0.2 - 1.0 μm (average 0.5 μm); Length 1.0 - 4.1 μm
III. Has 2 aqueous compartments
IV. Outermembrane as continuous limiting boundary of the organelle
V. Inner membrane forms many cristae which increase surface area
VI. Both membranes have their own specific enzymes
All the above features are attributed to –
(a) Chloroplast (b) Nucleus (c) ER (d) Mitochondria

104. Plastids are found in –
(a) All animal cells (b) Some animal cells (c) All plant cells (d) All plants cells and euglenoids

105. Which group of structures would be clearly seen in a suitable stained plant cell under the light microscope?
(a) Chloroplast, mitochondria, nucleus and ribosomes (b) Chloroplast, mitochondria, vacuole, nucleus, starch grain
(c) ER, GB, ribosome (d) GB, ER, ribosome, mitochondria

106. Based upon the type of pigment, plastids are of how many type?
(a) 3 types (b) 4 types (c) 2 types (d) 5 types

107. Chloroplasts contain –
(a) All types of pigments (b) Chl + Carotene + anthocyanine
(c) Chl + Carotenoids (d) Only chl

108. Carotenoids –
(a) Are fat soluble pigments (b) Include carotene (orange) and xanthophyll (yellow) pigments
(c) Are present in both chloroplasts and chromoplasts (d) All

109. I. Amyloplasts – Store starch e.g. potato
II. Elaioplasts – Store oil and fat
III. Aleuroplast – Store protein
The above types of plastids are included under –
(a) Leucoplasts (Colourless plastid) (b) Chromoplasts (Non green colour plastid)
(c) Chloroplast (green plastid) (d) None

110. In chloroplast, chlorophyll is present in –
(a) thylakoid (b) Stroma (c) Outer membrane (d) Inner membrane of envelope

111. Stacks of vesicles in chloroplast form –
(a) Stroma (b) Thylakoid (c) Grana (d) Oxysome

112. Extranuclear genes are found in –
(a) Lysosome and chloroplast (b) GB and ER
(c) Nucleus and mitochondria (d) Mitochondria and chloroplast

113. Majority of the chloroplast of the green plants are found in –
(a) Mesophylls of leaves (b) Bundle sheath of leaf
(c) Vascular bundle of leaf (d) Mid ribs of leaf

114. The number of chloroplast in each mesophyll is –
(a) 100 (b) 100 - 1000 (c) 20 - 40 (d) 104

115. In *Chlamydomonas* (a green alga) the number of chloroplast per cell is –
(a) 1 (b) 2 (c) 100 (d) 1000

116. The length and width of chloroplast is –
(a) 5 - 10 μm, 1 - 4 mm (b) 50 - 10 μm, 2 - 4 μm (c) 2 - 4 μm, 5 - 10 μm (d) 5 - 10 μm, 2 - 4 μm

117. In higher plants the chloroplast is –
(a) Spiral (b) Lens - shaped (c) Cup shaped (d) Reticulate

118. Which of the following is correct about the outer and inner membrane of chloroplast?
(a) Less permeable and more permeable respectively
(b) More permeable and less permeable respectively
(c) Both are equally permeable
(d) Both are equally impermeable

119. Grana of the chloroplast are interconnected by –
(a) Granal thylakoids (b) Granal lamellae (c) Stromal lamellae (d) Stroma

120. The stroma of chloroplast has –
(a) Enzymes for protein synthesis only (b) Enzymes for carbohydrate synthesis
(c) Both (d) Enzymes for dark reaction and oxidative phosphorylation

121. Which of the following is membraneless?
(a) Ribosomes (b) Nucleolus (c) Centriole (d) All

122. Which of the following is Nucleoproteinaceous?
(a) Chromosomes, Viruses and ribosomes (b) Centriole, Viruses and lysosome
(c) Viruses, chromosomes and vacuole (d) Nucleus, GB, DNA

123. 70S ribosomes are found –
(a) In prokaryotic cells, mitochondria and chloroplast (b) In prokaryotic cells and in cytoplasm of eukaryotic cells
(c) On Endoplasmic reticulum (d) On Endoplasmic reticulum and Nuclear membrane

124. Who discovered ribosomes as dense particles under the electron microscope?
(a) George Palade (b) Kolliker (c) Boveri (d) Strasburger

125. To enter or leave a cell, substances must pass through –
(a) Microtubule (b) Plasma membrane (c) Microfilament (d) Nucleus

126. Of the following organelles, which group is involved in manufacturing substances needed by cell?
(a) Lysosome, vacuole, ribosome (b) Vacuole, RER, SER
(c) Ribosome, RER, SER (d) RER, Lysosome, vacuole

127. Dye injected into a cell might be able to enter an adjacent cell through a –
(a) Microtubule (b) Microfilament (c) Plasmodesmata (d) Tight junction

128. The cytoskeleton is a proteinaceous network of fibres in the cytoplasm involved in –
(a) Mechanical support (b) Motility
(c) maintenance of cell-shape (d) All

129. Microtubules are made up of –
(a) Actin and function in locomotion (b) Tubulin is found in cilia and flagella
(c) Myosin and function in contraction (d) Polysaccharide and function in locomotion

130. An organelle with an internal cross section showing characteristic "9 + 2" morphology is the –
(a) Microtubule (b) Microfilament (c) Cilium or flagellum (d) Cytoskeleton

131. The cellular component at the base of each cilium or flagellum is –
(a) Centriole (b) Nucleus (c) Microvillus (d) Basal Body

132. The cellular structures that are almost like centrioles are –
(a) Basal bodies (b) Microfilaments (c) Microtubules (d) Centromeres

133. I. Cilium / Flagellum contains an outer ring of nine doublet microtubules surrounding two singlet microtubules
II. Cilia are smaller which works like oars, causing the movement of either the cells or surrounding fluid
III. Flagella are comparatively longer and responsible for cell movement.
IV. Cilium and flagellum are covered with plasma membrane
Which of the above statement is correct?
(a) I, II (b) I, II, III, IV (c) I, IV (d) II, III

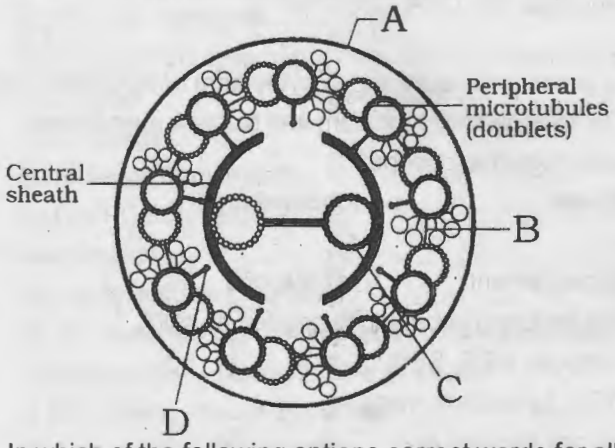
134. The core of cilium or flagellum, composed of microtubules and their associated proteins is called –
(a) Blepharoplast (b) Axoneme (c) Microfilament (d) Tubulin

135. Section of Cilia / flagella shows –

	Peripheral Microtubules (Doublet)	Central microtubules (singlet)	Radial spoke	Central Sheath
(a)	9 + 0	2	8	1
(b)	9 + 2	9 + 0	9	1
(c)	9	2	9	1
(d)	3	6	9	1

136. Choose the correct statement about cilia and flagella.
(a) They are hair-like outgrowths of the cell membrane
(b) Eukaryotic flagella are not structurally different from prokaryotic flagella
(c) They originate from basal bodies (centriole like structure)
(d) a and c are correct

137. Go through the section of cilia / flagella showing the different parts –



In which of the following options correct words for all the four blanks A, B, C, and D are indicated?
(a) A – Plasma membrane, B - Interdoublet bridge, C – Central microtubule, D – Radial spoke
(b) A – Plasma membrane, B – Arm, C – Central microtubule, D – Radial spoke
(c) A – Plasma membrane, B – Interdoublet bridge, C – Hub, D – Radial spoke
(d) A – Plasma membrane, B – Interdoublet bridge, C – Hub, D – Arm

138. Centrioles arise –
(a) From pre-existing centrioles
(b) *de novo*
(c) From nuclear envelope
(d) From spherosome

139. Which of the following statement is false?
(a) Both the centrioles in a centrosome lie perpendicular to each other
(b) Central proteinaceous hub is missing in a centriole
(c) Each centriole has an organization like that of a cartwheel.
(d) Centrosome usually contains 2 cylindrical centrioles

140. The cross section of a centriole shows

	Peripheral Microtubules (Triplet)	Central Microtubules (singlet)	Hub	Spokes	Inter triplet Bridge
(a)	9	2	1	9	9
(b)	9	2	9	9	9
(c)	9	2	1	2	2
(d)	9	0	1	9	9

141. Choose the false statement –
(a) Centrosome – Cytoplasmic structure of animal cells
(b) Centrioles form spindle poles
(c) centriole – Membraneless, but surrounded by amorphous pericentriolar bodies
(d) Centrosome occurs in every animal cells and most of the plant cells

142. Which of the following sequence is correct?
(a) Basal body → Cilium / flagellum → Centriole
(b) Cilium / flagellum → Basal body → Centriole
(c) Centriole → Basal body → Cilium / Flagellum
(d) Basal body → Centriole → Flagellum / Cilium

143. The inner and outernuclear membranes of nuclear envelope can be differentiated in that –
(a) Inner membrane has ribosomes (b) Outer membrane has ribosomes
(c) Outer membrane is continuous with the ER (d) Both b and c

144. The content of nucleolus is continuous with the rest of the nucleoplasm as –
(a) It is the site of active rRNA synthesis (b) It is spherical
(c) It is membraneless (d) It is associated with NOR of certain chromosome

145. Number of nucleolus in a nucleus is –
(a) Only one (b) Many (c) Dependent on number of SAT-chromosome (d) One or more

146. Nuclear DNA exists as a complex of proteins called _____ that condenses into _____ during _____ –
(a) Chromatids, chromosomes, cell division (b) Chromosomes, Chromatin, Interphase
(c) Chromatin, Chromosome, Interphase (d) Chromatin, Chromosome, Cell Division

147. Which of the following cell organelles is directly connected to the outer nuclear membrane?
(a) Mitochondria (b) Golgi body (c) ER (d) Chromatin

148. An organelle found in all eukaryotic cells during some portion of their lives is the –
(a) Chloroplast (b) Nucleus (c) Flagellum (d) Centriole

149. Material of the nucleus is stained by –
(a) Acidic dye (b) Basic dye (c) Neutral dye (d) Iodine

150. For the study of structure of nucleus the best cell is –
(a) Cell in the interphase (b) Cell in the late prophase
(c) Cell in the divisional phase (d) Cell in the meiotic phase

151. Which one is correct about the nuclear membranes (NMs)
(a) Both the NMs are never fused
(b) Both the NMs are always parallel to each other and is never fused

(c) Both NMs are parallel to each other and fused to form nuclear pores at a number of places

(d) Inner NM is attached with ribosomes

152. The nuclear pores are the passage for the movement of certain materials between the nucleus and cytoplasm in both the direction. Which one is correct about materials in their respective direction

(a) Proteins, enzymes into the nucleus (b) Ribosomal components out of the nucleus

(c) mRNA out of the nucleus (d) All

153. Actively functional nucleus shows –

(a) Large nucleolus, diffused chromatin and more nuclear pores

(b) Large nucleolus, diffused chromatin and no nuclear pores

(c) Large nucleolus, compact chromatin and many pores

(d) No nucleolus, diffused chromatin and small nuclear pores

154. Both the nuclear membranes are separated by _____ in perinuclear space –

(a) 10 to 50 A^o (b) 1 to 5 A^o (c) 10 to 50 nm (d) 1 to 5 nm

155. Cells actively carrying out protein synthesis have –

(a) Smaller and single nucleolus (b) Smaller and more numerous nucleoli

(c) Large and more numerous nucleoli (d) Larger and single nucleolus

156. Chromatin consists of –

(a) DNA only (b) DNA + Histones

(c) DNA + RNA + histones + Non-histones (d) Ribonucleoproteins only

157. The total length of DNA molecules of 46 chromosomes in a human cell is about _____, where as a typical cell is 10 m in length –

(a) 2 mm (b) 2 cm (c) 0.2 mm (d) 2m

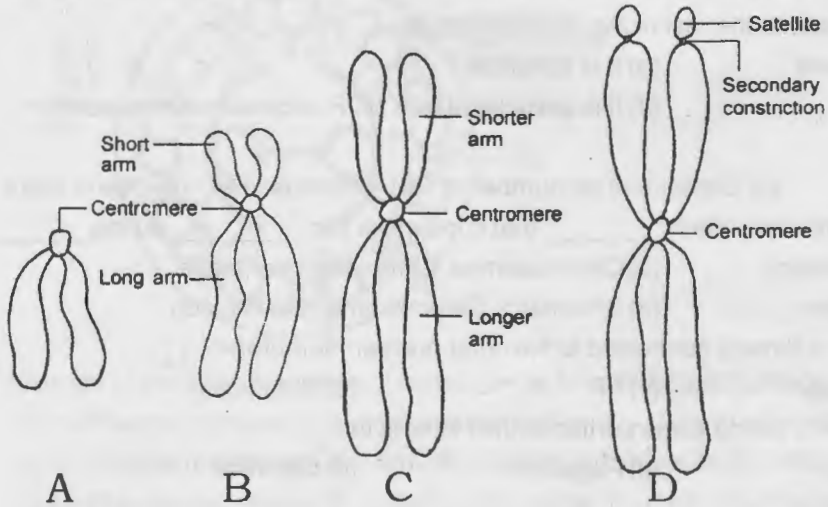
158. Part of chromosome after secondary constriction is called –

(a) Chromomere (b) Telomere (c) Satellite (d) Primary constriction

159. Structure which provides the shape to chromosomes is called –

(a) Centromere (b) Centriole (c) Satellite (d) Chromomere

160.



Which one is correct?

	A	B	C	D
(a)	Telocentric chr.	Acrocentric chr.	Submetacentric chr.	Metacentric chr.
(b)	Acrocentric chr.	Telocentric chr.	Metacentric chr.	Submetacentric chr.
(c)	Submetacentric chr.	Metacentric chr.	Telocentric chr.	Acrocentric chr.
(d)	Metacentric chr.	Submetacentric chr.	Acrocentric chr.	Telocentric chr.

161. The accompanying diagram represents chromosome. Identify the structures A, B and type of chromosome (C).

Type of Chromosome - C

(a) A - Satellite, B - Primary constriction, C - Acrocentric

(b) A - Satellite, B - Secondary constriction, C - Metacentric

(c) A - Satellite, B - Centromere, C - Telocentric

(d) A - Satellite, B - Centromere, C - Submetacentric

162. The accompanying diagram shows a chromosome

Which of the following table refers correctly to the chromosome?

	No. of centromere	No. of Kinetochore	No. of arms
(a)	2	1	4
(b)	1	2	4
(c)	2	2	4
(d)	1	2	2

163. Which of the following is incorrect about the microbodies?

(a) They are present in bacteria

(b) Minute, membrous vesicles

(c) They are present in plants and animals

(d) They have various enzymes

164. The accompanying diagram shows a chromosome. A is –

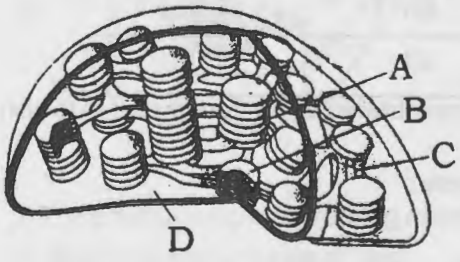
(a) Centromere

(b) Kinetochore

(c) Chromosome

(d) Chromocentric

165. Go through the section view of chloroplast showing the different parts –



In which of the following options correct words for all the four blanks A, B, C, and D are indicated?

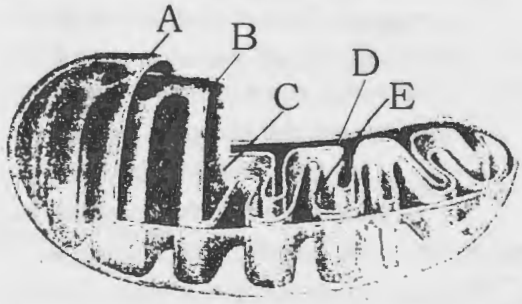
(a) A - Thylakoid, B - Stromal lamella, C - Stroma, D - Granum

(b) A - Granum, B - Thylakoid, C - Stromal lamella, D - Stroma

(c) A - Thylakoid, B - Granum, C - Stromal lamella, D - Stroma

(d) A - Granum, B - Thylakoid, C -Stroma, D - Stromal lamella

166. Go through the section view of a mitochondrion showing the different parts.



Now Identify A to E.

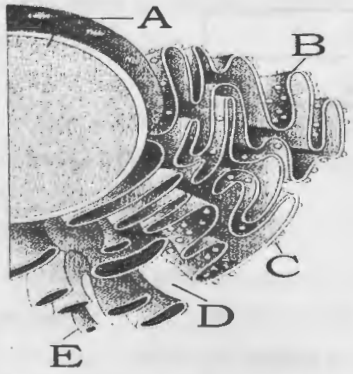
(a) A - Outer membrane, B - Inner membrane, C - Matrix, D - Inter-membrane space, E - Crista

(b) A - Outer membrane, B - Inner membrane, C - Inter-membrane space, D - Matrix, E - Crista

(c) A - Outer membrane, B - Inner membrane, C - Matrix, D - Crista, E - Inter-membrane space

(d) A - Outer membrane, B - Inner membrane, C - Crista, D - Matrix, E - Inter-membrane space

167. Identify the components labelled A, B, C, D and E in the diagram below from the list (i) to (viii) given along with –



Components :

(i) Cristae of mitochondria

(ii) Innermembrane of mitochondria

(iii) Cytoplasm

(iv) Smooth endoplasmic reticulum

(v) Rough endoplasmic reticulum

(vi) Mitochondrial matrix

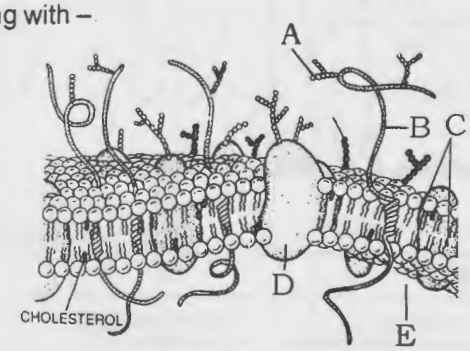
(vii) Ribosome

(viii) Nucleus

The correct components are –

	A	B	C	D	E
(a)	(viii)	(v)	(vii)	(iii)	(iv)
(b)	(i)	(iv)	(vii)	(vi)	(iii)
(c)	(vi)	(v)	(iv)	(vii)	(i)
(d)	(v)	(i)	(iii)	(ii)	(iv)

168. Identify the components labelled A, B, C, D and E in the diagram (cell membrane) below from the list (i) to (viii) g along with –



Components :

(i) Sugar

(ii) Protein

(iii) Lipid bilayer

(iv) Integral protein

(v) Cytoplasm

(vi) Cell wall

(vii) External protein

The correct components are –

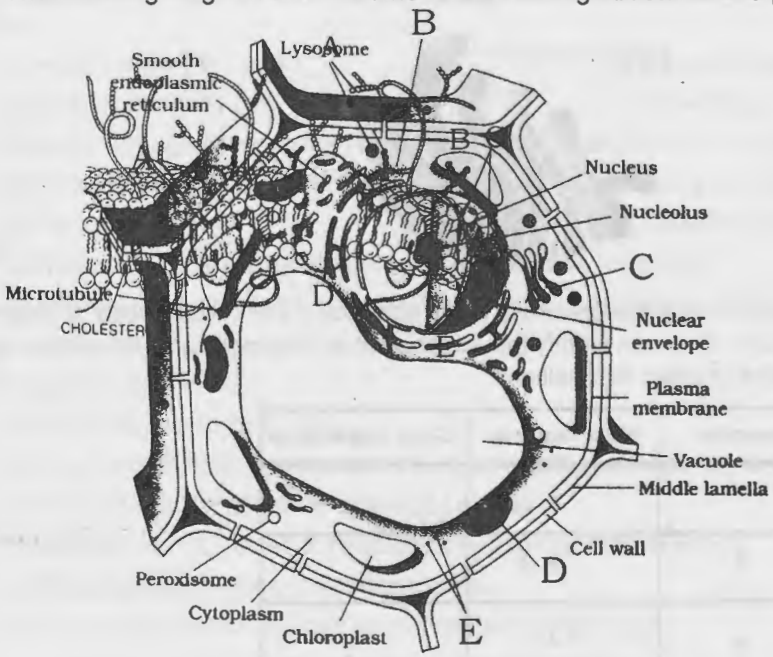
(a) A - (i), B - (ii), C - (iii), D - (iv), E - (v)

(b) A - (ii), B - (i), C - (iii), D - (iv), E - (v)

(c) A - (i), B - (ii), C - (iii), D - (iv), E - (vi)

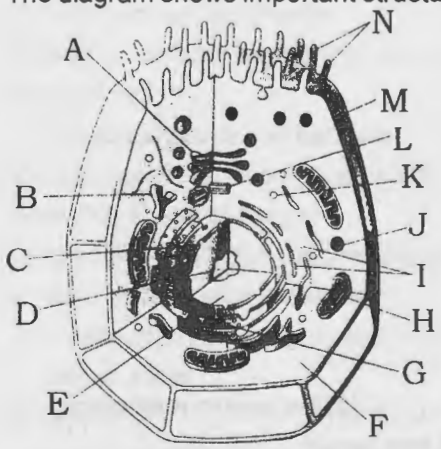
(d) A - (i), B - (ii), C - (iii), D - (vii), E - (v)

169. The following diagram shows some of the missing structures in a plant cell (A - E). Identify the structures –



(a) A - Plasmodesmata, B - Rough endosplasmic recticulum, C - Golgi apparatus, D - Mitochondrion, E - Ribosomes
(b) A - Desmosome, B - Rough endosplasmic recticulum, C - Golgi apparatus, D - Mitochondrion, E - Ribosomes
(c) A - Plasmodesmata, B - Smooth endosplasmic recticulum, C - Golgi apparatus, D - Mitochondrion, E - Ribosomes
(d) A - Tight junction, B - Rough endosplasmic recticulum, C - Golgi apparatus, D - Mitochondrion, E - Ribosomes

170. The diagram shows important structures in an animal cell.



(i) The structure replicates during mitosis and generates the spindle
(ii) Major site for synthesis of lipid
(iii) Power house of the cell
(iv) Store house of digestive enzyme
(v) Increases the surface area for the absorption of materials
(vi) Site of glycolysis
(vii) Site for active ribosomal RNA systhesis
Which one of the following option explain the labelling of figure with respect to their function?
(a) I - L, II - G, III - H, IV - J, V - N, VI - F, VII - D (b) I - M, II - G, III - H, IV - J, V - N, VI - F, VII - D
(c) I - L, II - B, III - H, IV - J, V - N, VI - F, VII - D (d) I - M, II - A, III - H, IV - J, V - N, VI - F, VII - D

171. Identify the Figure –

(a) RER

(b) SER

(c) GB

(d) None

172. Questions I, II and III refer to the table below, in which the presence (+) or absence (–) of certain types of organelles in five sample human cells is indicated. A blank does not signify the absence of an organelle, just its relative lack of importance when compared to the importance of other organelles.

	Nucleus	Flagellum	Lysosome	Mitochondria	Golgi Apparatus
Cell A	-	-		-	
Cell B	+	-	+	+ +	
Cell C	+	+	+	+	
Cell D	+	-	+ +		
Cell E	+	-		+	+

I. Cell which secretes proteins.

II. Cells present in blood

III. Haploid cell.

	I	II	III
(a)	Cell E	Cells A and D	Cell C
(b)	Cell D	Cells B and C	Cell E
(c)	Cell A	Cells D and E	Cell C
(d)	Cell B	Cells C and D	Cell A

173. To enter or leave a cell, substances must pass through

(a) a microtubule. (b) the Golgi apparatus. (c) a ribosome. (d) the plasma membrane.

174. Bacterial cell are prokaryotic; in comparison to a typical eukaryotic cell they would

(a) be smaller. (b) have a smaller nucleus.

(c) lack a plasma membrane. (d) have fewer internal membranous compartments.

175. Which of the following correctly matches an organelle with its function?

(a) mitochondrion . . . photosynthesis (b) nucleus . . . cellular respiration

(c) ribosome . . . manufacture of lipids (d) central vacuole . . . storage

176. The term "nuclear envelope" is more correct than the term "nuclear membrane" because

(a) the enclosure has pores which membranes do not

(b) the enclosure is made up of two membranes

(c) the chemical composition is inconsistent with cellular membranes

(d) None of the above. The two terms are perfect synonyms.

177. A cell has mitochondria, ribosomes, smooth and rough ER, and other parts. Based on this information, it could not be
(a) a cell from a pine tree. (b) a grasshopper cell.
(c) a yeast (fungus) cell. (d) a bacterium.

178. Passage through pores in the nuclear envelope is restricted primarily to
(a) proteins, RNA, and protein-RNA complexes (b) lipids and glycolipids
(c) DNA and RNA (d) RNA and protein-carbohydrate complexes

179. Cell fractionation is the most appropriate procedure for preparing ____ for study.
(a) isolated cells which are normally found tightly attached to neighbouring cells
(b) cells without a functional cytoskeleton
(c) isolated organelles
(d) the basic macromolecules

180. Which of the following clues would tell you whether a cell is prokaryotic or eukaryotic?
(a) the presence or absence of a rigid cell wall
(b) whether or not the cell is partitioned by internal membranes
(c) the presence or absence of ribosomes
(d) whether or not the cell carries out cellular metabolism

181. Choose the correct statement(s) for active transport –
(a) It occurs against the conc. so it needs ATP (b) A few ions transported by it
(c) Na^+ / K^+ pump is the example of active transport (d) All

182. Cell wall is –
(a) Nonliving and impermeable (b) Nonliving, rigid and permeable
(c) Living and semipermeable (d) Living and selective permeable

183. Cell wall forms outer covering for plasmamembrane of –
(a) Only fungi (b) Only fungi and plants
(c) Only fungi, plants and bacteria (d) Fungi, bacteria, plants and animals

184. Which is not the function of cell wall?
I. Provides shape to the cell
II. Protects the cell from mechanical damage and infection
III. Helps in cell to cell interaction
IV. Provides barrier to undesirable macromolecules
V. Imbibes water
(a) Only V (b) Only IV (c) Only II, IV and V (d) None

185. Important site for formation of glycoproteins and glycolipids is
(a) Lysosome (b) Vacuole (c) Golgi apparatus (d) Plastid

186. Peptide synthesis inside a cell takes place in
(a) Ribosomes (b) Chloroplast (c) Mitochondria (d) Chromoplast

187. In eubacteria, a cellular component that resembles eukaryotic cell is
(a) Cell wall (b) Plasma membrane (c) Nucleus (d) Ribosomes

188. Which one of the following organisms is not an example of eukaryotic cells
(a) *Amoeba proteus* (b) *Paramecium caudatum*
(c) *Escherichia coli* (d) Euglena *viridis*

189. Which one of the following is *not* considered as a part of the endomembrane system ?
(a) Golgi complex (b) Peroxisome (c) Vacuole (d) Lysosome

190. Of the following organelles, which group is involved in manufacturing substances needed by the cell?
(a) lysosome, vacuole, ribosome
(b) ribosome, rough ER, smooth ER
(c) vacuole, rough ER, smooth ER
(d) smooth ER, ribosome, vacuole

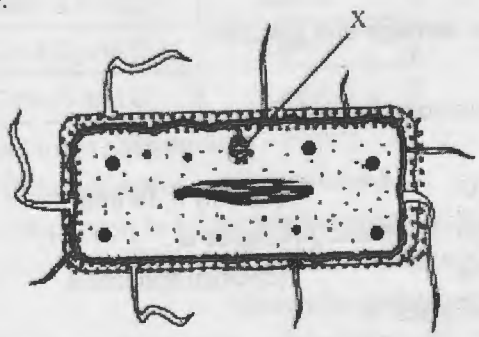
191. A cell has mitochondria, ribosomes, smooth and rough ER, and other parts. Based on this information, it could be
(a) a cell from a pine tree.
(b) a grasshopper cell.
(c) a yeast (fungus) cell.
(d) Actually, it could be any of the above.

192. The electron microscope has been particularly useful in studying bacteria, because
(a) electrons can penetrate tough bacterial cell walls.
(b) bacteria are very much small.
(c) bacteria move so quickly they are hard to photograph.
(d) with few organelles present, bacteria are distinguished by differences in individual macromolecules.

193. Which of the following statements are true about Endoplasmic Reticulum?
I. Smooth Endoplasmic Reticulum makes lipids.
II. It is also called the control center of the cell.
III. It processes carbohydrates.
IV It modifies chemicals that are toxic to the cell.
(a) I, II and III (b) I, III and IV (c) only I and IV (d) all are correct

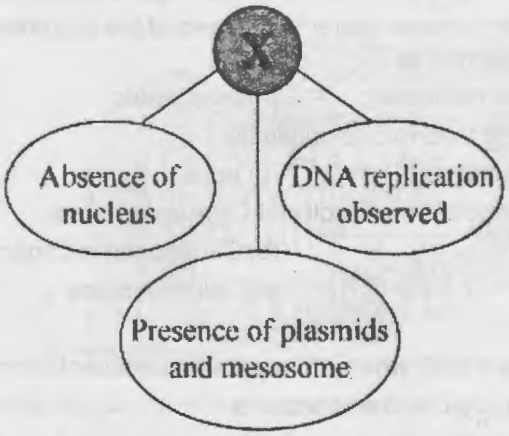
194. Which of the following statements are true about Eukaryotes?
I. They are cells with a nucleus.
II. They are found both in humans and multicellular organisms.
III. Endoplasmic reticulum is present in Eukaryotes.
IV. They have chemically complexed cell wall.
(a) I, II and III (b) I, III and IV (c) I, II and IV (d) all are correct

195. Some bacterial cells were fixed for microscopic observation. A certain labelled structure X was observed on occasions at the cell membrane.



In the given illustration, label X represents
(a) nucleoid
(b) plasmids
(c) ribosomes
(d) mesosome

196. Which organism is most appropriately represented by X?



(a) Bacterium (b) Animal (c) Plant (d) Virus

197. Microorganisms such as bacteria, viruses etc. are used in genetic manipulation. Bacterial plasmid is an important genetic engineering tool.Which of the following statements about bacterial plasmids is correct?

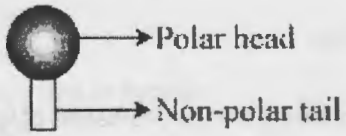
(a) They are double-stranded circular nucleic acids

(b) They are recombinant proteins in the cytoplasm

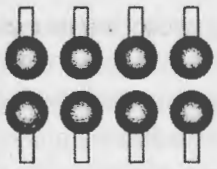
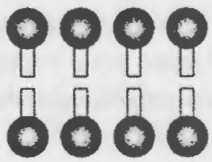
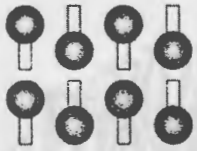
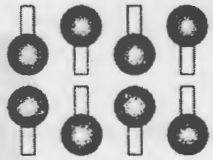
(c) They are cell organelles that contain nucleic acids

(d) They are cell organelles that contain recombinant proteins

198. The lipid molecules present in plasma membrane have polar heads and non-polar tails.



Which figure represents the correct arrangement of lipids in lipid bilayer?

(a)  (b)  (c)  (d) 

199. Which one of the following structures is an organelle within an organelle ?

(a) Ribosome (b) Peroxisome (c) ER (d) Mesosome

200. Which one of the following cellular parts is correctly described ?

(a) Thylakoids - flattened membranous sacs forming the grana of chloroplasts

(b) Centrioles - sites for active RNA synthesis

(c) Ribosomes - those on chloroplasts are larger (80s) while those in the cytoplasm are smaller (70s)

(d) Lysosomes - optimally active at a pH of about 8.5

201. The cell membranes of adjacent cells are fused at

(a) macula adherens (b) zonula adherens (c) zonula occludens (d) nexus

202. Detailed structure of the membrane was studied after the advent of electron microscope during

(a) 1930's (b) 1950's (c) 1970's (d) 1990s.

203. The usual axonemal arrangement of microtubules is

(a) 6 pairs of doublets radially arranged at periphery with a pair of centrally located microtubules

(b) 6 pairs of doublets radially arranged at periphery with a single centrally located microtubule

(c) 9 pairs-of doublets radially arranged at periphery with a pair of centrally located microtubules
(d) 9 pairs of doublets radially arranged at periphery with a single centrally located microtubule

204. When the chromosome has a centromere nearer to one end of the chromosome resulting bo one shorter and one longer arm, the chromosome is termed as
(a) metacentric (b) sub-metacentric (c) acrocentric (d) telocentric

205. Cells require which of the following to form cilia or flagella?
(a) centriole (b) ribosomes (c) actin (d) Both (a) and (b) only

206. Which one of the following does not differ in E.coli and Chlamydomonas
(a) Ribosomes (b) Chromosomal Organization
(c) Cell wall (d) Cell membrane

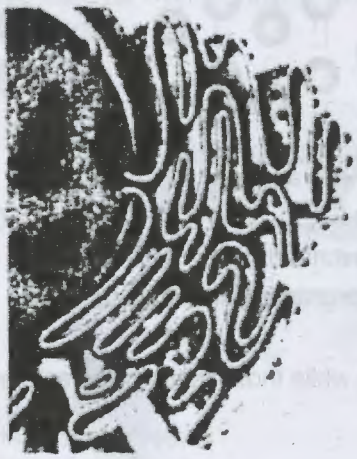
207. What is true about ribosomes
(a) The prodkaryotic ribosomes are 80S, where "S" stands for sedimentation coefficient
(b) These are composed of ribonucleic acid and proteins
(c) These are found only in eukaryotic cells
(d) These are self -splicing introns of some RNAs.

208. Nuclear mebrane is absent in
(a) Penicillium (b) Agaricus (c) Volvox (d) Nostoc

209. Select the correct statement from the following regarding cell membrane.
(a) Na+ and K+ ions move across cell membrane by passive transport
(b) Proteins make up 60 to 70% of the cell membrane.
(c) Lipids are arranged in a bilayer with polar heads towards the inner part.
(d) Fluid mosaic model of cell membrane was proposed by Singer and Nicolson

210. The Golgi complex plays a major role:
(a) in digesting proteins and carbohydrates
(b) as energy transferring organelles
(c) in post translational modification of proteins and glycosidation of lipids
(d) in trapping the light and transforming it into chemical energy

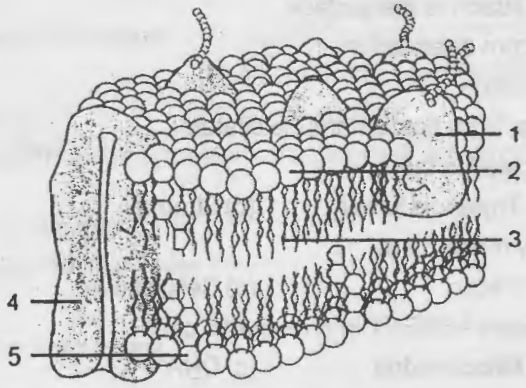
211. Which one of the following organelle in the figure correctly matches with its function?



(a) Golgi apparatus, protein synthesis
(b) Golgi apparatus, formation of glycolipids
(c) Rough endoplasmic reticulum, protein synthesis
(d) Rough endoplasmic reticulum, formation of glycoproteins

212. A major site for synthesis of lipids is :
(a) RER (b) SER (c) Symplast (d) Nucleoplasm

213. The diagram shows part of the cell surface membrane.



Which components help to maintain the fluidity of the membrane?

(a) 1 and 3 (b) 1 and 4 (c) 2 and 4 (d) 3 and 5

214. The most abundant intracellular cation is

(a) Na^+ (b) Ca^{++} (c) H^+ (d) K^+

215. Which structures perform the function of mitochondria in bacteria?

(a) Nucleoid (b) Ribosomes (c) Cell wall (d) Mesosomes

216. The solid linear cytoskeletal elements having a diameter of 6 nm and made up of a single type of monomer are known as

(a) Microtubules (b) Microfilaments (c) Intermediate filaments (d) Lamina

217. Match the following and select the correct answer :

(A) Centriole (i) Infoldings in mitochondria

(B) Chlorophyll (ii) Thylakoids

(C) Cristae (iii) Nucleic acids

(D) Ribozymes (iv) Basal body cilia or flagella

	(A)	(B)	(C)	(D)		(A)	(B)	(C)	(D)
(a)	(iv)	(ii)	(i)	(iii)	(b)	(i)	(ii)	(iv)	(iii)
(c)	(i)	(iii)	(ii)	(iv)	(d)	(iv)	(iii)	(i)	(ii)

218. Which of the following statements is correct?

(a) The core of cilium or flagellum is the basal body

(b) Elaioplasts store starch whereas aleuroplasts store proteins

(c) Membranous extensions into the cytoplasm in cyanobacteria which contain pigments are called chromatophores.

(d) Acrocentric chromosomes have only one arm

219. The term 'glycocalyx' is used for

(a) A layer surrounding the cell wall of bacteria

(b) A layer present between cell wall and membrane of bacteria

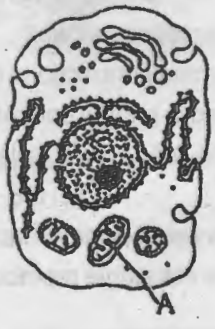
(c) Cell wall of bacteria

(d) Bacterial cell glyco-engineered to possess N-glycosylated proteins

220. Which of the following type of plastids does not contain stored food material?

(a) Amyloplasts (b) Chromoplasts (c) Eleioplasts (d) Aleuroplasts

221. Select the alternative giving correct identification and function of the organelle 'A' in the diagram



(a) Endoplasmic reticulum – synthesis of lipids

(b) Mitochondria – produce cellular energy in the form of ATP

(c) Golgi body – provides packaging material

(d) Lysosomes – secrete hydrolytic enzymes

222. Why is a capsule advantageous to a bacterium?
(a) It allows the bacterium to attach to the surface
(b) It protects the bacterium from desiccation
(c) It provides means of locomotion
(d) It allows bacterium to 'hide' from host's immune system

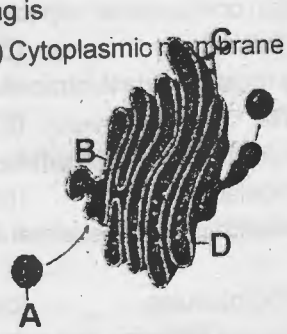
223. Chlorophyll molecules are located in the
(a) Thylakoid membrane (b) Thylakoid lumen (c) Stroma (d) Inner chloroplast membrane

224. The primary cell wall is mainly made up of
(a) Lignin (b) Pectin (c) Cellulose (d) Protein

225. Which of the followings is always ABSENT in prokaryotic cells?
(a) Ribosome (b) Mitochondria (c) DNA (d) Cell wall

226. The component of bacteria that retains the crystal violet stain during Gram-staining is
(a) O-antigen (b) Lipopolysaccharide (c) Peptidoglycan (d) Cytoplasmic membrane

227. Select the option with correct labelling of given structure of Golgi apparatus.



	A	B	C	D
(a)	Vesicle	Cis face	Cisternae	Trans face
(b)	Vesicle	Trans face	Cis face	Cisternae
(c)	Vesicle	Cis face	Trans face	Tubules
(d)	Vesicle	M-face	F-face	Tubules

228. Which of the following statement is wrong?
(a) Cell theory was profounded by both a botanist and a zoologist
(b) Smaller cells have large surface area per volume ratio
(c) Cell arises de novo
(d) Heterochromatin is genetically and metabolically inactive.

229. Kinetochrore is
(a) Granule within centromere
(b) Surface of centromere
(c) Constriction near chromosomal end
(d) Kinetin

230. How many microtubules are present in a cilium / flagellum?
(a) 20 (b) 11 (c) 9 (d) 1

231. Which is a wrong statement?
(a) Ribosome is an organelle present with 2 other organelles.
(b) Shape of chloroplast in higher plant is lens shaped
(c) Plastid is a mitoplast
(d) Largest subunit of ribosome in life kingdom is 60S.

232. All are correct except
(a) Number of membranes separating intrathylakoid space from cytoplasm is 3.
(b) Protoplast includes cell wall
(c) Plasmodesmata connections help in movement of substances between plant cells.
(d) Cells involved in energy consumption have large number of mitochondria.

233. Which one of the following is called "system of membrane"?
(a) ER (b) GB (c) Lysosome (d) Chloroplast

234. (i) Mitochondria are cellular fumaces
(ii) Mitochondria are single membrane bound

(iii) Na+ is present in middle lamella.
(iv) chloroplast is cellular kitchen.
(v) Ribosome is the site of peptide bond formation
(a) All are correct except (v) only (b) All are correct except (ii) only
(c) All are correct except (ii) and (iii) (d) All are correct

235. If you fractionate all the cell organelles from the cytoplasm of a plant cell, which one of the following set of fraction will have nucleic acids.
(a) Nucleus, mitochondria, lysosome, vacuole
(b) Mitochondria, chloroplast, peroxisome, lysosome
(c) Nucleus, chloroplast, GB, ER
(d) Nucleus, mitochrondria, ribosome, chloroplast

236. ER is not related with
(a) Plasmamembrane (b) GB (c) Mitochondria (d) Nucleus

237. The main organelle involved in modification and routing of newly synthesised protein to their destinations is :
(a) ER (b) Lysosome (c) Mitochondria (d) Chloroplast

238. Which cell organelle reduces the number of other organelles?
(a) Oxysome (b) Mesosome (c) Ribosome (d) Lysosome

239. Go through the following statements
(i) Bacteria, chloroplasts and mitochondria have circular DNA.
(ii) Chloroplast reduce air pollution.
(iii) GB is export of cell.
(iv) Nucleus is covered by porous single membrane
(v) Organelle involved in transformation of cell membrane is golgi complex
(vi) Nucleolus is the site of mRNA formation.
(a) Only (iv) and (vi) are incorrect (b) Only (i) and (v) are correct
(c) All are incorrect except (iii) (d) All are false

240. Which is not a true organelle?
(a) Lysosome (b) Mitochondrion (c) Chloroplast (d) Ribosome

241. Which is not constituent of cell membrane?
(a) Glycolipid (b) Phospholipid (c) Cholesterol (d) Proline

242. Choose the correct option.
(a) Respiratory enzymes are in chloroplast (b) Ribosomes can do protein alone
(c) Palade particle is peroxisome (d) Blepharoplast is a type of centriole

243. (i) They help in respiration.
(ii) They help in cell wall formation
(iii) They help in DNA replication
(iv) They increase surface area of plasma membrane.
Which of the following prokaryotic structures has all the above roles?
(a) Chromosome (b) Ribosome (c) Mesosome (d) Lysosome

244. Match the Column I with that of Column II and choose the correct combination from the options given.

Column I Organelle	Column II Site for
A. Rough ER	(i) Synthesis of glycoproteins
B. Smooth ER	(ii) Aerobic respiration
C. Mitochondria	(iii) Synthesis of lipid
D. Golgi apparatus	(iv) Protein synthesis

(a) A - (i), B - (ii), C - (iii), D - (iv) (b) A - (ii), B - (iii), C - (iv), D - (i)
(c) A - (iii), B - (iv), C - (ii), D - (i) (d) A - (iv), B - (iii), C - (ii), D - (i)

245. How many structures are not associated with bacterial cells?
(i) Capsid
(ii) Microtubular flagella
(iii) Polysomes
(iv) Naked genetic material
(v) Fimbriae
(vi) Cellulosic cell wall
(vii) Endomembrane system
(viii) Chromatophores
(ix) Chloroplast
(a) Five (b) Four (c) Six (d) Seven

246. How many statements are correct for sap vacuoles?
A. Double membrane bound space in the cytoplasm.
B. Non-cytoplasmic fluid filled sacs.
C. Bound by monolayer lipid membrane.
D. It maintains transports number of ions and other materials against concentration gradient.
E. Vacuolar sap contains the materials useful for the cell.
(a) Four (b) Three (c) Two (d) One

247. The following is generally used for creating density gradient during centrifugation.
(a) NaCl (b) KCl (c) CsCl (d) $MgCl_2$

248. The filament in flagellum can rotate by
(a) 360^o (b) 60^o (c) 120^o (d) 80^o

249. Which one of the following is correct for the transmembrane proteins in bilayer?
(a) They are absent in animal cells (b) They act as channel proteins
(c) They are absent in plant cells (d) They are only externally located

250. Mitochondria perform all of the following function except
(a) Nucleic acid synthesis (b) Steroid synthesis
(c) ATP synthesis (d) Polysaccharide degradation

251. Protoplast lacks in
(a) Cytoplasm (b) Nucleus (c) Mitochondria (d) Cell wall

252. Mitochondria are though to have evolved from prokaryotic cells that were ingested by an ancestral cell. Which feature have the prokaryotes lost during their evolution into mitochondria?
(a) Cell wall (b) Circular chromosome (c) Endoplasmic reticulum (d) Ribosomes

253. Which one of the following is not an inclusion body found in prokaryotes?
(a) Glycogen granule (b) Polysome (c) Phosphate granule (d) Cyanophycean granule

254. The chromosomes in which centromere is situated close to one end are
(a) Telocentric (b) Sub-metacentric (c) Metacentric (d) Acrocentric

255. Select the correct matching in the following pairs.
(a) Rough ER – Synthesis of glycogen (b) Rough ER – Oxidation of fatty acids
(c) Smooth ER – Oxidation of phospholipids (d) Smooth ER – Synthesis of lipids

256. The structures that are formed by stacking of organised flattened membranous sacs in the chloroplasts are
(a) Stroma lamellae (b) Stroma (c) Cristae (d) Grana

257. Nuclear envelope is a derivative of
(a) Microtubules (b) Rough endoplasmic reticulum
(c) Smooth endoplasmic reticulum (d) Membrane of Golgi complex

258. DNA is not present in
(a) Nucleus (b) Mitochondria (c) Chloroplast (d) Ribosome

259. Match the columns and identify the correct option.

Column I	Column II
A. Thylakoids	(i) Disc-shaped sacs in Golgi apparatus.
B. Cristae	(ii) Condensed structure of DNA
C. Cristernae	(iii) Flat membrane sacs ion stroma
D. Chromatin	(iv) Infolding in mitochondria

(a) A - (iii), B - (i), C - (iv), D - (ii) (b) A - (iii), B - (iv), C - (ii), D - (i)
(c) A - (iv), B - (iii), C - (i), D - (ii) (d) A - (iii), B - (iv), C - (i), D - (ii)

260. Which of the following structures is not found in a prokaryotic cell?
(a) Mesosome (b) Plasma membrane (c) Nuclear envelope (d) Ribosome

261. Cellular organelles with membranes are
(a) endoplasmic reticulum, ribosomes and nuclei (b) Lysosomes, golgi apparatus and mitochondria
(c) Nuclei, ribosomes and mitochondria (d) Chromosomes, ribosomes and endoplasmic reticulum

262. Chromatophores take part in
(a) Movement (b) Respiration (c) Photosynthesis (d) Growth

263. In given table (a), (b), (c) and (d) are matched with respective column I, II and III. Identify the correct matching.

	I	II	III
(a)	Passive transport	No use of ATP	Na+ / K+ pump
(b)	Bacteria	Mesosome	DNA replication
(c)	Cell wall in plant	Cellulose	Selectively permeable
(d)	ER	Convex face	Trans face

264. If living cells similar to those found on earth, were found on another planet where there was no oxygen, which cell organelle would most probably be absent?
(a) Cell membrane (b) Chromosomes (c) Ribosomes (d) Mitochondria

265. Which of the following represent the correct sequence of relative sizes in descending order?
(a) Cell, Nucleus, Chromosome, H_2O, O_2
(b) Cell, Nucleus, H_2O, Oxygen atom, Chromosome
(c) Chromosome, Cell, Nucleus, H_2O molecule, Oxygen atom.
(d) Cell, Nucleus, Water molecule, Chromosome, Oxygen atom

266. All the following statements are true regarding the 'Cell Theory' except –
(a) All living things or organisms are made of cells.
(b) All cells arise spontaneously
(c) Cell is the basic structural and functional unit of life
(d) All cells arise from pre-existing cells

267. Which of the following is not an exception of cell theory?
(a) Bacteria (b) Viruses (c) Prions (d) Viroids

268. Study the names of different cell organelles / structure given below.
Lysosome, Mitochondria, Ribosome, Chromosome, Thylakoid, Flagella, Peroxisomes.
How many of the above are bound by single membrane?
(a) Six (b) Two (c) Four (d) Three

269. Mitochondria and chloroplast are :-
(a) semi-autonomous organelles
(b) formed by division of pre-existing organelles and they contain DNA but lack protein synthesizing machinery
Which one of the following options is correct ?
(a) Both (a) and (b) are correct (b) (b) is true but (a) is false
(c) (a) is true but (b) is false (d) Both (a) and (b) are false

270. In a chloroplast the highest number of protons are found in :-
(a) Stroma (b) Lumen of thylakoids
(c) Inter membrane space (d) Antennae complex

271. Microtubules are the constituents of :-
(a) Cilia, Flagella and Peroxisomes (b) Spindle fibres, Centrioles and Cilia
(c) Centrioles, Spindle fibres and Chromatin (d) Centrosome, Nucleosome and Centrioles

272. A complex of ribosomes attached to a single strand of RNA is known as :-
(a) Polysome (b) Polymer (c) Polypeptide (d) Okazaki fragment

273. Which one of the following cell organelles is enclosed by a single membrane ?
(a) Mitochondria (b) Chloroplasts (c) Lysosomes (d) Nuclei

274. Water soluble pigments found in plant cell vacuoles are :-
(a) Xanthophylls (b) Chlorophylls (c) Carotenoids (d) Anthocyanins

275. Select the mismatch :-
(a) Protists-Eukaryotes (b) Methanogens-Prokaryotes
(c) Gas vacuoles-Green bacteria (d) Large central vacoules - Animal cells

276. Select the wrong statement :-
(a) Cyanobacteria lack flagellated cells.
(b) Mycoplasma is a wall-less microorganism
(c) Bacterial cell wall is made up of peptidoglycan.
(d) Pilli and fimbriae are mainly involved in motility of bacterial cells

277. A cell organelle containing hydrolytic enzymes is :-
(a) Ribosome (b) Mesosome (c) Lysosome (d) Microsome

278. 'Peroxisome' is the microbody of a cell that helps in :
(a) Removal of electron and associated hydrogen (b) Removal of proton
(c) Conversion of carbohydrate into fat (d) Conversion of carbohydrate into protein

279. Bacterial resistance to antibiotics is a genetic trait, it is normally carried by the :
(a) Centromere (b) Plasmid (c) Chromosome (d) Intron

280. Cytoskeletal network of a cell is built by a process called:
(a) Triphasic polymerization (b) Biphasic polymerization
(c) Treadmilling (d) Dynamic instability

281. In which animal cells polytene chromosomes are noticed?
(a) Man (b) Reptiles (c) Bird (d) Drosophila

282. Which cell organelle is present in both prokaryotic and eukaryotic cells?
(a) Endoplasmic reticulum (b) Mitochondria (c) Nucleus (d) Ribosome

283. Which one of the following is stored in lysosome?
(a) Secretory glycoproteins (b) Hydrolytic enzymes (c) RNA and protein (d) Fat, sugar, ATP

284. Which one of the following matching pairs is WRONG ?
I. Bacterial cell wall - cellulose
II. Bacterial ribosome - 16s rRNA
III. Bacterial flagella - protein
IV. Bacterial glycocalyx - cellulose
(a) I and II only (b) I and III only (c) I and IV only (d) II and III only

285. In plants, both cellulose and hemicellulose are major components of which one of the following ?
(a) Plasma membrane (b) Cell wall (c) Nuclear membrane (d) Mitochondrial membrane

286. Match the following items in column-I with those in column-II and choose the correct answer:

Column - I	Column - II
P. Plasma membrane mainly contains	i. Hemicellulose
Q. Middle lamella mainly composed of	ii. Calcium pectate
	iii. Proteinaceous filaments
	iv. Proteins embedded in phospholipid bilayer

(a) P-ii,Q-i (b) P-i, Q-ii (c) P-iv, Q-ii (d) P-iii,Q-iv

287. Which of the following pigments are not stored in a cell-organelle?
(a) Carotenes (b) Anthocyanins (c) Xanthophylls (d) Chlorophylls

288. What is the outer boundary of the cell?
(a) cell wall (b) plasma membrane (c) nuclear membrane (d) endoplasmic reticulum

289. Which of the following statements is NOT correct about the plasma membrane?
(a) Small noncharged molecules easily cross the membrane.
(b) Lipid molecules have little difficulty in crossing the plasma membrane.
(c) Charged molecules and ions readily move from inside the cell to outside the cell.
(d) Carbon dioxide follows its concentration gradient as it exits a cell.

290. Which organelle in a plant cell fills with water as turgor pressure develops?
(a) nucleus (b) endoplasmic reticulum
(c) Golgi apparatus (d) central vacuole

291. Which of the following conditions does NOT apply to active transport?
(a) requires ATP (b) transports molecules from a high to low concentration area
(c) requires a carrier protein (d) carrier proteins bind reversibly to transported substances

292. Why are proteins involved in active transport often called "pumps"?
(a) They use energy to move a substance against its concentration gradient.
(b) They use energy to move a substance with its concentration gradient.
(c) They use energy to bind the substance to the carrier.
(d) They use energy to dislodge the substance from the carrier.

293. What is the name of the structure that detoxifies alcohol in the liver?
(a) smooth endoplasmic reticulum (b) rough endoplasmic reticulum
(c) golgi apparatus (d) nucleus

294. Which of the following cells lacks cytoskeleton?
(a) Eukaryotic plant cell (b) Prokaryotic bacterial cells
(c) Both (a) and (b) (d) Prokaryotic cells and eukaryotic animal cells

295. Cytoskeletons are chemically
(a) nucleoprotein filaments (b) nucleoprotein filaments and lipids
(c) ribonucleoproteins filaments (d) protein filaments

296. Microfilaments are involved in
(a) Cyclosis (b) Amoeboid movement
(c) Furrow formation during cell division (d) All of these

297. Chromosome movement during cell division is regulated by
(a) Microtubules (b) Microfilaments
(c) Intermediate filaments (d) All of these

298. What do both mitochondria and chloroplasts have in common?
(a) They are structures where ATP is produced (b) Both are found in all eukaryotic cells.
(c) Both may be found in some prokaryotic cells (d) Only b and c are correct

299. To a cytogeneticist, a chromosome is an entity containing chromatin that
(a) Has a sister chromatid (b) Contains two sister chromatids
(c) Only has a single chromatid (d) Has a centromere

300. According to the fluid-mosaic model of cell membranes, which of the following is a true statement about membrane phospholipids?
(a) They frequently flip-flop from one side of the membrane to the other.
(b) They move laterally along the plane of the membrane
(c) They are free to depart from the membrane and dissolve in the surrounding solution.
(d) They have hydrophilic tails in the interior of the membrane

301. During which phase of mitosis are two-chromatid chromosomes visible?
(a) from metaphase through telophase (b) From G_2 of interphase through metaphase
(c) from the end of interphase until anaphase (d) from G_1 of interphase through metaphase

302. What is a human cell that contains 22 pairs of autosomes and two X chromosomes?
(a) an unfertilized egg cell (b) a sperm cell
(c) a male somatic cell (d) a female somatic cell

303. Which of the following components provides sticky character to the bacterial cell ?
(a) Nuclear membrane (b) Plasma membrane (c) Glycocalyx (d) Cell wall

304. Which among the following are the smallest living cells, known without a definite cell wall, pathogenic to plants as well as animals and can survive without oxygen?
(a) Pseudomonas (b) Mycoplasma (c) Nostoc (d) Bacillus

305. Which of the following cell organelles is responsible for extracting energy from carbohydrates to form ATP ?
(a) Ribosome (b) Chloroplast (c) Mitochondrion (d) Lysosome

306. Which of the following will not be affected by RNAse?
(a) Smaller subunit of ribosome. (b) Larger subunit of ribosome.
(c) Amino acyl tRNA transferase. (d) Nucleolus in interphase.

307. To study the ability to secrete a specific protein, cells were homogenized mechanically and organelles were separated by centrifugation. Which organelle should be used for further investigation?
(a) Microsome (b) Peroxisome (c) Lysosome (d) Ribosome

308. A few major discoveries in cell biology are listed
I. Schleiden and Schwann proposed the cell theory.
II. Leewenhoeck discovered bacteria.
III. Golgi stained cells with silver nitrate, discovered golgi apparatus.
IV. First transmission electron microscope was developed.
The correct chronological order of these events starting with the earliest event is
(a) I, II, III, IV (b) II, III, I, IV (c) II, I, III, IV (d) II, I, IV, III.

309. A few statements are made about the characteristics of various life forms. Mark the correct statement.
(a) All chordates are vertebrates but not all vertebrates are chordates.
(b) All prokaryotes lack nuclear envelope but nuclear envelope is present in mitochondria of eukaryotes.
(c) All eukaryotic chromosomes are associated with histone proteins but the genome of chloroplast lacks histones
(d) All bryophytes show predominant sporophytic generation but all pteridophytes show predominant gametophytic generation.

310. Which of the cellular organelles mentioned below have to import all the proteins they contains?
(a) Nucleus (b) Lysosomes (c) Chloroplast (d) Mitochondria

311. A Few cells and associated entities are listed. Which of them represents the correct ascending order of the size relative to each other
(a) Mitochondrion < Paramecium < Human < erythrocyte < *E. coli*
(b) Protein < Virus < Mitochondrion < Paramecium
(c) Chloroplast < Protein < Human sperm < Frog egg
(d) Nueleus < protein < Paramecium < Chloroplast

312. In a resting nucleus, centromeres appear as -
(a) euchromatin (b) constitutive heterochromatin
(c) facultative heterochromatin (d) nucleolus

313. Biochemical analysis of a cell fraction revealed no carbohydrates, 1% RNA, 0.2% DNA, 40% lipids and 60% proteins. It may possibly be a pure -
(a) Plasma membrane fraction (b) nuclear fraction
(c) microsomal fraction (d) mitochondrial fraction

314. Cell organelles that perform the function of food storage as well as energy harvesting are -
(a) Mitochondria (b) Plastids (c) Vacuoles (d) Nucleus

315. One of the major differences separating prokaryotes and eukaryotes is the presence in eukaryotes of membrane-bound structures known as :
(a) organelles (b) tissues (c) cytotoxins (d) nucleoids

316. Which of the following structures could play an important role in the phenomenon known as "drug tolerance" in liver cells?
(a) Ribosomes (b) Golgi apparatus (c) Chromosomes (d) Endosplasmic reticulum

317. Read the following four statements (I - IV) :–
I. Meiosis occurs in the diploid cells, which are destined to form gametes, it is called the reduction division since it reduces the chromosome number by half while making the gametes.
II. Based on the presence or absence of a membrane bound nucleus and other organelles, cells and hence organisms can be named as eukaryotic or prokaryotic.
III. Many membrane bound minute vesicles called microsomes that contains various enzymes are present in both plant and animals cells.
IV. Both the centrioles in a centrosome lie perpendicular to each other in which each has an organisation like the cart wheel.
Which of the above statements are correct?
(a) I, II (b) III, IV (c) II, III (d) I, II, III, IV

318. How many organelles in the list given below are not included in endomembrane system?
Golgi apparatus, Endoplasmic reticulum, Mitochondria, Lysosomes, Vacuoles, Cilia, Chloroplasts, Centrosome, Nucleus.
(a) Four (b) Three (c) Five (d) Six

319. The fluidity of membranes in a plant in cold weather may be maintained by :–
(a) Increasing the number of phospholipids with unsaturated hydrocarbon tails.
(b) Increasing the proportion of integral proteins.
(c) Decreasing concentration of cholesterol in membrane
(d) Increasing the number of phospholipids with saturated hydrocarbon tails.

320. Choose the correct pair.

	Organelle	Feature
(a)	Lysosome	Endomembrane system
(b)	Mitochondria	Matrix has all enzymes of Krebs cycle
(c)	Ribosome	First observed under light microscope
(d)	Centrosome	Two spherical structures surrounded by crystalline material

321. Choose incorrect statement for nucleolus.
(a) Polygonal structure present in nucleoplasm
(b) Continuous with rest of the nucleoplasm
(c) Site for active ribosomal RNA synthesis
(d) Large sized and more in number in cells actively carrying our protein synthesis

322. Cell organelle that divides intracellular space of a cell into two compartments luminal space and extra luminal space
(a) May have ribosomes attached by its smaller subunit
(b) Performs the function of packaging materials
(c) Shows a distinct polarity and is situated near the nucleus
(d) Is composed of tiny tubular structures scattered in the cytoplasm

323. What are the infolding of plasma membrane in prokaryotes called :
(a) Envelope of Nuclear membrane (b) Mesosome
(c) Mitochondria (d) Lysosome

324. Find the incorrect statements about bacterial characters :–
I. F-pili are longer and they occur only in donot bacteria.
II. Capsulated bacteria are mostly pathogenic and more resistant
III. Cell wall of gram negative bacteria is made up of only one layer of lipopolysaccharides.
(a) I and II (b) II and III (c) Only III (d) Only II

325. The genome of onion has 8 chromosomes (n = 8). In a root tip cell undergoing anaphase the number of chromosomes will be -
(a) 8 (b) 16 (c) 32 (d) Indeterminate

326. What is nucleoid?
(a) An organelle that makes protein
(b) A region that contain loosely organized
(c) An organelle that contains DNA surrounded by a nuclear
(d) An organelle that produces energy

327. What is characteristic of prokaryotic cells?
(a) Small, between 0.1 - 5 μm in length (b) High surface area to volume ratio
(c) Lack of nucleus (d) All of the above

328. Cluster of rRNA where ribosomes are assembled are called
(a) Nuclei (b) Nucleoli (c) GB (d) Polyribosomes

329. Lysosome is called
(a) Acid vacuole (b) Basic vacuole (c) Neutral vacuole (d) Pseudo vacuole

330. The largest plastid is
(a) Chloroplast (b) Chromoplast (c) Aleuroplast (d) Amyloplast

331. What is the main function of the chloroplast?
(a) Meiosis (b) Translation (c) Cellular Respiration (d) Photosynthesis

332. Which of the following controls which molecules can enter or leave the chloroplast?
(a) Outer Membrane (b) Inner Membrane (c) Stroma (d) Thylakoids

333. Which of the following is the collection of sacks containing chlorophyll?
(a) Outer Membrane (b) Inner Membrane (c) Stroma (d) Thylakoids

334. Pigments define the plant's:
(a) Smell (b) Taste (c) Shape (d) Color

335. Which of the following is the liquid inside the chloroplast?
(a) Outer Membrane (b) Inner Membrane (c) Stroma (d) Thylakoids

336. Photosynthesis is the process of turning:
(a) Oxygen into Carbon Dioxide (b) Food into Energy
(c) DNA into RNA (d) Sunlight into Energy

337. Other Functions of the chloroplast include:
(a) Making proteins (b) Fighting off diseases (c) Making amino acids (d) All of the Above

338. The mitochondria are to animal cells as the chloroplast are to_____.
(a) Plant Cells (b) Animal Cells (c) Bacteria (d) Prokaryotic Cells

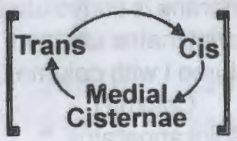
339. The Golgi complex participates in
(a) Respiration in bacteria (b) Formation of secretory vesicles
(c) Fatty acid breakdown (d) Activation of amino acid

340. Which of the following is true for nucleolus?
(a) It takes part in spindle formation (b) It is a membrane-bound structure
(c) Larger nucleoli are present in dividing cells (d) It is a site for active ribosomal RNA synthesis

341. Select the incorrect match :
(a) Submetacentric – L-shaped chromosomes
(b) Allosomes – Sex chromosomes
(c) Lampbrush – Diplotene bivalents chromosomes
(d) Polytene – Oocytes of chromosomes amphibians

342. Which of the following events does not occur in rough endoplasmic reticulum?
(a) Cleavage of signal peptide (b) Protein glycosylation
(c) Protein folding (d) Phospholipid synthesis

343. Many ribosomes may associate with a single mRNA to form multiple copies of a polypeptide simultaneously. Such strings of ribosomes are termed as
(a) Plastidome (b) Polyhedral bodies (c) Polysome (d) Nucleosome

344. Flow of materials through golgi body occurs in
(a) A one-way route [Cis → Trans] (b) A one-way route [Trans → Cis]
(c) Both way route [Trans ⇄ Cis] (d) Circular way route 

345. Site of actin and tubulin synthesis is
(a) SER (b) RER (c) 70S (d) Polysomes in cytoplasm.

346. Where does glycosylation of protein occur?
(a) Endoplasmic reticulum (b) Lysosomes
(c) Mitochondria (d) Chloroplast

347. Which of the following statment is incorrect regarding ribosome?
(a) Can be observed through high magnification light microscope
(b) Appear as granular structure under the electron microscope
(c) Eukaryotic ribosome and prokaryotic ribosome consist only one type of common ribosomal RNA
(d) The three domains of progenote is based on 16S ribosomal RNA genes

348. One of the following is not the feature of centriole
(a) It has an organisation like the cartwheel (b) It consists of hub and spokes made of protein
(c) It is a site for rRNA systhesis (d) Form the basal body of cilia and flagella

349. Proteins destined to be secreted move through the secretory pathway in which of the following orders?
(a) Rough ER → smooth ER → Golgi transport vesicle → Golgi cisternae → secretory vesicle → cell surface
(b) Rough ER → Golgi transport vesicle → Golgi cisternae → secretory vesicle → cell surface
(c) Golgi cisternae → ER transport vesicle → smoothER → secretory vesicle → cell surface
(d) Golgi cisternae → ER transport vesicle → rough ER → secretory vesicle → cell surface

350. Which of the following statements regarding cilia is not correct ?
(a) Cilia contain an outer ring of nine doublet microtubules surrounding two singlet microtubules.
(b) ATP is not required for ciliary movements
(c) Cilia are hair - like cellular appendages
(d) Microtubules of cilia are composed of tubulin

351. Homologous chromosomes can be defined as:
(a) Chromatids of same chromosome
(b) Same chromosome, same gene, different allele in different order
(c) Same chromosome, different gene, same allele
(d) Same chromosome, same gene, different allele in same order

352. If mitochondria is absent in mature RBC what will be the source of energy:
(a) TCA (b) ETS (c) link reaction (d) Glycolysis

353. The shorter and longer arms of a submetacentric chromosome are referred to as
(a) s-arm and l-arm respectively (b) p-arm and q-arm respectively
(c) q-arm and p-arm respectively (d) m-arm and n-arm respectively

354. Which of the following statements is not correct?
(a) Lysosomes have numerous hydrolytic enzymes
(b) The hydrolytic enzymes of lysosomes are active under acidic pH
(c) Lysosomes are membrane bound structures
(d) Lysosomes are formed by the process of packaging in the endoplasmic reticulum

355. Which of the following pair of organelles does not contain DNA?
(a) Mitochondria and Lysosomes (b) Chloroplast and Vacuoles
(c) Lysosomes and Vacuoles (d) Nuclear envelope and Mitochondria

356. Which of the following statements regarding mitochondria is incorrect?
(a) Outer membrane is permeable to monomers of carbohydrates, fats and proteins.
(b) Enzymes of electron transport are embedded in outer membrane.
(c) Inner membrane is convoluted with infoldings.
(d) Mitochondrial matrix contains single circular DNA molecule and ribosomes.

357. Match the column I with column II.

Column I	Column II
(A) Golgi apparatus	(i) Synthesis of protein
(B) Lysosomes	(ii) Trap waste and excretory products
(C) Vacuoles	(iii)Formation of glycoproteins and glycolipids
(D) Ribosomes	(iv) Digesting biomolecules

Choose the right match from options given below :
(a) (A)-(i), (B)-(ii), (C)-(iv), (D)-(iii) (b) (A)-(iii), (B)-(iv), (C)-(ii), (D)-(i)
(c) (A)-(iv), (B)-(iii), (C)-(i), (D)-(ii) (d) (A)-(iii), (B)-(ii), (C)-(iv), (D)-(i)

358. Which of the following cell organelles is present in the highest number in secretory cells?
(a) Lysosome (b) Mitochondria (c) Golgi complex (d) Endoplasmic reticulum

359. Non-membranous nucleoplasmic structures in nucleus are the site for active synthesis of
(a) tRNA (b) protein synthesis (c) mRNA (d) rRNA

360. Where is the respiratory electron transport system (ETS) located in plants ?
(a) Intermembrane space (b) Mitochondrial matrix
(c) Outer mitochondrial membrane (d) Inner mitochondrial membrane

361. The concept of "Omnis cellula-e cellula" regarding cell division was first proposed by
(1) Rudolf Virchow (2) Theodor Schwann (3) Schleiden (4) Aristotle

8 CELL : THE UNIT OF LIFE

1. c	2. c	3. a	4. a	5. c	6. d	7. a	8. a	9. c	10. b
11. d	12. b	13. a	14. d	15. d	16. d	17. d	18. c	19. b	20. c
21. c	22. b	23. c	24. d	25. c	26. d	27. b	28. d	29. b	30. b
31. d	32. b	33. a	34. a	35. d	36. c	37. a	38. c	39. a	40. d
41. c	42. c	43. c	44. b	45. b	46. a	47. d	48. c	49. b	50. c
51. d	52. d	53. d	54. c	55. c	56. d	57. c	58. d	59. c	60. d
61. d	62. b	63. c	64. d	65. a	66. c	67. c	68. d	69. c	70. d
71. d	72. b	73. b	74. d	75. c	76. a	77. c	78. c	79. a	80. b
81. c	82. b	83. a	84. a	85. a	86. d	87. a	88. c	89. d	90. d
91. a	92. a	93. b	94. c	95. a	96. b	97. c	98. d	99. c	100. b
101. b	102. c	103. d	104. d	105. b	106. a	107. c	108. d	109. a	110. a
111. c	112. d	113. a	114. c	115. a	116. d	117. b	118. b	119. c	120. c
121. d	122. a	123. a	124. a	125. b	126. c	127. c	128. d	129. b	130. c
131. d	132. a	133. b	134. b	135. c	136. d	137. a	138. a	139. b	140. d
141. d	142. c	143. d	144. c	145. d	146. d	147. c	148. b	149. b	150. a
151. c	152. d	153. a	154. c	155. c	156. c	157. d	158. c	159. a	160. a
161. b	162. b	163. a	164. b	165. b	166. a	167. a	168. a	169. a	170. c
171. c	172. a	173. d	174. a	175. d	176. b	177. d	178. a	179. c	180. b
181. d	182. b	183. c	184. d	185. c	186. a	187. b	188. c	189. b	190. b
191. d	192. b	193. b	194. a	195. d	196. a	197. a	198. b	199. a	200. a
201. c	202. b	203. c	204. c	205. d	206. d	207. b	208. d	209. d	210. c
211. c	212. b	213. d	214. d	215. d	216. b	217. a	218. c	219. a	220. b
221. b	222. d	223. a	224. c	225. b	226. c	227. a	228. c	229. b	230. a
231. c	232. b	233. a	234. c	235. d	236. c	237. a	238. d	239. a	240. d
241. d	242. d	243. c	244. d	245. a	246. c	247. c	248. a	249. b	250. d
251. d	252. a	253 b	254. d	255. d	256. d	257. b	258. d	259. d	260. c
261. b	262. c	263. b	264. d	265. a	266. b	267. a	268. d	269. c	270. b
271. b	272. a	273. c	274. d	275. d	276. d	277. c	278. a	279. b	280. d
281. d	282. d	283. b	284. c	285. b	286. c	287. b	288. b	289. c	290. d
291. b	292. a	293. a	294. b	295. d	296. d	297. a	298. a	299. d	300. b
301. c	302. d	303. c	304. b	305. c	306. c	307. a	308. c	309. c	310. b
311. b	312. b	313. d	314. b	315. a	316. d	317. d	318. c	319. a	320. a
321. a	322. d	323. b	324. c	325. c	326. b	327. d	328. b	329. a	330. d
331. d	332. b	333. d	334. d	335. c	336. d	337. d	338. a	339. b	340. d
341. d	342. d	343. c	344. a	345. d	346. a	347. a	348. c	349. b	350. b
351. d	352. d	353. b	354. d	355. c	356. b	357. b	358. c	359. d	360. d
361. a									

9 BIOMOLECULES

1. Which of the following statements is incorrect?
   (a) All the elements present in a sample of earth's crust are also present in a sample of living tissue
   (b) Relative abundance of carbon and hydrogen with respect to other elements is higher in any living organisms than in earth's crust
   (c) Living organisms have more nitrogen and oxygen per unit mass than in animate object (e.g. earth crust)
   (d) Living organisms have more Ca, Mg, Na in them than in animate object

2. One of the following is almost not found in living organism –
   (a) Si (b) Mg (c) Ca (d) S

3. **Living Tissue**
   ↓ Grinding in Cl_3CCOOH
   Thick slurry
   ↓
   Stained through cheese cloth
   ↓
   2 fractions are obtained

   A. Filtrate / Acid soluble pool B. Retentate / acid insoluble fraction or pellet

   I. Molecular weight ranging from 18 to 800 daltons (Da) approximately
   II. Has four types of organic compounds - protein nucleic acid, polysaccharide and lipid
   III. Contain chemicals that have molecular weight more than 800 Da.
   IV. Has monomers
   V. Has generally polymers
   VI. Represent chemical rough composition of cytosol
   VII. Represent the framework of cytoplasm and cell organelles

   Which of the following is the correct statements (I to VII) for A and B

	A	B
(a)	I, II, III	IV, V, VI, VII
(b)	II, IV, VI	I, III, V, VII
(c)	I, IV, VI	II, III, V, VII
(d)	I, III, V	II, IV, VI, VII

4. Lipid come under acid insoluble fraction during analysis of chemical composition of tissues. Why?
   (a) It has low molecular weight
   (b) It has high molecular weight
   (c) It is polymer
   (d) On grinding, the biomembranes are broken into pieces and form insoluble vesicles

5. The inorganic compounds like sulphate, phosphate, etc., are found in –
   (a) Acid soluble pool (b) Acid insoluble fraction
   (c) Both acid soluble pool and acid insoluble fraction (d) Not found in cellular pool

6. All of the following statements are correct except –
   (a) Elemental analysis gives elemental composition of living tissues

(b) Analysis for compound gives an idea of the kind of organic and inorganic constituents present in living tissues

(c) In plant ash contains carbon in maximum amount

(d) Both a and b

The four elements called " Big-four" which make up 95% of all elements found in a living system are –

(a) C, H, O, N (b) C, H, O, P (c) C, H, O, S (d) C, N, O, P

The correct order of chemical composition of living tissues / cells in term of % of the total cellular mass is –

(a) Nucleic acid > Proteins > H_2O > Carbohydrate > Ions > Lipid

(b) H_2O > Proteins > Nucleic acid > Carbohydrate > Lipid > Ions

(c) H_2O > Proteins > Carbohydrate > Nucleic acid > Lipid > Ions

(d) Lipid > Ions > Carbohydrate > H_2O > Proteins > Nucleic acid

Which one is the correct average composition of cells in respect of % of total cellular mass?

	H_2O	Proteins	Carbohydrate	Lipid	Nucleic acid	Ions
(a)	70 - 90	10 - 15	3	2	5 - 7	1
(b)	70 - 90	3	10 - 15	2	5 - 7	1
(c)	70 - 90	10 - 15	2	3	1	5 - 7
(d)	70 - 90	3	10 - 15	2	5 - 7	1

The sum total composition of acid soluble and acid insoluble fraction represent the entire emphenical composition of

(a) Dead cells (b) Gene pool (c) Cellular pool (d) Gene library

Biomolecules are

(a) Inorganic materials

(b) Organic materials

(c) All the carbon compounds obtained from living tissues

(d) Only DNA, RNA

An amino acid is a/an

(a) Substituted methane (b) Substituted ethane

(c) Any acid having amino group (d) Derivative of indoleacetic acid

In order to produce amino acids from methane how many substituents should occupy the valency positions of the carbon

(a) 1 (b) 3 (c) 2 (d) 4

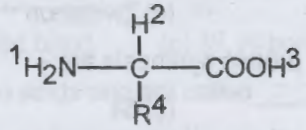
Protein amino acids are called –

(a) α-amino acids (b) β-amino acids (c) γ-amino acids (d) σ-amino acids

The number of amino and carboxyl groups in an amino acid is never –

(a) 1 and 1 (b) 2 and 1 (c) 3 and 1 (d) 1 and 2

Which of the two groups of following formula involved in peptide bond between different amino acids?

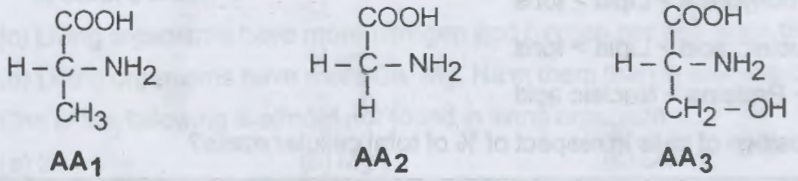


(a) 2 and 3 (b) 1 and 3 (c) 1 and 4 (d) 2 and 4

17. The physical and the chemical properties of amino acids are essentially of the –
(a) Only amino group (b) Only the carboxyl group
(c) Only the R functional group (d) Amino, carboxyl and R groups

18. Which of the group in amino acids makes them unique –
(a) R group (b) NH_2 group (c) COOH group (d) None

19. There are many types of amino acids on the basis of –
(a) NH_2 group (b) COOH group (c) R group (d) None

20. 

AA_1 **AA_2** **AA_3**

The correct names of above amino acids are –

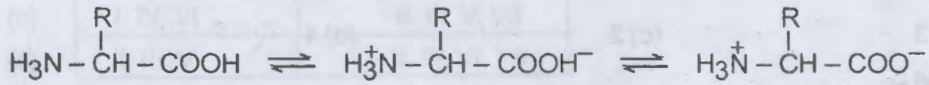
	AA_1	AA_2	AA_3
(a)	Glycine	Serine	Alanine
(b)	Alanine	Glycine	Serine
(c)	Serine	Glycine	Alanine
(d)	Serine	Alanine	Glycine

21. Based upon the number of NH_2 and COOH amino acids are –
(a) 3 types (b) 2 types (c) 4 types (d) 20 types

22. Which one is correct?

	Acidic Amino Acids	Basic Amino Acids	Neutral Amino Acid
(a)	Glutamic acid	Lysine	Valine
(b)	Lysine	Valine	Glutamic acid
(c)	Glutamic acid	Valine	Lysine
(d)	Lysine	Glutamic acid	Valine

23. The aromatic amino acid(s) is (are) –
(a) Typrosine (b) Phenylalanine (c) tryptophan (d) All

24. 

(A) **(B)** **(C)**

Which of the above is Zwitterionic form?
(a) A (b) C (c) B (d) All

25. The charged molecule which is electrically neutral is known as –
(a) Amide (b) Amino acid (c) Zwitterion (d) Polar amino acid

26. Types of amino acids universally used in protein synthesis are –
(a) 20 (b) 80 (c) 64 (d) 61

27. Which of the following statements is false?

(a) In solutions of different pH, the structure of amino acid changes

(b) Protein is a homopolymer

(c) Non-essential amino acids are synthesised by animals

(d) Dietary proteins are source of essential amino acids

28. Which one is the most abundant organic biomolecule in a cell?

(a) Water (b) Protein (c) DNA (d) mRNA

29. Which of the following are physically and chemically the most diverse in cells?

(a) Proteins (b) DNA (c) RNA (d) Nucleotide

30. All are proteins except –

(a) Receptors + Insulin (b) Antibody + Trypsin (c) GLUT - 4 + Collagen (d) CoQ

31. Match correctly between Column I and Column II –

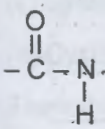
Column I	Column II
A. Collagen	I. Glucose transport
B. Trypsin	II. Binding with some chemical like for small taste and hormones
C. Insulin	III. Hormones
D. Antibody	IV. Enzyme
E. Receptor	V. Intercellular ground substance
F. GLUT - 4	VI. Fight infectious agents

(a) A - V, B - IV, C - III, D - VI, E - II, F - I (b) A - II, B - III, C - IV, D - V, E - VI, F - I

(c) A - VI, B - II, C - I, D - V, E - IV, F - III (d) A - I, B - IV, C - III, D - VI, E - II, F - V

32. In animal world the most abundant protein is _____ while in the whole biosphere the most abundant protein is _____.

(a) Antibody, Collagen (b) Collagen, RuBisCo (c) RuBisCo, Collagen (d) Collagen, Oxidase

33.  is found in all except.

(a) Polypeptides (b) Enzymes (c) Amino acid (d) Protein

34. Primary structure of protein is due to –

(a) Peptide bonds (b) Hydrogen bonds (c) –S–S bride (d) Ionic bonds

35. Formation of protein / formation peptide bonds is a type of –

(a) Hydration analysis (b) Dehydration analysis (c) Hydration synthesis (d) Dehydration synthesis

36. Which one of the following biomolecules will be different in different animals?

(a) Lipids (b) Vitamins (c) Carbohydrates (d) Proteins

37. In some places a protein molecule may be folded back on itself. This is called _____ structure and folds or coils are held together in place by _____.

(a) 2^{o}, H-bonds (b) 2^{o}, Peptide bond (c) 3^{o}, H-bonds (d) 1^{o}, Peptide bond

38. A protein has how many terminal amino acids and are called _____?

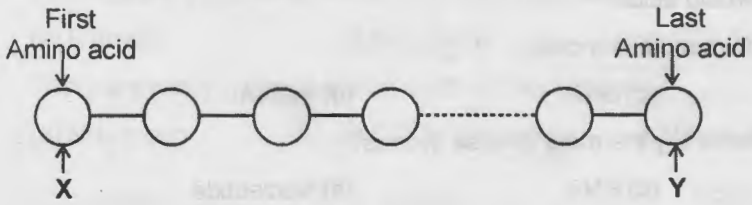
(a) 2; N-terminal amino acid and C-terminal amino acid

(b) 3; N-terminal amino acid, C-terminal amino acid, R-terminal amino acid

(c) 1; C-terminal amino acid

(d) 4; N-terminal amino acids

39.



(a) X is C-terminal amino acid and Y is N-terminal acid

(b) Both X and Y are C-terminal amino acids

(c) X is N-terminal amino acid and Y is C-terminal amino acid

(d) Both X and Y are N-terminal amino acid

40. All proteins –

(a) Are enzymes (b) Are homopolymer

(c) Consists of one or more polypeptide chains (d) Have a linear or flat shape

41. The primary structure of a protein is determined by its –

(a) Disulfide brides (b) α-helix structure (c) Order of amino acids (d) 3D-structure

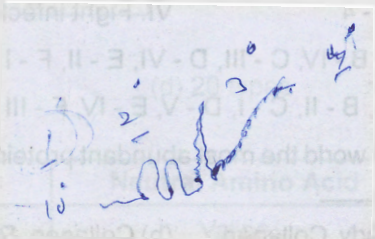
42. The quaternary structure of a protein –

(a) Consists of 4 subunits – hence the name quaternary

(b) Is unrelated to the function of the protein

(c) Both a and b

(d) Depends on the 1^{o} structure of subunits



43. Major classes of biologically significant large molecules include which of the following?

(a) Proteins (b) Nucleic acids

(c) Carbohydrates and Lipid (d) All

44. Amino acids can be classified by the –

(a) number of peptide bonds (b) Number of disulfide bridges they can form

(c) Number of carbon-carbon double (d) Characteristics of their side chains

45. The shape of folded protein is often determined by –

(a) Its tertiary structure (b) The sequence of its amino acids

(c) The number of peptide bonds (d) The Chargaff's rule

46. The 20 different common amino acids have different –

(a) R-groups (b) Acid groups (c) Peptide bonds (d) 1^{o} structure

47. A β-pleated sheet organization in a polypeptide chain is an example of –

(a) 1^{o} structure (b) 2^{o} structure (c) 3^{o} structure (d) 4^{o} structure

48. Polysaccharides, polypeptides, and polynucleotides have in common that they all –

(a) contain amino acids (b) Are formed in condensation reactions

(c) Contain nitrogen (d) Come out in acid soluble pool

49. The _____ structure of a protein relates to how separate polypeptides assemble together –

(a) 1^o (b) 2^o (c) 3^o (d) 4^o

50. Which of the following statements concerning polymers is not true?

(a) Polymers are synthesised from monomers during condensation

(b) Polymers are synthesised from monomers by addition of water

(c) Polymers consist of atleast two types of monomers

(d) b and c

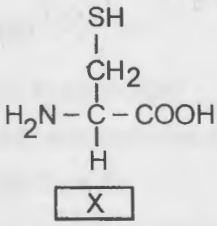
51. An α helix is the example of which level of protein structure?

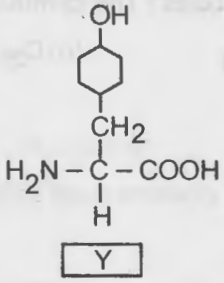
(a) 1^o (b) 2^o (c) 3^o (d) 4^o

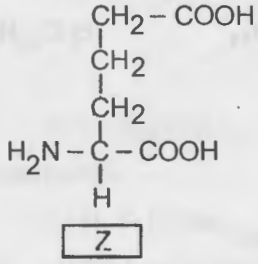
52. Adult human haemoglobin consists of –

(a) 2 subunits (α, α) (b) 2 subunits (β, β) (c) 4 subunits (2α, 2β) (d) 3 subunits (2α, 1β)

53.







The correct name of X, Y and Z amino acids are –

(a) Glutamic acid, tyrosine and cysteine respectively

(b) Tyrosine, cysteine and glutamic acid respectively

(c) Cysteine, tyrosine and glutamic acid respectively

(d) Cysteine, glutamic acid and tyrosine respectively

54. The overall three dimensional shape of polypeptide is called the –

(a) 1^o structure (b) 2^o structure (c) 3^o structure (d) 4^o structure

55. Which of the following is incorrect?

(a) Quaternary structure refers to the spatial relations between individual polypeptide chains in a multichained protein

(b) The tertiary structure is absolutely necessary for many biological activities of protein

(c) Biologists describe the protein structures at 3 levels only

(d) Protein structure is correlated with protein function

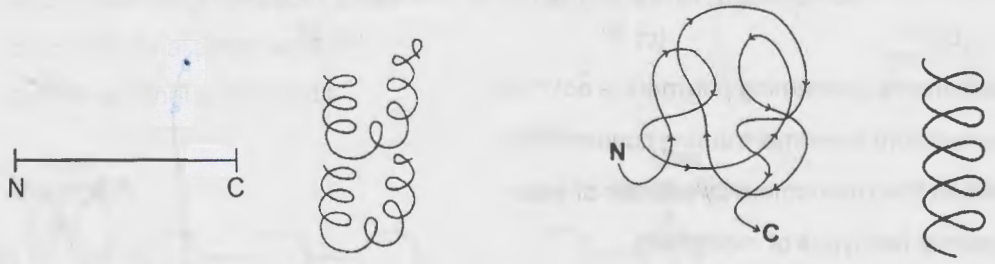
56. Primary protein structure determines which of the following additional levels of protein organization?

(a) 2^o (b) 3^o (c) 2^o, 3^o, 4^o (d) 4^o

57. Which is the highest structural organization found in all enzymes?

(a) 2^o (b) 3^o (c) 1^o (d) 4^o

58.



(A) (B) (C) (D)

What kinds of the structures of proteins are shown in the above figure?

(a) A = 1° structure, B = 2° structure, C = 3° structure, D = 4° structure

(b) A = 4° structure, B = 2° structure, C = 3° structure, D = 1° structure

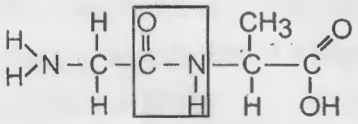
(c) A = 1° structure, B = 4° structure, C = 3° structure, D = 2° structure

(d) A = 4° structure, B = 3° structure, C = 2° structure, D = 1° structure

59. What is the formula of a polypeptide consisting of 10 glycine molecules? The formula of glycines $C_2H_5O_2$ –

(a) $C_6H_{12}O_0$ (b) $C_{20}H_{32}O_{11}$ (c) $C_{30}H_{16}O_6$ (d) $C_{25}H_{16}O_6$

60.



What is the structure enclosed by a box?

(a) An amino acid (b) Peptide bond (c) Glycosidic bond (d) Zwitterion

61. Lipids are –

(a) Insoluble in water (b) Readily soluble in organic solvent

(c) Important constituent of biological membrane (d) All

62. You have isolated an unidentified liquid from a sample of beans. You add the liquid to a beaker of water and shake vigorously. After a few minutes, the water and the other liquid separate into two layers. To which class of biological molecules does the unknown liquid most likely belong?

(a) Carbohydrates (b) Lipid (c) Proteins (d) Enzymes

63. In a saturated fat, you would expect to find all of the following except –

(a) Single-bonded carbon atoms (b) CH_3 at one end

(c) Fatty acid(s) attached with glycerol (d) Double bonded carbon atoms fatty acids

64. Arachnidonic acid and palmitic acids have how many carbons in each of them –

(a) 16, 16 (b) 16, 20 (c) 20, 16 (d) 18, 18

65. Glycerol is –

(a) Tetrahydroxy propane (b) Trihydroxy propane (c) Trihydroxy butane (d) Tetrahydroxy butane

66. A fat has –

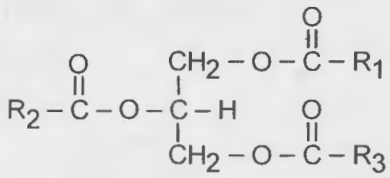
(a) 3 glycerol and one fatty acid molecule (b) One glycerol and 3 fatty acid molecules

(c) 3 glycerol and 3 fatty acid molecules (d) One glycerol and one fatty acid molecule

67. $CH_3-(CH_2)_{14}-COOH$

The above is the formula of –

(a) Phospholipid (b) Palmitic acid (c) Triglyceride (d) Arachidonic acid

68. 

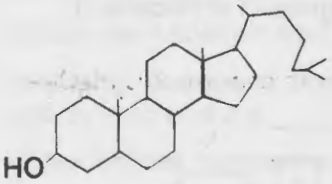
The above is the formula of –

(a) Steroid (b) lecithin (c) Triglyceride (d) Monoglyceride

69. Lecithin is –

(a) Phospholipid (b) Carbohydrate (c) Protein (d) Amino acid

70. This molecule is related to –



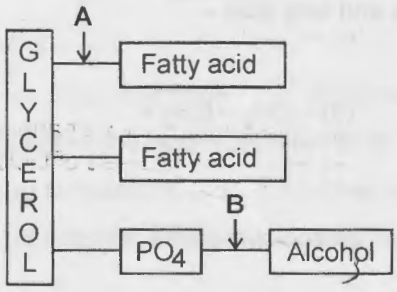
(a) Phospholipid (b) Lecithin (c) Cholesterol (d) Oleic acid

71. All carbohydrates and lipids have similarity in possessing –

(a) C, H, O (b) N, S, Protein

(c) Carboxylic and amino group (d) Carboxylic and hydroxyl group

72. The molecular is as follows –



The correct name of bonds indicated by A and B are –

	A	B
(a)	Ester bond	Ether bond
(b)	Ester bond	Amide bond
(c)	Ether bond	Amide bond
(d)	Ester bond	Phosphoester bond

73. Which one is false?

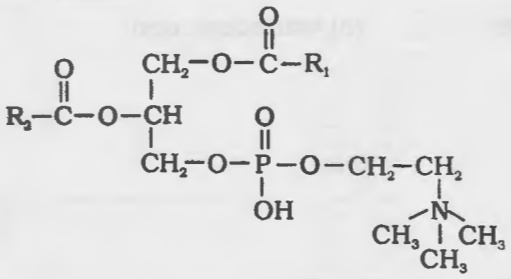
(a) Fatty acids may be unsaturated (with one or more C=C bonds) or a saturated (without double bonds)

(b) Fatty acid(s) may be esterified with glycerol forming monoglyceride, diglyceride and then triglyceride

(c) Some times especially neural tissues have lipid very much simple structures

(d) Fats and oils are triglycerides

74.



The above diagrammatic representation is the formula of –

(a) Lecithin (b) Cholesterol (c) Uridylic acid (d) Phosphatic acid

75. Which one of the following is false?

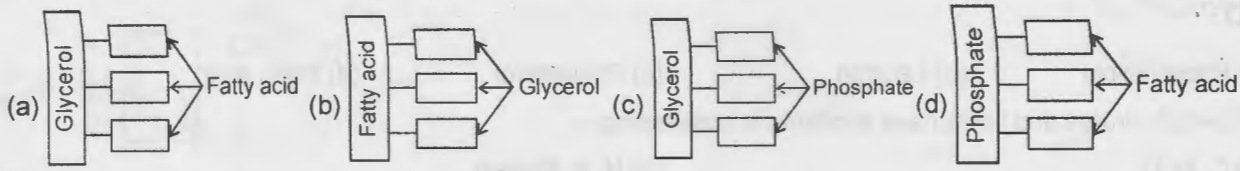
(a) Fatty acid and glycerol are soluble in water

(b) Phospholipids are found in the cell membrane

(c) In lipid R group may be $-CH_3$ group, $-C_2H_5$ group or higher number of $-CH_2$ group (1 to 19 carbon)

(d) Oils have lower melting temperature

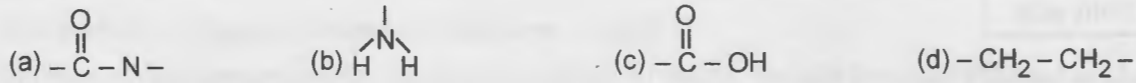
76. Which of following diagrams represents a molecule of simple lipid?



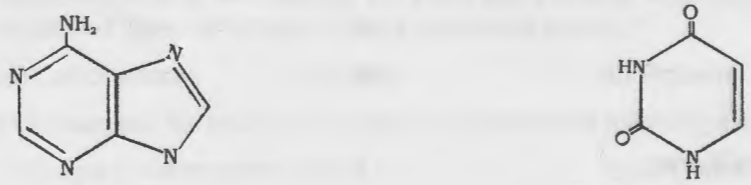
77. Cholesterol belongs to –

(a) Enzyme (b) Carbohydrate (c) Lipid (d) Protein

78. One of the following suggests the chemical similarity between amino acids and fatty acid –



79.



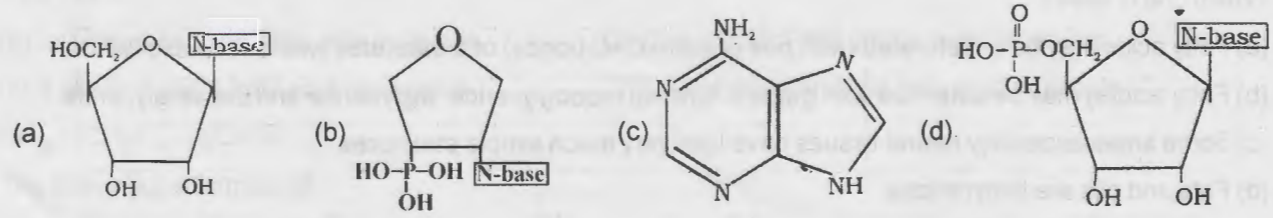
A B

The above diagram represent the nitrogenous bases. Identify the correct combination –

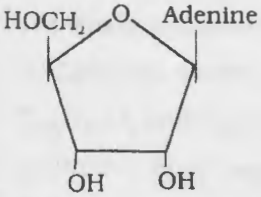
(a) A = Adenine; B = Thymine (b) A = Guanine; B = Thymine

(c) A = Adenine; B = Uracil (d) A = Guanine; B = Uracil

80. Which one of the following is the diagrammatic representation of a nucleotide?



81. Which one is false about the diagram?



(a) It is an adenylic acid

(b) It is an adenosine

(c) It will form adenylic acid if it binds with phosphate

(d) It is a nucleoside

82. Which one is correct?

(a) Adenine = Pyrimidine; Uracil = Purine (b) Adenine = Purine; Uracil = Purine

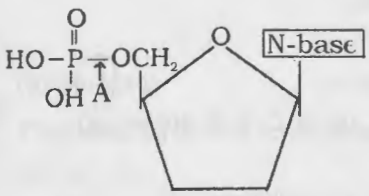
(c) Adenine = Adenylic acid; Uracil = Uridylic acid (d) Adenine = Purine; Uracil = Pyrimidine

83. Adenosine, Guanosine, thymidine, uridine, cytidine are all _____ but adenylic acid, guanylic acid, uridylic acid, cytidylic acid are _____.

(a) Nucleotides, nucleosides (b) Nucleosides, nucleotides

(c) Nucleotides, nucleic acids (d) Nucleotides, nucleases

84.



A is –

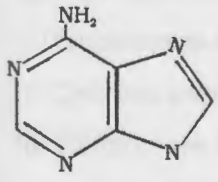
(a) Glycosidic bond (b) Phosphate bond (c) Ester bond (d) Ionic bond

85. Choose the incorrect statements –

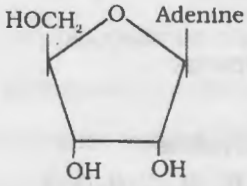
(a) N-bases (A, G, C, T, U) have heterocyclic rings (b) In cellular organisms DNA is genetic material

(c) Adenylic acid is nucleoside (d) Cytidine is a nucleoside

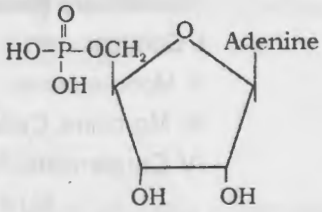
86.



A



B



C

The correct combination is –

	A	B	C
(a)	Adenine (N-base)	Adenosine (Nucleotide)	Adenylic acid (Nucleoside)
(b)	Adenine (N-base)	Adenosine (Nucleoside)	Adenylic acid (Nucleotide)
(c)	Adenosine (Nucleoside)	Adenylic acid (Nucleotide)	Adenine (N-base)
(d)	Uracil	Adenosine (Nucleoside)	Adenylic acid (Nucleotide)

87. Plants produce an enormous diversity of substances that have no apparent roles in growth and development processes are classified under the heading of –
(a) Primary metabolites (b) Secondary metabolites
(c) Necessary metabolites (d) Tertiary metabolites

88. Which one is secondary metabolite –
(a) Amino acid (b) Lipid (c) Alkaloid (d) Protein

89. Which of the following statements is false?
(a) The study of plant secondary metabolites has many practical application
(b) Some secondary metabolites have ecological importance
(c) The types of secondary metabolites in animal cells are more than that in plant cells
(d) Secondary metabolites are found in fungi, microbes and plants

90. Go through the following statements –
A. Primary metabolites are biochemicals formed as intermediates and products of normal vital metabolic pathways of organisms
B. Plant tissues produce only secondary metabolites
C. Secondary metabolites have restricted distribution in the plant kingdoms only.
D. Secondary metabolites are derivatives of primary metabolites.
E. Many plants, fungi and microbes synthesise secondary metabolites.
F. No secondary metabolite has ecological importance.
G. We understand the role of all secondary metabolites in the host organisms.
H. Many secondary metabolites are of economic importance to us.
Which of the above statement are wrong?
(a) A, B, C are wrong (b) D, E, F are wrong (c) A, D, E are wrong (d) B, C, F, G are wrong

91. Which one of the following is not a polymeric substance?
(a) Rubber (b) Morphine (c) Gum (d) Cellulose

92. Which of the following secondary metabolites are used as drugs?
(a) Abrin + Ricin (b) Vinblastin + Curcumin (c) Anthocyanine (d) Ricin + Glucosinolates

93. Which one is the secondary metabolites?
(a) Lemon oil grass (b) Sucrose (c) Maltose (d) Amino acid

94. Match the Column I with Column II correctly –

	Column I (Category)	**Column II (Secondary Metabolites)**
A.	Pigments	I. Concanavalin A
B.	Terpenoides	II. Monoterpenes, Diterpenes
C.	Alkaloids	III. Morphine, Cadeine
D.	Lectins	IV. Carotenoids, Anthocyanine

(a) A - IV, B - II, C - III, D - I (b) A - IV, B - III, C - II, D - I
(c) A - I, B - IV, C - III, D - II (d) A - I, B - III, C - II, D - IV

95. Which one(s) is (are) secondary metabolites?
(a) Flavonoids and Rubber (b) Antiotics and coloured pigments
(c) Scents, gums, spices (d) All

96. Three important polysaccharides made up of glucose monomers are –
(a) Sucrose, Lactose, maltose (b) Chitin, Glycogen, Starch
(c) Starch, Glycogen, Cellulose (d) RNA, DNA, Starch

97. Which one is homopolymer?
(a) Starch, Cellulose, Glycogen and Inulin (b) Insulin, Chitin, Pectin

(c) Cellulose, Insulin, Polypeptide (d) Protein, Lipid and polysaccharide

98. In animals, glucose is stored as _____ while in plants stored as _____ –

(a) Cellulose, starch (b) Starch, glycogen (c) Cellulose, glycogen (d) Glycogen, Starch

99. $C_{16}H_{32}O_2$ and $C_{16}H_{30}O_{15}$ are _____ and _____ respectively –

(a) Protein, Starch (b) Lipid, Protein (c) Cellulose, Pectine (d) Lipid, Carbohydrate

100. Cellulose is found in –

(a) Cell wall plant (b) Paper (c) Cotton (d) All

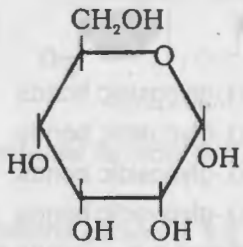
101. Inulin consists of –

(a) Only glucose (b) Only fructose (c) Only maltose (d) Protein

102. Which one is heteropolymer?

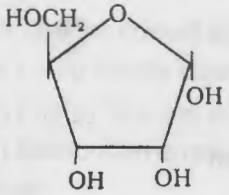
(a) Chitin (b) Peptidoglycan (c) Both (d) Inulin

103. The below structural formula belongs to –



(a) Glucose (b) Ribose (c) Sucrose (d) Deoxyribose

104. The below structural formula belongs to –



(a) Glucose (b) Ribose (c) Sucrose (d) Deoxyribose

105. Which of the following statements is false?

(a) Chitin, a complex or homopolysaccharide occurring in exoskeleton of arthopods consists of NAG

(b) Glucosamine and N-acetylglucosamine are modified sugar

(c) Cellulose shows blue colour when treated with I_2

(d) Starch shows blue colour when treated with I_2

106. I. Right end of polysaccharide is called reducing end while left end is called nonreducing end.

II. Starch can hold I_2 molecules in its helical secondary structure but cellulose being nonhelical, cannot hold I_2

III. Starch and glycogen are branched molecule

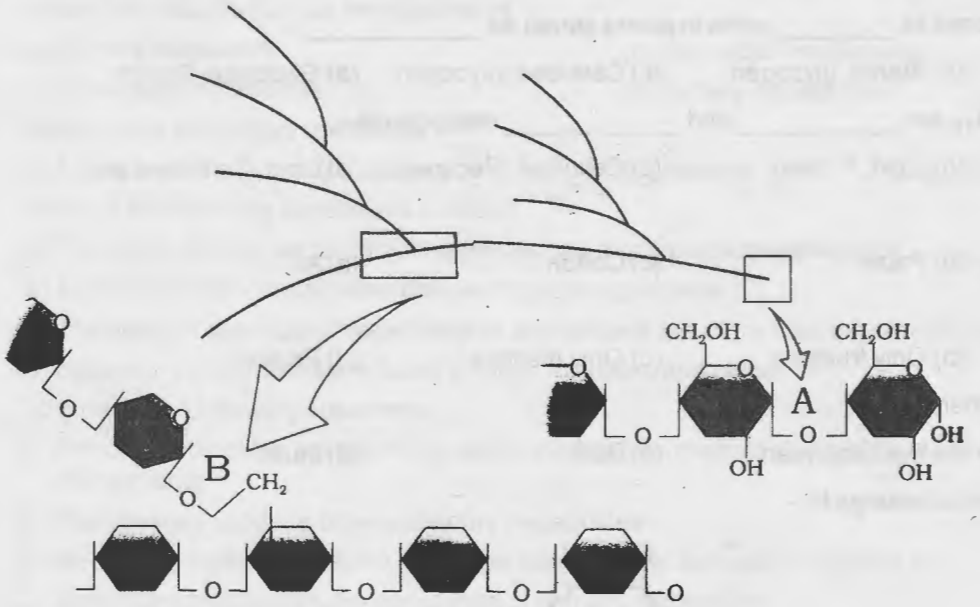
IV. Starch in plant and glycogen in animal are store houses of energy

(a) I and IV are correct (b) II and III are correct (c) Only IV is correct (d) All are correct

107. In polysaccharide the individual monosaccharides are linked by a bond. This bond is formed by dehydration. The bond is –

(a) Ester bond (b) Glycosidic bond (c) H-bond (d) Ionic bond

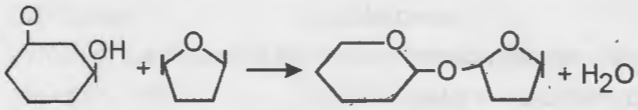
108. Identify A and B bonds in the following diagrammatic representation of a portion of glycogen –



(a) A = 1-4 α-glycosidic bonds, B = 1-6 α-glycosidic bonds
(b) A = 1-6 α-glycosidic bonds, B = 1-4 α-glycosidic bonds
(c) A = 1-1 α-glycosidic bonds, B = 1-1 α-glycosidic bonds
(d) A = 1-4 α-glycosidic bonds, B = 1-4 α-glycosidic bonds

109. The most common monomer of carbohydrates is a molecule of –
(a) Glucose (b) Fructose (c) Ribose (d) Deoxyribose

110. Which kind of reaction is shown by the following diagram?



(a) Hydrolysis (b) Dehydration (c) Denaturation (d) Hydration

111. Catabolic and anabolic pathways are often coupled in cell because –
(a) The intermediates of a catabolic pathway are used in the anabolic pathway
(b) Both the pathway use the same energy
(c) The free energy released from one pathway is used to drive other
(d) Their enzymes are controlled by their same activators and inhibitors

112. In a spontaneous reaction, the free energy of a system –
(a) Decreases (b) Increases
(c) Becomes equal to zero (d) Remains unchanged

113. Cells continue to function only when a metabolic disequilibrium is in effect. How do cells avoid reaching metabolic equilibrium?
(a) Providing constant supply of enzymes
(b) Cellular metabolism utilizes only those reactions that are irreversible
(c) Use feed back inhibition to turn off pathways
(d) The products of one reaction become the reactant of another reaction and are unable to accumulate

114. Choose the all incorrect statements –
I. Assembly of a protein from amino acids requires energy
II. When glucose is degraded into lactic acid in our muscles energy is liberated
III. Bond energy (ATP) is utilized for biosynthesis, osmotic and mechanical work that we perform

IV. Majority of metabolic reactions can occur in isolation

V. There are many examples of uncatalysed metabolic reactions

(a) All (b) None (c) IV and V (d) I and III

115. I. Acetic acid can form cholesterol

II. Anabolic pathway is endergonic while catabolic pathway is exergonic

III. All biomolecules have a turn over i.e. they are constantly being changed into some other biomolecules and also made from other biomolecules.

IV. Flow of metabolites through metabolic pathway has a definite rate and direction. It is called dynamic state of body constituents

(a) All are correct (b) All are wrong (c) I and II are correct (d) Only IV is correct

116. Complete the following sentence –

ADP + Pi ⟶ ATP is an _____ reaction, ATP ⟶ ADP + Pi is an _____ reaction, and the conversion of ADP + Pi to ATP _____ energy.

(a) Exergonic, endergonic, releases (b) Exergonic, endergonic, requires

(c) Endergonic, exergonic, requires (d) Exergonic, endergonic does not involve

117. Which one is false?

I. Energy can enter and leave a cell

II. Matter can enter and leave a cell

III. A cell can use energy from other sources to increase its order and complexity

IV. Metabolic pathways are interlinked

V. Blood concentration of glucose in a normal healthy person is 4.5 - 5.0 mM, while that of hormones would be nanogram / mL

VI. Living process is a constant effort to promote falling into equilibrium

(a) Only V (b) Only VI (c) Only I and IV (d) Only IV

118. Choose the correct statement(s) –

(a) Living steady state has a self regulatory mechanism called homeostasis

(b) Energy flow and energy transformation of living system follow law of thermodynamics

(c) Metabolism is release and gain of energy

(d) All

119. Which one is incorrect?

(a) Organisms live at the expense of free energy

(b) ATP powers the cellular work by complying exergonic reaction to endergonic reactions

(c) All living organisms exist in a steady state characterized by concentrations of biomolecules. Biomolecules are in a metabolic flux

(d) None

120. Choose the false statement –

(a) The living state is a non-equilibrium steady state to be able to perform work

(b) The constant flow of material or energy in and out of cell prevent from reaching equilibrium

(c) Living state and metabolism are synonymous

(d) None

121. What is the most correct about enzymes?

(a) All enzymes are basically proteins (b) All proteins are basically enzymes

(c) Some proteins are enzymes (d) Some enzymes are proteins

122. Choose the incorrect statement –

(a) Active enzyme has tertiary structure having many active sites (substrate binding sites)

(b) Enzyme are different from catalyst in being proteinaceous

(c) Enzymes occur in viruses

(d) Enzymes are biocatalyst

123. Which one is correct ?

(a) Inorganic catalysts work efficiently at high temperature and high pressure while enzymes get damaged at high temperature (above 40°C)

(b) Thermophilic organisms living in hot vents and sulphur springs have enzymes that are stable and retain their catalytic power even at high temperature (80 - 90°C)

(c) Ribozymes are nucleic acids behaving like enzyme

(d) All

124. $CO_2 + H_2O \longrightarrow H_2CO_3$

Carbonic acid

Which one is incorrect about the above reaction?

(a) Without enzyme, the rate of H_2CO_3 formation is 200 molecules per hour

(b) When carbonic anhydrase catalyses the same reaction, there is no change in the rate of H_2CO_3 formation

(c) The reaction catalysed by the enzyme shows speeds with about 600,000 molecules being formed / sec. (10 million times more rate)

(d) The enzymes occurs in cytoplasm of certain cells

125. The energy required for life processes must be extracted from an organisms –

(a) Nucleus (b) Biosynthesis (c) Enzyme (d) Environment

126. Which of the following statements about enzymes is true?

I. Enzymes do not alter the overall change in free energy for a reaction

II. Enzymes are proteins whose three dimensional shape is key to their functions

III. Enzymes speed up reactions by lowering activation energy

IV. Enzyme are highly specific for reactions

V. An enzyme like any protein has the secondary and tertiary structure.

VI. The energy input needed to start a chemical reaction is called activation energy

(a) All (b) All except V (c) V and VI (d) II and IV

127. Which of the following are unique features about the enzyme?

(a) They are not consumed by the enzyme-mediated reaction

(b) They are not altered by the enzyme-mediated reaction

(c) They lower the activation energy

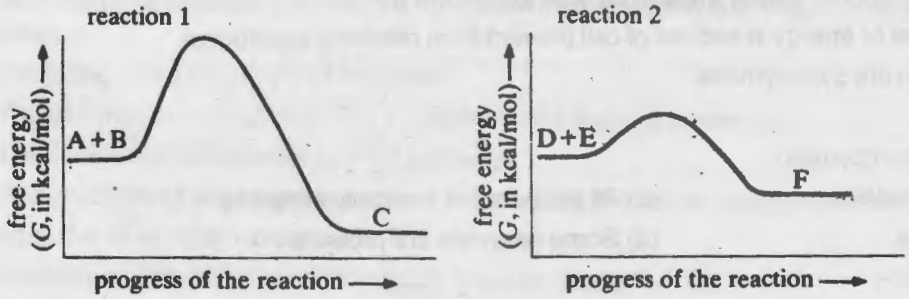
(d) All

128. Which statement about the enzymes is true?

(a) They act to speed up a biochemical reaction (b) They are made up of protein or RNA in some cases

(c) They are sensitive to temperature and pH (d) All

129. Of the two chemical reactions showing the following figures reaction 1 is –



Graphs of free energy for two chemical reactions.

(a) Faster and more endergonic than 2 (b) Faster and more exergonic than 2

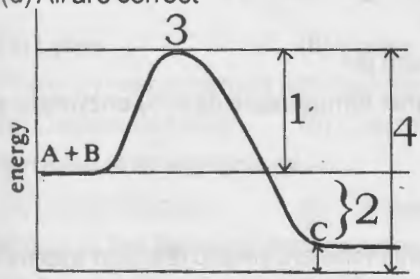
(c) Slower and more endergonic than 2 (d) Slower and more exergonic than 2

130. Which one(s) of the following statements is correct?
(a) Enzymes accelerate reactions by stabilizing transition state
(b) A chemical reaction of substrate to form product goes through a transition state that a higher free energy than either substrate or a product(s)
(c) The rate of formation of E–S complex is the same as the rate of breakdown of this complex either to products or back to reactant
(d) All

131. Select all false statements for an enzyme promoting a chemical reaction by –
I. Lowering the energy of activation
II. Causing the release of heat, which acts as a primer
III. Increasing molecular motion
IV. Changing the free energy difference between substrate and product
(a) I and IV (b) II and III (c) II, III, IV (d) III and IV

132. Activation energy –
(a) Is the difference in the average energy content of 'S' from that of its transition state
(b) Helps to change reactants into unstable transition state before they can be converted into products
(c) Is the minimum energy required from outside to overcome the energy barrier of reactant or to start a reaction
(d) All are correct

133.



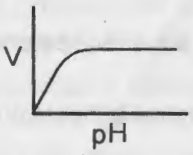
I. Segment representing the energy of activation
II. Segment representing the amount of free energy released by the reaction
III. Transition state
IV. Segment would be the same regardless of whether the reaction were uncatalysed or catalysed
Which one is correct?

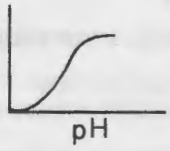
	I	II	III	IV
(a)	1	3	2	4
(b)	1	2	3	2
(c)	1	3	2	4
(d)	1	2	4	3

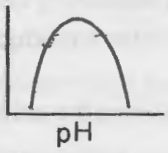
134. The steps in catalytic cycle of an enzyme action are given in random order –
I. The enzyme releases the products. Now enzyme is free to bind another substrate
II. The active sites, now in close proximity of substrate breaks the bond of substrate and E–P complex forms
III. Binding of substrate induces the enzyme to alter its shape fitting more tightly around the substrate
IV. The substrate binds to the active site of enzyme (i.e. fitting into the active site.
The correct order is –
(a) I, II, III, IV (b) IV, III, II, I (c) I, III, II, IV (d) I, II, IV, III

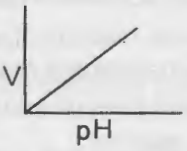
135. Which one is correct?
(a) $E + S \longrightarrow ES \longrightarrow E + P \longrightarrow EP$ (b) $E + S \longrightarrow ES \longrightarrow E - P \longrightarrow E + P$
(c) $E + S \rightleftharpoons ES \rightleftharpoons E - P \rightleftharpoons E + P$ (d) $E + S \rightleftharpoons ES \longrightarrow E - P \longrightarrow E + P$

136. Which one of the graphs shows the effect of pH on the velocity of a typical enzymatic reaction (V)?

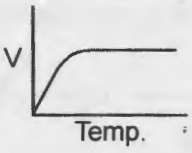
(a) 

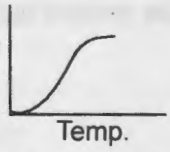
(b) 

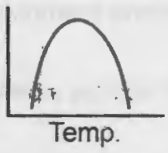
(c) 

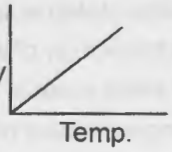
(d) 

137. Which one of the graphs show the effect of temperature on the velocity of a typical enzymatic reaction?

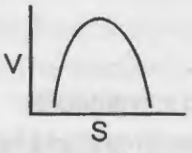
(a) 

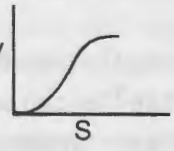
(b) 

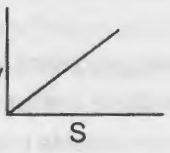
(c) 

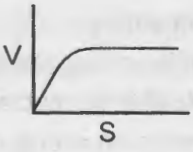
(d) 

138. Which one of the following graphs show the relationship between the rate of an enzymatic activity and substrate conc.(S) –

(a) 

(b) 

(c) 

(d) 

139. Which of the following statement is correct?

(a) Enzymes generally function in a narrow range of temperature and pH

(b) Enzymes show maximum activity at optimum temperature and optimum pH

(c) Enzymes remain in temporary inactive state at low temperature but higher temperature destroy enzymatic activity due to denaturation of proteins.

(d) All

140. Choose the correct statement(s) –

(a) Km (Michaelis - Menten) constant is the substrate concentration at which the enzymatic reaction attains half of its maximum velocity (1/2 Vmax)

(b) At lower Km, higher the substrate affinity for enzyme

(c) Vmax is reached when all the active sites of an enzyme are saturated with substrate

(d) All

141. In competitive inhibition –

(a) Inhibitor resembles the substrate in molecular structure

(b) Competition between substrates and inhibitors to occupy active sites

(c) Binding of the inhibitors to activities sites declines the enzyme action

(d) All

142. Sulpha drugs / sulphanilamides kill bacteria by inhibiting synthesis of folic acid from para-aminobenzoic acid. This type of control of bacterial pathogens is –

(a) Noncompetitive inhibition (b) Allosteric inhibition

(c) Competitive inhibition (d) Negative feed back

143. Inhibition of succinate dehydrogenase by malonate is the example of –

(a) Noncompetitive inhibition (b) Competitive inhibition

(c) Allosteric inhibition (d) Negative feed back

144. Enzymes are divided into

(a) 6 classes, each with 4 - 13 subclasses and named accordingly by a four-digit number

(b) 7 classes, each with 4 - 13 subclasses and named accordingly by a four-digit number

(c) 6 classes, each with 4 - 13 subclasses and named accordingly by a three-digit number

(d) 6 classes, each with 4 - 20 subclasses and named accordingly by a four-digit number

145. Match the column I with column II correctly –

Column I	Column II
1. Class - I	I. Ligases
2. Class - II	II. Isomerases
3. Class - III	III. Lyases
4. Class - IV	IV. Hydrolases
5. Class V	V. Transferase
6. Class VI	VI. Oxidoreductase or dehydrogenase or Redox enzyme

(a) 1 - I, 2 - II, 3 - III, 4 - IV, 5 - V, 6 - VI (b) 1 - I, 2 - III, 3 - V, 4 - II, 5 - IV, 6 - VI
(c) 1 - VI, 2 - V, 3 - IV, 4 - III, 5 - II, 6 - I (d) 1 - II, 2 - IV, 3 - VI, 4 - I, 5 - III, 6 - V

146. According to IUB system, isomerases belong to which class?
(a) 1 (b) III (c) V (d) IV

147. Apoenzyme and coenzyme collectively produce –
(a) Holoenzyme (b) Enzyme product complex (c) Cofactor (d) Prosthetic group

148. The suffix '–' added to substrate for naming the enzyme is –
(a) –ase (b) –in (c) –sine (d) –ose

149. The Hexokinase in the following reaction is kept under which class?

$$\text{Glucose + ATP} \xrightarrow[Mg^{++}]{\text{Hexokinase}} \text{Glucose 6-Phosphate + ADP}$$

(a) Lyase (b) Ligase (c) Isomerase (d) Transferase

150. The enzyme concerned with transfer of electrons is –
(a) Oxidoreductases (b) Cytochrome oxidase (c) Dehydrogenase (d) All of the above

151. Amylase is an example of –
(a) Oxidoreductase (b) Transferase (c) Hydrolase (d) Ligase

152. Which of the following enzymes does not belong to the class V of enzyme classification?
(a) Isomerases (b) Mutases (c) Epimerases (d) Dehydrogenases

153. A. Catalyses the transfer of a group (other than hydrogen).
B. Catalyses removal group from substrates by mechanism other than hydrolysis leaving double bond
C. Catalyzing the linking of 2 molecules by using energy into one molecule.
Identify the classes of enzymes for above functions

	A	B	C
(a)	Ligase	Lyase	Transferase
(b)	Transferase	Lyase	Ligase
(c)	Lyase	Ligase	Transferase
(d)	Transferase	Ligase	Lyase

154. When apoenzyme is separated from its metal component its activity is –
(a) Decreased (b) Increased (c) Lost (d) Not effected

155. Cofactors are –
(a) Nonprotein organic molecules (b) Certain vitamins
(c) Metallic ions (d) All of the above

156. Which of the following combinations is correct?
(a) Metal ions loosely attached with apoenzyme – Activators
(b) Non protein organic part attached to apoenzyme firmly – Prostatic group
(c) Non protein organic part attached loosely to apoenzyme – Coenzyme
(d) All of the above

157. Which one is not cofactor?

(a) Coenzyme (b) Apoenzyme (c) Prosthetic group (d) Metal ions

158. Which one is correct?

(a) Cofactor plays crucial role in catalytic activity of the enzymes

(b) Zn is activator of carboxypeptidase

(c) Catalase and peroxidase have haem as prosthetic group

(d) All

159. Which of the following statements is incorrect?

I. Nearly 1/3rd of all enzymes requires the presence of metal ions for catalytic function

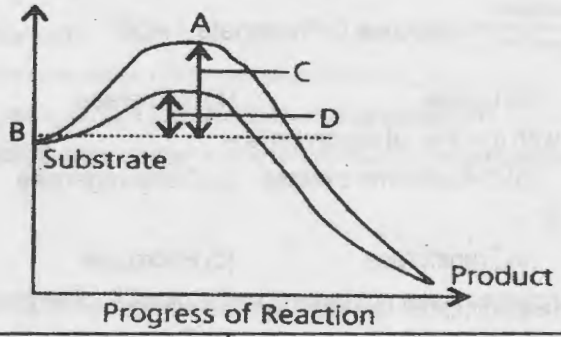
II. Metal ions form coordinate bond with side chain at active site of metalloenzyme and at the same time form one or more coordinate bonds with the substrate

III. NAD and NAD (coenzymes) contain niacin (vit.)

IV. Coenzyme are organic compounds but their association with the apoenzyme is only transient, usually occurs during catalysis

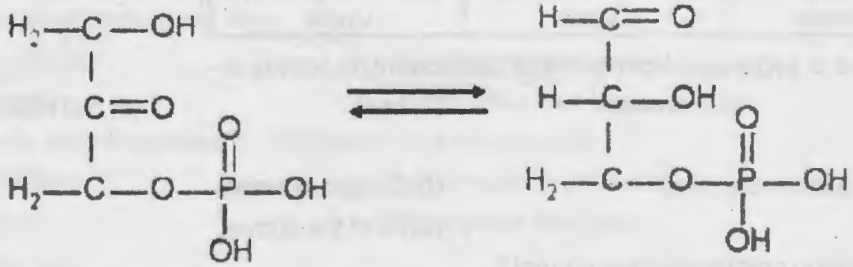
(a) All (b) Only III and IV (c) Only IV (d) None of the above

160. The figure given below shows the conversion of a substate into product by an enzyme. In which one of the four options (a-d) the components of reaction labelled as A, B, C and D are identified correctly?



	A	B	C	D
(a)	Potential energy	Transition state	Activation energy with enzyme	Activation energy without enzyme
(b)	Transition state	Potential energy	Activation energy without enzyme	Activation energy with enzyme
(c)	Potential energy	Transition state	Activation energy with enzyme	Activation energy without enzyme
(d)	Activation energy with enzyme	Transition state	Activation energy without enzyme	Potential energy

161. Dihydroxy acetone phosphate and glyceraldehyde -3-phosphate are reversibly interconvertible.



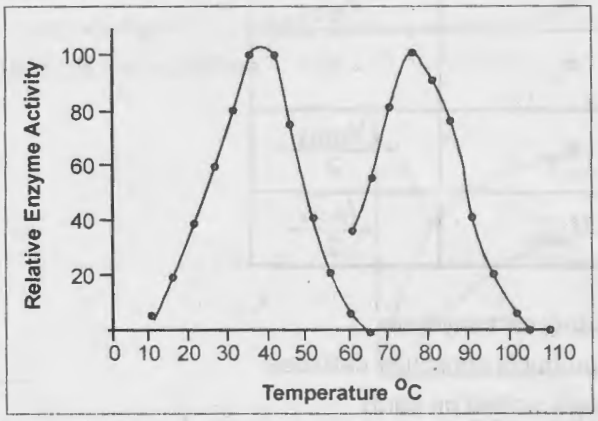
Dihydroxyacetone phosphate **Glyceraldehyde phosphate**

The enzyme that catalyzes the above reaction is

(a) Aldolase. (b) Isomerase.

(c) Phospho glycerokinase. (d) Phospho glyceromutase.

162. The following graph depicts the effect of temperature on the activity of the two enzymes A and B that catalyze the same reaction. Choose the correct statement(s) for these results.



A. The rate of reaction in each case increases with increase in temperature and declines at higher temperatures due to denaturation of the enzyme.

B. Both the enzymes A and B are thermolabile.

C. At higher temperature, the reactants become highly energized and fail to interact with the active site, thus decreasing the rate of reaction.

D. The enzyme A is from a mesophilic organism, whereas the enzyme B is from a thermophilic organism.

(a) A and B (b) B and C (c) C and D (d) A, B, D

163. Suppose all the reactions in a unicellular organism have come to equilibrium. This

(a) signals the birth of the organism. (b) happens when the organism is at rest.

(c) is true at all the times. (d) leads to death.

164. Enzymes are biocatalysts that catalyse reactions at very high rates compared to chemical catalysts. They are specific to the substrate and reaction they catalyse. A few statements about enzymes are made below:

(i) Not every enzyme is proteinacious in nature.

(ii) Some RNAs also are enzymes.

(iii) The active site of the enzyme is complementary to the transition state.

(iv) Enzymes alter the equilibrium constant of the reaction.

(v) Enzymes catalyse only irreversible reactions.

Which of the above statements are true?

(a) (i), (ii), and (iii). (b) (ii), (iii), and (iv). (c) (iii), (iv), and (v). (d) (i), (ii), and (v).

165. Which one of the following is made up of only one type of macromolecules?

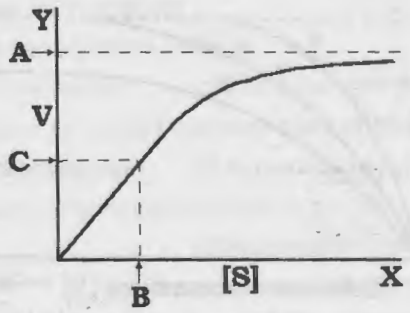
(a) virus (b) plasmid (c) ribosome (d) nucleosome

166. Ball and stick models emphasize the _____ of a molecule but fail to suggest its _____.

(a) Overall shape; bonding (b) Bonding; overall size

(c) overall size; bonding (d) geometry; overall shape

167. The adjoining graph shows change in conc. of substrate on enzyme activity. Identify A, B and C.



	A	B	C
(a)	Ki	K_m	V_{max}
(b)	$\frac{V_{max}}{2}$	K_m	Ki
(c)	V_{max}	K_m	$\frac{V_{max}}{2}$
(d)	K_m	V_{max}	$\frac{V_{max}}{2}$

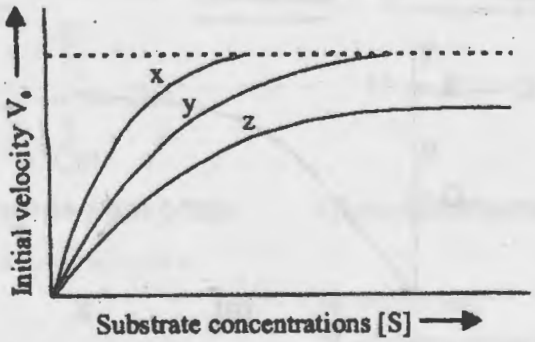
168. Find out the correct one.
(a) Cellulose is the most abundant carbohydrate.
(b) 50% of all photosynthetic products constitute cellulose
(c) Rubisco is the most abundant protein on earth
(d) All

169. Find out wrong one.
(a) Fevicol is a synthetic resin (polyvinyl alcohol)
(b) Biurets test, solubility test / Grease test and Ninhydrin test are done for protein, fat (oil) and AAs respectively
(c) Gums are heteropolysaccharide.
(d) Low Km value indicates lower susbtrate affinity.

170. What happens when milk is converted into curd or yoghurt?
(a) Bacterial enzymes convert lactose into lactic acid. (b) Globular milk protein is converted into fibrous protein
(c) Vit. C is changed into Thiamine (d) Both a and b

171. Which of the following is correct?
(a) I. Fruit juice shows positive test for Biuret's, Grease, Ninhydrin
II. Saliva shows positive test for Biuret's and Ninhydrin but negative test for Grease
III. Sweat shows negative test for Biuret's and Ninhydrin
(b) I. Fruit juice shows negative test for Biuret's, Grease, Ninhydrin
II. Saliva shows positive test for Biuret's and Ninhydrin but negative test for Grease
III. Sweat shows positive test for Biuret's and Ninhydrin
(c) I. Fruit juice shows positive test for Biuret's, Grease, Ninhydrin
II. Saliva shows negative test for Biuret's and Ninhydrin but positive test for Grease
III. Sweat shows negative test for Biuret's and Ninhydrin
(d) I. Fruit juice shows negative test for Biuret's, Grease, Ninhydrin
II. Saliva shows negative test for Biuret's and Ninhydrin but positive test for Grease
III. Sweat shows negative test for Biuret's and Ninhydrin

172. The given figure shows three velocity-substrate concentration curves for an enzyme reaction. What do the curves x, y and z depict respectively?



(a) x-normal enzyme reaction, y-competitive inhibition, z - non-competitive inhibition

(b) x-enzyme with an allosteric modulator added, y-normal enzyme activity, z-competitive inhibition
(c) x-enzyme with an allosteric stimulator, y-competitive inhibition added z-normal enzyme reaction
(d) x-normal enzyme reaction, y-non-competitive inhibitor added z-allosteric inhibitor added

173. Go through the figures and select the correct option –

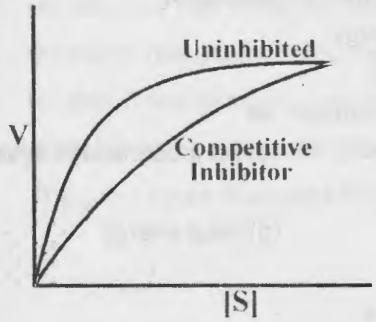


Fig. I

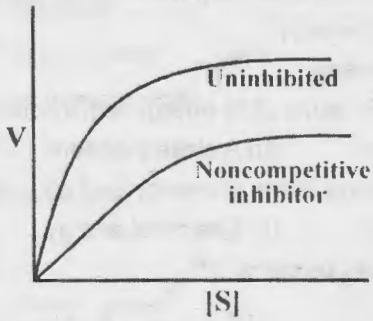


Fig. II

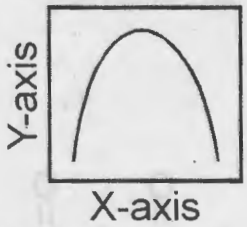
(a) I - In non-competitive type of enzymatic inhibition the V_{max} decreases and K_m remain unchanged
II - In competitive type of enzymatic inhibition the V_{max} decreases and K_m remain unchanged
(b) I - In non-competitive type of enzymatic inhibition the V_{max} decreases and K_m remain unchanged
II - In competitive type of enzymatic inhibition the V_{max} remain same and K_m is changed
(c) I - In non-competitive type of enzymatic inhibition the V_{max} increases and K_m remain unchanged
II - In competitive type of enzymatic inhibition the V_{max} changes and K_m decreases
(d) I - In non-competitive type of enzymatic inhibition the V_{max} increases and K_m remain unchanged
II - In competitive type of enzymatic inhibition the V_{max} increases and K_m increases

174. Which statement is incorrect about a 2-step reaction?
(a) The reaction may be exothermic or endothermic. (b) There are two intermediates.
(c) Either step may be rate determining. (d) There are two transition states.

175. Consider the following statements:
A. All enzymes require an additional chemical component called cofactor or coenzyme for their catalytic function.
B. The cofactor for pyruvate kinase is K^+
Which of the statements given above is/are correct?
(a) A only (b) B only (c) Both A and B (d) Neither A nor B

176. The Michaelis constant is a measure of which one of the following?
(a) Concentration of the enzyme (b) Catalytic efficiency of the enzyme
(c) Thermo-stability of the enzyme (d) Affinity of the enzyme for its substrate

177. The curve given show enzymatic activity with relation to three conditions (pH, temp. and substrate conc.). What do the two axises (x and y) represent?



(a) x-axis - Enzymatic activity, y-axis - pH
(b) x-axis - Temperature, y-axis - Enzyme activity
(c) x-axis - Substrate conc., y-axis - Enzymatic activity
(d) x-axis - enzymatic activity, y-axis - temperature

178. The initial source of energy to all the varied forms of life is
(a) A glucose molecule (b) An ATP molecule (c) The solar energy (d) A protein molecule.

179. The bioenergetic reactions are peculiar in the fact that they keep on managing the body at
(a) A megathermic level (b) An isothermic level (c) A microthermic level (d) A hekistothermic level.

180. In a living system, the chemical energy is principally stored in the form of
(a) Nucleotide diphosphates (b) Nucleoside triphosphates
(c) Nucleotide triphosphates (d) Nucleoside diphosphates.

181. Which of the followings is an important attribute of life?
(a) Energy transformation (b) Self-duplication (c) Process of evolution (d) All of the above.

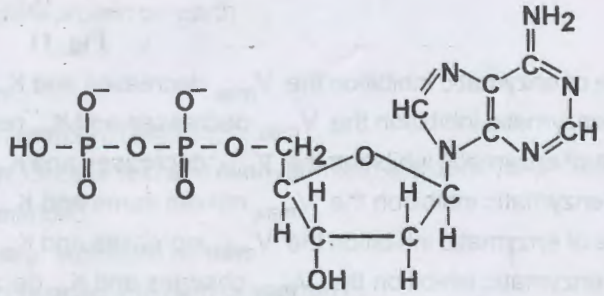
182 The life as such is an expression of a series of processes passing through a purely
(a) Exergonic phase (b) Endergonic phase (c) Thermodynamic phase (d) Nonthermic phase,

183. The series of reactions operating within the "metabolic* pool" of any living system brings about
(a) Conservation of energy (b) Transformation of energy
(c) Stagnation of energy (d) Destruction of energy.

184. A living organism in terms of its energy requirements from the environment, operates as
(a) An open system (b) A closed system (c) An inefficient system (d) An incognizable syste-

185. Which of the following forms of energy is of no use to the living organisms
(a) Radiant energy (b) Chemical energy (c) Free energy (d) Heat energy.

186. The molecule shown below is:



(a) dATP (b) dADP (c) dAMP (d) a polysaccharide

187. What kind of molecule is represented by the structure below?

$CH_3CH_2CH_2CH_2CH{=}CHCH_2CH_2CH_2CH_2CH_2CH_2CH_2COOH$

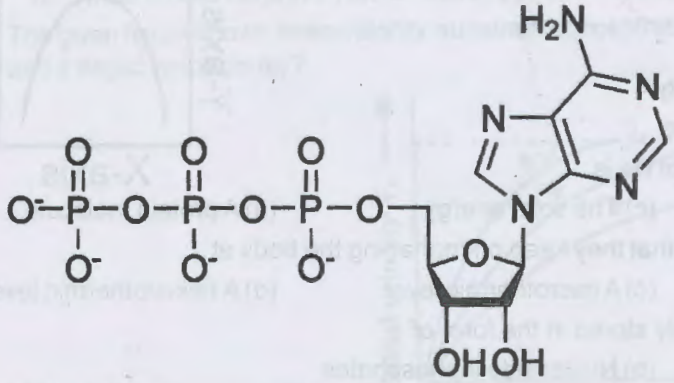
(a) a sugar (b) an unsaturated fatty acid
(c) a saturated fatty acid (d) a disaccharide

188. Given below are two statements A and B. Choose the correct answer related to the statements.
Statement A - Amino acids are amphoteric in their function.
Statement B - All amino acids are necessary for our body.
(a) Statement A is wrong, statement B is correct (b) Both the statements A and B are wrong
(c) Statement A is correct, statement B is wrong (d) Both the statements A and B are correct

189. _____ is a globular protein of ~6 kDa consisting of 51 amino acids, arranged in 2 polypeptide chains held together by disulphide bridge.
(a) Insulin (b) Keratin (c) Glucagon (d) Fibrinogen

190. Which of the following fatty acids is liquid at room temeprature?
(a) Palmitic acid (b) Stearic acid (c) Oleic acid (d) Arachidic acid

191.



The illustrated compound is

(a) adenosine triphosphate (b) guanosine triphosphate

(c) cytidine triphosphate (d) uridine triphosphate

192. Even though starch and cellulose are made up of the same repeating units of glucose, they are very different in their properties. The main difference between starch and cellulose is that

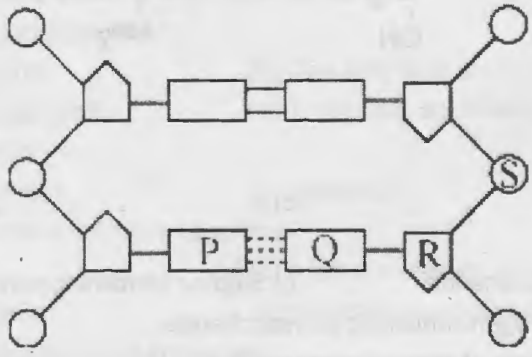
(a) cellulose has all its glucose repeats oriented in same direction

(b) starch has alternate glucose repeats oriented at 180° to each other

(c) starch has all its glucose repeats oriented perpendicular to each other

(d) cellulose has alternate glucose repeats oriented at 180° to each other

193. The given figure illustrates the structural components of a molecule.



The names of the labels are identified in which alternative?

(a) **P**-cytosine; **Q**-thymine; **R**-ribose; **S**-phosphate

(b) **P**-adenine; **Q**-guanine; **R**-ribose; **S**-hydrogen

(c) **P**-cytosine; **Q**-guanine; **R**-deoxyribose; **S**-phosphate

(d) **P**-adenine; **Q**-thymine; **R**-deoxyribose; **S**-hydrogen

194. Which one of the following biomolecules is correctly characterised ?

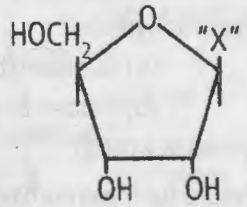
(a) Lecithin - a phosphorylated glyceride found in cell membrane

(b) Palmitic acid- an unsaturated fatty acid with 18 carbon atoms

(c) Adenylic acid - adenosine with a glucose phosphate molecule

(d) Alanine amino acid - Contains an amino group and an acidic group anywhere in the molecule

195. Given below is the diagrammatic representation of one of the categories of small molecular weight organic compounds in the living tissues. Identify the category shown and the one blank component "X" in it.



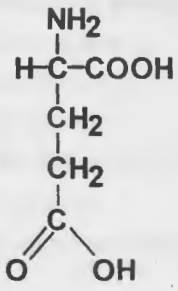
	Category	Component
(a)	Cholesterol	Guanin
(b)	Amino acid	NH_2
(c)	Nucleotide	Adenine
(d)	Nucleoside	Uracil

196. Which one is the most abundant protein in the animal world

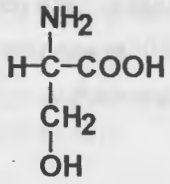
(a) Trypsin (b) Hemoglobin (c) Collagen (d) Insulin

197. Which one out of A -D given below correctly respresents the structural formula of the basic amino acid

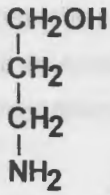
A



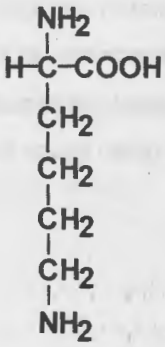
B



C



D



Options

(a) C (b) D (c) A (d) B

198. Macro molecule chitin is:

(a) Phosphorus containing polysaccharide (b) Sulphur containing polysaccharide

(c) Simple polysaccharide (d) Nitrogen containing polysaccharide

199. The essential chemical components of many coenzymes are:

(a) Nucleic acids (b) Carbohydrates (c) Vitamins (d) Proteins

200. Transition state structure of the substrate formed during an enzymatic reaction is

(a) transient but stable (b) permanent but unstable

(c) transient and unstable (d) permanent and stable

201. Phosphoglyceride is always made up of :

(a) only a saturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached

(b) only an unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached

(c) a saturated or unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached

(d) a saturated or unsaturated fatty acid esterified to a phosphate group which is also attached to a glycerol molecule

202. Select the option which is not correct with respect to enzyme action :-

(a) Substrate binds with enzyme at its active site.

(b) Addition of lot of succinate does not reverse the inhibition of succinic dehydrogenase by malonate.

(c) A non-competitive inhibitor binds the enzyme at a site distinct from that which binds the substrate.

(d) Malonate is a competitive inhibitor of succinic dehydrogenase.

203. Which one of the following is a non - reducing carbohydrate?

(a) Maltose (b) Sucrose (table sugar)

(c) Lactose (d) Ribose 5 - phosphate

204. Which of the following statements about enzymes is wrong?

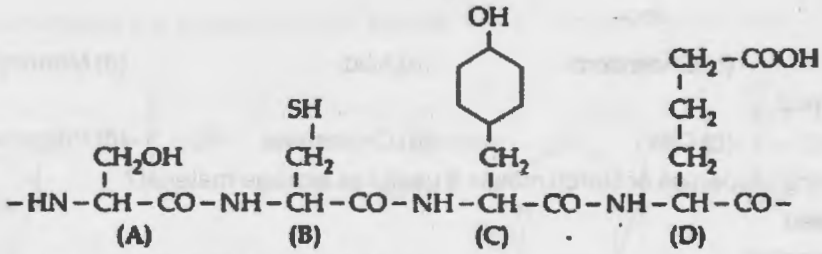
(a) Enzymes require optimum pH and temperature for maximum activity

(b) Enzymes are denatured at high temperatures

(c) Enzymes are mostly proteins but some are lipids also

(d) Enzymes are highly specific

205. The figure shows a hypothetical tetrapeptide portion of a protein with parts labelled A-D. Which one of the following option is correct?



(a) A is the sulphur containing amino acid – methionine
(b) D is the acidic amino acid – glutamic acid
(c) C is an aromatic amino acid – tryptophan
(d) A is the C – terminal amino acid and D is N terminal amino acid

206. One molecule of triglyceride is produced using
(a) One fatty acid and one glycerol
(b) One fatty acid and three glycerols
(c) Three fatty acids and three glycerols
(d) Three fatty acids and one glycerol

207. Glutenin is an important protein in
(a) Potato (b) Wheat (c) Soyabean (d) Spinach

208. Which of the folloiwng statements is wrong for sucrose ?
(a) It is a disaccharide
(b) It is a non-reducing sugar
(c) It accumulates in the cytoplasm
(d) It is comprised of maltose and fructose

209. The protein component of a holoenzyme is known as
(a) Coenzyme (b) Cofactor (c) Prosthetic group (d) Apoenzyme

210. Km is
(a) Product (b) Enzyme (c) Constant (d) Unit

211. Which of the following amino acids contains sulphur atom in its side chain?
(a) methionine (b) alanine (c) tryptophan (d) phenylalanine

212. Which of the following sugars cannot be hydrolyzed further to yield simple sugars?
(a) Ribose (b) Maltose (c) Sucrose (d) Lactose

213. Enzymes which catalyse reactions involving changes in structure of a molecule are
(a) Ligases (b) Isomerases (c) Hydrolyses (d) Transferases

214. Km value is dependent upon
(a) Temperature
(b) Substrate concentration
(c) Enzyme concentration
(d) All of the above

215. Starch is insoluble, yet it accumulates in large quantity in Potato tuber because
(a) It is useful for storage
(b) Starch is synthesised in tubers
(c) Tubers respire slowly
(d) Translocated sucrose is polymerised here.

216. Number of carbons in a ring of deoxyribose sugar is
(a) Three (b) Four (c) Five (d) Six

217. Which enzyme shows greatest substrate specificity?
(a) Nuclease (b) Trypsin (c) Pepsin (d) Sucrase

218. Catalytic efficiency of two different enzymes is compared by their
(a) Product (b) Molecular size (c) Km value (d) pH optimum value

219. An important step in the manufacture of pulp in paper industry from woody tissues of plants is
(a) Preparation of pure cellulose by removing lignin
(b) Treatment of wood with chemicals for breakdown of cellulose
(c) Removal of oil by suitable chemicals
(d) Removal of water from wood by prolonged heating at $50^{o}C$

220. Wax is
(a) Ester (b) Cholesterol (c) Acid (d) Monohydric alcohol

221. Which is least harmful
(a) Saturated fat (b) Oils (c) Cholesterol (d) Polyunsaturated fats.

222. Which of the following properties of starch makes it useful as storage material?
1. Easily translocated
2. Chemically nonreactive
3. Easily digested by animals
4. Osmotically inactive
5. Synthesised during photosynthesis
(a) 1, 3, 5 (b) 1 and 5 (c) 2 and 3 (d) 2 and 4

223. A typical homopolysaccharide is
(a) Starch (b) Lignin (c) Insulin (d) Suberin

224. At isoelectric point, a protein has
(a) No net charge (b) Negative charge (c) Positive charge (d) Both (b) and (c)

225. Polymer of sucrose is
(a) Cellulose (b) Starch (c) Glycogen (d) Fluka Ficoll

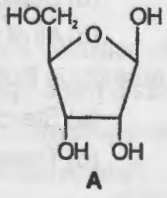
226. Prostaglandins are
(a) Simple proteins (b) Conjugated proteins (c) Satured fatty acids (d) Unsatured fatty acids

227. In a 50 g living tissue, the amount of water would be
(a) 15 - 25 g (b) 25 - 30 g (c) 35 - 45 g (d) 70 - 90 g

228. The catalytic efficiency of two different enzymes can be compared by the
(a) molecular size of the enzymes (b) pH optimum values
(c) K_m values (d) formation of the product

229. Which of the following statements about the structure of proteins is true?
(a) The sequence of amino acids in a protein represents the secondary structure
(b) The helices of proteins are always left handed
(c) Adult human haemoglobin consists of two subunits.
(d) Proteins are heteropolymers containing strings of amino acids.

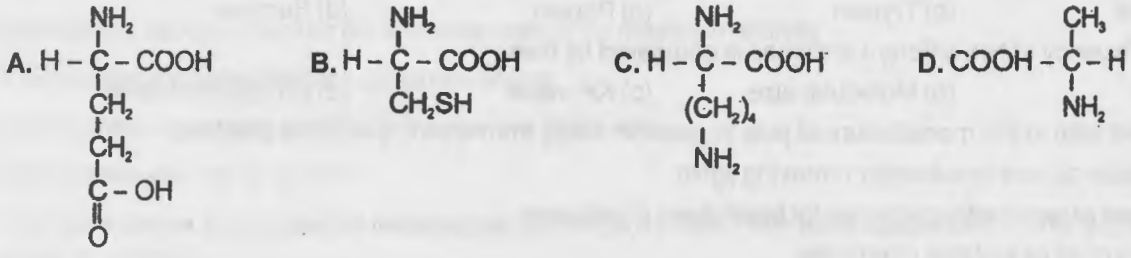
230. Identify the given molecule labelled as ___A___ and choose the biomolecules in which it is a component.



A

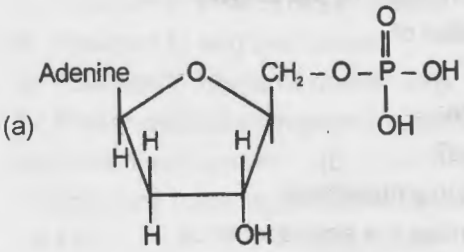
(a) DNA, RNA, ATP (b) RNA, ATP, NAD+ (c) RNA, FAD, DNA (d) ATP, GTP, DNA

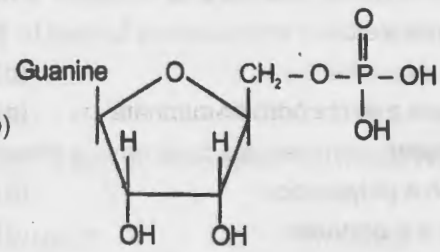
231. Which one out of A-D given below correctly represents the structural formula of basic amino acid?

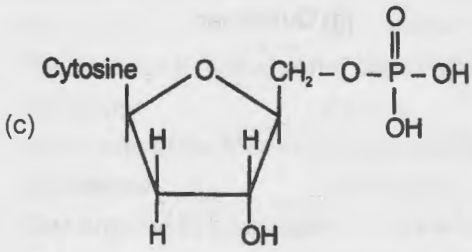


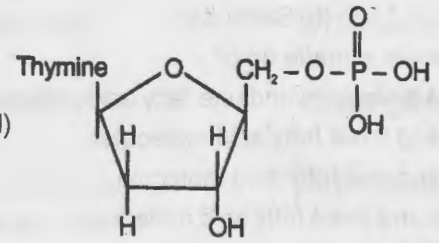
(a) A (b) B (c) C (d) D

232. All of the following nucleotides are present in DNA, except

(a) 

(b) 

(c) 

(d) 

233. The moiety present at the 5' end of ribose sugar in a polynucleotide is
(a) OH (b) CH_2 (c) phosphate (d) adenine

234. In the ribose of RNA, unlike DNA, every nucleotide residue has an additional
(a) COOH group in the 2' position (b) OH group in the 5' position
(c) OH group in the 2' position (d) Phosphate group in the 2' position

235. Which enzyme can hydrolyse peptidoglycans?
(a) Amylase (b) Lipase (c) Trypsin (d) Lysozyme

236. Not all proteins have a
(a) Primary structure (b) Secondary structure (c) Tertiary structure (d) Quaternary structure

237. A tripeptide contains
(a) 3-amino acids (b) 4-amino acids (c) 6-amino acids (d) 2-amino acids

238. How many phosphodiester bonds are there in ATP?
(a) 3 (b) 2 (c) 1 (d) 0

239. An allosteric inhibitor of the enzyme acts by binding to the
(a) Substrate (b) Product
(c) Catalytic site of the enzyme (d) Non-catalytic site of the enzyme

240. Which one of the following natural polymers is found both in insects and fungi?
(a) Pectin (b) Chitin (c) Cellulose (d) Suberin

241. Which one of the following combinations of all three fatty acids are essential for human beings?
(a) Oleic acid, linoleic acid and linolenic acid
(b) Palmitic acid, linoleic acid and arachidonic acid
(c) Oleic acid, linoleic acid and arachidonic acid
(d) Linoleic acid, linolenic acid and arachidonic acid

242. What is exhibited by lower km value?
(a) More affinity with substrate (b) Less affinity with substrate
(c) More affinity with product (d) less affinity with product

243. Which one of the following statements is incorrect?
(a) The competitive inhibitor does not affect the rate of breakdown of the enzyme-substrate complex
(b) The presence of the competitive inhibitor decreases the Km of the enzyme for the substrate

(c) A competitive inhibitor reacts reversibly with the enzyme to form an enzyme-inhibitor complex
(d) In competitive inhibition, the inhibitor molecule is not chemically changed by the enzyme

244. The chitinous exoskeleton of arthropods is formed by the polymerisation of
(a) N-acetyle glucosamine (b) Lipoglycans
(c) Keratin sulphate and chondroitin sulphate (d) D-glucosamine

245. Which of the following biomolecules does have a phosphodiester bond?
(a) Amino acids in a polypeptide (b) Nucleic acids in a nucleotide
(c) Fatty acids in a diglyceride (d) Monosaccharides in a polysaccharide

246. Mostly proteins which is present in protoplasm show which type of configuration?
(a) Primary (b) Secondary (c) Tertiary (d) Quaternary

247. A typical fat molecule is made up of :-
(a) Three glycerol molecules and one fatty acid molecule
(b) One glycerol and three fatty acid molecules
(c) One glycerol and one fatty acid molecule
(d) Three glycerol and three fatty acid molecules

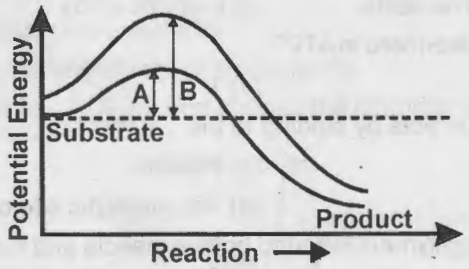
248. Which one of the following statements is wrong ?
(a) Sucrose is a disaccharide. (b) Cellulose is a polysaccharide.
(c) Uracil is a pyrimidine. (d) Glycine is a sulphur containing amino acid.

249. A non-proteinaceous enzyme is :-
(a) Ligase (b) Deoxyribonuclease (c) Lysozyme (d) Ribozyme

250. Phytochrome is a :-
(a) Lipoprotein (b) Chromoprotein (c) Flavoprotein (d) Glycoprotein

251. Which of the following is the least likely to be involved in stabilizing the three–dimensional folding of most proteins?
(a) Hydrophobic interaction (b) Ester bonds
(c) Hydrogen bonds (d) Electrostatic interaction

252. Which of the following describes the given graph correctly?



(a) Endothermic reaction with energy A in absence of enzyme and B in presence of enzyme
(b) Exothermic reaction with energy A in absence of enzyme and B in presence of enzyme
(c) Endothermic reaction with energy A in presence of enzyme and B in absence of enzyme
(d) Exothermic reaction with energy A in presence of enzyme and B in absence of enzyme.

253. Histone proteins are rich in :
(a) Alanine and glycine (b) Arginine and lysine (c) Histidine and serine (d) Tyrosine and cysteine

254. Which of the following pair of amino acids are acidic?
(a) Glycine and glutamate (b) Aspartate and valine
(c) Alanine and methionine (d) Glutamate and aspartate

255. First discovered amino acid is _____.
(a) Asparagine (b) Aspartate (c) Glutamate (d) Glutamine

256. Among the 20 standard protein coding amino acids, which was the last discovered amino acid?
(a) Leucine (b) Isoleucine (c) Threonine (d) Serine

257. Which of the followings can bring about the denaturation of proteins?
I. Reaction to salts of heavy metals
II. Reaction to acid and bases
III. Reaction to inorganic neutral salts
IV. Preservation at a temperature below $-5^{o}C$
(a) I and IV are correct (b) II and IV are correct (c) I, II and III are correct (d) III and IV are correct

258. Which of the following is a conenzyme?
(a) Fe^{++} (b) Mucus (c) NAD^{+} (d) Lyase

259. Which of the following nitrogenous base is double ringed?
(a) Guanine (b) Thymine (c) Uracil (d) Cytosine

260. The cofactor for the enzyme carboxypeptidase is :
(a) Copper (b) Iron (c) Zinc (d) Manganese

261. Which one of the following is a disaccharide
(a) Maltose (b) Ribose (c) Glucose (d) Fructose

262. First enzyme to be isolated in pure crystalline form was
(a) Zymase (b) Urease (c) Invertase (d) Diastase

263. Reaction will proceed faster if activation energy is
(a) high (b) low (c) remains constant (d) none of above

264. Which of the following statements about Michaelis-Menten kinetics is correct?
(a) K_m, the Michaelis constant, is defined as the concentration of substrate required for the reaction to reach maximum velocity.
(b) K_m, the Michaelis constant, is defined as the dissociation constant of the enzyme-substrate complex.
(c) K_m, the Michaelis constant, is expressed in terms of the reaction velocity.
(d) K_m, the Michaelis constant, is a measure of the affinity the enzyme has for its substrate.

265. Which of the following statements about Michaelis-Menten kinetics is correct?
I. A high Michaelis constant (K_m) indicates a high affinity of an enzyme for its substrate.
II. A low Michaelis constant (K_m) indicates a high affinity of an enzyme for its substrate.
III. The Michaelis constant (K_m) of an enzyme increases when the enzyme concentration is increased.
IV. The Michaelis constant (K_m) of an enzyme is unchanged when the enzyme concentration is increased.
(a) I and II are correct (b) II and III are correct (c) II and IV are correct (d) I and III are correct

266. Which one of the following statements is correct, with reference to enzymes ?
(a) Holoenzyme = Apoenzyme + Coenzyme (b) Coenzyme = Apoenzyme + Holoenzyme
(c) Holoenzyme = Coenzyme + Co-factor (d) Apoenzyme = Holoenzyme + Coenzyme

267. Which of the following are not polymeric?
(a) Proteins (b) Polysaccharides (c) Lipids (d) Nucleic acids

268. Fats and oils are the most preferred reserved foods. Choose the correct combination of statements given below to support this:
i. They have density lower than most other molecules in a cell.
ii. Their complete oxidation release energy greater than other organic polymers.
iii. Being hydrophobic they get clustered and use lesser space for storage.
iv. Being heteropolymeric they are the most convenient storage foods.
(a) ii & iii (b) i & ii (c) i & iv (d) iii & iv

269. The main difference between an enzyme catalyzed and uncatalyzed reaction is that the former has -
(a) lower energy of activation (b) lower free energy
(c) ability to use all available substrate (d) little influence of external conditions

270. In palmitic acid and arachidonic acid, number of carbon atoms are respectively :
(a) 18, 16 (b) 16, 20 (c) 20, 22 (d) 18, 22

271. Which of the following statement is correct?
(a) Arachidonic acid has 20 carbon atoms including the carboxyl carbon
(b) Palmitic acid has 16 carbon atoms
(c) Stearic acid is saturated fatty acid
(d) All are correct

272. NAD and NADP contain :
(a) Niacin and Biotin respectively
(b) Riboflavin and Biotin respectively
(c) Riboflavin and Niacin respectively
(d) Niacin and Niacin respectively

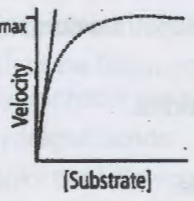
273. The two functional groups characteristic of sugars are
(a) Carbonyl and phosphate
(b) Carbonyl and methyl
(c) Hydroxyl and methyl
(d) Carbonyl and hydroxyl

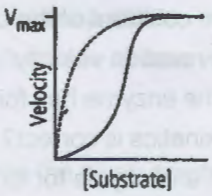
274. How many total types of N-bases in DNA and RNA molecules –
(a) 4 (b) 3 (c) 5 (d) 6

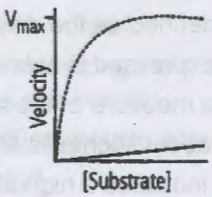
275. Vinblastin is obtained from –
(a) *Catharanthus roseus*
(b) *Curcuma amada*
(c) *Atropa belladona*
(d) *Syzygium cumini*

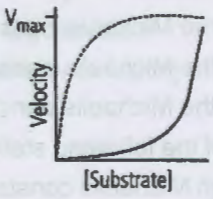
276. How many polypeptide chains are there in 1 Hb molecule?
(a) 2 α & 2β (b) 4 α (c) 4β (d) 1 α & 3β

277. Which of the following correctly represents the same reaction in which no enzyme is used? Broken line represents the enzyme catalysed reaction for comparison.

(a) 

(b) 

(c) 

(d) 

278. Stabilization of the unique coiled structure of an alpha helix in a protein is primarily attributed to
(a) hydrogen bonding between the peptide backbone atoms
(b) disulfide bridges between cysteine side chains
(c) carbohydrate moieties attached to polar amino acids
(d) peptide linkages that covalently bond amino acids

279. For long term energy storage animals usually prefer –
(a) Glycogen (b) Starch (c) Fats (d) Proteins

280. Protein on reaction with which yields Ruhemann's purple?
(a) Ninhydrin (b) Cu^{2+} (c) H_2O_2 (d) Benedict's solution

281. Consider the following statement :
(A) Coenzyme or metal ion that is tightly bound to enzyme protein is called prosthetic group.
(B) A complete catalytic active enzyme with its bound prosthetic group is called apoenzyme.
Select the correct option.
(a) Both (A) and (B) are true.
(b) (A) is true but (B) is false.
(c) Both (A) and (B) are false.
(d) (A) is false but (B) is true

282. Purines found both in DNA and RNA are
(a) Adenine and thymine
(b) Adenine and guanine
(c) Guanine and cytosine
(d) Cytosine and thymine

283. Which of the following glucose transporters is insulin-dependent?
(a) GLUT I (b) GLUT II (c) GLUT III (d) GLUT IV

284. Prosthetic groups differ from co-enzymes in that
(a) They can serve as co-factors in a number of enzyme - catalyzed reactions
(b) They require metal ions for their activity
(c) They (prosthetic groups) are tightly bound to apoenzymes
(d) Their association with apoenzymes is transient

285. "Ramachandran plot" is used to confirm the structure of
(a) DNA (b) RNA (c) Proteins (d) Triacylglycerides

286. Which of the following organic compounds is the main constituent of Lecithin?
(a) Phosphoprotein (b) Arachidonic acid (c) Phospholipid (d) Cholesterol

287. Which of the following statements about enzyme is/ are correct?
I. Enzyme used to partially pre-digested baby food has trypsin.
II. The catalytic efficiency of two different enzymes can be compared by the K_m values.
III. An enzyme with high K_m requires a high concentration of substrate to get V_{max}.
IV. A small K_m indicates that the enzyme requires only a small amount of substrate to become saturated.
(a) I and II are correct (b) II and III are correct (c) II and IV are correct (d) All are correct

9 BIOMOLECULES

1. d	2. a	3. c	4. d	5. a	6. c	7. a	8. b	9. a	10. c
11. c	12. a	13. d	14. a	15. c	16. b	17. d	18. a	19. c	20. b
21. a	22. a	23. d	24. b	25. c	26. a	27. b	28. b	29. a	30. d
31. a	32. b	33. c	34. a	35. d	36. d	37. a	38. a	39. c	40. c
41. c	42. d	43. d	44. d	45. b	46. a	47. b	48. b	49. d	50. d
51. b	52. c	53. c	54. c	55. c	56. c	57. b	58. c	59. b	60. b
61. d	62. b	63. d	64. c	65. b	66. b	67. b	68. c	69. a	70. c
71. a	72. d	73. c	74. a	75. a	76. a	77. c	78. c	79. c	80. d
81. a	82. d	83. b	84. c	85. c	86. b	87. b	88. c	89. c	90. d
91. b	92. b	93. a	94. a	95. d	96. c	97. a	98. d	99. d	100. d
101. b	102. b	103. a	104. b	105. c	106. d	107. b	108. a	109. a	110. b
111. c	112. a	113. d	114. c	115. a	116. c	117. b	118. d	119.d	120. d
121. a	122. c	123. d	124. b	125. d	126. a	127. d	128. d	129. d	130. d
131. c	132. d	133. b	134. b	135. d	136. c	137. c	138. d	139. d	140. d
141. d	142. c	143. b	144. a	145. c	146. c	147. a	148. a	149. d	150. d
151. c	152. d	153. b	154. c	155. d	156. d	157. b	158. d	159. d	160. b
161. b	162. d	163. d	164. a	165. b	166. d	167. c	168. d	169. d	170. d
171. a	172. a	173. b	174. b	175. b	176. d	177. b	178. c	179. b	180. b
181. d	182. c	183. b	184. a	185. d	186. b	187. b	188. d	189. a	190. c
191. a	192. d	193. c	194. a	195. d	196. c	197. b	198. d	199. c	200. c
201. c	202. b	203. b	204. c	205. b	206. d	207. b	208. d	209. d	210. c
211. a	212. a	213. b	214. b	215. a	216. b	217. d	218. c	219. a	220. a
221. d	222. d	223. a	224. a	225. d	226. d	227. c	228. c	229. d	230. b
231. c	232. b	233. c	234. c	235. d	236. d	237. a	238. d	239. d	240. b
241. d	242. a	243. b	244. a	245. b	246. c	247. b	248. d	249. d	250. b
251. b	252. d	253. b	254. d	255. b	256. c	257. c	258. c	259. a	260. c
261. a	262. b	263. b	264. d	265. c	266. a	267. c	268. a	269. a	270. b
271. d	272. d	273. d	274. c	275. a	276. a	277. c	278. a	279. c	280. a
281. c	282. b	283. d	284. c	285. c	286. c	287. d			

SOLUTION

277. In absence of enzyme, reaction is not catalysed and hence rate of reaction or velocity increases slowly in comparison to catalysed reaction with the increase in substrate concentration.

10 CELL CYCLE AND CELL DIVISION

1. The products of mitosis are –
   (a) One nucleus containing twice as much DNA as the parent nucleus
   (b) Two genetically identical cells
   (c) Four nuclei containing half as much DNA as the parent nucleus
   (d) Two genetically identical nuclei
2. The mitotic spindle is composed of –
   (a) Chromosomes (b) Chromatids (c) Microtubules (d) Chromatin
3. Centrosomes are –
   (a) Constricted regions of phase chromosomes
   (b) Regions where microtubules polymerize
   (c) The central region of the same cell
   (d) Part of cilia
4. When dividing cells are examined under a light microscope, chromosomes first become visible during –
   (a) Interphase (b) The S Phase (c) Prophase (d) G_1
5. The structures that line up the chromosomes on the equatorial plate during metaphase are called –
   (a) Asters (b) Polar and Kinetochore microtubules
   (c) Centrosomes (d) Centrioles
6. DNA replication occurs –
   (a) During both mitosis and meiosis (b) Only during mitosis
   (c) Only during meiosis (d) During the S phase
7. Mature nerve cells are incapable of cell division. These cells are probably in –
   (a) G_1 phase (b) The S phase (c) G_2 phase (d) Mitosis
8. The microtubules of the mitotic spindle attach to a specialized structure in the centromere region of each chromosome, called the –
   (a) Kinetochore (b) Nucleosome (c) Equatorial plate (d) Centrosome
9. After the centromeres separate during mitosis the chromatids now called _____ move toward opposite poles of the spindle –
   (a) Centrosomes (b) Kinetochores (c) Half spindles (d) Daughter chromosomes
10. In plant cells, cytokinesis is accomplished by the formation of a(n)
    (a) membrane furrow (b) Equatorial plate (c) Cell plate (d) Spindle
11. Genetically diverse offspring result from –
    (a) Mitosis (b) Cloning (c) Cytokinesis (d) Sexual reproduction
12. Meiosis can occur –
    (a) in all organism (b) Only when an organism is diploid
    (d) Only in multicellular organisms (d) Only in haploid organisms
13. The members of a homologous pair of chromosomes –
    (a) Are identical in size and appearance
    (b) Contain identical genetic information

(c) Separate to opposite poles of the cell during mitosis

(d) Are found only in haploid cells

14. The diagnosis of Down syndrome is made by examining the individual's –

(a) Spores (b) Karyotype (c) Chromatin (d) Nucleosome

15. During meiosis, the sister chromatids separate during –

(a) Anaphase II (b) Anaphase I (c) The S phase (d) Synapsis

16. The exchange of genetic material between chromatids and homologous chromosomes occurs during –

(a) Interphase (b) Mitosis and Meiosis (c) Prophase I (d) Anaphase I

17. At the end of the first meiotic division, each chromosome consists of –

(a) A homologous chromosome pair (b) Four copies of each DNA molecule

(c) Two chromatids (d) A pair of polar microtubules

18. The four haploid nuclei found at the end of meiosis differ from one another in their exact genetic composition. Some of this difference is the result of –

(a) Cytokinesis (b) Respiration of DNA during the S phase

(c) Spindle formation (d) Crossing over during Prophase I

19. During meiosis I in human, one of the daughter cells receives –

(a) Only maternal chromosomes

(b) A mixture of maternal and paternal chromosomes

(c) The same number of chromosomes as a diploid cell

(d) A sister chromatid from each chromosome

20. A triploid nucleus cannot undergo meiosis because –

(a) The DNA cannot replicate (b) Not all of the chromosomes can form homologous pairs

(c) The sister chromatids cannot separate (d) Cytokinesis cannot occur

21. Chromatin condenses to form discrete, visible chromosomes –

(a) Early in G_1 (b) During S (c) During telophase (d) During prophase

22. Chromosomes decondense into diffuse chromatin –

(a) At the end of telophase (b) At the beginning of prophase

(c) At the end of interphase (d) At the end of metaphase

23. Genetic recombination occurs during –

(a) Prophase of meiosis I (b) Interphase precending meiosis II

(c) Mitotic telophase (d) Fertilization

24. The number of chromosomes is reduced to half during –

(a) Anaphase of mitosis and meiosis (b) Meiosis II

(c) Meiosis I (d) Fertilization

25. The total DNA content of each daughter cell is reduced during meiosis because –

(a) Chromosomes do not replicate during the interphase preceding meiosis I

(b) Chromosomes do not replicate between meiosis I and II

(c) Half of the chromosomes from each gamete are lost during fertilization

(d) Chromosome arms are lost during crossing over

26. Chromosome number is reduced during meiosis because the process consists of –
(a) Two cell divisions without any chromosome replication
(b) A single cell division without any chromosome replication
(c) Two cell division in which half of the chromosomes are destroyed
(d) Two cell divisions and only single round of chromosome replication

27. Which of the following phase of the cell cycle is not a part of interphase?
(a) M (b) S (c) G_1 (d) G_2

28. During mitotic anaphase, chromatids migrate –
(a) From the metaphase plate towards the poles
(b) Towards the nuclear envelope
(c) Along with their sister chromatids toward one pole
(d) Along with the other member of the homologous pair toward the metaphase plate

29. Which of the following does not occur during mitotic prophase?
(a) Disappearance of the nuclear envelope
(b) Chromosome condensation
(c) Migration of centrioles towards the cell poles
(d) Synapsis of homologous chromosomes

30. Which of the following is not true for homologous chromosome pairs?
(a) They come from only one of the individual's parents
(b) They usually contain slightly different versions of the same genetic information
(c) They segregate from each other during meiosis I
(d) They synapse during meiosis I

31. Which of the following is not true for sister chromatids?
(a) They arise by replication during S phase
(b) They segregate from each other during each mitotic anaphase
(c) They usually contain identical versions of the same genetic information
(d) They segregate from each other during meiosis I

32. A cell that is post reproductive will remain in –
(a) S (b) G_1 (c) G_2 (d) M

33. The milestone that defines telophase is when the chromosomes –
(a) Separate (b) Come together (c) Are at opposite poles (d) Line up

34. Meiosis takes place in
(a) Conidia (b) Gemmule (c) Megaspore (d) Meiocyte

35. A reduction step during meiosis is important because –
(a) It returns the chromosomes number to normal before fertilization
(b) There is a mechanism for this
(c) Only one copy of each chromosome is necessary

(d) Otherwise chromosome copies would double each fertilization

36. Which of the following phases lasts for more than 95% of the duration of cell cycle –

(a) M-phase (b) G_1-phase (c) G_2-phase (d) Interphase

37. Which phase corresponds to the interval between the mitosis and initiation of DNA replication –

(a) S-phase (b) M-phase (c) G1-phase (d) G_2-phase

38. What happens in S-phase?

(a) DNA replication (b) In animal cell replication of centriole

(c) Both a and b (d) Separation of replicated DNA

39. Which is otherwise called quiescent stage?

(a) G_0 (b) G_2 (c) G_1 (d) S-phase

40. Cells in G_0-stage –

(a) Are metabolically more active

(b) Are metabolically inactive

(c) Remain metabolically active but no longer proliferate in normal condition

(d) None

41. Mitosis is seen in –

(a) Apical meristem (b) Lateral meristem (c) Intercalary meristem (d) All meristematic cells

42. As mitosis begins, a condensed chromosome appears to consist of two –

(a) Centromeres (b) Centriole (c) Centrosome (d) Chromatids

43. During which phase of the cell cycle does cell grow. The cell doubles in size during which phase of cell cycle

(a) Interphase (b) Metaphase (c) Anaphase (d) Telophase

44. Normal cellular activities, such protein synthesis, occurs primarily during

(a) Prophase (b) Metaphase (c) Anaphase (d) Interphase

45. It is important that the centromere not divide till the end of metaphase because it –

(a) Contains genes that control prophase (b) Holds the replicated DNA molecules together

(c) Is connected with nuclear membrane (d) Produces spindle fibres

46. Mitotic telophase shows which of the following events –

(a) Arrival of chromosomes cluster at opposite pole and loss of their identity as discrete elements

(b) NM assembles around each chromosomes clusters

(c) Nucleolus, GB and ER form

(d) All

47. Which of the following statements is True?

(a) Cell plate represents the middle lamella between the walls of two adjacents cells

(b) At the time of cytokinesis, organelles like mitochondria and plastids get distributed between the daughter cells

(c) Cytokinesis in plant cell is centrifugal and takes place by cell-plate formation while animal cells by furrowing / cleavage and is centripetal

(d) All

48. Go through the following events –

I. Termanization of chiasmata occurs

II. Chromosomes are fully condensed

III. Meiotic spindle is assembled

IV. By the end NM and nucleolus disappear

The above points indicate that it is –

(a) Zygotene stage (b) Diakinesis stage (c) Metaphase II (d) Pachytene

49. Crossing is an enzyme-mediated process. The enzyme is –

(a) DNA ligase (b) Recombinase (c) RNAase (d) DNAase

50. Diplotene can lasts for months or years in –

(a) Oocytes of all vertebrates (b) Oocytes of all invertebrates

(c) Oocytes of some vertebrates (d) Spermatocytes of all vertebrates

51. Match Column I with Column II

Column I	Column II
I. Chromosomes are moved to spindle equator	((a) Pachytene
II. Centromere splits and chromatids apart	((b) Zygotene
III. Pairing between homologous chromosomes takes place	((c) Anaphase
IV. Crossing between homologous chromosomes	((d) Metaphase

	I	II	III	IV
(a)	A	B	C	D
(b)	B	C	D	A
(c)	D	C	B	A
(d)	C	A	D	B

52. Cell cycle is the character of –

(a) Only bacteria (b) Only plants and animals

(c) Only protists (d) All organisms

53. Which event is not associated with prophase I?

(a) Synizesis (b) Synapsis (c) Segregation (d) Terminalization

54. Human cells in culture show a cell cycle to be completed in approximately –

(a) 42 hours (b) 24 hours (c) 24 minutes (d) 24 seconds

55. Yeast cell divides once in approximately every –

(a) 90 minutes (b) 9 minutes (c) 24 hours (d) 24 days

56. Which one is the correct sequence of a cell cycle?

(a) $G_2 \rightarrow M \rightarrow G_1 \rightarrow S$ (b) $S \rightarrow G_2 \rightarrow M \rightarrow G_1$

(c) $G_1 \rightarrow S \rightarrow G_2 \rightarrow M$ (d) $M \rightarrow G_1 \rightarrow S \rightarrow G_2$

57. A cell cycle includes –

(a) Interphase + M-phase / divisional phase (b) Prophase + Metaphase + Anaphase + Telophase

(c) $G_1 + S + G_2$ - phase (d) karyokinesis + Cytokinesis

58. If you are provided with root tips of onion in your class and asked to count the chromosomes, which of the following stages can you most conveniently look into?

(a) Anaphase (b) Prophase (c) Metaphase (d) Telophase

59. Which one is the longest phase?

(a) G_1 (b) G_2 (c) Interphase (d) Prophase

60. Which of the following statements is wrong?

(a) Chromosomes are well visualized in interphase

(b) Duration of cell cycle can vary from organism to organism and also from cell type to cell type

(c) M phase represents actual divisional phase or mitosis

(d) Interphase represents the phase between the two successive M phases

61. Interphase –

(a) Includes karyokinesis and cytokinesis

(b) Some time called resting phase, is the preparatory phase for division in which cell undergoes growth and DNA replication in an order

(c) Is the shortest phase in which biomolecules are synthesised very fast

(d) Includes 5% duration of the cell cycle

62. Which is the correct order of cell cycle

(a) $G_1 \rightarrow S \rightarrow G_2 \rightarrow$ Prophase $\rightarrow$ Metaphase $\rightarrow$ Anaphase $\rightarrow$ Telophase $\rightarrow$ Cytokinesis

(b) $G_2 \rightarrow G_1 \rightarrow S \rightarrow P\text{–}M \rightarrow A \rightarrow T \rightarrow$ cytokinesis

(c) $S \rightarrow G_1 \rightarrow G_2 \rightarrow P\text{–}M \rightarrow A \rightarrow T \rightarrow$ cytokinesis

(d) Prophase $\rightarrow$ Metaphase $\rightarrow$ Anaphase $\rightarrow$ Telophase $\rightarrow$ Cytokinesis $\rightarrow S \rightarrow G_2 \rightarrow G_1$

63. Which one is false about G_1-phase (Gap-I)?

(a) It occurs between M and S phase (b) In it cells are metabolically active and continuously grow

(c) It is pre-synthetic or post mitotic phase (d) In this phase DNA replicates

64. Which one is correct about S-phase (synthetic phase)?

I. It occurs between G_1 and G_2

II. It marks the period during which DNA replicates

III. At the end of this phase DNA is doubled but the number of chromosomes remains unchanged

IV. As the DNA is doubled in this phase number of chromosomes is also doubled

V. Centrioles replicate in this phase

VI. Amount of DNA changes from 2C to 4C

VII. It is pre G_2 and post G_1 phase

(a) I, II, IV, V, VI, VII are correct (b) I, II, III, V, VI, VII are correct

(c) All are correct (d) Only IV is correct

65. Which one is false statement about G_2-phase?

(a) It is post-S and Pre M-phase

(b) In this phase cell has quantity of DNA in each cell is 4C if the DNA in G1 phase is 2C

(c) In it G_0 resides

(d) Proteins like tubulin is formed for mitosis as well as cell growth continues

66. The sequence of events by which a cell duplicates its genome, synthesises other constituents of cells and eventually divides into daughter cells is termed as –

(a) Interphase (b) M-phase

(c) Karyokinesis + Cytokinesis (d) Cell cycle

67. Select the wrong statement –

(a) cell growth is a continuous process

(b) Cytoplasmic increase occurs only during one specific stage in the cell cycle

(c) DNA synthesis occurs only during one specific phase of cell cycle

(d) None

68. Which one is correct for G_0 stage?

I. It is a quiescent stage

II. In this phase cell cycle is stopped

III. G_0 cells in this stage do not grow or proliferate but metabolically active

IV. G_0 cells can divide in response to some stimulus

(a) All are correct (b) I, II, III are correct (c) I, II are correct (d) Only I and IV are correct

69. Which of the following phases of the cell cycle is not part of interphase –

(a) S (b) G_1, G_2 (c) G_0 (d) M

70. DNA replication occurs –

(a) Before mitosis and meiosis (b) Only before mitosis

(c) Only before meiosis (d) During chromosomal condensation in G_2-phase

71. DNA replicates –

(a) Only once in each cell cycle (b) Twice in each cell cycle

(c) Once in mitotic cell cycle, once in meiotic I (Reductional division) and Once in meiotic II (equational division)

72. Typically, cells that no longer undergo mitosis have chromosomes with _____ molecule of DNA and they remain in the _____ subphase of interphase –

(a) One, G_1 (b) Two, G_2 (c) One, G_2 (c) Two, S

73. If mitotic division is arrested in G1 phase of a cell cycle, then the condition is known as –

(a) G_2 phase (b) S phase (c) G_0 phase (d) M-phase

74. Non-dividing cells like heart cells, neuron are in _____ phase

(a) G_1 (b) G_2 (c) G_4 (d) G_0

75. Cells that do not further divide exit G_1 phase to enter an inactive stage called –

(a) G_1 stage (b) G_2 stage (c) G_4 stage (d) G_0 stage

76. Which of the following statements is false?

(a) Mitosis or the equational division is usually restricted to the 2N cells only

(b) In onion 2N = 16

(c) Growth and reproduction are characteristics of cells indeed of all living organism

(d) In plants meristematic tissues show meiosis

77. Which one is false about mitosis?

(a) Mitosis occurs in both haploid and diploid cells

(b) Root tip is the best material for study of mitosis

(c) M-phase, the most dramatic period of cell cycle and a progressive process having no clear cut line between various phases, involves a major reorganisation of all components of the cell

(d) Cells at late prophase, when view under microscope show GB, ER, nucleolus and NM

78. The major events of mitotic prophase include cell of the following except –

(a) Condensation of chromosomal materials to form compact chromosomes

(b) Initiation of the assembly of mitosis spindles, helped by cytoplasmic proteinaceous microtubules DNA replication

(c) Nuclear membrane breakdown and nucleolar disaggregation

(d) DNA replication

79. At metaphase of mitosis, each chromosome consists of _____ chromatid(s) _____ centromere(s) _____ kinetochore(s) and _____ molecules of DNA –

(a) 2, 1, 2, 2 (b) 2, 2, 2, 2 (c) 2, 1, 1, 1 (d) 2, 1, 2, 1

80. In human cells chromosomes are –

(a) Always condensed during the entire cell cycle (b) Different in different tissues

(c) Of the same size and shape (d) Visible only during mitosis and meiosis

81. Which of the following about the chromatids is false?

(a) They are replicated chromosomes still joined together at the centromere

(b) Both the chromatids are identical in both mitotic chromosome

(c) Both the sister chromatids separate in the late prophase

(d) In some lower plants and in some social insects haploid cells also divide by mitosis

82. Which of the following is true about kinetochores?

(a) They are localized at the centromere of each chromosome

(b) They are the sites where microtubules attach to separate the chromosomes

(c) They are organised so that there is one per sister chromatid in meiosis

(d) All of the above

83. The milestone that defines metaphase is when the chromosomes –

(a) Separate (b) Are at the opposite poles

(c) Line up (d) Cross over

84. The milestone that defines anaphase is when the chromosomes / chromatids

(a) Separate (b) Come together (c) Are at opposite poles (d) Line up

85. Human males have _____ different types of chromosomes.

(a) 23 (b) 24 (c) 46 (d) 48

86. The number of chromatids in a cell in prophase I of meiosis of a person with Turner syndrome (XO) is

(a) 23 (b) 25 (c) 46 (d) 90

87. Which one of the following correctly indicates the stages of mitosis at which particular events occur?

	DNA replication	Breakdown of nuclear membrane	Division of centromere
(a)	Interphase	Metaphase	Metaphase
(b)	Interphase	Prophase	Anaphase
(c)	Interphase	Interphase	Anaphase
(d)	Prophase	Prophase	Anaphase

88. Which is the longest phase in the cell cycle of human liver cells?

(a) Anaphase (b) Prophase (c) Interphase (d) Telophase

89. In prophase of mitosis, which one of the following events occurs in animal cells but not in plant cells?

(a) Centrioles migrate to opposite sides of the nucleus

(b) Homologous chromosomes do not associate

(c) The nuclear envelope (membrane) breaks down

(d) Nucleoli disappear

90. The events shown below occur during different phases –

A. Centromere splits, chromatids separate and move to opposite poles chromatids are now called chromosome

B. Chromosomes cluster at opposite poles, decondensation of chromosome reappearance of NM, GB, ER and nucleolus

C. Chromosomal replication

D. Kinetochores attach to spindle fibres and chromosome are arranged at equatorial plate

E. Spiration of chromosomes / condensation of chromosomal materials

Which of the following correctly identifies each of the phases described –

	Interphase	Prophase	Metaphase	Anaphase	Telophase
(a)	C	E	D	A	B
(b)	C	D	E	A	B
(c)	C	E	D	B	A
(d)	C	A	D	E	B

91. During mitotic anaphase, chromatids migrate –

(a) From the poles of the cell toward the metaphasic plate

(b) Toward the NM

(c) Along with their side chromatids toward one pole

(d) From metaphase plate towards the poles

92. Microtubules that form the mitotic spindle tend to originate from _____ and terminate in _____.

(a) Centromeres, telomeres (b) Centrioles, telomere

(c) Centrioles, kinetochores (d) The nuclear envelope, Kinetochore

93. Synaptonemal complex is more conspicious at

(a) Zygotene (b) Pachytene (c) Diplotene (d) Leptotene

94. In plant cells, cytokinesis is accomplished by the formation of a(n) –

(a) Aster (b) Equatorial plate (c) Cell plate (d) Membrane furrow

95. The distribution of mitochondria and plastid between the daughter cells during cytokinesis –

(a) Is random (b) Is directed by centrioles

(c) Is directed by mitotic spindle (d) Is directed by nuclear membrane

96. When dividing cells are examined under a light microscope, chromosomes first become visible during –

(a) Interphase (b) Prophase (c) Metaphase (d) G_2 and S phases

97. Centromere are –

(a) Constricted regions of chromosomes (b) Regions where microtubules polymerise

(c) Part of Cilia (d) The central part of the same cell

Cell Cycle and Cell Division

98. In the cell cycle, mitosis occurs between –

(a) G_1 and S phase (b) S and G_1 phase (c) S and G_2 phase (d) G_1 and G_2 phase

99. Cellular structures which disappear during late prophase and reappear during telophase are –

(a) Mitochondria and spindle fibres (b) Plasma membrane

(c) Nuclear membrane and nucleolus (d) Plastid

100. The best stage to observe shape, size and number of chromosomes is –

(a) Metaphase (b) Anaphase (c) Interphase (d) Prophase or telophase

101. A picture of dividing *Drosophila* cell through a microscope shows that the cell contains 8 chromosomes, each consisting of two chromatids. The picture must have been taken during –

(a) Mitotic metaphase (b) Mitotic Anaphase (c) Meiotic Anaphase II (d) Meiotic Telophase II

102. Which of the following phase of mitosis is essentially the reverse of prophase in terms of nuclear changes?

(a) S-phase (b) Anaphase (c) Telophase (d) Interphase

103. Which of the following is not a function of mitotic cell division in animals?

(a) Growth and repair (b) Cell replacement (c) Asexual reproduction (d) Gametes formation

104. Given –

1. Chromatid
2. Monod
3. Dyad
4. Daughter chromosome

The correct sequence in cell division is :

(a) 1, 2, 3, 4 (b) 2, 3, 1, 4 (c) 3, 2, 1, 4 (d) 4, 3, 2, 1

105. Cytokinesis in animal cell takes place by _____; in _____ direction while in plant cell by _____; in _____ direction –

(a) Furrowing, centrifugal, cell plate, centripetal (b) Furrowing, centripetal, cell plate, Centrifugal

(c) Cell plate, centrifugal, furrowing, centripetal (d) Cell plate, centripetal, furrowing, centrifugal

106. Phragmoplasts or Phragmosomes, vesicles of GB are the precursors of –

(a) Cell plate (b) Chloropalsts (c) Chromoplast (d) Protoplast

107. In some organisms like certain fungi and algae, cells undergoing mitosis repeatedly without subsequently undergoing cytokinesis. What would result from it?

(a) Decrease in the chromosome number (b) Decrease in the DNA molecules

(c) Formation of syncytium (d) Multicellularity

108. Liquid endosperm in coconut is resulted due to –

(a) Karyokinesis followed by cytokinesis

(b) Failure of karyokinesis followed by cytokinesis

(c) Karyokinesis twice followed by single cytokinesis

(d) karyokinesis is not followed by cytokinesis

109. Which of the following statements is correct?

I. Mitosis / equatorial is usually restricted to diploid cells

II. In some lower plants and in some social insects haploid cells also divide by mitosis

III. Mitosis is essential for the cell to restore the nucleo-cytoplasmic ratio

IV. Mitotic division in apical meristem lateral cambium results in a continuous growth throughout the life

(a) All are correct (b) All are incorrect (c) Only I and are correct (d) Only IV are correct

110. Significance of mitosis is in –

(a) Producing identical cells genetically similar to mother cell

(b) Increasing cellular mass

(c) In reducing the chromosome (2N ⟶ N)

(d) Swift division

111. Mitosis is important for skin, gut and blood cells because –

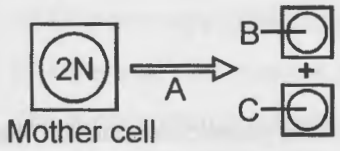
(a) It allows the animals to grow faster (b) All cells must divide

(c) Old and work out cells are regularly replaced (d) It helps the cells to overcome the effect of UV-rays

112. In meiosis, haploid condition is realised by which stage?

(a) Anaphase I (b) Anaphase II (c) Metaphase I (d) Metaphase II

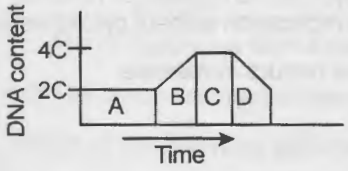
113.



Identify A to C

	A	B	C
(a)	Meiosis	N	N
(b)	Meiosis	2N	2N
(c)	Mitosis	N	N
(d)	Mitosis	2N	2N

114.



The above graph shows the change in DNA content during various phases (A to (d) in a typical mitotic cell cycle. Identify the phases

	A	B	C	D
(a)	G_2	G_1	S	M
(b)	G	S	G_2	M
(c)	G_1	S	G_2	M
(d)	M	G_1	S	G_2

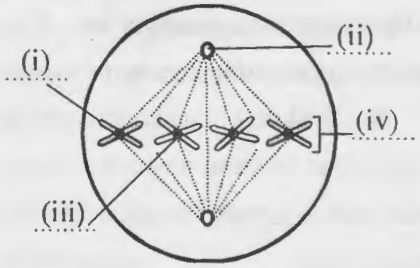
115. To form 16 cells how many times a root cell must divide –

(a) 4 (b) 15 (c) 16 (d) 2

116. To form 16 cells how many times mitosis is supposed to occur –

(a) 4 (b) 15 (c) 16 (d) 2

117. Label the structure indicated by lines (i), (ii), (iii) and (iv) –



(a) (i) - Chromatid, (ii) Centriole, (iii) Centromere, (iv) Chromosome

(b) (i) - Chromomosome, (ii) Centriole, (iii) Centromere, (iv) Chromatid

(c) (i) - Chromatid, (ii) Centromere, (iii) Centriole, (iv) Chromosome

(d) (i) - Chromomosome, (ii) Centromere, (iii) Centriole, (iv) Chromatid

118. The members of a homologous pair of chromosomes –

(a) Are identical in size and appearance

(b) Contain identical genetic information

(c) Separate to opposite poles of the cell during mitosis

(d) Are found only in haploid cells

119. The four haploid nuclei found at the end of meiosis differ from one another in their exact genetic composition, some of this difference is the result of

(a) Cytokinesis

(b) Replication of DNA during the S-phase

(c) Spindle formation

(d) Crossing over during prophase I

120. A cell that passes the restriction point in G_1 will most likely –

(a) Undergo chromosome duplication

(b) Have just completed cytokinesis.

(c) Continue to divide only if it is a cancer

(d) Move into the G_0 phase

121. Asexual reproduction produces genetically identical individuals because –

(a) Chromosome do not have to replicate

(b) It involves chromosome replication without cytokinesis

(c) No meiosis or fertilization takes place

(d) The only cell division that occurs in meiosis

122. One difference between mitosis and meiosis I is that –

(a) homologous chromosome pairs synapse during mitosis

(b) Chromosome do not replicate in the interphase preceding meiosis

(c) Homologous chromosomes pairs synapse during meiosis but not mitosis

(d) Spindle composed of microtubules are not required during meiosis

123. The number of chromosomes is reduced to half during –

(a) Anaphase of mitosis and meiosis

(b) Meiosis II

(c) Meiosis I

(d) Fertilization

124. Which of the following is correct?

(a) DNA replication occur before mitosis but not meiosis.

(b) In human cells, chromosome are visible only during mitosis and meiosis.

(c) During meiosis centromere divides in anaphase I.

(d) Crossing over takes place in meiosis II.

125. Chromosome number is reduced during meiosis because the process consists of –

(a) Two cell divisions without any chromosome replication

(b) A single cell division without any chromosome replication

(c) Two cell divisions in which half of the chromosomes are destroyed

(d) Two cell divisions and only a single round of chromosome replication

126. Which of the following is false?

(a) The mitotic spindle is composed of microtubules.

(b) In plant cells, cytokinesis is accomplished by the formation of a cell plate.

(c) The distribution of mitochondria between the daughter cells during cytokinesis is random.

(d) Chromatin condenses to form discrete, visible chromosomes early in G_1.

127. A reduction step during meiosis is important because –

(a) It returns the chromosome number to normal before fertilization

(b) There is a mechanism for this

(c) Only one copy of each chromosome is necessary

(d) Otherwise chromosome copies would double each fertilization

128. The importance of synapsis and the formation of chiasmata is that –

(a) Reciprocal exchange of chromosomal sections occurs

(b) The DNA on homologous chromosomes mix

(c) As a result an increase in the variation of progeny occurs

(d) All of the above

129. Which of the following is true for the meiosis?

(a) The chromosome number in the resulting cell is halved

(b) DNA replication occurs between meiosis I and meiosis II

(c) The homologous do not pair during prophase I

(d) The chromosome number of the resulting cells is the same as that of the parent cell

130. Which of the following statements about meiosis is false?

(a) Haploid cells cannot divide meiotically

(b) DNA replication does not occur during interkinesis

(c) Assortment of homologous chromosomes on the equatorial plate during metaphase I is independent

(d) Of the four cells produced by meiosis, none are genetically identical to the parent cells but two are identical to each other

131. Which one is correct about meiosis?

(a) First division is reduction and second division is equational

(b) The best material for the study of meiosis is microspore (pollen) mother cell in microsporangium of anther

(c) The importance of meiosis lies in maintaining the chromosomal number from generation to generation in sexually reproducing organisms

(d) All

132. Which one is correct about crossing over / genetic recombination?

I. It occurs in tetrad stage. It occurs in pachytene of prophase I of meiosis I

II. It occurs between non-sister chromatids of homologous chromosomes

III. It is the exchange of genetic material between the homologous chromosomes

IV. It is recombinase enzyme mediated process

V. Recombination nodule of synaptonemal complex between the homologous chromosomes is the site of crossing over

VI. It causes genetic variation which is important for evolution.

VII. It is also the reciprocal transfer of genes between the non homologous chromosomes

(a) All (b) All except VII (c) II, IV and VII (d) I, III and VII

133. Recombination is caused by –

(a) Crossing over alone (b) Crossing over and independent assortment

(c) Independent assortment only (d) Chiasma formation

134. Match the Column I with Column II –

Column I		**Column II**
1.	Terminalization of chiasmata	A. Zygotene
2.	Synapsis	B. Diplotene
3.	Crossing over	C. Metaphase I
4.	Dissolution of synaptonemal complex	D. Diakinesis
5.	Best stage for the study of chiasmata	E. Pachytene
6.	Nuclear membrane and nucleolus disappear	
7.	Tetrads are arranged on equatorial line	

(a) A - 2, B - 4, 5, C - 7, D - 1, 6, E - 3 (b) A - 2, B - 3, C - 7, D - 1, 4, 6, E - 5

(c) A - 2, B - 7, C - 3, D - 1, 4, 5, E - 6 (d) A - 2, B - 1, C - 4, D - 5, 3, E - 6

135. I. It is the final phase of prophase I

II. Termination of chiasmata occurs

III. Fully condensed chromosomes

IV. Spindle is assembled

V. Nucleolus and NM breaks down

The above characteristic are attributed to –

(a) Zygotene (b) Diakinesis (c) Diplotene (d) Metaphase I

136. Anaphase I is marked by –

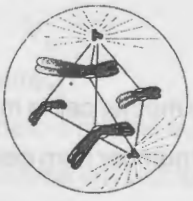
(a) Movement of homologous chromosomes toward their respective pole

(b) Centromere division

(c) Sister chromatids remain associated at centromere

(d) a and c

137. Identify the following diagram –



(a) Transition to Metaphase (mitosis) (b) Transition to Anaphase II (meiosis)

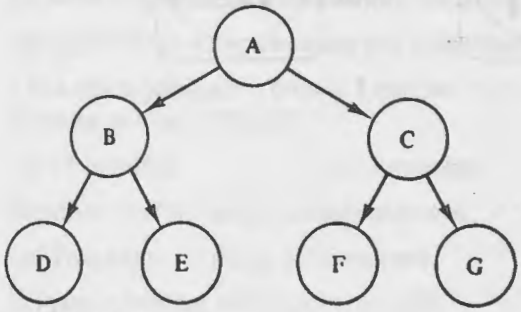
(c) Transition to Metaphase-I (meiosis) (d) Transition to Anaphase (mitosis)

138. The following shows a cell undergoing in Prophase I

Keeping the diagram in view, which of the following diagram is correct for one of the cell at the end of meiosis?

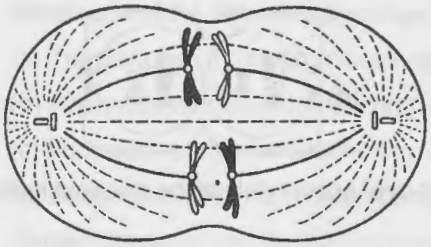
(a)  (b)  (c)  (d) 

139. D, E, F and G are the four daughter cells resulting when cell A undergoes meiosis as shown in the following diagram. If no crossing over has occurred which cells listed below, if any, are genetically identical?



(a) Cells B and C
(b) No two cells
(c) Cells D and E, cells F and G
(d) Cells D, and F, Cell E and G

140. The drawing below shows a cell whose diploid chromosome number is four. This cell is in –



(a) Metaphase
(b) Anaphase of mitosis
(c) First anaphase of meiosis
(d) Second anaphase of meiosis

141. Which one is correct about bivalent ?

I. Bivalent are tetrads

II. A bivalent means 4 chromatids and 2 centromere

III. One bivalent consists of 2 homologous chromosomes, each and sister chromatids

IV. Bivalents form in zygotene

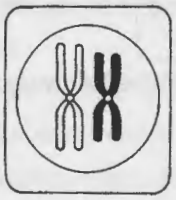
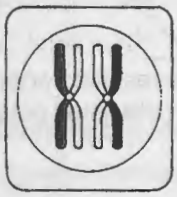
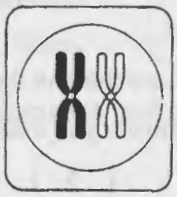
(a) All (b) Only III (c) III and IV (d) Only IV

142. The accompanying diagram shows the nuclear contents of a cell.

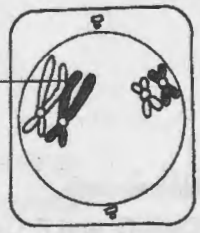
Which line in the following table refers CORRECTLY to this cell?

	number of pairs of homologous chromosomes	number of chromatids	number of centromeres
(a)	3	6	12
(b)	3	12	6
(c)	6	6	12
(d)	6	12	6

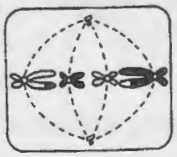
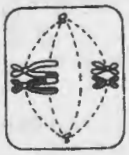
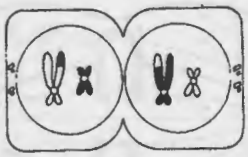
143. Which of the following correctly shows a pair of homologous chromosomes at the start of meiosis?

(a)  (b)  (c)  (d) 

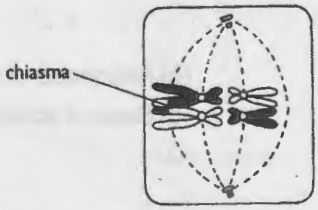
144. The following diagram shows a cell undergoing meiosis



Which of the diagrams below shows the next stage in the process?

(a)  (b)  (c)  (d) 

145. In the following diagram of a cell undergoing meiosis, assume that crossing over occurs only at the chiasma indicated



Which of the following gametes will NOT be formed from this cell?

(a)  (b)  (c)  (d) 

146. Four different steps that occur during meiosis are given in the following list.

I. Complete separation of chromatids.

II. Pairing of homologous chromosomes.

III. Lining up of paired chromosomes on equator.

IV. Crossing over between chromatids.

These steps would occur int eh order –

(a) II, III, IV, I (b) III, II, IV, I (c) II, IV, III, I (d) III, I, II, IV

147. The DNA content of individual cells and the number of cells in each phase of a "cell cycle" can be determined using flow cytometry. Which of the following combinations of "phase of a cell cycle and its corresponding DNA content" can be considered normal?

A. Diploid cells found in the G_0 or G_1 phase.

B. Cells with twice the normal DNA content in the early M phase.

C. Cells with intermediate amounts of DNA in the S phase.

D. Cells with twice the normal DNA content in the G_2 phase.

(a) A and B (b) B and C (c) C and D (d) All

148. Sara would like to film the movement of chromosomes during cell division. Her best choice for a microscope would be

(a) light microscope, because of its resolving power.

(b) transmission electron microscope, because of its magnifying power.

(c) scanning electron microscope, because the specimen is alive.

(d) light microscope, because the specimen is alive.

149. Let a cell's generation time is 1 minute. In 20 minutes a culture tube (culture medium) is 1/8th filled with cells. When the tube will be fullfilled?

(a) 21 minutes (b) 23 minutes (c) 60 minutes (d) 160 minutes

150. Number of chromatids at metaphase is :

(a) Two each in mitosis and meiosis (b) Two in mitosis and one in meiosis

(c) two in mitosis and four in meiosis (d) one in mitosis and two in meiosis

151. How many equational divisions are necessary in a cell of onion root tip to form 128 cells?

(a) 64 (b) 128 (c) 7 (d) None of these

152. Which one of the following precedes reformation of the nuclear envelope during M-phase of the cell cycle?

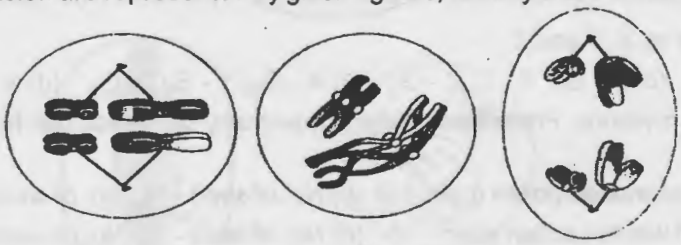
(a) Transcription from chromosomes and reassembly of the nuclear lamina

(b) Formation of the contractile ring, and formation of the phragmoplast

(c) Formation of the contractile ring, and Transcription from chromosomes

(d) Decondensation from chromosomes, and reassembly of the nuclear lamina.

153. Certain stages of cell division are represented by given figures, identify them correctly



(a) A - Metaphase, B - Prophase I, C - Anaphase (b) A - Metaphase, B - Prophase I, C - Anaphase I

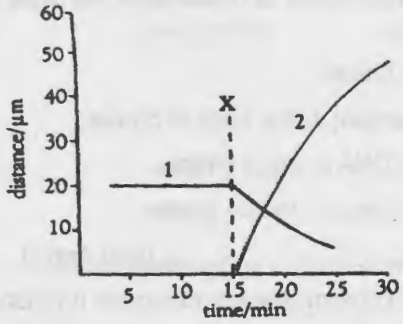
(c) A- Metaphase I, B - Prophase I, C -Anaphase I (d) A - Metaphase I, B - Prophase, C - Anaphase

154. The diagrams show stages of mitosis.

What is the order of these stages during mitosis?

(a) 1, 2, 4, 3, 5 (b) 2, 3, 5, 1, 4 (c) 3, 5, 4, 1, 2 (d) 3, 4, 5, 1, 2

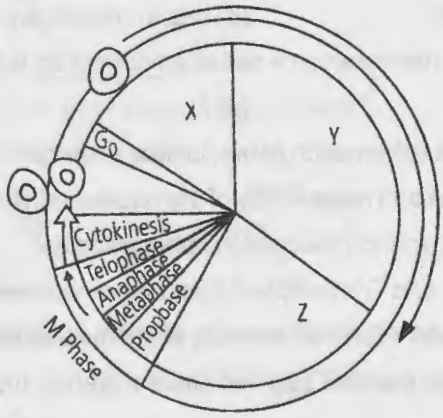
155. The graph below illustrates the behaviour of the chromosomes during one mitotic cell division.



Which one of the following correctly indicates the changes illustrated by curves 1 and 2, and the stage of mitosis which is commencing at X?.

	stage of mitosis commencing at X	distance between centromeres of chromosomes and poles of spindle	distance between centromeres of sister chromatids
(a)	anaphase	1	2
(b)	anaphase	2	1
(c)	metaphase	1	2
(d)	metaphase	2	1

156. The following diagram refers to a typical cell cycle.



Identify the parts marked as X, Y and Z.

(a) X - G_1; Y - S; Z - G_2 (b) X - G_2; Y - S; Z - G_1 (c) X - G_0; Y - S; Z - G_2 (d) X - G_1; Y - G_2; Z - G_0

157. You are given 13 meiotic divisions. From these division how many seeds you can form? How many pollen grain will be wasted?

(a) No. of seed - 13, No. of wasted pollen grain - 13 (b) No. of seed - 10, No. of wasted pollen grain - 2

(c) No. of seed - 2, No. of wasted pollen grain - 10 (d) No. of seed - 52, No. of wasted pollen grain - 52

158. The plant *Haplopappus spp.* is diploid and 2n = 4. There are one long pair and one short pair of chromosomes. The figure below represent anaphases of individual cells in meiosis or mitosis in a plant that is genetically a dihybrid (A/a; B/b genes on different chromosome. The lines represent chromosomes or chromatids, and the points of the V's represent centromeres. In each case, the figure represents a cell in meiosis I, meiosis II, mitosis or an impossible situation.

(a) 1 - Meiosis I, 2 - Mitosis, 3 - Meiosis I, 4 - Meiosis I (b) 1 - Mitosis I, 2 - Mitosis, 3 - Meiosis II, 4 - Meiosis I

(c) 1 - Impossible, 2 - Meiosis-II, 3 - Impossible, 4 - Impossible (d) 1 - Impossible, 2 - Mitosis, 3 - Meiosis I, 4 - Meiosis I

159. What would be the number of chromosomes of the aleurone cells of a plant with 42 chromosomes in its roots tip cells?

(a) 21 (b) 42 (c) 63 (d) 84

160. Select the correct option with respect to mitosis

(a) Chromosomes move to the spindle equator and get alingned along equatorial plate in metaphase

(b) Chromatids separate but remain in the centre of the cell in anaphase

(c) Chromatids start moving towards opposite poles in telophase

(d) Golgi complex and endoplasmic reticulum are still visible at the end of prophase

161. At metaphase, chromosomes are attached to the spindle fibres by their :

(a) Satellites (b) Secondary constrictions

(c) Kinetochores (d) Centromere

162. The chromosomes become gradually visible with compaction of chromatin during the meiotic stage

(a) diplotene (b) leptotene (c) zygotene (d) pachytene

163. Two nuclear divisions occur during meiosis: meiosis I and meiosis II. Meiosis reduces chromosome number and introduces genetic variations in offsprings.Which of the following events does not occur during prophase I in meiosis?

(a) Crossing-over between homologous chromosomes (b) Pairing of homologous chromosomes

(c) Disintegration of spindle fibres (d) Formation of spindle fibres

164. The condensation of chromatin into dense chromosomes takes place during ___i___, while chromosomes uncoil to form thread-like chromatin during ___ii___.

(a) i-telophase; ii-metaphase (b) i-metaphase; ii-anaphase

(c) i-anaphase; ii-prophase (d) i-prophase; ii-telophase

165. The given diagram illustrates a cell

Which of the following statements regarding the image is false?

(a) It is in telophase

(b) It is an animal cell

(c) The cell furrow is forming

(d) The nuclear envelope is disappearing

166. Which stages of cell division do the following figures A and B represent respectively?

Fig. A

Fig. B

	Fig. A	Fig. B
(1)	Prophase	Anaphase
(2)	Metaphase	Telophase
(3)	Telophase	Metaphase
(4)	Late Anaphase	Prophase

(a) 1 (b) 2 (c) 3 (d) 4

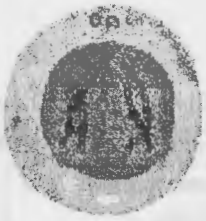
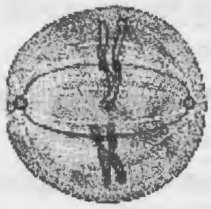
167. A bivalent consists of

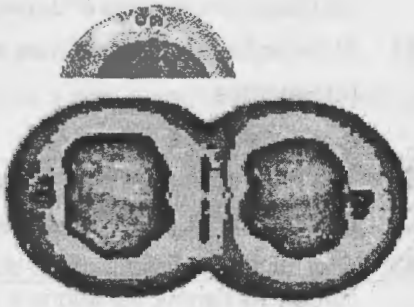
(a) Two chromatids and one centromere (b) Four chromatids and two centromeres

(c) Two chromatids and two centromeres (d) Four chromatids and four centromeres

168. The given images illustrate a sequence in cell division

The missing stage in the above sequence is

(a)  (b)  (c) 



169. Identify the meiotic stage in which the homologous chromosomes separat associated at their centromeres :

(a) Metaphase I (b) Metaphase II (c) Anaphase I (d) Anaphase II

170. The chromosomes become gradually visible with compaction of chromatin during meiotic stage

(a) diplotene (b) leptotene (c) zygotene (d) pachytene

171. During gamete formation, the enzyme recombinase participates during

(a) Metaphase - I (b) Anaphase - II (c) Prophase - I (d) Prophase - II

172. Given below is the representation of a certain event at a particular stage of a type of cell division. Which is this stage?

(a) Prophase I during meiosis (b) Prophase II during meiosis

(c) Prophase of Mitosis (d) Both prophase and metaphase of mitosis

173. Meiosis results in

(a) Production of gametes (b) Reduction in the number of chromosomes

(c) Introduction of variation (d) all of the above

174. At which stage of meiosis does the genetic constitution of gametes is finally decided

(a) Metaphase I (b) Anaphase II (c) Metaphase II (d) Anaphase I

175. Meiosis occurs in organisms during

(a) Sexual reproduction (b) Vegetative reproduction

(c) Both sexual and vegetative reproduction (d) None of the above

176. During anaphase-I of meiosis

(a) Homologous chromosomes separate (b) Non-homologous autosomes separate

(c) Sister chromatids separate (d) Non-sister chromatids separate

177. Meiosis is characterised by

(a) Double reduction division (b) Equal division only

(c) Both reduction and equal division (d) Homotypic division

178. A bivalent of meiosis-I consists of
(a) Two chromatids and one centromere (b) Two chromatids and two centromere
(c) Four chromatids and two centromere (d) Four chromatids and four centromere

179. Cells which are not dividing are likely to be at
(a) G_1 (b) G_2 (c) G_0 (d) S phase

180. Which of the events listed below is not observed during mitosis?
(a) Chromatin condensation
(b) Movement of centrioles to opposite poles
(c) Appearance of chromosomes with two chromatids joined together at the centromere.
(d) Crossing over

181. Identify the wrong statement about meiosis
(a) Pairing of homologus chromosomes
(b) Four haploid cells are formed
(c) At the end of meiosis the number of chromosomes are reduced to half
(d) Two cycle of DNA replication occurs

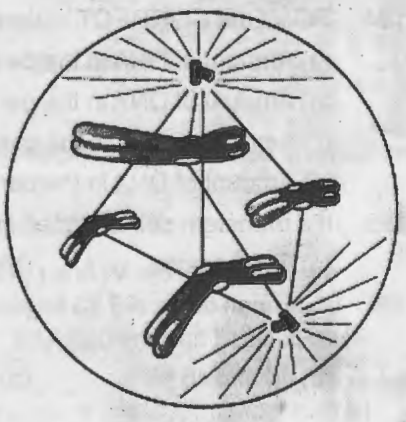
182. Select the correct statement about G_1 phase
(a) Cell is metabolicaly inactive (b) DNA in the cell does not replicate
(c) It is not a phase of synthesis of macromolecules (d) Cell stops growing

183. In onion root tip during metaphase stage of mitosis the number of kinetochores will be –
(a) 4 (b) 8 (c) 16 (d) 32

184. A stage in cell division is shown in the figure. Select the answer which gives correct identification of the stage with its characteristics.

(a)	Telophase	Nuclear envelop reforms, golgi complex reforms.
(b)	Late anaphase	Chromo-somes move away from equatorial plate, golgi complex not present
(c)	Cytokinesis	Cell plate formed, mitochondria distributed between two daughter cells
(d)	Telophase	ER and nucleolus not reformed yet

185. Stage at which the following structure visible is
(a) Transition to Metaphase
(b) Transition to Late Prophase
(c) Transition to Early Prophase
(d) Transition to Anaphase



186. The complex formed by a pair of synapsed homologous chromosomes is called:
(a) Equatorial plate (b) Kinetochore (c) Bivalent (d) Axoneme

187. During which phase(s) of cell cycle, amount of DNA in a cell remains at 4C level if the initial amount is denoted as 2C?
(a) G_0 and G_1 (b) G_1 and S (c) Only G_2 (d) G_2 and M

188. In 'S' phase of the cell cycle :-
(a) Amount of DNA doubles in each cell.
(b) Amount of DNA remains same in each cell.
(c) Chromosome number is increased.
(d) Amount of DNA is reduced to half in each cell.

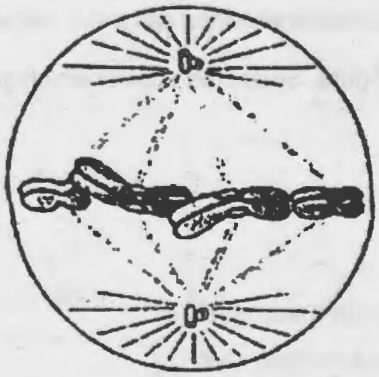
189. The enzyme recombinase is required at which stage of meiosis :
(a) Pachytene (b) Zygotene (c) Diplotene (d) Diakinesis

190. The centrosome duplicates during the
(a) G_2 - phase of cell cycle (b) S - phase of cell cycle
(c) Prophase of cell cycle (d) G_1 - phase of cell cycle

191. During the metaphase stage of mitosis spindle fibres attach to chromosomes at
(a) Centromere (b) Kinetochore
(c) Both centromere and kinetochore (d) Centromere, kinetochore and areas adjoining centromere

192. During meiosis I, the chromosomes start pairing at
(a) Leptotene (b) Zygotene (c) Pachytene (d) Diplotene

193. A stage of mitosis is shown in the diagram. Which stage is it and what are its characteristics?



(a) Late prophase – chromosomes move to spindle equator
(b) Metaphase – spindle fibres attached to kinetochores, centromeres split and chromatidsseparate
(c) Metaphase – chromosomes moved to spindle equator chromosomes made up of two sister chromatids
(d) Anaphase – centromeres split and chromatids separate and start moving away

194. Select the CORRECT statement related to mitosis
(a) Amount of DNA in the parent cell is first halved and then distributed into two daughter cells
(b) Amount of DNA in the parent cell is first doubled and then distributed into two daughter cells
(c) Amount of DNA in the parent cell is first halved and then distributed into four daughter cells
(d) Amount of DNA in the parent cell is first doubled and then distributed into four daughter cells

195. If a meristem cell is placed in a medium containing active thymidine, radioactivity will be first observed in
(a) Euchromatin (b) Heterochromatin (c) Both simultaneously (d) None of the above

196. In human there are 23 bivalents in metaphase - I, what will be the number of chromosomes in daughter cells after meiosis - I and meiosis - II?
(a) 46 and 46 (b) 92 and 46 (c) 23 and 23 (d) 46 and 23

197. Choose the correct option.
(a) Longest phase in meiosis is metaphase - I
(b) During cell division spindles are attached to NOR (Nucleolar organising region) of chromosome
(c) In meiosis nucleus divides twice and DNA also replicates twice
(d) Synaptinemal complex appears first in zygotene of meiosis and disappears in diplotene

198. Go through the following statements
(i) Meiosis never occurs in haploid cells
(ii) Meiosis occurs in sperm and egg
(iii) Mitosis heals wound
(iv) Crossing over occurs between sister chromatids of a chromosome in pachytene
(v) In anaphase centromere splits but chromatids do not separate.
(a) All are correct (b) (i) and (iii) are correct (c) (i), (ii) and (v) are correct (d) Only (ii) is correct

199. Go through the following statements.
I. Meiosis - II is similar to mitosis
II. Terminalization of chiasmata occurs in meiosis - II.
III. Meiosis - II performs separation of homologous chromosomes.
IV. Interphase is intermitosis.
V. After mitosis, the number of chromosomes in daughter cells shall one fourth of parent cell.
Pick up the correct statements
(a) I, III, V (b) I, II, III (c) I, III, IV (d) I, IV

200. Choose the correct option :
(a) Spindle fibres attach to centromere, not to kinetochore.
(b) Homologous genes are separated at diplotene
(c) Chromatin condenses to form chromosome in telophase
(d) Number of chromatids per chromosome is two in meiotic anaphase I but one in mitotic anaphase

201. Which is incorrect about G_0?
(a) Cell metabolism continues in G_0. (b) Cell growth occurs in G_0
(c) Mitosis occurs after G_0 (d) Hormones help to exit G_0

202. If a cell possesses twice as much DNA as in the functional cell, the cell
(a) Is preparing to divide (b) Has completed division
(c) Has ceased to function (d) Has reached end of its life span

203. Arrange the following events of meiosis in correct sequence
I. Terminalization
II. Crossing over
III. Synapsis
IV. Disjunction
(a) 4, 3, 2, 1 (b) 3, 2, 1, 4 (c) 2, 1, 4, 3 (d) 1, 4, 3, 2

204. Read the following statements
I. G_0 state of celldenotes exit of cell from cell cycle
II. The two chromatids of a metaphase chromosome represent replicated chromosome to be separated at anaphase
III. DNA polymerase is active in S-phase.
IV. RNA polymerase is active throughout interphase.
(a) I and II are correct (b) I, II, III, IV are correct (c) II and IV are correct (d) I and IV are correct

205. Gametic information is transferred from zygote to all cells of body by
(a) Mitosis (b) Meiosis (c) Dinomitosis (d) Amitosis

206. Go through the following statements and choose incorrect one.
(a) After meiosis - I both the chromatids of a chromosome is genetically similar.
(b) Homologous chromosomes show maximum attraction during zygotene.
(c) Number of chromatids per chromosome is two in both mitotic and meiotic metaphase
(d) The amount of DNA in each cell after cytokinesis in mitosis is double to the amount of DNA in previous G2 phase.

207. A cell that passes the restriction point in G1 will most likely
(a) undergo chromosome duplication
(b) have just have completed cytokinesis
(c) continue to divide only if it is a cancer cell
(d) show a drop in MPF concentration

208. Which one of the following is the significance of mitosis?
(a) Restricted to haploid cells
(b) Cell repair
(c) Increases the genetic variability
(d) Recombination of chromosomes

209. Find out the correct statement.
(a) During mitosis endoplasmic reticulum and nucleolus disappear completely at early prophase.
(b) Chromosomes are arranged along the equator during prophase of mitosis
(c) Chromosome is made up of two sister chromatids at anaphase of mitosis
(d) Small disc shaped structures at the surface of the centromeres that appear during metaphase are kinetochores.

210. Select the events that do not occur in interphase stage of cell-cycle.
A. RNA and protein synthesis.
B. Cytoplasmic growth.
C. Polymerisation of spindle fibres protein.
D. Disappearance of Golgi bodies and ER.
E. DNA molecules in highly supercoiled stage.
(a) C, D and E
(b) D and E only
(c) B, C and D
(d) C and D only

211. If mitotically dividing diploid cell has initial amount of DNA as 5 Pg in G1 stage, that is distributed among its 8 chromosomes then which of the following assumption is correct?
(a) G2 phase – 16 chromatids with 10 Pg DNA
(b) Late prophase nucleus – 4 chromatids with 10 Pg DNA
(c) Anaphasic cell – 16 chromatids with 10 Pg DNA
(d) S stage – 4 chromatids with 2.5 Pg DNA

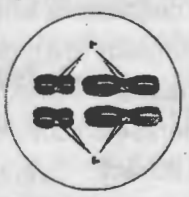
212. Compaction of chromosomes continues and it is followed by the synapsis stage during cell division in
A. Antherozoid mother cells in mosses.
B. Meristematic tissues of plants.
C. Sperm mother cells in ferns.
D. Spore mother cells in conifers.
E. Embryonic stage of higher plants.
(a) A, C and D
(b) C and D
(c) D only
(d) All are correct, except B

213. Which of the following is a correct sequence of meiotic cell-cycle w.r.t. given diagram?


A


B


C


D

(a) A → C → D → B
(b) B → D → C → A
(c) B → D → A → C
(d) C → B → D → A

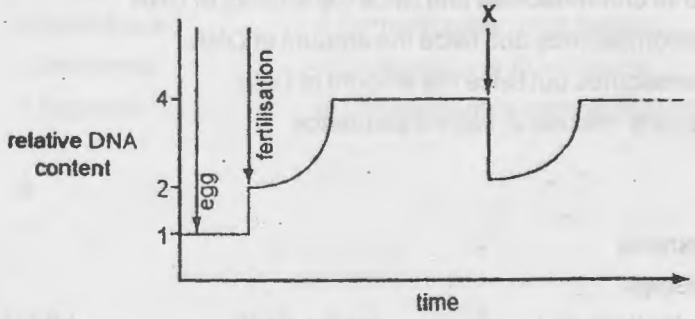
214. The stage between two meiotic divisions is called interkinesis and
(a) Is long lived
(b) Is followed by prophase I
(c) Is generally short lived and followed by prophase II
(d) Involves duplication of genes and centrioles.

215. What are the conditions in a human cell just before the cell enters prophase?

	No. of chromatids	No. of molecules of DNA in nucleus	Spindle present	Nuclear envelope present
(a)	46	46	Yes	No
(b)	92	46	No	Yes
(c)	46	92	Yes	Yes
(d)	92	92	No	Yes

216. Which processes involve mitosis?
(a) Growth, reduction division and asexual reproduction
(b) Growth, repair and asexual reproduction
(c) Growth, repair and semi-conservative replication
(d) Repair, reduction division and asexual reproduction

217. The graph represents the changes in the quantity of DNA present in one nucleus at different stages in the life cycle



Which stage takes place at X?
(a) Interphase (b) Metaphase (c) Prophase (d) Telophase

218. Which one of the following is wrong for meiosis?
(a) It leads to formation of sister chromatids
(b) It occurs in diploid cell
(c) It occurs in haploid cell
(d) It occurs by splitting of centromeres and separation of sister chromatids

219. Which of the following does not occur in the interphase of eukaryotic cell division?
(a) Increase of ATP synthesis (b) Increase of DNA synthesis
(c) Increase of RNA synthesis (d) Reduction in cell size

220. Match the items in Column I with those in Column II, and choose the correct answer.

Column I	Column II
P. Mitosis	(i) Occurs in diploid cells only
Q.Meiosis	(ii) Occurs in both haploid and diploid cells
	(iii) Daughter and parent cells have same chromosome numbers
	(iv) Synapsis of homologous chromosomes

(a) P - (i), Q - (ii) (b) P - (ii), Q - (iii) (c) P - (iii), Q - (iv) (d) P - (iv), Q - (i)

221. What is a correct description of the centrioles, nuclear envelope and spindle during mitosis in animal cells?

	Phase	Centrioles	Nuclear envelope	Spindle
(a)	Anaphase	Replicate	Absent	Present
(b)	Metaphase	Present	Reforms	Present
(c)	Prophase	Move apart	Breaks up	Forms
(d)	Telophase	Replicate	Breaks up	Breaks up

222. Select the correct option.

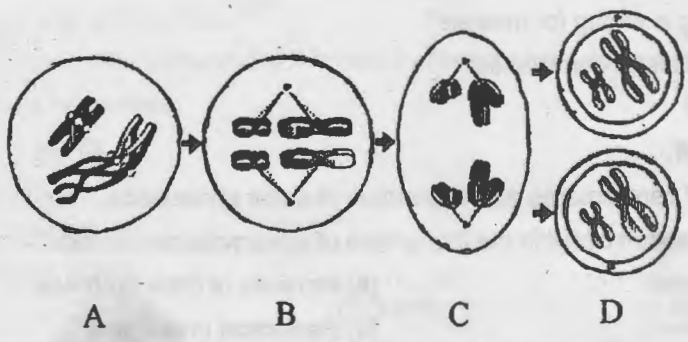
Column I	Column II
A. Synapsis aligns homologous chromosomes	(i) Anaphase-II
B. Synthesis of RNA and protein	(ii) Zygotene
C. Action of enzyme recombinase	(iii) G_2-phase
D. Centromeres do not separate but chromatids move towards opposite poles	(iv) Anaphase - I
	(v) Pachytene

(a) A - (i), B - (ii), C - (v), D - (iv) (b) A - (ii), B - (iii), C - (iv), D - (v)
(c) A - (ii), B - (i), C - (iii), D - (iv) (d) A - (ii), B - (iii), C - (v), D - (iv)

223. A somatic cell that has just completed the S phase of its cell cycle, as compared to gamete of the same species, has
(a) Twice the number of chromosomes and four times the amount of DNA
(b) Four times the number of chromosomes and twice the amount of DNA
(c) Twice the number of chromosomes and twice the amount of DNA
(d) Same number of chromosomes but twice the amount of DNA

224. Arrange the following events of meiosis in correct sequence
I. Crossing over.
II. Synapsis
III. Terminalisation of chiasmata.
IV. Disappearance of nucleolus
(a) I, II, III, IV (b) II, III, IV, I (c) II, I, IV, III (d) II, I, III, IV

225. Following diagram shows modification of the meiosis I. Identify A, B, C and D.



(a) A - Telophase I, B - Anaphase I, C - Metaphase I, D - Prophase I
(b) A - Prophase I, B - Metaphase I, C - Anaphase I, D - Telophase I
(c) A - Metaphase I, B - Telophase I, C - Prophase I, D - Anaphase I
(d) A - Anaphase I, B - Prophase I, C - Telophase I, D - Metaphase I

226. Which of the following statement gives best explanation for evolutionary advantage of meiosis?
(a) Meiosis alternates with mitosis from generation to generation.
(b) The same genetic material passes on generation after generation.
(c) Meiosis is must for sexual reproduction.
(d) Genetic recombination occurs during meiosis.

227. How many chromosome shall be present in a diploid cell at mitotic anaphase if its egg cell has 10 chromosomes?
(a) 10 (b) 40 (c) 30 (d) 20

228. Spindle fibres attach on to :-
(a) Telomere of the chromosome
(b) Kinetochore of the chromosome
(c) Centromere of the chromosome
(d) Kinetosome of the chromosome

229. In meiosis crossing over is initiated at :
(a) Pachytene (b) Leptotene (c) Zygotene (d) Diplotene

230. Which of the following is not a characteristic feature during mitosis in somatic cells ?
(a) Spindle fibres
(b) Disappearance of nucleolus
(c) Chromosome movement
(d) Synapsis

231. During cell growth, DNA synthesis takes place in:-
(a) G_2 phase (b) M phase (c) S phase (d) G_1 phase

232. When cell has stalled DNA replication fork, which checkpoint should be predominantly activated?
(a) M (b) Both G_2 / M and M (c) G_1 / S (d) G_2 / M

233. Match the stages of meiosis in Column–I to their characteristic features in Column–II and select the correct option using the codes given below :

Column-I	Column-II
a Pachytene	i Pairing of homologous chromosomes
b Metaphase-I	ii Terminalization of chiasmata
c Diakinesis	iii Crossing over takes place
d Zygotene	iv Chromosomes align at equatorial plate

Codes :

	a	b	c	d
(a)	ii	iv	iii	i
(b)	iv	iii	ii	i
(c)	iii	iv	ii	i
(d)	i	iv	ii	iii

234. In which stage of meiosis homologous chromosomes are segregated ?
(a) Metaphase I (b) Anaphase I (c) Anaphase II (d) Metaphase II

235. Cells of certain species of animals have six pairs of chromosomes. How many molecules of DNA will remain in a nucleus of these animals during G2 phase?
(a) 12 (b) 48 (c) 6 (d) 24

236. During cell division the process that causes failure of separation of sister chromatids is called:
(a) Coincidence (b) Interference (c) Non-disjunction (d) Complementation

237. Nuclear membrane is formed around the groups of daughter chromosomes during the telophase by :
(a) Endoplasmic reticulum
(b) Lysosomes
(c) Golgi apparatus
(d) Microbodies

238. Which of the following is not true for meiosis?
(a) Production of genetic variability
(b) Maintaining constancy of chromosome number during sexual reproduction
(c) Reduction of chromosome number to one half
(d) Production of diploid cell

239. Which of the following is used as the mitotic spindle poison?
(a) Ca^{++} (b) Mg^{++} (c) Tubulin (d) Colchicine

240. When does replication of centriole occur?
(a) Interphase (b) Prophase (c) Late prophase (d) Late telophase

241. Progression of cell cycle is regulated by the concentration of which type of molecule?
(a) Centrosomes (b) Cyclin-dependent kinases
(c) Cyclins (d) Microtubules

242. Select the option which correctly represents the stage anaphase - I for chromosome number 2n = 4.

(a)  (b)  (c)  (d) 

243. The G_0 phase is
(a) the checkpoint before G_1 (b) the state of most cells in an animal body
(c) another name for interphase (d) a permanent state of all body cells

244. Which of the following terms is not related to mitosis?
(a) gametes (b) chromosomes (c) DNA replication (d) somatic cells

245. Following synapsis during meiosis I, the homologous chromosomes separate. This separation means that _____.
(a) both chromosomes of each homologous pair reach each haploid daughter cell
(b) both chromosomes of each homologous pair reach each diploid daughter cell
(c) one chromosome from each homologous pair reaches each haploid daughter cell
(d) one chromosome from each homologous pair reaches each diploid daughter cell

246. During _____, homologous chromosomes separate and dyads move to opposite poles of the spindle.
(a) prophase I (b) prophase II (c) metaphase I (d) anaphase I

247. During _____, the sister chromatids are lined up at the equator.
(a) prophase I (b) prophase II (c) metaphase I (d) metaphase II

248. At the completion of meiosis I, each human cell contains
(a) 23 chromosomes, 46 chromatids (b) 46 chromosomes, 46 chromatids
(c) 46 chromosomes, 92 chromatids (d) 23 chromosomes, 23 chromatids

249. Which of the following is incorrect?
(a) Crossing over and independent assortment are the two sources of genetic diversity in meiosis.
(b) Meiosis and sexual reproduction have fostered diversity in natural world
(c) Meiosis involves one replication only
(d) Independent assortment occurs during metaphase II

250. In the beginning of meiosis, a meiocyte has 16 Pg of DNA. The amount in a gamete will be
(a) 4 Pg (b) 16 Pg (c) 32 Pg (d) 8 Pg

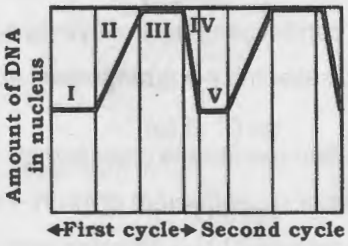
251. If mammalian cells receive a go-ahead signal at the G_1 checkpoint, they will
(a) move directly into telophase.
(b) complete the cycle and divide.
(c) exit the cycle and switch to a nondividing state.
(d) show a drop in MPF concentration.

252. The 'restriction point' occurs here:
(a) G_0 (b) G_1 (c) S (d) G_2

253. Nerve and muscle cells are in this phase:
(a) G_0 (b) G_1 (c) S (d) G_2

254. The cyclin component of MPF is destroyed toward the end of this phase:
(a) G_0 (b) G_1 (c) S (d) M

255. In the figure below, mitosis is represented by which number?



(a) I (b) II (c) III (d) IV

256. Progression through the cell cycle is regulated by oscillations in the concentration of which types of molecule?
(a) Actin (b) Tubulin
(c) Cyclin - dependent kinases (d) Cyclins

257. In order to enter the cell cycle a cell must be stimulated from outside. What type of molecule provides this stimulation?
(a) Cyclins (b) Cyclin-dependent kinases
(c) Cytokines and growth factors (d)) Tyrosine kinases

258. The passage of a cell through the stages of the cell cycle is controlled by protein kinases that phosphorylate many different proteins at appropriate times. What are these protein kinases called?
(a) Cdk activating kinases (b) Cyclin-dependent kinases
(c) Cyclins (d)) Tyrosine kinases

259. At which cell cycle checkpoint is the cell cycle halted if the cell's DNA is damaged?
(a) G_1 - S (b) S - G_2 (c) G_2 - M (d)) G_0 - G_1

260. In which phase of the cell cycle are the chromosomes inactive, condensed, and not transcribed to messenger RNA?
(a) G_1 phase. (b) S phase. (c) M phase. (d)) G_2 phase.

261. Cyclin dependent kinases which control progression through cell cycle checkpoints are fully activated by which of the following:
(a) binding to cyclins.
(b) phosphorylation by Cdk activating protein kinase.
(c) binding to cyclin, plus phosphorylation by a Cdk activating protein kinase.
(d)) phosphorylation by a tyrosine kinase.

262. Passage through which checkpoint is the step which commits the cell to proceed through to mitosis and cell division?
(a) G_1 to S. (b) S to G_2. (c) G_2 to M. (d)) M to G_1.

263. How many checkpoints in a cell cycle?
(a) 3 (b) 4 (c) 5 (d) 6

264. Measurement of the amount of DNA per nucleus were taken on a large number of cells from a growing fungus. The measured DNA levels ranged between 3 to 6 picograms (pg) per nucleus. One nucleus has 5 pg of DNA. What stage of the cell cycle was this nucleus in?
(a) G_0 (b) G_1 (c) M (d) S

265. In the list given, the first point at which you could distinguish between a mitosis and a meiosis would be :
(a) Telophase (b) Anaphase (c) Metaphase (d) Prophase

266. How do cells at the completion of meiosis compare with the cell from which they were derived?
(a) They have the same number of chromosomes and half the amount of DNA.
(b) They have half the amount of cytoplasm and twice the amount of DNA
(c) They have half the number of chromosomes and half the amount of DNA
(d) They have twice the amount of cytoplasm and half the amount of DNA

267. Which of the following options gives the correct sequence of events during mitosis ?
(a) Condensation → nuclear membrane disassembly → arrangement at equator → centromere division → segregation → telophase
(b) Condensation → crossing over → nuclear membrane disassembly → segregation → telophase
(c) Condensation → arrangement at equator → centromere division → segregation → telophase
(d) Condensation → nuclear membrane disassembly → crossing over → segregation → telophase

268. Anaphase Promoting Complex (APC) is a protein degradation machinery necessary for proper mitosis of animal cells. If APC is defective in a human cell, which of the following is expected to occur?
(a) Chromosomes will be fragmented (b) Chromosomes will not segregate
(c) Recombination of chromosome arms will occur (d) Chromosomes will not condense

269. Maturation promoting factors formation triggers the cell to cross
(a) $G_1 \rightarrow S$ (b) $S \rightarrow G_2$ (c) $G_2 \rightarrow M$ (d) $M \rightarrow G_1$

270. Select an incorrect statement w.r.t. cell cycle :–
(a) Duplication of genes occurs twice in meiosis
(b) Karyokinesis occurs twicve during meiotic division
(c) Cyclins are protein that activate protein kinase to regulate the cell cycle.
(d) After telophase - I, chromosome number is reduced to half

271. All of the following statements are true for the typical eukaryotic cell cycle EXCEPT:
(a) The S phase is far removed from cell division.
(b) G_1 occurs after the S phase.
(c) The shortest phase in terms of time is usually M.
(d) Many of the enzymes necessary for DNA replication are typically produced during G_1

272. A bacterium growing on an agar surface divides. Most bacteria are not very motile on solid surface. The progeny of bacteria remain very near to the location of original bacterium. If 10 cells are plated and a cell takes 30 minutes to multiply then number of colonies visible, next day would be
(a) 10 (b) 10^2 (c) 10^4 (d) 10^8

273. A drug 'Placlitaxel' interferes with the breakdown of micro tubules and stabilizes them. This drug is also used in cancer therapy. Which of the following stages will be severely affected when animal cell is treated with this drug?
(a) Prophase (b) G_0 (c) Anaphase (d) Cytokinesis

274. During which period of cell cycle do the paired centrioles become centrosomes?
(a) prophase (b) metaphase (c) anaphase (d) telophase

275. Meiosis allows species to increase the genetic variation within the gene pool by
(a) making exact copies of each parent cell (b) using a diploid cell to make two haploid cells
(c) causing internal fertilization (d) generating new cells to repair injury

276. If the amount of DNA in the cell during given mitosis stage is 20 pg, then the number of chromosome and amount of DNA in its mother cell at G_1 phase was

(a) 8; 20 pg (b) 4; 10 pg (c) 8; 10 pg (d) 4; 20 pg

277. Restorage of nucleocytoplasmic ratio is performed in :–

(a) G_1 phase (b) G_2 phase (c) S phage (d) M phase

278. The complete disintegration of nuclear envelope marks the :

(a) Early prophase (b) Start of second phase of mitosis

(c) End of first phase of mitosis (d) End of second phase of mitosis

279. If in a cell 6 tetrad are present in prophase-I then what will be the number of chromatids in each cell in Anaphase-II?

(a) 24 (b) 6 (c) 12 (d) 48

280. If primary spermatocyte have 2n = 16 chromosomes during first meiotic division, in such case how many chromatids could be present in each secondary spermatocyte?

(a) 32 (b) 8 (c) 24 (d) 16

281. What would be the DNA content in the cell at G_1, G_2, anaphase stage, when the content after mitotic phase is 40 Pg?

(a) G_1 = 40 Pg, G_2 = 80 Pg, Anaphase = 40 Pg. (b) G_1 = 40 Pg, G_2 = 80 Pg, Anaphase = 80 Pg.

(c) G_1 = 80 Pg, G_2 = 40 Pg, Anaphase = 40 Pg. (d) G_1 = 80 Pg, G_2 = 40 Pg, Anaphase = 80 Pg.

282. Mention the DNA content of cell at the S, Prophase I, Prophase II of meiocyte.

(a) 4C, 4C, 2C (b) 2C, 1C, 2C (c) 4C, 2C, 2C (d) 1C, 4C, 2C

283. How many chromosomes and DNA content will the cell have in G1 phase, after S-phase and after M-phase respectively, if root tip cells possess 14 chromosomes?

(a) $\frac{14}{2C}, \frac{28}{4C}$ and $\frac{14}{4C}$ (b) $\frac{14}{2C}, \frac{14}{4C}$ and $\frac{14}{2C}$ (c) $\frac{14}{2C}, \frac{14}{2C}$ and $\frac{7}{2C}$ (d) $\frac{28}{4C}, \frac{28}{8C}$ and $\frac{14}{2C}$

284. In mitosis, the daughter cells resemble their parent cell. But in meiosis, they differ not only from parent cell in having half the number of chromosomes, but also differ among themselves qualitatively in genetic constitution due to

(a) Segregation and crossing over only (b) Independent assortment and segregation only

(c) Crossing over, independent assortment and segregation

(d) Independent assortment and crossing over only

285. Segregation of Mendelian factors (Aa) occurs during

(a) Diplotene (b) Anaphase I (c) Zygotene/Pachytene (d) Anaphase II

286. Which is not characteristic of meiosis

(a) Two stage of DNA replication, first before meiosis I and Second before meiosis II

(b) Recombination and crossing over

(c) Sister chromatids separate during anaphase II

(d) Nuclear membrane disappears towards the end of Prophase

287. At diakinesis, a meiocyte has ten pairs of chromosomes. The chromosome number expected in each nucleus is,
(a) Ten at the end of first division and five at the end of second division
(b) Ten at the end of first division and ten at the end of second division
(c) Five at the end of first division and five at the end of second division
(d) Twenty at the end of first division and ten at the end of second division

288. Synaptinemal complex is visible from
(a) Leptotene through diplotene (b) Pachytene through diplotene
(c) Zygotene through pachytene (d) Diplotene through metaphase

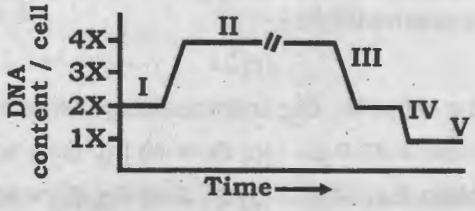
289. During a cell cycle the transition from G_1 to S phase and from G_2 to M phase requires the activation of which of the following?
(a) Inducer enzyme (b) ATP (c) Cyclins (d) Cyclin-CDK complex

290. A eukaryotic cell that receives a "go-ahead" signal at the G1 checkpoint of the cell cycle will
(a) complete the cycle and divide. (b) move directly into the M phase.
(c) move directly into the G_2 phase. (d) enter a resting stage.

291. The cell cycle is regulated by checkpoints during the _____ phases.
(a) G_1, S and G_2 (b) G_1, S and C (c) G_1, G_2, and M (d) G_1, S and M

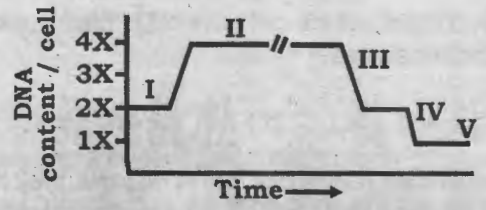
292. The eukaryotic cell cycle is controlled at several points; which of these statements is not true?
(a) Cell growth is assessed at the G_1/S checkpoint.
(b) DNA replication is assessed at the G_2/M checkpoint.
(c) Environmental conditions are assessed at the G_0 checkpoint.
(d) The chromosomes are assessed at the spindle checkpoint.

293. Which number represents the DNA content of a sperm cell?



(a) I (b) II (c) IV (d) V

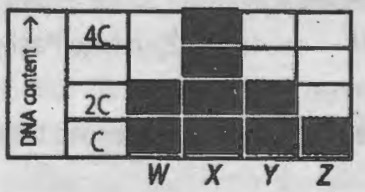
294. Which number represents G_2?



(a) I (b) II (c) III (d) IV

295. The stage during which separation of the paired homologous chromosomes begins is
(a) Diakinesis (b) Diplotene (c) Pachytene (d) Zygotene

296. The amount of DNA present per cell during a nuclear division is represented as a bar diagram below. DNA content

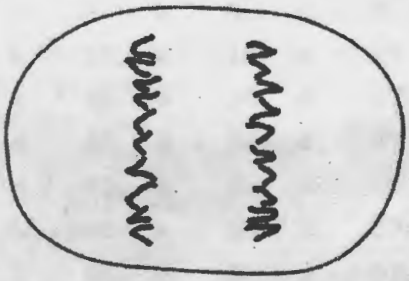


What phase are represented by X and Y?
(a) X - Prophase I, Y - S phase (b) X - Prophase I, Y - Prophase II
(c) X - Metaphase II, Y - Prophase II (d) X - Anaphase II, Y - Telophase I

297. Organelle duplication and DNA duplication occurs respectively in

(a) G_2 and G_1 (b) G_1 and S (c) G_1 and M (d) Telophase

298. In *Zea Mays* the diploid chromosome number equals 20. In which of the following tissues of the plant would the cell division illustrated in the diagram below occur?



(a) Apical meristem (b) Anther (c) Cambiurn (d) Sepal

299. Ribonucleoprotein 'Telomerase' is significantly is expressed in all the following cells except

(a) Cancerous cells (b) Stem cells (c) Epidermal cells (d) Skeletal muscle cell

300. Decision of G0 - phase occurs

(a) towards the end of G1 phase (b) before middle of G1 phase

(c) at the end of telophase (d) towards end of cytokinesis

301. Which specific protein is formed in G2 phase

(a) Histone (b) DNA polymerase (c) Scaffold protiens (d) Tubulin

302. In meiosis, the daughter cells differ from parent cell as well as amongst themselves due to

(a) segregation, independent assortment and crossing over (b) segregation and crossing over

(c) independent assortment and crossing over (d) segregation and independent assortmen

303. Synaptonemal complex completed during

(a) Leptotene (b) Zygotene (c) Pachytene (d) Diplotene

304. Cell cycle progression from one phase to another is primarily controlled by

(a) phosphorylation of cdks (b) proteolysis of cyclin

(c) dephosphorylation of cyclin (d) proteolysis of cdks

305. DNA sequence responsible for chromatid separation

(a) centromere (b) telomere (c) kinetochore (d) satellite

306. Consider a diploid organism with 2n value of 4. How many chromosomes and DNA molecules respectively are present in the G_1 and G_2 phases of somatic cell of this organism?

(a) G_1 : 4 and 4 ; : G_2 4 and 4 (b) G_1 : 4 and 4 ; : G_2 4 and 8

(c) G_1 : 4 and 4 ; : G_2 8 and 4 (d) G_1 : 4 and 4 ; : G_2 8 and 8

307. The correct sequence of phases of cell cycle is :

(a) M $\rightarrow$ G1 $\rightarrow$ G2 $\rightarrow$ S (b) G1 $\rightarrow$ G2 $\rightarrow$ S $\rightarrow$ M

(c) S $\rightarrow$ G1 $\rightarrow$ G2 $\rightarrow$ M (d) G1 $\rightarrow$ S $\rightarrow$ G2 $\rightarrow$ M

308. Cell in G_0 phase :

(a) exit the cell cycle (b) enter the cell cycle (c) suspend the cell cycle (d) terminate the cell cycle

309. Crossing over takes place between which chromatids and in which stage of the cell cycle ?

(a) Non-sister chromatids of non-homologous chromosomes at Pachytene stage of prophase I

(b) Non-sister chromatids of non-homologous chromosomes at Zygotene stage of prophase I

(c) Non-sister chromatids of homologous chromosomes at Pachytene stage of prophase I

(d) Non-sister chromatids of homologous chromosomes at Zygotene stage of prophase I

310. After meiosis I, the resultant daughter cells have
(a) four times the amount of DNA in comparison to haploid gamete.
(b) same amount of DNA as in the parent cell in S phase.
(c) twice the amount of DNA in comparison to haploid gamete.
(d) same amount of DNA in comparison to haploid gamete.

10 CELL CYCLE AND CELL DIVISION

1. d	2. c	3. b	4. c	5. b	6. d	7. a	8. a	9. d	10. c
11. d	12. b	13. a	14. b	15. a	16. c	17. c	18. d	19. b	20. b
21. d	22. a	23. a	24. c	25. b	26. d	27. a	28. a	29. d	30. a
31. d	32. b	33. c	34. d	35. d	36. d	37. c	38. c	39. a	40. c
41. d	42. d	43. a	44. d	45. b	46. d	47. d	48. b	49. b	50. c
51. c	52. d	53. c	54. b	55. a	56. c	57. a	58. c	59. c	60. a
61. b	62. a	63. d	64. b	65. c	66. d	67. b	68. a	69. d	70. a
71. a	72. a	73. c	74. d	75. d	76. d	77. d	78. d	79. a	80. d
81. c	82. d	83. c	84. a	85. b	86. d	87. b	88. c	89. a	90. a
91. d	92. c	93. b	94. c	95. a	96. b	97. a	98. b	99. c	100. a
101. a	102. c	103. d	104. c	105. b	106. a	107. c	108. d	109. a	110. a
111. c	112. a	113. d	114. c	115. b	116. a	117. a	118. a	119. d	120.a
121. c	122. c	123. c	124.b	125. d	126.d	127. d	128. d	129. a	130. d
131. d	132. b	133. b	134. a	135. b	136. d	137. a	138. b	139. c	140. c
141. a	142. b	143. d	144. b	145. d	146. c	147. d	148. d	149. b	150. a
151. c	152. d	153. c	154. d	155. a	156. a	157. b	158. c	159. c	160. a
161. c	162. b	163. c	164. d	165. d	166. d	167. b	168. b	169. c	170. b
171. c	172. a	173. d	174. d	175. a	176. a	177. a	178. c	179. c	180. d
181. d	182. b	183. d	184. a	185. a	186. c	187. d	188. a	189. a	190. b
191. b	192. b	193. c	194. b	195. a	196. c	197. d	198. b	199. d	200. d
201. c	202. a	203. b	204. b	205. a	206. d	207. a	208. b	209. d	210. a
211. c	212. c	213. b	214. c	215. d	216. b	217. d	218. c	219. d	220. c
221. c	222. d	223. a	224. d	225. b	226. d	227. b	228. b	229. a	230. d
231. c	232. c	233. c	234. b	235. d	236. c	237. a	238. d	239. d	240.a
241. b	242. b	243. b	244. a	245. c	246. d	247. d	248. a	249. d	250. a
251. b	252. b	253. a	254. d	255. d	256. d	257. c	258. b	259. a	260. c
261. c	262. a	263. a	264. d	265. d	266. c	267. a	268. b	269. c	270. a
271. b	272. a	273. c	274. a	275. b	276. b	277. d	278. c	279. c	280. d
281. b	282. a	283. b	284. c	285. b	286. a	287. b	288. c	289. d	290. a
291. c	292. c	293. d	294. b	295. b	296. b	297. b	298. b	299. d	300. b
301. d	302. a	303. c	304. a	305. a	306. b	307. d	308. a	309. c	310. c

SOLUTIONS

272. Since bacteria are not very motile and remain near to location of original spot. So, although bacteria will divide exponentially but only 10 colonies will be observed next day.

296. The amount of DNA in each diploid cell is 2C. During S phase, DNA replicates and the amount of DNA per cell doubles i.e., increases to 4C. Hence, when cell enters M phase and undergoes meiosis I, the amount of DNA in prophase I will be 4C. After completion of meiosis I DNA will reduce to 2C because meiosis I is a reductional division. Therefore, in prophase II of meiosis II the amount of DNA would be 2C.

11 TRANSPORT IN PLANTS

1. Transport of organic and inorganic materials is –
   (a) Unidirectional (b) Multidirectional
   (c) bidirectional (d) first undirectional then bidirectional
2. Factors affecting the rate of diffusion are –
   I. Gradient of concentration
   II. Permeability of the membrane
   III. Temperature
   IV. Pressure
   V. Size of diffusing material
   (a) I, III and V are correct (b) I and V are correct
   (c) I, II, III, IV, V are correct (d) Only V is correct
3. Go through the following points regarding diffusion –
   I. It is a passive and slow process
   II. It is an active and fast process
   III. It needs ATP
   IV. It does not need energy
   V. It occurs against the concentration gradient
   VI. Molecules move in a random manner, the net result being substances moving from region of higher concentration to region of lower concentration
   (a) I, III and V are correct (b) II and V are correct
   (c) All are correct except III (d) All are correct except II, III and V
4. Which one / ones is / are correct?
   (a) Smaller substances diffuse faster
   (b) Hydrophilic substances cannot pass through the cell membrane due to lipid present in the cell membrane
   (c) Diffusion is rapid over short distance but extremely slow over long distance
   (d) All
5. Facilitated diffusion –
   (a) Needs a carrier protein (b) Is an active process
   (c) Occurs against the concentration gradient (d) Needs ATP
6. Facilitated diffusion –
   I. Is a very specific process
   II. Is a passive process
   III. Helps the substances, hydrophilic in nature, to be transported across the membrane
   IV. Is faster than active process
   (a) All are correct (b) I, IV are correct (c) I, II and IV are correct (d) All are correct except IV
7. Which does not affect the rate of diffusion of a substance –
   (a) Temperature and concentration gradient
   (b) Electrical charges of the diffusing materials
   (c) Presence of the other substances in the solution
   (d) Molecular diameter of the diffusing materials
8. Transporting substances across a membrane from an area of lower concentration to an area of higher concentration

requires –

(a) energy (b) phospholipid (c) Diffusion (d) Facilitated diffusion

9. You place cells in a solution of glucose and measure the rate at which glucose enters the cells. As you increase the concentration of glucose solution, the rate at which glucose enters the cells increases. However when the glucose concentration of the solution is increased above 10M, the rate at which glucose enters no longer increases. Which of the following is the most likely mechanism for glucose transport in the cells?

(a) Facilitated diffusion via a carrier protein (b) Facilitated diffusion without carrier protein

(c) Active transport (d) Symport

10. Active transport is important because it can move molecules –

(a) From their high concentration to a lower concentration

(b) From their low concentration to a higher concentration

(c) With less ATP than might otherwise be used to move molecules

(d) by increasing their diffusion coefficient

11. Osmosis is a specific form of –

(a) Active transport (b) Secondary active transport

(c) Faciliated diffusion (d) Diffusion

12. Which one(s) is / are correct about porins ?

I. They are proteins

II. They form huge pores in the outer membrane of plastids, mitochondria and some bacteria

III. They allow molecules upto the size of small proteins to pass through

(a) All are correct (b) All are incorrect (c) I and III are correct (d) I and II are correct

13. Which of the following is correct about facilitated and Active transport?

(a) Both need energy

(b) Both need no ATP

(c) Both use carbohydrates to move the molecules across the membrane

(d) Both need carrier proteins which are sensitive to inhibitors that react with protein side chains

14. Water channel consists of how many types of aquaporins

(a) 1 (b) 84 (c) 8 (d) 9

15. Which one is highly selective?

(a) Simple diffusion and Active transport (b) Active transport and facilitated diffusion

(c) Simple diffusion and facilitated diffusion (d) Active transport and passive transport

16. Go through comparison of different transport process given below

	Property	Simple Diffusion	Facilitated Diffusion	Active Transport
I.	Needs carrier protein	Yes	Yes	Yes
II.	Uphill transport	No	Yes	Yes
III.	Transport saturates	No	No	No
IV.	Needs ATP	No	Yes	Yes

(a) Only I is correct (b) I and II are correct (c) Only II is correct (d) No one is correct

17. Which statement about the membrane channel is not true?

(a) They are proteins (b) Movement through them is along the concentration gradient

(c) The are pores in the membrane (d) All ions pass through the same type of channel

18. Which of the following limits the movement of molecules when carrier mediated facilitated diffusion is involved?

(a) Concentrated gradient (b) Availability of carrier molecules

(c) Temperature (d) All of the above

19. You are monitoring the diffusion of a coloured molecule across a membrane. Which of the following will result in the

fastest rate of diffusion?

(a) An internal concentration of 5% and an external concentration of 60%

(b) An internal concentration of 35% and an external conc. of 40%

(c) An internal concentration of 60% and an external concentration of 5%

(d) a and c are correct

20. Transport proteins that simultaneously move two molecules across a membrane in the same direction are called–

(a) Uniport (b) Antiport (c) Symport (d) Diffusive ports

21. The rate of facilitated diffusion of a molecule does not continue to increase as concentration difference of molecules across the membrane increases. Why?

(a) Facilitated diffusion needs the use of ATP

(b) The transport protein must be of the channel type

(c) As the concentration difference increases molecules interfere with one another

(d) The transport must be of carrier type

22. Which of the following is true for diffusion?

I. It is a slow process

II. It does not depend on a living system

III. It is very important to plants since it is the only means for gaseous movement within the plant body

IV. Diffusion is very obvious in gases and liquids, but diffusion in solid rather than of solid is more likely

(a) All are correct (b) Only II is correct (c) Only I and II are correct (d) None

23. Go through the following statements

I. In active transport, pumps are proteins that use energy for transportation of molecules against the concentration gradient.

II. Carrier protein is very specific

III. Transport rate reaches a maximum when all the active protein transporters are used and saturated

(a) All are correct (b) None is correct (c) I and III are correct (d) II and III are correct

24. You are studying transport of a certain type of molecules into cell. You find that transport slows down when the cells are poisoned with a chemical that inhibits energy production. Under normal circumstances the molecules you are studying is probably transported by –

(a) Simple diffusion (b) Osmosis (c) Active transport (d) Facilitated diffusion

25. Which of the following is not true of the carrier molecules involved in facilitated diffusion?

(a) They increase the speed of transport across a membrane

(b) They concentrate solute molecules on one side of the membrane

(c) They have specific binding sites for molecules they transport

(d) Transport protein may undergo conformational change upon binding of solutes.

26. A watermelon has how much water?

(a) More than 92% (b) About 10 to 15% (c) 100% (d) 5 litres

27. Most herbaceous plants have how much dry weight of its total fresh weight?

(a) 92% (b) 10 - 15% (c) 50% (d) 29%

28. Go through the following points –

I. A dry alive and respiring seeds has no water at all.

II. A mature corn plant absorbs about 3 litres of water in a day.

III. In 5 hours a mustard plant absorbs water equal to its own weight.

IV. Water is often limiting for plant growth and productivity in both agricultural and natural environment.

(a) All are correct (b) All are incorrect (c) Only I is correct (d) II, III and IV are correct

29. When different types of molecules in a fluid move together in response to a pressure gradient, this is called –

(a) Joined response (b) Bulk flow (c) Facilitated diffusion (d) Pressured movement

30. The tendency of water to move towards greater solute concentration is the example of –
(a) Active transport (b) Osmolarity (c) Diffusion (d) Passive transport

31. Water potential is –
(a) Equal to solute potential
(b) Equal to pressure potential
(c) Equal to O. P.
(d) A tendency of a solution to take up water from another solution across a membrane.

32. Pressure on plant cell wall caused by osmotic movement of water is called –
(a) O.P. (b) T.P. (c) Tonic pressure (d) Hypertonic pressure

33. O.P. of pure water is –
(a) 0 (b) 1 (c) 10 (d) 100

34. Which of the following methods for transporting substances across a membrane does not involve a change in shape of transport protein –
(a) Facilitated diffusion (b) Simple diffusion (c) Active Transport (d) $Na^+ - K^+$ Pump

35. Water potential –
(a) Of a solution is always greater that of pure H_2O
(b) Of a solution is always zero
(c) Of pure water is zero but of solution is always less than zero
(d) Of a solution is always positive

36. Which relationship is considered correct for a solution
(a) $\Psi_w = \Psi_s + \Psi_p$ (b) $\Psi_s = \Psi_w + \Psi_p$ (c) $\Psi_w = \Psi_s$ (d) $\Psi_p = \Psi_w$

37. If a pressure greater than atmospheric pressure is applied to pure water and a solution, its Ψ_w value
(a) increases (b) decreases (c) remains constant (d) will be equal to Ψ_p

38. Choose the correct relation –
(a) $\Psi_s = \Psi_p + \Psi_m$ (b) $\Psi_p = \Psi_w$ (c) $\Psi_w = \Psi_s + \Psi_p$ (d) $\Psi_p = \Psi_w + \Psi_m + \Psi_p$

39.

Now choose the correct option –
(a) Kinetic energy (K.E.) of H_2O in A solution > K. E. of water in B solution
(b) K. E. of water in B solution > K. E. of water in A solution
(c) K. E. of water in A solution = K. E. of H_2O in B solution
(d) Water potential has nothing to do with K. E. of water in a solution

40. Water tends to move into a cell that has a(n) –
(a) high T. P. (b) high positive Ψ_w (c) more negative Ψ_w (d) low T. P.

41. A plant cell placed in pure water will –
(a) expand until the osmotic potential or solute potential reaches that of water
(b) becomes more turgid until the pressure potential of cell reaches its osmotic potential
(c) become more turgid until the osmotic potential reaches that of pure water
(d) becomes less turgid until the osmotic potential reaches that of pure water.

42. When a large amount of water enters a plant cell, what happens –
(a) Entry of water increases as the water potential increases

(b) Entry of water reduces the T.P.
(c) Entry of water is opposed by T.P
(d) Entry of water makes Ψ_w of cell more negative

43. When sugars are actively transported into a cell, what happens to T.P. inside that cell as a result –
(a) No change; sugar conc. has no effect on T.P.
(b) Increases because sugar conc. directly affects T.P.
(c) Decreases, because water exits and affect turgor pressure (T.P.)
(d) Increases, because water enters and affects T.P.

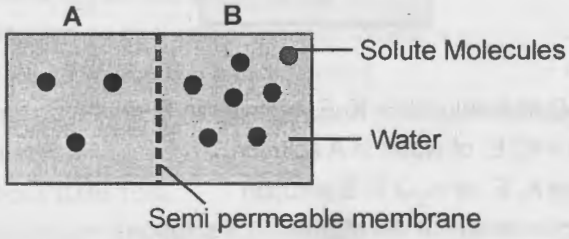
44. In plant cell which ones are important determinants of movement of molecules in or out of the cell –
(a) Cell wall + cell membrane
(b) Cell wall + Tonoplasts
(c) Tonoplast + Vacuolar membrane
(d) Tonoplast + cell membrane

45. Which one is correct?
(a) Only the net direction of osmosis, not the rate of osmosis depends on both the pressure gradient & concentration gradient
(b) The rate of osmosis depends on only the pressure gradient
(c) The net direction and rate of osmosis do not depend upon Pressure gradient and conc. gradient.
(d) The net direction and rate of osmosis depend upon both the pressure gradient and conc. gradient.

46. Water will move from its region of high chemical potential / concentration to its region of lower chemical potential until
(a) equilibrium is reached / DPD of both regions becomes same
(b) water amount in both regions becomes equal.
(c) solute amount in both regions become equal
(d) Amount of both solvent and solutes in both regions become equal

47. Water potential gradient is
(a) The overall movement of solutes
(b) The evaporation of water from the leaves.
(c) The overall movement of water
(d) Pressure gradient minus water potential

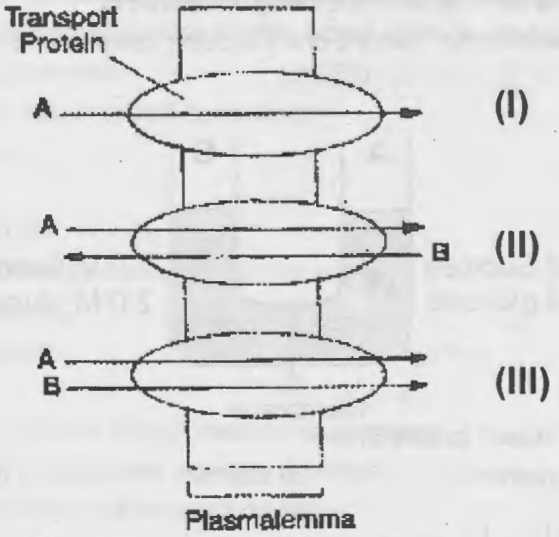
48. Go through the following figure



Now point out the incorrect statement
(a) Movement of solvent molecules will take place from chamber A to B
(b) Movement of solute will take place from chamber A to B
(c) Presence of a SPM is a prerequisite for this process to occur
(d) The direction and the rate of osmosis depend upon both the pressure gradient and conc. gradient

49. For a solution / a cell
(a) Ψ_w is negative but Ψ_s is positive
(b) Ψ_w is positive but Ψ_s is negative
(c) Both Ψ_w and Ψ_s are negative
(d) Both are positive

50. Identify the process occuring in I, II and III –



	I	II	III
(a)	Co port	Symport	Antiport
(b)	Antiport	Uniport	Symport
(c)	Symport	Co port	Antiport
(d)	Uniport	Antiport	Symport

51. Choose the correct option for A to B in comparison of different transport mechanisms

Property	Simple diffusion	Facilitated diffusion	Active transport
Highly selective	A	Yes	Yes
Uphill transport	B	C	Yes
Transport Saturation	D	Yes	Yes

	A	B	C	D
(a)	Yes	Yes	No	Yes
(b)	Yes	No	No	Yes
(c)	No	No	No	No
(d)	Yes	No	Yes	No

52. If the external solution balances the osmotic pressure of cytoplasm. It is said to be –
(a) hypotonic (b) Hypertonic (c) Atonic (d) Isotonic

53. Process of Plasmolysis is –
(a) Always reversible (b) Always irreversible (c) rarely reversible (d) usually reversible

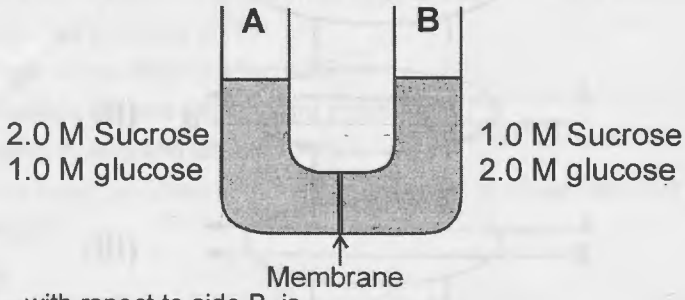
54. The pressure exerted by the protoplasts due to entry of water against the rigid wall is called –
(a) pressure potential (b) Osmotic potential (c) Solute potential (d) Water potential

55. When a plant cell is placed in a hypotonic solution, which of the following occurs?
(a) the cell takes up water and eventually bursts
(b) The cell takes up water until the osmotic potential equals the pressure potential of the cell
(c) plasmolysis occurs
(d) nothing occurs

56. Which statement characterizes a hypotonic solution?
(a) The solution has a greater solute conc. than the one it is being compared to.

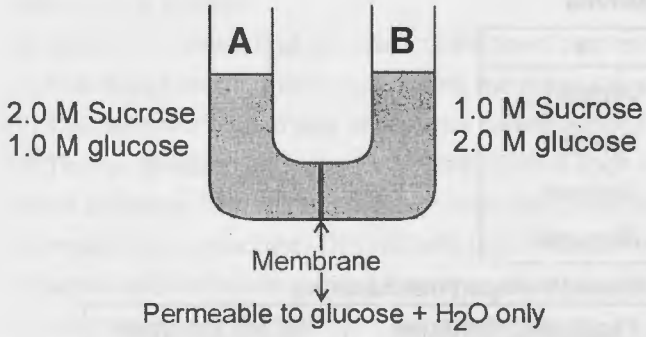
(b) The solution has equal solute conc. to one its is being compared to.
(c) The solution has a lesser solute conc. than the one it is being compared to
(d) None of the above

57.



Initially solution in side A, with rspect to side B, is –
(a) hypotonic (b) Hypertonic (c) isotonic (d) lwer

58.



After the system reaches equilibrium, what changes are observed?
(a) The water level is higher in side A than in side B.
(b) The water level is higher in side B than in side A
(c) No change is observed
(d) First the level of water is high in tube A and then water level is decreased.

59. If a plasmolysed cell has OP = 10, TP = –2, its DPD will be –
(a) 8 (b) 12 (c) 10 (d) –2

60. When does a concentration gradient exist?
(a) When solute concentrations are low
(b) When membranes rupture
(c) When solute concentration is high
(d) When solute concentration differ on either side of a membrane

61. What would be Ψ_p of a fully flaccid cell?
(a) +3 (b) +2 (c) –3 (d) 0

62. During plasmolysis what occurs?
(a) Movement of water occurs across the membrane from an area of higher water potential to lower water potential
(b) Movement of water occurs across the membrane from an area of low water potential to high water potential
(c) Water moves inside the cell until equilibrium is reached
(d) O. P. of cell remains the same

63. When a plasmolysed cell is placed in water or hypotonic solution, what happens?
(a) T.P. of cell decreases (b) T.P. of cell becomes zero
(c) T.P. increases (d) Water potential of cell decreases

64. Plant absorbent consists of –

(a) Hydrophobic colloid (b) Hydrophilic colloids (c) Cellulose and pectin (d) lignin like chemical

65. The process which brings about entry of water into seed coat when seeds are placed in water for germination is
(a) Diffusion (b) Osmosis (c) DPD (d) Imbibition

66. Seeds when soaked in water, they imbibe it because of –
(a) O.P inside the seed is low
(b) OP of water is high
(c) DPD of seed is very much low
(d) Water potential gradient between the seed coat and water

67. Water potential of imbibants is –
(a) highly positive (b) zero (c) highly negative (d) always positive

68. Imbibition causes –
(a) Increase in the volume of imbibant but no pressure development
(b) Decrease in the volume of imbibant and pressure develops
(c) No change in volume of imbibant but pressure develops
(d) Volume of imbibant increases and pressure develops

69. Stomatal movement is not affected by
(a) O_2 concentration (b) Light
(c) Temperature (d) CO_2 concentration

70. Imbibition is –
(a) Faciliated diffusion (b) An active transport
(c) Primary active transport (d) Diffusion

71. Go through the following facts –
I. The pressure that is produced by swelling of wood had been used by prehistoric man to split rocks and boulders
II. The seedling is able to come out of soil due to development of a pressure. This pressure is –
(a) O.P. (b) T. P. (c) I.P. (d) Ψ_w

72. Pre-requisite for imbibition is / are –
(a) Water potential gradient between the absorbent and the liquid but not the affinity between absorbent and liquid
(b) Affinity between absorbent and liquid but not water potential gradient between surface of absorbent and liquid.
(c) Water potential gradient between the surface of absorbent and liquid as well as affinity between absorbent and liquid.
(d) Wooden frame

73. Mass or bulk flow of substance is called –
(a) Active transport (b) Translocation (c) Diffusion (d) Facilitated diffusion

74. Unidirectional flow of water, minerals, some organic nitrogen and hormones occurs through –
(a) Xylem (b) Phloem (c) Root (d) Vascular tissue

75. Multidirectional flow of a variety of organic and inorganic solutes occurs through –
(a) Xylem (b) Vascular tissue (c) Phloem (d) Root

76. Which of the following is the part of apoplast?
(a) Cell wall (b) Plasma membrane (c) Plasmodesmata (d) Cytoplasm

77. Water moving through the apoplast from the soil to stele cells must crosses a plasma membrane in the cells of
(a) Root hairs (b) Cortex (c) Endodermis (d) Vessel

78. _____ are generally moved by a mass or bulk flow system.
(a) Water and minerals (b) Water and organic molecule
(c) Water, minerals and food (d) Only water

79. Which of the following is true about apoplast (the transport route through intercellular spaces and cell wall)

(a) Cell membrane is involved (b) Minerals movement is regulated by membranes
(c) Plasmodesmata are involved (d) Water and solutes can move by bulk flow

80. Endodermal cells differ from other cells in root. They –
(a) Lack symplast region (b) Have a high rate of water transport
(c) Are completely surrounded by a waxy layer (d) Prevent water and ions from moving between them

81. Water will move from the root hairs through cortex if the water potentials are –
(a) Root hairs = 0; Cortex = 0; Xylem = 0
(b) Root hairs = 0; Cortex = –1; Xylem = –2
(c) Root hairs = –2; Cortex = –1; Xylem = 0
(d) Root hairs = 0; Cortex = +1; Xylem = +2

82. Cell walls impregnated with water repellent suberin are found in the cells of –
(a) Endodermis (b) Pericycle (c) trancheids (d) root hairs

83. The primary function of casparian strips is to –
(a) force water and minerals through the membranes of endodermal cells
(b) prevent entry into the stele solely through the apoplast
(c) provide regulation for water and minerals movement in the plants
(d) All

84. The primary difference between the apoplast and the symplast is that the –
(a) apoplast is non-living spaces and cell walls
(b) apoplast relies on active transport
(c) symplast is nonliving spaces and cell wall
(d) apoplast prevents passive diffusion

85. Which one is not true?
(a) The symplast is a meshwork consisting of (connected) living cells
(b) The casparian strips prevent water from moving between endodermal cells
(c) Water can move freely in the apoplast from cortical area to xylem of root
(d) All

86. Which of the following is not a component of the symplast?
(a) Sieve tube (b) Endodermal cells (c) Plasmodesmata (d) Xylem tracheids

87. The casparian strip prevents water and minerals from entering the stele through the –
(a) Plasmodesmata (b) Apoplast (c) symplast (d) Xylem vessel

88. All of the following increase the surface area available for absorption of water and minerals by a root except –
(a) Mycorrhiza (b) Numerous branches of root
(c) Root hairs (d) None

89. The barrier inside the root that prevents water from leaking out of the vascular tissue is the –
(a) Epidermis (b) Casparian strip (c) Apoplast (d) Root hairs

90. The pathway for water that lies with the cell walls is –
(a) the apoplastic pathway (b) the symplastic pathway
(c) the casparian pathway (d) the endodermal pathway

91. A botanist discovered a mutant plant that was unable to produce materials that form casparian strip. This plant would be
(a) Unable to transport water or solutes to the leaves
(b) Unable to use its sugar as a sugar sink
(c) Able to exert greater root pressure than the normal plant
(d) Unable to control amounts of water and solutes it absorbs

92. Which one of following is incorrect?

(a) Movement through the apoplast does not involve crossing the cell membrane
(b) Water is absorbed along with mineral solutes, by the root hairs, purely by diffusion
(c) Apoplastic movement is dependent on the gradient
(d) Symplast is the system of adjacent cell wall

93. All are correct except –
(a) Mycorrhizal fungi form a network around the young root and they penetrate the root cells
(b) Mycorrhizae helps the plant to absorb water and minerals
(c) Root provides sugar and nitrogenous organic compounds to the mycorrhizae
(d) Pinus seed can germinate and establish without mycorrhizae

94. Which of the following is the casparian strip?
(a) The layer of endodermis
(b) The waxy layer between the endodermal cells
(c) The apoplast
(d) The layer of epidermal cells

95. Guttation is most commonly observed under condition of –
(a) High atmospheric humidity and plentiful soil water
(b) Low atmospheric humidity and little soil water
(c) High atmospheric humidity but little soil water
(d) Low atmospheric humidity but plentiful soil water

96. Guttation results from –
(a) A high water potential of the leaves than of roots
(b) Root pressure causing water to flow up through xylem faster than it can be lost by transpiration.
(c) The pressure flow of sap through phloem
(d) A water vapour breaks in the column of xylem sap.

97. Root pressure –
(a) Is not sufficient to rise water above ground level
(b) Is negative in all except the tallest trees
(c) Is the driving force for the mass flow of sugar
(d) can push water upto small heights in the stem

98. As various ions from the soil are actively transported into vascular tissues of root, water follows and increases the pressure inside the xylem. This positive pressure is called –
(a) Mass pressure (b) Root pressure (c) osmotic potential (d) None

99. Attraction of water molecules to polar surface is known as :
(a) Cohesion (b) Adhesion (c) Capillarity (d) Tencile strength

100. Go through the four statements given below –
I. Root pressure provides a light push in the overall process of water transport
II. Most plants meet their water need by transpiration pull
III. The greatest contribution of root pressure may be to re-establish the continuous chains of water molecules in the xylem vessel which often break under enormous tension created by transpiration
IV. Guttation is the cause of transpiration pull
The correct statement are –
(a) I, II, III, IV (b) I, II, III (c) II, III, IV (d) II, III

101. As a tree begins transpiring in the morning, tension pressure occurs first in –
(a) Leaf (b) Branches (c) Root (d) All the regions of the tree

102. Water potential measure the tendency of water to –
(a) Evaporate
(b) Move from one place to another
(c) Condense
(d) Adhere

103. Water potential of a cell is lowered by the –

(a) Addition of solutes (b) Addition of water (c) Addition of heat (d) Removal of solutes

104. To develop root pressure, energy is used to –
(a) Actively transport minerals into root cells (b) Evaporate water in the leaves
(c) Condense water in the xylem (d) Create suction in the xylem

105. According to transpiration-cohesion theory water is pulled upward through the xylem. The cause of the pull is –
(a) Guttation (b) Root pressure (c) transpiration (d) condensation

106. The lowest water potentials in the xylem are in the –
(a) root hairs (b) Vascular cylinders of root
(c) tracheids of the stem (d) leaves

107. The energy source that drives the upward flow of water is –
(a) light (b) sucrose (c) solar heat (d) ATP

108. Which of the following is not a major factor in the movement of xylem sap up in a tall tree?
(a) Plasmodesmata (b) Cohesion and adhesion
(c) tension (d) transpiration

109. Adhesion is the result of –
(a) hydrogen bonding between the water molecules
(b) Transpiration pull
(c) High surface tension
(d) Attraction of water molecules to polar surface / hydrophilic wall of the xylem tube.

110. The fact that water transport continues as long as leaves are alive and active indicates that –
(a) Leaves pump water (b) Leaves are necessary for transport of water
(c) Roots are active (d) Water is needed for leaves to remain alive

111. Water in the xylem vessel of a long tree is –
(a) pulled (b) pushed (c) first pulled then pushed (d) first pushed then pulled

112. The transpiration driven ascent of sap depends on which of the following physical properties of water?
(a) Cohesion (b) Surface tension (c) Adhesion (d) All

113. Which of the following statement is correct concerning the flow of sap in xylem of trees?
(a) In the morning sap begins to flow first in the twigs and later in the trunk
(b) Flow is driven by high conc. of sugar in the vessel elements
(c) Flow from the roots to the twigs would be accelerated if the leaves are removed
(d) Rapid flow of water puts the xylem under a pressure much greater than atmospheric pressure.

114. Which of the following is a difference between transport by xylem and transport by phloem?
(a) Active transport moves xylem but not phloem sap
(b) Transpiration moves phloem sap but not xylem sap
(c) xylem sap moves up; phloem sap moves up and down
(d) xylem moves from sugar source to sink but phloem does not

115. What keeps the force of gravity from pulling water molecules out of the leaves?
(a) Upward pressure from root (b) High water pressure in leaves
(c) movement of water towards a sugar sink (d) Cohesion and adhesion of water molecules

116. In plants, the area outside the plasma membrane, but still within plant is called –
(a) Interstitial area (b) Apoplast (c) Stele (d) None

117. Tension is a result of which of the following –
(a) Transpiration at the leaf surface (b) Cohesive nature of water
(c) Narrowness of the xylem tube (d) All

118. Imagine a live twig from a tree and examine the cut surface of the twig with a magnifying glass. You locate a vascular

tissue and observe a growing droplet of fluid exuding from the cut surface. This fluid is probably –

(a) Phloem sap (b) Xylem sap (c) guttation fluid (d) Only water

119. What is the minimum number of cell membranes that a water molecule must move through in getting from soil into a xylem vessel –

(a) 0 (b) 1 (c) 2 (d) 6

120. The last thing all water and solute molecules must pass through before they can enter the vascular system and move upward to leaves is –

(a) Endodermis (b) Stoma (c) Epidermis (d) Root hair

121. The tensile strength of water / high capillarity is the gift of which properties of water –

(a) Cohesion (b) Adhesion (c) Surface tension (d) All

122. Go through the following statements –

I. No energy is expended directly by the plant to translocate water

II. The mechanisms of water transport from the soil through the plant body to the atmosphere include diffusion, bulk flow and osmosis

III. Water moves in the root via the apoplast, transmembrane, and symplast pathway

IV. The cohesion tension theory explains water transport in xylem

(a) I, II, III, IV are correct (b) I, II and III are correct (c) II and III are correct (d) Only IV is correct

123. A student is performing a chemical analysis of xylem sap. This student should not expect to find much of –

(a) Nitrogen (b) Sugar (c) P (d) Water

124. Which of the following is not part of the transpiration cohesion adhesion mechanism of ascent of sap?

(a) The loss of water from the mesophyll cells, which initiate a pull of water molecules from the neighboring cells

(b) Hydrophilic wall of narrow tracheids and xylem vessel that help to raise the column of water against the force of gravity

(c) Reduction of water potential in the surface film of mesophyll due to transpiration

(d) The active pumping of water into the xylem of root

125. I. Transpiration and gaseous exchange occur through stomata

II. Cell wall of guard cells are homogenous in nature

III. Guard cells are regular in shape

IV. Cellulosic microfibrils are longitudinally oriented in guard cells

The correct statements are –

(a) All (b) Only IV (c) Only I and III (d) I, II and IV

126. Which one(s) aids(s) stomatal movement –

(a) Heterogenous nature of cell wall

(b) Unique shape of guard cell

(c) Radial orientation of cellulosic microfibrils in the guard cell

(d) All

127. Which of the following plant factor affects transpiration –

(a) Number and distribution of stomata, number of stomata open, temperature

(b) Temperature, light, humidity, wind speed

(c) Canopy structure, water status of plant, number and distribution of stomata and number of stomata open(%)

(d) Canopy structure, number and distribution of stomata and humidity of air

128. I. The immediate cause of stomatal movement is a change in the turgidity of guard cell

II. Higher vapour pressure in substomatal chamber and intercellular space with respect to atmospheric vapour pressure does not favour transpiration.

III. Forces generated by transpiration create pressure sufficient to lift a xylem sized water column over 130 meters high.

IV. Under low humidity, optimum temperature, guard cells are turgid, moist soil, transpiration would be high.

Which of the above points is correct –

(a) All (b) I, III and IV are correct

(c) No one is correct (d) Only IV is correct

129. Resistance to water flow in the root cortex is higher for –

(a) apoplastic pathway (b) symplastic pathway (c) both have the same (d) None

130. The casparian strip –

I. Limits the pathway available to water and solutes, forcing them to enter the symplast

II. Surrounds the pericycle

III. Is made of suberin

The correct statement is –

(a) All (b) None (c) I and II (d) II and III

131. If a plant cell is placed in deionised water, the water potential of that cell becomes –

(a) More positive because pressure potential becomes more positive

(b) More positive because pressure potential becomes more negative

(c) More negative because pressure potential becomes more negative

(d) Less negative because pressure potential becomes more positive

132. Which of the following criteria does not pertain to facilitated transport?

(a) Requirement of special membrane proteins (b) High selectivity

(c) Transport saturation (d) Uphill transport

133. Which one is not a function of transpiration?

(a) Cooling of leaves (b) Uptake of minerals (c) Uptake of water (d) Excretion of minerals

134. Let the amount of water to be transpired per mole in C_4 plant is Y and in C_3 plant is Z. Which one is correct?

(a) $Y > Z$ (b) $Z > Y$ (c) $Z = Y$ (d) $Z \gtrless Y$

135. Statement I – The evolution of the C_4 photosynthetic system is probably one of the strategies for maximizing the availability of CO_2 while minimizing water loss.

Statement II – C_3 plants are twice as efficient as C_4 plants in terms of fixing carbon

Statement III – C_3 plant loses only half as much water as a C_4 plant for the same amount of CO_2 fixed.

(a) All statements are correct (b) All statements are incorrect

(c) Only statement I is correct (d) Statement II and III are correct

136. Stomata –

(a) Control the opening of guard cells

(b) Are covered by a waxy cuticle

(c) are usually most abundant on the upper epidermis of a leaf

(d) Close when water is being lost at a very high rate.

137. I. Like water, all minerals are absorbed passively by root –

II. Transport proteins of endodermal cells of root are control points where a plant adjusts the quality and types of minerals that reach xylem.

III. Transpiration has more than purpose

IV. Small amount of exchange of materials does take place between xylem and phloem

(a) All are correct (b) All are incorrect

(c) II, III and IV are correct (d) II and III are wrong but IV are correct

138. Which one is correct –

(a) Unlike water all minerals cannot be passively absorbed by roots

(b) Most of the minerals enter the root by active transport

(c) Ions are absorbed from soil by both passive and active transport

(d) All

139. In root there is one way active transport of ions because of presence of –
(a) Pericycle (b) Diffusion (c) ATP (d) Endodermis

140. Ions from soil reach to xylem of root through –
(a) Active uptake only
(b) Passive uptake only
(c) Only diffusion
(d) Active or passive uptake or a combination of both

141. Minerals uptake can be depressed by depriving the root of O_2 which indicates ____(A)____ is required, such uptake involves ____(B)____ transport.

	A	B
(a)	CO_2	Passive
(b)	O_2	Facilitated transport
(c)	O_2	active
(d)	H_2O	Antiport

142. Unloading of mineral ions occurs at the fine vein endings through –
(a) Diffusion only
(b) Active transport only
(c) Diffusion and active transport
(d) Facilitated diffusion and active transport

143. Transpiration facilitates –
(a) Transferring minerals to leaves
(b) To maintain turgidity (hence shape and structure of the plant)
(c) availability of water to photosynthesis
(d) All

144. Transport of water through the xylem is –
(a) Active, requiring energy expenditure by the soil
(b) Passive requiring no energy expenditure by the plant
(c) Active requiring energy expenditure by plant
(d) Passive unless the soil is very dry

145. Root hairs do not play a role in –
(a) O_2 uptake (b) minerals uptake (c) water uptake (d) CO_2 uptake

146. Which of the following cells are found in pairs on the leaf surface?
(a) Subsidiary cells (b) Stomata (c) Guard cells (d) Epidermal cells

147. Which of the following statement about the movement of water through xylem tissue is false?
(a) Water is pumped up the plants by the roots
(b) Water is pulled up the plant by evaporation of water from the leaf surfaces
(c) Water has a strong tendency to be pulled into air by evaporation
(d) Continuous column of water in xylem tissue resists breaking, even when exposed to the forces of evaporation and gravity

148. An analysis of the xylem exudates indicates that –
I. Some of the inorganic nitrogen travel in the organic form as amino acids and related organic compounds, much of it is carried as inorganic ions.
II. Small amount of P and S are carried as organic compounds
(a) Both I and II are correct
(b) Both I and II are incorrect
(c) Only I is correct
(d) Only II is correct

149. Which is correct –
(a) Sink for minerals is root and source is growing regions of plant.
(b) Small amount of exchange of materials takes place between xylem and phloem

(c) Structural components like Ca are remobilised
(d) None

150. According to the pressure flow model for translocation –
(a) Sugar conc. is highest near sink area
(b) Water enters the sieve tube by osmosis
(c) Sugar is transported out of the sieve tubes near the source area
(d) Sugar is transported through phloem as glucose

151. If xylem sap in a stem is under tension, what will occur if you cut the stem?
(a) Sap will sprout out
(b) Sap will stay at the cut surface
(c) Air will be pulled into the xylem
(d) The cut surface will form bubbles if placed under water

152. At the site where sugars are to be used, how do sugars move from sieve tubes into the tissue
(a) Diffusion (b) By active transport (c) By osmosis (d) Via the apoplast

153. The pressure flow model of translocation depends entirely on the existence of mechanisms for loading sugars into phloem at the _____ regions and for unloading them at the _____ regions –
(a) sink, source (b) sink, sink (c) source, source (d) source, sink

154. According to the pressure flow model, during fruit development, photosynthesizing leaves would be the _____ and the fruit would be _____
(a) sink, sink (b) sink, source (c) source, sink (d) source, source

155. Which statement about phloem transport is not true –
(a) It takes place in sieve tubes. It stops if phloem is heat killed
(b) Sucrose is actively transported into sieve tube at source
(c) contents in a sieve tube move more unidirectionally
(d) A high T.P. is maintained in the sieve tube

156. Arrange the following five events in a correct order that explains the mass flow of materials in the phloem.
1. Water diffuses into the sieve tube elements
2. Leaf cells produce sugar by photosynthesis
3. Solutes are actively transported into the sieve elements
4. Sugar is transported from cell to cell in the leaf
5. Sugar moves down the stem
(a) 2 - 4 - 3 - 1 - 5 (b) 2 - 4 - 1 - 3 - 5 (c) 1 - 2 - 3 - 5 - 4 (d) 4 - 2 - 1 - 3 - 5

157. What mechanism explains the movement of sucrose from source to sink –
(a) evaporation of water and active transport of sucrose from sink
(b) Osmotic movement of water into the sucrose loaded sieve tube cells creating a higher hydrostatic pressure into the source than in the sink
(c) tension created by differences in hydrostatic pressure in the source and sink
(d) Active transport of sucrose through the sieve tube membranes driven by proton pump.

158. The translocation of organic solutes through phloems is bidirectional because –
(a) Root acts as source and leaf acts as sink
(b) Source and sink irreversed in any season
(c) Translocation is ATP regulated process
(d) Source-sink relationship is variable depending upon season or needs of plant

159. I. Phloem sap can be transported in any required direction
II. Phloem transports mainly water and sucrose but other sugars, hormones and amino acids are also transported
III. Cytoplasmic strands pass through the holes in the sieve plate forming continuous filaments
IV. Ascent of sap is a pulling movement and translocation of organic solutes is a pushing movement
(a) All are correct (b) All are incorrect (c) I, II, III are correct (d) III and IV are correct

160. Which of the following cell types would be third cell type a sugar molecule is likely to encounter on its route from the site of production in chloroplast to the site of storage in the root?
(a) Mesophyll (b) Sieve tube (c) Companion cell (d) Parenchyma

161. Loading of phloem is related to –
(a) Increase of sugar in phloem (b) elongation of phloem cell
(c) separation of phloem parenchyma (d) Strengthening of phloem fibres

162. Active loading of sugar into a sieve tube is probably driven by –
(a) Gravity (b) Water flow (c) Proton pumps (d) Solar radiation

163. Companion cells specialized for transport of sugar to the sieve tube are –
(a) Aquaporin (b) Transfer cell (c) Guard cell (d) Water stomata

164. Where are the proton pumps responsible for phloem loading located?
(a) on the membrane of companion cell (b) On the membrane of sieve tube
(c) On the membranes of root cell (d) On the membranes of root hair

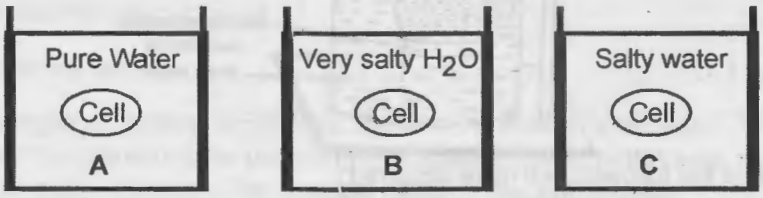
165. Transport of the products of photosynthesis is thought to occur by pressure flow through the sieve tubes of phloem from a source to a sink. Which of the following statements about phloem transport is false?
(a) Water enters the sieve tube by osmosis
(b) Sieve tubes in the source have a low hydrostatic pressure (Turgor pressure)
(c) Water and solutes move through the sieve tubes along the pressure gradient
(d) All

166. Choose the correct option.
(a) Loading of the phloem sets up a gradient that facilitates the mass movement in the phloem
(b) Pressure is positive in sieve tubes while xylem is usually under tension
(c) Sieve tubes are living cells, while matured xylem is dead
(d) All are correct

167. Which one of the following is correct?

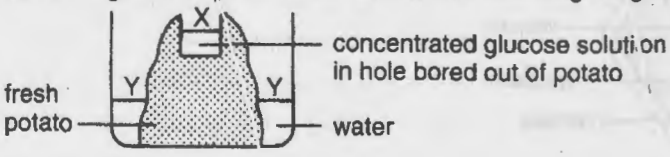
	Phloem loading	Phloem unloading
(a)	Active process	active process
(b)	Active	Passive
(c)	Passive	Active
(d)	Passive	Passive

168 What is correct for diagram below?



(a) Cell "A" will lose H_2O, Cell "B" will gain H_2O, Cell "C" neither gain nor loses H_2O
(b) Cell "A" neither gain nor loses H_2O, Cell "B" will gain H_2O, Cell "C" will lose H_2O
(c) Cell "A" will gain, Cell "B" neither gain nor loses H_2O, Cell "C" will lose H_2O
(d) Cell "A" will gain H_2O, Cell "B" will lose H_2O, Cell "C" neither gain nor loses H_2O

169. Go through the experiment shown in the following diagram –

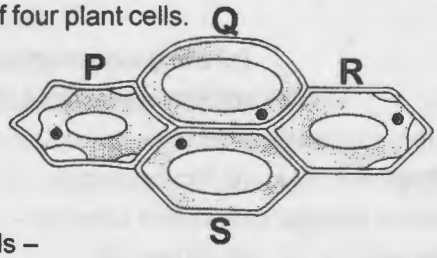


After a few days, which of the following will have occurred?

(a) A rise in level X and a drop in level Y (b) A drop in level X and a drop in level Y

(c) A rise in level X and a rise in level Y (d) A drop in level X and a rise in level Y

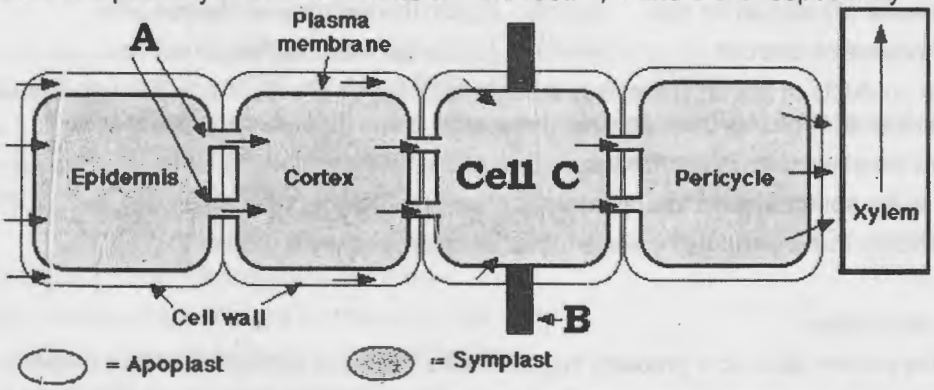
170. Go through the following diagram of four plant cells.



No wall pressure would exist in cells –

(a) P and Q (b) Q and S (c) P and R (d) R and S

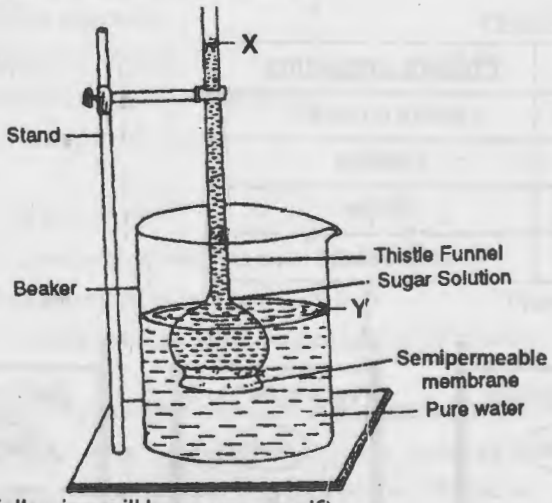
171. The following show the pathway of water movement in the root. A, B and C are respectively –



(a) Desmosome, Casparian strip, Endodermis (b) Gap junction, Casparian strip, Endodermis

(c) Tight junction, Casparian strip, Endodermis (d) Plasmodesmata, Casparian strip, Endodermis

172. Go through the experiment shown in the following diagram –

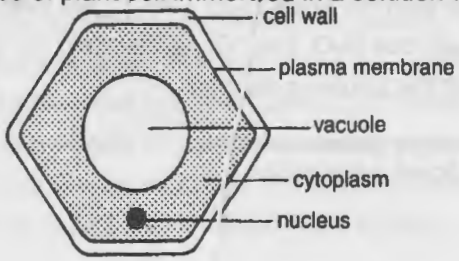


After a few days, which of the following will have occurred?

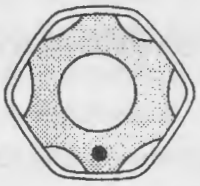
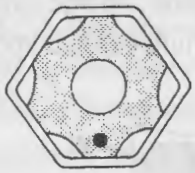
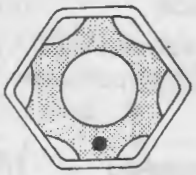
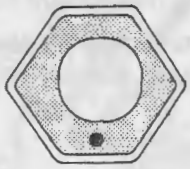
(a) A rise in level X and a drop in level Y (b) A drop in level X and a drop in level Y

(c) A rise in level X and a rise in level Y (d) A drop in level X and a rise in level Y

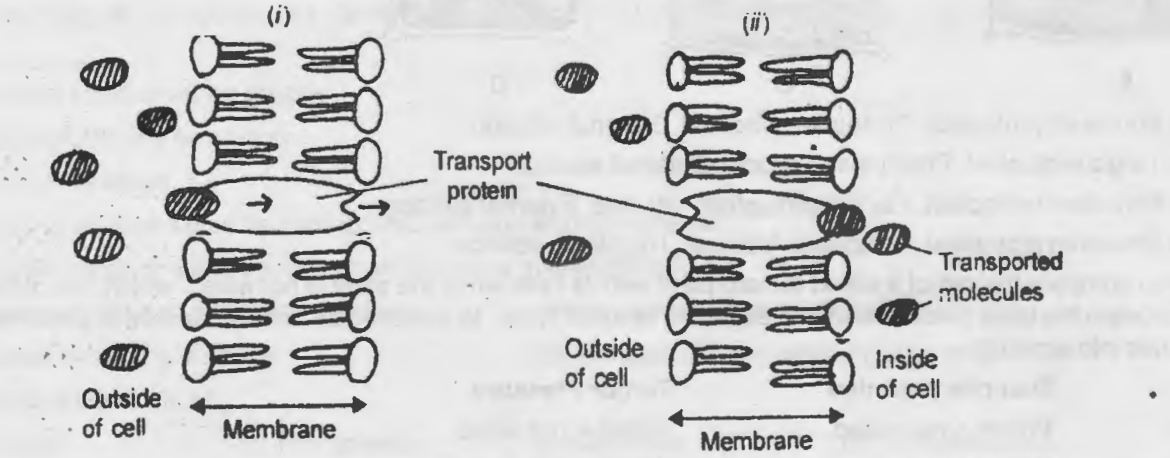
173. The diagram shows the appearance of plant cell immersed in a solution which is isotonic to the cell's sap –



Which of the diagram shown below most accurately represents the appearance of this cell after immersion in a hypertonic solution?

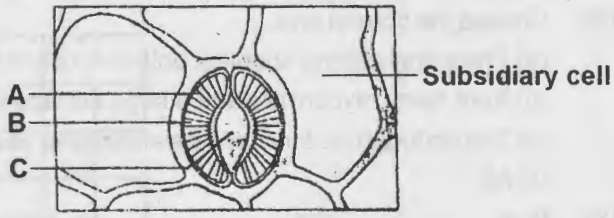
(a)  (b)  (c)  (d) 

174. The diagram shows the transportation of materials by –



(a) Simple diffusion (b) Facilitated Diffusion (c) Primary Active transport (d) Secondary Active transport

175. Given below is the diagram of stomatal apparatus. In which of the following all of the three parts labelled as A, B and C are correctly identified?



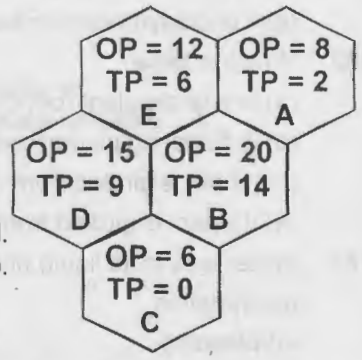
(a) A - Microfibril, B - Stomatal aperture, C - Guard cell

(b) A - Microfibril, B - Guard cell, C - Stomatal aperture

(c) A - Stomatal aperture, B - Guard cell, C - Microfibril

(d) A - Guard cell, B - Stomatal aperture, C - Microfibril

176. In this diagram, when the TP of the cell B increases to 18. What would be changes with regard to water movement.



(a) Cells A, C, D and E absorb water from B

(b) Water difuses into B from other cells

(c) B actively absorb water from neighbor cell

(d) No movement of water will occured

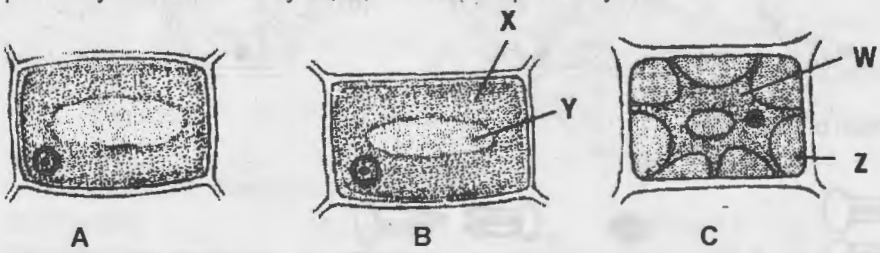
177. The diagram refers the ringing or girdling experiment. Bark having phloem is removed. This experiment proves that phloem is the path for translocation of food. In this exp. swollen part of stem has been indicated. The possible cause of this swollen is –

(a) Accumulation of food material just above the ring (As downward movement of food is inhibited).

(b) Accumulation of water and mineral just above the ring

(c) A repairing mechanism is taken place (d) Injured parts undergo turgidity

178. The accompany diagram shows plasmolysis in cell. A is normal turgid cell, B shows incipient plasmolysis and C is plasmolysed cell. Identify W, X, Y and Z respectively.



(a) Shrunken protoplast, Protoplast, Vacuole, External solution

(b) Turgid protoplast, Protoplast, Vacuole, External solution

(c) Shrunken protoplast, Flaccid protoplast, Vacuole, External solution

(d) Shrunken protoplast, Protoplast, Vacuole, Hypotonic solution

179. If you compare the cell of a wilted tomato plant with its cells when the plant is not wilted, which one of the following choices in the table below shows the expected results? Note : In selecting an answer be sure to take the sign of the values into account

	Osmotic potential	Turgor Pressure
(a)	Wilted < not wilted	Wilted < not wilted
(b)	Wilted > not wilted	Wilted < not wilted
(c)	Wilted < not wilted	Wilted > not wilted
(d)	Wilted > not wilted	Wilted > not wilted

180. Choose the correct one.

(a) The symplast and apoplast both function in transport within tissues and organs

(b) Root hairs, mycorrhiza and a large surface area of cortical cells enhance water and mineral absorption

(c) The endodermis functions as a selective sentry between the root cortex and vascular tissue

(d) All

181. Both _____ and _____ are sugar sinks.

(a) A growing root; a developing fruit. (b) A photosynthesizing leaf; a developing root.

(c) A photosynthesizing leaf; a developing fruit. (d) A photosynthesizing leaf; a tuber where starch is being broken down.

182. Which is false?

(a) In a girdle plant root dies first.

(b) In flowering plants foods are transported in the form of sucrose

(c) If bark is girdled from the main stem of a tree, the plant dies because ascent of sap stops.

(d) If xylem is girdled from the main stem, leaves wilt.

183. Water loss in its liquid phase is known as :

(a) Guttation (b) Transportation

(c) Bleeding (d) Evaporation

184. The diagram shows a Potato plant forming new tubers.

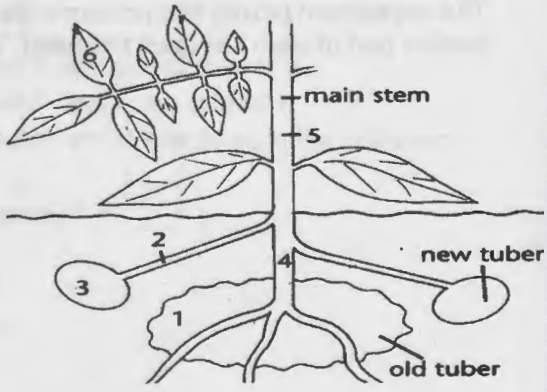
Which route would be taken by most of the food at this time?

(a) 1 ⟶ 4 ⟶ 2 ⟶ 3

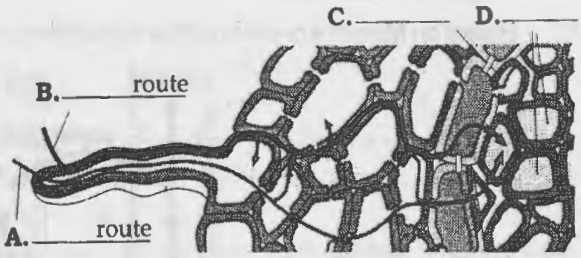
(b) 6 ⟶ 5 ⟶ 2 ⟶ 3

(c) 1 ⟶ 4 ⟶ 5 ⟶ 6

(d) 6 ⟶ 5 ⟶ 4 ⟶ 1



185. The diagram indicates routes of transport of water and minerals from the soil through the root. Identify letters A to D.



(a) A - Symplastic, B - Apoplastic, C - Casparian strip, D - Xy. vessels
(b) A - Apoplastic, B - Symplastic, C - Casparian strip, D - Xy. vessels
(c) A - Symplastic, B - Apoplastic, C - Cellulosic strip, D - Ph. vessels
(d) A - Apoplastic, B - Symplastic, C - Cellulosic strip, D - Xy. vessels

186. Attraction of water molecules to polar surface is called

(a) Cohesion (b) Adhesion (c) Capillarity (d) Tensile strength

187. One cell is kept in 1M solution of sucrose and another cell in 1M solution of NaCl. The water potential of the cells kept in _____ .

(a) sucrose solution will be greater
(b) NaCl solution will be greater
(c) both will be equal
(d) sucrose solution would be lower & NaCl solution would be greater

188. Active absorption of water by roots from the soil is mainly affected by :

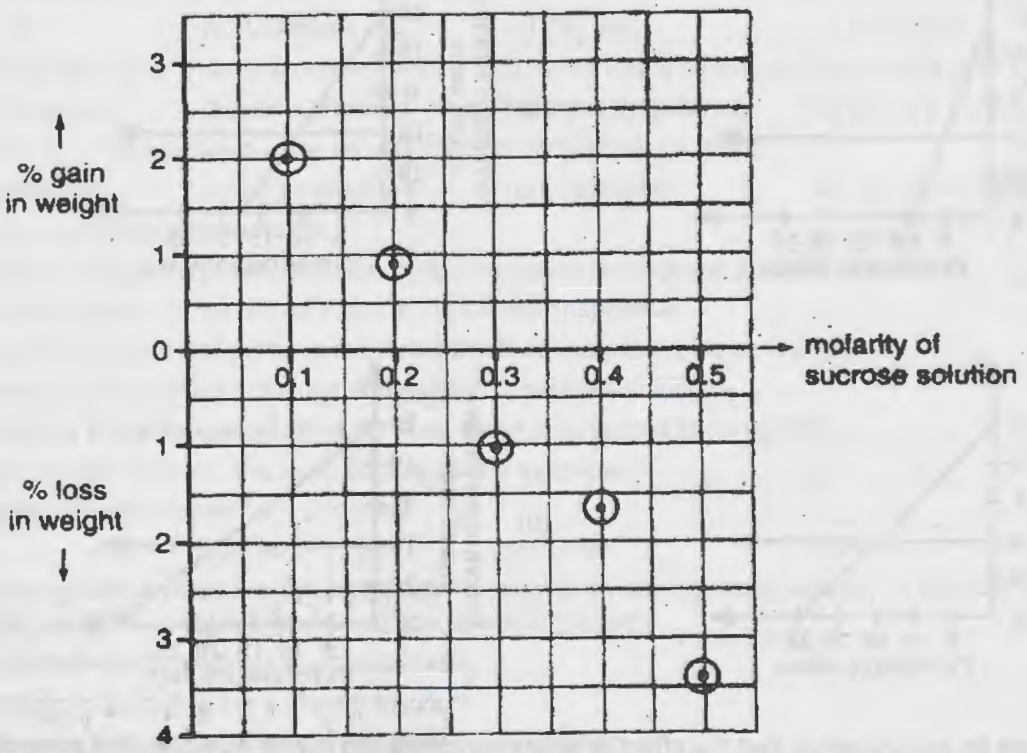
(a) Tension in cell sap due to transpiration (b) hydrophobic nature of root hair
(c) Typical tissue organization (d) Osmotic concentration of cell sap

189. Guttation is the result of :

(a) Diffusion (b) Transpiration (c) Osmosis (d) Root pressure

190. In an experiment, groups of potato disc were weighed and then each group was immersed in one of a series of sucrose solutions. After two hours each group was reweighed and its percentage gain or loss in weight was calculated.

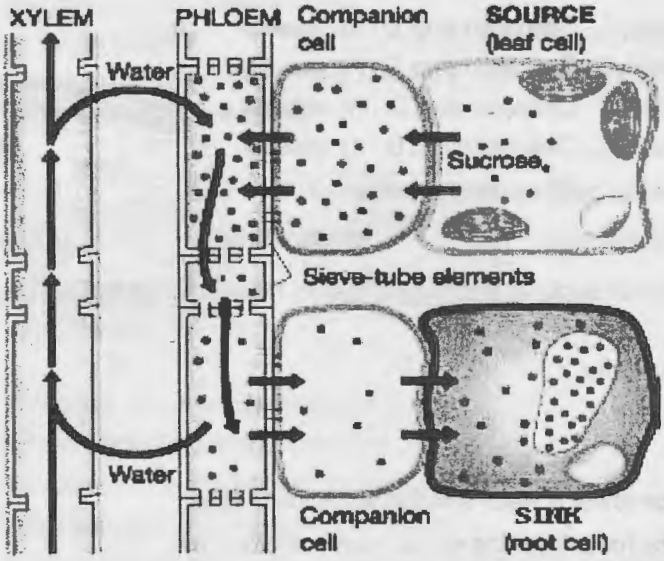
The following graph shows the results plotted as points.



From these results it can be concluded that the water concentration of potato cell sap is approximately equivalent to that of a sucrose solution of molarity.

(a) 0.10 (b) 0.25 (c) 0.35 (d) 0.50

191. Based on Munch's pressure-flow hypothesis, which of the following conditions would increase the rate of translocation?

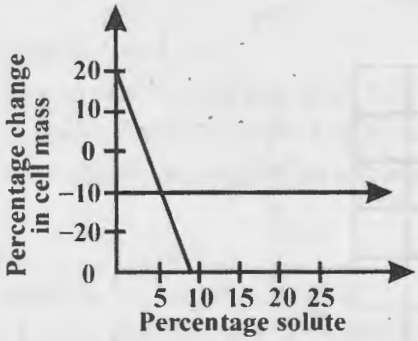


(a) an increase in the humidity in the outside air (b) a decrease in phloem unloading at the sink

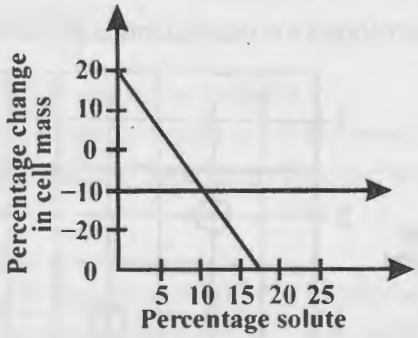
(c) an increase in sucrose production at the source (d) a decrease in photosynthesis

192. The effect of solute concentration on the mass of tissue cells is studied. It is observed from the collected data that the tissue cells were isotonic to 10% solute concentration. Which graph represents that the cells are isotonic to 10% solute concentration?

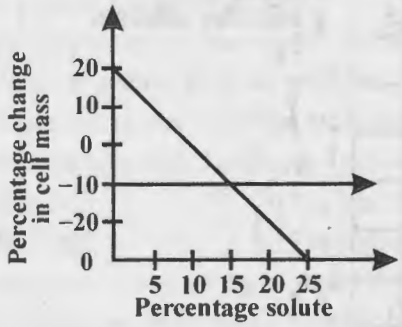
(a)



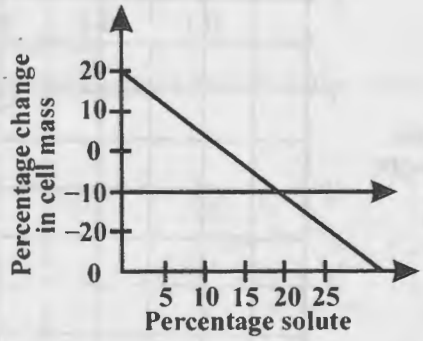
(b)



(c)



(d)



193. Shila designs an experiment to test the effect of solute concentration during osmosis. She takes four equal sized potato cubes having an identical weight and places each cube in four separate test tubes I, II, III,and IV, containing 1%, 2%, 3%, and 4% sucrose concentrations respectively. After one hour, she removes the cubes from the test tubes, blots the pieces with a paper towel, and weighs them to find the final mass of each cube.The solution in test tube III was hypertonic to the cytoplasm of the potato cells.What change will be observed in the potato cube of test

tube III?

(a) The final weight of the potato cube will be less than its initial weight.

(b) The final weight of the potato cube will be more than its initial weight.

(c) There will be equal movement of water in and out of the potato cube.

(d) There will be equal movement of sucrose in and out of the potato cube.

194. Some of the amino acids that are not synthesised by cells are imported into the cells from outside.Through which process do amino acids enter cells?

(a) Osmosis (b) Endocytosis (c) Active transport (d) Facilitated diffusion

195. The given table illustrates the concentration of water inside and outside the cell in various systems.

System	Intracellular concentration of water	Extra cellular concentration of water
A	0.09 M	0.10 M
B	0.1 M	0.5 M
C	0.05 M	0.7 M
D	0.03 M	0.6 M

The maximum rate of diffusion is observed in

(a) system A (b) system B (c) system C (d) system D

196. The concentration of solute in four cells is 0.5 M. They are placed in four separate containers I, II, III, and IV, filled with saline water of concentrations 0.1 M, 0.5 M, 1 M, and 2 M respectively. In which container will a cell swell?

(a) I (b) II (c) III (d) IV

197. Phloem sap is mainly made of

(a) water and sucrose (b) water and minerals

(c) oligosaccharides and hormones (d) none of these.

198. Force generated by transpiration can create pressure sufficient to lift water even upto the height of

(a) 130 feet (b) 130 metre (c) 230 feet (d) 230 metre.

199. The smallest amount of pressure needed to stop fluid from moving by osmosis is referred to as the

(a) turgor pressure (b) water potential (c) pressure potential (d) solute potential

200. In the absence of transpiration water moves into and up xylem because of

(a) root pressure (b) turgor pressure (c) evaporation (d) high soil mineral concentration

201. Go through the following statements.

I. High root pressure can cause water to be lost by leaves through the process of guttation.

II. Chlorophyll content of leaves will not directly affect transpiration.

III. The lower surface of leaf will have more number of stomata in a dorsiventral leaf.

IV. Cells shrink in hypotonic solutions and swell in hypertonic solutions.

V. Imbibition is a special type of diffusion when water is absorbed by living cells.

VI. Most of the water flow in the roots occurs via the symplast.

Which of the above statement are incorrect?

(a) One (b) Two (c) Three (d) Four

202. If you could connect an active xylem vessel from a shoot to an active phloem sieve-tube member from a leaf using a "micropipe," which way would the solution flow between the two?

(a) The solution would flow from xylem to phloem.

(b) The solution would flow from phloem to xylem.

(c) The solution would flow back and forth from one to another.

(d) The solution would not flow between the two.

203. If you could override the control mechanisms that open stomata and force them to remain closed, what would you expect to happen to the plant?

(a) Sugar synthesis would likely slow down.

(b) Water transport would likely slow down.

(c) All of these could be the result of keeping stomata closed.

(d) None of these would be the result of keeping stomata closed.

204. If a cell with a solute potential of – 0.2 MPa and a pressure potential of 0.4 MPa is placed in a chamber filled with pure water that is pressurized with 0.5 MPa, what will happen?

(a) Water will flow out of the cell. (b) Water will flow into the cell.

(c) The cell will be crushed. (d) The cell will explode.

205. You are a molecule of water travelling through the plant. Which of the following processes would not provide a driving force for you to move at either a cellular level or over longer distances through the plant?

(a) mass flow (b) osmosis

(c) diffusion (d) All the above are driving forces for water movement.

206. The movement of water in the xylem relies upon the

(a) ability of water molecules to hydrogen-bond with each other.

(b) active transport.

(c) evaporation of water from the leaf surface.

(d) Both a and c are correct.

207. You place a piece of potato weighing 0.3 gram with a water potential of 1 MPa in a beaker of Pepsi. After 10 minutes, you remove the potato piece, and it now weighs 0.25 gram. You conclude that

(a) Pepsi Cola has a water potential greater than 1 MPa.

(b) Pepsi Cola has a water potential of 0 MPa.

(c) Pepsi Cola has a water potential less than 1 MPa.

(d) Pepsi Cola does not have turgor pressure, and so you cannot conclude anything about its water potential.

208. Sucrose enters a phloem sieve-tube cell because of

(a) osmosis. (b) water potential. (c) active transport. (d) a process regulated by auxin.

209. Blowing water up through a drinking straw is most like

(a) guttation. (b) diffusion. (c) mass flow in xylem. (d) mass flow in phloem.

210. If you wanted to force stomata to open, which of the following would work?

(a) Treat the plant with abscisic acid.

(b) Stimulate water movement into the guard cells.

(c) Stimulate water movement out of the guard cells.

(d) Force the dermal cells around the stomata to dehydrate, thereby pulling the guard cells apart.

211. The Casparian strip is analogous to

(a) caulking to waterproof a seam in the bathtub.

(b) axle grease to lubricate a wheel.

(c) a condom to prevent fertilization.

(d) masking tape to hold things together.

212. Which is true of a fully turgid cell?

(a) O.P = D.P.D (b) O.P = Zero (c) D.P.D = Zero (d) T.P = Zero

213. Osmotic pressure of a cell is zero when

(a) T.P. is maximum (b) D.P.D. is maximum (c) T.P. is zero (d) Not possible.

214. What prevents wall to wall to wall (apoplast) movement of absorbed water?

(a) Osmotic apparatus of root hair cells (b) Cortical cells

(c) Pericycle cells (d) Endodermal cells

215. The osmotic expansion of a cell kept in water is chiefly regulated by :
(a) Mitochondria (b) Vacuoles (c) Plastids (d) Ribosomes

216. The correct statement regarding mechanism of food translocation in plant is
(a) It occurs in form of polysaccharides
(b) It is always from leaves to roots
(c) It requires expenditure of energy when translocates between source and sink end.
(d) The companion cells provide energy during the loading in sieve cells.

217. Which of the following statements about the mass flow hypothesis is wrong?
(a) It is the accepted mechanism for translocation of sugars from source to sink.
(b) As glucose is prepared at source it is converted to sucrose
(c) Sucrose is actively loaded into a sieve tube
(d) The process of loading at source produces a hypotonic condition in the phloem

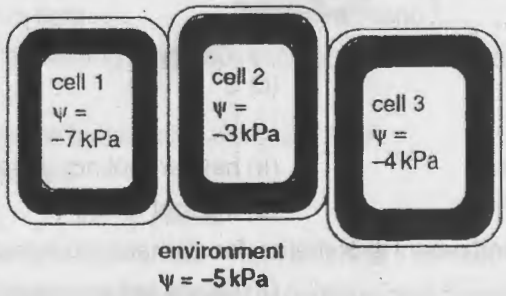
218. Match the following and choose the correct option.

A. Water potential	(i) It is usually positive
B. Solute potential	(ii) It is zero for pure water
C. Pressure potential	(iii) It is always negative

(a) A - (ii), B - (iii), C - (i) (b) A - (i), B - (iii), C - (ii) (c) A - (iii), B - (ii), C - (i) (d) A - (ii), B - (i), C - (iii)

219. Which of the following statements about plasmolysis is / are true?
I. Plasmolysis occurs when water moves into the cell.
II. Cells shrink in hypotonic solutions.
III. If the external solution balances the osmotic pressure of the cytoplasm, it is said to be isotonic.
(a) I only (b) II only (c) III only (d) I and II only

220. The diagram shows the water potential (ψ) in some plant cells and in their environment.



Which statement describes the movement of water between these cells and between them and their environment?
(a) All three cells are turgid, so no water moves.
(b) Water moves from cell 1, cell 3 and the environment into cell 2.
(c) Water moves from cell 3 to the environment, and from the environment to cell 1.
(d) Water moves from the environment into cells 1, 2 and 3.

221. What occurs in the apoplast and symplast pathways?

	Water enters cell wall	Water enters cytoplasm through plasma membrane	Water enters vacuoles	Water moves from cell to cell through plasmodesmata	Water moves from cell to cell through intercellular spaces
(a)	Apoplast	Apoplast	Apoplast	Symplast	Symplast
(b)	Apoplast	Symplast	Symplast	Symplast	Apoplast
(c)	Symplast	Apoplast	Apoplast	Apoplast	Symplast
(d)	Symplast	Symplast	Symplast	Apoplast	Apoplast

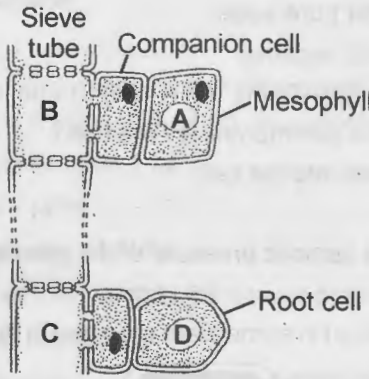
222. Transport proteins of endodermal cells are control points, where a plant adjusts the quantity and type of solutes that reach the xylem. Root endodermis is able to actively transport ions in one direction only because of the layer of
(a) Actin (b) Lignin (c) Suberin (d) Cellulose

223. Water potential gradient between the absorbent and the liquid imbibed is essential for imbibition. In addition, for any susbtance to imbibe any liquid, one of the following is also a prerequisite.
(a) Affinity between the adsorbant and the liquid (b) Molecular density of the adsorbant
(c) Concentration of the adsorbant (d) Pressure potential of the adsorbant

224. Passage cells help in
(a) Transport of water towards pericycle (b) Transport of water towards epiblema
(c) Absorption of water from soil (d) Passage of CO_2 towards stomata

225. The apoplast is located
(a) Outside the plasma membrane (b) In the entire cytosol
(c) On both sides of plasma membrane (d) In the plastidial content

226. The diagram shows the tissues involved in the transport of sucrose in a plant.
Where is the highest concentration of sucrose?



(a) A (b) B (c) C (d) D

227. In a ring girdled plant
(a) the shoot and root die together (b) neither root nor shoot will die
(c) the shoot dies first (d) the root dies first

228. Which one gives the most valid and recent explanation for stomatal movement?
(a) Starch hydrolysis (b) Guard cell photosynthesis
(c) Transpiration (d) Potassium influx and efflux

229. Transpiration and root pressure cause water to rise in plants by
(a) Pushing it upward (b) Pushing and pulling it, respectively
(c) Pulling it upward (d) Pulling and pushing it respectively

230. Root pressure develops due to
(a) Passive absorption (b) Active absorption
(c) Increase in transpiration (d) Low osmotic potential in soil

231. A column of water within xylem vessels of tall trees does not break under its weight because of
(a) Lignificant of xylem vessels (b) Positive root pressure
(c) Dissolved sugars in water (d) Tensile strength of water

232. Which of the following would be least likely to affect osmosis in plants?
(a) proton pumps in the membrane (b) a difference in solute concentrations
(c) receptor proteins in the membrane (d) aquaporins

233. In plant roots, the Casparian strip is correctly described by which of the following?
(a) It aids in the uptake of nutrients.
(b) It provides energy for the active transport of minerals into the stele from the cortex.
(c) It ensures that all minerals are absorbed from the soil in equal amounts.
(d) It ensures that all water and dissolved substances must pass through a cell membrane before entering the stele.

234. Water vapour comes out from the plant leaf through the stomatal opening. Through the same stomatal opening carbon dioxide diffuses into the plant during photosynthesis.
Reason out the above statements using one of following options :-
(a) Both processes cannot happen simultaneously.
(b) Both processes can happen together because the diffusion coefficient of water and CO_2 is different.
(c) The above processes happen only during night time.
(d) One process occurs during day time, and the other at night.

235. A few drops of sap were collected by cutting across a plant stem by a suitable method. The sap was tested chemically. Which one of the following test results indicates that it is phloem sap ?
(a) Low refractive index (b) Absence of sugar (c) Acidic (d) Alkaline

236. The movement of solvent molecules into the region of higher solute concentration through semipermiable membrane is called :
(a) Imbibition (b) Diffusion (c) Osmosis (d) Plasmolysis

237. Turgor pressure of a plant cell increases due to :
(a) Endosmosis (b) Exosmosis (c) Wall pressure (d) Diffusion pressure deficit

238. Which of the following forms of soil-water is commonly absorbed by plants ?
(a) Hygroscopic water (b) Capillary water (c) Gravitational water (d) Free water

239. In plant 'transpiration pull' theory for ascent of sap was first proposed by :
(a) Dixon (b) Dixon and Jolly (c) J. C. Bose (d) Strasburger

240. In plants opening of stomata is regulated by :
(a) Red light (b) Blue light (c) Far-red light (d) Ultraviolet light

241. Select the correct statement(s) pertaining to transpiration process in plants:
I. It is a necessary evil for plants.
II. Loss of water takes place through hydathodes in vapour form.
III. It may also occur through lenticels.
IV. The process is active during night in C_3 plants.
(a) I and IV are correct (b) II and IV are correct (c) I and III are correct (d) III and IV are correct

242. Which of the following equations is correct in respect of osmotic phenomenon ?
(a) DPD = OP – TP (b) DPD = OP + TP (c) DPD = OP × TP (d) DPD = OP ÷ TP

243. Incipient plasmolysis is :
(a) Last stage of plasmolysis (b) Mid stage of plasmolysis
(c) Zero hour for inception of plasmolysis (d) Initial stage of plasmolysis

244. Two adjacent plant cells are depicted below. A few statements regarding them are made. Mark the correct statement.

Cell A	Cell B
Ψ = –1200 Kpa	Ψ = –800 Kpa
Ψ_P = 800 Kpa	Ψ_P = 600 Kpa
Ψ_S = –2000 KPa	Ψ_S = –1400 KPa

(a) The Cell A has a higher water potential than B
(b) The direction of movement of water by osmosis will be from Cell A to Cell B
(c) At equilibrium, the two cells will have a potential value of –1700 KPa.
(d) Assuming that the solute potentials of the two cells do not change at equilibrium, the pressure potential of Cell B will be 400 KPa.

245. An organism with a cell wall would be unable to do which process?
(a) Osmosis (b) Phagocytosis (c) Active transport (d) diffusion

246. Which of the following facilitates opening of stomatal aperture ?
(a) Decrease in turgidity of guard cells
(b) Radial orientation of cellulose microfibrils in the cell wall of guard cells
(c) Longitudinal orientation of cellulose microfibrils in the cell wall of guard cells
(d) Contraction of outer wall of guard cells

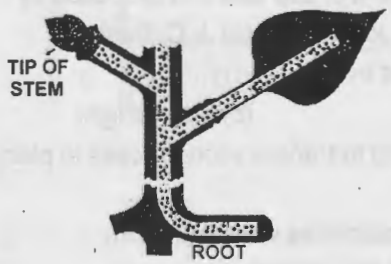
247. The water potential of pure water is :
(a) Less than zero (b) More than zero but less than one
(c) More than one (d) Zero

248. Water potential (Ψ) plays important role in water absorption and conduction from soil to leaf. Under which condition the process will go on smoothly?
(a) $\Psi_{atmosphere} < \Psi_{leaf} < \Psi_{root} < \Psi_{soil}$ (b) $\Psi_{atmosphere} > \Psi_{leaf} > \Psi_{root} > \Psi_{soil}$
(c) $\Psi_{atmosphere} = \Psi_{leaf} = \Psi_{root} = \Psi_{soil}$ (d) $\Psi_{atmosphere} < \Psi_{leaf} = \Psi_{root} > \Psi_{soil}$

249. When a plant cell undergoes expensive growth, the increase in volume is caused mostly:
(a) uptake of minerals (b) uptake of water (c) synthesis of cellulose (d) synthesis of proteins

250. Continuous water column is created in xylem during transpiration pull due to
(a) Cohesion and adhesion forces (b) Dead nature of cell wall
(c) Less lignification of cell wall (d) High tensile strength and low capillarity

251. Which of the following is wrong statement regarding the figure below?



(a) A diasaccharide enters sieve tube cells by active transport in leaves.
(b) At the source and water moves from phloem to xylem
(c) As hydrostatic pressure in phloem sieve tube increases, pressure flow begins
(d) Loss of solute at sink end produces a high water potential in phloem

252. If you could connect and active xylem vessel from a shoot to an active phloem sieve-tube member from a leaf using a "micropipe," which way would the solution flow between the two?
(a) The solution would flow from xylem to phloem.
(b) The solution would flow from phloem to xylem.
(c) The solution would flow back and forth from one to another.
(d) The solution would not flow between the two.

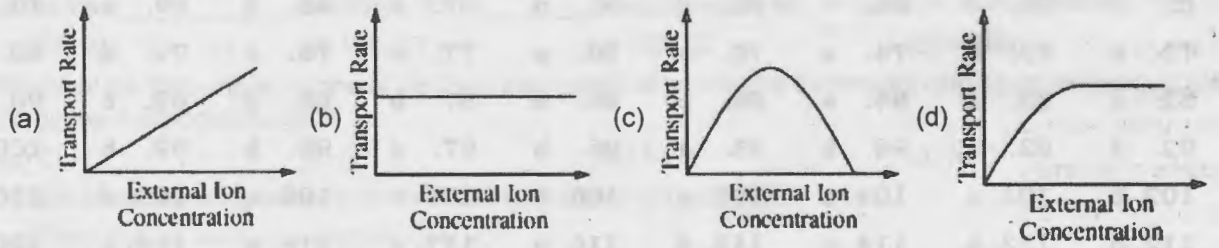
253. If you could override the control mechanisms that open stomata and force them to remain closed, what would you expect to happen to the plant?
(a) Sugar synthesis would likely slow down.
(b) Water transport would likely slow down.
(c) All of these could be the result of keeping stomata closed.
(d) None of these would be the result of keeping stomata closed.

254. You are a molecule of water traveling through the plant. Which of the following processes would not provide a driving force for you to move at either a cellular level or over longer distances through the plant?
(a) mass flow (b) osmosis
(c) diffusion (d) All the above are driving forces for water movement.

255. Death of protoplasm is a pre-requisite for a vital function like –
(a) Transport of sap (b) Transport of food (c) Absorption of water (d) Gaseous exchange

256. Transpiration is an energy consuming process. Spraying anti-transpirants in flowering stages may prove advantageous but it is not advantageous in vegetative stages since it will have a direct effect on:
(a) photosynthesis resulting in stunted plant. (b) translocation of food through phloem.
(c) absorption and translocation of minerals. (d) synthesis and accumulation of florigen.

257. Of the graphs shown below. which is most representative of the kinetics of ion transport through a membrane channel?



258. Pine seedlings grown in sterile potting soil grow much slower then seedlings grown in soil from the area where the seeds were collected. This is most likely because :
(a) The sterilization process kilss the root hairs as they emerge from the seedling
(b) The normal symbiotic fungi are not present in the sterilized soil.
(c) Sterilization removes essential nutrients from the soil.
(d) Sterilization process kill symbiotic bacteria.

259. Which of the following is correct about symplast?
(a) Living continuum (b) Cell wall and intercellular space
(c) Non-Living continuum (d) None of these

260. Which of the following is not a feature of active transport of solutes in plants ?
(a) Requires ATP (b) Occurs against concentration gradient
(c) Non-selective (d) Occurs through membranes

261. What will be the direction of flow of water when a plant cell is placed in a hypotonic solution ?
(a) No flow of water in any direction (b) Water will flow in both directions
(c) Water will flow out of the cell (d) Water will flow into the cell

262. What is the direction of movement of sugars in phloem?
(a) Non-multidirectional (b) Upward (c) Downward (d) Bi-directional

263. Xylem translocates.
(a) Water only
(b) Water and mineral salts only
(c) Water, mineral salts and some organic nitrogen only
(d) Water, mineral salts, some organic nitrogen and hormones

264. Phloem in gymnosperms lacks :
(a) Albuminous cells and sieve cells (b) Sieve tubes only
(c) Companion cells only (d) Both sieve tubes and companion cells

11 TRANSPORT IN PLANTS

1. b	2. c	3. d	4. d	5. a	6. d	7. c	8. a	9. a	10. b
11. d	12. a	13. d	14. c	15. b	16. d	17. d	18. d	19. d	20. c
21. d	22. a	23. a	24. c	25. b	26. a	27. b	28. d	29. b	30. c
31. d	32. b	33. a	34. b	35. c	36. c	37. a	38. c	39. a	40. c
41. b	42. c	43. d	44. d	45. d	46. a	47. c	48. b	49. c	50. d
51. c	52. d	53. d	54. a	55. b	56. c	57. c	58. a	59. b	60. d
61. d	62. a	63. c	64. b	65. d	66. d	67. c	68. d	69. a	70. d
71. c	72. c	73. b	74. a	75. c	76. a	77. c	78. c	79. d	80. d
81. b	82. a	83. d	84. a	85. c	86. d	87. b	88. d	89. b	90. a
91. d	92. d	93. d	94. b	95. a	96. b	97. d	98. b	99. b	100. b
101. a	102. b	103. a	104. a	105. c	106. d	107. c	108. a	109. d	110. b
111. a	112. d	113. a	114. c	115. d	116. b	117. a	118. a	119. c	120. a
121. d	122. a	123. b	124. d	125. c	126. d	127. c	128. b	129. b	130. a
131. d	132. d	133. d	134. b	135. c	136. d	137. c	138. d	139. d	140. d
141. c	142. a	143. d	144. b	145. d	146. c	147. a	148. d	149. b	150. b
151. c	152. b	153. d	154. c	155. c	156. a	157. b	158. d	159. a	160. b
161. a	162. c	163. b	164. a	165. b	166. d	167. a	168. d	169. a	170. c
171. d	172. a	173. b	174. b	175. b	176. a	177. a	178. a	179. a	180. d
181. a	182. c	183. a	184. b	185. a	186. b	187. a	188. d	189. d	190. b
191. c	192. b	193. a	194. d	195. c	196. a	197. a	198. b	199. d	200. a
201. c	202. b	203. c	204. b	205. d	206. d	207. c	208. c	209. a	210. b
211. a	212. c	213. d	214. d	215. b	216. d	217. d	218. a	219. c	220. c
221. b	222. c	223. a	224. a	225. a	226. b	227. d	228. d	229. d	230. b
231. d	232. c	233. d	234. b	235. d	236. c	237. a	238. b	239.b	240. b
241. c	242. a	243. b	244. d	245. b	246. b	247. d	248. a	249. b	250. a
251. b	252. b	253. c	254. d	255. a	256. c	257. d	258. b	259. a	260. c
261. d	262. d	263. d	264. d						

12 MINERAL NUTRITION

1. Essential elements are –
   (a) not required for normal reproduction.
   (b) not replaced by other elements.
   (c) indirectly involved in metabolism.
   (d) required only in those metabolic process which lead to increase in cytoplasmic mass.
2. The effect of mineral deficiencies involving fairly mobile nutrients will be observed in –
   (a) Older portions of the plant (b) New leaves and shoot
   (c) The root system (d) The color of leaves
3. More than _____ elements of the _____ discovered so far are found in different plants
   (a) 60, 105 (b) 105, 60 (c) 30, 60 (d) 4, 105
4. Which of the following is not one of the three elements that provide the framework / structural elements of the cells and component of biomolecules?
   (a) C (b) H (c) Fe (d) N, O
5. Which of the following statements best characterizes micronutrients?
   (a) They include elements such as C, H, O
   (b) They occur in such small amounts that they are not necessary for life
   (c) They are essential elements required in very small amounts
   (d) They are needed by all organisms in the same quantity
6. Which of the following choices is not one of the three plant macronutrients included in most fertilizers?
   (a) O (b) N (c) P (d) K
7. Plants are generally immobile. However, their roots can help them –
   (a) Forage over longer distances for food (b) Photosynthesize
   (c)Feed on the tissues of dead organisms (d) Grow through their energy sources
8. Of the 4 most abundant elements in most plants [C, H, O and N], which does a terrestrial green plant procure mainly through its roots from the soil?
   (a) H and O (b) H and N (c) C and O (d) O and N
9. Which of the following is not a criterion for an essential nutrient?
   (a) It is required for growth and reproduction (b) Form large molecules in plants
   (c) No other element can replace it (d) It is required for a specific structure or metabolic function
10. Which of the following techniques can researchers use to explore plant nutrient deficiencies?
    (a) Hydrophonics (b) Sun exposure (c) Crop rotation (d) Hyperbaric chambers
11. Soil could be deficient in any of the following nutrients. If you had to supply one of them, which would be needed in the smallest amount?
    (a) S (b) P (c) K (d) Fe
12. Which one of the following roles is not characteristic of an essential element?
    (a) Being a component of biomolecules
    (b) Changing the chemistry of soil
    (c) Being a structural component of energy-related chemical components.
    (d) Activation or inactivation of enzymes
13. Hydrophonics has been successfully employed as a technique for the commercial production of vegetables like –
    (a) Tomato (b) Seedless cucumber (c) Lettuce (d) All

14. To the plants soil is not the source of –
(a) C (b) H (c) O (d) All

15. The amount of macronutrients per kg of dry matter is –
(a) 10 mmole (b) Above 10 mmole (c) Less than 10 mmole (d) 0.1 mg

16. Which is not a criterion for essentiality of a mineral?
(a) Direct role in metabolism (b) Requirement is specific
(c) Dispensible for growth (d) Deficiency causes hunger sign

17. Essential elements (17) are –
(a) Only macronutrients (b) Only micronutrients
(c) Both macro and micronutrients (d) C, H, O and N only

18. Which one is not a trace element / micronutrient –
(a) Mn (b) Cu (c) Mo (d) K

19. Which is a false statement regarding macronutrients?
(a) Form plant structure (b) Become toxic in slight excess
(c) Develop osmotic potential (d) Component of energy-related compounds

20. Plants acquire minerals from the soil by :
(a) Recycling them (b) Growing (c) Rain water (d) Soil microbes

21. Partial mineral element is –
(a) N (b) P (c) K (d) Fe

22. Deficiency of which mineral causes deficiency of N –
(a) Mo (b) K (c) Mn (d) S

23. I. Component of chlorophyll
II. Helps to maintain ribosome structure
III. Activator for Rubisco and Pepco
IV. Activates the enzymes of respiration and photosynthesis
V. Involved in synthesis of nucleic acids
The above roles are played by –
(a) Ca^{+2} (b) Mg^{+2} (c) Mn^{+2} (d) Cl^{-}

24. Minerals which maintain cation-anion balance in cells are –
(a) Cl and K (b) K and Fe (c) Cl and Mg (d) Ca and Mg

25. Minerals associated with redox reaction are –
(a) Na, Cu (b) N, Cu (c) Fe, Cu (d) Ca, Fe

26. Which of the following elements are required for chlorophyll synthesis –
(a) Fe and Mg (b) Mo and Ca (c) Cu and Ca (d) Ca and K

27. Inhibition of cell division occurs due to lack or low level of –
(a) N but not S (b) S but not K (c) N, S and K (d) K but not S and N

28. Which of the following is a component of vitamin (thiamine, biotin), Acetyl CoA, cysteine, methionine and ferrerdoxin?
(a) Fe (b) S (c) Co (d) K

29. In plants a common symptom caused by deficiency of P, K, N and Mg is –
(a) Leaf tip hooking (b) Anthocyanin development
(c) Necrosis / death of tissue (d) Poor formation of vascular tissue

30. I. Helps in the formation of middle lamella
II. Needed in spindle fibre formation
III. Accumulates in older leaves
IV. Involved in normal functioning of cell membrane

V. Activates certain enzymes like succinate dehydrogenase.

The above list is associated with –

(a) Fe (b) Mg (c) Ca (d) Cu

31. I. The deficiency of any element can cause multiple symptoms –

II. Same symptoms may be caused by the deficiency of one of several different elements

III. The concentration of the essential element below which plant growth is retarded is termed as critical concentration

IV. Chlorosis is the loss of chlorophyll due to deficiency of N, K, Mg, Fe, S, Mn, Zn, Mo

V. Different plants respond differently to the deficiency of the same element.

Which one is correct

(a) I, II, III, IV, V (b) Only I and IV (c) Only I and III (d) Only III and IV

32. Match the column I with column II –

Column I		Column II
A.	Mg	1. Found in some amino acids
B.	S	2. Structural component of chlorophyll
C.	I	3. Not important for plants
D.	Mn	4. Required for photolysis of water

(a) A-2, B-1, C-3, D-4 (b) A-1, B-2, C-3, D-4 (c) A-1, B-3, C-4, D-2 (d) A-2, B-3, C-1, D-4

33. An element which with the help of Na^+ and K^+, determines the solute concentration and anion-cation balance in cell is

(a) Cl (b) S (c) Zn (d) Mo

34. Which element is very essential for uptake and utilization of Ca^{+2}, membrane function, pollen germination and carbohydrate translocation via phloem –

(a) Cl (b) Mg (c) Mn (d) B

35. Crop plants absorb carbon in the form of –

(a) Elemental carbon from the soil (b) CO_2 from the soil

(c) CO_2 from the air (d) Carbonates

36. The first experiment on hydrophonics was performed by –

(a) Sachs (b) Knop (c) Hoagland (d) Amon

37. Hydrophonics is a system of growing plants in –

(a) Soilless culture or solution cultures (b) Acidic soil

(c) Soilless cultures with alkaline pH (d) Soilless culture with acidic pH

38. Choose the correct statement(s) –

I. Solution culture / Hydrophonics contains all essential minerals except one, the usefulness of which is to be determined

II. Na, Si, Co and Selenium are beneficial element required by higher plants

III. Zn is the activator of nitrogenases while Mo is the activator of alcohol dehydrogenase

IV. Zn is needed for auxin synthesis

(a) All (b) I, II, III (c) None (d) I, II, IV

39. Plants obtain Fe in the form of –

(a) Ferric ions (b) Ferrous ion

(c) Either ferric or ferrous ions (d) $FeSO_4$

40. Which mineral is required in larger amount in comparison to other micronutrients?

(a) Mo (b) B (c) Fe (d) Zn

41. Which one is the major constituent of proteins, nucleic acids, vitamins and hormones –

(a) P (b) N (c) K (d) S

42. I. Important constituent of proteins involved in ETS

II. Activator of catalase

III. Important constituent of cytochrome
IV. Essential for chlorophyll synthesis
The above roles have been assigned to –
(a) Cu (b) Fe (c) Ca (d) Mo

43. Match the following –

Column I	Column II
I. K	A. Stomatal opening
II. Mo	B. Constituent of cell membrane
III. P	C. Photolysis of water
IV. Mn	D. Most free ion
	E. Component of Nitrogenase and Nitrate reductase

Answer Code –

	I	II	III	IV
(a)	A, D	E,	B	C
(b)	A, E	D	C	B
(c)	A, E	D	B	C
(d)	D	A	C	B, E

44. The technique used for studying the effects of deficiency or toxicity of mineral nutrients on plant growth and metabolism is called –
(a) Hydrosonics (b) Hydrosphere (c) Solution culture (d) Hygroponics

45. Which of the following characteristics defines an element as essential element for a particular species
(a) If it is missing a plant cannot grow or reproduce normally.
(b) If it is absent other nutrients may be substituted for it
(c) If it is present in high concentration plant growth increases
(d) For high seed production it has to be added as a fertilizer

46. Micronutrients are needed in very small amount because –
(a) Most of them are mobile in the plants (b) They mainly function as cofactors of enzyme
(c) They play minor role in plant health (d) Only meristems need these nutrients

47. A mineral deficiency is likely to affect older leaves more than younger leaves if the –
(a) mineral is a micronutrient
(b) Deficiency persists for a long time
(c) Mineral is very mobile within the plant
(d) Older leaves are in direct contact of sunlight

48. It is necessary to study all the symptoms of the plant to identify the deficiency of an element because of –
(a) The deficiency of an element may cause multiple symptoms
(b) The same symptoms may be caused by the deficiency of more than element
(c) both
(d) An element has only one role in plants health

49. The symptoms of toxicity are difficult to identify because of –
(a) Presence of water in soil
(b) Phytoremediation
(c) Primary symptoms
(d) Many a times excess of micronutrients interfere in the absorption and functioning of other nutrients

50. Excess of Mn causes deficiency of –
(a) Fe (b) Mg (c) Ca (d) All

51. The toxicity symptoms of Mn like brown spots surrounded by chlorotic veins is due to –
(a) Deficiency of Mn only (b) Excess of Fe
(c) Excess of Mg (d) Combined deficiency symptoms of Fe, Mg and Ca

52. I. Essential macronutrients are nine in number, micronutrients are eight in numbers.
II. Every mineral element that is present in a cell is needed by the cell
III. Nitrogen as a nutrient element is highly immobile in the plants
IV. Deficiencies of essential elements disrupt plant growth and development
V. Although the functions of essential elements are diverse, they can be grouped into 4 general categories
(a) All are correct (b) All are correct except I, IV, V
(c) I, IV and V are correct (d) II and IV are correct

53. Which one of the following statements can best explain the term critical concentration –
(a) Essential element concentration below which the plant growth is reduced
(b) Micronutrient concentration below which plant growth becomes stunted
(c) Essential element concentration below which plant remains in the vegetative phase
(d) Essential element below which chlorosis occurs

54. Which of the following symptoms is not due to Mn-toxicity in plants?
(a) Ca-translocation in shoot apex is inhibited
(b) Appearance of brown spot surrounded by chlorotic veins
(c) Deficiency of both Fe and N is induced
(d) None

55. Plants cannot be grown in –
(a) Soil with essential minerals
(b) Water with essential minerals
(c) Either soil or water with essential minerals
(d) Water or soil without essential minerals

56. Nitrogen fixation is –
(a) Converting nitrogen in the air to form a usable form by plants
(b) Recycling nitrogen from organic matter in the soil
(c) Absorbing nitrogen from the soil
(d) Conversion of NO_3 to N_2

57. Reaction carried out by N_2 metabolising microbes include –
(i) $2NH_3 + 3O_2 \longrightarrow 2NO_2 + 2H^+ + H_2O$
(ii) $2NO_2^- + O_2 \longrightarrow 2NO_3^-$
Which of the following statements about these equations is not correct –
(a) Step (i) is carried out by *Nitrosomonas* or *Nitrococcus*
(b) Step II is carried out by *Nitrobacter*
(c) Both steps I and II can be called nitrification
(d) Bacteria carrying out these steps are usually photoautotrophs

58. With regard to the biological Nitrogen Fixation by *Rhizobium* in association with soyabean, which one of the following does not hold true –
(a) Nitrogenase may require O_2 for its function
(b) Nitrogenase is Mo-Fe protein
(c) Leg-haemoglobin is a pink coloured pigment
(d) Nitrogenase helps to convert N_2 gas into 2 molecules of NH_3 (Nitrogen fixation)

59. Ammonifying bacteria in the soil –

(a) Convert ammonium to nitrate
(b) fix nitrogen
(c) Convert nitrogen in organic molecules into ammonium
(d) Convert Nitrogen to Ammonia

60. If a new nutrient is discovered, it would be –
(a) Micronutrient (b) Macronutrient (c) rare gas (d) a or b

61. Fe deficiency causes _____ leaves to turn _____.
(a) Old, yellow (b) Young, yellow (c) young, orange (d) Old, brown spotted

62. The form of nitrogen from the soil that plant absorbs is –
(a) NH_3 (b) N_2 (c) Nitrate (d) Nitrite

63. Which of the following compounds is used directly to build proteins –
(a) NH_3 (b) N_2 (c) Nitrate (d) Nitrite

64. One example of a nutrient in the reduced form is the –
(a) Carbon in CO_2 (b) Hydrogen in H_2O (c) Nitrogen in NH_3 (d) Sulphur in sulphate form

65. Some bacteria function as denitrifers; they –
(a) Oxidise NH_3 to Nitrate (b) Oxidise Nitrate to Nitrite
(c) Reduce N_2 to NH_3 (d) reduce NO_3 to N_2

66. One of the defining characteristics of an essential element is that it –
(a) is only necessary for early growth of the seedling
(b) Can be replaced or not replaced by another element
(c) Has a direct function in the plant
(d) Is found in relatively high concentration in the environment

67. The five elements that comprise most proteins are –
(a) C, S, O, P, K (b) C, H, O, N, S (c) C, H, N, S, P (d) C, H, O, N, Fe

68. The three elements most commonly added to agricultural soils in fertilizers –
(a) N, P, Fe (b) N, K, Fe (c) N, P, K (d) N, S, Fe

69. All N_2 fixers belong to –
(a) Eubacteria (b) Eubacteria and Plantae
(c) Plantae (d) Protista

70. Nitrogenase enzymes react with the substrate N_2 with _____ hydrogen atoms before releasing product –
(a) 2 (b) 3 (c) 6 (d) 5

71. Nitrogenase enzymes are extremely sensitive to _____ molecules –
(a) Hydrogen (b) Oxygen (c) Water (d) CO_2

72. Nodules that are actively fixing nitrogen are pink, demonstrating the presence of –
(a) Fe (b) Chlorophyll (c) Leg-haemoglobin (d) Anthocyanin

73. Plants take up sulphur in the _____ form and phosphorus in the _____ form –
(a) Reduced, Oxidised (b) Oxidised, Oxidised (c) Reduced, Reduced (d) Oxidised, Reduced

74. Root nodules on plants of the legume family contain –
(a) Cyanobacteria (b) *Nitrococcus* (c) *Rhizobium* (d) *Nitrobacter*

75. Which of the following statements about the chemical process of N_2 fixation in cells is true –
(a) It is enhanced by high O_2 concentrations (b) Very little energy in the form of ATP is needed
(b) All three bonds between nitrogen atoms are broken simultaneously
(d) Hydrogen atoms are added to nitrogen to form NH_3 molecules

76. The process that is the opposite of nitrogen fixation is –
(a) Nitrification (b) Denitrification (c) Ammonification (d) Nitrate reduction

77. The relationship between *Rhizobium* and the roots of legumes can be best described by which of the following terms.
(a) Parasitic (b) Antagonistic (c)Symbiotic (d) Carnivorous

78. Nitrogen fixation is –
(a) Performed by plants only (b) The oxidation of N_2
(c) The reduction of NH_3 to NO_3 (d) Multi-stepped chemical reaction

79. Nitrate reduction –
(a) is performed by plants (b) Takes place in mitochondria
(c) Is catalysed by nitrogenase (d) Performed by specialized plant cells located in the root

80. Which of the following groups of micro-organisms do not include the representatives that can fix N_2 –
(a) Free-living *Rhizobium* (b) Nodule-inhabiting *Rhizobium*
(c) Cyanobacteria (d) *Azotobacter*

81. I. Nitrogenase is only catalytic under anaerobic conditions
II. The energy for nitrogen fixation can be provided by respiration of the host cells
III. In nitrogen fixation, nitrogen is reduced by the addition of 3 successive pairs of hydrogen
IV. Within a nodule, O_2 levels are kept low.
V. Many living organisms can utilize the nitrogen in the form of N_2, available abundantly in air.
(a) All are correct (b) I, II, III, V are correct
(c) II, III, IV, V are correct (d) Only V is false

82. Which one of the following is correct –
(a) *Azotobacter* and *Beijernickia* are free living N_2-fixers
(b) *Rhodospirillum* is anaerobic N_2 fixing bacterium
(c) *Bacillus* is a free living N_2 fixer
(d) All

83. The largest reservoir of nitrogen on earth is –
(a) The soil (b) The air (c) The oceans (d) Granite rocks

84. The bond in molecular nitrogen (N_2) is difficult to break, because it is a –
(a) twisted configuration (b) quadruple hydrogen bond
(c) triple covalent bond (d) triple ionic bond

85. Which of the following formulas describes nitrogen fixation?
(a) $N_2 + 3H_2 \rightarrow 2NH_3$ (b) $2NH_4^+ + 2O_2 + 8e^- \rightarrow N_2 + 4H_2O$
(c) $2NH_3 \rightarrow N_2 + 3H_2$ (d) $2N_2$ + glucose $\rightarrow$ 2 amino acids

86. Nitrogen fixation by organisms requires conditions that are –
(a) highly alkaline (b) anaerobic (c) saturated with sunlight (d) free of water

87. The conversion of ammonia to ammonium occurs –
(a) on the ribosomes of cyanobacteria (b) on the endoplasmic reticulum of green algae
(c) spontaneously when ammonia is in water (d) on the dry surface of soil particles

88. Plants having mutualistic relations with nitrogen-fixing bacteria receive _____ from the bacteria –
(a) ammonia (b) amino acids (c) nitrite (d) nitrate

89. Plants that have mutualistic relations with nitrogen-fixing bacteria provide the bacteria with –
(a) N_2 (b) enzymes (c) sugars (d) nitrite

90. The nodule in a plant root where nitrogen-fixing bacteria live, forms from cells of the –
(a) epidermis (b) cortex (c) endodermis (d) vascular cylinder

91. Plants such as cloves and beans that have nitrogen-fixing bacteria in their roots are in which of the following families?
(a) Orchidaceae (b) Asteraceae (c) Solanaceae (d) Leguminosae

92. Reduction of one molecule of nitrogen into 2 molecules of NH_3 consumes –
(a) 4 molecules of ATP (b) 16 molecules of ATP

(c) 56 molecules of ATP (d) 38 molecules of ATP

93. Nitrogenase enzyme is –
(a) A protein (b) A Mo - Cu Protein (c) Fe - Cu Protein (d) Mo - Fe Protein

94. Leg-haemoglobin is –
(a) O_2 scavenger (b) N_2 scavenger (c) CO_2 scavenger (d) Protein scavenger

95. Which one is correct about the free living *Rhizobium sp.* and its enzyme?
(a) Bacteria are aerobic and nitrogenase are active
(b) Bacteria are anaerobic and nitrogenase is active (operational)
(c) Bacteria are aerobic and nitrogenase is inactive
(d) Bacteria are anaerobic and nitrogenase is inactive

96. Which one is the correct summary equation for the nitrogen fixation –
(a) $N_2 + 8e^- + 8H^+ + 8ATP \longrightarrow NH_3 + H_2 + 16ADP + 16Pi$
(b) $N_2 + 8e + 8H^+ + 16ATP \longrightarrow 2\ NH_3 + H_2 + 16ADP + 16Pi$
(c) $2NH_3 + 4O_2 \longrightarrow 2H^+ + 2H_2O + 2NO_3^-$
(d) $2NH_3 + 3O_2 \longrightarrow 2NO_2^- + 2H^+ + 2H_2O$

97. *Rhizobium* is –
(a) Coccus (b) Spiral (c) Rod-shaped (d) filamentous

98. Which one is false about the bacteria *Rhizobium* and *Frankia* –
(a) Both are N_2-fixers
(b) Both are free living in soil but can live as symbiotic life with their respective partners.
(c) *Frankia* produces nodules on the roots of non leguminous plants like *Alnus* while *Rhizobium* does the same in leguminous plants
(d) None

99. Source(s) of nitrogen oxides is –
(a) Industrial combustion (b) Forest fibre, automobile
(c) Power-generating stations (d) All

100. *Nitrosomonas*, *Nitrococcus* and *Nitrobacter* are –
(a) Photoautotroph (b) Chemoheterotrophs (c) Chemoautotroph (d) Decomposers

101. Corn is a crop that requires a lot of nitrogen to grow properly. Farmers will often grow corn in a particular field every year, alternating it with a legume. What is the purpose of this –
(a) Legumes form mycorrhizal association which can convert atmospheric N_2 into a form usable by plants
(b) Legume roots contain bacteria that convert atmospheric nitrogen into a form usable by plants
(c) Legume are the only plants that can convert atmospheric nitrogen into a form usable by plants
(d) Legumes deplete the soil of nitrogen, so corn is grown to replenish the nitrogen in the soil

102. Is the ability to fix nitrogen limited to certain organisms –
(a) No, all bacteria can fix nitrogen (b) Yes, only some bacteria and plant can fix nitrogen
(c) Yes, only some bacteria can fix nitrogen (d) No, all organisms can fix nitrogen

103. Which of the following happens to be the key organism in the nitrogen cycle –
(a) All green plants (b) Leguminous plants (c) Bacteria (d) Heterotrophic plants

104. Which of the following represents the abiological mode of adding nitrogen to the soil –
(a) Ammonification (b) Nitrification (c) Lightning (d) Nodule formation

105. Which one is false?
(a) Soil supplies minerals, harbours N_2-fixing bacteria and other microbes, holds water, supplies O_2 to root and acts as matrix that stabilises the plant
(b) Both macro and micro nutrients form component of fertilizers
(c) Weathering and breaking down of rock enrich the soil with dissolved ions and inorganic salts

(d) Dentrification is not the job of bacteria *Pseudomonas* and *Thiobacillus*

106. Most of the plants obtain nitrogen from the soil in the form of –
(a) Nitrates and nitrites (b) Nitrates and ammonium salt
(c) Nitrites and ammonium salts (d) Hyponitrites and nitrates

107. Nitrate reductase forms –
(a) N_2 (b) AAs (c) NO_2 (d) NO_3

108. Nodule formation is reduced in the legume roots due to deficiency of –
(a) S (b) B (c) N (d) S, B

109. The fixation of nitrogen in the root nodules is an example of –
(a) associative symbiosis (b) obligatory symbiosis
(c) non-symbiotic N_2-fixation (d) Phyllosphere association

110. The different steps in a nodule formation are given below –
I. A matured nodule establishes a direct vascular connection with the host for exchange of nutrients
II. Root hair curls and the bacteria invade the root hair
III. *Rhizobium* bacteria contact a susceptile root hair, divide near it
IV. The infection thread is produced carring the bacteria and grows into the cortex of the root
V. The bacteria get modified into rod-shaped bacteroids and cause inner cortical layer and pericycle to divide to form nodule.
The correct sequence is –
(a) III, II, IV, I, V (b) III, II, IV, V, I (c) IV, V, III, II, I (d) I, III, V, II, IV

111. The T. S. of nodule indicates that it is red / orange in its –
(a) outer part (b) basal part (c) central part (d) terminal part

112. At physiological pH, for the formation of ammonium ion, Ammonia is –
(a) deprotonated (b) decarboxylated (c) carboxylated (d) protonated

113. The plants cannot accumulate NH_4^+ ion because –
(a) It is oxidising agent (b) It is reducing agent
(c) It is oxidatively aminated (d) It is toxic to plants

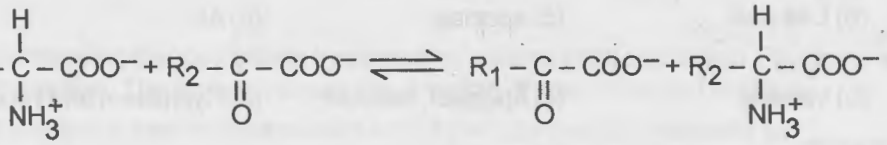
114. What is the fate of NH_4^+ in plant –
(a) It is deprotonated (b) It is reprotonated
(c) It is used to synthesise amino acid (d) It is used in photorespiration

115. The process of conversion of $NH^+_4 \longrightarrow NO_2^{-1} \longrightarrow NO_3^{-1}$ is called –
(a) Ammonification (b) Nitrification (c) N_2 fixation (d) Denitrification

116. Cell division in root nodules is promoted by _____ secreted by plant and _____ secreted by bacteria –
(a) Auxin, Cytokinin (b) Cytokinin, Auxin
(c) Auxin, Leg-haemoglobin (d) Nitrogenase, Leg-haemoglobin

117. NH_4^+ is used to synthesise amino acids in plants. For it there are 2 main ways –

(i) α-Ketoglutaric acid + NH_4^+ + NADPH $\xrightarrow[\text{Dehydrogenase}]{\text{Glutamate}}$ glutamate + H_2O + NADP

(ii) 

(a) Both (i) and (ii) are reductive amination
(b) Both (i) and (ii) are transamination
(c) (i) is transamination and (ii) is reductive amination

(d) (i) is reductive amination and (ii) is transamination

118. Which is not true for nitrogenase enzyme in root nodules in legumes?
(a) synthesized by nif genes of *Rhizobium* (b) Site of reduction of N_2 into NH_3
(c) It is a Mo-Fe protein (d) Resistant to O_2 conc.

119. The amino acids which plays a central role in nitrogen metabolism is / are –
(a) Glutamic acid (b) α-ketoglutaric acid (c) Aspartic acid (d) Double aminated keto acids

120. Conversion of $NO_3^{-1} \longrightarrow NO_2^{-1} \longrightarrow NH_4^+$ is called and is catalysed by –
(a) Nitrate assimilation, nitrate and nitrite reductase (b) Nitrification, nitrate and nitrate reductase
(c) Ammonification, glutamate dehydrogenase (d) Denitrification, transaminase

121. Transported and storage form of nitrogen in plants are –
(a) Amides (b) Polypeptides (c) Amino acids (d) α-ketoglutaric acids

122. Leg-haemoglobin is found in which of the following organism?
(a) *Anthoceros* (b) *Aulosira* (c) *Nostoc* (d) Groundnut

123. Nitrite reductase enzyme is used to convert –
(a) Nitrate into nitrite ion (b) Nitrogen of atmosphere into ammonia
(c) Ammonia into nitrates (d) Nitrite to ammonium ion

124. The process of conversion of NO_2^{-1}, $NO_3^{-1} \longrightarrow NH_3 \longrightarrow N_2$ is called and is done by –
(a) Nitrification, *Nitrosomonas* (b) Denitrification, *Pseudomonas*
(c) Nitrate assimilation, Nitrogenase (d) Ammonification, *Bacillus*

125. Most of the mineral nutrients required by plants are absorbed by the root cells by the process –
(a) Phagocytosis (b) Passive transport (c) Active transport (d) Osmosis

126. The translocation of inorganic solute –
(a) Is equal to the rate of translocation of water (b) Is dependent on transpiration pull
(c) Occurs through xylem vessel (d) All

127. Characteristic of an ion channel includes which of the following –
(a) They are transmembrane proteins
(b) They are gated channels
(c) They act as selective pores. Transport through the channel is always passive
(d) All

128. During ionic flux, the uptake of ions into inner space is –
(a) Passive process (b) Active process (c) Energy dependent (d) Both b and c

129. Select the false statement –
(a) Leg-haemoglobin is present in the cytoplasm of infected nodule cells.
(b) The host plant (legume) produce globin part while bacteria *(Rhizobium)* produces haem part of leg-haemoglobin
(c) Most of our knowledge about mechanisms of absorption of nutrients by root is based on a single plant cell, isolated tissue and/or organ, and it shows that 3 main phases are involved in this process
(d) Ion transport across the root obeys the same biophysical laws that govern cellular transport

130. Outer space / free space includes –
(a) inter cellular spaces (b) Cell wall (c) apoplast (d) All

131. Inner space consists of –
(a) Cytoplasm (b) Vacuole (c) Apoplast, vacuole (d) Cytoplasm and vacuole

132. I. Rapid uptake of ions
II. Active process
III. Passive transport
IV. Occurs through ion channels

V. Slow process

VI. Absorbed ions are free and exchangeable

VII. Not exchangeable with external medium

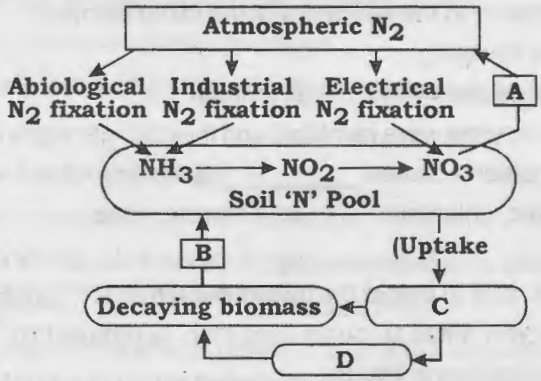
There are 2 phases of mineral absorption. **A** – Initial or 1st phase. **B** – Second phase

Which of the following options is correct about A and B

(a) A = I, III, IV, VI; B = II, V, VII (b) A = II, III, IV, VI; B = I, V, VII

(c) A = I, V, VII; B = II, III, IV, VI (d) A = II, V, VII; B = I, III, IV, VI

133. Study the cycle shown below and select the option which gives correct words for all the four blanks A, B, C and D –



	A	B	C	D
(a)	Nitrification	Ammonification	Animals	Plants
(b)	Denitrification	Ammonification	Plants	Animals
(c)	Nitrification	Denitrification	Animals	Plants
(d)	Denitrification	Nitrification	Plants	Animals

134. Which of the following medium is NOT used in the growth of hydrophonic plants?

(a) Minerals (b) Water (c) Light (d) Soil

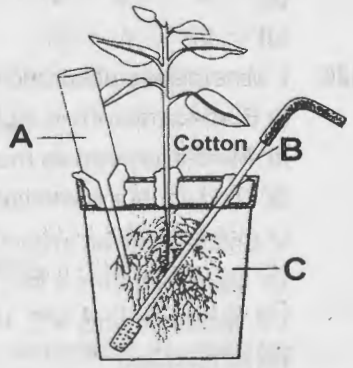
135. What is the primary controlled variable from which scientists benefit in a hydrophonic experiment?

(a) Sunlight (b) Insects (c) Size of the plant (d) Nutrient uptake

136. What types of plants can be grown hydrophonically?

(a) Vegetables (b) Flowers (c) Herbs (d) All of the above

137. The accompanying diagram shows a typical setup for hydrophonic technique. Select the option which gives correct words for all the three blanks A, B and C –



(a) A - Funnel for adding water & nutrients, B - Aerating tube, C - Nutrient solution

(b) A-Funnel for adding water only, B - Aerating tube, C - Nutrient solution

(c) A-Funnel for adding nutrients only, B - Aerating tube, C - Nutrient solution

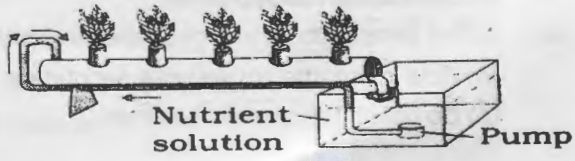
(d) A - Funnel for adding water and nutrients, B - Aerating tube, C - Water

138. The accompanying diagram shows hydrophonic / soilless plant production. Plants are grown in a tube or trough placed on a slight incline. The arrows indicate the direction of flow of nutrient solution.

Nutrient solution is sent to the elevated end of the tube from the reservoir by _____ and it flows back into reservoir due to _____.

(a) Pump, Pump (b) Gravity, Gravity

(c) Gravity, Pump (d) Pump, Gravity



139. Most plants continue to obtain new sources of mineral nutrients by –
(a) Breaking down organic matter (b) Growing longer roots
(c) Evolving more PS (d) Microbes

140. Phytolysis of water needs :
(a) Mn^{+2}, Cl^{-} (b) Mn^{+2}, SO_4^{-2} (c) Na^{+}, K^{+} (d) Na^{+}, Cl^{-}

141. Any mineral ion conc. in tissues that reduces the dry wt. of tissue by about 10% is considered :
(a) Toxic (b) Essential minerals (c) Micronutrients (d) Macronutrients

142. Select the wrong statements.
(a) Different plants respond differently to the deficiency of the same element
(b) Deficiency of N, S, Mo delays flowering.
(c) The requirement of micronutrients is always in high amount.
(d) By hydrophonics, essential elements were identified and their hunger signs discovered.

143. The moderate decrease of micronutrients causes _____ symptoms while a moderate increase causes _____
(a) Deficiency, toxicity (b) Toxic, chlorosis (c) Chlorotic, toxic (d) Chlorotic, necrosis

144. Identify the incorrect one.
(a) There are techniques that are able to detect the minerals even at 10^{-8} g/ml
(b) Micronutrients are needed in very small amounts (less than 10 mmole Kg^{-1} of dry wt).
(c) Cu is essential for overall metabolism in plants.
(d) Cu is absorbed as cuprus form.

145. Match correctly between Column I and Column II.

Column I	Column II
A. Zn	I. Hexokinase, PFK.
B. K	II. Most free ion.
C. Cu	III. Aconitase, peroxidase, catalase.
D. Fe	IV. Tyrosinase
E. Mg	V. Decarboxylase and alcohol dehydrogenase

	A	B	C	D	E
(a)	V	II	IV	III	I
(b)	I	II	III	IV	V
(c)	V	IV	III	II	I
(d)	II	V	III	IV	I

146. I. Minerals are absorbed in ionic forms as a very dilute solution.
II. Boron is absorbed as BO_3^{-1} or $B_4O_7^{2-}$.
III. Mo is absorbed as molybdate ions.
IV. C, H, O, N = essential elements of biomolecules / structural elements of cells.
V. Solutes play an insignificant role in cellular Ψ_W determination.
VI. Macronutrients = Mn, Zn, Cu, B, Mo, Cl, Fe and N.
VII. Micronutrients = C, H, O, P, K, N, S, Ca and Mg.
(a) All are false (b) All are correct (c) V, VI, VII are correct (d) I, III, IV are correct

147. Which is a false statement regarding macronutrients?
(a) Form plant structure (b) No role in ETS
(c) Develop osmotic potential (d) Become toxic in excess

148. All are correct about micronutrients except.
(a) Role in enzyme activation is secondary (b) Little role in protoplasmic structure
(c) Do not cause osmotic potential (d) Become toxic in excess

149. Which one is false?

I. Mobile elements – N, P, K, Mg, Zn, Cl

II. Immobile elements – Ca, Fe, S, Mn, B, Cu

III. Deficiency symptoms first appear in older leaves due to deficiency of P, K, N, Zn, Mg or Cl

IV. Deficiency symptoms first appear in young leaves due to deficiency of Ca, Cu, Fe, S, Mn or B.

(a) All are wrong (b) None (c) III and IV (d) I and II

150. Which one is correct?

(a) N, P, K are critical elements and are present in most of the fertilizers.

(b) Phytotron - Plants are grown under controlled conditions

(c) Mg in chl. and P in ATP are elements of energy related compounds in plants

(d) All

151. Aspargine and Glutamine are :

(a) Amino acids (b) Imino acids (c) Amide (d) Protein

152. Which one of the following is an amide involved in nitrogen assimilation by plants?

(a) Glutamate (b) Alanine (c) Asparagine (d) Serine

153. The deficiencies of micronutrients not only affects growth of plants but also vital functions such as photosynthetic and mitochondrial electron flow. Among the list given below which group of three elements shall affect most both photosynthetic and mitochondrial electron transport?

(a) Co, Ni, Mo (b) Ca, K, Na (c) Mn, Co, Ca (d) Cu, Mn, Fe

154. A mineral deficiency is likely to affect older leaves more than younger leaves if –

(a) The mineral is micronutrient (b) The older leaves are in direct sunlight

(c) The mineral is very mobile within plant (d) The mineral is needed for chlorophyll synthesis

155. Which of the following is false about amides?

(a) They are AA derivatives in which –OH of COOH is replaced by another NH_2 group

(b) They are double aminated keto acids.

(c) Amides are transported by phloem generally

(d) Amides link C and N metabolism

156. Choose wrong one.

(a) N_2-fixation needs anaerobic condition

(b) ATP, that is used in nitrogen fixation comes from respiration of host cells

(c) Amides — serves as protein precursor, key compound for nitrogen transport and storage.

(d) Amides have low N– to C ratio

157. Which of the following statement is correct?

(a) Amides and ureides are the transported forms of nitrogen as they have more nitrogen

(b) Legumes of tropical origin (e.g. soyabean) transport ureides

(c) The host plant produces globin part and bacterial symbiont produces haem part of leghaemoglobin (N_2-fixing pigment)

(d) All

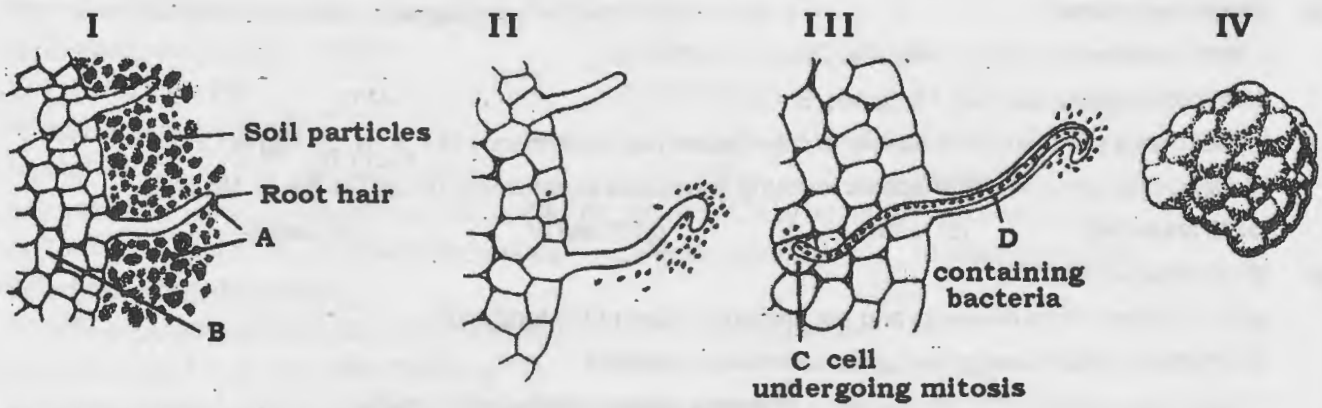
158. In leguminous plant root nodules are formed due to division and cells division of :

(a) Cortex (b) Pericycle (c) Both (d) Xylem and phloem

159. The cell of a root nodule in leguminous plant shows a rod shaped structure called _____.

(a) Bacteria (b) Infection thread (c) Bacteroid (d) Ureide

160. The following diagram indicates the development of root nodule in soyabean.



Identify A to D respectively.

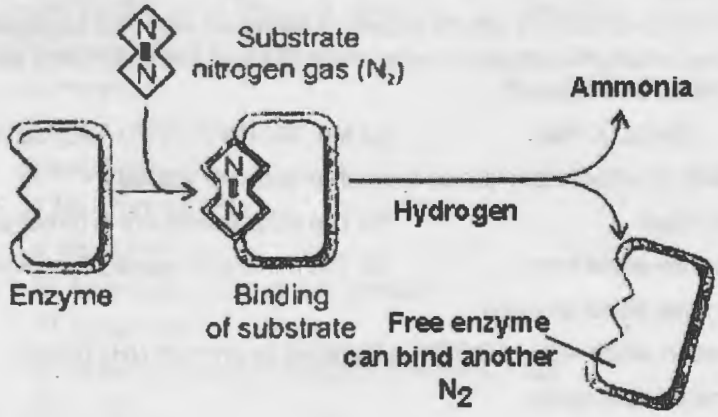
(a) A - *Rhizobial* bacteria; B - Cortex cell; C - Outer cortex; D - Infection thread

(b) A - *Rhizobial* bacteria; B - Cortex cell; C - Inner cortex; D - Infection thread

(c) A - *Rhizobial* bacteria; B - Endodermal cell; C - Inner Endodermis; D - Infection thread

(d) A - *Nitrosomonas* bacteria; B - Cortex cell; C - Inner cortex; D - Infection thread

161. The following diagram is related to the Nitrogen fixation. Go through the diagram and answer the correct option.



I. Nitrogenase catalyses the reaction.

II. The formation of ammonia is a reductive process.

III. One molecule of nitrogen produces two molecules of ammonia.

IV. Nitrate reductase catalyse the reaction.

V. Formation of ammonia is an oxidative process.

VI. One molecule of nitrogen produces one molecule of ammonia.

(a) I, II and III are correct (b) IV, V and VI are correct (c) I, V and VI are correct (d) III, IV and V are correct

162. Nitrifying bacteria

(a) Reduce nitrates to free nitrogen (b) Oxidize ammonia to nitrates

(c) Convert free nitrogen to nitrogen compounds (d) Convert proteins into ammonia

163. The function of leghaemoglobin in the root nodules of legumes is

(a) Expression of *nif gene* (b) Inhibition of nitrogenase activity

(c) Oxygen removal (d) Nodule differentiation

164. Which one of the following elements in plants is not remobilised?

(a) Sulphur (b) Phosphorus (c) Calcium (d) Potassium

165. A prokaryotic autotrophic nitrogen fixing symbiont found in

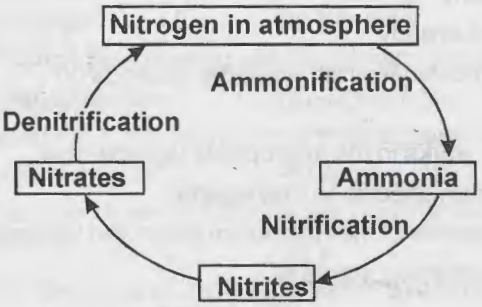
(a) *Pisum* (b) *Alnus* (c) *Cycas* (d) *Cicer*

166. Which one of the following is **not** an essential mineral element for plants while the remaining three are?

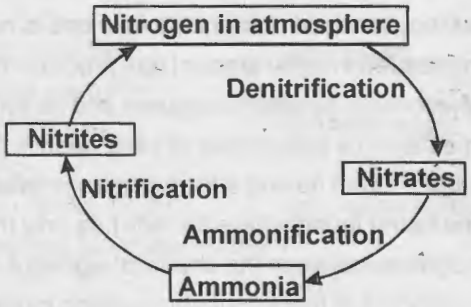
(a) Iron (b) Manganese (c) Cadmium (d) Phosphorus

167. Nitrogen cycle involves many compounds. Which illustration correctly depicts the nitrogen cycle?

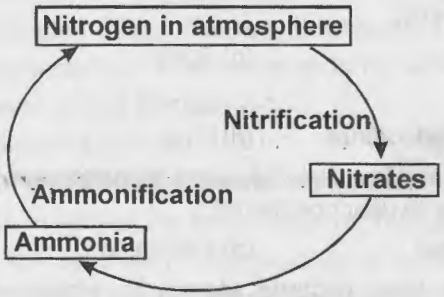
(a)



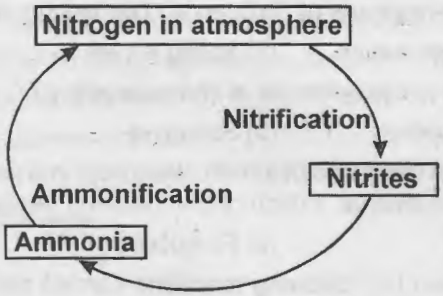
(b)



(c)

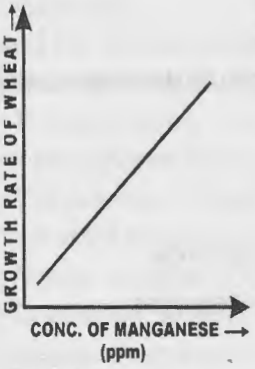


(d)

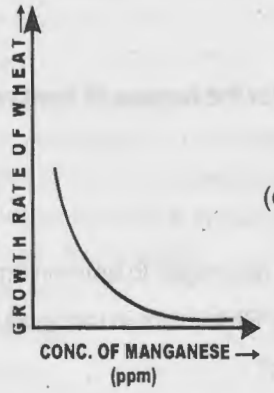


168. Mala and her classmates have been given a science assignment of studying the effect of concentration of micronutrients in the soil and the growth of crop plants. For this, the students decided to study the effect of manganese on the growth of wheat plants in the field.Which graph correctly illustrates the relationship between growth of plants and concentration of manganese in the soil?

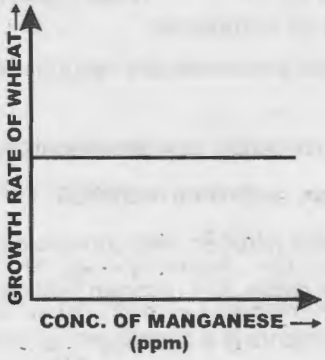
(a)



(b)



(c)



(d)

169. For its activity, carboxypeptidase requires :
(a) Zinc (b) Iron (c) Niacin (d) Copper

170. For its action, nitrogenase requires :
(a) High input of energy (b) Light (c) Mn^{2+} (d) Super oxygen radicals

171. Which one of the following is wrong statement
(a) Anabaena and Nostoc are capable of fixing nitrogen in free living state also.
(b) Root nodule forming nitrogen fixers live as aerobes under free-living conditions.
(c) Phosphorus is a constituent of cell membranes, certain nucleic acids and cell proteins.
(d) Nitrosomonas ans Nitrobacter are chemoautotrophs.

172. Professor Arun claims to have discovered a new macronutrient required for plant growth. Most of Professor Arun's colleagues are skeptical of this claim. Why might they consider it unlikely?

(a) All the nutrients required for plant growth have already been found.
(b) It is very difficult to prove that a plant needs a certain nutrient.
(c) Plants need thousands of nutrients; a new one is not significant.
(d) Any nutrient needed in large amount has probably been found already.

173. The specific relationship between a legume and its symbiotic *Rhizobium* strain probably depends on
(a) each legume having a specific set of early nodulin genes.
(b) each Rhizobium strain having a form of nitrogenase that only works in the appropriate legume host.
(c) each legume being found where the soil has only the Rhizobium specific to that legume.
(d) specific recognition between the chemical signals & signal receptors of the Rhizobium strain and legume species.

174. The first stable product of fixation of atmospheric nitrogen in leguminous plants is :
(a) NO_2^- (b) Ammonia (c) NO_3^- (d) Glutamate

175. Deficiency symptoms of nitrogen and potassium are visible first in :
(a) Senescent leaves (b) Young leaves (c) Roots (d) Buds

176. Anoxygenic photosynthesis is characteristic of :
(a) *Rhodospirillum* (b) Spirogyra (c) Chlamydomonas (d) Ulva

177. A few normal seedlings of tomato were kept in a dark room. After a few days they were found to have become white-coloured like albinos. Which of the following terms will you use to describe them?
(a) Mutated (b) Embolised (c) Etiolated (d) Defoliated

178. Carefully read the following reactions carried out by nitrogen fixing bacteria. Identify the statement about these equations which is not true.

$$2NH_3 + 3O_2 \longrightarrow 2NO_2^- + 2H^+ + 2H_2O \quad \text{..... (A)}$$
$$2NO_2^- + O_2 \longrightarrow 2NO_3^- \quad \text{..... (B)}$$

(a) Both the step (A) and (B) can be called nitrification.
(b) Step (A) carried out by *Nitrosomonas* or *Nitrococcus*
(c) Both the steps occur only in photoautotrophs.
(d) Step (B) is carried out by *Nitrobacter*.

179. Which two distinct microbial processes are responsible for the release of fixed nitrogen as dinitrogen gas (N2) to the atmosphere?
(a) Anaerobic ammonium oxidation, and denitrification
(b) Aerobic nitrate oxidation, and nitrite reduction
(c) Decomposition of organic nitrogen, and conversion of dinitrogen to ammoniumcompounds
(d) Enteric fermentation in cattle, and nitrogen fixation by Rhizobium in root nodules oflegumes

180. Which of the following elements is a constituent of biotin?
(a) Sulphur (b) Magnesium (c) Calcium (d) Phosphorus

181. 98% of all living organisms is made up of just following number of elements.
(a) 25 (b) 6 (c) 50 (d) 100

182. Minerals known to be required in large amounts for plant growth include
(a) Potassium, phosphorus, selenium, boron (b) Magnesium, sulphur, iron, zinc
(c) Phosphorus, potassium, sulphur, calcium (d) Calcium, magnesium, manganese, copper

183. During biological nitrogen fixation, inactivation of nitrogenase by oxygen poisoning is prevented by
(a) Carotene (b) Cytochrome (c) Leghaemoglobin (d) Xanthophyll

184. Which is essential for the growth of root tip ?
(a) Ca (b) Mn (c) Zn (d) Fe

185. Conversion of nitrate to ammonia is a/an :
(a) Amination process (b) Deamination process (c) Oxidative process (d) Reductive process

186. The enzyme nitrogenase is extremely sensitive to :
(a) Oxygen (b) Nitrogen (c) Hydrogen (d) Helium

187. Which of the following can fix nitrogen in nonleguminous plants ?
(a) *Rhodospirillum* (b) *Azotobacter* (c) *Frankia* (d) *Rhizobium*

188. Criteria of essentiality of nutrients in plants was given by
(a) Shull (1923) (b) Bendict (1927) (c) Arnon (1938) (d) Sachis (1960)

189. How many types of bacteria are identified as being involved in nitrogen fixation?
(a) 12 (b) 9 (c) 6 (d) 3

190. Find the group of bacteria in which all are nitrogen fixing :–
(a) *Nitrosomonas, Streptococcus, Lactobacillus* (b) *rhizobium, Azotobacter, Nostoc*
(c) *Nitrobacter, Streptobacillus, Lactobacillus* (d) *Clostridium, Rhizobium, Lactobacillus*

191. In transamination process when glutamic acid is the donor of amino group and pyruvic acid is the acceptor then :
(a) Aspartic acid is formed (b) Alanine is formed
(c) Aspargine is formed (d) Glutamine is formed

192. Which of the following statement is correct?
(a) Calcium inhibits the translocation of manganese in shoot apex
(b) Calcium deficiency is first reported in old leaf
(c) In grasses, Si provides the mechanical strength
(d) Nitrogenase catalyse the conversion of NH_3 to N_2

193. How many of the following organisms not fix the atmospheric nitrogen in free living condition?
Frankia, Anabaena, Rhodospirillum, Bijernickia, Rhizobium, Azotobacter, Nostoc.
(a) Two (b) Four (c) Five (d) Three

194. Which of the following elements is responsible for maintaining turgor in cells?
(a) Potassium (b) Sodium (c) Magnesium (d) Calcium

195. Select the incorrect statement
(a) Microelements involve N, P, Mn, Cu,Mo.
(b) The concentration of microelements is 10 m mole/kg.
(c) If the concentration is more than 10 m mole/kg, they become toxic
(d) The deficiency of microelements causes symptoms of disease

196. Which of the following is nitrogen fixing algae
(a) *Nostoc, Anabaena, Oscillatoria* (b) *Azolla, Anabaenra , Azotobactes*
(c) *Oscillatoria, Anabaena, Azolla* (d) *Azolla, Nostoc, Oscillatoria*

197. Go through the following points.
I. C, H, O, P, K, N, S, Ca and Mg = 9 macronutrients.
II. Mo, Ni, Cl, B, Fe, Cu, Mn & Zn = 8 micronutrients.
III. More than 10 mmol per kg of dry matter micronutrients causes toxicity.
IV. Hydroponics has allowed investigators to more accurately determine which nutrients are essential.
V. All soil organisms are helpful to plants because they add nutrients to the soil.
(a) Only I and II are correct (b) Only III and IV are correct
(c) Only IV and V are correct (d) I, II, III, IV and V are correct

198. Nitrogen-fixing bacteria _____.
(a) Reduce nitrogen to NH_4^+ (b) Can break the triple bond in N_2
(c) Form mutualistic relationships with legumes (d) All of the above

199. Which soil mineral is most likely least away during hard rain?
(a) Na^+ (b) K^+ (c) Ca^{++} (d) NO_3^-

200. Which of the following bacteria reduce nitrate in soil into nitrogen ?
(a) Nitrosomonas (b) Nitrobacter (c) Nitrococcus (d) Thiobacillus

201. The main difference between active and passive transport across cell membrane is :
(a) active transport occurs more rapidly than passive transport.
(b) passive transport is non-selective whereas active transport is selective.
(c) passive transport requires a concentration gradient across a biological membrane whereas active transport requires energy to move solutes.
(d) passive transport is confined to anionic carrier proteins whereas active transport is confined to cationic channel proteins.

202. Thiobacillus is a group of bacteria helpful in carrying out
(a) Nitrogen fixation (b) Chemoautotrophic fixation (c) Nitrification (d) Denitrification

12 MINERAL NUTRITION

1. b	2. a	3. a	4. c	5. c	6. a	7. a	8. b	9. b	10. a
11. d	12. b	13. d	14. a	15. b	16. c	17. c	18. d	19. b	20. b
21. a	22. a	23. b	24. a	25. c	26. a	27. c	28. b	29. c	30. c
31. a	32. a	33. a	34. d	35. c	36. a	37. a	38. d	39. a	40. c
41. b	42. b	43. a	44. c	45. a	46. b	47. c	48. c	49. d	50. d
51. d	52. c	53. a	54. c	55. d	56. a	57. d	58. a	59. c	60. a
61. b	62. c	63. a	64. c	65. d	66. c	67. b	68. c	69. a	70. c
71. b	72. c	73. b	74. c	75. d	76. b	77. c	78. d	79. a	80. a
81. d	82. d	83. b	84. c	85. a	86. b	87. c	88. a	89. c	90. b
91. d	92. b	93. d	94. a	95. c	96. b	97. c	98. d	99. d	100. c
101. b	102. c	103. c	104. c	105. d	106. b	107. c	108. d	109. b	110. b
111. c	112. d	113. d	114. c	115. b	116. a	117. d	118. d	119. a	120. a
121. a	122. d	123. d	124. b	125. c	126. d	127. d	128. d	129. c	130. d
131. d	132. a	133. b	134. d	135. d	136. d	137. a	138. d	139. b	140. a
141. a	142. c	143. a	144. d	145. a	146. d	147. d	148. a	149. b	150. d
151. c	152. c	153. d	154. c	155. c	156. d	157. d	158. c	159. c	160. b
161. a	162. b	163. c	164. c	165. c	166. c	167. a	168. b	169. a	170. a
171. c	172. d	173. d	174. b	175. a	176. a	177. c	178. c	179. a	180. a
181. b	182. c	183. c	184. a	185. d	186. a	187.c	188. c	189. d	190. b
191. b	192. c	193. a	194. a	195. a	196. a	197. d	198. d	199. d	200. d
201. c	202. d								

13 PHOTOSYNTHESIS IN HIGHER PLANTS

1. Photosynthesis is –
   (a) A physical process (b) A chemical process
   (c) A physio-chemical process (d) An energy wasting process
2. Photosynthesis is important because –
   (a) It is an important source of all foods on earth
   (b) It is responsible for the release of O_2
   (c) It is responsible for the release of O_2 in the environment in night
   (d) a and b
3. Moll's half leaf experiment proves that –
   (a) Light is essential for photosynthesis (b) CO_2 is essential for photosynthesis
   (c) O_2 releases during photosynthesis (d) Chlorophyll is essential for photosynthesis
4. Who proved that vegetation purifies the air impured by burning of candle –
   (a) Von Mayr (b) De Saussure (c) Sachs (d) Joseph Priestley
5. Who discovered the role of light and green parts of the plants in purifying the noxious air –
   (a) Von Mayr (b) De saussure (c) Sachs (d) Jan Ingenhousz
6. Who found that in green parts of plant glucose is made and glucose is stored as starch –
   (a) Sach (b) Arnon (c) Arnold (d) Englemann
7. Who used prism, white light, green alga, *Cladophora* and aerobic bacteria and plotted the action spectra for photosynthesis
   (a) Sachs (b) Amon (c) Arnold (d) Englemann
8. Who proved that O_2 comes from water, not from CO_2 in photosynthesis? It was based on the experiment of photosynthesis in purple and green bacteria.
   (a) Van Neil (b) Englemann (c) Arnold (d) Arnon
9. Which of the following statements is false?
   (a) Usually chloroplasts align themselves along the walls of mesophyll cells, so that they get optimum quantity of incident light
   (b) Within chloroplast there is a membranous system consisting of grana, stromal lamellae and stroma
   (c) There is division of labour within chloroplast
   (d) In grana CO_2 is fixed
10. Which one is the correct summary equation of photosynthesis –
    (a) $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O$ + energy (b) $C_6H_{12}O_6 + 6O_2 + 6H_2O \longrightarrow 6CO_2 + 12H_2O$ + energy
    (c) $6CO_2 + 6H_2O \xrightarrow[\text{Chlorophyll}]{\text{Light}} 6O_2 + C_6H_{12}O_6$ (d) $6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Light}} 6O_2 + C_6H_{12}O_6 + 6H_2O$
11. Which equation is the correct to prove that O_2 comes from water during photosynthesis –
    (a) $6CO_2{}^{18} + 12H_2O \longrightarrow 6O_2{}^{18} + C_6H_{12}O_6 + 6H_2O$ (b) $6O_2 + 12H_2O^{18} \longrightarrow 6O_2 + C_6H_{12}O_6 + 6H_2O^{18}$
    (c) $6CO_2{}^{18} + 12H_2O \longrightarrow 6CO_2{}^{18} + C_6H_{12}O_6$ (d) $6CO_2 + 12H_2O^{18} \longrightarrow 6O_2{}^{18} + C_6H_{12}O_6 + 6H_2O$
12. The membranous system of grana is responsible for –
    (a) Trapping light energy but not ATP and $NADPH_2$ formation
    (b) Trapping light energy and also for fixation of CO_2
    (c) For ATP and $NADPH_2$ formation but not for light trapping
    (d) For light capturing and also for $NADPH_2$ and ATP formation

13. In stroma –
(a) Enzymatic reactions incorporate CO_2 into the plant leading to ATP and $NADH_2$ formation
(b) Enzymatic reactions incorporate CO_2 into plant leading to the synthesis of sugar, which in turn forms starch
(c) Light energy is captured to form glucose
(d) ATP and $NADPH_2$ are splitted and H_2O and O_2 comes out

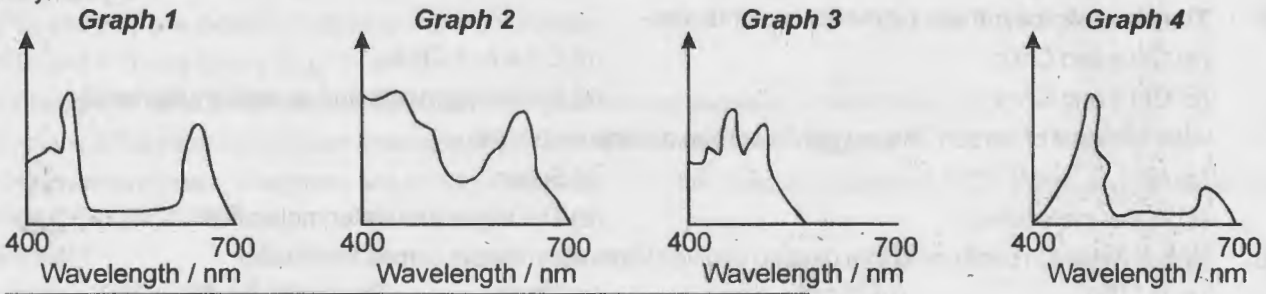
14. Which one is correct?
I. Light reaction occurs in stroma
II. Light reaction occurs in grana and ATP + $NADPH_2$ are formed
III. In stroma dark reaction occurs
IV. Dark reaction is not directly light driven but is dependent on the products (ATP + $NADPH_2$) formed in light reaction
(a) All are correct (b) All are incorrect (c) II, III and IV are correct (d) I, II and IV are correct

15. Leaf pigments, (Chl a, Chl b, Xanthophyll and carotene can be separated by –
(a) Paper chromatography (b) Electrophoresis
(c) X-ray diffusion (d) ELISA test

16. Which one is not an accessory photosynthetic pigment?
(a) Chl b (b) Xanthophyll (c) Carotene (d) Chl a

17. What is / are the function(s) of accessory pigments?
(a) They enable a wider range of wavelength of incoming light to be utilized for photosynthesis
(b) They absorb light and transfer the energy to reaction centre
(c) They protect reaction centre from photooxidation
(d) All

18. Three of the graphs below show the absorption spectra of photosynthetic pigments. One graph shows the action spectrum of photosynthesis for a plant containing the pigments.
All the *x* axis show wavelength. Three of the *y* axis show light absorption. One *y* axis shows the rate of photosynthesis.



	Chlorophyll a	*Absorption Chlorophyll b*	*Spectra Carotenoids*	*Action Spectrum*
(a)	1	4	3	2
(b)	2	1	3	4
(c)	2	4	3	1
(d)	3	2	4	1

19. The rate of photosynthesis of a freshwater plant is measured using five spectral colours. Which sequence of colours would give an increasing photosynthetic response?

	Smallest ⟶			*Largest response*
(a)	Blue	Green	Yellow	Orange	Red
(b)	Green	Yellow	Orange	Red	Blue
(c)	Red	Orange	Yellow	Green	Blue
(d)	Yellow	Green	Orange	Blue	Red

20. Accessory pigments –
(a) Play no role in photosynthesis
(b) release e^- and get oxidised
(c) Transfer e^- to NADP
(d) Allow plants to harvest visible light of wider range wavelengths

21. A graph that plots the rate at which CO_2 is converted to glucose versus the wavelength of light illuminating a leaf is called –
(a) An absorption spectrum (b) An action spectrum
(c) A planck constant (d) Enzyme kinetics

22. Why are the absorption spectrum of Chl a and the action spectrum of photosynthesis are identical?
(a) Chl a absorbs both red and blue light maximumly
(b) Chl a reflects blue light
(c) Accessory pigments contribute energy to drive photosynthesis
(d) Different wave lengths of light have different energy

23. Photosynthesis and respiration have which of the following in common?
(a) In eukaryotes, both processes occur in specialised organelles
(b) ATP synthesis in both processes relies on chemiosmotic mechanism
(c) Both use electron transport
(d) All of the above

24. Light reaction / photochemical phase includes –
(a) Absorption of light, water splitting, O_2 release (b) ATP and $NADPH_2$ formation
(c) CO_2 fixation and glucose formation (d) a and b

25. The expression "We are creatures of chloroplasts" means that –
(a) All life possesses chloroplast (b) All life depends ultimately on photosynthesis
(c) Chloroplasts are models of all cell organelles (d) a and c

26. The main photosynthetic pigments in plants are –
(a) Chl a and Chl c (b) Chl a and Chl b
(c) Chl x and Chl y (d) Retinal pigments and accessory pigments

27. After removal of carbon, the oxygen in carbon dioxide ends up in –
(a) Air (b) Sugar
(c) Water molecules (d) The sugar and water molecules

28. Which helped in confirming that oxygen evolved in photosynthesis comes from water
(a) $H_2\,{}^{18}O$ (b) $^{14}CO_2$ (c) $^{15}NO_3$ (d) $^{3}H_2O$

29. The main purpose of photosynthesis is to –
(a) Consume CO_2 (b) Produce ATP
(c) Convert light energy into chemical energy (d) Produce starch

30. Because of properties of chlorophyll, plants need adequate _____ light to grow properly –
(a) Green (b) Blue and red (c) Infrared (d) Ultraviolet

31. Photosystem I (PS I) and photosystem II (PSII) are named –
(a) In the sequence of their discovery (b) In the sequence in which they function during light reaction
(c) In the sequence of their positions (d) In the sequence of e transfer

32. The light harvesting complex (LHC) is made up of –
(a) One molecule of Chl a
(b) Very few molecules of Chl a
(c) Hundreds of pigment molecules bound to proteins
(d) Chl a + Chl c + protein + DNA

33. PS consists of –
(a) Only antenna molecule (b) Only reaction centre
(c) Both antenna molecule and reaction centre (d) Only LHC

34. Reaction centre consists of –
(a) Single molecule of Chl b (b) LHC
(c) Single molecule of Chl a (d) Single molecule of Chl a but 2 molecules of Chl b

35. Reaction centre of PSI is _____ and Reaction centre of PSII is _____ –
(a) P_{680}, P_{700} (b) P_{700}, P_{680} (c) P_{800}, P_{600} (d) P_{700}, P_{900}

36. In PSI the reaction centre Chl a has absorption maxima at _____, while in PSII the reaction centre Chl a has absorption maxima at _____ –
(a) 700 nm, 680 nm (b) 680 nm, 700 nm (c) 400 nm, 500 nm (d) 700 nm, 800 nm

37. Select the correct path that an e^- could take during complete photosynthesis –
(a) $CO_2 \longrightarrow$ RuBP $\longrightarrow$ G3P $\longrightarrow$ Glucose
(b) $H_2O \longrightarrow$ PSI $\longrightarrow$ PSII $\longrightarrow$ NADPH + $H^+ \longrightarrow$ G3P
(c) PSII $\longrightarrow$ $H_2O \longrightarrow$ PSI $\longrightarrow$ NADP + $H^+ \longrightarrow$ Glucose
(d) $H_2O \longrightarrow$ PSII $\longrightarrow$ PSI $\longrightarrow$ NADPH + $H^+ \longrightarrow$ G3P

38. When the chloroplast pigments absorb light –
(a) They become reduced (b) They lose potential energy
(c) Their electrons become excited (d) The calvin cycle is triggered

39. The light reactions of photosynthesis generate high-energy electrons, that end up in _____. They produce _____ and _____.
(a) ATP, $NADPH_2$, O_2 (b) O_2, ATP, $NADPH_2$ (c) Chl, O_2, H_2O (d) $NADPH_2$, ATP, O_2

40. Which of the following is not a product of light reaction of photosynthesis?
(a) O_2 (b) ATP, $NADPH_2$ (c) High-energy electrons (d) Sugar

41. Which statement about the light reactions of photosynthesis is false?
(a) PSI and PSII are located in stroma of the chloroplast
(b) PSI and PSII are linked by e^- carriers
(c) Chlorophylls have an absorption spectrum with pronounced peaks in red and blue light
(d) Protons diffuse through protein channels which are ATP-synthetase molecules

42. During photosynthesis, electrons are continuously lost from the reaction centre of PSII. What source is used to replace these electrons?
(a) Sunlight (b) O_2 (c) H_2O (d) O_3

43. What does "PSII splits water" mean?
(a) Water is broken into monomers (b) A condensation reaction occurs
(c) Water is reduced to yield hydrogen gas (d) Water is oxidised to yield protons, electrons and oxygen

44. Free energy is released in cyclic photophosphorylation.
(a) By the formation of ATP.
(b) During the excitation of chlorophyll
(c) During the fluorescence of chlorophyll
(d) During each of the redox reactions of the electron transport chain

45. If green plant cells are incubated with O^{18}-labelled CO_2, what molecule will become radioactive as the cells are exposed to light?
(a) ATP (b) Water (c) Sugar (d) O_2

46. If green plant cells are incubated with O^{18}-labelled water, what molecule will become radioactive as cells are exposed to light –
(a) O_2 (b) CO_2 (c) H_2O (d) Sugar

47. Electrons excited by absorption of light in PSI are transferred to the primary acceptors, and therefore must be replaced. The replacements come directly from –
(a) NADP (b) ATP (c) PSII (d) Water

48. The biochemical objective of PSI is to
(a) Oxidise NADPH (b) Hydrolyze ATP (c) Phosphorylate ADP (d) Reduce $NADP^+$

49. The Z-scheme refers to –
(a) The type of photosynthesis used in plants found in areas with minimal precipitation
(b) The pattern of grana within the chloroplasts of photosynthetic plants
(c) The carbon-fixation process also known as the calvin cycle.
(d) an energy diagram for the transfer of electrons in the light reactions of photosynthesis in plants

50. The electron flow from PSII to NADP via ETS and PSI follows –
(a) Uphill ⟶ Downhill ⟶ Uphill ⟶ Downhill (b) Downhill ⟶ Upnhill ⟶ Downhill ⟶ Uphill
(c) Downhill ⟶ Uphill ⟶ Uphill ⟶ Downhill (d) Uphill ⟶ Downhill ⟶ Downhill ⟶ Uphill

51. The whole scheme of transfer of electrons, starting from PSII, Uphill to the acceptor, down the e^- transport chain to PSI, excitation of electrons, transfer to another acceptor, and finally downhill to $NADP^+$ is called –
(a) Y-scheme (b) δ-scheme (c) Z-scheme (d) None

52. If all the carriers involved in light reaction of green plants are placed in a sequence on a redox potential scale, a characteristic shape like _____ is formed.
(a) V (b) Z (c) Y (d) θ

53. Water splitting complex is associated with –
(a) Outer membrane of chloroplast (b) Inner membrane of chloroplast
(c) Stroma (d) PSII

54. PSII is physically located on which side of the thylakoid membrane?
(a) Inner side (b) Outer side
(c) Within the lumen of thylakoid (d) Position of PSII shifts from inner to outerside or vice-versa

55. Phosphorylation occurs in –
(a) Mitochondria (b) Chloroplast (c) Both (d) Cell wall

56. In Z-scheme of photosynthesis which one(s) is involved?
(a) PSI (b) PSII (c) e^- carriers (d) All

57. In Z-scheme which one(s) is / are formed?
(a) ATP (b) $NADPH_2$ (c) O_2 (d) All

58. Cyclic and non cyclic flow of e^- is used in plants to –
(a) Meet the ATP demands of Calvin-cycle (b) Avoid producing excess $NADPH + H^+$
(c) Balance ATP and $NADPH + H^+$ ratio in chloroplasts
(d) All

59. In Cyclic electron Flow –
(a) O_2 is released (b) ATP is formed
(c) NADPH + H is formed (d) Photolysis of water occurs

60. Which one is false?
(a) H_2S, not H_2O, is involved in photosynthesis of purple sulphur bacteria
(b) Light and dark reactions are stopped in the absence of light
(c) Calvin cycle occurs in the grana of chloroplast
(d) ATP is produced during light reaction via chemiosmosis

61. Which of the following materials are not recycled between dark and light reactions?
(a) NADPH + H (b) ADP (c) ATP (d) O_2 and CO_2

62. Which one of the following is false about the activities associated with PSI and PSII in noncyclic photophosphorylation

(a) Water is oxidised in PSII, but not PSI
(b) Photons (light) are needed to activate both PSI and PSII
(c) Photolysis of water formation of ATP + NADPH + H occur
(d) Production of NADPH + H^+ is associated with PSII, not PSI

63. Which one of the following statements correctly describes Cyclic photophosphorylation –
(a) Cyclic photophosphorylation has both PSI and PSII
(b) Cyclic photosphorylation produces neither ATP nor NADPH + H^+
(c) Water is the ultimate source of e^- in cyclic phosphorylation
(d) Electrons are cycled in cyclic photophosphorylation

64. For NADPH + H^+ formation –
(a) Only PSI is needed (b) Only PSII is needed
(c) Both PSI and PSII are needed (d) Only stroma is needed

65. Where is the possible site for cyclic photophosphorylation?
(a) In PSII (b) In Stroma
(c) In granal thylakoids / lamellae (d) In stromal lamellae

66. Stromal lamellae lack –
(a) PSII (b) PSI (c) NADP reductase (d) a and c

67. The following (P through U) are the main steps of chemosynthetic ATP synthesis in the light reaction. Which answer places them in correct order?
P. H^+ concentration gradient established
Q. H^+ diffuses through ATP synthetase
R. Carriers use energy from electrons to move H^+ across the membrane
S. Electrons from PSII pass along electron transport chain
T. Light excites electrons in PSII
U. Energy of H^+ flow is used by ATP synthetase to make ATP
(a) PQTSRU (b) STPQRU (c) TSRPQU (d) TSRUQP

68. Photophosphorylation in a chloroplast is most similar to which of the following mitochondrial reactions?
(a) Oxidative phosphorylation (b) Substrate level phosphorylation
(c) Hydrolysis (d) None

69. In chemiosmotic hypothesis for energy generation in chloroplast –
(a) Electron transport carriers set up a proton gradient
(b) A pH gradient drives the hydrolysis of ATP to ADP
(c) ATP must be continuously translocated into the chloroplast
(d) The electron transport carriers use energy of moving electron in uphill direction to form ATP

70. Chemiosmosis needs –
(a) A membrane (b) A proton pump (c) A proton gradient and ATPase (d) All

71. ATPase –
(a) Has no channel (b) Has a channel that allows diffusion of e^-
(c) Has a channel that allows H^+ diffusion (d) All

72. In chemiosmotic synthesis of ATP, H^+ diffuses through ATP-synthetase –
(a) From the stroma into thylakoid lumen / space
(b) From thylakoid space into stroma
(c) From the cytoplasm into stroma
(d) From the periplastidal space to stroma

73. A difference between the chemiosmotic concept in photosynthesis and respiration is that in phosphorylation –
(a) No development of proton gradient takes palce in respiration

(b) As H^+ conc. gradient rather than a proton-motice force drives phosphorylation

(c) ATP synthetase releases ATP into the stroma rather than into the cytosol

(d) The proton accumulates inside the membrane / in the lumen of thylakoid while in respiration, protons accumulate in the intermembrane of the mitochondria.

74. Chemiosmotic hypothesis attempts to explain –

(a) The movement of water into the chloroplast and its use in photosynthesis

(b) Coupling of ATP formation to e^- flow in electron transport chain

(c) The movement of NADH from cytoplasm into plastid

(d) Coupling of chemical gradients to osmosis

75. During light-dependent reactions, light energy is converted to chemical potential energy through the process of chemiosmosis in the chloroplasts. Which of the following statement about this process is false –

I. The electron carriers of phosphorylation are located in the thylakoid

II. During phosphorylation, the chloroplast stroma becomes more acidic than the interior of thylakoid membrane

III. Protons diffuse through the protein channels which are ATP synthetase molecules

IV. ATP is formed from ADP + Pi on the stroma side of the thylakoid in the chloroplast.

V. During phosphorylation, water ionizes to form $H^+ + 2OH^-$, yielding an e^- to PSII

(a) I, II, V (b) Only II (c) III, IV (d) Only IV

76. Both PSI and PSII operate –

(a) Separately (b) One after the other

(c) PSI system first followed by PSII (d) Simultaneously

77. Flow of electrons in non-cyclic photophosphorylation is –

(a) From PSI to PSII (b) unidirectional (c) PSI ; PSII (d) Bidirectional

78. Photolysis of water results in the release of –

(a) Electrons, protons and oxygen (b) Protons and O_2

(c) e^- and O_2 (d) e^- and H^+ (Protons)

79. During the light reaction of photosynthesis which of the following phenomena, is observed in cyclic and noncyclic photophosphorylation?

(a) ATP formation (b) Photolysis of water (c) $NADPH_2$ formation (d) involvement of both PSI and PSII

80. Excited pigment molecule shifts an e^- to an outer orbit having –

(a) More energy (b) Lesser energy (c) Equal energy (d) Lesser spin

81. Photosynthesis is –

(a) Endergonic, photochemical, anabolic and reductive process

(b) Exergonic, reductive and catabolic process

(c) Exergonic reductive and anabolic process

(d) Exergonic, chemosynthetic process

82. What happens during the light phase of photosynthesis?

(a) ADP is hydrolysed and NADPH oxidised

(b) ADP is phosphorylated and NADP reduced

(c) ATP is hydrolysed and NADPH oxidised

(d) ATP is hydrolysed and NADP reduced

83. Which of the following statements concerning the light reaction of photosynthesis is true?

(a) PSI can operate independent of PSII

(b) PSI and II are activated by different wavelengths of light

(c) PSI and II transfer electrons and create proton gradients across the thylakoid membrane

(d) All of the above

84. Which one of the following is a correct outline of the main events in photosynthesis?

(a) Oxygen reacts with a carbohydrate to produce water and carbon dioxide in the presence of light
(b) Light joins carbon dioxide to an acceptor compound which is then reduced by hydrogen obtained from water
(c) Light splits water and the resulting hydroxyl group combines with a compound which has incorporated carbon dioxide
(d) Carbon dioxide combines with an acceptor compound and this is reduced by hydrogen split from water by light

85. Which statement about photosynthesis is false?
(a) In green plants PSI and PSII are required for the synthesis of $NADPH + H^+$
(b) Photosynthesis is a redox process; H_2O is oxidised, CO_2 is reduced
(c) Photosynthesis is a physio-chemical process
(d) None

86. Mutation that inactives cytochrome system would –
(a) Inhibit movement of electrons from PSI to PSII (b) Inhibit movement of e^- from PSII to PSI
(c) Promote $NADPH + H^+$ formation (d) Promote photolysis of water

87. Chemiosmosis –
(a) Depends on protein complexes in thylakoid membrane
(b) Depends on a difference in H^+ concentration between the thylakoid space and the stroma
(c) Results in ATP formation
(d) All

88. Which one is correct?
(a) The final acceptor of electrons during non cyclic flow of electron is $NADP^+$
(b) A photosystem consists of pigments, a reaction centre and an electron acceptor
(c) ATPase enzyme has 2 parts (membrane bound CF_0 and F_1 part is attached to the stromal side of membrane
(d) All

89. The thylakoid membrane bears several F_0 - F_1 particle / ATPase / ATP synthase. Which of following is correct for these particles?
(a) One of its part (F_0) is embedded in the membrane and forms transmembrane channel that carries out facilitated diffusion of protons across the membrane
(b) Its other part (F_1) protrudes out from the outer surface of the thylakoid membrane facing towards stroma
(c) The catalytic sites for ATP formation are located in F_1 part
(d) All

90. In terms of the spatial organization of photosynthesis within the chloroplast, what is the advantage of light reactions producing ATP and $NADPH_2$ on the stromal side of the thylakoid membrane –
(a) Water is more in thylakoid
(b) Light reaction occurs in stroma
(c) Dark reaction / Calvin cycle occurs in grana and needs ATP + $NADPH_2$
(d) The Calvin Cycle, which consumes ATP and $NADPH_2$ occurs in stroma

91. Following steps in random order are given below for photophosphorylation through chemiosmosis –
I. ATP synthase produces ATP due to flow of H^+ from thylakoid lumen to stroma
II. NADP reductase, located on stroma side of membrane, obtains e^- from PSI and protons from stroma to form $NADPH_2$
III. Cytochrome system (b & f) transport electrons and pumps H+ from stroma to thylakoid space
IV. PSII oxidises water
V. Reaction centre of PSII gets photoexcited having released electrons.
The correct sequence is –
(a) I, II, II, IV, V (b) V, IV, III, II, I (c) I, III, II, IV, V (d) III, V, IV, II, I

92. When noncyclic photophosphorylation changes to cyclic photophosphorylation, the excited electrons leave PSI and go back to _____ to make more _____.
(a) b_6 - f complex, ATP (b) b_6 - f complex, ADP

(c) b_6 - f complex, NADPH (d) b_6 - f complex, NADPH2

93. During light reaction, as electrons move through photosystems, protons are transported across the membrane. This happens because of –

(a) The primary acceptor of e^- (located towards the outer surface of the membrane) transfers its electron not to an e^- carrier but to H carrier

(b) The primary acceptor of e^- transfers only its e^- to e^- carrier

(c) The primary acceptor of e^- transfers only H^+ to the next carrier

(d) NADP - reductase is present in grana

94. Biosynthetic phase of photosynthesis needs –

(a) ATP, $NADPH_2$, CO_2 and H_2O (b) Only CO_2

(c) Only ATP + $NADPH_2$ (d) Only O_2

95. Immediately after light becomes unavailable biosynthetic processes –

(a) Stop immediately (b) Remain continued for ever

(c) Stop and then starts (d) Continue for some time and then stops

96. The enzyme ATPase couples the synthesis of ATP to –

(a) The diffusion of protons (b) The reduction of $NADP^+$

(c) The excitation of Chl. (d) Carbon dioxide fixation

97. The enzyme rubisco is found in –

(a) Chloroplast (b) mitochondria (c) Cytoplasm (d) Nucleus

98. During carbon dioxide fixation / Calvin Cycle, CO_2 combines with –

(a) $NADPH_2$ (b) Water

(c) Ribulose biphosphate (d) 3PGAld

99. The energy to hydrolyse water comes from –

(a) Oxidised chlorophyll (b) Reduced Chl (c) The proton gradient (d) ATP

100. In bright light, the pH of the thylakoid space –

(a) Can become more acidic (b) Can become more alkaline

(c) Never changes (d) Can become neutral

101. When carbon dioxide is added to RuBP-the first stable product synthesized is –

(a) Phosphoglycerate (3C-compound) (b) OAA

(c) ATP (d) Pyruvate

102. The net energy outcome of cyclic phosphorylation is –

(a) ATP + $NADPH_2$ (b) ATP (c) Sugar (d) NADPH + H^+

103. Which of the following statements concerning the Calvin-Cycle are false?

(a) CO_2 is assimilated into sugars (b) RuBP is regenerated

(c) It needs ATP + NADPH + H^+ (d) None

104. Which of the following statements concerning rubisco is true?

(a) It is an enzyme

(b) It catalyze the beginning steps of both photorespiration and Calvin-Benson cycle

(c) It is the most abundant protein on earth

(d) All

105. Which of the following begins the Calvin-Cycle and is the commitment step that results the entire pathway being carried out?

(a) 3PGA $\xrightarrow[ATP,\ NADPH_2]{}$ 3PGAld

(b) The regenerationof RuBP

(c) CO_2 + RuBP $\longrightarrow$ 3PGA

(d) As a cycle, it can start at any point

106. The overall reaction $CO_2 + H_2O + NADPH_2 + ATP \longrightarrow$ sugar + ADP + iP + NADP –
(a) Describes the light reaction of photosynthesis (b) Is exergonic
(c) Occurs only at night (d) Requires many enzymes

107. Which of the following serves as both reactant in photosynthesis and product in cellular respiration?
(a) O_2 (b) CO_2 (c) H_2O (d) b and c

108. The nature of ATP in both photosynthesis and cellular respiration is made possible by –
(a) The existance of proton gradient across the specific membrane
(b) The action of ATPase
(c) Energy from e^- movements
(d) All

109. The majority of energy carrier molecules are oxidised or reduced in the –
(a) Nucleus (b) Mitochondria and Chloroplast
(c) Nucleus (d) Golgi Body

110. I. Initial CO_2 acceptor
II. Extent of photorespiration
III. Enzyme catalyzing reaction that fixes CO_2
IV. Presence of Calvin Cycle
V. Leaf anatomy
Which one does not differ between a C_3 and a C_4 plant?
(a) I and V (b) IV (c) II and III (d) II

111. The compound identified by Calvin, Benson and Basham as the first one made by CO_2 fixation is –
(a) Ribulose bisphosphate (b) Phosphoglycerate
(c) Triose-phosphate (d) Malate

112. PEP carboxylase is –
(a) Involved in at least some CO_2 fixation in both C_3 and C_4 plants.
(b) Catalyzes the reaction fixing CO_2 into pyruvic acid in bundle sheath cells
(c) Capable of fixing CO_2 more efficiently at lower atmospheric CO_2 concentration than RUBP carboxylase
(d) The most abundant enzyme in the world

113. The enzyme phosphoenol pyruvate cvarboxylase catalyses the combination of CO_2 and phosphoenol pyruvate to form oxaloacetic acid in –
(a) Pea (b) Sugarcane (c) Pinus (d) Apple

114. The energy in photosynthesis for attaching a phosphate group to ADP comes from –
(a) Breaking down glucose (b) Protons moving from the thylakoid compartment
(c) Taking a phosphate off of a sugar (d) All of the above

115. When Rubisco acts as an oxygenase –
(a) Phsophoglycerate and phosphoglycolate are produced
(b) Phosphoenol pyruvate is oxidized
(c) Net carbon fixation is enhanced
(d) It must mean that the plant is deprived of CO_2

116. Calvin Cycle represents which of the following phenomenon –
(a) Oxidative Carboxylation (b) Substrate level phosphorylation
(c) Dark respiration (d) Reductive carboxylation

117. The mechanisms of ATP formation both in chloroplast and mitochondria is explained by –
(a) Relay pump theory of Godlewski (b) Cholodny Went's model

(c) Chemiosmotic theory (d) Munch's pressure / mass flow model

118. In which of the following cells of a C_3 leaf would you find the highest concentration of enzyme rubisco –
(a) Epidermal cell (b) Mesophyll cell (c) Bundle sheath cell (d) b and c

119. If photosynthesizing green algae (oxygenic photosynthesis) are provided with CO_2 labelled with an isotope of oxygen (^{18}O that is "heavy" but not radioactive), later analysis will show that all of the following compounds produced by the algae contain the ^{18}O label except –
(a) PGA (b) RuBP (c) Glucose (d) O_2

120. Thomas Engelmann illuminated a filament of algae with light that passed through a prism, thus exposing different segments of the algal filament to different wavelengths of light. He added aerobic bacteria and found that these bacteria congregated in the areas illuminated by red and blue light. If you ran the same experiment without passing light through a prism, what would you predict?
(a) There would be no difference in results
(b) The number of bacteria would decrease along the entire length of the filament
(c) The bacteria would be relatively evenly distributed along the length of the filament
(d) The number of bacteria would increase along the entire length of the filament

121. Cooperation of the two photosystems of the chloroplast is required for –
(a) ATP synthesis (b) Reduction of $NADP^+$
(c) Oxidation of the reaction center of photosystem (d) Genration of a proton-motive force

122. If radioactive carbondioxide ($^{14}CO_2$) is used in Calvin Cycle then which carbon atom of 3-phosphoglycerate will appear radioactive –
(a) Carbon-3 (b) Carbon-1 (c) Carbon-2 (d) None

123. Chloroplasts are disrupted and the stroma separated from the lamellae. The isolated stroma will fix CO_2 if it is supplied with –
(a) Oxygen (b) Carotenoid (c) Light (d) ATP + NADPH

124. Which of the following pigment involved directly in photochemical reaction in pigment system –
(a) Chl b (b) Chl a (c) Carotene (d) Xanthophyllus

125. Conversion of pyruvate into PEP by use of ATP in C_4 pathway occurs in –
(a) Mesophyll cell's cytoplasm (b) Mesophyll cell's chloroplast
(c) Bundle sheath cell's cytoplasm (d) Bundle sheath cell's chloroplast

126. Total energy requirement for fixing one CO_2 by combined C_4 and C_3 cycle is –
(a) 5 ATP + 4 NADPH (b) 3 ATP + 4 NADPH (c) 5 ATP + 2 NADPH (d) 8 ATP + 2 NADPH

127. Why Calvin cycle is called C_3-cycle?
(a) Primary CO_2 acceptor is C_3 - compound
(b) Many intermediate compounds are C_3 - compounds
(c) 1st stable product is 3 PGA which is a C_3 - compound
(d) None

128. Calvin Cycle has –
(a) Carboxylation, Regenration (b) Oxygenation, Regeneration
(c) Reduction, Oxygenation (d) Carboxylation, reduction and regeneration

129. The reactions of Calvin cycle not directly dependent on light, but they usually do not occur at night – Why?
(a) Night is often too cold for these reactions to occur
(b) CO_2 concentration in night is too high for these reactions to occur
(c) Plants usually open their stomata at night
(d) Calvin cycle is dependent on the products of light reaction

130. PEPcase has an advantage to RuBisCO. The advantage is that –

(a) PEPCase conserves energy but RUBISCO does not
(b) RUBISCO combines with O_2, but PEPCase does not
(c) PEPCase combines with O_2 but RUBisCO does not
(d) PEPCase is present in both mesophyll and bundle sheath but RUBisCO is not

131. Calvin Cycle is –
(a) Only monocots and dicots (b) In only C_3-plant
(c) In only C_4-plant (d) In all photosynthetic plants

132. In Calvin Cycle, if one molecule of RUBP is carboxylated, how many PGA molecule(s) is resulted –
(a) 1 (b) 3 (c) 6 (d) 2

133. Which of following ratio is correct for the production of one molecule of glucose through 6 rounds of calvin cyle?

	CO_2	:	ATP	:	$NADPH_2$
(a)	1	:	2	:	2
(b)	6	:	18	:	12
(c)	6	:	12	:	18
(d)	5	:	6	:	9

134. How many ATP is needed to generate one molecule of RuDP in Clavin Cycle?
(a) 6 (b) 2 (c) 1 (d) 18

135. In C_3 plants, when O_2 levels are high and CO_2 levels are low _____ occurs, this produces no _____.
(a) ATP synthesis, $NADPH_2$ (b) Photorespiration, CO_2
(c) Photorespiration, ATP / sugar / $NADPH_2$ (d) C3 cycle, sugar

136. Matrix is to mitochondria as the _____ is to chloroplasts.
(a) Thylakoid space (b) PS (c) Thylakoid membrane (d) Stroma

137. The scientists believed that since the first product was C_3 acid, the primary CO_2 acceptor would be –
(a) C_2 - compound (b) C_3 - compound (c) C_5 - compound (d) C_6 - compound

138. C_4 plants are abundant in –
(a) Temperate region with more humid conditions
(b) Temeprate region with more dry conditions
(c) Tropical region with more humid conditions
(d) Tropical region with more dry conditions

139. I. The most abundant enzyme in the world.
II. Its active site can bind to both CO_2 and O_2 hence the name.
III. Has a much greater affinity for CO_2 than O_2.
IV. The relative conc. of O_2 and CO_2 determines which of the two will bind to the enzyme.
V. It is present in all photosynthetic plants.
VI. It is present in chloroplast.
The above facts are characteristic of which enzyme?
(a) PEPCase (b) RuBisCO (c) Hexokinase (d) Nitrogenase

140. C_4 plants are able to minimize photorespiration because C_4 plants –
(a) Do not carry out the Calvin cycle (b) Use PEPCase to initiate CO_2 fixation
(c) Exclude Calvin Cycle (d) Do not show respiration

141. Which of the following statements regarding photorespiration are true?
(a) Photorespiration is a metabolically expensive pathway
(b) Photorespiration is avoided when CO_2 is abundant
(c) Photorespiration results in a loss of usable carbon dioxide
(d) All

Photosynthesis in Higher Plants

142. After World War II who used radioactive C^{14} in algal photosynthesis and worked out the complete biosynthetic pathway of photosynthesis –
(a) Hatch (b) Slack (c) Melvin Calvin (d) Hill

143. Function of photorespiration is –
(a) CO_2 fixation (b) unknown (c) ATP production (d) to form glucose

144. Photorespiration starts –
(a) In mitochondria (b) In chloroplast (c) In C_4 plants (d) In cytoplasm

145. During photorespiration RUBisCO uses _____ as a substrate –
(a) CO_2 (b) NADPH (c) O_2 (d) 3-PGA

146. I. They have a special type of leaf anatomy.
II. They tolerate higher temperature.
III. They show a response to high light insensities.
IV. They lack photorespiration.
V. They have greater productivity of biomass
The above characters are shown by –
(a) All monocots (b) C_3-plants (c) All C_2-plants (d) All C_4-plants

147. The leaves of C_4 plants show –
(a) No chloroplasts in cells of bundle sheath (b) No chloroplasts in mesophyll
(c) Monomorphic chloroplasts (d) Kranz anatomy

148. Hatch and Slack pathway (HSK pathway)is otherwise known as C_4-cycle because –
(a) The first stable product is oxaloacetic acid / OAA which is a C_4-compound
(b) The primary CO_2 acceptor is OAA, a C_4 compound
(c) All intermediate metabolites are C_4-compounds
(d) At one time $4CO_2$ molecules take part in Carboxylation pathway

149. The C_2 oxidative photosynthetic carbon cycle is –
(a) C_3 cycle (b) Photorespiration (c) C_4 cycle (d) CAM

150. Which one(s) is correct for C_3 plants?
(a) Photosynthetic CO_2 fixation and photorespiratory oxygenation are competing reactions.
(b) Competition between carboxylation and oxygenation decreases the efficiency of photosynthesis
(c) Carboxylation and oxygenation are closely interlocked in the intact leaf
(d) All

151. In Calvin cycle which stage needs ATP?
(a) Carboxylation only (b) Only regeneration
(c) Both carboxylation and reduction (d) Both reduction and regeneration

152. C_4 acid, formed in the mesophyll of C_4 plants leaf during photosynthesis is –
(a) OAA or Malic acid or Aspartic acid (b) Pyruvic acid
(c) Succinic acid (d) Fumaric acid

153. In C_4 plant, during photosynthesis C_4 acid undergoes decarboxylation in _____ to produce C_3 acid (pyruvic acid) and _____.
(a) Mesophyll, O_2 (b) Bundle sheath, O_2 (c) Grana, CO_2 (d) Bundle sheath, CO_2

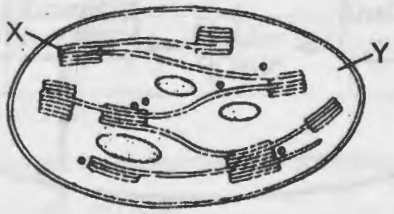
154. During photosynthesis C_3 acid is transported from cells of bundle sheath where it is converted to –
(a) Pyruvic acid (b) PEP (c) OAA (d) malic acid

Photosynthesis in Higher Plants

155. Which one is correct for C_4-plants?

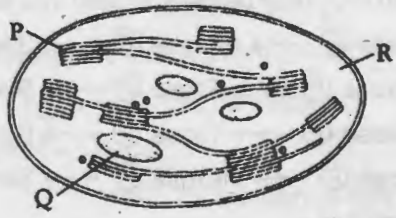
	Mesophyll		Bundle Sheath	
(a)	PEPCase	C_4-Cycle	RUBisCO	C_3-Cycle
(b)	PEPCase	Calvin Cycle	RUBisCO	C_4-Cycle
(c)	RUBisCO	C_4-Cycle	PEPCase	C_3-Cycle
(d)	RUBisCO	C_2-Cycle	PEPCase	C_3-Cycle

156. Which one of the following correctly identifies X and Y and shows their functions?



	X		Y	
	Structure	**Function**	**Structure**	**Function**
(a)	Grana	Photolysis of water	Stroma	CO_2 fixation
(b)	Grana	CO_2 fixation	Stroma	Photolysis of water
(c)	Stroma	Photolysis	Grana	CO_2 fixation
(d)	Grana	CO_2 fixation	Lamellae	Photolysis of water

157. The diagram shows the ultrastructure of a chloroplast as seen in section. What are the fucntions of P, Q and R?



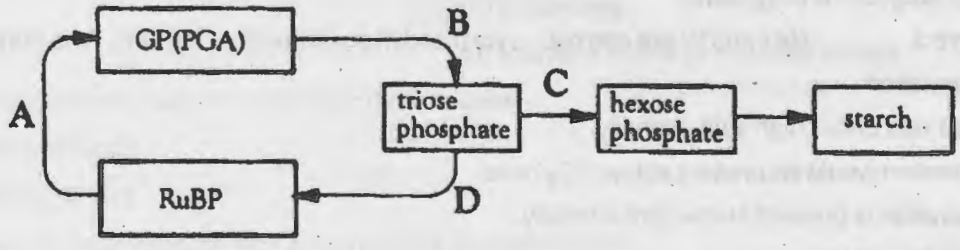
	P	Q	R
(a)	Carbohydrate storage	Carbohydrate synthesis	Light reaction
(b)	Light reaction	Carbohydrate synthesis	Carbohydrate storage
(c)	Light reaction	Carbohydrate storage	Carbohydrate synthesis
(d)	Light absorption	Carbohydrate synthesis	Carbohydrate storage

158. Compared to retinal, chlorophyll can be described as a pigment that has a –

(a) Narrow absorption range but high efficiency (b) Narrow absorption range but low efficiency

(c) Wide absorption range but low efficiency (d) Wide absorption range but high efficiency

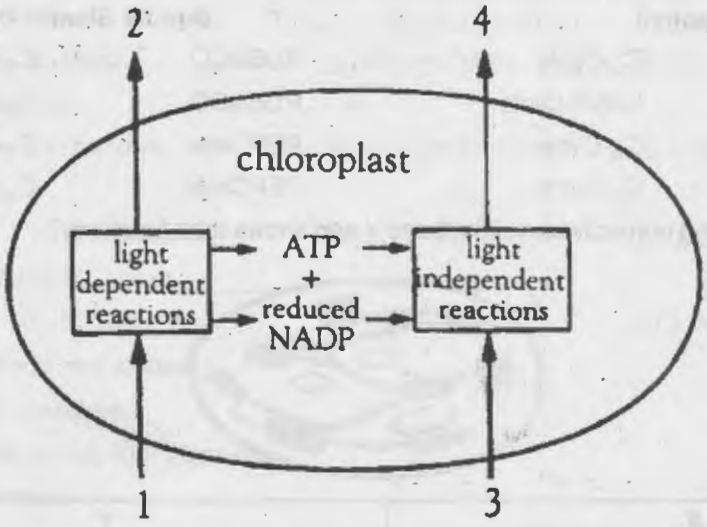
159. The diagram represents the calvin cycle



At which stage is CO_2 incorporated –

(a) A (b) B (c) C (d) D

160. The diagram shows the movement of substances in and out of a chloroplast –



What do labels 1 to 4 represent?

	1	2	3	4
(a)	CO_2	ATP	H_2O	Starch
(b)	CO_2	H_2O	Sugars	O_2
(c)	H_2O	O_2	CO_2	Sugar
(d)	Sugar	H_2O	ATP	O_2

161. What is the outline sequence by which CO_2 may be incorporated into starch by photosynthesis?

(a) PGA + CO_2 ⟶ RuBP ⟶ Triose Ⓟ ⟶ Hexose Ⓟ ⟶ Starch

(b) PGA + CO_2 ⟶ RuDP ⟶ Hexose Ⓟ ⟶ Triose Ⓟ ⟶ Starch

(c) RuBP + CO_2 ⟶ PGA ⟶ Hexose Ⓟ ⟶ Triose Ⓟ ⟶ Starch

(d) RuBP + CO_2 ⟶ PGA ⟶ Triose Ⓟ ⟶ Hexose Ⓟ ⟶ Starch

162. All C_4 plants show Kranz anatomy and it is –

(a) Environmentally determined (b) Non-gentically determined

(c) Edaphically determined (d) Genetically determined

163. The term Kranz (wreath) of Kranz-anatomy of leaf C_4 plant refers to arrangement of cells. These cells are cells of–

(a) Mesophyll (b) Spongy parenchyma

(c) Bundle sheath (d) Both mesophyll and bundle sheath

164. I. Photorespiration is favoured by high O_2, low CO_2, rise in temperature, high light intensity.

II. Chloroplasts of cells of bundle sheath of C_4 plants are granaless and have RUBisCO but no PEPCo.

III. Chloroplasts of mesophyll cells of C_4 plant are granale, have PEPcase but no RUBisCo.

IV. Maize and Sorghum are C_4 plants

(a) All are correct (b) I and IV are correct (c) II and III are correct (d) Only IV is correct

165. I. Initial carboxylation.

II. CO_2 fixation rate under high light intensity.

III. Photorespiration would be present at low CO_2 conc.

IV. Photorespiration is present at low light intensity.

V. Optimum temperature.

Choose the correct option of C_3 and C_4 plant.

		I		II		III		IV		V
	C_3 plant	C_4 plant	C_3 plant	C_4 plant	C_3 plant	C_4 plant	C_3 plant	C_4 plant	C_3 plant	C_4 plant
(a)	Mesophyll	Mesophyll	High	High	High	Negligible	Negligible	Negligible	20 – 25°C	Above 40°
(b)	Mesophyll	Bundle sheath	Low	Low	Negligible	High	High	High	Above 40°C	20° – 25°C
(c)	Bundle Sheath	Mesophyll	Low	High	Low	Low	Low	Low	0°C	10°C
(d)	Bundle Sheath	Bundle Sheath	High	High	High	Low	Low	High	50°C	40°C

166. Plant factors affecting photosynthesis include –
(a) Number, age, size, and orientation of leaves, mesophyll cells and chloroplast, internal CO_2 conc., the amount of chlorophyll.
(b) Nature of leaves, size of mesophyll cells and light
(c) Mesophyll cells distribution and temperature.
(d) Quantity of chlorophyll, size of leaves and CO_2

167. Law of limiting factors was given by –
(a) Blackman (b) Whiteman (c) Hill (d) Calvin

168. Photosynthetic yield depends upon –
(a) Duration of exposure to light (b) Light intensity
(c) Light quality (d) All

169. At low light intensities, the relation between the incident light and CO_2 fixation rates is –
(a) Sigmoid (b) Linear (c) parabola (d) hyperbola

170. Rate of photosynthesis is independent of –
(a) Quality of light (b) Intensity of light
(c) duration of exposure to light (d) All

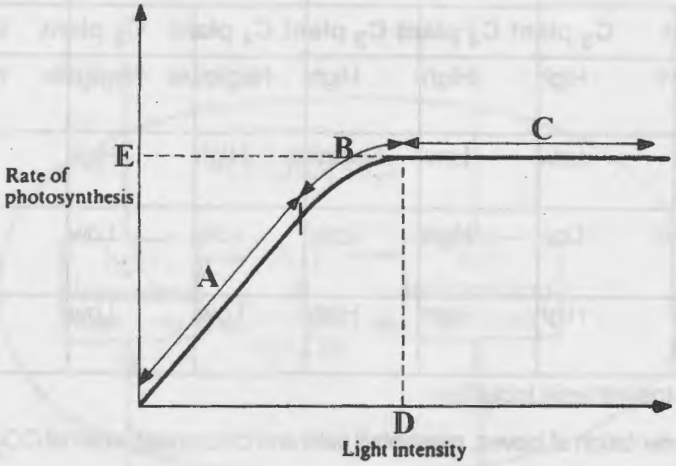
171. At higher light intensities gradually photosynthesis rate does not show further increase – why?
(a) Higher light intensity activate more chlorophylls
(b) Higher light intensity causes more transpiration
(c) No need of more sugar formation (d) Other factors become limiting

172. Light saturation occurs at _____% of full sunlight –
(a) 20 (b) 100 (c) 50 (d) 10

173. Light is rarely a limiting factor in nature except in –
(a) Maize (b) Sugarcane
(c) Sorghum (d) Plants in shade or in dense forests

174. Increase in light intensity beyond saturation point causes –
(a) More photosynthesis
(b) Less photosynthesis
(c) Breakdown of the chlorophyll and a decrease in photosynthesis
(d) Heliotropism

175.



Column - 1	Column - 2
I. Limiting factor in region A	1. Some factor other than light intensity is becoming the limiting factor
II. B represents to	2. Light is no longer limiting factor
III. C represents to	3. Light intensity
IV. D represents to	4. Maximum rate of photosynthesis
V. E represents to	5. Saturation point for light intensity

The correct option is –

(a) I - 1, II - 2, III - 3, IV - 4, V - 5 (b) I - 3, II - 1, III - 2, IV - 5, V - 4

(c) I - 4, II - 2, III - 5, IV - 3, V - 1 (d) I - 5, II - 4, III - 3, IV - 2, V - 1

176. Under the normal condition which one is the major limiting factor?

(a) CO_2 conc. (b) Light (c) Temperature (d) Chl. Conc.

177. For photosynthesis the present atmospheric conc. of CO_2 (0.03 and 0.04) is –

(a) Optimum (b) Suboptimum (c) Superaoptimum (d) Sufficient

178. If CO_2 conc. increases upto 0.05% the rate of photosynthesis –

(a) Decreases (b) Increases for short terms

(c) First decreases and then increases (d) Becomes zero

179. Which one is incorrect?

(a) The C_3 and C_4 plants respond similarly to CO_2 concentration

(b) At low light conditions neither C_3 nor C_4 plants respond to high CO_2 concentration

(c) C_4 plants attain saturation at much lower CO_2 concentration (about 360 μIL^{-1}) than C_3 plants (about 500 μIL^{-1})

(d) Current availability of CO_2 levels is limiting to the C_3 plants

180. Which green house crops are being grown in CO_2 enriched atmosphere

(a) Mango + Bamboo (b) Tomatoes + Bell pepper + Roses + cucumber + Lettuce

(c) *Datura* and *Pinus* (d) *Pinus* and *Cycas*

181. Which is incorrect?

(a) C_3 palnts respond to higher temeprature, show higher photosynthetic rate while C_4 plants have lower optimum temperature

(b) Tropical plants have higher temeprature optimum than the plants adapted to temperate climate

(c) Light reaction is less temperature sensitive than dark reaction

(d) The effect of water as a factor is more through its effect on plant, rather than directly on photosynthesis

182. Under water stress, the rate of photosynthesis declines because of –

(a) Stomatal closure leading to decrease in CO_2 supply

(b) Reduced water potential that decreases leaf surface areas for photosynthesis

(c) Both

(d) Turgidity of leaf

183. At higher light intensities the rate of photosynthesis decreases because of –

(a) Other factors becoming limiting

(b) Destruction / photoxidation of chlorophyll

(c) Both a and b

(d) Carotenoids are killed

184. Which one is correct about sciophytes / shade loving plants –

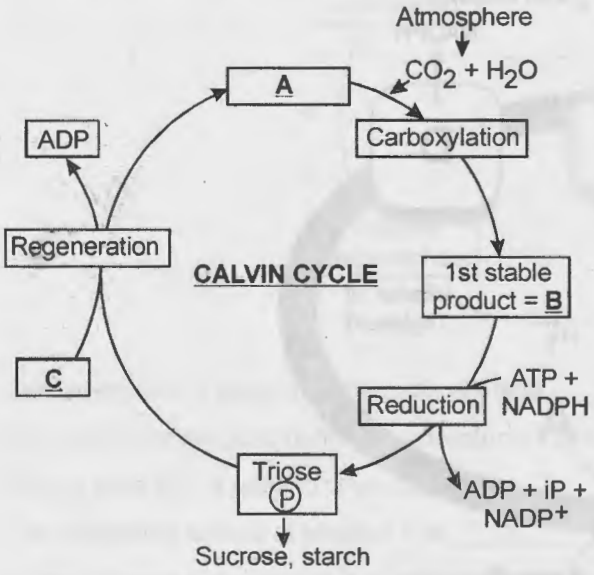
(a) Larger photosynthetic unit

(b) Have more total chlorophyll / reaction centre

(c) Higher rate of photoynthesis

(d) Both a and b

185.



Identify A, B and C

	A	B	C
(a)	ATP	3PGA	RuBP
(b)	3PGA	ATP	Sugar
(c)	RuBP	3-PGA	ATP
(d)	Sugar	RuDP	NADPH

186. Assume a thylakoid is somehow punctured so that the interior of the thylakoid is no longer separated from the stroma. This damage will have the most direct effect on which of the following processes?

(a) The splitting of water

(b) The absorption of light energy by chlorophyll

(c) The flow of electrons from photosystem II to photosystem I

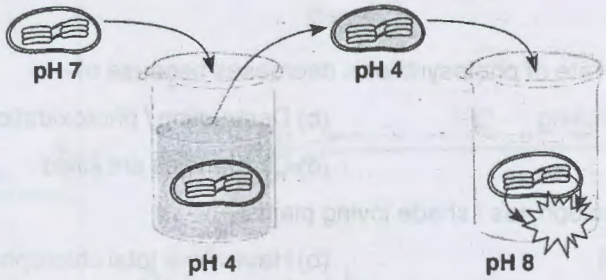
(d) The synthesis of ATP

187. In an experiment studying photosynthesis performed during the day, you provide a plant with radioactive carbon dioxide ($^{14}CO_2$) as a metabolic tracer. The ^{14}C is incorporated first into oxaloacetic acid. The plant is best characterized as a

(a) C_4 plant (b) C_3 plant (c) CAM plant (d) Heterotroph

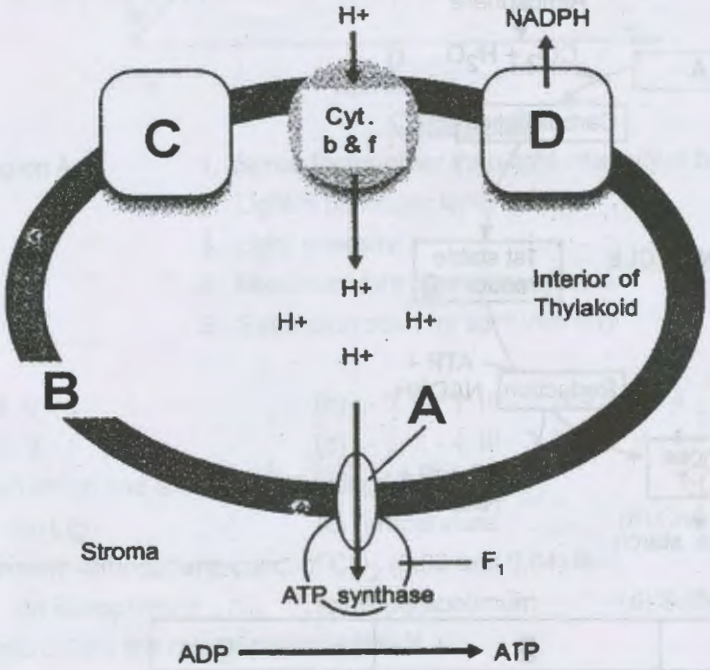
188. The diagram below represents an experiment with isolated chloroplasts. The chloroplasts were first made acidic by soaking them in a solution at pH 4. After the thylakoid space reached pH 4, the chloroplasts were transferred to a basic solution at pH 8. The chloroplasts are then placed in the dark. Which of these compounds would you expect to

be produced?



(a) ATP (b) NAD (c) G3P (d) $C_6H_{12}O_6$

189. Study the pathway ATP synthesis through chemiosmosis given below –



In which of the following options correct words for all the three blanks A, B, C and D are indicated –

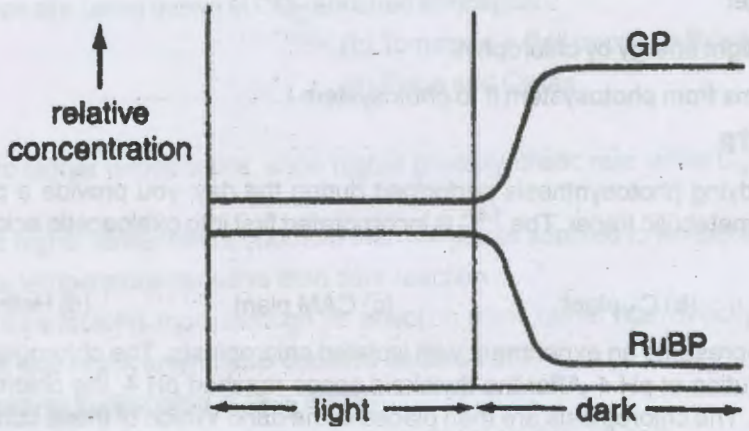
(a) A - F_1, B - Thylakoid membrane, C - Photosystem (I), D - Photosystem (II)

(b) A - F_0, B - Thylakoid membrane, C - Photosystem (I), D - Photosystem (II)

(c) A - F_1, B - Thylakoid membrane, C - Photosystem (II), D - Photosystem (I)

(d) A - F_0, B - Thylakoid membrane, C - Photosystem (II), D - Photosystem (I)

190. The graph below refers to an experiment involving a species of alga. The relative concentrations of GP and RuBP present in the cells were monitored when the plants were in light and then in darkness –



Which of the following conclusions CANNOT be drawn from these results?

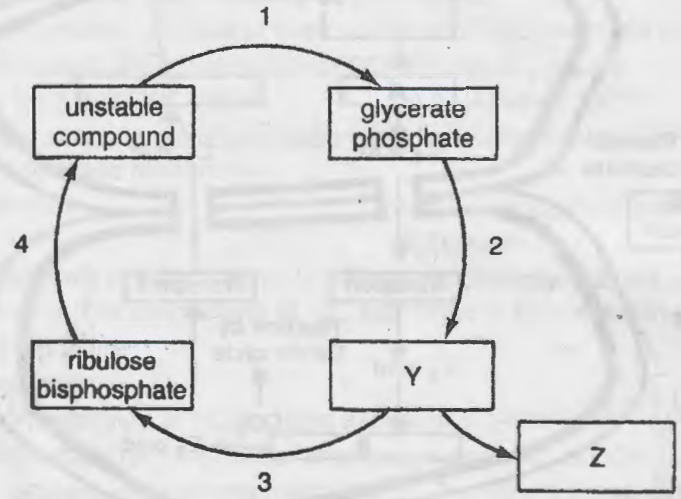
(a) In darkness the relative concentration of GP increases

(b) During the experiment RuBP may be converted into GP

(c) The relative concentration of RuBP decreases on removal of CO_2

(d) In light a steady state exists between RuBP and GP

191. The below diagram is the cyclic series of reactions that occurs during carbon fixation stage of photosynthesis –



Carbon dioxide is taken into the cycle at stage ___A___.

Hydrogen from reduced hydrogen acceptor is used at stage ___B___.

Energy from ATP is used to drive stages ___C___.

The substance formed at position Y is ___D___.

If one molecule of susbtance Y is released per cycle, how many ___E___ times must the cycle turn for one molecule of sucrose ($C_{12}H_{22}O_{11}$) to be built up at position Z?

(a) A - 4; B - 2; C - 2 and 3; D - 3-carbon sugar; E - 4

(b) A - 3; B - 3; C - 1 and 2; D - pyruvate acid, E - 2

(c) A - 2; B - 4; C - 3 and 4; D - glucose-1-phosphate; E - 8

(d) A - 1; B - 1; C - 2 and 4; D - citric acid; E - 12

192. Which of the following changes in concentration of chemicals would occur if an illuminated green plant cell's source of carbon dioxide were removed?

	Ribulose bisphosphate	*Glycerate phosphate*
(a)	increase	increase
(b)	decrease	decrease
(c)	increase	decrease
(d)	decrease	increase

193. Which of the following correctly ranks the following structures in terms of size, largest to smallest?

Chloroplast (C), mesophyll cell (MC), pigment system (P), chlorophyll molecule (M), thyllakoid (T).

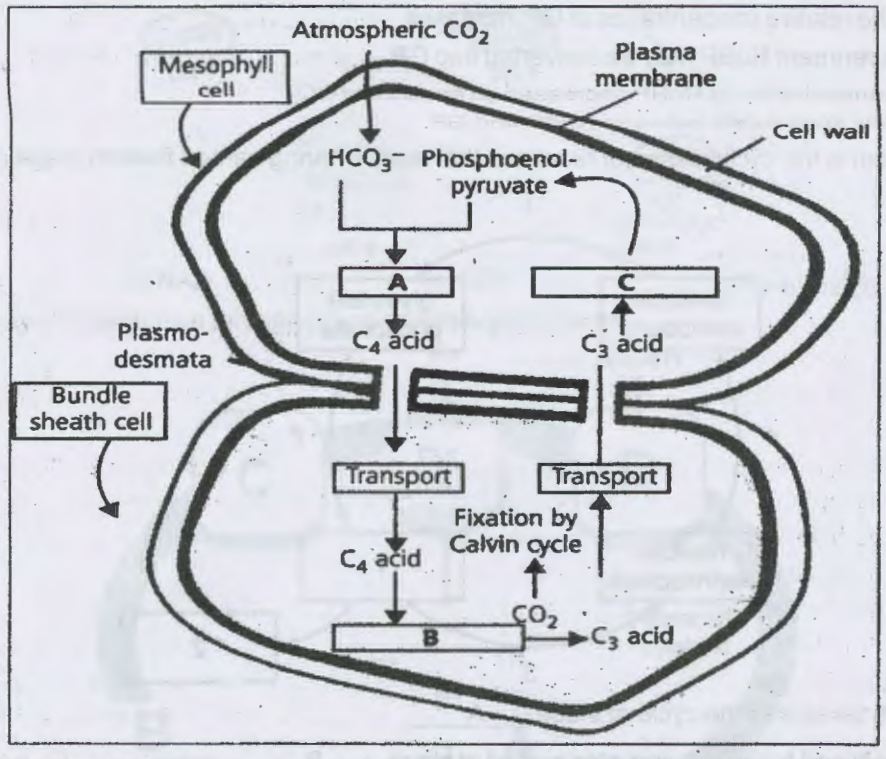
(a) P-MC-T-C-M (b) MC-C-T-M-P (c) P-MC-C-T-M (d) MC-T-P-C-M

194. In an experiment, mature leaves on the plant were enclosed for a fixed amount of time in a transparent bag that had radioactive CO_2. In which part of the plant will maximum radioactivity be found after some time?

(a) Actively growing leaves. (b) Guard cells of all the leaves.

(c) In mature leaves. (d) Senescing leaves and roots.

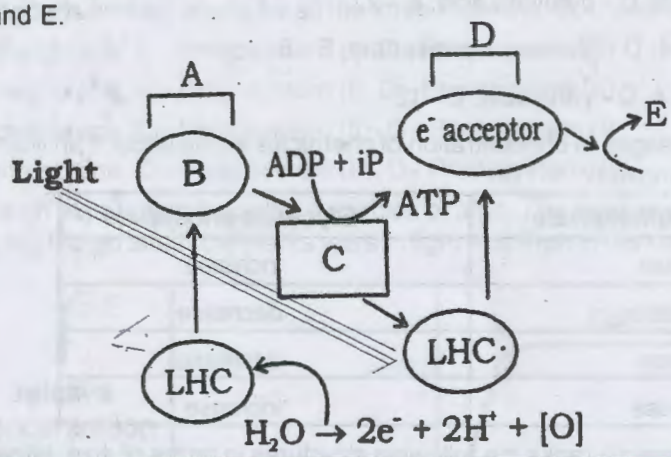
195. Study the pathway given below:



In which of the following options correct words for all the three blanks A, B and C are idicated?

	A	B	C
(a)	Decarboxylation	Reduction	Regeneration
(b)	Fixation	Transamination	Regeneration
(c)	Fixation	Decarboxylation	Regeneration
(d)	carboxylation	Decarboxylation	Reduction

196. Given beloiw is the pathway of light reaction. In which of the following option correct words for all the given blanks indicated by A, B, C, D and E.



	A	B	C	D	E
(a)	P 700	H^+ acceptor	e^- acceptor	P680	$NADP^+$
(b)	Photosystem I	e^- acceptor	e^- transport system	Photosystem II	$NADPH_2$ + ATP
(c)	Photosystem II	H^+ acceptor	e^- acceptor	P700	NADPH
(d)	Photosystem II	e^- acceptor	e^- transport system	Photosystem I	NADPH + H^+

197. DCMU also called 'DIURON' is a potent non selective herbicide it kills plant by -
(a) Inhibiting light reaction - I (b) Inhibiting light reaction - II
(c) Inhibiting dark reaction / calvin cycle (d) Inhibiting respiration / Kreb's cycle

198. What is the effect of high CO_2 concentration and higher values of ATP / ADP ratio -
(a) Rate of Calvin cycle is increased
(b) Rate of Kreb's cycle is decreased
(c) Rate of Calvin cycle is decreased and Kreb's cycle is increased
(d) Rate of Calvin cycle is increased and that of Kreb's cycle and Glycolate cycle is decreased

199. The requirement for the reduction of each molecule of CO_2 through C_3 cycle is
(a) 3 $NADH_2$, 2ATP (b) 2 $NADPH_2$, 2ATP (c) 2 $NADPH_2$, 3 ATP (d) 3 $NADPH_2$, 3 ATP

200. The experimental material that has largely been responsible for making rapid advances in tracing path of carbon in Calvin cycle & other photosynthetic research is -
(a) *Chlorella* and *Scenedesmus* (b) *Chalmydomonas* and *Chlorella*
(c) *Hydrilla* (d) Spinach

201. Melvin Calvin conducted two sets of experiments. In first set the Chlorella was fed with $^{14}CO_2$ for 3 seconds and in the second set for 60 seconds. The radioactivity of ^{14}C was found to be present in-
(a) 1-C of PGA in both the exposure
(b) 3-C of PGA in both the exposure
(c) The radioactivity of short-exposure in 1-C and long exposure in 3-C of PGA
(d) The radioactivity of long exposure in 1-C and of short exposure in 3-C of PGA

202. While *Chlorella* is rapidly growing in an environment of CO_2. The light is turned off and $^{14}CO_2$ is introduced. The distribution of radioactivity during this light to dark change is then studied: There was a marked increase in compound A and decreases in compound B-
(a) A is PGAl and B is PGA (b) A is PGA and B is DHAP
(c) A is RUBP and B is PGA (d) A is PGA and B is RUBP

203. One plant is grown in the shade of a green house and the other is grown under a forest canopy (i.e. under the shade of trees). What would be the effect of these two type of shades on the rate of photosynthesis -
(a) The rate of photosynthesis would be equally low in both the types of shade
(b) The rate of photosynthesis would be greater under the forest canopy
(c) The rate of photosynthesis would be greater in the shade of a green house
(d) The shade of green house or a forest canopy would not influence the rate of photosynthesis because only 1% of sunlight is used in photosynthesis

204. Two groups of isolated thylakoids are placed in an acidic bathing solution so that H^+ diffuses into the thylakoids. They are then transferred to a basic bathing solution, and one group is placed in the light, while the other group is kept in the dark. Select below the choice that describes what you expect each group of thylakoids to produce.

	In Light	In Dark
(a)	ATP only	Nothing
(b)	ATP, O_2	ATP only
(c)	ATP, O_2, glucose	ATP, O_2
(d)	ATP, O_2	O_2

205. To make one molecule of glucose 6 turns of the calvin cycle are required. Select incorrect pair that goes in and comes out of the calvin cycle.

	In	Out
(a)	Six CO_2	One glucose
(b)	18 ATP	18 ADP
(c)	12 NADPH	12 NADP
(d)	12 ATP	12 ADP

206. CAM helps the plants in
(a) Reproduction (b) Conserving water (c) Secondary growth (d) Disease resistance

207. A student sets up an experiment on photosynthesis and it is as follows : He takes soda water in a glass tumbler and adds chlorophyll extract into the contents and keeps the tumbler exposed to sunlight, hoping that he has provided the necessary ingredients. What will happen after, say, a few hours of exposure to light? Choose the correct answer.
(a) Photosynthesis takes place and glucose would be produced turning the mixture sweet.
(b) Photosynthesis will take place and starch would be produced which will turn the mixture turbid.
(c) Photosynthesis does not occur and CO_2 dissolved in soda water escapes into the atmosphere.
(d) Photosynthesis will not take place because intact chloroplasts are needed for the process.

208. In Kranz anatomy, the bundle sheath cells have :
(a) thin walls, many intercellular spaces and no chloroplasts
(b) thick walls, no intercellular spaces and large number of chloroplasts
(c) thin walls, no intercellular spaces and several chloroplasts
(d) thick walls, many intercellular spaces and few chloroplasts

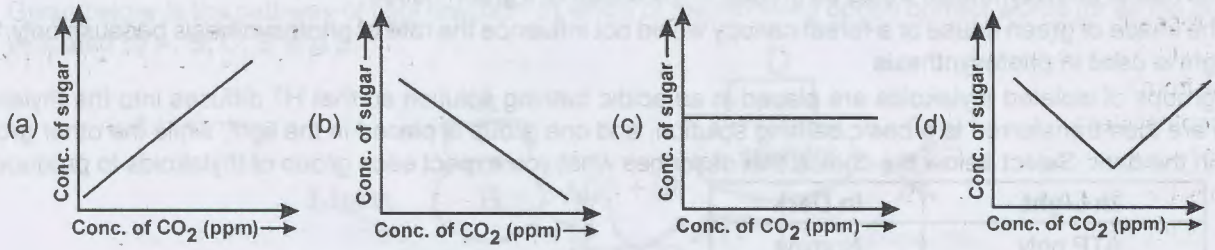
209. Which one of the following is essential for photolysis of water ?
(a) Manganese (b) Zinc (c) Copper (d) Boron

210. The possible advantages of absence of Grana in chloroplast of C_4 leaves is
(a) Division of labour
(b) More formation of malic acid
(c) No competition between oxygen and carbon dioxide for active sites of enzyme RuBisCo
(d) Occurrence of excessive photolysis of water

211. In the overall process of photosynthesis, the number of CO_2, water, sugar and O_2 molecules utilized and produced is
(a) 12 (b) 13 (c) 19 (d) 31

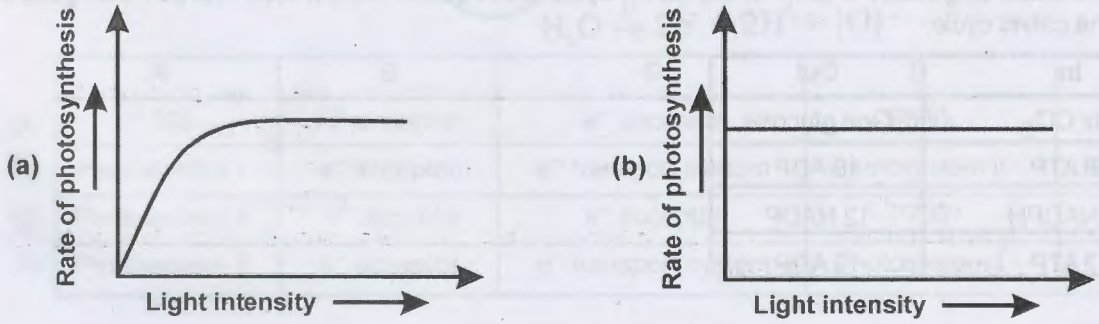
212. During Calvin cycle the total number of CO_2, ATP and NADPH molecules utilized and glucose, ADP and NADP molecules generated is
(a) 31 (b) 36 (c) 61 (d) 67

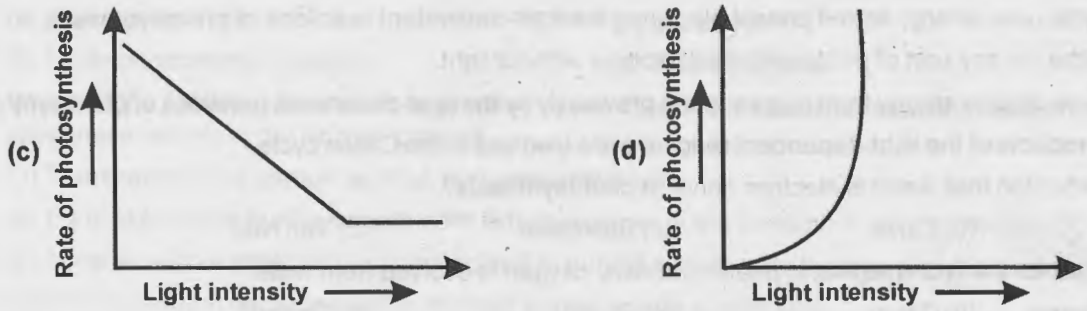
213. Anthony and his classmates decided to study the effect of amount of carbon dioxide on the growth of plants. For this purpose, they grew sugarcane in controlled environment and measured the amount of sugar content at different concentrations of carbon dioxide. Which graph represents the sugar content in sugarcane and the concentration of carbon dioxide correctly?



214. C_3 pathways require ___I___ ATP for CO_2 fixation while C_4 pathways require ___II___ ATP for CO_2 fixation. Which of the following alternative complete the statement above?
(a) I-2; II-3 (b) I-3; II-5 (c) I-5; II-2 (d) I-3; II-2

215. Which of the following graphs correctly gives the relationship between the rate of photosynthesis and light intensity?





216. A process that makes important difference between C_3 and C_4 plants is :
(a) Transpiration (b) Glycolysis (c) Photosynthesis (d) Photorespiration

217. Best defined function of Manganese in green plants is :
(a) Photolysis of water (b) Calvin cycle (c) Nitrogen fixation (d) Water absorption

218. The correct sequence of cell organelles during photorespiration is :
(a) Chloroplast,-Golgibodies,-mitochondria (b) Chloroplast,-RoughEndoplasmic reticulum, Dictyosomes
(c) Chloroplast,-mitochondria,-peroxisome (d) Chloroplast,-vacuole,-peroxisome

219. During the process of aerobic respiration, ___*i*___ gets oxidized and its molecules get transferred to the electron transport chain while in photosynthesis, ___*ii*___ gets oxidized to transfer molecules to the electron transport chain.
(a) i-glucose; ii-xanthophyll (b) i-carbon dioxide; ii-xanthophyll
(c) i-carbon dioxide; ii-chlorophyll-a (d) i-glucose; ii-chlorophyll-a

220. During glycolysis, one glucose molecule splits into ___*i*___ molecules of glyceraldehyde 3-phosphate while during Calvin cycle, ___*ii*___ molecules of glyceraldehyde 3-phosphate give rise to one molecule of glucose.
(a) i-one; ii-two (b) i-two; ii-two (c) i-two; ii-three (d) i-three; ii-three

221. A source of protons for proton gradient within a chloroplast is
(a) Water (b) CH_2O
(c) Chlorophyll (d) Phospholipids within the thylakoid membrane

222. What are the products of linear photophosphorylation?
(a) heat and fluorescence (b) ATP and P700 (c) ATP and NADPH (d) ADP and NADP

223. As a research scientist, you measure the amount of ATP and NADPH consumed by the Calvin cycle in 1 hour. You find 30,000 molecules of ATP consumed, but only 20,000 molecules of NADPH. Where did the extra ATP molecules come from?
(a) photosystem II (b) photosystem I (c) cyclic electron flow (d) linear electron flow

224. $P680^+$ is said to be the strongest biological oxidizing agent. Why?
(a) It is the receptor for the most excited electron in either photosystem.
(b) It is the molecule that transfers electrons to plastoquinone (Pq) of the electron transfer system.
(c) It transfers its electrons to reduce $NADP^+$ to NADPH.
(d) This molecule has a stronger attraction for electrons than oxygen, to obtain electrons from water.

225. In 1772, Joseph Priestley demonstrated that
(a) Plants foul the air.
(b) Animals purify the air during day time.
(c) Plants and animals restore air for each other.
(d) Plants get killed in the air produced by animals.

226. The first hypothesis that oxygen released during photosynthesis is derived from water, was proposed by
(a) Engelmann (b) Priestley (c) Van Niel (d) Blackman

227. Who stated that in photosynthesis light energy is converted into chemical energy?
(a) R. Mayer (b) Willstatter and Stoll (c) Arnon (d) Calvin

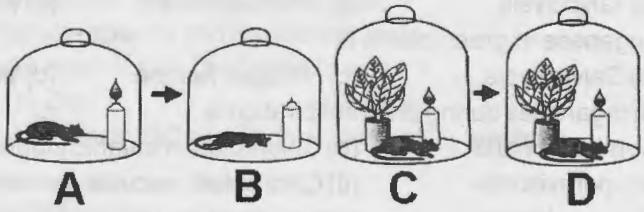
228. In an experiment on O_2 evolution by photosynthesising *Hydrilla* plant, pinch of sodium bicarbonate is added to water. The rate of photosynthesis or O_2 evolution will
(a) Increase (b) Decrease (c) Stop (d) Not be affected

229. Why is it possible for the Calvin cycle to occur in the dark?
(a) The Calvin cycle uses energy stored previously during the light-dependent reactions of photosynthesis.
(b) It is not possible for any part of photosynthesis to occur without light.
(c) The Calvin cycle obtains energy from sugars made previously by the light-dependent reactions of photosynthesis.
(d) None of the products of the light-dependent reactions are involved in the Calvin cycle.

230. Who first of all indicated that water is electron donor in photosynthesis?
(a) Arnon (b) Calvin (c) Blakeslee (d) Van Niel

231. Who demonstrated for the first time that in photosynthesis, oxygen is evolved from water?
(a) Ruben and Kamen (b) Calvin (c) R. Hill (d) Govindji

232. Go through the following experiment.



This experiment is referred to
(a) Arnold (b) Arnon (c) Hill (d) Priestley

233. **Statement A :** Photorespiration decreases photosynthetic output.
Statement B : In photorespiratory pathway, neither ATP nor NADPH is produced.
(a) Statement A is correct and Statement B is wrong.
(b) Both the statements A and B are correct.
(c) Statement B is correct and statement A is wrong.
(d) Both statements A and B are wrong.

234. _____ are the most abundant proteins in the living world.
(a) PEPcase of plants and keratin of animals
(b) Ribozyme of plants and collagen of animals
(c) Alcohol dehydrogenase of plants and melanin of animals.
(d) RuBisCO of plants and collagen of animals

235. Bundle sheath cells
(a) Are rich in RuBisCO (b) Are rich in PEP carboxylase
(c) Lack RuBisCO (d) Lack both RuBisCO and PEP carboxylase

236. The correct sequence of organelles in which glycolate and glyoxylate are produced sequentially in photorespiration, is
(a) Chloroplast and mitochondria (b) Chloroplast and peroxisome
(c) Peroxisome and mitochondria (d) Peroxisome and chloroplast

237. Identify the correct statement (s) in relation to C_4 photosynthesis
(A) Kranz anatomy is an essential feature for C_4 plants
(B) C4 plants have higher water use efficiency than C_3 plants
(C) Photrespiration can be minimized when C_4 pathway is in operation
(D) Conversion of oxaloacetate to malate occurs in the bundle sheath cells
(a) A, B, C are correct (b) B, C, D are correct (c) A, C, D are correct (d) All are correct

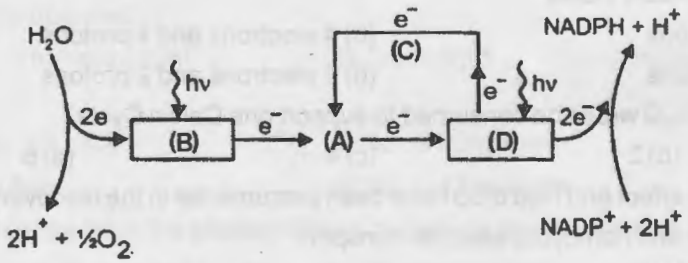
238. Step at which NADPH2 is required in Calvin cycle is
(a) carboxylation (b) regeneration (c) reduction (d) phosphorylation

Photosynthesis in Higher Plants

239. Oxygen evolution is connected with
(a) photosystem II (b) photosystem I
(c) Cyclic photophosphorylation (d) RUBP enzyme

240. Which of the following step/event is required to increase the intracellular concentration of CO_2 ensuring minimal oxygenase activity in dry tropical plants?
(a) Transport of fixed carbon as PGA from mesophyll cells.
(b) C4 acid from the bundle sheath cells is broken down in the mesophyll cells to release CO_2.
(c) Aspartic acid or malic acid is translocated to bundle sheath cells through plasmodesmata
(d) ATP dependant decarboxylation of malic acid in bundle sheath cells

241. Examine the figure given below and select the right option giving the components (A/B/C/D) correctly identified.



(a) A - Photosystem - I, D - Photosystem - II
(b) A - ATP synthase, C - Cyclic ETC
(c) A - PQ, B - Photosystem - II, D - F_0 - F_1 particle
(d) A - Cyt b_6f, C - Cycle ETC, D - Photosystem - I

242. 3-phosphoglyceric acid (PGA) as the first CO_2 fixation product in algal photosynthesis was discovered by
(a) Joseph Priestley (b) Jan Ingenhousz (c) T. W. Engelmann (d) Melvin Calvin

243. Maximum absorption of light by chlorophyll a occurs in which regions of the absorption spectrum?
A. Blue
B. Red
C. Green
D. Yellow
(a) A and B only (b) B and C only (c) A and D only (d) B and D only

244. Manganese, calcium and chloride ions present in PS II play an important role in
(a) Absorption of light (b) CO_2 assimilation (c) Photolysis of water (d) ATP synthesis

245. The visible portion of light spectrum useful in photosynthesis is referred to as
(a) RFLP (b) PAR (c) VAM (d) VNTR

246. The time taken from the fixation of CO_2 to the formation of one glucose molecule is about _____ seconds.
(a) 20 (b) 40 (c) 60 (d) 90

247. Greenhouse crops such as tomatoes and bell pepper produce higher yields. This is due to
(a) CO_2 enriched atmosphere leads to higher yields
(b) CO_2 is a limiting factor to photosynthesis
(c) Diffused light in green house
(d) Tomatoes and bell pepper are not C_3 plants.

248. C_4 pathway is advantageous over C_3 pathway in plants as it
(a) Occurs in relatively low CO_2 concentration (b) Uses more amount of water
(c) Occurs in relatively low O_2 concentration (d) Is less efficient in energy utilisation

Photosynthesis in Higher Plants

249. The oxygen evolved during photosynthesis, comes from water molecules. Which one of the following pairs of elements is involved in this reaction?
(a) Magnesium and Molybdenum (b) Magnesium and Chlorine
(c) Manganese and Chlorine (d) Manganese and Potassium

250. In photosynthesis the light-independent reactions take place at
(a) Photosystem II (b) Stromal matrix (c) Thylakoid lumen (d) Photosystem I

251. Number of chlorophyll molecules arranged per reaction centre in the light harvesting complex are
(a) 100 (b) 200 (c) 300 (d) 400

252. How much oxygen is formed from 264 g of CO_2 and 216 g of H_2O?
(a) 96 g (b) 216 g (c) 264 g (d) 192 g

253. Photolysis of a water molecule yields
(a) 2 electrons and 4 protons (b) 4 electrons and 4 protons
(c) 4 electrons and 2 protons (d) 2 electrons and 2 protons

254. How many molecules of H_2O would be consumed to support one Calvin Cycle?
(a) 1 (b) 2 (c) 4 (d) 6

255. Emerson's enhancement effect and Red drop have been instrumental in the discovery of :-
(a) Photophosphorylation and non-cyclic electron transport
(b) Two photosystems operating simultaneously
(c) Photophosphorylation and cyclic electron transport
(d) Oxidative phosphorylation

256. A plant in your garden avoids photorespiratory losses, has improved water use efficiency shows high rates of photosynthesis at high temperatures and has improved efficiency of nitrogen utilisation. In which of the following physiological groups would you assign this plant?
(a) C_3 (b) C_4 (c) CAM (d) Nitrogen fixer

257. The process which makes major difference between C_3 and C_4 plants is :-
(a) Photorespiration (b) Respiration (c) Glycolysis (d) Calvin cycle

258. The expected advantage for the bundle sheath chloroplast having no grana is
(a) O_2 does not compete with CO_2 for active site of RuBisCO.
(b) O_2 would destroy granal membrane.
(c) O_2 would denature enzymes of Calvin Cycle.
(d) O_2 would stop ETS.

259. Go through the following statements.
I. Chloroplasts may be phototaxis.
II. In monocotyledonous leaf, spongy mesophyll has large intercellular spaces for efficient gaseous exchange.
III. Higher oxygen concentration stimulates C_3 photosynthesis.
IV. Chlorophyll absorbs blue and red light.
V. Chlorophyll a absorption in red light is about twice that of chlorophyll b.
(a) I and II are correct (b) I, IV and V are correct (c) II and III are correct (d) II and IV are correct

260. What did Engelmann observe from his prism experiments?
(a) Bacteria could not detect the sites of O_2 evolution.
(b) Bacteria released excess carbon dioxide in red and blue light.
(c) Bacteria accumulated due to the increase in temperature caused by increase in oxygen concentration.
(d) Bacteria get accumulated towards red and blue light.

261. The empirical formula of 'chlorophyll a' is :
(a) $C_{55}H_{72}O_5N_4Mg$ (b) $C_{55}H_{70}O_6N_4Mg$ (c) $C_{55}H_{72}O_5N_4Fe$ (d) $C_{55}H_{72}O_4N_5Mg$

Photosynthesis in Higher Plants

262. Stomata remain open at night in :
(a) C_3 plants (b) C_4 plants (c) CAM plants (d) Hydrophytic plants

263. Photorespiratory reactions are operated in :
(a) Chloroplasts, ribosomes and peroxisomes (b) Chloroplasts, mitochondria and peroxisomes
(c) Mitochondria, peroxisomes and lysosomes (d) Mitochondria, chloroplasts and ribosomes

264. Kranz type of leaf anatomy is observed in
(a) C_3 plants (b) C_4 plants (c) C_3 and C_4 plants (d) Hydrophytic plants

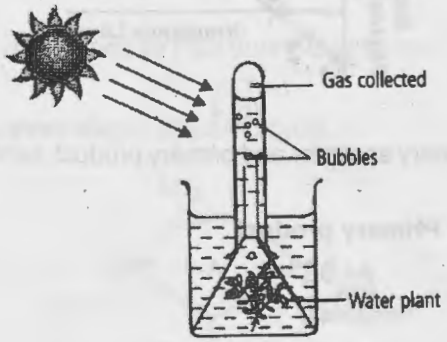
265. The entire reactions of C_4 pathway takes place in
(a) Mesophyll and bundle sheath (b) Vascular bundle and palisade tissue
(c) Mitochondria and peroxisome (d) Bundle sheath and endoplasmic reticulum

266. Photosynthesis cannot be operated in :
(a) Red light (b) Yellow light (c) Green light (d) Blue light

267 Ferrodoxin (Fd) is a
(a) Non-heme iron protein (b) Heme iron protein
(c) Copper containing protein (d) None of the above

268. Photosynthetic reaction centre from the photosynthetic bacterium was crystallized by
(a) Gulierrez (b) Burnell and Hatch (c) Fluggs and Heldt (d) Huber, Mitchel and Deisenhofer

269. The given figure shows an experimental set-up to investigate photosynthesis. The plant was exposed to different light intensities and the rate of photosynthesis was estimated by counting the number of bubbles produced by the plant.



The results are as follows:

Light intensity (unit)	**1**	**2**	**3**	**4**	**5**
Number of bubbles	**4**	**20**	**24**	**28**	**28**

What could be inferred from the given experiment?
(a) The rate of photosynthesis increases with increasing light intensities.
(b) Light intensity limits photosynthesis upto a certain extent.
(c) The rate of photosynthesis in the given experimental set-up is determined by the rate of production of gaseous oxygen.
(d) All of these

270. With reference to factors affecting the rate of photosynthesis, which of the following statements is not correct ?
(a) Increasing atmospheric CO_2 concentration up to 0.05% can enhance CO_2 fixation rate
(b) C_3 plants respond to higher temperatures with enhanced photosynthesis while C_4 plants have much lower temperature optimum
(c) Tomato is a greenhouse crop which can be grown in CO_2-enriched atmosphere for higher yield
(d) Light saturation for CO_2 fixation occurs at 10% of full sunlight

271. Phosphoenol pyruvate (PEP) is the primary CO_2 acceptor in:
(a) C_4 plants (b) C_2 plants (c) C_3 and C_4 plants (d) C_3 plants

Photosynthesis in Higher Plants

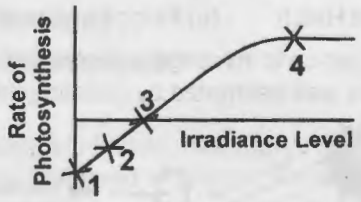
272. In C_4 plants, dimorphism of chloroplasts is an adaptation to:
(a) absorb light efficiently.
(b) absorb light in blue-violet and red regions.
(c) carry out cyclic and non-cyclic electron transfer.
(d) minimize photorespiration.

273. In C_2 (photorespiration) cycle, RUBISCO utilizes:
(a) CO_2 (b) O_2 (c) $NADPH_2$ (d) Inorganic phosphate

274. Which of the following statements is true for photosynthesis ?
(a) Dark reactions occurs only in dark
(b) Dark and light reactions always occur simultaneously
(c) Dark reactions occur only when light reactions stop
(d) Dark reactions may also occur in dark

275. During the opening of stomata, the organic malate ions are produced in the guard cells for maintaining the :
(a) Negative voltage to take i potassium ions (b) Photosynthetic products in active osmotic form
(c) Calcium ions in lesser concentration (d) Respiratory pathway in aerobic mode

276. The point on the. graph where rate of photosynthesis equals the rate of respiration is:



(a) 2 (b) 3 (c) 4 (d) 1

277. How many carbon are present in primary acceptor and primary product during CO_2 fixation in Maize (A) and Rice (B) respectively?

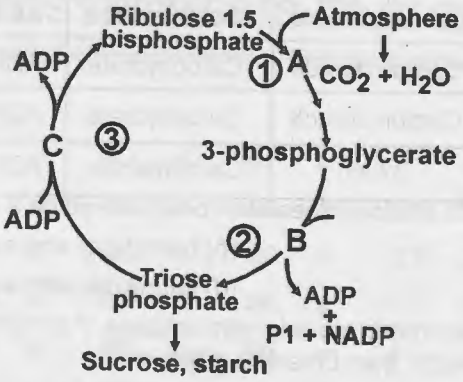
	Primary acceptor	Primary product
(a)	A - 3C	A - 3C
(b)	B - 5C	B - 4C
(c)	A - 3C; B - 5C	B - 3C
(d)	A - 5C	A - 4C; B - 3C

278. Photosynthetic yield is increased when shorter and longer light wavelength are simultaneously irradiated to a photosynthetic cell. This proves that
(a) There are two pigment systems in chloroplasts
(b) The two pigment systems are interconnected
(c) Photolysis of water is essential for formation of assimilatory power.
(d) More than one option is correct

279. Consider following four (I - IV) statements and choose correct option :–
I. In stroma lamella only PS-I is present
II. C_4 plants loose nearly half of water for fixing same amount of CO_2 than C_3 plants
III. Cu (copper) is essential for over all metabolism in plant
IV. Ethylene increase male flowers in cucumber
(a) I, II, III and IV (b) I, III and IV (c) I, II and III (d) I and II

280. The common feature between cyclic and non cyclic photo phosphorylation is :–
(a) Photosystem - II (b) Source of electrons (c) Proton gradient (d) Release of O_2

281. Which one option is not correct for A, B and C is given diagram?

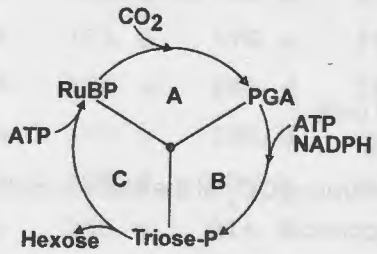


(a) A - Product of light reaction not used
(b) B - is important for recycling of this cycle
(c) A - RuBisCo is required in this process
(d) C - 5 carbon molecule formed by this process

282. In which portion of the chloroplast, pH is higher when sunlight is on the chloroplast?
(a) stroma
(b) Cytosol
(c) Space enclosed by the inner & outer membrane
(d) Space enclosed by the thylakoid membrane

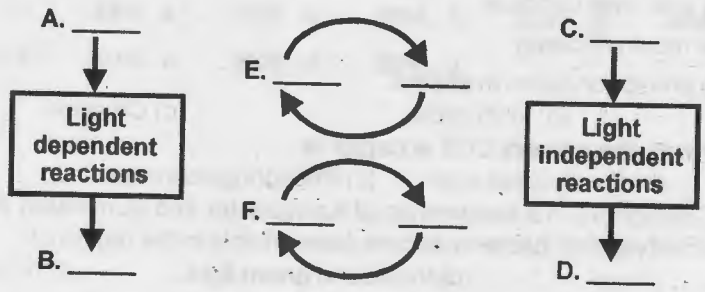
283. Read the following functions carefully :
I. H_2O splitting
II. O_2 release
III. NADH formation
IV. ATP consumption
How many functions among the above carried by PS-I during Z-scheme?
(a) Four (b) Zero (c) Two (d) One

284. The below diagram represents the three stages of Calvin cycle.



Identify A, B, C :
(a) A - Carboxylation; B - Reduction; C - Regeneration
(b) A - Regeneration; B - Reduction; C - Carboxylation
(c) A - Reduction; B - Carboxylation; C - Regeneration
(d) A - Carboxylation; B - Regeneration; C - Reduction

285. Label this diagram using these labels : water, carbohydrate, carbon dioxide, oxygen, ATP, ADP + Ⓟ, NADPH and $NADP^+$.



	A	B	C	D	E	F
(a)	Water	Oxyen	Carbon dioxide	Carbohydrate	ADP + Ⓟ → ATP	$NADP^+$ → NADPH
(b)	Water	Oxyen	Carbon dioxide	Carbohydrate	ADP + Ⓟ → ATP	NAD → NADH
(c)	Oxyen	Water	Carbon dioxide	Carbohydrate	ADP + Ⓟ → ATP	$NADP^+$ → NADPH
(d)	Carbon dioxide	Water	Oxyen	Carbohydrate	ADP + Ⓟ → ATP	$NADP^+$ → NADPH

286. A minimum ratio of transpiration to photosynthesis will be observed on a
(a) humid and cloudy day (b) humid day and sunny day
(c) sunny day with no winds (d) sunny day with strong winds

287. If X is the rate of photosynthesis at shorter wave length radiation, Y at higher wavelenth, Z is the rate at the combination of shorter and higher wavelength, then Emerson effect is
(a) X > Z + Y (b) Z = X + Y (c) Z = X = Y (d) Z > X + Y

288. Arrange the two following lists into their most appropriate pairs.

A. Antennae pigment molecules	I. Reduction of ferredoxin
B. Thylakoid membrane	II. O_2 generation
C. Photosystem II	III. ET chain
D. Photosystem I	IV. Absorption of light
E. The mobile lipophilic e^- carrier of many photosynthetic organisms.	V. Plastoquinone

(a) A - IV, B - III, C - II, D - I, E - V (b) A - V, B - IV, C - III, D - II, E - I
(c) A - I, B - II, C - III, D - IV, E - V (d) A - IV, B - II, C - III, D - I, E - V

289. Oxygen is not produced during photosynthesis by
(a) Cycas (b) Nostoc
(c) Green sulphur bacteria (d) Chara

290. Which of the following is not a product of light reaction of photosynthesis?
(a) NADPH (b) NADH (c) ATP (d) Oxygen

291. Why C_4 plants are more efficient?
(a) They show photorespiration
(b) They have RuBisCO in mesophyll cells
(c) They can tolerate high temperature
(d) They have a mechanism of concentrating CO_2 at the place of RuBisCO enzyme action.

292. Which of the following statements is correct?
(a) RuBisCO is present in the mesophyll cells of C_4 plants
(b) RuBisCO is present in the mesophyll cells of C_3 plants
(c) PEP case is present in the bundle sheath cells of C_4 plants
(d) Both RuBisCO and PEPcase are present in mesophyll cells of C_4 plants

293. Why are C_4 plants able to photosynthesize with no apparent photorespiration?
(a) They do not participate in the Calvin cycle.
(b) They use PEP carboxylase to initially fix CO_2.
(c) They are adapted to cold, wet climates.
(d) They conserve water more efficiently.

294. In which of the following phosphorylation in absent:
(a) Glycolysis (b) kreb cycle (c) C4 cycle (d) ETS

295. In Hatch and Slack pathway, the primary CO2 acceptor is
(a) Rubisco (b) Oxaloacetic acid (c) Phosphoglyceric acid (d) Phosphoenol pyruvate

296. One scientist cultured Cladophora in a suspension of Azotobacter and illuminated the culture by splitting light through a prism. He observed that bacteria accumulated mainly in the region of :
(a) Blue and red light (c) Violet and green light
(b) Indigo and green light (d) Orange and yellow light

13 PHOTOSYNTHESIS IN HIGHER PLANTS

1. c	2. d	3. b	4. d	5. d	6. a	7. d	8. a	9. d	10. d
11. d	12. d	13. b	14. c	15. a	16. d	17. d	18. a	19. b	20. d
21. b	22. a	23. d	24. d	25. b	26. b	27. d	28. a	29. c	30. b
31. a	32. c	33. c	34. c	35. b	36. a	37. d	38. c	39. d	40. d
41. a	42. c	43. d	44. d	45. c	46. a	47. c	48. d	49. d	50. a
51. c	52. b	53. d	54. a	55. c	56. d	57. d	58. d	59. b	60. c
61. d	62. d	63. d	64. c	65. d	66. d	67. c	68. a	69. a	70. d
71. c	72. b	73. d	74. b	75. b	76. d	77. b	78. a	79. a	80. a
81. a	82. b	83. d	84. d	85. d	86. b	87. d	88. d	89. d	90. d
91. b	92. a	93. a	94. a	95. d	96. a	97. a	98. c	99. a	100. a
101. a	102. b	103. d	104. d	105. c	106. d	107. d	108. d	109. b	110. b
111. b	112. c	113. b	114. b	115. a	116. d	117. c	118. b	119. d	120. c
121. b	122. b	123. d	124. b	125. b	126. c	127. c	128. d	129. d	130. b
131. d	132. d	133. b	134. c	135. c	136. d	137. a	138. d	139. b	140. b
141. d	142. c	143. b	144. b	145. c	146. d	147. d	148. a	149. b	150. d
151. d	152. a	153. d	154. b	155. a	156. a	157. c	158. a	159. a	160. c
161. d	162. d	163. c	164. a	165. a	166. a	167. a	168. d	169. b	170. c
171. d	172. d	173. d	174. c	175. b	176. a	177. b	178. b	179. a	180. b
181. a	182. c	183. b	184. d	185. c	186. d	187. a	188. a	189. d	190. c
191. a	192. c	193. b	194. a	195. c	196. d	197. b	198. d	199. c	200. a
201. c	202. d	203. c	204. b	205. d	206. b	207. d	208. b	209. a	210. c
211. d	212. d	213. a	214. b	215. a	216. d	217. a	218. c	219. d	220. b
221. a	222. c	223. c	224. d	225. c	226. c	227. a	228. a	229. a	230. d
231. c	232. d	233. b	234. d	235. a	236. b	237. a	238. c	239. a	240. c
241. d	242. d	243. a	244. c	245. b	246. d	247. a	248. a	249. c	250. b
251. c	252. d	253. d	254. b	255. b	256. b	257. a	258. a	259. b	260. d
261. a	262. c	263. b	264. b	265. a	266. c	267. a	268. d	269. d	270. b
271. a	272. d	273. b	274. b	275. a	276. b	277. c	278. d	279. c	280. c
281. b	282. a	283. b	284. a	285. a	286. b	287. d	288. a	289. c	290. b
291. d	292. b	293. b	294. c	295. d	296. a				

14 RESPIRATION IN PLANTS

1. Which of the following represents a correct ordering of the events that occur in the catabolism of glucose in the absence of O_2?
   (a) Glycolysis; TCA cycle; oxidative phosphorylation (b) Glycolysis; oxidative phosphorylation; TCA cycle
   (c) Oxidative phosphorylation; TCA cycle; glycolysis (d) Glycolysis; fermentation
2. Glycolytic pathway from glucose to pyruvic acid involves 10 reactions. Each individual reaction needs –
   (a) One molecule of ATP (b) One molecule of ADP
   (c) One molecule of NAD (d) One molecule of specific enzyme
3. Glycolysis occurs in the _____ and produces _____, which in the presence of O_2 enters the _____
   (a) Cytosol; pyruvate; mitochondrion (b) Cytosol; glucose; mitochondrion
   (c) Mitochondrion; pyruvate; chloroplast (d) Chloroplast; glucose; cytosol
4. Which metabolic pathway is a common pathway to both anaerobic and aerobic metabolism?
   (a) TCA cycle (b) ETS (c) EMP pathway (d) Kreb's cycle
5. ATP is –
   (a) An energy currency (b) a nucleotide
   (c) formed in both respiration and photosynthesis (d) All
6. The end product of glycolysis is –
   (a) pyruvate (b) The starting point for TCA cycle
   (c) The starting point for fermentation (d) All
7. 1st step (reaction) of glycolysis is –
   (a) Oxidative step (b) Reductive step (c) Endergonic (d) Exergonic
8. Glycolysis was discovered by –
   (a) Embden (b) Meyerhof (c) Parnas (d) All
9. Glycolysis –
   (a) Takes place in all living cells
   (b) Causes partial oxidation of glucose (one molecule) to form 2 molecules of pyruvic acid and 2 ATP as net gain
   (c) Uses 2 ATP at two steps
   (d) All
10. Respiration is –
    (a) Anabolic + Exergonic (b) Catabolic + Exergonic
    (c) Catabolic + Endergonic (d) Anabolic + Endergonic
11. Usable energy of respiration is –
    (a) used in charging biomolecules into activity (b) Stored as heat
    (c) Immediately consumed in cellular activities (d) Trapped in ATP molecules
12. Function of respiration is to –
    (a) make ATP (b) Make NADH (c) Get rid of glucose (d) Get rid of CO_2
13. In Respiration –
    (a) Dry wt decreases
    (b) C–C bonds of complex compounds break through oxidation in cells
    (c) Energy contained in the respiratory materials is released in a series of slow stepwise reactions controlled by enzymes
    (d) All
14. Which one performs both respiration and photosynthesis?

(a) Root cells (b) Mesophyll (c) Ovum of angiosperm (d) Xylem parenchyma

15. For gaseous exchange plants have –
(a) Stomata (b) Lenticels (c) Porin (d) a and b

16. The reasons why plants can get along without respiratory organs are –
(a) Almost all living cells in a plant have their surfaces exposed to air
(b) Plants have little demand for gas exchange
(c) Taking care of its own gas exchange need by every part, very little transport of gases from one part to another
(d) All

17. Why is a different enzyme involved in each step of glycolysis?
(a) Each step occurs in a different subcellular location
(b) Each step occurs in a different cell
(c) Each step involves a different change in potential energy
(d) Each step involves a different chemical reaction.

18. Nearly every living organism uses glucose as a nutrient source of energy. Why?
(a) Glucose is the only molecule capable of providing the energy to produce ATP
(b) The structure of glucose is very similar to ATP
(c) Glucose has more potential energy than any other respiratory substrate
(d) The ability to harvest energy from glucose appeared very early in biological evolution

19. Glycolysis is found in –
(a) Eukaryotic cells (b) Anaerobic cells (c) Virtually all cells (d) Most muscle cells

20. How many molecules of O_2 are used and how many CO_2 comes out during the glycolytic breakdown of one glucose molecule?
(a) 1; 2 (b) 2; 1 (c) 0; 0 (d) 36; 6

21. 3PGAld is oxidised during glycolysis. What happens to the hydrogen atoms and the e^- that are removed during oxidation?
(a) They reduce NAD^+
(b) They oxidise NAD^+
(c) They are transferred to $C_3H_4O_3$ (Pyruvic acid)
(d) They come out immediately in the form of H_2O

22. Which one is false for glycolysis?
(a) Substrate level phosphorylation occurs (b) The end products are CO_2 and H_2O
(c) ATP is formed (d) ATP is used

23. If glucose is labelled with ^{14}C, what molecule will become radioactive as glycolysis and TCA cycle are completed.
(a) Water (b) NADH (c) ATP (d) CO_2

24. Glycolysis occurs in _____; the TCA cycle occurs in _____; and ETC occurs in _____.
(a) Mitochondrial matrix, cytosol; mitochondrial inner membrane
(b) Cytosol; mitochondrial matrix; mitochondrial inner membrane
(c) Mitochondrial outer membrane; cytosol; mitochondrial inner membrane
(d) Cytosol; outer chamber of mitochondria; inner chamber of mitochondria

25. What will happen to glycolytic pathway if a cell runs completely out of ATP –
(a) Glycolysis will speed up
(b) Glycolysis will be slow down
(c) Glycolysis will stop as first and third steps need ATP input
(d) Glycolysis will increase as energy will be supplied by $NADH_2$

26. During glycolysis, for each mole of glucose oxidised to pyruvate –
(a) 6 moles of ATP are produced

(b) 2 moles of NAD^+ are produced
(c) 2 moles of ATP are used, and 4 moles of ATP are produced
(d) No ATP is produced

27. During glycolysis, the conversion of one mole of 3PGAld to $C_3H_4O_3$ yield 2 moles of ATP. But the oxidation of glucose to $C_3H_4O_3$ produces a total of 4 moles of ATP. Where do the remaining 2 moles of ATP come from?
(a) One mole of glucose gives 2 moles of 3PGAld (b) Glycolysis produces 2NADH
(c) Fermentation of $C_3H_4O_3$ produces 2ATP more (d) 2ATP are used in the conversion of glucose to 3PGAld

28. For glycolysis to continue, all cells require –
(a) O_2 (b) Mitochondria (c) ETS (d) NAD^+

29. The oxidation of pyruvic acid to CO_2 is called –
(a) Fermentation (b) TCA / Citric acid cycle
(c) Glycolysis (d) Oxidative phosphorylation

30. During the energy-priming portion of glycolysis, the phosphates from ATP molecules are –
(a) Added to first and 6th carbon (b) Added to 1st and 4th carbon
(c) Wasted, as an energy investment (d) Used to make lactate

31. In the absence of O_2 cells capable of fermentation –
(a) Accumulate glucose (b) No longer produce ATP
(c) Accumulate pyruvate (d) Oxidise NADH to produce NAD^+

32. For bacteria to continue growing rapidly when they are shifted from an environment containing O_2 to an anaerobic environment, they must –
(a) Produce more ATP per mole of glucose during glycolysis
(b) Produce ATP during oxidation of NADH
(c) Increase the rate of glycolysis
(d) Increase the rate of TCA cycle

33. In alcoholic fermentation, NAD^+ is produced during the –
(a) Reduction of acetyldehyde to ethanol (b) Oxidation of glucose
(c) Oxidation of pyruvate to acetyl CoA (d) Hydrolysis of ATP to ADP

34. The free energy released during oxidation of 3 PGAld to 1, 3 di PGA, is –
(a) Used to oxidise NADH (b) Lost as heat
(c) Used to form ATP (d) Used to reduce NAD^+

35. The results of first five reactions of the glycolytic pathway are –
(a) Adding phosphates, modifying sugars, and forming 3PGAld
(b) Removal of e^- and H^+ from glucose
(c) Oxidation of pyruvate and formation of acetyl CoA
(d) Oxidative step

36. Fermentation always produces –
(a) AMP (b) NAD^+ (c) Pi (d) DNA

37. Choose the correct combination between respiratory substrates and their respective RQs.

	Carbohydrate	Fat	Protein
(a)	2	1	1
(b)	0	1	1
(c)	1	0.7	0.9
(d)	0.5	0.5	0.5

38. Fermentation takes palce :
(a) Under anaerobic conditions in many prokaryotes and unicellular eukaryotes
(b) Under aerobic conditions in many prokaryotes and unicellular eukaryotes

(c) Under anaerobic conditions in all prokaryotes and unicellular eukaryotes
(d) Under aerobic conditions in all prokaryotes and unicellular eukaryotes

39. In order for glucose to be used as an energy source, it is necessary that –
(a) Glucose be formed from fructose (b) Glucose be degraded to CO_2
(c) 2 molecules of ATP be invested in the system (d) None

40. Many species derives their energy from fermentation. The function of fermentation is to –
(a) Reduce NAD^+
(b) Oxidise CO_2
(c) Oxidise $NADH + H^+$, ensuring a continued supply of ATP.
(d) Production of acetyl CoA

41. Which of the following cellular metabolic processes can occur in the presence or absence of O_2?
(a) Glycolysis (b) Fermentation
(c) TCA cycle (d) Electron transport coupled with chemiosmosis

42. The main purpose of cellular respiration is to –
(a) Convert potential to kinetic energy
(b) Convert kinetic to potential energy
(c) Create energy in the cell
(d) Convert energy stored in the chemical bonds of glucose to an energy that the cell can use.

43. If O_2 is not present, yeast cells break down glucose to –
(a) $CO_2 + H_2O$ (b) CO_2 + Lactic acid (c) CO_2 + Pyruvic acid (d) C_2H_5OH and CO_2

44. NAD^+ is –
(a) a protein (b) an oxidising agent
(c) a reducing agent (d) formed under only aerobic conditions

45. In terms of efficiency at converting the energy of glucose in ATP –
(a) aerobic glycolysis is better than TCA cycle (b) eukaryotic cells are more efficient than prokaryotic cells
(c) Electron transport chain is not necessary for high efficiency
(d) Anaerobic conditions are much less efficient than aerobic

46. Which of the following statements about cellular energy-harvesting pathway is false?
(a) Autotrophs can produce their own food but must obtain energy from it by glycolysis and cellular respiration
(b) Fermentation usually occurs under anaerobic conditions
(c) Pyruvate oxidation can only occur under aerobic conditions
(d) None

47. Which of the following statements regarding metabolic pathways is false?
(a) Many of the steps of glycolysis can run in reverse
(b) Starch, sucrose or glycogen must be hydrolysed before it can enter the glycolysis
(c) After fats are digested glycerol enters glycolysis by forming DHAP
(d) After fats digestion, fatty acids can no longer participate in cellular respiration

48.

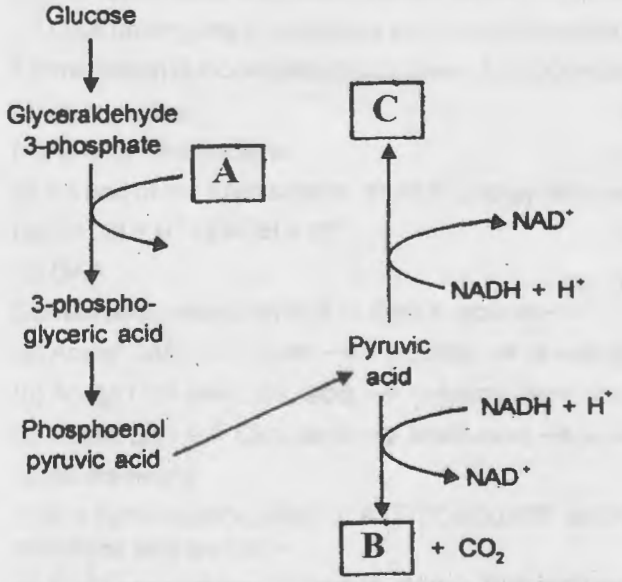


Figure – Major pathway of Anaerobic respiration

Identify A, B and C –

	A	B	C
(a)	NAD^+	Ethanol	Lactic acid
(b)	Ethanol	NAD^+	Lactic acid
(c)	Lactic acid	Ethanol	NAD
(d)	NAD	Lactic acid	Ethanol

49. In animal cells, like muscle, during exercise, when O_2 is inadequate for cellular respiration, pyruvic acids is reduced into lactic acid by –
(a) O_2 (b) Carboxylation (c) lactate dehydrogenase (d) All

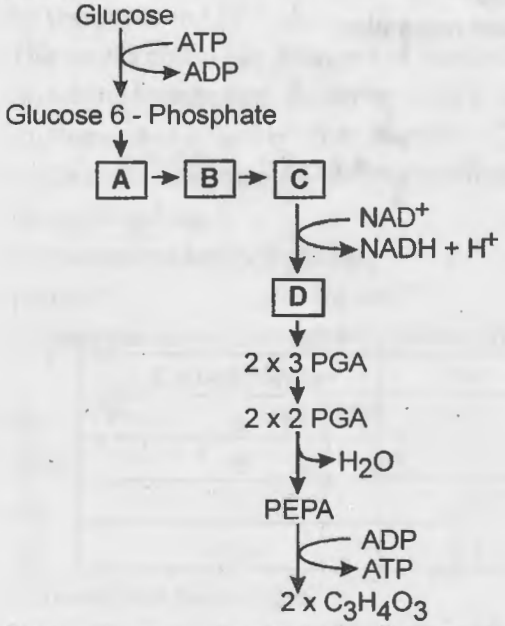
50. Pyruvate $\longrightarrow$ $C_2H_5OH + CO_2$
The above reaction needs 2 enzymes named as –
(a) Pyruvate decarboxylase and alcohol dehydrogenase
(b) Pyruvate decarboxylase and enolase
(c) Pyruvate decarboxylase and pyruvate kinase
(d) Pyruvate carboxylase + Aldolase

51. Which one is true?
(a) In absence of O_2, fermentation regenerates the NAD^+ needed for glycolysis
(b) Fermentation does not liberate all the energy available in each sugar molecule
(c) When alcohol conc. reaches 13%, the yeast cells become poisoned and die
(d) All

52. Which one is false?
(a) Less than 7% of energy in glucose is released during lactic or alcoholic fermentation
(b) Fermentation is observed in all cells
(c) O_2 is an essential requirement for aerobic respiration but it enters the respiratory process at the end
(d) In aerobic respiration glucose is broken down into $CO_2 + H_2O$

53. Where is ATP synthesized in glycolysis?
(a) When 1, 3 di PGA is changed into 3 PGA
(b) When PEPA is changed into pyruvic acid
(c) When Fr. 1, 6 di P is broken in Triose phosphate (2 molecules)
(d) Both a and b

54.



Choose the correct names of A, B, C and D.

	A	B	C	D
(a)	1, 3 di PGA	3 PGAld	Fr.1, 6 di P	Fr. 6 P
(b)	3 PGAld	1, 3 di PGA	Fr. 1, 6 di P	Fr. 6 P
(c)	Fr. 1, 6 di P	Fr. 6 P	3 PGAld	1, 3 di PGA
(d)	Fr. 6 P	Fr. 1, 6 di P	3 PGAld	1, 3 di PGA

55. A the end of glycolysis X is the net energy gain from one molecule of glucose via Y, but there is also energy stored in the form of Z.

	X	Y	Z
(a)	1 ATP	Oxidative phosphorylation	$NADH + H^+$
(b)	2 ATPs	Oxidative phosphorylation	$NADH + H^+$
(c)	2 ATPs	Substrate level phosphorylation	$NADPH + H^+$
(d)	2ATPs	Substrate level phosphorylation	$NADH + H^+$

56. In Kreb's cycle, the first product is citric acid which is a 6-carbon compound. It is formed by a condensing irreversible reaction between –
(a) OAA and Pyruvic acid
(b) OAA and Acetyl Coenzyme A
(c) Pyruvic acid and Acetyl Coenzyme A
(d) OAA and Citrate synthetase

57. Conversion of a-ketoglutaric acid into succinic acid is a step of –
(a) EMP pathway (b) TCA cycle (c) HMP pathway (d) ED pathway

58. In Kreb's cycle, how many oxidation (dehydrogenation) occur?
(a) 4 (b) 6 (c) 2 (d) 1

59. Kreb's cycle was discovered by Krebs in pigeon muscles in 1940. Which step is called Gateway step / Link reaction in aerobic respiration?
(a) Glycolysis
(b) Formation of acetyl Coenzyme A
(c) Citric acid formation
(d) ETS terminal oxidation

60. In Kreb's cycle –
(a) Acetyl coenzyme A undergoes 4 oxidations and 2 decarboxylations
(b) Pyruvic acid undergoes 4 oxidations and 2 decarboxylations
(c) TCA undergoes 4 oxidations and 4 decarboxylations
(d) OAA undergoes 4 oxidations and 2 decarboxylations.

61. Fermentation is incomplete breakdown of carbohydrates. It is performed by –
(a) All microbes
(b) Some fungi and some bacteria
(c) All fungi and bacteria
(d) Only yeast

62. At the end of the Kreb's cycle, most of energy removed from glucose molecule is transferred to –
(a) $NADH + H^+ / FADH + H^+$
(b) ATP
(c) OAA
(d) Citric acid

63. Correct sequence of events in Kreb's cycle is –
(a) Acetyl CoA → Citrate → Pyruvate → α-ketoglutarate → Succinate → Malate → Fumarate → OAA
(b) Acetyl CoA → Citric acid → α-ketoglutaric acid → Succinic acid → Fumaric acid → Malic acid → OAA
(c) Acetyl CoA → Citric acid → Malic acid → α-ketoglutaric acid → Succinic acid → OAA
(d) All are wrong

64. Kreb's cycle is also called TCA (Tri Carboxylic acid Cycle) or citric acid cycle (Organic acid cycle). It is also called metabolic sink as it is –
(a) Common pathway for carbohydrates, fats and proteins (amino acids)
(b) Common pathway for carbohydrates and fats only

(c) Common pathway for carbohydrates and organic acids only
(d) None of the above

65. Which is not found inside the mitochondrion?
(a) Citric acid (b) PEP or PEPA (c) Malic acid (d) Ketoglutaric acid

66. The first 5-C dicarboxylic acid in Kreb's cycle which is used in nitrogen metabolism is –
(a) OAA (b) Citric acid (c) α-ketoglutaric acid (d) Acetyl Coenzyme A

67. In Kreb's cycle, the H^+ removed at succinate level is accepted by –
(a) FAD^+ (b) NAD^+ (c) ADP (d) FMN^+

68. Krebs' cycle is completed with the formation of –
(a) Citric acid (b) OAA (c) Succinic acid (d) Malic acid

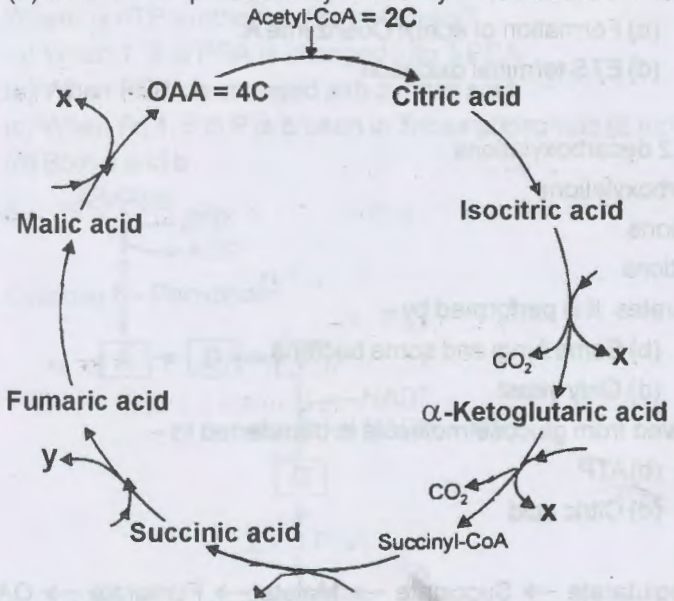
69. Inside an active mitochondrion, most electrons follow which pathway?
(a) Glycolysis → NADH → Oxidative Phosphorylation → ATP → O_2
(b) Krebs' cycle → $FADH_2$ → ETS → ATP
(c) ETS → Krebs' cycle → ATP → O_2
(d) Krebs' cycle → NADH + H^+ → Electron transport chain → O_2

70. Most of the CO_2 is released during –
(a) Glycolysis (b) The Kreb's Cycle (c) Lactate fermentation (d) Oxidative phosphorylation

71. In aerobic cellular respiration, which generates more ATP –
(a) Substrate level phosphorylation (b) Chemiosmosis
(c) Both generate the same amount of ATP (d) Neither generates ATP

72. Which one of the following statements correctly describes relationship between the Kreb's cycle and electron transport pathway?
(a) The Kreb's cycle releases H^+ used by electron transport
(b) The electron transport pathway obtains electron from the CO_2 produced by the Kreb's cycle
(c) The Kreb's cycle and electron transport pathway, both produce ATP
(d) NADH + H^+ produced by Krebs' cycle is used to make ATP by electron transport

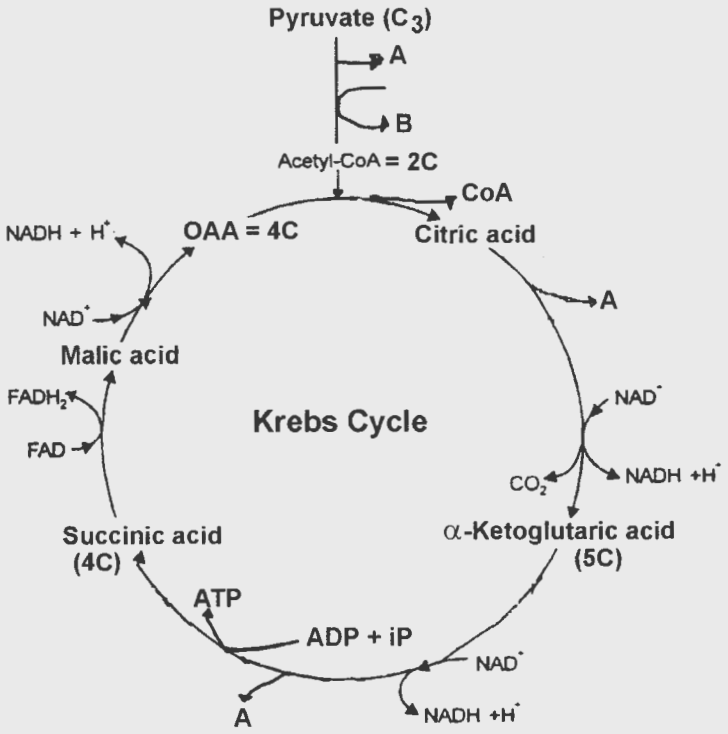
73.



Identify X; Y; and Z.

	X	Y	Z
(a)	GTP	$NADH_2$	CO_2
(b)	$FADH_2$	$NADH_2$	GTP
(c)	$NADH_2$	$FADH_2$	GTP
(d)	CO_2	$NADH_2$	ADP

74.



Identify by 'A' and 'B'

	A	B
(a)	$NADH + H^+$	CO_2
(b)	FAD^+	$FADH + H^+$
(c)	CO_2	$NADH + H^+$
(d)	CO_2	$FADH + H^+$

75. At the end of the Kreb's cycle, but before the electron transport chain, the oxidation of glucose has produced a net gain of –

(a) $3CO_2$, 5 $NADH_2$, 1 $FADH_2$, 2 ATP (b) $6CO_2$, 10 $NADH_2$, 2 $FADH_2$, 4 ATP

(c) $6CO_2$, 10 $NADH_2$, 2 $FADH_2$, 38 ATP (d) None of the above is correct

76. If oxygen is labelled with ^{18}O, which molecule will become radioactive as glycolysis, Kreb's cycle and oxidative phosphorylation are completed –

(a) Water (b) CO_2 (c) ATP (d) $NADH_2$

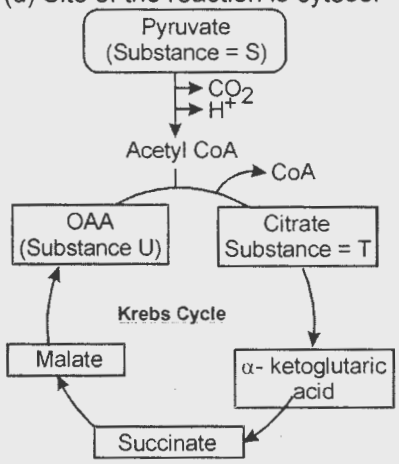
77. All of these events occur in the conversion of pyruvic acid into Acetyl CoA except –

(a) Production of CO_2 (b) Conversion of 3-carbon molecule into a 2C molecule

(c) Pyruvate dehydrogenase enzyme complex, several factors like Mg^{+2}, NAD^+ and CoA are needed

(d) Site of the reaction is cytosol

78.



How many carbon atoms are in S, T and U –

	S	T	U
(a)	3	6	4
(b)	4	6	3
(c)	6	3	4
(d)	6	3	3

79. If 2 acetyl CoA molecules are fed into the Kreb's cycle, how many ATP molecules are synthesised directly in the cycle?
(a) 2 (b) 4 (c) 36 (d) 38

80. Which one is correct?
(a) Kreb's cycle and chemiosmosis are inhibited in anaerobic conditions
(b) Both glucose and fructose readily enter the glycolytic pathway
(c) Glucose and fructose are phosphorylated by Hexokinase
(d) All

81. All of the following processes can release CO_2 except –
(a) Alcohol fermentation
(b) Oxidative decarboxylation and Kreb's cycle
(c) Oxidative phosphorylation
(d) α-Ketoglutaric acid $\longrightarrow$ succinic acid

82. Which of the following sequences correctly indicates the potential ATP yield of the indicated molecules from greatest ATP yield to least ATP yield?
(a) Pyruvate, ethanol, glucose, acetyl CoA
(b) Glucose, Pyruvate, acetyl CoA, NADH + H^+
(c) Glucose, $FADH_2$, Acetyl CoA, pyruvate
(d) Glucose, $FADH_2$, $NADH_2$, pyruvate

83. The first reaction of Kreb's cycle i.e. condensation of acetyl group with OAA and water is catalysed by –
(a) Citrate synthetase
(b) Succinate dehydrogenase
(c) RuBisCo
(d) PEPCase

84. Which of the following steps is associated with ATP formation (substrate level phosphorylation)?
(a) Succinyl CoA $\longrightarrow$ Succinic acid
(b) 1, 3 diPGA $\longrightarrow$ 3 PGA
(c) PEP $\longrightarrow$ Pyruvate
(d) All

85. I. $C_6H_{12}O_6 + NAD^+ + 2ADP + 2\ iP \longrightarrow 2C_3H_4O_3 + 2ATP + 2NADH + 2H^+$
II. Pyruvic acid + $4NAD^+ + FAD^+ + 2H_2O + ADP + Pi \longrightarrow 3CO_2 + 4NADH + 4H^+ + ATP + FADH_2$
III. Pyruvate $\xrightarrow[NAD^+]{NADH + H^+}$ $C_2H_5OH + CO_2$

Categorise the summary equations under respective phases –

	I	II	III
(a)	Glycolysis	Fermentation	Krebs' cycle
(b)	Krebs' cycle	Fermentation	Glycolysis
(c)	Krebs' cycle	Glycolysis	Fermentation
(d)	Glycolysis	Krebs' cycle	Fermentation

86. Which one is correct?
(a) During the fermentation, 2 molecules of ATP per molecule of glucose is the net gain
(b) Oxidative phosphorylation produces the most ATP in the cell
(c) During TCA cycle oxidative steps are coupled to the reductions of e^- carriers
(d) All

87. In yeast cell, if TCA cycle is shut down due to lack of O_2, glycolysis will probably –
(a) Shut down (b) Increase
(c) Produce more ATP / glucose molecule (d) Produce more $NADH_2$ / glucose molecule

88. O_2 is used by –
(a) Citric acid cycle (b) Electron transport chain
(c) Substrate level phosphorylation (d) ATP synthase

89. Water is the by-product of cellular respiration. The water is produced as a result of –
(a) Conversion of pyruvate to acetyl CoA
(b) Conversion of glucose to pyruvate
(c) Combining carbon dioxide with protons
(d) The reduction of oxygen at the end of electron transport chain

90. The chemiosmotic generation of ATP is driven by –
(a) Osmotic movement from low OP to high OP
(b) Oxidative phosphorylation
(c) A difference in H^+ concentration on both side of membrane
(d) None

91. Most ATP in our bodies is made by –
(a) Glycolysis (b) TCA cycle (c) Burning fat (d) ATP synthase

92. The main purpose of electron transport chain is to –
(a) Cycle NADH + H^+ back to NAD^+ (b) Use the intermediates from TCA cycle
(c) breakdown pyruvate (d) All

93. Terminal e^- acceptor of e^- transport is –
(a) CO_2 (b) $C_6H_{12}O_6$ (c) H_2O (d) O_2

94. Which statement concerning ATP synthesis is true?
(a) ATP can be synthesised through substrate level phosphorylation, photophosphorylation and oxidative phosphorylation
(b) The proton-motive force is the establishment of proton gradients and electrochemical potentials across the inner membrane
(c) Proton-motice force is essential for back flow of H^+ from outer chamber of matrix of mitochondria through proton channel (F_0) of F_0-F_1 particle to produce ATP
(d) All

95. Choose the false statement –
(a) Respiratory chain uses O_2 as final hydrogen acceptor
(b) All living cells perform glycolysis
(c) Glycolysis can operate in presence or absence of O_2
(d) CN^- cannot stop chemiosmosis

96. Go through the following statements about the chemiosmotic mechanism –
I. Protons are pumped across the membrane
II. Protons return through the membrane by way of a channel protein.
III. ATP is required for protons to return.
IV. The membrane in question is the inner mitochondrial membrane.
V. Proton pumping is associated with the respiratory chain
(a) V is incorrect (b) III is incorrect (c) All are incorrect except III (d) Only III is correct

97. Which of the following is not true of oxidative phosphorylation?
(a) It uses oxygen as the initial e^- donor
(b) It involves the redox reactions of electron transport chain
(c) It involves an ATP synthase located in the inner mitochondrial membrane
(d) It depends on chemiosmosis

98. The e^- carrier molecules and cytochrome –
(a) Are reduced as they pass electrons on to the next molecule
(b) Transfer electrons between the electron carrier complexes
(c) Shuttle protons to ATP synthase
(d) Are found in outer mitochondrial membrane

99. Choose the false option –
(a) Flow of electrons in ETS is $Fe^{+3} \longrightarrow Fe^{+2} \longrightarrow Fe^{+3}$
(b) In ETS electrons move from high negative to high positive redox potential
(c) Cyt a_3 has Fe and Cu
(d) Cytochrome are non-proteinaceous but ubiquinone is proteinaceous

100. The oxidation of a molecule of $FADH_2$ yield less ATP (2ATP) and a molecule of $NADH_2$ yields 3ATP but $FADH_2$ yields only 2 ATP because
(a) Carries few electrons
(b) Passes its electrons to a transport molecule later in the chain and at a lower level
(c) Has a lower energy conformation than $NADH_2$
(d) Is formed in the cytosol and energy is lost when it shuttles its electron across the mitochondrial membrane

101. Which of the following conversions represents a reduction reaction?
(a) Pyruvate ⟶ Acetyl CoA (b) $NADH + H^+ \longrightarrow NAD^+ + 2H$
(c) 3 PGAld ⟶ Pyruvate (d) Acetaldehyde ⟶ Ethanol

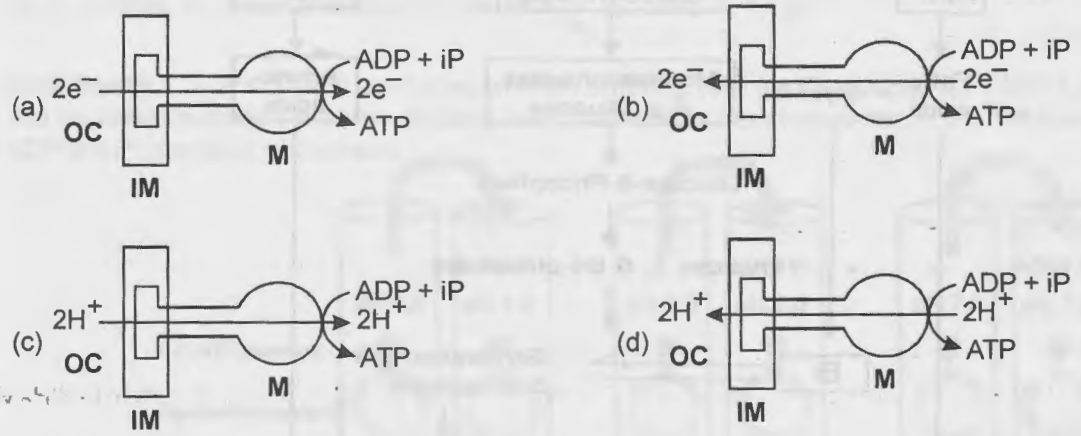
102. I. Proton channel of oxysome / complex V / ATP synthase is located in F_0
II. Metabolic water is water produced in terminal oxidation / produced in respiration
III. CoQ accepts electron from NADH dehydrogenase (complex I) and also can accept electron from $FADH_2$ / succinate Q-reductase / complex II
IV. Cytochrome c is a small protein attached to outer surface of the inner mitochondrial membrane and acts as a mobile carrier for transfer of electrons between complex III (Cyt bc, complex) and IV
V. Complex IV refers to cytochrome c oxidase (cyta a, a_3 and 2 Cu per centre)
VI. If a cell is treated with a drug that inhibits ATP synthase, the pH of mitochondrial matrix will increase
(a) All are correct (b) All are incorrect (c) I and V are correct (d) Only III is correct

103. Which statement about oxidative phosphorylation is not true?
(a) The inner mitochondrial membrane has 5 distinct respiratory or enzyme complexes
(b) CoQ links complex I and II, and cyt c links complex III with complex IV
(c) FAD, FMN, FeS clusters and copper are other cofactors that participitate in electron transfer
(d) 38 ATPs are formed when one pair of protons return to matrix via F_0 of ATP synthase

104. The initial step in the biosynthesis of ATP by chemiosmosis in the mitochondrion is the –
(a) Pumping of protons in the outer chamber (b) Pumping of electrons in the matrix
(c) Action of ATP synthase (d) Formation of metabolic water

105. Which of the following shows correct order of electrons in mitochondria?
(a) FeS ⟶ NADH ⟶ CoQ ⟶ Cyt b ⟶ FeS ⟶ Cyt c_1 ⟶ Cyt c ⟶ Cyt a_3 ⟶ O_2 ⟶ Cyt b
(b) NADH ⟶ FMN ⟶ FeS ⟶ CoQ ⟶ Cyt b ⟶ FeS ⟶ Cyt c_1 ⟶ Cyt c ⟶ Cyt a ⟶ Cyt a_3 ⟶ O_2
(c) NADH ⟶ Cyt c_1 ⟶ Cyt c ⟶ Cyt a ⟶ Cyt a_3 ⟶ O_2 ⟶ FMN ⟶ FeS ⟶ CoQ ⟶ Cyt b ⟶ FeS
(d) Cyt c_1 ⟶ Cyt c ⟶ Cyt a ⟶ Cyt a_3 ⟶ NADH ⟶ FMN ⟶ FeS ⟶ CoQ ⟶ Cyt b ⟶ FeS ⟶ O_2

106. Which of the following diagram represents of ATP synthesis in mitochondria through chemiosmosis –
I.M = Inner membrane
M = Matrix
O.C = Outer Chamber



107. Net gain of ATP molecules during aerobic respiration of one molecule of glucose is –

(a) 36 (b) 40 (c) 39 (d) 8

108. Select the wrong option.

I. Fermentation is partial breakdown of glucose but aerobic respiration is the complete break down of glucose in CO_2 + H_2O

II. $NADH + H^+ \xrightarrow[\text{Fermentation}]{\text{Very slow}} NAD^+$

III. $NADH + H^+ \xrightarrow[\text{Aerobic respiration}]{\text{Very fast}} NAD^+$

IV. In respiratory pathway glycerol changes into DHAP

(a) None (b) All (c) I (d) III and IV

109. Out of 3 respiratory substrate (carbohydrates, fat and protein), which one is the most favoured substrate –

(a) Glucose (b) Protein / amino acid (c) Fat / fatty acid (d) All

110. Respiratory pathway is –

(a) Catabolic (b) Amphibolic

(c) Anabolic (d) Non enzymatically controlled process

111. Which of the following is amphibolic –

(a) Glycolysis (b) Oxidative decarboxylation of pyruvate

(c) TCA cycle (d) Oxidative phosphorylation

112. Kreb's Cycle is considered as amphibolic because of facts as follows –

(a) The intermediates of the cycle are used as precursors in the biosynthesis of many compounds

(b) It is sole process to produce ATP

(c) It is the oxidation of acetyl CoA in CO_2 and H_2O

(d) a and c

113. Choose the correct option –

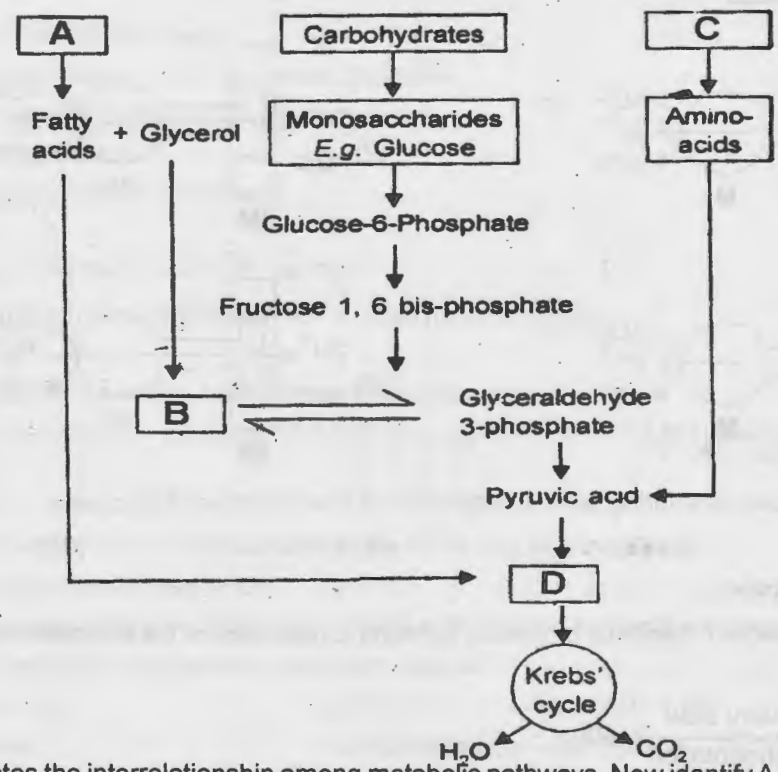
(a) $RQ = \dfrac{\text{Volume of } CO_2 \text{ evolved}}{\text{Volume of } O_2 \text{ consumed}}$

(b) RQ depends on the types of respiratory material

(c) Living organisms use respiratory substances (often more than one); pure lipid or fats are never used

(d) All

114.



The above figure indicates the interrelationship among metabolic pathways. Now identify A to D.

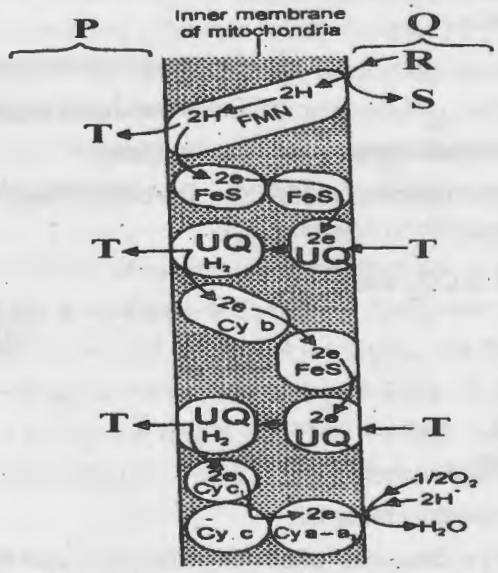
	A	B	C	D
(a)	Protein	Acetyl CoA	Fat	DHAP
(b)	Fat	DHAP	Protein	Acetyl CoA
(c)	Acetyl CoA	Fat	DHAP	Protein
(d)	Fat	DHAP	Acetyl CoA	Protein

115. $2(C_{51}H_{98}O_6) + 145O_2 \longrightarrow 102CO_2 + 98H_2O$ + Energy

The RQ of above reaction is –

(a) 1 (b) 0.7 (c) 1.45 (d) 1.62

116. The adjoining diagram refers to mitochodnrial electron transport chain. Identify the P, Q, R, S, T



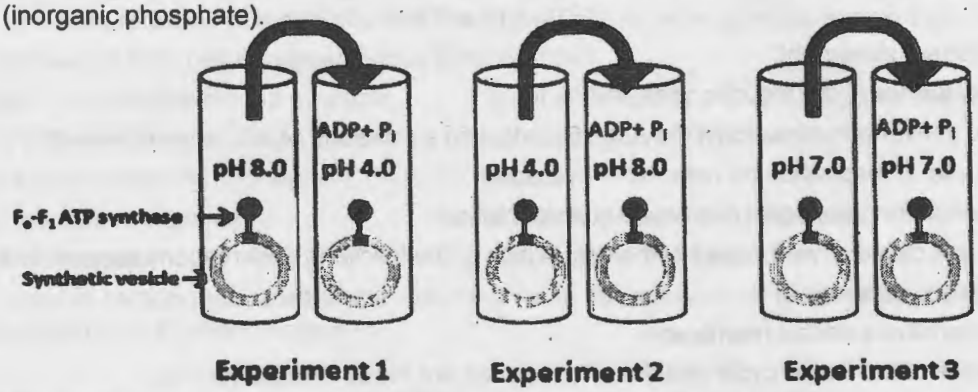
(a) P - Matrix; Q - Outer membrane; R - $FMNH_2$; S - $NADH_2$; T - 2H

(b) P - Outer chamber; Q - Matrix; R - NADH + H^+; S - NAD^+; T - $2H^+$

(c) P - Outer membrane; Q - Cristae; R - NAD^+; S - $NADH + H^+$; T - H_2

(d) P - Cristae; Q - Outer chamber; R - $NADH + H^+$; S - NAD^+ ; T - $2H^+$

117. Experiments 1, 2, and 3 were conducted wherein synthetic vesicles containing F_0-F_1 ATP synthase were prepared and incubated overnight in a tube. Subsequently, the vesicles were transferred to another tube which also contained ADP and Pi (inorganic phosphate).



Experiment 1 **Experiment 2** **Experiment 3**

A. A proton gradient across the vesicular membrane will be present in both experiments 1 and 2 at the time of transfer.

B. As a consequence of the proton gradient, ATP will be synthesised in both experiments 1 and 2.

C. ATP will be synthesised in experiment 3 because Fo-F1 ATP synthase has the inherent property to catalyse the synthesis of ATP from ADP and Pi.

D. ATP will be synthesised in experiment 2 because the proton has to flow out of the vesicles through the F_0-F_1 ATP synthase for ATP synthesis.

(a) A and B (b) B and C (c) C and D (d) A and D

118. Six tubes containing preparations from animal tissue were set up as shown in the table.

Tube contents

1. glucose + homogenised cells
2. glucose + mitochondria
3. glucose + cytoplasm lacking organelles
4. pyruvic acid + homogenised cells
5. pyruvic acid + mitochondria
6. pyruvic acid + cytoplasm lacking organelles

After incubation, in which three tubes would carbon dioxide be produced?

(a) 1, 2 and 3 (b) 1, 4 and 5 (c) 3, 4 and 6 (d) 3, 5 and 6

119. In mitochondria, protons accumulate in the :

(a) Outer membrane (b) Inner membrane (c) Intermembrane space (d) Matrix

120. Anaerobic respiration produces ___*i*___ amount of energy as compared to aerobic respiration because ___*ii*___ produced during anaerobic respiration is not broken down completely into CO_2 and H_2O.

(a) i-lesser; ii-lactic acid (b) i-lesser; ii-citric acid (c) i-larger; ii-lactic acid (d) i-larger; ii-citric acid

121. Glycolysis term has originated from Greek words.

(a) glycose and lysis (b) glycos and lysis (c) glyco and lysis (d) glucose and lysis

122. The ultimate electron acceptor of respiration in an aerobic organism is:

(a) Cytochrome (b) Oxygen (c) Hydrogen (d) Glucose

123. Phosphorylation of glucose during glycolysis is catalysed by

(a) Phosphoglucomutase (b) Phosphoglucoisomerase

(c) Hexokinase (d) Phosphorylase

124. Pyruvic acid, the key product of glycolysis can have many metabolic fates. Under aerobic condition it forms

(a) Lactic acid (b) $CO_2 + H_2O$ (c) Acetyl CoA + CO_2 (d) Ethanol + CO_2

125. The chemical substances involved in respiration enters the mitochondrion from cytoplasm are
(a) $C_3H_4O_3$, O_2, reduced NAD, ADP & Phosphate (b) $C_6H_{12}O_6$, O_2, reduced NAD, ADP & Phosphate
(c) CO_2, NAD, ATP & water (d) Acetyl CoA, $NADH_2$, ADP & Phosphate

126. Which of the following exhibits the highest rate of respiration?
(a) Growing shoot apex (b) Germinating seed
(c) Root tip (d) Leaf bud

127. Choose the correct statement:
(a) Pyruvate is formed in the mitochondrial matrix.
(b) During the conversion of succinyl Co-A to succinic acid a molecule of ATP is synthesized.
(c) Oxygen is vital in respiration for removal of hydrogen.
(d) There is complete breakdown of glucose in fermentation.

128. Mitochondria are called powerhouses of the cell. Which of the following observations support this statement?
(a) Mitochondria synthesise ATP
(b) Mitochondria have a double membrane
(c) The enzymes of the Krebs cycle and the cytochromes are found in mitochondria.
(d) Mitochondria are found in almost all plants and animal cells.

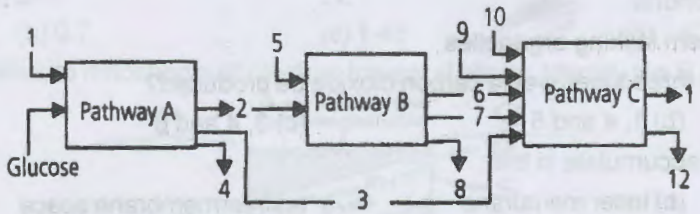
129. The end product of oxidative phosphorylation is
(a) NADH (b) Oxygen (c) ADP (d) ATP + H_2O

130. Match the following and choose the correct option from those given below.

Column A	Column B
A. Molecular oxygen	(i) α - Ketoglutaric acid
B. Electron acceptor	(ii) hydrogen acceptor
C. Pyruvate dehydrogenase	(iii) cytochrome C
D. Decarboxylation	(iv) acetyl CoA

Options
(a) A-ii, B-iii, C-iv, D-i (b) A-iii, B-iv, C-ii, D-i (c) A-ii, B-i, C-iii, D-iv (d) A-iv, B-iii, C-i, D-ii

131. The three boxes in this diagram represent the three major biosynthetic pathways in aerobic respiration. Arrows represent net reactants or products.



Arrows numbered 4, 8 and 12 can all be :
(a) NADH (b) ATP (c) H_2O (d) FAD+ or $FADH_2$

132. Which of the metabolites is common to respiration mediated breakdown of fats, carbohydrates and proteins?
(a) Glucose - 6 - phosphate (b) Fructose 1, 6 - bisphosphate
(c) Pyruvic acid (d) Acetyl CoA

133. Substrate-level phosphorylation accounts for approximately what percentage of the ATP formed by the reactions of glycolysis?
(a) 0% (b) 2% (c) 10% (d) 100%

134. What is the purpose in having several steps in glycolysis or the Kreb's cycle rather than a single step from glucose and oxygen to carbon dioxide and water?
(a) The multistep approach increases the amount of heat produced in the reaction.
(b) The multistep approach increases the amount of potential energy in the reaction.

(c) The multistep approach is the only way to convert glucose to carbon dioxide.

(d) The multistep approach makes better use of the potential energy in the reaction.

135. Why does NADH donate electrons to the beginning of the electron transport chain, whereas $FADH_2$ donates electrons to the middle of the chain?

(a) $FADH_2$ is more rapidly oxidized than NADH. (b) NADH has more electrons to donate than $FADH_2$.

(c) $FADH_2$ has more reducing potential than NADH. (d) NADH has more potential energy than $FADH_2$.

136. When do cells switch from cellular respiration to fermentation?

(a) when electron acceptors are not available (b) when NADH and FADH2 supplies are low

(c) when the proton-motive force runs down (d) when pyruvate is not available

137. In which one of the following processes CO_2 in not released ?

(a) Aerobic respiration in plants (b) Aerobic respiration in animals

(c) Alcoholic fermentation (d) Lactate fermentation

138. Match the organic compounds listed under Column - I with the explanation given under Column - II. Choose the appropriate option from th given choices.

Column - I	Column - II
A. phosphoenol pyruvate (PEP)	p. 6-carbon compound
B. Ribulose biphosphate (RuBP)	q. 2-carbon compound
C. Oxaloacetic acid (OAA)	r. 4-carbon compound
D. Acetyl co-enzyme-A	s. 5-carbon compound
	t. 3-carbon compound

(a) A - t, B - s, C - r, D - q (b) A - t, B - s, C - r, D - p

(c) A - t, B - p, C - q, D - r (d) A - q, B - r, C - s, D - t

139. How many ATP are produced when one molecule of $FADH_2$ is oxidized to FAD through Electron Transport System?

(a) 2 (b) 3 (c) 1 (d) 4

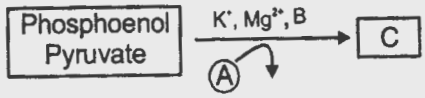
140. Out of 38 molecules of ATP produced upon aerobic respiration of glucose, the break up in ATP production in glycolysis (P), pyruvate to acetyl-CoA formation (Q) and Krebs cycle (R) is as follows:

(a) P = 2, Q = 6, R = 30 (b) P = 8, Q = 6, R = 24 (c) P = 8, Q = 10, R = 20 (d) P = 2, Q = 12, R = 24

141. Inner membrane of mitochondria is permeable to

(a) glucose (b) fructose (c) sucrose (d) ATP

142. Given below is the equation of glycolytic pathway. identify A, B and C.



(a) A - ADP; B - Pyruvate kinase; C - Pyruvic acid

(b) A - ATP; B - Enolase; C - PGA; C - PGA

(c) A - ATP; B - PGAL dehydrogenase; C - PGAL

(d) A - ADP; B - Pyruvate dikinase; C - PGA

143. How many ATP are produced by the complete oxidation of two molecules of isocitrate by ETS only?

(a) 24 (b) 11 (c) 30 (d) 22

144. In which one of the following reactions of glycolysis, oxidation takes place?

(a) Glucose 6-phosphate to fructose 6-phosphate

(b) Fructose 6-phosphate to fructose 1, 6-biphosphate

(c) 1, 3-biphosphoglycerate to 3-phosphoglyceric acid

(d) 3-phosphoglyceraldehyde to 1, 3-biphosphoglycerate

145. Why is aerobic respiration of a molecule of glucose considered more efficient than anaerobic respiration?

(a) More ATP is produced (b) More carbon dioxide is produced

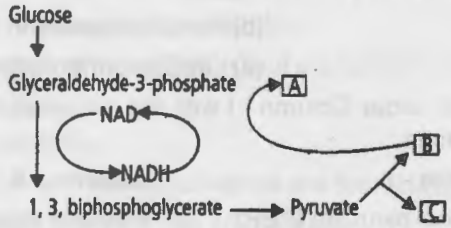
(c) More water is produced (d) More oxygen is used

146. Which is the first compound, which is common for both glucose and fructose in glycolysis?
(a) Fructose-6-phosphate (b) Glucose-6-phosphate
(c) Fructose-1, 6-biphosphate (d) Fructose-1-phosphate

147. Which molecule links glycolysis with fermentation as well as TCA cycle?
(a) Ethanol (b) Acetaldehyde (c) PEP (d) Pyruvic acid

148. How much of the energy released during aerobic respiration is approximately conserved in the form of ATP?
(a) 20% (b) 40% (c) 60% (d) 100%

149. Choose the correct combination of labelling the molecules involved in the pathway of anaerobic respiration in Yeast.



(a) A - Acetaldehyde, B - CO_2, C - Ethanol (b) A - Ethanol, B - CO_2, C - Acetaldehyde
(c) A - Ethanol, B - Acetaldehyde, C - CO_2 (d) A - CO_2, B - Ethanol, C - Acetaldehyde

150. ATP synthesis in cell requires
(a) H^+ gradient across the membrane (b) K^+ gradient across the membrane
(c) PO_4^{3-} gradient across the membrane (d) Ca^{2+} gradient across the membrane

151. Which one of the following is the only 5-carbon compound formed during Krebs' cycle?
(a) Malic acid (b) Succinic acid (c) Cis-aconitic acid (d) α-ketoglutaric acid

152. When protein is aerobically oxidised the RQ (Respiration Quotient) value will be
(a) one (b) zero (c) more than one (d) less than one

153. Cytochromes are found in
(a) Cristae of mitochondria (b) Lysosomes
(c) Matrix of mitochondria (d) Outer wall of mitochondria

154. Green plants kept in light produce ATP from glucose. The process is
(a) Photophosphorylation (b) Glycolysis (c) TCA cycle (d) Oxidative phosphorylation

155. The reaction forming 3-phosphoglyceric acid in glycolysis is
(a) Cleavage (b) Oxidative phosphorylation
(c) Dephosphorylation (d) Oxidative decarboxylation

156. During passage of electron over ETC.
(a) Electron undergoes resonance (b) Electron undergoes fluorescence
(c) Electron undergoes active transport (d) pH of matrix increases.

157. There is no direct transfer of electron from cyt b to cyt c as
(a) Energy is not available (b) The two are not nearby
(c) Electrons are transported in pairs (d) Electrons have no affinity for cytochromes.

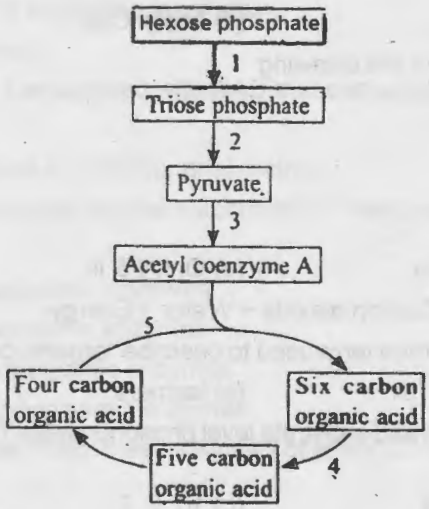
158. Number of oxygen atoms required for complete oxidation of pyruvic acid is
(a) 6. (b) 12 (c) 3 (d) 0

159. Which of the following biomolecules is common to respiration-mediated breakdown of fats, carbohydrates and proteins ?
(a) Pyruvic acid (b) Acetyl CoA (c) Glucose-6-phosphate (d) Fructose 1,6-bisphosphate

160. Oxidative phosphorylation is :-
(a) Addition of phosphate group to ATP.
(b) Formation of ATP by energy released from electrons removed during substrate oxidation.
(c) Formation of ATP by transfer of phosphate group from a substrate to ADP
(d) Oxidation of phosphate group in ATP

161. Which of the following metabolites enter the TCA cycle during glucose oxidation ?
(a) Oxaloacetic acid (b) Pyruvic acid (c) Acetyl CoA (d) Malic acid

162. Given flow chart shows some of the stages in respiration.



During which of the following stages does oxidative decarboxylation occur?
(a) 1 and 3 (b) 2 and 3 (c) 3 and 4 (d) 4 and 5

163. Electrons from NADH produced in the mitochondrial matrix during citric acid cycle are oxidised by :–
(a) Complex II (b) Complex III (c) Complex I (d) Complex IV

164. There are various types of ATPase pump found in different types of cells of these, F-type, ATPase, also are found in all of the following except.
(a) Inner membrane of mitochondria (b) Thylakoid membrane of chloroplasts
(c) Plasma membrane of fungi (d) All are correct

165. Which statement is wrong for Krebs' cycle ?
(a) There is one point in the cycle where FAD^+ is reduced to $FADH_2$
(b) During conversion of succinyl CoA to succinic acid, a molecule of GTP is synthesised
(c) The cycle starts with condensation of acetyl group (acetyl CoA) with pyruvic acid to yield citric acid
(d) There are three points in the cycle where NAD^+ is reduced to $NADH + H^+$

166. Respiration differs from photorespiration as the latter:
(a) takes place only during day and within the chloroplast.
(b) yields less ATP.
(c) utilizes ATP.
(d) occurs in peroxisomes.

167. A glucose fed yeast cell is moved from an aerobic environment to an anaerobic one. For the cell to continue generating ATP at the same rate, rate of glucose consumption should increase:
(a) 2 times (b) 4 times (c) 19 times (d) 38 times

168. Which of the following enzymes involved in Kreb's cycle is not present in the mitochondrial matrix?
(a) Aconitase (b) Malate dehydrogenase
(c) Fumarase (d) Succinate dehydrogenase

169. The RQ for a resting human adult is approximately 0.85. If he/she undertakes violent exercise for 3 to 5 minutes:
(a) RQ will rise. (b) RQ will fall. (c) RQ will remain same. (d) RQ will fall and then rise.

170. The chemical transformations occurring in glycolysis can be summarized as follows

Glucose $\xrightarrow{1}$ FDP $\xrightarrow{2}$ 2(3PGAL) $\xrightarrow{3}$ 2(PGA) $\xrightarrow{4}$ PEP $\xrightarrow{5}$ PA

If NAD^+ is not available, the pathway will be blocked at the raction represented by
(a) 2 (b) 3 (c) 4 (d) 5

171. Which of the following is the key compound in the intermediary metabolism of carbohydrates, lipid and proteins
(a) PEP (b) PGA (c) Acetyl CoA (d) α -ketoglutarate

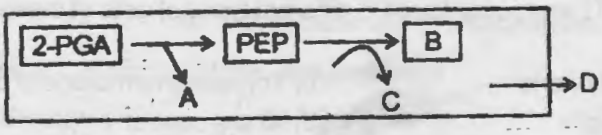
172. Absence of oxygen will arrest which of the following
i. EMP Pathway
ii. TCA cycle
iii. Chemiosmosis coupling
iv. Lactate fermentation
(a) i, ii & iii (b) ii, iii & vi (c) Only i & iii (d) only ii & iii

173. Organic compounds + Oxygen $\longrightarrow$ Carbon dioxide + Water + Energy
In the equation above, what is a common term used to describe "organic compounds"?
(a) Hydrocarbons (b) Food (c) Isomers (d) Functional groups

174. How many oxidation, decarboxylation and substrate level phosphorylation occurs respectively during complete oxidation of two pyruvate molecule :–
(a) 3, 5, 1 (b) 6, 10, 2 (c) 10, 6, 2 (d) 5, 3, 1

175. Marker enzyme of mitochondria is used in which of the following step :–
(a) Succinyl CoA $\longrightarrow$ Succinic acid (b) Succinate $\longrightarrow$ Fumarate
(c) Fumarate $\longrightarrow$ Malate (d) Citrate $\longrightarrow$ Isocitrate

176. Identify A, B, C and D in the given reaction occuring during respiration.



(a) D - Cytoplasm; B - Pyruvate (3C) (b) A - ATP; C - H_2O
(c) C - ADP; D - Mitochondrial matrix (d) A - H_2O; B - Acetyl CoA

177. Direct phosphorylation in glycolytic pathway of respiration.
(a) Occurs when 2H atoms are removed from glyceraldehyde 3-phosphate
(b) Needs enzyme pyruvate kinase only
(c) Occurs when triose biphosphate is dephosphorylated to triose phosphate
(d) Produces a total of 2 molecules of ATP per glucose

178. First respiratory substrate :
(a) Lipid (b) Protein (c) Carbohydrate (d) Both (a) and (c)

179. Pyruvate which is formed by the glycolytic catabolism of carbohydrates in the cytosol, after it enters into mitochondrial matrix it undergoes :
(a) Reductive amination (b) Oxidation decarboxylation
(c) Reductive carboxylation (d) Reductive decarboxylation

180. How many oxidation step take place during glycolysis, link reaction and Kreb's cycle.
(a) 1, 1 and 1 (b) 1, 1 and 4 (c) 1, 1 and 3 (d) 1, 1 and 8

181. How many protons will be pump in outer chamber of mitochondria if pyruvic acid is completely oxidised?
(a) 28 (b) 30 (c) 32 (d) 26

182. Which of the metabolites is common to respiration mediated breakdown of glycerol, carbohydrates and proteins.
(a) Pyruvic acid (b) Acetyl CoA
(c) Glyceraldehyde 3-phosphate (d) Pyruvic acid and Acetyl CoA

183. What is the role of NAD^+ in cellular respiration?
(a) It is a nucleotide source for ATP synthesis.
(b) It functions as an electron carrier.
(c) It functions as an enzyme.
(d) It is the final electron acceptor for anaerobic respiration.

184. Which of these statements is incorrect?
(a) Glycolysis operates as long as it is supplied with NAD that can pick up hydrogen atoms
(b) Glycolysis occurs in cytosol
(c) Enzymes of TCA cycle are present in mitochondrial matrix
(d) Oxidative phosphorylation takes place in outer mitochondrial membrane

185. Which is required in glycolysis
(a) ATP, ADP, NAD^+, Glucose, cytoplasmic enzymes
(b) FAD^+, ADP, ATP, Glucose, cytoplasmic enzymes
(c) $NADP^+$, ATP, GTP, Glucose, cytoplasmic enzymes
(d) NAD^+, $NADP^+$, ATP, Glucose, cytoplasmic enzymes

186. How many ATP molecules are formed from three molecules of acetyl CoA in Krebs cycle excluding electron transport chain?
(a) 5 (b) 3 (c) 6 (d) 33

187. Respiratory quotient of maturing fatty seed and germinating fatty seed respectively are
(a) 1 and ∞ (b) > 1 and < 1 (c) ∞ and 1 (d) 1 and 1

188. If respiratory substrate has high proportion of oxygen as compared to carbon and hydrogen, RQ will be
(a) Less than one (b) More than one (c) Infinity (d) Zero

189. When a molecule of pyruvic acid is subjected to fermentation and forms lactic acid, there is
(a) Gain of 2 ATP (b) Loss of 3 ATP (c) Loss of 6 ATP (d) Gain of 3 ATP

190. Which kind of metabolic poison would most directly interfere with glycolysis?
(a) An agent that reacts with oxygen and depletes its concentration in the cell.
(b) An agent that binds to pyruvate and inactivates it.
(c) An agent that closely mimics the structure of glucose but is not metabolized.
(d) An agent that reacts with NADH and oxidizes it to NAD^+.

191. Respiratory Quotient (RQ) value of tripalmitin is
(a) 0.9 (b) 0.7 (c) 0.07 (d) 0.09

192. Conversion of glucose to glucose-6-phosphate, the first irreversible reaction of glycolysis, is catalyzed by
(a) Aldolase (b) Hexokinase (c) Enolase (d) Phosphofructokinase

14 RESPIRATION IN PLANTS

1. d	2. d	3. a	4. c	5. d	6. d	7. c	8. d	9. d	10. b
11. d	12. a	13. d	14. b	15. d	16. d	17. d	18. d	19. c	20. c
21. a	22. b	23. d	24. b	25. c	26. c	27. a	28. d	29. b	30. a
31. d	32. c	33. a	34. d	35. a	36. b	37. c	38. a	39. c	40. c
41. a	42. d	43. d	44. b	45. d	46. d	47. d	48. a	49. c	50. a
51. d	52. b	53. d	54. d	55. d	56. b	57. b	58. a	59. b	60. a
61. b	62. a	63. b	64. a	65. b	66. c	67. a	68. b	69. d	70. b
71. b	72. d	73. c	74. c	75. b	76. a	77. d	78. a	79. a	80. d
81. c	82. b	83. a	84. d	85. d	86. d	87. b	88. b	89. d	90. c
91. d	92. a	93. d	94. d	95. d	96. b	97. a	98. b	99. d	100. b
101. d	102. a	103. d	104. a	105. b	106. c	107. a	108. a	109. a	110. b
111. c	112. d	113. d	114. b	115. b	116. b	117. d	118. b	119. c	120. a
121. b	122. b	123. c	124. c	125. a	126. b	127. c	128. a	129. d	130. a
131. b	132. d	133. d	134. d	135. d	136. a	137 d	138. a	139. a	140. b
141. d	142. a	143.d	144. d	145. a	146. a	147. d	148. b	149. c	150. a
151. d	152. d	153. a	154. d	155. c	156. d	157. b	158. a	159. b	160. b
161. c	162. c	163. c	164. c	165. c	166. c	167. c	168. d	169. a	170. b
171. c	172. d	173. b	174. c	175. b	176. a	177. c	178. c	179. b	180. b
181. a	182. d	183. b	184. d	185. a	186. b	187. b	188. b	189. b	190. c
191. b	192. b								

15 PLANT GROWTH AND DEVELOPMENT

1. Which of the following is not the characteristic of growth of an organism?
   (a) It is an irreversible permanent increase in size of an organ / its part / an individual cell
   (b) It is accompanied by metabolic processes
   (c) It is quantitative and intrinsic
   (d) None of the above
2. Characteristic of plant growth includes which of the following –
   (a) It is localised and generally determinate (b) It is localized and generally indeterminate
   (c) It is non-measurable (d) It is diffused, determinate and non measurable
3. The form of growth wherein new cells are always being added to the plant body by the activity of meristem is called –
   (a) Open form of growth (b) Close form of growth
   (c) Diffused form of growth (d) Discontinuous form of growth
4. Select the incorrect option –
   (a) Primary growth is the increase in girth of axis due to activity of Apical meristem
   (b) Secondary growth is the increase in girth due to activity of lateral meristem (vascular cambium & cork cambium)
   (c) Elongation of plant is the primary growth
   (d) b and c
5. Growth at cellular level, is principally a consequence in the amount of –
   (a) Protoplasm (b) Apoplast (c) Cell wall (d) Apoplasm
6. Which one(s) is more or less proportional to increase in protoplasm?
   (a) Increase in fresh / dry weight (b) Increase in length, area, volume
   (c) Increase in cell number (d) All
7. I. One maize root cell can give rise to more than 17,500 cells.
   II. A cell in water melon can increase in size upto 350000 times
   III. The growth of pollen tube is measured in length
   IV. The growth of the leaf is measured in term of volume
   (a) I, II are correct (b) III and IV are correct (c) I and III are correct (d) I, II and III are correct
8. Real growth is –
   (a) Protoplasmic growth (b) Cell wall growth (c) Growth in size (d) Growth in volume
9. The period of growth is generally divided into –
   (a) 3 phases (b) 2 phases (c) 4 phases (d) 6 phases
10. Which of the following points is shown by cell at the root or shoot apex –
    (a) Rich in protoplasm, possesses large conspicuous triploid nucleus
    (b) Cell wall is cellulosic, primary in nature and with abundant plasmodesmata
    (c) Rich in protoplasm with large conspicuous nucleus
    (d) B and C
11. Maximal size in terms of wall thickening and protoplasmic modification are achieved by –
    (a) Cells of divisional phase (b) Cells of maturation phase
    (c) Cells of elongation phase (d) Cells of meristematic tissue
12. Increased vacuolation, cell enlargement and new cell wall deposition are the characteristics of cell in –
    (a) divisional phase (b) enlongation phase (c) maturation phase (d) differentiation phase
13. Most of the tissues and cell types represent –

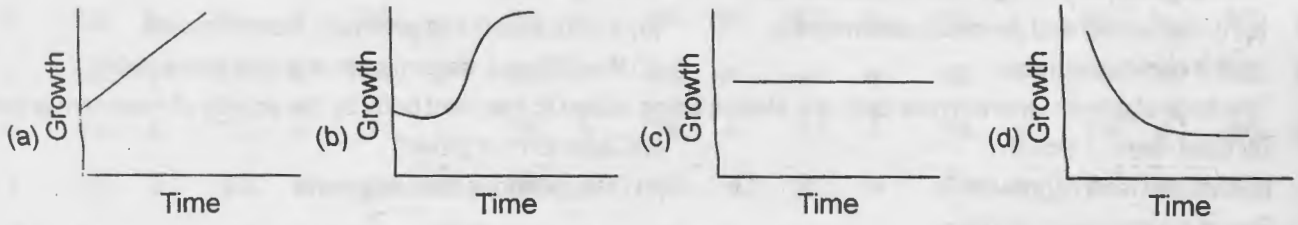
(a) Division phase (b) Elongation phase (c) Enlargement phase (d) maturation phase

14. Increase in growth per unit time is called –
(a) Exponential growth (b) Intrinsic growth (c) growth rate (d) cell elongation

15. Exponential phase in growth is characterised by –
(a) enlargment of cells (b) Constant increase in growth rate
(c) Maturation of cells (d) a and b

16. Arithmetic growth includes all except –
(a) constant growth rate (b) It is found in root and shoot cells
(c) It is expressed as $L_t = L_o + rt$ (d) Its characteristic graph is sigmoid

17. Which one is the correct graph of arithmetic growth?



18. Why a linear curve is obtained in arithmetic growth?
(a) Because it has lag, log and stationary phase
(b) Because one daughter cell remains meristematic while the other daughter cell differentiates and matures
(c) Because of the effect of environment on mitosis
(d) None

19. Go through the following points –
I. Slow growth, thereafter exponential growth and then stationary phase
II. Geometric and arithmetic phases
III. Characteristic of all living organisms growing in natural environment
IV. $W_1 = W_0 e^{rt}$

	Sigmoid curve	Exponential growth	Embryo development
(a)	II	I	III, IV
(b)	I, III	IV	II
(c)	I	II, III	IV
(d)	III, IV	I	II

20. Exponential growth cannot sustain for long. The possible cause is –
(a) Limited nutrient available (b) Limited space
(c) Accumulation of toxic materials (d) All

21. The rate of growth is highest in –
(a) Lag phase (b) Log phase (c) Steady phase (d) None

22. Plant growth is regulated by –
(a) Climatic factor (b) Growth hormones (c) Both (d) Minerals

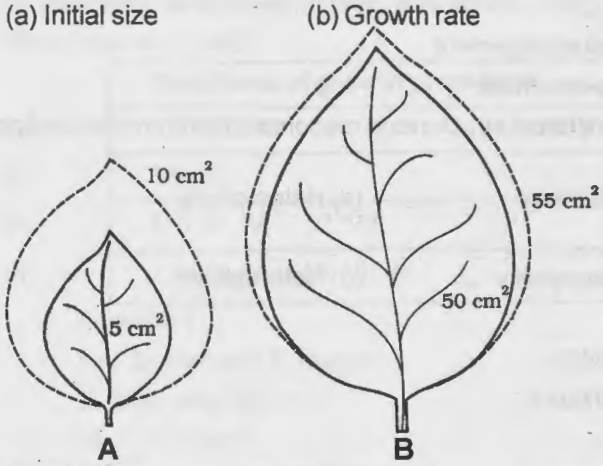
23. A sigmoid growth curve is characteristic of –
(a) Bacteria growing in culture medium (b) Organisms growing in natural habitat
(c) All cells, tissue and organs (d) All

24. The exponential growth can be expressed as $W_1 = W_0 e^{rt}$. "r" is –
(a) Relative growth rate and depends on final size (b) It is initial size
(c) Relative growth and also referred to as efficiency index

(d) None of the above

25. In exponential growth the final size depends upon –
(a) Initial size (b) Growth rate (c) Time of growth (d) All

26.



Time = 1 day Time = 1 day

	A - Leaf		B - Leaf	
	AGR	RGR	AGR	RGR
(a)	1%	1%	2%	2%
(b)	100%	5%	10%	5%
(c)	5 cm^2	100%	5 cm^2	10%
(d)	0.5 cm^2	100%	1.5 cm^2	100%

27. For growth which one(s) is essential –
(a) Nutrients (b) H_2O (c) O_2 (d) All

28. Water is needed for –
(a) Cell-enlargement (b) Providing aqueous medium for enzymatic reactions
(c) Both (d) oxidising glucose to provide energy

29. I. O_2 helps in releasing metabolic energy essential for growth activities.
II. Nutrients (Micro and Macromolecules) are required by plants for the synthesis of protoplasm as well as act as source of energy
III. Optimum temperature for plant growth is needed
IV. Environmental signal like light and gravity affect certain phases of growth
(a) All are correct (b) All are incorrect (c) I, II and IV are correct (d) I and IV are correct

30. During differentiation cell undergoes structural changes in their –
(b) Cell wall only (b) Protoplasm only (c) Apoplast only (d) Cell wall and protoplast

31. Under certain conditions regaining the lost capacity of division by living cells is called –
(a) Dedifferentiation (b) Redifferentiation (c) Differentiation (d) Efficiency index

32. Which one is the example of dedifferentiated cells?
(a) Procambium + Vascular cambium (b) Vascular cambium + Interfascicular cambium
(c) Phellogen + Procambium (d) Cork cambium + Interfascicular cambium

33. Which one(s) is/are redifferentiated cell(s)?
(a) Cork (b) Secondary cortex (c) Both (d) None

34. Growth in plants is –
(a) Only determinate (b) Only indeterminate
(c) Mostly determinate (d) Open (both determinate and indeterminate)

35. Differentiation in plant is open because cells / tissues arising out of the same meristem –

(a) have same structure at maturity (b) Have different structures at maturity
(c) Have capacity to disappear their cell walls (d) Have same fate

36. Which of the following includes all three process –
(a) Differentiation (b) Cell enlargement
(c) Seed germination, senescence (d) Development

37. The ability of plant to follow different pathways and produce different structures in response to environment and phases of life is termed as –
(a) Elasticity (b) Growth efficiency (c) Plasticity (d) Heterophylly

38. The example of plasticity in plant *Ranunculus* is –
(a) Homophylly (b) Isophylly (c) Megaphylly (d) Heterophylly

39. Environmental heterophylly is seen in –
(a) *Ranunculus* (Buttercup) (b) Cotton
(c) Coriander (d) Larkspur

40. Intrinsic heterophylly is seen in all except –
(a) Cotton (b) Coriander (c) Buttercup (d) Larkspur

41. Intrinsic factors affecting development include –
(a) Intracellular (genetic) factors (b) Intercellular factors like light
(c) Intercellular factors like PGRs (d) a and c

42. Extrinsic factors affecting the development include all except –
(a) O_2, light, temperature (b) CO_2 and nutrients (c) Water (d) PGRs and genetic factors

43.

Column I	Column II
I. IAA	A. Terpenes
II. GA	B. Indole compounds
III. ABA	C. Adenine derivatives
IV. C_2H_4	D. Gases
V. Kinetin, (N^6-furfuryl amino purine)	E. Carotenoid derivatives

The correct match is –
(a) I - B, II - A, III - E, IV - D, V - C (b) I - A, II - B, III - C, IV - D, V - E
(c) I - E, II - D, III - A, IV - B, V - C (d) None

44. Which one includes growth promoters?
(a) Auxin, Cytokinin, ABA (b) GA, Cytokinin, C_2H_4
(c) C_2H_4, ABA (d) Auxin, Cytokinin, GA

45. Which one include growth inhibitors?
(a) ABA, Cytokinin (b) GA, IAA (c) ABA, C_2H_4 (d) None

46. PGRs include –
(a) Only growth promoters (b) Only growth inhibitors
(c) Both growth promoters and growth inhibitors (d) Only solid hormones, not gaseous hormones

47. Which of the following growth regulators can fit either of the groups (promoter and inhibitor) –
(a) C_2H_4 (b) ABA (c) GA (d) IAA

48. I. Cell division
II. Cell enlargement
III. Pattern formation
IV. Tropic growth
V. Flowering
VI. Fruiting

VII. Seed germination

VIII. Response to wound

IX. Response to stresses of biotic and abiotic origin

Which one is correct?

	Functions of growth promoters	Functions of growth inhibitor
(a)	I, II, VII, IX	III, IV, V, VI, VIII
(b)	VIII, IX	I, II, III, IV, V, VI, VII
(c)	I, II, III, IV, V, VI, VII	VIII, IX
(d)	I, II, III, IV, V, VI, VII, IX	VIII

49.

Column I	Column II
I. C. Darwin and F. Darwin	A. Cytokinin
II. Miller and Skoog	B. ABA
III. F. W Went	C. C_2H_4
IV. Kurosawa	D. Auxin
	E. GA

Correct Match is –

	I	II	III	IV
(a)	D	A	D	E
(b)	D	A	C	B
(c)	C	A	B	D
(d)	E	D	B	A

50. **Statement I** – Confirmation of the release of volatile substances from ripened oranges that hastened the ripening of stored unripe bananas.

Statement II – Callus formation from the internodal segments of tobacco stem with the Auxin and extracts of vascular tissues / yeast / coconut milk / DNA. Later, Cytokinesis promoting substance was identified, crystallized and named as KINETIN.

Statement III – Reporting of appearance of symptoms of bakane / foolish seedling disease caused by fungus. *Gibberella fujikuroi*, in uninfected seedling when they were treated with sterile filtrates of the fungus. The active substances were later identified as GA.

Choose the correct option –

	I	II	III
(a)	Miller + Skoog	Cousins	Kurosawa
(b)	Kurosawa	Cousins	Miller + Skoog
(c)	Cousins	Kurosawa	Miller + Skoog
(d)	Cousins	Miller + Skoog	Kurosawa

51. ABA was discovered during –

(a) Mid 1960s (b) Mid 1906 (c) Mid 1966 (d) Mid 1967

52. The historical experiment on canary grasses coleoptile as a first step in the discovery of auxin was conducted by–

(a) Darwin (b) Went (c) Kogl (d) Kurosawa

53. Who isolated auxin from coleoptile seedling for the first time –

(a) Darwin (b) Miller (c) Skoog (d) F. W. Went

54. 3 terms – Inhibitor-B, Abscission II and Dormin are used for the same hormone. That hormone is –

(a) Auxin (b) ABA (c) C_2H_4 (d) GA

55. Auxin was first isolated from –
(a) Coleoptile of oat (b) Human urine (c) Maize (d) tea

56. The term "auxin" is used for –
(a) IAA (b) NAA (c) 2, 4-D and 2, 4, 5-T (d) All

57. Which one is correct?
(a) IAA and IBA are natural but NAA , 2, 4-D and 2, 4, 5-T are synthetic auxins
(b) IAA and NAA are natural but IBA, 2, 4, 5-T and 2, 4-D are synthetic auxin
(c) NAA and 2, 4, 5-T are natural but IAA, IBA and 2, 4-D are synthetic hormones
(d) IAA, NAA, IBA, 2, 4-D and 2, 4, 5-T are synthetic auxins

58. Plant growth substances generally –
(a) Have a single role (b) Are species-specific
(c) Are produced in many parts of plant (d) Affect mainly the cells that produce them

59. The hormone responsible for phototropism is –
(a) Auxin (b) C_2H_4 (c) ABA (d) GA

60. The phenomenon of apical dominance is strengthened by –
(a) Removal of the tip (b) Removal of leaves (c) Auxin production (d) Production of fruits

61. If a shoot cutting is treated with auxin, which of the following is likely to result?
(a) Extensive root production (b) Suppression of apical dominance
(c) Growth of lateral buds (d) Bolting of the shoot

62. The discovery of auxin is traced back to the work of Charles and Francis Darwin. In their experiments, they studied
(a) Photonastic movement (b) Photoperiodism (c) Phototropism (d) Photosynthesis

63. Removal of auxin source demonstrates that leaf abscission is _____ by auxin, and apical dominance is _____ by auxin.
(a) Promoted, promoted (b) inhibited, inhibited (c) promoted, inhibited (d) inhibited, promoted

64. Which process is not directly affected by auxin?
(a) Apical dominance and root initiation (b) Parthenocarpy
(c) Synthesis of α-amylase by barley seeds (d) Leaf abscission

65. Branching is inhibited by _____ from the tip of a growing shoot, but this effect is encountered by _____ from the root.
(a) Cytokinin, auxin (b) Auxin, Cytokinin (c) GA, Cytokinin (d) GA, ABA

66. Which of the following statements correctly explains why a plant becomes bushier when the tip of its shoot is removed?
(a) The removal of the plant tip also removes the auxin that is keeping lower buds from developing
(b) Programmed cell death allows the plant to change its form
(c) The concentration of the morphogens sent from the root to stem is increased
(d) None of the above

67. Which of the following plant hormones can cause the base of a shoot to form new root, prevents fruit and leaf drop at early stage, to be used as herbicide / weedicide, also controls xylem differentiation and helps in cell division –
(a) GA (b) Cytokinin (c) Auxin (d) ABA

68. Go through the following statements –
I. Promotes flowering in pineapple
II. Used to prepare weed free lawn
III. Promotes the abscission of older mature leaves and fruits
The above functions are carried out by –
(a) GA (b) C_2H_4 (c) ABA (d) Auxin

69. Removal of shoot tips (decapitation) means loss of apical dominance and it is widely applied in –
(a) Tea plantation (b) Hedge-making (c) Both (d) Bolting

70. How many gibberellins have been reported from fungi and higher plants –
(a) Less than 100 (b) More than 1000 (c) More than 100 (d) 100

71. Which one(s) is acidic in nature?
(a) Auxins (b) GAs (c) ABA (d) All

72. In coleoptile tissue, auxin –
(a) Is not transported, because auxin is used where it is made
(b) Is transported by diffusion, with no preferred direction
(c) Is transported from base to tip
(d) Is produced by the growing apices of the stem and roots, from where they migrate to the regions of their action

73. Which GA was the first Giberrellin to be discovered?
(a) GA_1 (b) GA_2 (c) GA_3 (d) GA_4

74. Gibberellins have many effects. Which one of the following is not an effect of gibberellins in plants?
(a) Bolting (b) Delay senescence
(c) Increase the grapes stalk (d) Induces dormancy

75. The fruits can be left on the tree longer so as to extend the market period. This is due to which function of GA?
(a) Bolting (b) Delay senescence (c) Internodal elongation (d) Parthenocarpy

76. Which of the following hormones causes fruits like apple to elongate and improve its shape –
(a) GA (b) ABA (c) NAA (d) 2, 4 D

77. Spraying sugarcane with gibberellins increases the yield by as much as 20 tonnes per acre. GA performs it –
(a) By improving the quality of fruit (b) By making plants with rosette habit
(c) By internodal elongation (d) By delaying senescence

78. Bolting is –
(a) Internodal elongation just prior to flowering in beet, cabbage and many plants with rosette habit.
(b) A type of grafting
(c) Nodal elongation in certain plants
(d) None

79. Which one is false?
(a) GA_3 is used to speed up the malting process in brewing industry
(b) Spraying juvenile conifers with GAs hastens the maturity, thus leading to early seed production
(c) GA_3 is a commercially available gibberellin
(d) GA_3 cannot increase the length of internode in sugarcane

80. Cytokinins and ethylene have opposite effects on –
(a) Leaf senescence (b) Elongation of stem
(c) Lateral swelling of stem (d) Winter dormancy

81. Two cytokinins are kinetin and Zeatin. What is the difference between the two?
(a) Kinetin is the active form of zeatin
(b) Zeatin is the active form of kinetin
(c) Zeatin is a synthetic cytokinin and kinetin is naturally occuring
(d) Zeatin is a naturally occuring plant cytokinin, kinetin is not

82. Cytokinins are formed primarily in which area of the plant?
(a) Tips of shoot (b) Root (c) Stem (d) Lateral buds and leaves

83. Auxin and Cytokinin are antagonistic in which of the following functions?
(a) Cell division (b) Phototropism (c) Apical dominance (d) Geotropism

84. Natural cytokinins are synthesised in –
(a) Root apices (b) Developing shoot buds
(c) Young fruits (d) All

85. Kinetin, a modified adenine (purine) was discovered from –
(a) the autoclaved herring sperm DNA (b) Coconut milk
(c) Corn-Kernel (d) Fungus

86. Zeatin is –
(a) an auxin (b) a GA (c) a cytokinin (d) None

87. Zeatin was extracted for the first time from –
(a) Maize (b) Coconut (c) Fungus (d) Autoclaved herring sperm

88. Cytokinins help to produce all except –
(a) New leaves
(b) Chloroplast in leaves
(c) Lateral shoot growth and adventitious shoot formation
(d) Rooting on stem cut

89. Cytokinin helps in delay of leaf senescene by –
(a) Increasing more water absorption by root (b) Increasing rate of translocation of organic solutes
(c) Promoting nutrients mobilization (d) Formation of adventitious buds

90. C_2H_4 is synthesised in large amounts by –
(a) Shoot tip (b) Root tip
(c) Young leaves (d) Tissue undergoing senescence and ripening fruits

91. I. C_2H_4 promotes leaf senescence
II. C_2H_4 speeds the ripening of fruits
III. C_2H_4 causes apical hook formation
IV. C_2H_4 promotes horizontal growth of seedling and swelling of axis
V. C_2H_4 promotes male flowers in cucumber thereby increasing the yield
Which one is false?
(a) All (b) I and V (c) II and IV (d) V

92. During ripening of the fruits, rate of respiration is increased under the influence of hormone. It is called Climacteric respiration. The hormone is –
(a) ABA (b) Auxin (c) C_2H_4 (d) GA

93. Which hormone is used to initiate flowering and synchronising fruit set in pineapple?
(a) C_2H_2 (b) C_2H_4 (c) GA_3 (d) IAA

94. Seed dormancy is regulated by –
(a) C_2H_4 (b) ABA (c) IAA (d) GA_3

95. I. Cytokinin is primarily concerned with cell division
II. C_2H_4 breaks seed and bud dormany
III. ABA stimulates the opening of stomata
IV. C_2H_4 initiates germination in peanut seeds, sprouting of potato tubers
V. ABA is synergistic to GA
The false statement is –
(a) I, II, IV (b) III, V (c) III, IV (d) IV, V

96. Which one is stress hormone –
(a) ABA (b) C_2H_4 (c) GA_7 (d) IAA

97. I. "Y" hormone induces flowering in mango and also promotes rapid internode / petiole elongation in deep water rice plants and hence helping leaves or upper part of shoot above water.
II. "X" hormone promotes root growth and root hairs formation
III. "Z" hormone inhibits the seed germination, increases the tolerance of plant to various stresses, play important role in seed development, maturation and dormancy.

Identify the correct names of hormones

(a) Y = ABA; X = Auxin; Z = GA (b) Z = GA; X = Auxin; Y = C_2H_4

(c) Y = Auxin; X = C_2H_4; Z = GAA (d) Y = C_2H_4; X = C_2H_4; Z = ABA

98. The most widely used compound as a source of C_2H_4 is –

(a) Kinetin (b) Zeatin (c) IBA (d) Ethephon

99. Ethephon hastens the fruit ripening in tomatoes and apple and accelerates abscission in flowers and fruits. Above statement indicates that ethephon must release –

(a) ABA (b) C_2H_4 (c) IAA (d) GA_7

100. Which hormone promotes female flowers in cucumber –

(a) ABA (b) C_2H_4 (c) GA_4 (d) GA3

101. Which of the following is incorrect?

(a) Any PGR has diverse physiological effects on plants (b) Diverse PGRs manifest similar effect

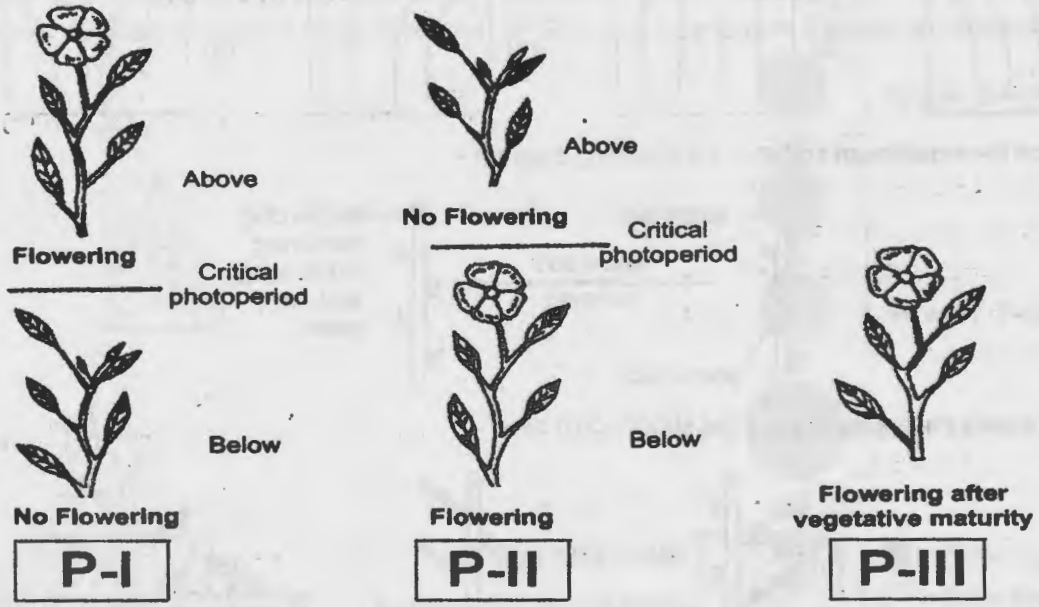
(c) PGRs may act synergistically and antagonistically (d) None

102. Long day plants flower specially when the –

(a) Light period is lesser than some critical length (b) Light period is greater than some critical period

(c) Dark period is less than some critical length (d) Dark period is more than some critical length

103. Go through the following experiment and observe the results.



Now identify plants (P-I, II and III) –

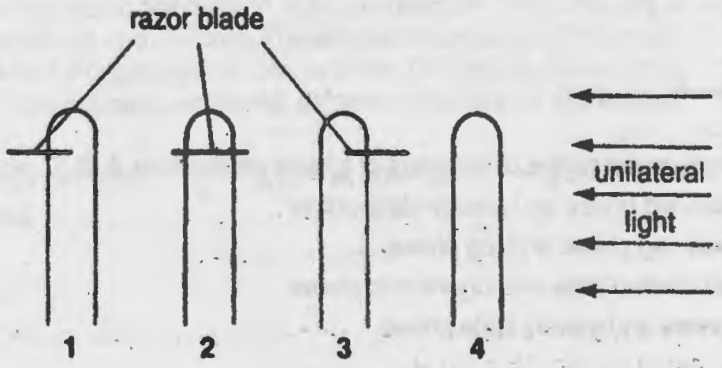
(a) P-I = Long day plant; P-II = Short day plant; P-III = Day neutral plant

(b) P-I = Short day plant; P-II = Long day plant; P-III = Day neutral plant

(c) P-I = Short day plant; P-II = Short day plant; P-III = Day neutral plant

(d) P-I = Long day plant; P-II = Long day plant; P-III = Day neutral plant

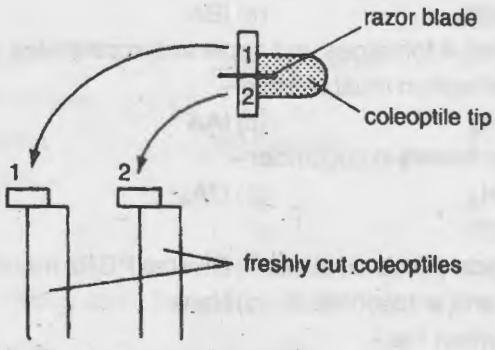
104. The following diagram shows four coleoptiles set up at the start of an experiment –



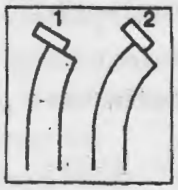
Which two coleoptiles will Both bend towards the light source?

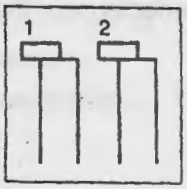
(a) 1 and 2 (b) 1 and 4 (c) 2 and 3 (d) 3 and 4

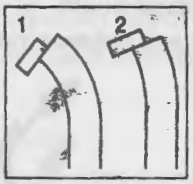
105. Agar blocks 1 and 2 were kept in the positions shown in the diagram below for several hours and then transferred onto two freshly cut coleoptiles.

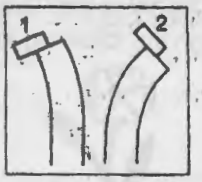


Which of the following would result after two days of growth?

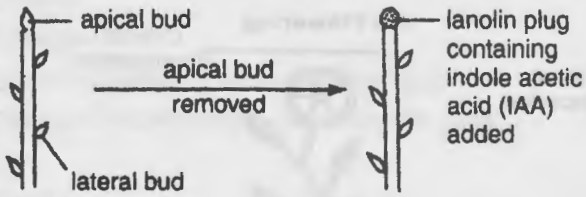
(a) 

(b) 

(c) 

(d) 

106. Go through the experiment shown in the following diagram –



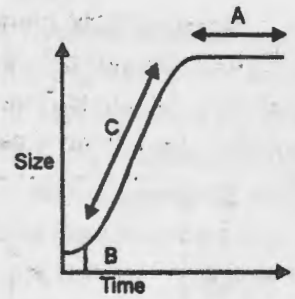
After two weeks the appearance of the shoot would be –

(a) 

(b) 

(c) 

(d) 

107. 

Given above is a graph drawn on the parameters of growth versus time. A, B, C respectively represent –

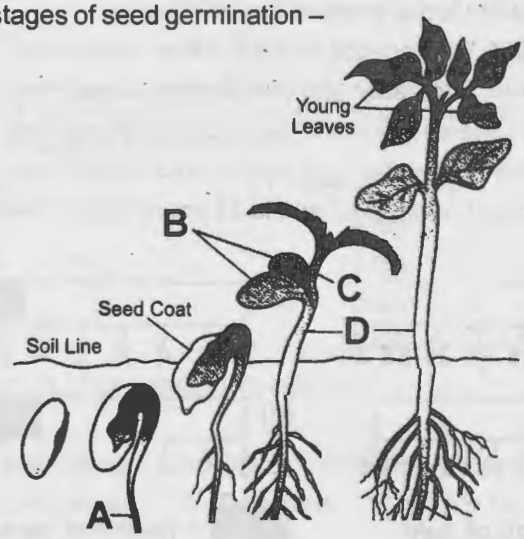
(a) Exponential phase, log phase and steady state phase

(b) Steady state phase, lag phase and log phase

(c) Log phase, steady state phase and logarithmic phase

(d) Log phase, lag phase and steady state phase

108. The below diagram shows the stages of seed germination –

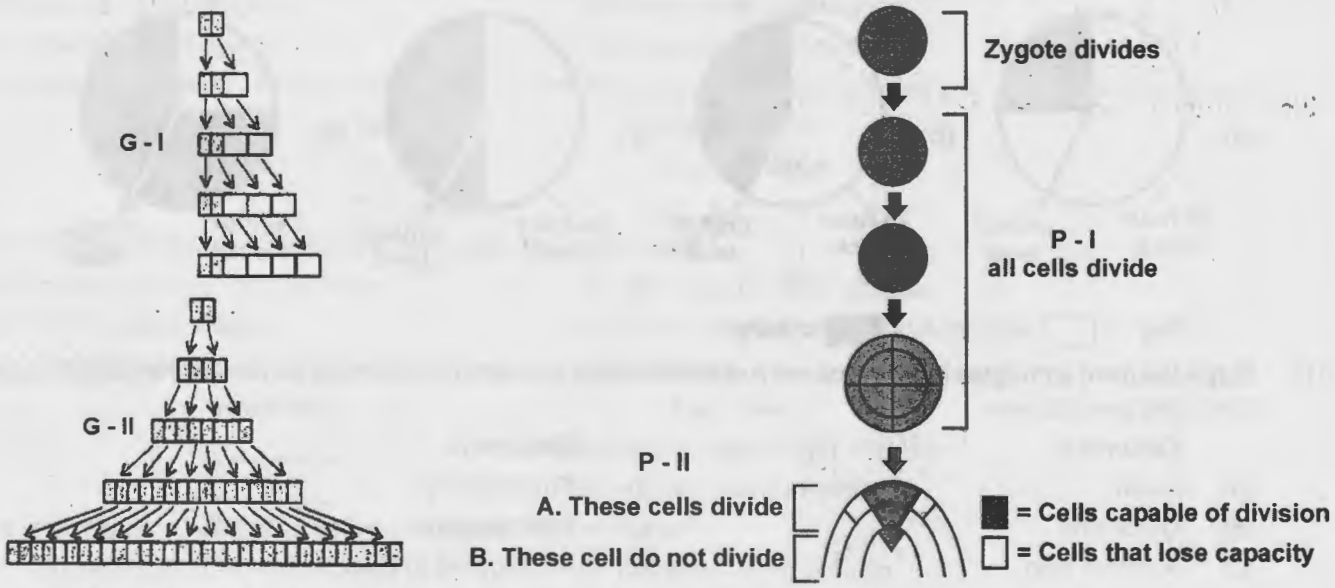


Now identify A, B, C and D respectively –

(a) Plumule, Cotyledons, Epicotyl and Hypocotyl (b) Radicle, Cotyledons, Epicotyl and Hypocotyl

(c) Mesocotyl, Cotyledons, Epicotyl and Hypocotyl (d) Root hair, Cotyledons, Epicotyl and Hypocotyl

109.



Identify Growth(s) and Phase(s) in above diagrammatic representation –

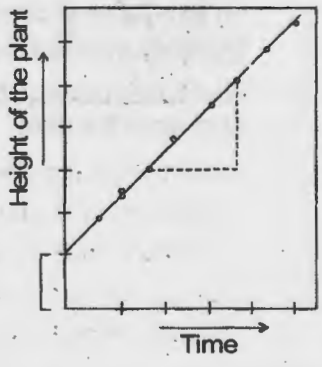
(a) G - I — Arithmetic growth; G - II — Geometric growth; P - I — Geometric Phase; P - II — Arithmetic Phase

(b) G - I — Arithmetic growth; G - II — Geometric growth; P - I — Arithmetic Phase; P - II — Geometric Phase

(c) G - I — Geometric growth; G - II — Arithmetic growth; P - I — Geometric Phase; P - II — Arithmetic Phase

(d) G - I — Geometric growth; G - II — Arithmetic growth; P - I — Arithmetic Phase; P - II — Geometric Phase

110. In arithmetic growth, following mitotic cell division, only one daughter cell continues to divide while the other differentiates and matures. The simplest expression of arithmetic growth is exemplified by a root elongating at a constant rate. On plotting the length of the organ against time, a linear curve is obtained, as seen in the graph. Mathematically, it is expressed as –



(a) $L_t = L_0 + rt$ (L_t = Length at time 't' L_0 = length at time 'zero' r = growth rate/ elongation per unit time).

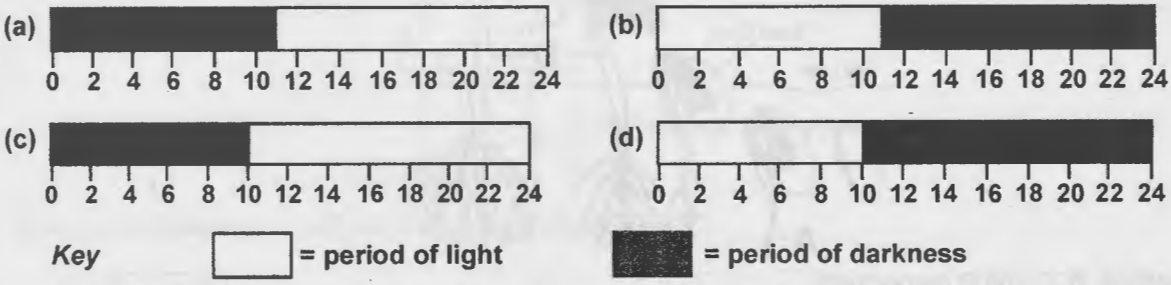
(b) $L_t = L_0 e^{rt}$

(c) $L_t = L_0 + rt$ or $L_t = L_0 e^{rt}$

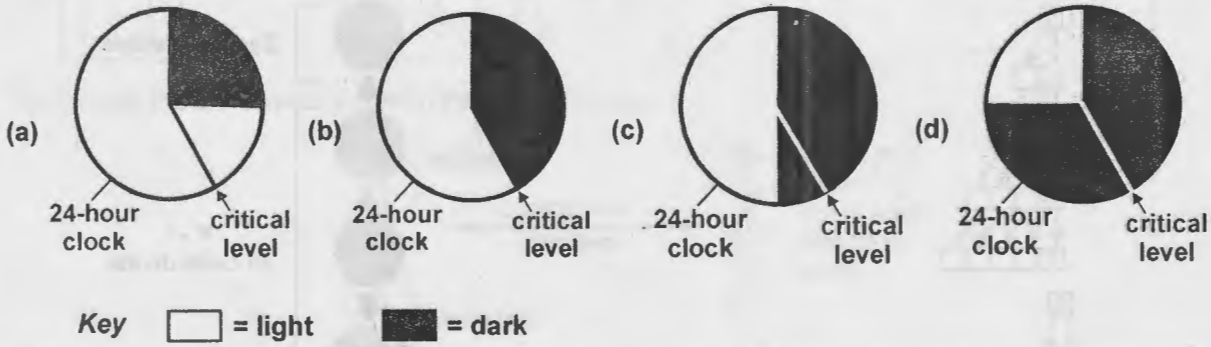
(d) $L_t = 2 \times L_0$

111. The correct sequence of the developmental process in a plant cell is
(a) Plasmatic growth, Differentiation, Senescence and Maturation respectively
(b) Plasmatic growth, Differentiation, Maturation and Senescence respectively
(c) Maturation, Plasmatic growth, Differentiation and Senescence respectively
(d) Differentiation, Plasmatic growth, Maturation and Senescence respectively

112. Sedum is a long day plant. Its critical duration of light is 13 hours. Under which of the following conditions would it flower?



113. Maryland Mammoth Tobacco is a short day plant. Its critical duration of darkness is 10 hours. Under which of the following conditions will it NOT flower?



114. Match the plant hormones listed in column A with their major role listed in column B and select the correct option from the codes given below –

Column A		Column B	
(A)	Auxin	(i)	Fruit ripening
(B)	Cytokinins	(ii)	Phototropism
(C)	Abscisic acid	(iii)	Anatagonist to GAs
(D)	Ethylene	(iv)	Stomatal opening and closing
		(v)	Growth of lateral buds

(a) A - IV; B - V; C - III, II; D - I
(b) A - II; B - IV; C - III, IV; D - I
(c) A - II; B - IV, V; C - III; D - I
(d) A - III, IV; B - V; C - II; D - I

115. Which of the following effects is brought about by gibberellins but not by auxins?
(a) stimulation of cambial activity
(b) stimulation of fruit development
(c) inhibition of leaf abscission
(d) breaking of dormancy in leaf buds

116. Four potted plants (I, II, III, and IV) of cabbage (biennial plant) are subjected to different temperatures for several days as given in the table.

Pot	Temperature
I	5°C
II	24°C
III	27°C
IV	32°C

Which potted plant will show flowering?

(a) I (b) II (c) III (d) IV

117. Four potted plants I, II, III, and IV (of short day plant, which has the critical period of 14 hours) are taken and exposed to light for different time periods as listed in the given table.

Pot	Time duration
I	16 hrs
II	15 hrs
III	14 hrs
IV	10 hrs

Which potted plant will show flowering after exposure to light?

(a) I (b) II (c) III (d) IV

118. The given table enlists various compounds containing plant hormones and their function in agriculture.

No.	Compound	Function
1.	2, 4 - D	*i*
2.	*ii*	Fruit ripening

The information in which alternative completes the given table?

(a) i-Weedicide; ii-Ethephon (b) i-Insecticide; ii-Ethephon

(c) i-Insecticide; ii-Kinetin (d) i-Weedicide; ii-Kinetin

119. The given table enlists various types of developmental processes in plant cells and their corresponding tissues.

No.	Tissue	Function
1.	*i*	Redifferentation
2.	Cork cambium	*ii*

The information in which alternative completes the given table?

(a) i-Primary xylem; ii-Differentiation (b) i-Phellogen; ii-Differentiation

(c) i-Cork; ii-differentiated (d) i-Primary xylem; ii-Dedifferentiation

120. The given table enlists various plant hormones and their functions.

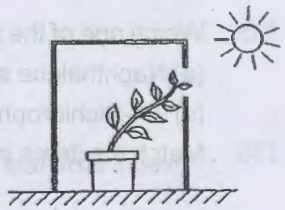
Hormone	Function
i	Increases the length of grape stalk
ii	Promotes seed dormancy

The information in which alternative completes the given table?

(a) i-Gibberellic acid; ii-Abscisic acid (b) i-Abscisic acid; ii-Auxin

(c) i-Auxin; ii-Ethylene (d) i-Ethylene; ii-Gibberellic acid

121. The given diagram illustrates phototropism in a plant.



Which plant hormone induces the phenomenon of phototropism in plants?

(a) Auxins (b) Ethylene

(c) Cytokinin (d) Gibberellins

122. The given table enlists various plant hormones and their chemical composition.

Plant hormone	Chemical composition
Auxin	*i*
ii	Terpenes
iii	Adenine derivatives

The information in which alternative completes the given table?

(a) i-Indole derivative; ii-Gibberellic acid; iii-Cytokinin

(b) i-Indole derivative; ii-Abscisic acid; iii-Ethylene

(c) i-Carotenoid derivative; ii-Abscisic acid; iii-Cytokinin
(d) i-Amino acid; ii-Gibberellic acid; iii-Cytokinin

123. Through their effect on plant growth regulators, what do the temperature and light control in the plants ?
(a) Apical dominance (b) Flowering (c) Closure of stomata (d) Fruit elongation

124. Which one of the following generally acts as an antagonist to gibberellins ?
(a) Zeatin (b) Ethylene (c) ABA (d) IAA

125. Vernalisation stimulates flowering in :
(a) Zamikand (b) Turmeric (c) Carrot (d) Ginger

126. To speed up the malting process in brewing industry the growth hormone used is
(a) auxin (b) gibberellic acid (c) kinetin (d) ethylene.

127. Meristem which is consumed in the formation of organ is
(a) lateral meristem (b) secondary meristem
(c) indeterminate meristem (d) determinate meristem

128. During seed germination its stored food is mobilized by:
(a) Ethylene (b) Cytokinin (c) ABA (d) Gibberellin

129. Cell enlargement may occur in
(a) all direction (b) linear direction (c) both a and b (d) none of these.

130. The maximum growth phase is
(a) lag phase (b) steady phase (c) log phase (d) senescent phase

131. Dr. F. Went noted that if coleoptile tips were removed and placed on agar for one hour, the agar would produce a bending when placed on one side of freshly-cut coleoptile stumps . Of what significance is this experiment ?
(a) It made possible the isolation and exact identification of auxin.
(b) It is the basis for quantitative determination of small amounts of growth promoting substances.
(c) It supports the hypothesis that IAA is auxin.
(d) It demonstrated polar movement of auxins.

132. Which one of the following growth regulators is known as stress hormone?
(a) Abscissic acid (b) Ethylene (c) GA_3 (d) Indole acetic acid

133. If a plant produces flowers when exposed only to alternating periods of 5 hours light and 3 hours dark, in a 24-hour cycle, then the plant should be a
(a) short-long day plant (b) short day plant (c) day neutral plant (d) long day plant

134. The pineapple which under natural conditions is difficult to blossom has been made to produce fruits throughout the year by application of
(a) IAA, IBA (b) NAA, 2, 4-D (c) Phenyl acetic acid (d) Cytokinin

135. Which one of the following is a growth regulator produced by plants ?
(a) Naphthalene acetic acid (b) Zeatin
(c) 2,4-Dichlorophenoxyacetic acid (d) Benzyl aminopurine

136. Match the items in column I with those in column II, and choose the CORRECT answer.

Column I	Column II
P. Control of weeds	i. Gibberellin
Q. Induction of germination	ii. Cytokinin
R. Ripening of fruit	iii. 2, 4-D
S. Delaying of senescence	iv. Ethylene

(a) P-ii, Q-iv, R-iii, S-i (b) P-iii, Q-i, R-iv, S-ii (c) P-i, Q-ii, R-iv, S-iii (d) P-ii, Q-iii, R-i, S-iv

137. Cytokinin is not found in
(a) root apex (b) shoot apex (c) young fruits (d) mature fruits

138. Select the correctly matched pair.
(a) C. Darwin and S. F. Darwin – Gibberellic acid
(b) F. W. Went – Auxin
(c) E. Kurosawa – Ethylene
(d) Skoog and Miller – Abscisic acid

139. One hormone stimulates the closure of stomata and another one influences the swelling of the axis in dicot plants. They are
(a) Gibberellins and ethylene
(b) Abscisic acid and cytokinins
(c) Gibberellins and cytokinins
(d) Abscisic acid and ethylene

140. Which of the following statements regarding photoperiodism is false?
(a) The response of plants to periods of light / day is termed photoperiodism
(b) The shoot apices cannot perceive photoperiods
(c) In day neutral plants there is no correlation between exposure to light duration and induction of flowering response
(d) The site of perception of the light / dark duration is the flower.

141. One hormone hastens maturity period in juvenile conifers, a second hormone controls xylem differentiation, while the third increases the tolerance of plants to various stresses. They are respectively
(a) Gibberellin, Auxin, Cytokinin (b) Auxin, Gibberellin, Cytokinin
(c) Gibberellin, Auxin, ABA (d) Auxin, Gibberellin, ABA

142. The aleurone synthesises and secretes digestive enzymes that hydrolyse nutrients stored in the endosperm, in presence of
(a) Auxin (b) Gibberellin (c) Cytokinin (d) ethylene

143. Bolting means
(a) Elongation of stem in rossette plants (b) Dwarfing of stem
(c) Increase in flowering (d) Appearance of flowers

144. Typical growth curve in plants is
(a) Stair-steps shaped (b) Parabolic (c) Sigmoid (d) Linear

145. What causes a green plant exposed to the light, on only one side, to bend towards the source of light as it grows?
(a) Light stimulates plant cells on the lighted side to grow faster
(b) Auxin accumulates on the shaded side, stimulating greater cell elongation there
(c) Green plants need light to perform photosynthesis
(d) Green plants seek light because they are phototropic

146. Auxin can be bioassayed by
(a) Potometer (b) Lettuce hypocotyl elongation
(c) Avena coleoptile curvature (d) Hydroponics

147. If you were to prune the shoot tips of a plant, what would be the effect on the plant and the leaf area index?
(a) bushier plants; lower leaf area index (b) tall plants; higher leaf area index
(c) short plants; lower leaf area index (d) bushier plants; higher leaf area indexes

148. The Avena curvature is used for bioassay of :
(a) ABA (b) GA_3 (c) IAA (d) Ethylene

149. You are given a tissue with its potential for differentiation in an artificial culture. Which of the following pairs of hormones would you add to the medium to secure shoots as well as roots?
(a) Auxin and abscisic acid (b) Gibberellin and abscisic acid
(c) IAA and gibberellin (d) Auxin and cytokinin

150. Seed dormancy can be broken by :
(a) ABA and GA_3 (b) GA_3 and ethylene (c) IAA and ABA (d) ABA and IPA

151. Plants which disregard the requirement of a definite day length for the following are called :
(a) Short day plants (b) Long day plants (c) Day neutral plants (d) Long short-day plants

152. Which of the following is a potent weedicide ?
(a) IPA (b) TIBA (c) BAP (d) 2, 4-D

153. Vernalization is the effect of low temperature on :
(a) Delaying of flowering (b) Inhibition of flowering
(c) Acceleration of fruit ripening (d) Acceleration of flowering

154. Seed dormancy can be broken by the following combination of chemicals
(a) GA_3, IAA and ABA (b) KNO_3, GA_3 and Ethylene chlorohydrin
(c) NAA, 2, 4, 5-T and IAA (d) ABA, BAP and GA_3

155. Seedless fruits can be induced by
(a) ABA and IAA (b) ABA and Zeatin (c) IAA and GA_3 (d) Ethylene and ABA

156. The primary hormone causing abscission of leaves is
(a) IAA (b) Ethylene (c) ABA (d) Cytokinin

157. Which of the following is most likely to occur when a small piece containing the primary meristem at the tip of a dicot shoot is cut off?
(a) The plant will send out lateral branches (b) The plant will lose its leaves
(c) The growth of buds at nodes is inhibited (d) The plant grows tall and spindly

158. Fruit and leaf drop at early stages can be prevented by the application of:
(a) Ethylene (b) Auxins (c) Gibberellic acid (d) Cytokinins

159. A plant has critical photoperiod of 10 hours and it is being considered as long day plant because it flowers when :
(a) Photoperiod of less than 10 hours is given
(b) Seed is exposed to 10 hours of light before sowing
(c) Photoperiod of more than 10 hours is given to shoot apex
(d) Photoperiod of more than 10 hours is given to leaves.

160. Which of the following plant activity is not an example of growth promotion activity?
(a) Germination of seeds (b) Cell division (c) Delay in senescence (d) Abscission

161. A long day plant with critical day length of 14 hrs will flower under which of the following treatments?
(a) 7 hrs light - 2 hrs darkness - 3 hrs light - 5 hrs darkness - 7 hrs light
(b) 5 hrs light - 2 hrs darkness - 3 hrs light - 5 hrs darkness - 7 hrs light
(c) 11 hrs darkness - 2 hrs darkness - 3 hrs light - 5 hrs darkness - 7 hrs light
(d) 6 hrs light - 2 hrs darkness - 3 hrs light - 5 hrs darkness - 7 hrs light

162. Cytokinin involves
(a) Kinetin, zeatin, BAP (b) GA_3, IBA, Kinetin (c) Zeatin, GA_3, BAP (d) IAA, Zeatin, kinetin

163. Which of the following statement is wrong about Abscisic acid :
(a) It helps in general plant metabolism (b) It is antagonistic to GA_3
(c) It helps in seed maturation & dormancy (d) Morphogenesis

164. Vernalization
(a) Help in shortening the period between germination and flowering
(b) Is useless for monocots
(c) Is high temperature treatment to some annual crops
(d) More than one option is correct.

165. A flash of red light followed by a flash of far red light given during the middle of the light to a short day plant will likely
(a) Cause increased flower production (b) Have no effect upon flowering
(c) Inhibit flowering (d) Stimulate flowering

166. Removal of shoot tips is a very useful technique to boost the production of tealeaves. This is because :
(a) Gibberellins delay senescence of leaves.
(b) Gibberellins prevent bolting and are inactivated.
(c) Auxins prevent leaf drop at early stages.
(d) Effect of auxins is removed and growth of lateral buds is enhanced.

167. In order to increase the yield of sugarcane crop, which of the following plant growth regulators should be sprayed?
(a) Cytokinins (b) Ethylene (c) Auxins (d) Gibberellin

168. It takes very long time for pineapple plants to produce flowers. Which combination of hormones can be applied to artificially induce flowering in pineapple plants throughout the year to increase yield?
(a) Auxin and Ethylene (b) Gibberellin and Cytokinin
(c) Gibberellin and Abscisic acid (d) Cytokinin and Abscisic acid

15 PLANT GROWTH AND DEVELOPMENT

1. d	2. b	3. a	4. a	5. a	6. d	7. d	8. a	9. a	10. d
11. b	12. b	13. d	14. c	15. d	16. d	17. a	18. b	19. b	20. d
21. b	22. c	23. d	24. c	25. d	26. c	27. d	28. c	29. a	30. d
31. a	32. d	33. c	34. d	35. b	36. d	37. c	38. d	39. a	40. c
41. d	42. d	43. a	44. d	45. c	46. c	47. a	48. c	49. a	50. d
51. a	52. a	53. d	54. b	55. b	56. d	57. a	58. c	59. a	60. c
61. a	62. c	63. d	64. c	65. b	66. a	67. c	68. d	69. c	70. c
71. d	72. d	73. c	74. d	75. b	76. a	77. c	78. a	79. d	80. a
81. d	82. b	83. c	84. d	85. a	86. c	87. a	88. d	89. c	90. d
91. d	92. c	93. b	94. b	95. b	96. a	97. d	98. d	99. b	100. b
101. d	102. b	103. a	104. d	105. a	106. a	107. b	108. b	109. a	110. a
111. b	112. c	113. a	114. c	115. d	116. a	117. d	118. a	119. c	120. a
121. a	122. a	123. b	124. c	125. c	126. b	127. d	128. d	129. a	130. c
131. b	132. a	133 d	134. b	135. b	136. b	137. d	138. b	139. d	140. d
141. c	142. b	143. a	144. c	145. b	146. c	147. d	148. c	149. d	150. b
151. c	152. d	153. d	154. b	155. c	156. b	157. a	158. b	159. d	160. d
161. a	162. a	163. a	164. a	165. b	166. d	167. d	168. a		

16 DIGESTION AND ABSORPTION

1. Which of the following components of our food are taken in small quantities?
   (a) Carbohydrate and proteins (b) Proteins and minerals
   (c) Proteins and lipids (d) Minerals and vitamins
2. Which of the following molecules can be used by us as a source of energy?
   (a) Carbohydrates only (b) Fats only
   (c) Carbohydrates or fats (d) Carbohydrates, fats and vitamins
3. Digestion is –
   (a) Absorption of diffusible food
   (b) Absorption of water
   (c) Throwing out of non-diffusible food substances
   (d) Conversion of non-diffusible complex food substances into simple absorbable forms
4. Dental formula of adult person is –
   (a) $\frac{2122}{2122}$ (b) $\frac{2114}{2114}$ (c) $\frac{2123}{2123}$ (d) $\frac{2123}{2124}$
5. Our teeth are –
   (a) Acrodont and homodont (b) Homodont and polyphyodont
   (c) Thecodont, diphyodont and heterodont (d) Acrodont, homodont and polyphyodont
6. Frenulum is –
   (a) Adenoid present on pharyngeal wall (b) tonsils located on lateral wall of soft palate
   (c) Fold attaching tongue to the floor of oral cavity (d) V-shaped sulcus for terminalis on tongue
7. The hard chewing surface of teeth helping in mastication of food is called –
   (a) Dentine (b) Frenulum (c) Root (d) Enamel
8. The upper surface of the tongue has small projections, some of which bear taste buds. These projections are called–
   (a) Papillae (b) Taste pore (c) Frenulus (d) Sulcus terminalis
9. The common passage for food and air is –
   (a) Gullet (b) Glottis (c) Larynx (d) Pharynx
10. The oesophagus and trachea (wind pipe) open into –
    (a) Gullet (b) Glottis (c) Larynx (d) Pharynx
11. A thin long tube extending posteriorly and passing through neck, thorax and a diaphragm and leading to stomach is called –
    (a) Pharynx (b) Trachea (c) Oesophagus (d) Larynx
12. Our stomach is –
    (a) U-shaped (b) J-shaped (c) C-shaped (d) Rod-shaped
13. A muscular sphincter regulating opening of oesophagus into the stomach is called –
    (a) Pyloric sphincter (b) Cardiac Sphincter (c) Sphincter of oddi (d) Boyden sphincter
14. Cardiac sphincter is –
    (a) Gastro-oesophageal sphincter (b) Gastro-duodenal sphincter
    (c) Pyloric sphincter (d) None
15. The stomach is located in the upper _____ portion of the _____ cavity –
    (a) Right, thoracic (b) Left, abdominal (c) Right, abdominal (d) Left, thoracic
16. The narrow distal part of stomach leading to the intestine is called –
    (a) Cardiac (b) Pyloric (c) Fundus (d) None

17. The proximal part of stomach in which oesophagus opens is called –
(a) Cardiac (b) Pyloric (c) Fundus (d) None

18. Which of the following is not the part of stomach?
(a) Caecum (b) Pyloric (c) Fundus (d) Cardiac

19. Small intestine is distinguishable into 3 parts, a 'C' shaped _____, a long coiled middle portion _____ and a highly coiled _____ –
(a) ileum, jejunum, duodenum (b) duodenum, Jejunum, ilium
(c) duodenum, jejunum, ileum (d) caecum, duodenum, ileum

20. The opening of stomach into duodenum is guarded by –
(a) Cardiac sphincter (b) Sphincter of Boyden (c) Sphincter of Oddi (d) Pyloric sphincter

21. Ileum is –
(a) First part of small intestine (b) Middle part of small intestine
(c) Last part of small intestine (d) First part of large intestine

22. Which of the following parts of small intestine opens into large intestine?
(a) Duodenum (b) Ileum (c) Jejunum (d) Colon

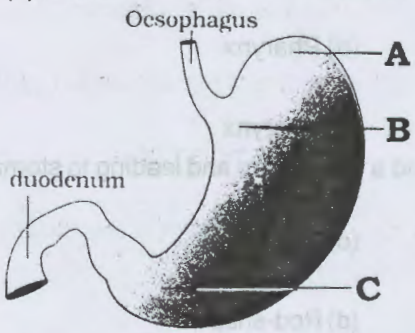
23. All of the following is the part of large intestine except –
(a) Ileum (b) Caecum (c) Colon (d) Rectum

24. Caecum is small blind sac which hosts some symbiotic micro-organisms. From it a small finger like vestigeal organ arises. This organ is called –
(a) Parotid gland (b) Vermis (c) Vermiform appendix (d) Lacteals

25. Caecum opens into –
(a) Rectum (b) Duodenum (c) Colon (d) Jejunum

26. Which of the following organs has 3 parts (ascending, transverse and descending parts) –
(a) Colon (b) Caecum (c) Small intestine (d) Large intestine

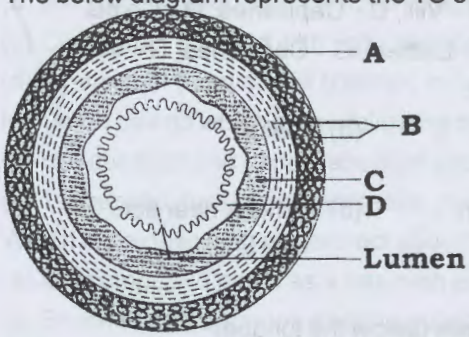
27. Which of the following sequence is correct?
(a) Descending part of colon → Rectum → Anus (b) Stomach → Jejunum → Duodenum
(c) Ileum → Colon → Caecum (d) Colon → Anus → Rectum

28. 

Anatomical regions of human stomach are –
(a) A - Fundus; B - Pyloric; C - Cardiac (b) A - Cardiac; B - Fundus; C - Pyloric
(c) A - Fundus; B - Cardiac; C - Pyloric (d) A - Pyloric; B - Fundus; C - Cardiac

29. The wall of alimentary canal from oesophagus to rectum posses four layers. The sequence of these layers is –
(a) Serosa → Mucosa → Submucosa → Muscularis
(b) Muscularis → Serosa → Mucosa → Submucosa
(c) Serosa → Muscularis → Mucosa → Submucosa
(d) Serosa → Muscularis → Submucosa → Mucosa

30. The below diagram represents the TS of Gut. Identify A, B, C and D –



(a) A - Serosa; B - Muscularis; C - Submucosa; D - Mucosa
(b) A - Muscularis; B - Serosa; C - Submucosa; D - Mucosa
(c) A - Serosa; B - Muscularis; C - Mucosa; D - Submucosa
(d) A - Serosa; B - Submucosa; C - Muscularis; D - Mucosa

31. Epiglottis is a cartilaginous flap which prevents the entry of food into –
(a) Glottis (b) Gullet (c) Oesophagus (d) None of the above

32. Duodenal glands / Brunner's glands are present in –
(a) Submucosa (b) Mucosa (c) Muscularis (d) Serosa

33. Mucosa forms irregular folds (rugae) in the –
(a) Ileum (b) Stomach (c) Jejunum (d) Colon

34. Mucosa forms many small finger like villi in the –
(a) Stomach (b) Colon (c) Caecum (d) Small intestine

35. The many projections on the wall of small intestine function to –
(a) Secrete digestion enzymes
(b) Increase the surface area
(c) Hold products of digestion so they do not enter the large intestine
(d) Hold mucus, so ulcers do not form

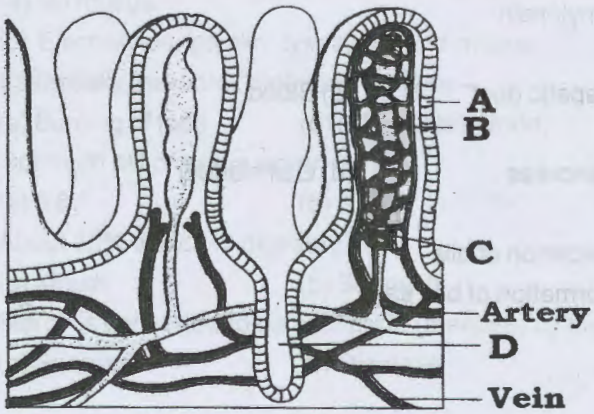
36. Which layer of the gut is responsible for peristalsis?
(a) Smooth muscles (b) Mucosa (c) Submucosa (d) Serosa

37. Which of the following statements is false?
(a) Mucosal epithelium has goblet cells which secrete mucus for lubrication
(b) Mucosa forms gastric glands in the stomach and crypts in between the bases of villi in intestine
(c) Cells lining the villi has brush border or microvilli
(d) All the four basic layer in the wall of gut never show modification in different parts of the alimentary canal

38. Lacteals, lymph capillaries are found in –
(a) Spleen (b) Intestinal villi (c) Salivary gland (d) Mammary gland

39. Intestinal villi are supplied with –
(a) Only blood capillaries (b) Only lacteals (c) Lacteals and valves (d) Blood capillaries and lacteals

40. The below diagram represents a section of small intestinal mucosa showing villi. Identify A, B, C and D –



(a) A - Villi, B - Lacteal, C - Capillaries, D - Crypts (b) A - Lacteal, B - Villi, C - Capillaries, D - Crypts
(c) A - Villi, B - Lacteal, C - Crypts, D - Capillaries (d) A - Crypts, B - Lacteal, C - Capillaries, D - Villi

41. Number of salivary glands present in human being is –
(a) 5 pairs (b) 3 pairs (c) 4 pairs (d) 2 pairs

42. Parotid glands are located below –
(a) Eye (b) Tongue (c) Floor of mouth (d) In cheek near ear

43. Which of the following salivary gland is absent in human beings?
(a) Zygomatic (b) Parotids
(c) The sub-maxillary / sub-mandibular (lower jaw) (d) The sub-linguals (below the tongue)

44. Saliva is secreted by –
(a) Liver (b) Gastric gland (c) Duodenal gland (d) None

45. Which one is the largest gland?
(a) Liver (b) Pancreas (c) Salivary gland (d) Gastric gland

46. Liver secretes?
(a) No digestive enzymes (b) Many digestive enzymes (c) Hormones (d) Succus entericus

47. Liver of man is –
(a) Bilobed (b) 3-lobed (c) 4-lobed (d) 5-lobed

48. Digestive juice lacking enzyme but aiding digestion is –
(a) Chyle (b) Chyme (c) Bile (d) Succus entericus

49. In adult human liver weighs –
(a) 2 kg (b) 2-3 kg (c) 500 g (d) 1.2 to 1.5 kg

50. Liver is situated in –
(a) Thoracic cavity (b) Above the thoracic cavity
(c) In abdominal cavity below diaphragm (d) In abdominal cavity above diaphragm

51. Which of the following is the structural and functional unit of liver?
(a) Hepatic cells (b) Hepatic cord (c) Hepatic lobule (d) Hepatic lobe

52. Find out the correct match –

Column I	Column II
A. Hepatic lobule	I. Base of Villi
B. Crypts of leiberkuhn	II. Glisson's capsule
C. Sphincter of Oddi	III. Gall bladder
D. Cystic duct	IV. Hepato-pancreatic duct

(a) A - II, B - I, C - IV, D - III (b) A - I, B - II, C - IV, D - III (c) A - I, B - II, C - III, D - IV (d) A - IV, B - III, C - II, D - I

53. Hepatocytes secrete –
(a) Lipase (b) Bile, no digestive enzymes
(c) Bile with digestive enzymes (d) Amylopsin

54. Bile is produced by –
(a) Gall bladder (b) Liver (c) Hepatic duct (d) Blood

55. Cystic duct arises from –
(a) Liver (b) Kidney (c) Pancreas (d) Gall bladder

56. Function of gall bladder is –
(a) Storage of bile (b) Secretion of bile
(c) Formation of digestive enzyme (d) Formation of bile salts

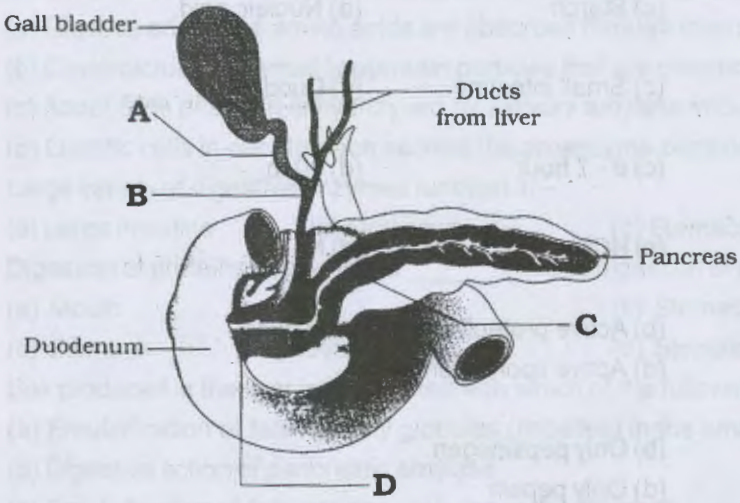
57. Common bile duct is formed when
(a) Right and left hepatic ducts are fused

(b) Bile duct is fused with pancreatic duct
(c) Cystic duct is fused with right hepatic duct.
(d) Cystic duct (duct of gall bladder) is fused with a common hepatic duct

58. In human beings which of the following opens into the duodenum –
(a) Hepatic duct and pancreatic duct separately (b) Hepato-pancreatic duct
(c) 1st hepatic duct, then pancreatic duct (d) 1st pancreatic duct then hepatic duct

59. Which of the following is incorrect about pancreas?
(a) It is compound gland as it has both exocrine and endocrine part
(b) Exocrine part secretes alkaline pancreatic juice having enzymes
(c) Endocrine part secretes hormones like insulin and glucagon
(d) It is surrounded by Glisson's capsule

60. The below diagram is a duct system of liver, gall bladder and pancreas. Write the names of ducts from A to D –



(a) A - Cystic duct, B - Bile duct, C - Pancreatic duct, D - Hepato-pancreatic duct
(b) A - Bile duct, B - Cystic duct, C - Pancreatic duct, D - Hepato-pancreatic duct
(c) A - Cystic duct, B - Bile duct, C - Hepato-pancreatic duct, D - Pancreatic duct
(d) A - Cystic duct, B - Pancreatic duct, C - Bile duct, D - Hepato-pancreatic duct

61. Process of digestion is accomplished by –
(a) Only mechanical process (b) Only chemical process
(c) Neither mechanical nor chemical process (d) Both mechanical and chemical processes

62. In human being digestion of starch starts from –
(a) Mouth (b) Stomach (c) Duodenum (d) Oesophagus

63. Saliva has –
(a) No mucus (b) Amylase / Ptyalin, lysozyme but no mucus
(c) Electrolytes, ptyalin, lysozyme and mucus (d) Only salivary amylase

64. Essentially the word "digestion" means –
(a) Burning of food (b) hydrolysis of food (c) Breaking down of food (d) Oxidation of food

65. Optimum pH of saliva action is –
(a) 6.8 (b) 8.6 (c) 7 (d) 9.5

66. About 30% starch is digested in –
(a) Mouth (b) Stomach (c) Small intestine (d) Colon

67. Starch is converted to disaccharide (maltose) by the action of
(a) Sucrose (b) Diastase (c) Maltose (d) Amylase

68. Which of the following statements about starch digestion is false?
(a) It begins in mouth (b) It occurs in stomach
(c) It requires the action of pancreatic amylase (d) Its digestion is completed into small intestine

69. Lysozyme –
(a) Acts on lipid (b) Acts on lactose (c) Is antibacterial agent (d) Is like lipase

70. Find out the correct matching between the cells of gastric gland and their respective secretory products –

Column I	Column II
A. Neck cells	I. HCl, Intrinsic factor
B. Peptic / Chief cells	II. Mucus
C. Parietal / Oxyntic cells	III. Pepsinogen

(a) A - II, B - III, C - I (b) A - III, B - II, C - I (c) A - I, B - II, C - III (d) A - II, B - I, C - III

71. Stomach is the site of digestion mainly of –
(a) Protein (b) Lipid (c) Starch (d) Nucleic acid

72. Digestion of protein starts from –
(a) Mouth (b) Stomach (c) Small intestine (d) Duodenum

73. The stomach stores food for –
(a) 4 - 5 hours (b) 1 hour (c) 6 - 7 hour (d) 30 m

74. Pepsinogen is activated by –
(a) Trypsin (b) Chymotrypsin (c) HCl (d) Na^+

75. Pepsin is –
(a) Inactive proteolytic gastric enzyme (b) Active proteolytic gastric enzyme
(c) Active enzyme of pancreatic juice (d) Active lipolytic enzyme

76. Gastric juice has –
(a) Only HCl (b) Only pepsinogen
(c) Mucus, bicarbonates, pepsin and HCl (d) Only pepsin

77. pH at which pepsin acts is –
(a) 1.8 (b) 5.8 (c) 6.8 (d) 7.8

78. Pepsin converts –
(a) Protein into amino acid (b) Fat into fatty acid
(c) Peptones into amino acid (d) Proteins into proteoses and peptones (peptides)

79. Mucus and bicarbonates in gastric juice –
(a) Lubricate the food (b) Protect mucosal epithelium from HCl
(c) Active pepsinogen (d) Both a and b

80. The pulpy and partially digested food inside the stomach is called –
(a) Chyle (b) Chyme (c) Bolus (d) None

81. Which of the following statement is false?
(a) Intrinsic factor is essential for absorption of Vit B_{12}
(b) Gastric gland never secretes even a small amount of lipase
(c) Rennin, a proteolytic enzyme (for milk proteins) found in gastric juice of infants
(d) All

82. Three secretions meeting the food in small intestine are –
(a) Bile, gastric juice and saliva
(b) Bile, pancreatic juice and gastric juice
(c) Pancreatic juice, intestinal juice and gastric juice
(d) Bile, pancreatic juice and succus entericus

83. Trypsinogen, chymotrypsinogen, procarboxypeptidase, amylase, lipase and nuclease enzymes are found in –
(a) Pancreatic juice (a) Succus intericus / intestinal juice
(c) Gastric juice (d) Bile and gastric juice

84. Pancreatic inactive enzymes are –
(a) Trypsinogen (b) Chymotrypsinogen (c) Procarboxypeptidase (d) All

85. When you eat an apple your body breaks down the tissue of the apple and absorbs the nutrients. What is the correct path that an apple would take through your digestive system?
(a) Mouth, stomach, small intestine, colon (b) Stomach, mouth, small intestine, colon
(c) Small intestine, colon, stomach, mouth (d) Mouth, small intestine, stomach, colon

86. Which of the following lists the four stages of food processing in order?
(a) Ingestion, digestion, absorption, elimination (b) Digestion, ingestion, absorption, elimination
(c) Ingestion, absorption, elimination, digestion (d) Ingestion, digestion, elimination, absorption

87. Which one of the following statements is true regarding digestion and absorption of food in humans?
(a) Glucose and some amino acids are absorbed through intestinal mucosa with the help of carrier proteins.
(b) Chylomicrons are small lipoprotein particles that are transported from intestine into blood capillaries.
(c) About 60% of starch is hydrolysed by salivary amylase in our mouth.
(d) Oxyntic cells in our stomach secrete the proenzyme pepsinogen.

88. Large variety of digestive enzymes function in –
(a) Large intestine (b) Oral cavity (c) Stomach (d) Small intestine

89. Digestion of proteins begins in the _____ and digestion of polysaccharides begins in the _____.
(a) Mouth ..... stomach (b) Stomach ..... small intestine
(c) Stomach ..... mouth (d) Stomach ..... stomach

90. Bile produced in the liver is associated with which of the following?
(a) Emulsification of fats into tiny globules (micelles) in the small intestine by bile salts
(b) Digestive action of pancreatic amylase
(c) Emulsification of fats into tiny globules in the stomach
(d) Digestion of proteins into amino acids

91. Most of the chemical digestion of food in humans is completed in the –
(a) Small intestine (b) Appendix (c) Ascending colon (d) Stomach

92. Waves of muscle contraction that move the intestinal content are –
(a) Caused by contraction of skeletal muscle (b) Regulated by liver secretions
(c) Called peristalsis (d) Voluntary

93. Digestive enzymes responsible for breaking down disaccharides include –
(a) pepsin, trypsin and trypsinogen (b) Amylase, pepsin and lipase
(c) Sucrase, lactase and maltase (d) Pepsin, trypsin and chymotrypsin

94. Which function of the liver results in the production of bile pigments?
(a) Breakdown of haemoglobin (b) Deamination of amino acids
(c) Detoxification of metabolic poisons (d) Release of stored vitamin A

95. Trypsin digests protein in –
(a) Stomach in acidic medium (b) Stomach in alkaline medium
(c) Duodenum in acidic medium (d) Duodenum in alkaline medium

96. Vermiform appendix is made up of –
(a) Digestion tissue (b) Respiratory tissue (c) Excretory tissue (d) Lymphatic tissue

97. Bile aids in digestion and absorption of fats because it contains –
(a) Lipase (b) Bile salts (c) Bile pigments (d) All of the above

98. Emulsification of fat is carried out by –
(a) Bile pigments (b) Bile salts (c) HCl (d) Pancreatic juice

99. Enzymes required for starch digestion occur in humans in –
(a) Saliva and pancreatic juice (b) Saliva and gastric juice
(c) Gastric juice and pancreatic juice (d) Gastric and duodenal juices

100. Proteolytic enzymes are –
(a) Pepsin, trypsin and peptidase (b) Amylopsin, steapsin and ptyalin
(c) Amylase, lipase and zymase (d) Zymase, dehydrogenase and urease

101. Aminopeptidase, a digestive enzyme produces –
(a) Tripeptidases (b) Smaller peptides (c) peptones (d) Amino acids

102. Lacteals take part –
(a) Digestion of milk (b) Absorption of fat / fatty acids and glycerol
(c) Digestion of lactic acid (d) None of the above

103. Enterokinase / enteropeptidase takes part in conversion of –
(a) Pepsinogen to pepsin (b) Trypsinogen to trypsin (c) Protein into polypeptides (d) Caseinogen into casein

104. Enterokinase is –
(a) Pancreatic hormone (b) Intestinal hormone (c) Pancreatic enzyme (d) Component of intestinal juice

105. Optimum pH for enzyme trypsin is –
(a) 5.9 (b) 4.6 (c) 8.5 (d) 7.0

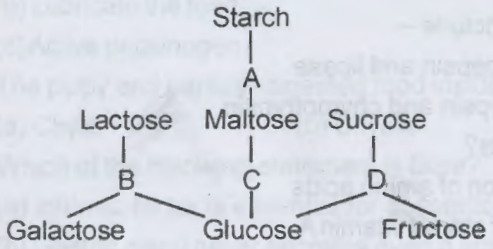
106. First step in digestion of fat is –
(a) Emulsification (b) Enzyme action
(c) Absorption by lacteals (d) Storage in adipose tissue

107. Both starch and proteins are digested by –
(a) Saliva (b) Pancreatic juice (c) Gastric juice (d) Bile

108. Protein digesting enzyme is –
(a) Pepsin (b) Chymotrypsinogen (c) Trophoprotein (d) Amylase

109. Point out the wrong enzymatic reaction –
(a) Sucrose $\xrightarrow{\text{Invertase}}$ Glucose + Fructose (b) Lactose $\xrightarrow{\text{Lactase}}$ Glucose + Fructose
(c) Pepsinogen $\xrightarrow{\text{HCl}}$ Pepsin (d) Maltose $\xrightarrow{\text{Maltase}}$ Glucose + Glucose

110. Identify enzymes a, b, c, and d in digestion of carbohydrates –



(a) A - Amylase, B - Invertase, C - Maltase, D - Lactase
(b) A - Amylase, B - Lactase, C - Maltase, D - Invertase
(c) A - Amylase, B - Maltase, C - Lactase, D - Invertase
(d) A - Amylase, B - Maltase, C - Invertase, D - Lactase

111. Find out the correct sequence of substrate, enzyme and product –
(a) Small intestine : Proteins $\xrightarrow{\text{Pepsin}}$ Amino acids

(b) Stomach : Fats $\xrightarrow{\text{Lipase}}$ Micelles

(c) Duodenum : Triglycerides $\xrightarrow{\text{Trypsin}}$ Monoglycerides

(d) Small intestine : Starch $\xrightarrow{\alpha\text{-Amylase}}$ Maltose

112. Match the columns and choose the correct option –

Column I	Column II
A. Salivary amylase	I. Proteins
B. Bile Salts	II. Milk proteins
C. Rennin	III. Starch
D. Pepsin	IV. Lipids

(a) A - III, B - IV, C - II, D - I (b) A - III, B - IV, C - I, D - II

(c) A - IV, B - III, C - II, D - I (d) A - I, B - II, C - III, D - IV

113. The bile has cholesterol, bile salts, phospholipids and –

(a) Bilirubin and biliverdin (b) biliprotein (c) Bipeptidase (d) All

114. Which one(s) is bile pigment?

(a) Bilirubin and haemoglobin (b) Biliverdin and cytochrome

(c) Bilirubin and biliverdin (d) Haemoglobin and cytochrome

115. The intestinal mucosal epithelium has goblet cells which secretes –

(a) Digestive enzymes (b) Intestinal digestive enzymes

(c) Mucus (d) Succus intericus

116. The secretion of the brush border cells along with secretions of goblet cells present in mucosa of small intestine constitutes –

(a) Chyme (b) Chyle (c) Succus entericus (d) Interstitial fluid

117. The juice having maltase, dipeptidase, lipase, nucleotidase, nucleosidase, etc is called –

(a) pancreatic juice (b) Gastric juice (c) Intestinal juice ./ Succus intericus (d) Bile

118. Protection of intestinal mucosa as well as alkaline medium (pH = 7.8) for enzymatic actions in small intestine is provided by –

(a) Mucus of intestinal juice (b) Bicarbonate from pancreas

(c) Mucus and bicarbonates from Brunner's gland / duodenal glands (d) All

119. Which of the following processes is helped by bile salts –

(a) Nucleic acid $\xrightarrow[\text{Nuclease}]{}$ Nucleotides $\xrightarrow[\text{Nucleotidase}]{}$ Nucleosides $\xrightarrow[\text{Nucleosidase}]{}$ Sugar + bases

(b) Sucrose $\xrightarrow[\text{Sucrase}]{}$ Glucose + Fructose

(c) Fats $\xrightarrow[\text{Lipase}]{}$ Diglycerides $\longrightarrow$ Monoglycerides

(d) Proteins, Peptones, Proteoses $\xrightarrow[\text{Carboxypeptidase}]{\text{Trypsin / Chymotrypsin}}$ Dipeptides

120. Which of the following statements is false?

(a) The breakdown of most of biomacromolecules occurs in duodenum

(b) Simple substances (digested foods) are absorbed in the jejunum and ileum

(c) Very significant digestive activity occurs in large intestine

(d) Undigested and unabsorbed substances are passed on to the large intestine

121. Which of the following is not the function of large intestine?

(a) Absorption of some water, minerals and certain drugs

(b) Nutrient absorption

(c) Secretion of mucus to lubricate faeces
(d) Temporary storage of faeces in rectum

122. The undigested substance (faeces) enter into the _____ of large intestine through _____ valve which prevents backflow of faecal matter –
(a) Caecum, ileo-caecal (b) Colon, ileo-colon valve (c) Rectum, Recto-colonic (d) Colon, pyloric valve

123. The activities of gastrointestinal tract –
(a) Are under neural control only (b) Are under hormonal control only
(c) Are under neural and hormonal control (d) Are under neither hormonal nor neural control

124. Secretion of saliva can be stimulated by –
(a) Sight of food (b) Smell of food
(c) Presence of food in oral cavity (d) All

125. In addition to neural control, hormones also influence the –
(a) Gastric secretions
(b) Intestinal secretions
(c) Muscular activities of different parts of alimentary canal
(d) All

126. Hormonal control of the secretion of digestive juice is carried out by local _____ produced by _____ and _____ mucosa.
(a) Neurotransmitters, liver, pancreas (b) Hormones, Liver, pancreas
(c) Hormones, Gastric, intestinal (d) Neurotransmitters, gastric, intestinal

127. Absorption of digested food is carried out by –
(a) Passive method (b) Active transport (c) Facilitated transport (d) All

128. Glucose and amino acids are absorbed in the intestine by –
(a) Active transport (b) Passive transport (c) Selective absorption (d) Osmosis

129. Which of the following statements is incorrect?
I. Absorption of simple sugar, alcohol, some water and medicines takes place in stomach
II. Maximum water absorption occurs in small intestine
III. Small intestine is the major site of digestion and absorption of food
IV. Fatty acid and glycerol are absorbed by lacteals
V. Nothing is absorbed in mouth and large intestine
(a) I, IV and V (b) V (c) IV (d) II and III

130. Fructose and some amino acids are absorbed by –
(a) Active transport (b) Diffusion (c) Facilitated transport (d) Osmosis

131. Amino acids, glucose, electrolytes like Na^+ are absorbed by –
(a) Active transport (b) Passive transport (c) Facilitated transport (d) Osmosis

132. Which of the following statement is wrong about chylomicrons?
I. Chylomicrons are produced in the epithelial cells of small intestine
II. It contains triglycerides, cholesterol and phospholipids
III. It is protein coated small vesicles
IV. Chylomicrons are released from the epithelial cell into lacteals
(a) I and IV (b) II and III (c) I, II, III and IV (d) None of the above

133. Chylomicrons are concerned with –
(a) Digestion of fats (b) Absorption of proteins (c) Digestion of protein (d) Absorption of fats

134. The absorbed substances finally reach the tissue which utilize them for their activities. This process is called –
(a) Assimilation (b) Emulsification (c) Catabolism (d) Digestion

135. Defaecation –

(a) Is a voluntary process (b) Is carried out by a mass peristaltic movement
(c) Both (d) Is otherwise known as ingestion

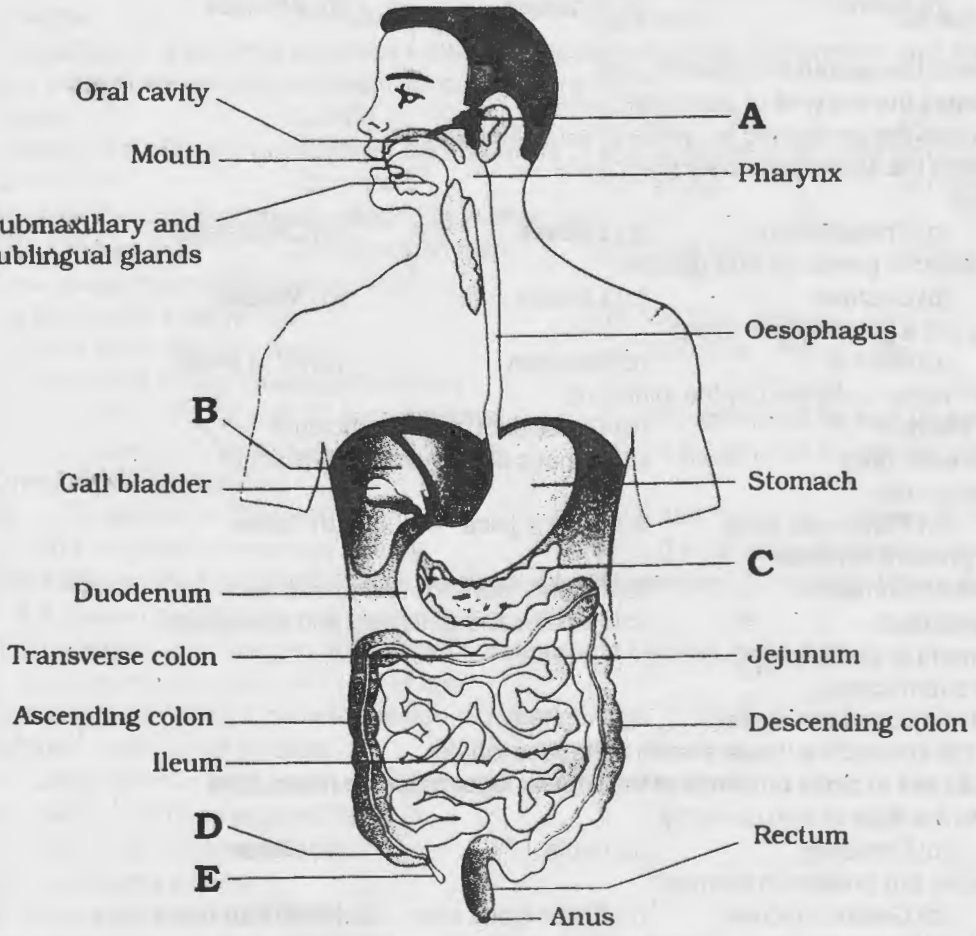
136. Which of the following statements is incorrect?
(a) Faecal accumulation in the rectum initiates a neural reflex causing an urge for its removal
(b) Reflex action for vomiting is controlled by medulla
(c) Irregular bowel movements cause constipation
(d) In diarrhoea absorption of food is increased

137. The cause(s) of indigestion is / are –
(a) Inadequate enzymes secretion (b) Anxiety
(c) Food poisoning, over eating and spicy food (d) All

138. The abnormal frequent bowel movement and increased liquidity of faecal discharge is known as –
(a) Constipation (b) Vomiting (c) Diarrhoea (d) Indigestion

139. Swelling of gut is the most common ailment due to –
(a) Bacterial infections
(b) Viral infections
(c) Infection of intestinal parasites (e.g. different types of worms)
(d) All

140. The below diagram represents the human digestive system. Identify A, B, C, D and E



(a) A - Parotid gland, B - Liver, C - Pancreas, D - Caecum, E - Vermiform appendix
(b) A - Parotid gland, B - Pancreas, C - Liver, D - Caecum, E - Vermiform appendix
(c) A - Parotid gland, B - Caecum C - Pancreas, D - Liver, E - Vermiform appendix
(d) A - Parotid gland, B - Liver, C - Caecum, D - Pancreas, E - Vermiform appendix

141. The primary dentition in human differs from permanent dentition in not having one of the following type of teeth.
(a) Molars (b) Incisors (c) Canines (d) Premolars

142. The digestion of butter begins with
(a) Saliva (b) Large intestine contents
(c) Pancreatic juice (d) Lysozyme

143. Protein coated small fat globules for absorption are called
(a) Chylomicrons (b) Micelles (c) Lacteals (d) None of these

144. Glucose, some amino acids and sodium are absorbed in to blood by
(a) simple diffusion
(b) Active transport
(c) Facilitated transport
(d) The statement is incorrect since they are absorbed in lymph and not in blood

145. The disaccharidases are secreted with
(a) Saliva (b) Gastric juice (c) Intestinal juice (d) Pancreatic juice

146. The utilization of absorbed food substances by tissues is called
(a) Deglutition (b) Assimilation (c) Emulsification (d) Constipation

147. The hydrolytic action of the following enzyme produces pentose sugar
(a) Amylase (b) Sucrase (c) Nucleotidase (d) None of these

148. Succus entericus is a term used for
(a) The junction of ileum and colon (b) Inflammation of intestine
(c) Vermiform appendix (d) Digestive juice of intestine

149. Gastric juice does not contain
(a) Lipase (b) Rennin (c) Protease (d) Amylase

150. Enterokinase is
(a) A hormone that prevents the secretion of gastric juice
(b) An enzyme that activates the enzyme of pancreatic juice
(c) An enzyme that activates the proteolytic enzymes of succus entericus
(d) A hormone that prevents the secretion of pancreatic juice

151. Bile juice does not contain
(a) Bilirubin (b) Phospholipids (c) Lipases (d) Cholesterol

152. Hydrolysis by following enzyme produces only glucose
(a) Amylase (b) Sucrase (c) Lactase (d) Maltase

153. Which of the following is not a proteolytic enzyme
(a) Chymotrypsin (b) Rennin (c) Steapsin (d) All of these

154. The common bile duct in human is formed by the joining of
(a) Pancreatic duct and bile duct (b) Cystic duct and hepatic duct
(c) Cystic duct and pancreatic duct (d) Hepatic duct and pancreatic duct

155. Carbohydrases are missing from
(a) Intestinal juice (b) Pancreatic juice (c) Gastric juice (d) Saliva

156. The sphincter of Oddi is present between
(a) Oesophagus and cardiac stomach (b) Pyloric stomach and duodenum
(c) Hepatic duct and cystic duct (d) Hepatopancreatic duct and duodenum

157. Mark the incorrect statement in the following
(a) Brunner's glands are submucosal
(b) Irregular folds of gastric mucosa are rugae
(c) Glisson's capsule is the connective tissue sheath of hepatic lobule
(d) Mesothelium or serosa lies in close proximity of the circular layer of tunica muscularis

158. The tongue is attached to the floor or oral cavity by
(a) Papillae (b) Frenulum (c) Uvula (d) Gullet

159. How many types of tissues are present in stomach
(a) Oral mucosa (b) Gastric mucosa (c) Three types only (d) All four types

160. The absorption of water alcohol and simple sugars occurs in
(a) Oral mucosa (b) Gastric mucosa (c) Mucosa of ileum only (d) Mucosa

161. If for some reason the parietal cells of the gastric epithelium become partially non-functional, what is likely to happen?
(a) The pancreatic enzymes and specially the trypsin and lipase will not work efficiently

(b) The pH of stomach will fall abruptly
(c) Steapsin will be more effective
(d) Proteins will not be adequately hydrolysed by pepsin into proteoses and peptones

162. Jaundice is a disorder of
(a) Excretory system (b) Skin and eyes (c) Digestive system (d) Circulatory system

163. Go through the following statements
I. Your stomach is located right behind your belly button.
II. The Large Intestine is responsible for removing water from the undigested food, turning it from a liquid paste into solid waste. –
III. The esophagus is a muscular tube that carries food from our mouth to our stomach.
IV. Everything we eat is completely digested and used by our bodies.
V. The job of the digestive system is to break food down so that our bodies can use it as fuel or energy.
The correct statements are –
(a) I and IV (b) II and IV (c) I, III and IV (d) II, III and V

164. What is inside your stomach that helps break food down into a thick liquid paste?
(a) water (b) acids and enzymes
(c) villi (d) stomach does not take part in breaking the food

165. What are the tiny finger-like projections called that are inside the small intestine? These tiny finger-like projections absorb the nutrients form the food and send the vitamins, minerals, proteins, carbohydrates and fats into our bloodstream.
(a) esophagus (b) arteries (c) villi (d) Flagella

166. What is removed from the undigested food when it is in the Large Intestine?
(a) water (b) nutrients (c) energy (d) sugar

167. An analysis of a patient's diet shows they ate 90g carbohydrate, 10g protein, and 10g fat each day. Approximately how many Calories did this patient consume in one day?
(a) 440 (b) 470 (c) 490 (d) 740

168. Which of the following accounts for the difference in energy between fats and carbohydrates/proteins?
(a) Nitrogen (b) Water (c) Hydrogen (d) Oxygen

169. Average kilocalorie of energy needed by woman is
(a) Less than man (b) More than man (c) Equal to man (d) Cannot be predicted

170. An average man needs approximately
(a) 2900 Kcal. energy / day (b) 500 Kcal. energy / day
(c) 1000 Kcal. energy / day (d) 2000 Kcal. energy / day

171. Balanced diet should have approximately
(a) 1/5 protein, 3/5 fat and 1/5 carbohydrate (b) 3/5 protein, 1/5 fat and 1/5 carbohydrate
(c) 1/5 protein, 1/5 fat and 3/5 carbohydrate (d) 1/2 protein, 1/4 fat and 3/5 carbohydrate

172. One gram of fat produces
(a) 4.1 k. calories of chemical energy (b) 9.45 k. calories of chemical energy
(c) 7.0 k. calories of chemical energy (d) 5.0 k. calories of chemical energy

173. The following are the symptoms of Kwashiorkor and Marasmus. Categorized them correctly.
I. It is caused by deficiency of protein in the diet.
II. It is caused by prolonged deficiency of proteins and calories in the diet.
III.It affects infants under one year of age.
IV. It commonly affects babies between 1-3 years of age.
V. Subcutaneous fat persists.
VI. Subcutaneous fat is used up, making ribs very prominent.
VII. Oedema affects legs and face.
VIII. Skin and hair change colour.
IX. No oedema occurs.
X. No change in skin and hair colour.
(a) Kwashiorkor - I, IV, V, VII, VIII; Marasmus - II, III, VI, IX, X
(b) Kwashiorkor - I, II, V, VI, VIII, IX; Marasmus - III, IV, VII, X
(c) Kwashiorkor - II, III, VI, IX, X; Marasmus - I, IV, V, VII, VIII
(d) Kwashiorkor - III, IV, VII, X; Marasmus - I, II, V, VI, VIII, IX

174. The common passage for bile and pancreatic juice is

(a) ampulla of Vater (b) ductus choledochus (d) duct of Wirsung (d) duct of Santorini

175. Where do certain symbiotic microorganisms normally occur in human body ?
(a) Caecum (b) Oral lining and tongue surface
(c) Vermiform appendix and rectum (d) Duodenum

176. The falciform ligament in man connects
(a) liver with diaphragm (b) lungs with diaphragm
(c) stomach with diaphragm (d) liver with stomach.

177. Argentaffin cells in human beings are found in
(a) small intestine (b) stomach (c) liver (d) both (a) and (b)

178. In human beings, the three pair of salivary glands and numerous buccal glands produce about
(a) 1.0 dm^3 of saliva per day (b) 1.5 dm^3 of saliva per day
(c) 2.0 dm^3 of saliva per day (d) 2.5 dm^3 of saliva per day.

179. In the gastrointestinal tract the Meissner's plexus and the Auerbach's plexus occur respectively in the
(a) lamina propria and muscularis mucosa (b) submucosa and muscularis externs
(c) submucosa and mucosa (d) mucosa and muscularis externs.

180. Anxiety and eating spicy food together in an otherwise normal human, may lead to
(a) Indigestion (b) Jaundice (c) Diarrhoea (d) Vomiting

181. How is the digestion of fats different from that of proteins and carbohydrates?
(a) Fat digestion occurs in the small intestine, and the digestion of proteins and carbohydrates occurs in the stomach.
(b) Fats are absorbed into the cells as fatty acids and monoglycerides but are then modified for absorption into the blood; amino acids and glucose are not modified further.
(c) Fats enter the hepatic portal circulation, but digested proteins and carbohydrates enter the lymphatic system.
(d) Digested fats are absorbed in the large intestine, and digested proteins and carbohydrates are absorbed in the small intestine.

182. Select the correct match of the digested products in humans given in column-I with their' absorption site and mechanism in column-II

	Column - I	Column - II
(1)	Fructose, Na^+	Small intestine, passive absorption
(2)	Glycerol, fatty acids	Duodenum, move as chilomicrons
(3)	Cholesterol, maltose	Large intestine, active absorption
(4)	Glycine, glucose	Small intestine, active absorption

(a) Option (1) (b) Option (2) (c) Option (3) (d) Option (4)

183. Go through the statements.
A. All foods begin their enzymatic digestion in the mouth.
B. After leaving the oral cavity, the bolus enters the larynx.
C. The epiglottis prevents food from entering the trachea.
D. Enzyme production continues in the esophagus.
E. The trachea leads to the esophagus and then to the stomach.
How many statement is / are correct?
(a) One (b) Two (c) Three (d) Four

184. The initial step in the digestion of milk in humans is carried out by ?
(a) Lipase (b) Trypsin (c) Rennin (d) Pepsin

185. Fructose is absorbed into the blood through mucosa cells of intestine by the process called :
(a) active transport (b) facilitated transport (c) simple diffusion (d) co-transport mechanism

186. Which enzymes are likely to act on the baked potatoes eaten by a man, starting from the mouth and as it moves dow the alimentary canal?

(a) Salivary maltase → carboxy peptidase → trypsinogen

(b) Pancreatic amylase → salivary amylase → lipases

(c) Disaccharidase like maltase → lipases → nucleases

(d) Salivary amylase → pancreatic amylase → disaccharidases

187. Which of the following organs does not produce any digestive enzymes?

(a) Salivary gland (b) Pancreas (c) Liver (d) Stomach

188. Choose the correct answer among the following Brush border enzymes are

(a) Maltase, sucrase, lactase (b) Trypsin, chymotrypsin, carboxypeptidase

(c) Amylase, nuclease, lipase (d) Nucleotidase, nucleosidase, amylase

189 Read the statements A, B, C and D given below. Select the option which correctly states whether the statement is True (T) or False (F).

A. Gastric glands of the stomach mucosa have oxyntic / chief cells which secrete HCl.

B. Rennin is a proteolytic enzyme found in gastric juice in infants which helps in the digestion of milk proteins.

C. Fructose and some amino acids like glycine are absorbed with the help of carrier ions Na+ called facilitated transport.

D. Vomiting is a reflex action controlled by the vomit centre in hypothalamus.

Options –

	A	B	C	D
(a)	T	T	T	F
(b)	F	T	T	F
(c)	F	F	T	T
(d)	F	T	F	T

190. Which of the following is / are characteristic of saliva?

A. It contains Na^+, K^+, Cl^-, HCO_3^-. Its pH is 6.8

B. Secretion rate is increased by sympathetic nervous system.

C. Characterised by salivary amylase and lingual lipase.

D. About 60% starch is hydrolysed in buccal cavity by α-salivary amylase.

Options

(a) A and B are correct (b) B and C are correct (c) B and D are correct (d) A and C are correct

191. Mark the incorrect statement about the enzyme carboxypeptidase

(a) Zinc is the co-factor for this proteolytic enzyme

(b) It is exopeptidase

(c) It cleaves the peptide bond at N-terminal end of the polypeptide chain

(d) It is an enzyme of pancreatic juice

192. If the oxyntic cells of gastric glands are rendered non-functional then which of the following process is / are affected?

A. Digestion of proteins in alkaline medium

B. Absorption of vitamin B_{12}

C. Digestion of starch

D. Digestion of fats by lingual lipase

(a) A only (b) A and B (c) B (d) A, B, C and D

193. Study the following reactions given below catalysed by enzymes A, B, C and D.

I. Maltose $\xrightarrow{A}$ Glucose + Glucose

II. Starch $\xrightarrow{B}$ Maltose + Isomaltose

III. Nucleic acids $\xrightarrow{C}$ Nucleotides

IV. Lactose $\xrightarrow{D}$ Glucose + Galactose

Choose the option which includes enzymes present in succus entericus

(a) A and B (b) A and C (c) C and D (d) A and D

194. Choose the correct statement among the following.

(a) The intestinal mucosal epithelium has oxyntic cells.

(b) Ptyalin converts proteins into proteoses and peptones.

(c) Crypts of Lieberkuhn is seen between the bases of villi in the intestine

(d) Sphincter of Oddi is present at the junction of oesophagus and cardiac stomach

195. The alimentary canal in humans has length of

(a) 6 - 9 metres (b) 2 - 5 metres (c) 10 - 28 metres (d) 1 - 2 metres

196. This is a storing organ

(a) Gall bladder (b) Liver (c) Pancreas (d) Colon

197. Zymogenic cells of gastric gland secrete

(a) Pepsinogen (b) Trypsin (c) Pepsin (d) Chymotrypsin

198. Which organ secretes most of the plasma proteins?

(a) pancreas (b) heart (c) kidney (d) liver

199. Which of the following statements is not correct?

(a) Oxyntic cells are present in the mucosa of stomach and secrete HCl.

(b) Acini are present in the pancreas and secrete carboxypeptidase

(c) Brunner's glands are present in the submucosa of stomach and secrete pepsinogen

(d) Goblet cells are present in the mucosa of intestine and secrete mucus

200. Gastric juice of infants contains

(a) Pepsinogen, lipase, rennin (b) Amylase, rennin, pepsinogen

(c) Maltase, pepsinogen, rennin (d) Nuclease, pepsinogen, lipase

201. The enzyme that is not present in succus entericus is

(a) Nucleosidase (b) Lipase (c) Maltase (d) Nuclease

202. Which of the following guards the opening of hepatopancreatic duct into the duodenum ?

(a) Semilunar valve (b) Ileocaecal valve (c) Pyloric sphincter (d) Sphincter of Oddi

203. In the stomach, gastric acid is secreted by the :-

(a) gastrin secreting cells (b) parietal cells (c) peptic cells (d) acidic cells

204. Which hormones do stimulate the production of pancreatic juice and bicarbonate?

(a) Cholecystokinin and secretin (b) Insulin and glucagon

(c) Angiotensin and epinephrine (d) Gastrin and insulin

205. Kupffer cell is present in :

(a) Liver (b) Pancreas (c) Kidney (d) Intestine

206. Trypsinogen is activated by :

(a) HCl (b) Enterokinase (c) Bile (d) Chymotrypsin

207. Fatty substances are emulsified by :

(a) Lipase enzyme (b) Bilirubin and biliverdin

(c) HCl (d) Sodium salts of glycocholic and taurocholic acids

208. Where is Brunner's gland located ?

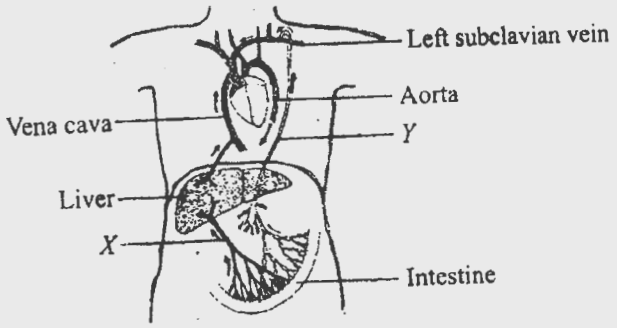
(a) Submucosa of duodenum (b) Submucosa of stomach

(c) Mucosa of oesophagus (d) Mucosa of ileum

Digestion and Absorption

209. Synthesis of glucose from sources other than carbohydrate is called
(a) Glycolysis (b) Glycogenesis (c) Gluconeogenesis (d) Glycogenolysis

210. Observe the given figure having arrows to illustrate the movement of absorbed food in the body. Identify X and Y and select the correct option regarding the presence or absence of sugars, amino acids and fatty acids / glycerol in absorbed food in X and Y.



	Sugars		Amino acids		Fatty acids / glycerol	
	X	Y	X	Y	X	Y
(a)	Yes	No	No	No	Yes	Yes
(b)	Yes	No	Yes	No	No	Yes
(c)	No	Yes	No	Yes	No	Yes
(d)	Yes	Yes	No	No	Yes	Yes

211. Acid neutralizer present in mucus of saliva:
(a) Bicarbonate ion (b) Thiocyanate (c) Sodium acetate (d) Sodium hydroxide

212. Enamel is composed principally of
(a) Ca phosphate (b) Ca sulphate (c) Ca chloride (d) Na phosphate

213. Go through the statements.
I. Glisson's capsule is characteristic feature of mammalian liver.
II. The opening of hepatopancreatic ampulla is guarded by sphincter of Oddi.
III. Fatty acids and glycerol cannot reach the blood stream directly.
IV. Fatty acids and glycerol are insoluble in water
Which is / are correct?
(a) Only statement - I is correct (b) Only statement - II is correct
(c) Only statement - III is correct (d) All statements are correct

214. Select the correct sequence of the flow of bile from the liver.
(a) Hepatic ducts → Gall bladder → Cystic duct → Bile duct → Hepatopancreatic ampulla → Duodenum.
(b) Hepatic ducts → Cystic duct → Hepatopancreatic ampulla → Bile duct → Gall bladder → Duodenum.
(c) Hepatic ducts → Cystic duct → Bile duct → Gall bladder → Hepatopancreatic ampulla → Duodenum.
(d) Hepatic ducts → Bile duct → Hepatopancreatic ampulla → Cystic duct → Gall bladder → Duodenum.

215. Mucosa membrane of alimentary canal consists of
(a) muscular mucosa (b) lamina propria (c) epithelium (d) all of these.

216. Go through the following statements.
(i) Na^+ is coupled with absorption of glucose & amino acids
(ii) Most ions are actively absorbed along the length of small intestine
(iii) Water Absorption – 95% of water is absorbed in the small intestines by osmosis.
Which statement is correct?
(a) (i) and (ii) only (b) (ii) and (iii) only (c) All are correct (d) None are correct

217. A healthy person eats the following diet – 5 gm raw sugar, 4 gm albumin, 10 gm pure buffalo ghee adultrated with 2 gm vegetable ghee (hydrogenate vegetable oil), 5 gm lignin. How many calories he is likely to get?
(a) 126 (b) 164 (c) 112 (d) 144

218. Which of the following is NOT directly dependent on a person's adequate protein intake?
(a) Formation of enzymes (b) Formation of glycoen stores in the liver
(c) Production of antibodies in the immune system (d) Production of muscle tissue.

219. Which of the following is NOT a function of the vertebrate liver?
(a) Converts excess glucose to glycogen (b) Deaminates excess amino acids
(c) Produces bile (d) Conserves body water

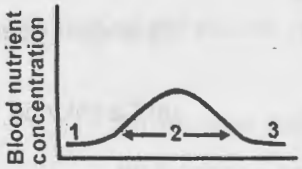
220. Which cells of "Crypts of Lieberkuhn" secrete antibacterial lysozyme ?
(a) Paneth cells (b) Zymogen cells (c) Kupffer cells (d) Argentaffin cells

221. Which of the following options best represents the enzyme composition of pancreatic juice ?
(a) amylase, pepsin, trypsinogen, maltase (b) peptidase, amylase, pepsin, rennin
(c) lipase, amylase, trypsinogen, procarboxypeptidase (d) amylase, peptidase, trypsinogen, rennin

222. A baby boy aged two years is admitted to play school and passes through a dental check - up. The dentist observed that the boy had twenty teeth. Which teeth were absent?
(a) Canines (b) Pre-molars (c) Molars (d) Incisors

223. Which of following processes occurring in the stomach is autocatalysis?
(a) Low pH denaturing the proteinaceous substances in food. (b) Low pH activating pepsinogen to pepsin.
(c) Absorption of monomeric molecules in chyme. (d) Pepsin activating more pepsinogen molecules.

224. The accompanying graph indicates digestion of food. 1, 2 and 3 indicate :



(a) 1 and 2-mouth, 3-stomach (b) 1-mouth, 2-stomach, 3-small intestine
(c) 1-mouth, 2-oesophagus, 3-stomach (d) 1-stomach, 2-small intestine, 3-large intestine

225. Which of the following sugars is absorbed from the small intestine by facilitated diffusion?
(a) Fructose (b) Glucose (c) Sucrose (d) Lactose

226. Which of the following gastric cells indirectly help in erythropoiesis?
(a) Goblet cells (b) Mucous cells (c) Chief cells (d) Parietal cells

227. Which of the following terms describe human dentition?
(a) Pleurodont, Monophyodont, Homodont (b) Thecodont, Diphyodont, Heterodont
(c) Thecodont, Diphyodont, Homodont (d) Pleurodont, Diphyodont, Heterodont

228. Which among the following is predominant epithelia in digestive tract?
(a) Stratified squamous epithelia (b) Simple cuboidal epithelia
(c) Simple squamous epithelia (d) Pseudostratified ciliated epithelia

229. Which of the following options correctly describes the sequence of enzymes involved in digestion of proteins?

Proteins $\xrightarrow{(i)}$ Peptones $\xrightarrow{(ii)}$ Dipeptides $\xrightarrow{(iii)}$ Amino acids

(a) (i) Pepsin ; (ii) Carboxypeptidase ; (iii) Trypsin
(b) (i) Pepsin; (ii) Chymotrypsin; (iii) Trypsin
(c) (i) Pepsin; (ii) Chymotrypsin; (iii) Dipeptidase
(d) (i) Trypsin; (ii) Pepsin; (iii) Dipeptidase

230. Which of the following options is incorrect regarding digestion of fats?
(a) Lipase is present in pancreatic juice but absent in intestinal juice.
(b) Emulsification of fat increases the action of lipase on fat.
(c) Most of the fat is digested by pancreatic lipase in the small intestine.
(d) Bile salts convert fat droplets into smaller ones by reducing their surface tension.

231. Which of the following is **incorrect** about oesophagus?
(a) Presence of visceral peritoneum on outside
(b) Absence of diqestive glands
(c) Mucus membrane lined by non-keratinized stratified squamous epithelium
(d) Presence of involuntary muscles in posterior two third part of oesophagus

232. Which of the following sequence is **correct** for the layers of the wall of stomach from outside to inside?
(a) Serosa – LMF – CMF – Submucosa – Mucosa
(b) Mucosa – CMF – LMF – OMF – Submucosa
(c) Serosa – LMF – CMF – OMF – Submucosa – Mucosa
(d) Serosa – LMF – OMF – CMF – Mucosa – Submucosa

233. Choose the **wrong** match.
(a) Salivary Amylase - Starch - Slightly acidic medium - Dextrins
(b) Chymotrypsin - Derived proteins - Acidic pH - Amino acids
(c) Steapsin - Triglycerides - Alkaline pH - Monoglyceride
(d) Nucleosidase - Nucleoside - Alkaline pH - Purine

234. Identify the incorrect statement regarding human dentition:
(a) The dental formula of a young child would be 2102/2102
(b) The human teeth are thecodont, diphyodont and heterodont
(c) The enamel is secreted by the odontoblasts and the dentin by the ameloblasts
(d) The pulp of the human tooth is sometimes also called as the "nerve" of the tooth

235. Match each item in Column I with one in Column II and choose the correct answer from the codes given below:

COLUMN I	COLUMN II
A. Epiglottis	I. Prevents reflux of acidic gastric secretions into esophagus
B. Cardiac Sphincter	II. Regulates opening of hepato-pancreatic duct into the duodenum
C. Pyloric sphincter	III. Prevents entry of food into the airway
D. Sphincter of Oddi	IV. Gaurds the opening of stomach into duodenum

Codes

	A	B	C	D
(a)	III	IV	II	I
(b)	III	I	IV	II
(c)	III	II	I	IV
(d)	I	IV	II	III

236. How many of the given statements are correct:
I. The gut wall has an inner circular and an outer longitudinal muscular layer
II. An oblique muscle layer may be present in the stomach
III. Brunner's glands are submucosal glands in the duodenum
IV. Irregular folds of mucosa in stomach are called as rugae
V. Crypts of lieberkuhn are seen in intestine
VI. The later part of the small intestine is lined with columnar brush bordered epithelium
(a) 3 (b) 4 (c) 5 (d) 6

Digestion and Absorption

237. Match each item in COLUMN I with one in COLUMN II and choose your answer from the codes given below:

COLUMN I	COLUMN II
A. Stenson's duct	I. Acini
B. Exocrine pancreas	II. Stores bile
C. Glisson's capsule	III. Parotid
D. Gall bladder	IV. Covering of hepatic lobule

Codes

	A	B	C	D		A	B	C	D
(a)	III	I	IV	II	(b)	I	IV	III	II
(c)	III	I	II	IV	(d)	I	II	III	IV

238. Identify the incorrect statement regarding the gastric secretions in humans:
(a) Probably the only life saving function of humans is secretion of Castle's intrinsic factor
(b) Human stomach also produces a small amount of lipase
(c) HCl secreted by oxyntic [parietal] cells coverts pepsinogen into pepsin
(d) Gastric secretion are regulated by the diencephalon

239. Trypsinogen can be activated by:
(a) Enterogastrone (b) HCl (c) Trypsin (d) Bile

240. Succus entericus does not contain:
(a) Dipeptidase (b) Sucrase (c) Nuclease (d) Lipase

241. What is true regarding the absorption of end products of digestion in humans?
(a) Fructose is absorbed by simple diffusion.
(b) Some drugs like acetyl salicylic acid and alcohol are absorbed from the oral mucosa
(c) The largest amount of water is absorbed from the large intestine
(d) Fatty acids and glycerol are reformed into chylomicrons that are transported into lacteals

242. What is incorrect for Marasmus?
(a) It is due to deficiency of both proteins and calories
(b) Its occurrence increase generally at a younger age than Kwashiokor
(c) Edema and ascites are the main clinical features
(d) The prognosis is better than that of Kwashiorkor

243. Which of the following hormones contracts gall bladder and also helps pancreas secrete its enzymes?
(a) Gastrin (b) Cholecystokinin (c) Secretin (d) Gastric inhibitory peptide

244. A vitamin that is not stored in the liver is vitamin :
(a) C (b) K (c) B_{12} (d) A

245. The enzyme which does not directly act upon the food substance in the small intestine of man is
(a) amylopsin (b) lipase (c) Enterokinase (d) trypsin

246. Match the following structures with their respective location in organs

A. Crypts of Lieberkuhn	(i) Pancreas
B. Glisson's Capsule	(ii) Duodenum
C. Islets of Langerhans	(iii) Small intestine
D. Brunner's Glands	(iv) Liver

Select the correct option from the following

	A	B	C	D
(a)	(iii)	(i)	(ii)	(iv)
(b)	(ii)	(iv)	(i)	(iii)
(c)	(iii)	(iv)	(i)	(ii)
(d)	(iii)	(ii)	(i)	(iv)

247. Select the correct sequence of organs in the alimentary canal of cockroach starting from mouth
(a) Pharynx ---> Oesophagus ---> Crop ---> Gizzard ---> Ileum ---> Colon ---> Rectum
(b) Pharynx ---> Oesophagus ---> Gizzard ---> Crop ---> Ileum ---> Colon ---> Rectum
(c) Pharynx ---> Oesophagus ---> Gizzard ---> Ileum ---> Crop ---> Colon ---> Rectum
(d) Pharynx ---> Oesophagus ---> Ileum ---> Crop ---> Gizzard ---> Colon ---> Rectum

248. Identify the cells whose secretion protects the lining of gastro-intestinal tract from various enzymes.
(a) Chief Cells (b) Goblet Cells (c) Oxyntic Cells (d) Duodenal Cells

249. What triggers activation of protoxin to active Bt toxin of Bacillus thuringiensis in boll worm?
(a) Body temperature (b) Moist surface of midgut (3) Alkaline pH of gut (4) Acidic pH of stomach

250. Match the items given in Column-I with those in Column-II and choose the correct option.

Column-I	Column-II
A. Rennin	(i) Vitamin B12
B. Enterokinase	(ii) Facilitated transport
C. Oxyntic cells	(iii)Milk proteins
D. Fructose	(iv) Trypsinogen

(a) A.-(iii), B.-(iv), C.-(i), D.-(ii) (b) A.-(iii), B.-(iv), C.-(ii), D.-(i)
(c) A.-(iv), B.-(iii), C.-(i), D.-(ii) (d) A.-(iv), B.-(iii), C.-(ii), D.-(i)

251. Kwashiorkor disease is due to
(a) protein deficiency not accompanied by calorie deficiency
(b) simultaneous deficiency of proteins and fats
(c) simultaneous deficiency of proteins and calories
(d) deficiency of carbohydrate

16 DIGESTION AND ABSORPTION

1. d	2. c	3. d	4. c	5. c	6. c	7. d	8. a	9. d	10. d
11. c	12. b	13. b	14. a	15. b	16. b	17. a	18. a	19. c	20. d
21. c	22. b	23. a	24. c	25. c	26. a	27. a	28. c	29. d	30. a
31. a	32. a	33. b	34. d	35. b	36. a	37. d	38. b	39. d	40. a
41. b	42. d	43. a	44. d	45. a	46. a	47. a	48. c	49. d	50. c
51. c	52. a	53. b	54. b	55. d	56. a	57. d	58. b	59. d	60. a
61. d	62. a	63. c	64. b	65. a	66. a	67. d	68. b	69. c	70. a
71. a	72. b	73. a	74. c	75. b	76. c	77. a	78. d	79. d	80. b
81. b	82. d	83. a	84. d	85. a	86. a	87. a	88. d	89. c	90. a
91. a	92. c	93. c	94. a	95. d	96. d	97. b	98. b	99. a	100. a
101. d	102. b	103. b	104. d	105. c	106. a	107. b	108. a	109. b	110. b
111. d	112. a	113. a	114. c	115. c	116. c	117. c	118. d	119. c	120. c
121. b	122. a	123. c	124. d	125. d	126. c	127. d	128. a	129. b	130. c
131. a	132. d	133. d	134. a	135. c	136. d	137. d	138. c	139. d	140. a
141. d	142. c	143. a	144. b	145. c	146. b	147. d	148. d	149. d	150. b
151. c	152. d	153. c	154. b	155. c	156. d	157. d	158. b	159. d	160. b
161. d	162. c.	163. d	164. b	165. c	166. a	167. c	168. d	169. a	170. a
171. c	172. b	173. a	174. a	175. a	176. a	177.d	178. b	179. b	180. a
181. b	182. d	183. a	184. c	185. b	186. d	187. c	188. a	189. b	190. d
191. c	192. c	193. d	194. c	195. a	196.a	197. a	198. d	199. c	200. a
201. d	202. d	203. b	204. a	205. a	206. b	207. d	208. a	209. c	210. b
211. a	212 a	213. d	214. a	215. d	216. c	217. d	218. b	219. d	220. a
221. c	222. b	223. d	224. d	225. a	226. d	227. b	228. a	229. c	230. a
231. a	232. c	233. b	234. c	235. b	236. d	237. a	238. d	239. c	240. c
241. d	242. c	243. b	244. a	245. c	246. c	247. a	248. b	249. c	250. a
251. a									

17 BREATHING AND EXCHANGE OF GASES

1. In which of the following gaseous exchange between O_2 and CO_2 occurs through general body surface?
   (a) Sponges (b) Coelenterates (c) Flatworms (d) All
2. Match the followings correctly –

Animals	Respiratory Organs
A. Earthworms	I. Lungs
B. Most aquatic arthropods	II. Trachea
C. Fishes	III. Gills
D. Birds / Reptiles	IV. Moist cuticle
E. Insects	

   (a) A - IV, B and C - III, D - I, E - II (b) A - IV, B - III, C and D - I, E - III
   (c) A - II, B and C - III, D - I, E - IV (d) A - III, B and C - I, D - II, E - IV
3. Amphibians e.g. frogs respire –
   (a) Through moist skin (b) Lungs (c) Both (d) Trachea
4. Which is the correct sequence of air passages in man?
   (a) External nostril ⟶ Nasal passage ⟶ Internal nostril ⟶ Pharynx ⟶ Larynx ⟶ Trachea ⟶ Bronchi ⟶ Bronchioles ⟶ Alveoli
   (b) Nose ⟶ Larynx ⟶ Pharynx ⟶ Bronchioles ⟶ Bronchi ⟶ Alveoli
   (c) Nose ⟶ Pharynx ⟶ Trachea ⟶ Larynx ⟶ Bronchi ⟶ Bronchioles ⟶ Alveoli
   (d) Nose ⟶ Larynx ⟶ Bronchi ⟶ Pharynx ⟶ Trachea ⟶ Bronchioles ⟶ Alveoli
5. Which is correct about nasopharynx?
   (a) Internal nostrils open into nasopharynx
   (b) It is the common passage for both air and food
   (c) It opens through gullet of the larynx region into the trachea
   (d) All
6. Which of the following options is wrong about the larynx (sound box)
   (a) It is a bony box
   (b) Glottis is the opening into the larynx
   (c) During swallowing of food glottis is covered by epiglottis to prevent food entry into the larynx
   (d) All
7. Trachea divides into right and left primary bronchi at _____th thoracic vertebra.
   (a) 4 (b) 5 (c) 6 (d) 9
8. Incomplete cartilaginous rings support all of the following except –
   (a) Trachea (b) Primary, secondary and tertiary bronchi
   (c) Respiratory bronchioles (d) Initial bronchioles
9. Which of the following has the smallest diameter?
   (a) Trachea (b) Terminal bronchiole (c) Tertiary bronchus (d) Secondary bronchus
10. Lungs are comprised by –
   (a) Only alveoli (b) Pleura
   (c) Different types of bronchi (d) Network of bronchi, bronchioles and alveoli
11. Sites of gaseous exchange in lungs are –
   (a) Alveoli (b) Tracheoles (c) Bronchioles (d) Pleura
12. I. It is double layered and covers the lungs
   II. Fluid between the layers reduces friction on lung-surface
   III. Outer layer is in contact with thoracic wall

IV. Inner layer is in contact with lungs

The above features refer to –

(a) Pericardium (b) Peritoneum (c) Pleura (d) None

13. The part starting with the external nostrils upto the terminal bronchioles constitute the –
(a) Respiratory or exchange part of respiratory system
(b) Inspiratory part
(c) Conducting part
(d) Expiratory part

14. Respiratory or exchange part of the respiratory system consists of –
(a) The parts starting with external nostrils upto terminal bronchioles
(b) Alveoli and their ducts
(c) All bronchi and terminal bronchioles
(d) All bronchioles

15. The conducting part of the respiratory system has functions.
(a) Filter, warm and moisten the air (b) Gaseous exchange
(c) Filtering the air only (d) Warm the air

16. The chamber formed dorsally by the vertebral column, ventrally by sternum, laterally by ribs and on the lower side by dome-shaped diaphragm is –
(a) Abdominal cavity (b) Thoracic cavity (c) Pelvic cavity (d) Cranial cavity

17. The lungs expand in inspiration / inhalation because –
(a) Diaphragm contracts upward (b) The volume of thoracic cavity increases
(c) External intercostal muscles relax (d) Diaphragm relaxes

18. The process of exhalation / expiration is begun mainly due to –
(a) The contraction of intercostal muscles (b) The contraction of the diaphragm
(c) The relaxation of muscles (d) Low pressure in thoracic cavity

19. Which of the following statements about the mechanism of ventilation / breathing is false?
(a) As the diaphragm relaxes, air is expelled from the respiratory system
(b) During inspiration the lungs act as suction pump
(c) Inspiration is a passive and expiration is an active process
(d) For quiet breathing external intercostal muscles and diaphragm play an important role

20. Inspiration occurs when there is a negative pressure in the lungs with respect to atmospheric pressure. This negative pressure is achieved when –
(a) Intrapulmonary pressure is less than the atmospheric pressure
(b) Intra pulmonary pressure is greater than the atmospheric pressure
(c) Intrapulmonary pressure is equal to the atmospheric pressure
(d) Intrapleural pressure becomes more than the intraalveolar pressure

21. Expiration takes place when the intrapulmonary pressure is –
(a) Greater than the atmospheric pressure (b) Lesser than the atmospheric pressure
(c) Equal to atmospheric pressure (d) Equal to intrapleural pressure

22. Which of the following sequences is correct to initiate inspiration?
I. The contraction of external intercostal muscles raises the ribs and sternum
II. Volume of thorax increases in the dorso-ventral axis
III. Intrapulmonary pressure decreases
IV. Diaphragm contraction
V. Air rushes into lungs
VI. Volume of thorax increases in the anterio-posterior axis
(a) I, II, IV, V, III, VI (b) I, II, III, IV, V (c) I, II, IV, VI, III, V (d) VI, V, I, II, III, IV

23. Which of the following sequences is correct to initiate expiration?
I. Relaxation of external intercostal muscles and return of diaphragm and sternum to their normal position

II. Air expelled from lungs
III. Volume of thorax decreases
IV. Intrapulmonary pressure increases
(a) I, III, IV, II (b) II, IV, III, I (c) IV, III, II, I (d) I, II, III, IV

24. On an average, a healthy human breathes _____ times / minute –
(a) 20 - 40 (b) 1 - 6 (c) 12 - 16 (d) 16 - 25

25. Additional muscles for forceful breathing are –
(a) Diaphragm and external intercostal muscles (b) Abdominal muscles and internal intercostal muscles
(c) Diaphragm and abdominal muscles (d) External and internal intercostal muscles

26. Match the following –

Column A	**Column B**
1. Tidal Volume	A. Tidal volume and inspiratory reserve volume and expiratory reserve volume
2. Residual volume	B. Additional amount of air inhaled beyond tidal volume when taking a very deep breath
3. Expiratory reserve volume	C. Amount of air remaining in lungs after expiratory reserve volume is expelled
4. Inspiratory reserve volume	D. Tidal volume and inspiratory reserve volume
5. Inspiratory capacity	E. Volume of air in one breath
6. Vital capacity	F. Amount of air exhaled in forced exhalation

(a) 1 - C, 2 - E, 3 - B, 4 - F, 5 - D, 6 - A (b) 1 - E, 2 - F, 3 - C, 4 - B, 5 - A, 6 - D
(c) 1 - E, 2 - C, 3 - F, 4 - B, 5 - D, 6 - A (d) 1 - E, 2 - C, 3 - B, 4 - F, 5 - A, 6 - D

27. Match the columns –

Column I	**Column II**
1. Tidal Volume	A. 2500 - 3000 ml of air
2. Inspiratory reserve volume	B. 1000 ml of air
3. Expiratory reserve volume	C. 500 ml of air
4. Residual volume	D. 3400 - 4800 ml of air
5. Vital capacity	E. 1200 ml of air

(a) 1 - C, 2 - D, 3 - B, 4 - A, 5 - E (b) 1 - C, 2 - A, 3 - B, 4 - E, 5 - D
(c) 1 - C, 2 - A, 3 - D, 4 - E, 5 - B (d) 1 - E, 2 - A, 3 - B, 4 - E, 5 - D

28. Arrange the following in order of increasing volume –
1. Tidal volume
2. Residual volume
3. Expiratory reserve volume
4. Vital capacity
(a) 1 < 2 < 3 < 4 (b) 1 < 4 < 3 < 2 (c) 1 < 3 < 2 < 4 (d) 1 < 4 < 2 < 3

29. Air entering lung is –
1. Warmed 2. Filtered
3. Deprived of some oxygen 4. Enriched with CO_2
What is true?
(a) 1, 2, 3, and 4 (b) 1 and 2 (c) 2 and 4 (d) 2 and 3

30. Different respiratory volumes are given below –
I. Tidal Volume = 500 ml
II. Residual Volume = 1000 ml
III. Inspiratory Reserve Volume = 2500 ml
IV. Expiratory Reserve Volume = 1000 ml
The functional residual capacity (FRC) is –
(a) 3500 ml (b) 2000 ml (c) 600 ml (d) 3000 ml

31. Expiratory capacity is equal to –
(a) TV + ERV (b) ERV + IRV (c) ERV + RV (d) ERV + RV

32. A spirometer cannot be used to measure –

(a) IC (b) RV (c) ERV (d) IRV

33. Exchange of gases –
(a) Occurs between the alveoli and pulmonary blood capillary
(b) Occurs between blood and tissues
(c) By diffusion
(d) All

34. Which of the following factors affect the diffusion of gases?
(a) Partial pressure of diffusing gases (b) Solubility of gases
(c) The thickness of diffusion membrane (d) All

35. Which of the following statements about the partial pressure of CO_2 is true?
(a) It is higher in alveoli than in pulmonary artery
(b) It is higher in the systemic arteries than in tissues
(c) It is higher in systemic veins than in systemic arteries
(d) It is higher in the pulmonary veins than in pulmonary arteries

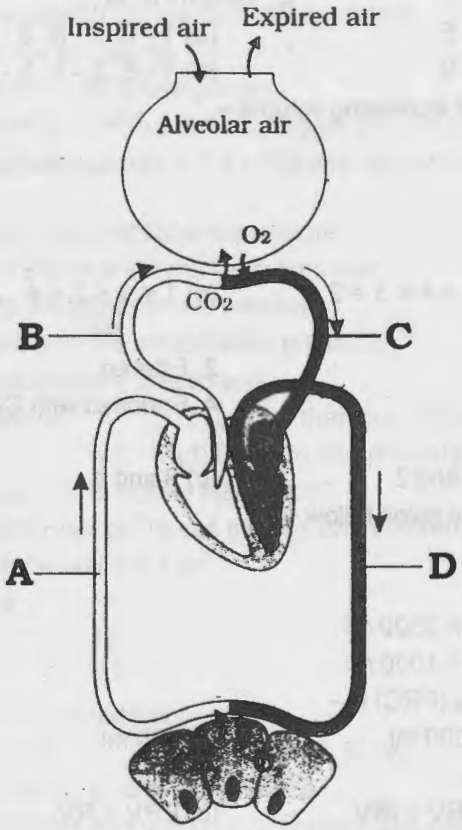
36. The partial pressure of CO_2 in the venous blood is –
(a) Greater than in the tissue spaces (b) Lesser than in the tissue spaces
(c) Lesser than in the arterial blood (d) Less than in alveoli

37. A section of an alveolus with a pulmonary capillary indicates the presence of major layers constituting diffusion membrane –
(a) 3 (b) 2 (c) 6 (d) 10

38. Partial pressures (in mmHg) of O_2 in atmospheric air, alveoli deoxygenated blood, oxygenated blood and tissues are–
(a) 40, 95, 40, 104, 159 (b) 104, 40, 40, 95, 159 (c) 153, 104, 40, 95, 40 (d) 195, 104, 95, 40, 40

39. Partial pressure (in mmHg) of CO_2 in atmospheric air, alveoli, deoxygenated blood, oxygenated blood and tissues are–
(a) 0.3, 40, 45, 40, 45 (b) 40, 45, 40, 45, 0.3 (c) 40, 40, 45, 45, 0.3 (d) 0.3, 45, 45, 40, 40

40.

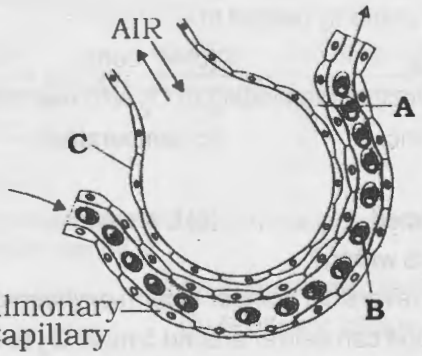


Name the blood vessels A to D –

	A	B	C	D
(a)	Systemic vein	Pulmonary artery	Pulmonary vein	Systemic artery
(b)	Systemic artery	Pulmonary artery	Pulmonary vein	Systemic vein
(c)	Pulmonary artery	Systemic vein	Pulmonary vein	Systemic artery
(d)	Systemic vein	Pulmonary vein	Pulmonary artery	Systemic artery

41. In comparison to solubility of O_2 in blood the solubility of CO_2 is –
(a) 20 - 25 times lesser (b) Slightly higher (c) Slightly greater (d) 20 - 25 times higher

42. Study the accompanying figure.



Identity A to C

	A	B	C
(a)	Basement substance	RBC	Alveolar wall
(b)	O_2	CO_2	Alveolar O_2
(c)	Pleura	RBC	Pericardium
(d)	Pleura	WBC	Pulmonary vein

43. The barrier between the air in alveolus and blood in pulmonary capillary consists of 3 layers and its total thickness
(a) 1 mm (b) more than 1 mm
(c) much less than 1 mm (d) 2 mm

44. Respiration involves following steps –
A. Diffusion of gases O_2 and CO_2 across alveolar membrane
B. Transport of gases by blood
C. Utilization of O_2 by cell for catabolic reactions and resultant release of CO_2
D. Pulmonary ventilation by which atmospheric air is drawn in and CO_2 rich alveolar air is released out
E. Diffusion of O_2 and CO_2 between blood and tissues.
The correct sequence of steps is –
(a) A → B → C → D → E (b) E → D → C → B → A
(c) C → E → B → A → D (d) C → B → E → A → D

45. Total percentage of O_2 transported by haemoglobin or RBC is –
(a) 3% (b) 97% (c) 49% (d) 100%

46. Besides RBC blood plasma also carries O_2 in solution. The percentage is –
(a) 3% (b) 97% (c) 49% (d) 25%

47. CO_2 is transported –
(a) By RBC (b) As bicarbonates (c) In a dissolved state through plasma (d) All

48. The majority of CO_2 is transported as –
(a) Carbonates (b) Bicarbonates (c) Carbaminohaemoglobin (d) Dissolved state in blood

49. Blood carries the CO_2 in 3 forms. The correct percentages of CO_2 in these forms are –

	As carbinohaemoglobin in RBC	As bicarbonates	Dissolved form in plasma
(a)	20 - 25%	70%	7%
(b)	70%	20 - 25%	7%
(c)	20 - 25%	7%	70%
(d)	7%	20 - 25%	70%

50. Gas exchange in animals always involves –
(a) Anaerobic cellular respiration (b) Diffusion across membranes
(c) Active transport of gases (d) None

51. Each molecule of haemoglobin when fully saturated carries how many molecules of O_2 –
(a) 1 (b) 2 (c) 4 (d) 20

52. Dissociation curve is associated with –
(a) Carbonic anhydrase (b) CO (c) $CHCl_3$ (d) Oxyhaemoglobin

53. Binding of O_2 with haemoglobin is primarily related to –
(a) PO_2 (b) PCO_2 (c) H^+ conc. (d) None

54. Besides PO_2 the other factor(s) affecting the binding of O_2 with haemoglobin is / are –
(a) PCO_2 (b) H^+ conc. (c) temperature (d) All

55. Oxygen dissociation curve is –
(a) J-shaped (b) S-shaped (c) L-shaped (d) Zig-zag

56. Which of the following statements is wrong?
(a) O_2 binds with haemoglobin in a reversible manner to form oxyhaemoglobin
(b) Every 100 ml of oxygenated blood can deliver around 5 ml of O_2 to the tissue
(c) Occupational respiratory disorder are characterised by fibrosis (proliferation of fibrous tissues
(d) None

57. What will be the PO_2 and PCO_2 in the atmospheric air compared to those in the alveolar?
(a) PO_2 lesser, PCO_2 higher (b) PO_2 higher, PCO_2 lesser
(c) PO_2 higher, PCO_2 higher (d) PO_2 lesser, PCO_2 lesser

58. Which of the following would have the same O_2 content?
(a) Blood entering the lungs – blood leaving the lungs
(b) Blood entering the right side of the heart – blood leaving the right side of the heart
(c) Blood entering the right side of the heart – blood leaving the left side of the heart
(d) Blood entering the tissue capillaries – blood leaving the tissue capillaries

59. When the percentage saturation of haemoglobin with O_2 is plotted against the PO_2. We get –
(a) J-shaped curve (b) L-shaped curve
(c) S-shaped / sigmoid curve (d) Rectangular graph

60. CO_2 dissociates from carbinohaemoglobin when –
(a) $PO_2 = \downarrow$, $PCO_2 = \downarrow$ (b) $PO_2 = \uparrow$, $PCO_2 = \uparrow$ (c) $PO_2 = \downarrow$, $PCO_2 = \uparrow$ (d) $PO_2 = \uparrow$, $PCO_2 = \downarrow$

61. Which of the following situations would result in the greatest degree of O_2 saturation for haemoglobin, assuming PO_2 remains constant –
(a) Increased CO_2 levels, decreased temperature (b) Increased CO_2 levels, increased temperature
(c) Decreased CO_2 levels, decreased temperature (d) Decreased CO_2 levels, increased temperature

62. Which of the following factors favour the formation of oxyhaemoglobin in lungs?
(a) $PO_2 = \downarrow$, $PCO_2 = \uparrow$, $H^+ = \uparrow$, Temperature = $\uparrow$
(b) $PO_2 = \uparrow$, $PCO_2 = \uparrow$, $H^+ = \downarrow$, Temperature = $\uparrow$
(c) $PO_2 = \uparrow$, $PCO_2 = \downarrow$, pH = $\uparrow$ or $H^+ = \downarrow$, Temperature = $\downarrow$
(d) $PO_2 = \downarrow$, $PCO_2 = \uparrow$, pH = $\uparrow$, Temperature = $\downarrow$

63. All of the following favour the dissociation of oxyhaemoglobin to deliver O_2 to tissues except –
(a) $PO_2 = \uparrow$ (b) $PCO_2 = \uparrow$ or H+ = $\uparrow$ (c) Temperature = $\uparrow$ (d) $PO_2 = \downarrow$

64. The transport of CO_2 by the blood in primarily dependent on –
(a) The solubility of CO_2 in blood
(b) The presence of carbonic anhydrase in RBCs
(c) The ability of haemoglobin to bind and transport CO_2

(d) The ability of other blood proteins

65. Which of the following statements is false?
(a) PO_2 is the major factor which affects the binding of CO_2 with haemoglobin
(b) PCO_2 is low and PO_2 is high as in the tissues, more binding of CO_2 with Hb occurs
(c) RBC contains a very high conc. of carbonic anhydrase and minute quantities of the same in the plasma
(d) Every 100 ml of deoxygenated blood delivers approximately 4 ml of CO_2 to the alveoli

66. Which of the following equation is correct?
(a) $CO_2 \longrightarrow H_2CO_3 \longrightarrow HCO_3^- + H^+$
(b) $CO_2 + H_2O \underset{}{\overset{\text{Carbonic anhydrase}}{\rightleftharpoons}} H_2CO_3 \overset{\text{Carbonic anhydrase}}{\rightleftharpoons} H^+ + HCO_3^-$
(c) $CO_2 + H_2O \longrightarrow CH_4 + 2O_2$
(d) $CO_2 + H_2O \rightleftharpoons CO + H_2O_2$

67. Respiratory process is regulated by certain specialized centres in the brain. One of the following listed centres can reduce the inspiratory duration upon stimulation –
(a) Medullary inspiratory centre (b) Pneumotaxic centre
(c) Chemosynthetic centre (d) Apneustic centre

68. Pneumotaxic centre is present in –
(a) Pons (b) Medulla oblongata (c) Cerebrum (d) Cerebellum

69. The largest proportion of CO_2 carried by blood is in the form of –
(a) Molecular CO_2 dissolved in the plasma (b) Bicarbonates (HCO_3^-) carried within RBCs
(c) HCO_3^- carried in the plasma (d) Molecular CO_2 chemically bound to haemoglobin

70. Which of the following is NOT a function of the lungs?
(a) Metabolism (b) Serves as a reservoir of blood for the left ventricle.
(c) It is a filter to protect the systemic vasculature (d) All of the above are true.

71. The breathing centre initiates ventilation in response to –
(a) A decrease in air pressure (b) A decrease in O_2
(c) An increase in CO_2 (d) The rate of gas exchange in the alveoli

72. All of the following factors play role in the regulation of respiratory rhythm except –
(a) CO_2 (b) H^+ conc. (c) O_2 (d) None of the above is correct

73. Receptors associated with aortic arch and carotid artery can recognise changes in _____ and _____ conc. and send necessary signal to _____ for remedial action.
(a) O_2, CO_2, Pneumothorax (b) CO_2, H^+, rthythm centre
(c) CO_2, H^+, apneustic centre (d) O_2, H^+, Pneumothorax

74. Respiratory centre of brain is stimulated by –
(a) CO_2 content in venous blood (b) CO_2 content in arterial blood
(c) O_2 content in arterial blood (d) O_2 content in venous blood

75. Which of the following equations is correct?
(a) $Hb + O_2 \underset{\text{Dissociation (in lungs)}}{\overset{\text{Association (in tissue)}}{\rightleftharpoons}} HbO_2$
(b) $Hb + O_2 \underset{\text{Association (in tissues)}}{\overset{\text{Dissociation (in lungs)}}{\rightleftharpoons}} HbO_2$
(c) $HbO_2 \underset{\text{Association (in lungs)}}{\overset{\text{Dissociation (in tissues)}}{\rightleftharpoons}} Hb + O_2$
(d) $HbO_2 \underset{\text{Dissociation (in tissues)}}{\overset{\text{Association (in lungs)}}{\rightleftharpoons}} Hb + O_2$

76. Human beings have significant ability to maintain and moderate the respiratory rhythm to suit demands of the body. For it we have –
Respiratory rhythm centre in medulla = R
Pneumotaxic centre in Pons = PT

Chemosensitive area in medulla = C_1

Peripheral chemoreceptors in aortic arch and carotid artery = C_2

Find out the correct path for regulation of respiration

(a) $C_2 \rightarrow R \rightarrow PT \rightarrow C_1$ (b) $PT \rightarrow R \leftarrow C_2$, C_1 (c) $C_1 \rightarrow PT \rightarrow C_2$, R (d) $PT \rightarrow C_2 \rightarrow C_1$, R

77. Asthma is caused by –

(a) Infections of lungs (b) Infection of trachea

(c) Spasm in bronchial muscles (d) Infection in nose

78. Hypoxia is the condition in which less O_2 becomes available to the tissues. This may be due to –

(a) Lesser O_2 in the atmosphere (b) More CO in the air

(c) Less RBC in the blood (d) All

79. One reason for emphysema is –

(a) Cigarette smoking (b) Drug addition (c) Wine consumption (d) Heavy exercise

80. Emphysema is characterised by –

(a) Permanent enlargement and destruction of alveolar area leading to reduction in respiratory surface

(b) Inhibition of respiratory centre

(c) Accumulation of fluid in lungs

(d) Spasm of muscles of trachea

81. Why do human beings have difficulty breathing at high elevations?

(a) O_2 makes up lower percentage of air there (b) The temperature is lower there

(c) The barometric pressure is higher there (d) PO_2 is lower there

82. Which of the following diseases is / are occupational respiratory disorder?

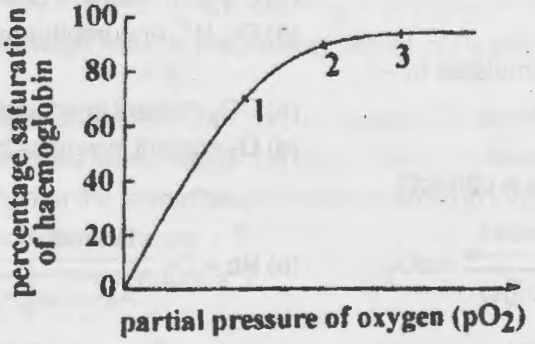
(a) *Silicosis, Fibrosis* and asbestosis (b) Emphysema and mountain sickness

(c) Asthma and Emphysema (d) Asthma and Hepatitis

83. Respiratory control centre lies in –

(a) Pons (b) Medulla oblongata (c) Both (d) Cerebellum

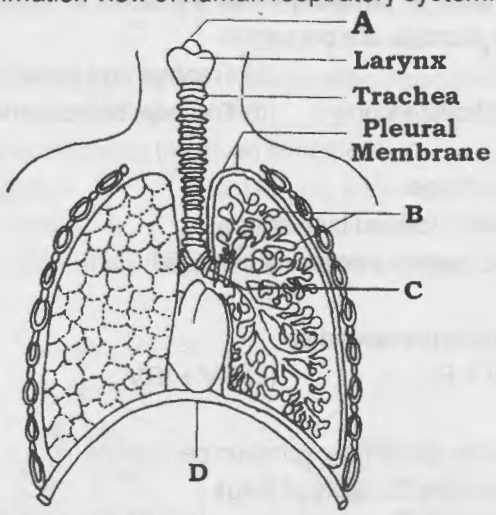
84. The graph shows an oxygen dissociation curve for haemoglobin –



Where in the body will haemoglobin be saturated at the percentages shown at points 1, 2, and 3 on the graph?

	Left ventricle	Pulmonary vein	Vena cava
(a)	1	2	3
(b)	2	1	3
(c)	2	3	1
(d)	3	2	1

85. Go through the following diagrammation view of human respiratory system. Identify A, B, C and D –



(a) A - Epiglottis, B - Alveoli, C - Bronchus, D - Diaphragm
(b) A - Epiglottis, B - Alveoli, C - Bronchioles, D - Diaphragm
(c) A - Soundbox, B - Alveoli, C - Bronchus, D - Diaphragm
(d) A - Soundbox, B - Alveoli, C - Bronchioles, D - Diaphragm

86. The maximum volume of air you can forcefully exhale after taking the deepest possible breath is called
(a) Tidal volume (b) Total respiratory volume
(c) Residual volume (d) Vital capacity

87. The breathing rhythm is generated in the _____ and is influenced by variation in levels of _____ in the blood.
(a) Medulla, CO_2 (b) Medulla, O_2 (c) Frontal lobe, CO_2 and O_2 (d) Frontal lobe, CO_2

88. The Hering-Breuer reflex
(a) Begins with stretch receptors in the trachea
(b) Involves the forebrain
(c) Occurs when mucus blocks the airways
(d) Is an override reflex that prevents the breathing muscles from overdistending and damaging the lungs.

89. Which of the following represents a larger volume of air than is normally found in the resting tidal volume of a human lung?
(a) Residual volume (b) Inspiratory reserve volume
(c) Expiratory reserve volume (d) All of the above

90. Neural control of breathing is in the
(a) cerebrum (b) Diaphragm (c) Medulla (d) Olfactory lobe

91. A large proportion of oxygen is left unused in the human blood even after its uptake by the body tissues. This O_2
(a) Helps in releasing more O_2 to the epithelium tissues
(b) Acts as a reserve during muscular exercise
(c) Raises the pCO_2 of blood to 75 mm of Hg
(d) Is enough to keep oxyhaemoglobin saturation at 96%

92. Two friends are eating together on a dining table. One of them suddenly starts coughing while swallowing some food. This coughing would have been due to improper movement of
(a) Tongue (b) Epiglottis (c) Diaphragm (d) Neck

93. Which one of the following is a possibility for most of us in regard to breathing, by making a conscious effort?
(a) One can breathe out air totally without oxygen
(b) One can breathe out air through eustachian tubes by closing both the nose and the mouth
(c) One can consciously breathe in and breathe out by moving the diaphragm alone, without moving the ribs at all

(d) The lungs can be made fully empty by forcefully breathing out all air from them

94. Cartilagenous rings in respiratory passage are present in
(a) Trachea only (b) Trachea and initial bronchioles only
(c) Trachea, bronchi and initial bronchioles only (d) Trachea, bronchi and all bronchioles

95. Mark the correct statement
(a) Tracheal rings are of hyaline cartilage
(b) Dorsal side of thoracic chamber is formed by sternum
(c) Expiration occurs when there is negative pressure in lungs
(d) All of these

96. Functional residual capacity can be represented as
(a) TV + ERV (b) ERV + RV (c) RV + IRV (d) ERV + TV + IRV

97. 6000 to 8000 ml of air is the
(a) Vital capacity of lungs (b) Volume of normal expiration per minute
(c) Sum of IRV + ERV (d) Inspiratory capacity of lungs

98. The volume of air that remains in the lungs after normal expiration is
(a) Residual volume (b) Vital capacity (c) Expiratory capacity (d) Functional residual capacity

99. Mark incorrect statement in the following
(a) Diffusion membrane is made up of 3-major layers
(b) Solubility of CO_2 is higher than that of O_2 by 20 - 25 times
(c) Breathing volumes are estimated by spirometer
(d) High conc. of hydrogen ions favours oxyhaemoglobin formation

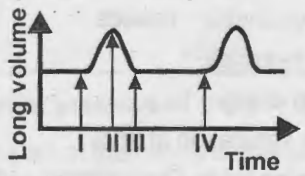
100. Every 100 ml of oxygenated blood delivers following amount of O_2 to the tissues under normal physiological condition
(a) 5 ml (b) 25 ml (c) 50 ml (d) More the 50 ml

101. The Pneumotaxic centre that can moderate the function of respiratory rhythm centre is located in
(a) Dorsal side of medulla (b) Ventral side of medulla
(c) Aortic arch and carotid artery (d) Pons

102. Which of the following does NOT happen during inspiration?
(a) The ribs move upward.
(b) The diaphragm lifts up.
(c) The antero-posterior dimensions of the chest are increased.
(d) The tranverse dimensions of the thorax are increased.

103. Bulk of carbon dioxide (CO_2) released from body tissues into the blood is present as :
(a) bicarbonate in blood plasma and RBCs
(b) free CO, in blood plasma
(c) 70% carbamino-haemoglobin and 30% as bicarbonate
(d) carbamino-haemoglobin in RBCs

104. The given figure illustrates the changes in lung volume during the process of breathing.



The change from II to III indicates the
(a) movement of diaphragm away from the lungs (b) expansion of the thoracic cavity
(c) movement of air out of the lungs (d) expansion of ribs

105. The percentage composition of respiratory gases is given in the table.

	Oxygen	**CO_2**	**Nitrogen**
Inspired air	20.95	0.04	79.01
Expired air	16.4	4.0	79.6

The approximate percentage of oxygen transported by the blood during one complete circulation is

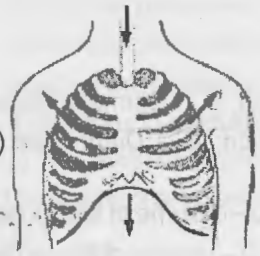
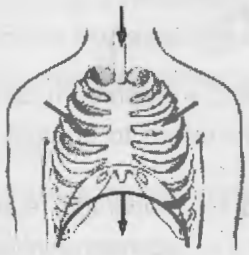
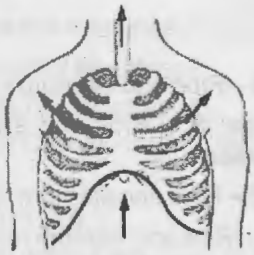
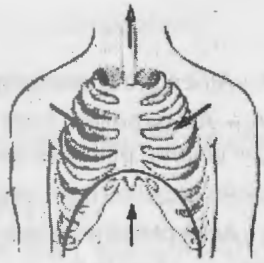
(a) 16 (b) 18 (c) 20 (d) 22

106. Under normal physiological conditions, every 100 mL of oxygenated blood delivers about ___*i*___ of O_2 to the ___*ii*___ and every 100 mL of deoxygenated blood delivers about ___*iii*___ of CO_2 to the ___*iv*___.
The information in which alternative completes the given statement?

(a) i-4 mL; ii-tissues; iii- 5 mL; iv-alveoli (b) i-5 mL; ii-tissues; iii-4 mL; iv-alveoli

(c) i-4 mL; ii-alveoli; iii-5 mL; iv-tissues (d) i-5 mL; ii-alveoli; iii-4 mL; iv-tissues

107. Exhalation is the process of expulsion of air through the respiratory tract. Which figure illustrates the process of exhalation?

(a)  (b)  (c)  (d) 

108. The pneumotaxic centre is present in the ___*i*___ region of the brain. It directly regulates the functions of the___*ii*___. The information in which alternative completes the given statements?

(a) i-pons; ii-chemosensitive area (b) i-cerebellum; ii-chemosensitive area

(c) i-cerebellum; ii-respiratory rhythm centre (d) i-pons; ii-respiratory rhythm centre

109. Haemoglobin combines reversibly with oxygen to form oxyhaemoglobin. Each haemoglobin molecule carries

(a) six oxygen molecules attached to heme groups (b) four oxygen molecules attached to heme groups

(c) six oxygen molecules attached to the globin component

(d) four oxygen molecules attached to the globin component

110. The respiratory membrane is a very thin membrane. It facilitates the exchange of respiratory gases through diffusion. Oxygen enters deoxygenated blood through diffusion because the

(a) partial pressure of oxygen in alveolar air and capillaries is 40 mm Hg and 100 mm Hg respectively.

(b) partial pressure of oxygen in alveolar air and capillaries is 100 mm Hg and 40 mm Hg respectively.

(c) partial pressure of oxygen in alveolar air and capillaries air is 46 mm Hg and 40 mm Hg respectively

(d) partial pressure of oxygen in alveolar air and capillaries is 40 mm Hg and 46 mm Hg respectively.

111. During inspiration, how does alveolar pressure compare to atmospheric pressure?

(a) Alveolar pressure is greater than atmospheric. (b) Alveolar pressure is less than atmospheric.

(c) Alveolar pressure is the same as atmospheric.

(d) Alveolar pressure is one of the few pressures where the reference pressure is not atmospheric.

112. Which of the following is NOT an effector of respiration?

(a) Heart (b) diaphragm (c) intercostals (d) Trapezius.

113. Which of the following is the first branching of the bronchial tree that has gas exchanging capabilities?

(a) Terminal bronchioles. (b) Respiratory bronchioles

(c) Alveoli (d) alveolar ducts.

114. The most powerful respiratory stimulus for breathing in a healthy person is _____.

(a) loss of oxygen in tissues (b) increase of carbon dioxide

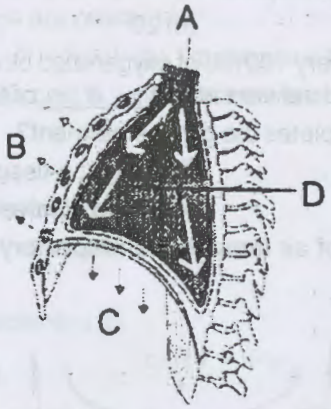
(c) pH (acidosis) (d) pH (alkalosis)

115. Breathing becomes exhalerated when the person open his nose after holding of the breath by closing his nose with finger. This is due to

(a) Decreasing in H^+ in the body (b) Carbon monoxide build up in the body

(c) Decrease in carbon dioxide in arterial blood (d) Carbon dioxide build up in the body

116. Following illustration depicts the mechanism of breathing. In which of the following option all the parts A, B, C and D are correctly labelled?



(a) A – Air entering into lungs; B – Ribs and sternum raised; C – Diaphragm contracted; D – Volume of thorax raised

(b) A – Air expelled from lungs; B – Ribs and sternum return to original position; C – Diaphragm relaxed; D – Volume of thorax decreased

(c) A – Air expelled from lungs; B – Ribs and sternum raised; C – Diaphragm relaxed; D – Volume of thorax decreased

(d) A – Air expelled from lungs; B – Ribs and sternum raised; C – Diaphragm contracted; D – Volume of thorax decreased

117. Which one of the following is the correct statement for respiration in human

(a) Cigarette smoking may lead of inflammation of bronchi

(b) Neural signals from pneumotaxic centre in pons region of brain can increase the duration of inspiration

(c) Workers in grinding and stone - breaking industries may suffer, from lung fibrosis

(d) About 90% of carbon dioxide (CO_2) is carried by haemoglobin as carbamino haemoglobin

118. People who have migrated from the planes to an area adjoining Rohtang Pass about six months back :

(a) have more RBCs and their haemoglobin has a lower binding affinity to O_2.

(b) are not physically fit to play games like football.

(c) suffer from altitude sickness with symptoms like nausea, fatigue, etc.

(d) have the usual RBC count but their haemoglobin has very high binding affinity to O_2.

119. What happens to the windpipe, or trachea, before it reaches the lungs?

(a) It branches in two directions. (b) It branches in three directions.

(c) It vibrates and creates sounds. (d) It closes up so that no oxygen can escape.

120. When we breathe in, we inhale many gases, including oxygen. What happens to the gases that the body can't use?

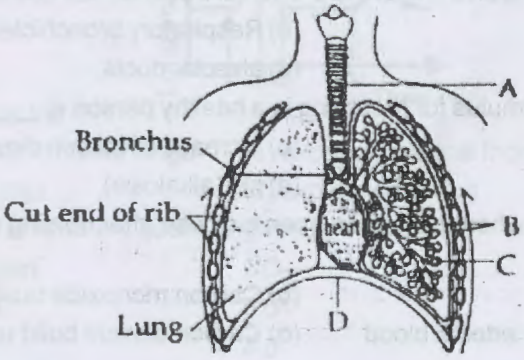
(a) They are exhaled.

(b) They are changed into oxygen by the lungs.

(c) They circulate through the body and are disposed off later.

(d) They are absorbed into the digestive system and used to create energy.

121. The figure shows a diagrammatic view of human respiratory system with labels A, B, C and D. Select the option which gives correct identification and main function and/or characteristics.



(a) B-pleural membrane-surround ribs on both sides to provide cushion against rubbing.
(b) C-Alveoli-thin walled vascular bag like structures for exchange of gases.
(c) D-Lower end of lungs-diaphragm pulls it down during inspiration
(d) A-trachea-long tube supported by complete cartilaginous rings for conducting inspired air.

122. Which of the following is NOT an effector of respiration?
(a) Heart (b) diaphragm (c) intercostals (d) Trapezius.

123. During inspiration, how does alveolar pressure is compared to atmospheric pressure?
(a) Alveolar pressure is greater than atmospheric.
(b) Alveolar pressure is less than atmospheric.
(c) Alveolar pressure is the same as atmospheric.
(d) Alveolar pressure is one of the few pressures where the reference pressure is not atmospheric.

124. Which of the following is not involved in the neural control of breathing?
(a) Neurons in medulla (b) The vagus nerve
(c) The contraction of diaphragm (d) Chemosensor / Chemosensitive area on the surface of medulla

125. The resting tidal volume to vital capacity ratio should be –
(a) 1 : 5 (b) 1 : 9 (c) 1 : 20 (d) 1 : 40

126. A person met with an accident and died instantaneously without any injury to heart, brain, stomach and kidney; one of these must be the reason –
(a) Diaphragm get punctured. (b) Stomach stopped digestion
(c) Intestine get twisted (d) RBC's get coagulated

127. All of the following can bond with haemoglobin except
(a) O_2 (b) H^+ (c) CO_2 (d) HCO_3^-

128. A person has vital capacity of 5L and residual volume of 1.2 L. Total lung capacity –
(a) 6.2 L (b) 4.8 L (c) 500 ml (d) None

129. At rest cardiac output is 5L / min, how much CO_2 is delivered to the lungs to be exhaled each minute?
(a) 4 ml / min. (b) 200 ml / min. (c) 5 ml / min. (d) 1.34 ml / min.

130. The serous membrane which covers the lungs is called
(a) Pericardium (b) Peritoneum (c) Perichondrium (d) Pleura

131. The volume of air that can be breathed in by maximum forced inspiration over and above the normal inspiration is called
(a) Expiratory Reserved Volume (b) Inspiratory Reserved Volume
(c) Vital Capacity (d) Inspiratory Capacity

132. Partial pressures (in mmHg) of respiratory gases at different regions are given below.

Respiratory gas	A	B	C
Oxygen (P)	159	104	40
Carbon dioxide (Q)	0.3	40	45

Identify the regions A, B and C respectively from the options.
(a) P – Alveoli, deoxygenated blood, oxygenated blood.
(b) Q – Tissues, lung alveoli, oxygenated blood.
(c) P – Atmospheric air, alveoli, deoxygenated blood
(d) Q – Atmospheric air, oxygenated blood, alveoli

133. Breathing rate will automatically increase when
(a) Blood pH is high (b) The amount of carbon dioxide in blood increases
(c) Blood acidity decreases (d) Haemoglobin is unloaded

134. When you take a deep breath, your stomach moves out because
(a) Swallowing of air increases the volume of thoracic cavity.

(b) Your stomach should not move out when you take a deep breath, because you want the volume of the chest cavity to increase not abdominal cavity.

(c) Contracting your abdominal muscles pushes your stomach out, generating negative pressure in the lungs

(d) When your diaphragm contracts, it moves down, pressing your abdominal cavity out.

135. Each haemoglobin molecule can carry a maximum of four molecules of O_2. Binding of oxygen with haemoglobin is primarily related to

A. Partial pressure of O_2

B. Partial pressure of CO_2

C. Hydrogen ion concentration

D. Temperature

Options –

(a) B only (b) A only (c) C and D (d) B and D

136. Which of the following pulmonary volumes / capacities is not directly measured by spirometer?

(a) Volume of air inspired or expired during a normal respiration.

(b) Volume of air remaining in the lungs after forcible expiration.

(c) Total volume of air a person can inspire after a normal expiration

(d) The maximum volume of air a person can breath in after a forced expiration.

137. ERV + RV = ? for lungs

(a) FRC (b) VC (c) IRV (d) TV

138. Each 100 mL of human arterial blood carries 'P' mL of O_2 and 'Q' mL of CO_2 whereas each 100 mL of venous blood carries 'R' mL of O_2 and 'S' mL of CO_2. Choose the correct value of P, Q, R and S.

(a) P - 48 mL, Q - 19-20 mL, R - 52 mL, S - 14-15 mL

(b) P - 19-20 mL, Q - 48 mL, R - 14-15 mL, S - 58 mL

(c) P - 14-15 mL, Q - 52 mL, R - 19-20 mL, S - 48 mL

(d) P - 52 mL, Q - 14-15 mL, R - 48 mL, S - 19-20 mL

139. How would health improve if a person suffering from mild emphysema stopped smoking cigarettes?

(a) Goblet cells secrete more mucus, allowing a greater number of pathogens to be trapped.

(b) Increased number of phagocytic macrophages arrive in the lungs

(c) Less atheroma build-up on the inner lining of arteries, increasing lumen diameter.

(d) Less carboxyhaemoglobin produced, increasing oxygen transport by haemoglobin.

140. Which is correct about the affinity between haemoglobin and the gases carbon dioxide, carbon monoxide and oxygen?

	Highest affinity		**Lowest affinity**
(a)	Carbon monoxide	Carbon dioxide	Oxygen
(b)	Carbon monoxide	Oxygen	Carbon dioxide
(c)	Oxygen	Carbon dioxide	Carbon monoxide
(d)	Oxygen	Carbon monoxide	Carbon dioxide

141. The squamous epithelial cells of the alveoli form part of the gas exchange system.

How do these cells assist gas exchange?

1. They contain many mitochondria.

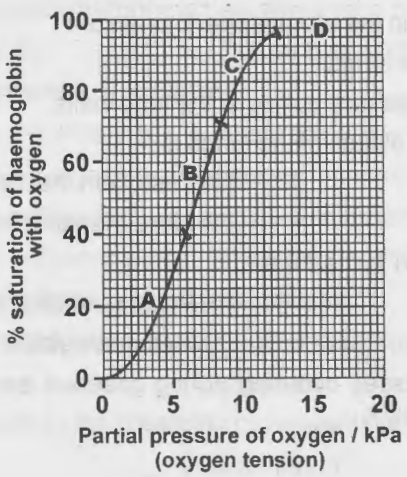
2. They have a large surface area.

3. They provide a short diffusion path

(a) 1 and 2 only (b) 1 and 3 only (c) 2 and 3 only (d) 1, 2 and 3

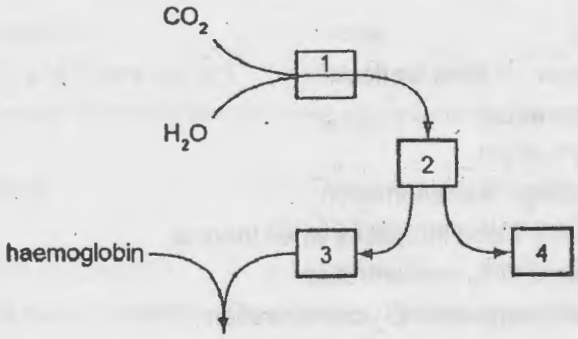
142. The graph shows the percentage saturation of haemoglobin with oxygen at different partial pressures of oxygen.

Which range of partial pressure of oxygen produces the greatest change of percentage saturation of haemoglobin per unit oxygen tension?



(a) A (b) B (c) C (d) D

143. The diagram shows part played by red blood cells in the transport of carbon dioxide.



Which row is correct?

	1	2	3	4
(a)	Carbaminohaemoglobin	Haemoglobinic acid	Hydrogen ions	Hydrogen carbonate ions
(b)	Carbonic anhydrase	Carbonic acid	Hydrogen ions	Hydrogen carbonate ions
(c)	Carboxyhaemoglobin	Carbonic anhydrase	Carbonic acid	Carbon dioxide
(d)	Haemoglobinic acid	Carbonic acid	Hydrogen carbonate ions	Hydrogen ions

144. When you hold your breath, which of the following gas changes in blood would first lead to the urge to breathe?

(a) Falling CO_2 concentration (b) Rising CO_2 and falling O_2 concentration

(c) Falling O_2 concentration (d) Rising CO_2 concentration

145. Name the pulmonary disease in which alveolar surface area involved in gas exchange is drastically reduced due to damage in the alveolar walls.

(a) Pneumonia (b) Asthma (c) Pleurisy (d) Emphysema

146. The cells which do not respire

(a) Epidermal cells (b) Sieve cells (c) Cortical cells (d) Erythrocytes

147. Name the chronic respiratory disorder caused mainly by cigarette smoking :-

(a) Emphysema (b) Asthma (c) Respiratory acidosis (d) Respiratory alkalosis

148. Asthma may be attributed to :

(a) bacterial infection of the lungs (b) allergic reaction of the mast cells in the lungs

(c) inflammation of the trachea (d) accumulation of fluid in the lungs

149. Lungs do not collapse between breaths and some air always remains in the lungs which can never be expelled because :-
(a) There is a positive intrapleural pressure
(b) Pressure in the lungs is higher than the atomospheric pressure.
(c) There is a negative pressure in the lungs.
(d) There is a negative intrapleural pressure pulling at the lung walls.

150. The partial pressure of oxygen in the alveoli of the lungs is :-
(a) Less than that in the blood (b) Less than that of carbon dioxide
(c) Equal to that in the blood (d) More than that in the blood

151. CO_2 is carried in blood by hemoglobin in the form of :
(a) Sodium bicarbonate (b) Potassium bicarbonate
(c) Carbamino compound (d) Methaemoglobin

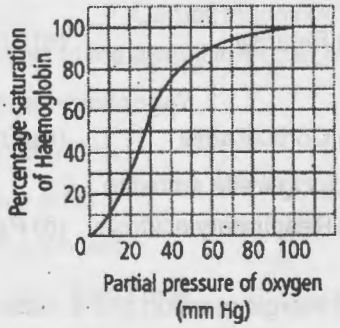
152. The given figures show some processes occuring during gaseous exchange in the human body. What are the phenomena X and Y called respectively?

(a) X - Hamburger's phenomenon; Y - Bohr's effect.
(b) X - Bohr's effect; Y - Haldane effect.
(c) X - Haldane effect; Y - Bohr's effect.
(d) X - Haldane effect; Y - Hamburger's phenomenon

153. Dissociation of oxyhaemoglobin in blood increases when there is
(a) Increase in pH and decrease in CO_2 concentration
(b) Decrease in temperature and increase in O_2 concentration
(c) Increase in CO_2 concentration
(d) Decrease in pH and increase in CO_2 concentration

154. Read the given statements.
I. Partial pressure of oxygen in inspired air is 104 mm Hg.
II. CO_2 is less soluble in venous blood than in arterial blood.
III. Liver is the chief site of deamination.
IV. Pepsin cannot hydrolyse milk proteins.
Of the above statements.
(a) I, II and III are correct (b) III and IV are incorrect
(c) I, II and IV are incorrect (d) Only I is correct

155. Which of the following is incorrect about the given graph?



(a) Increase in partial pressure of CO_2 shift the curve to right.
(b) At low temperature the curve shifts to left.
(c) At high pH the curve shifts to right.
(d) Decrease in partial pressure of oxygen shifts the curve to right.

156. A limit of gaseous exchange of respiratory membrane between alveoli and pulmonary blood is known as
(a) Partial pressure (b) Alveolar air (c) Diffusing capacity (d) Inspired air

157. Select the correct sequence for the process of expiration.
(a) Alveoli → Bronchi → Trachea → Pharynx → Nasal cavities → Internal nares → External nares.
(b) Alveoli → Bronchi → Trachea → Larynx → Pharynx → Internal nares → Nasal cavities → External nares.
(c) Bronchi → Alveoli → Trachea → Pharynx → Larynx → Internal nares → Nasal cavities → External nares.
(d) Bronchi → Alveoli → Trachea → Intemal nares → Larynx → Pharynx → Nasal cavities → External nares.

158. When diaphragm of man is completely dome shaped in it indicates.
(a) end of expiration and beginning of inspiration. (b) beginning of expiration and end of inspiration
(c) hyperpnea (d) dyspnea

159. The structure which does not contribute to the breathing movements in mammals is
(a) ribs (b) larynx (c) diaphragm (d) intercostal muscles

160. In a typical multicellular animal, the circulatory system interacts with various specialized surfaces in order to exchange materials with the exterior environment. Which of the following is not an example of such an exchange surface?
I. skin II. intestine III. muscle IV. lung V. kidney
(a) I and II are correct (b) II and IV are correct (c) Only III is correct (d) IV and V are correct

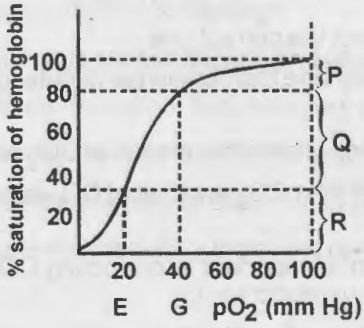
161. Adult human RBCs are enucleated. Which of the following statement(s) is/are most appropriate explanation for this feature?
(I) They do not need to reproduce (II) They are somatic cells
(III) They do not metabolize (IV) All their internal space is available for oxygen transport
(a) only (I) (b) (I), (III) and (IV) (c) (II) and (III) (d) only (IV)

162. Lungs are made up of air-filled sacs, the alveoli. They do not collapse even after forceful expiration, because of:
(a) Inspiratory Reserve Volume (b) Tidal Volume
(c) Expiratory Reserve Volume (d) Residual Volume

163. A person suffer's punctures in his chest cavity in an accident, without any damage to the lungs. its effect could be
(a) Reduced breathing rate (b) Rapid increase in breathing rate
(c) No change in respiration (d) Cessation of breathing

164. What structure do RBCs move through single file?
(a) artery (b) arteriole (c) capillary (d) venule

165. Following graph represents oxyhemoglobin dissociation curve. Point E and G represent venous O_2 pressure during exercise and resting state respectively. How much total percentage of oxygen is unloaded in tissue during exercise?



(a) R (b) Q (c) P + Q (d) P + Q + R

166. Gaseous exchange takes place through diffusion membrane. Which of the following is not related to diffusion membrane.
(a) Its total thickness is more than a millimetre (b) Thin squamous epithelium of alveoli
(c) Endothelium of alveolar capillaries (d) A basement membrane

167. If O_2 concentration in tissue becomes as high as at the respiratory surface :–
(a) Oxyhaemoglobin would dissociate to supply to the tissue
(b) Haemoglobin would combine with more O_2 at respiratory surface
(c) Oxyhaemoglobin would not dissociate to supply O_2 to the tissue
(d) CO_2 will interfere with the O_2 transport

168. The vital capacity of the lung signifies the volume of air breathed in :
(a) During normal inspiration (b) With forcible expiration
(c) With forcible inspiration (d) With deep inspiration and exhaled out by forcible expiration

169. The partial pressure of oxygen and the partial pressure of carbon dioxide is identical in
(a) Alveoli and deoxygenated blood (b) Tissues and deoxygenated blood
(c) Oxygenated blood and tissues (d) Tissues and oxygenated blood

170. The correct statements about respiration are
(i) In cockroach gaseous exchange occurs mainly between tracheoles and haemolymph
(ii) Increase in inspiratory capacity does not involve an increase in tidal volume
(iii) Partial pressure of oxygen in blood is less than that in alveoli
(iv) Chloride shift in erythrocytes maintain the ionic balance
(a) (i) and (ii) (b) (i), (iii) and (iv) (c) (i), (ii) and (iv) (d) (ii) and (iii)

171. Which of the following options correctly represents the lung conditions in asthma and emphysema, respectively?
(a) Increased respiratory surface; Inflammation of bronchioles
(b) Increased number of bronchioles; Increased respiratory surface
(c) Inflammation of bronchioles; Decreased respiratory surface
(d) Decreased respiratory surface; Inflammation of bronchioles

172. Match the items given in Column I with those in Column II and select the correct option given below:

Column I	Column II
A. Tidal volume	i. 2500 – 3000 mL
B. Inspiratory Reserve	ii. 1100 – 1200 mL volume
C. Expiratory Reserve	iii. 500 – 550 mL volume
D. Residual volume	iv. 1000 – 1100 mL

	A	B	C	D		A	B	C	D
(a)	i	iv	ii	iii	(b)	iii	i	iv	ii
(c)	iii	ii	i	iv	(d)	iv	iii	ii	i

173. Which of the following is an occupational respiratory disorder?
(a) Botulism (b) Silicosis (c) Anthracis (d) Emphysema

174. Read the following statements and select the correct one.
I. The volume of gas that diffuses through the membrane per minute for a pressure difference of 1 mm Hg is defined as diffusing capacity.
II. The high pCO_2 in deoxygenated blood allows the release of CO_2 from blood into the alveoli.
III. Diffusion of oxygen is 20 times faster than CO_2 and that of CO_2 is two times faster than nitrogen at the particular pressure difference.
IV. Binding of oxygen with haemoglobin is important in promoting CO_2 transport and its exchange in tissues and lungs.
(a) I, II and IV (b) II, III and IV (c) III and IV (d) All of these

175. The respiratory disorder which leads to irreversible distension and loss of elasticity of alveoli of lungs is

(a) bronchitis (b) bronchial asthma (c) emphysema (d) SARS.

176. During the exchange of gases between lung alveoli and pulmonary capillaries, if the partial pressure of oxygen in alveolar capillaries is 95 mm Hg and the partial pressure of CO_2 is 45 mm Hg in deoxygenated blood. Based on this identify the correct statement.

(a) The partial pressure of oxygen will be highest, i.e., 104 mm Hg in alveoli.

(b) The partial pressure of nitrogen will remain same in both blood and alveoli.

(c) The partial pressure of CO_2 is less in pulmonary veins as compared to pulmonary arteries.

(d) All of these

177. Which of the following muscles are involved in forceful expiration?

(a) Abdominal and diaphragm muscles (b) External intercostal and diaphragm muscles

(c) Abdominal and internal intercostal muscles (d) External and internal intercostal muscles

178. A disease characterised by accumulation of fluid with dead WBCs occupying most of the air space in alveolar sac is

(a) Pneumonia (b) Bronchitis (c) Emphysema (d) Bronchial asthma

179. Air rushes into the lungs of humans during inhalation because:

(a) the rib muscles and diaphragm contract, increasing the lung volume.

(b) pressure in the alveoli increases.

(c) gas flows from a region of lower pressure to a region of higher pressure.

(d) a positive respiratory pressure is created when the diaphragm relaxes.

180. A person with a tidal volume of 450 mL, a vital capacity of 4,000 mL, and a residual volume of 1,000 mL would have a potential total lung capacity of

(a) 1,450 mL. (b) 4,450 mL. (c) 5,000 mL. (d) 5,450 mL.

181. Some human infants, especially those born prematurely, suffer serious respiratory failure. This most probably relates to which of the following?

(a) the sudden change from the uterine environment to the air

(b) the overproduction of surfactants

(c) the incomplete development of the lung surface

(d) inadequate production of surfactant

182. The oxy-hemoglobin dissociation curve shifts to the right by all the following except:

(a) Increased carbon dioxide (b) Increased pH

(c) Increased temperature (d) Presence of 2, 3 DPG

183. Blood carbon dioxide levels determine the pH of other body fluids as well as blood, including the pH of cerebrospinal fluid. How does this enable the organism to control breathing?

(a) The brain directly measures and monitors carbon dioxide and causes breathing changes accordingly.

(b) The medulla, which is in contact with cerebrospinal fluid, monitors pH and uses this measure to control breathing.

(c) The brain alters the pH of the cerebrospinal fluid to force the animal to retain more or less carbon dioxide.

(d) Stretch receptors in the lungs cause the medulla to speed up or slow breathing.

184. Which of the following does not stimulate the medullary breathing center chemosensitive neurons?

(a) low blood pH (b) low blood oxygen

(c) high blood carbon dioxide (d) high spinal fluid acidity

185. Match each item in COLUMN I with one in COLUMN II and choose the correct answer from the codes given below.

COLUMN I	COLUMN II
A. Asthma	I. Over-inflation of alveoli
B. Emphysema	II. Vaccine preventable
C. Occupational lung disease	III. Bronchospasm
D. Tuberculosis	IV. Pulmonary fibrosis

Codes

	A	B	C	D		A	B	C	D
(a)	III	I	IV	II	(b)	I	III	IV	II
(c)	III	I	II	IV	(d)	I	IV	II	III

186. 'CO' poisoning causes the decrease in oxygen availability to the tissues because
(a) It binds the haemoglobin and to form stable compound carboxyhaemoglobin
(b) It increases CO_2 concentration in our body.
(c) It is a toxic gas so main body organs like brain, failure occured.
(d) 'CO' impedes the CO_2 transportation.

187. Identify the incorrect statement:
(a) The larynx, rings in the wall of trachea and the epiglottis are cartilaginous
(b) A negative intrapleural pressure will help in keeping the lungs inflated
(c) An airtight thoracic chamber is essential as we can directly alter the pulmonary volume
(d) The conducting part of the airway warms, humidifies and filters the air reaching the exchange site

188. Which of the following is entirely made up of cartilage?
(a) Nasal septum (b) Larynx (c) Glottis (d) Trachea

189. Glottis is an opening in the floor of
(a) Mouth (b) Trachea (c) Pharynx (d) Diaphragm

190. The form of energy used in respiration is :
(a) Chemical (b) Electrical (c) Mechanical (d) Radiant

191. The affinity of Hb for O_2 is
(a) Decreased in metabolizing tissue (b) Increased at higher body temperature
(c) Increase at higher than normal 2, 3 DPG levels (d) Decreased at more basic than normal pH

192. If a person inhale normally without any extra effort after a forceful exhalation. Which pulmonary volumes will be inhaled :
(a) TV + IRV + ERV (b) TV + FRC (c) TV + IRV (d) TV + ERV

193. Tidal Volume and Expiratory Reserve Volume of an athlete is 500 mL and 1000 mL, respectively. What will be his Expiratory Capacity if the Residual Volume is 1200 mL?
(a) 1500 mL (b) 1700 mL (c) 2200 mL (d) 2700 mL

194. Select the correct statement.
(a) Expiration is initiated due to contraction of diaphragm.
(b) Expiration occurs due to external intercostal muscles.
(c) Intrapulmonary pressure is lower than the atmospheric pressure during inspiration.
(d) Inspiration occurs when atmospheric pressure is less than intrapulmonary pressure.

195. The maximum volume of air a person can breathe in after a forced expiration is known as :
(a) Total Lung Capacity (b) Expiratory Capacity
(c) Vital Capacity (d) Inspiratory Capacity

17 BREATHING AND EXCHANGE OF GASES

1. d	2. a	3. c	4. a	5. a	6. a	7. b	8. c	9. b	10. d
11. a	12. c	13. c	14. b	15. a	16. b	17. b	18. c	19. c	20. a
21. a	22. c	23. a	24. c	25. b	26. c	27. b	28. c	29. b	30. b
31. a	32. b	33. d	34. d	35. c	36. b	37. a	38. c	39. a	40. a
41. d	42. a	43. c	44. c	45. b	46. a	47. d	48. b	49. a	50. b
51. c	52. d	53. a	54. d	55. b	56. d	57. b	58. b	59. c	60. d
61. c	62. c	63. a	64. b	65. b	66. b	67. b	68. a	69. c	70. d
71. c	72. c	73. b	74. b	75. c	76. b	77. c	78. d	79. a	80. a
81. d	82. a	83. c	84. c	85. a	86. d	87. a	88. d	89. d	90. c
91. b	92. b	93. c	94. c	95. a	96. b	97. b	98. d	99. d	100. a
101. d	102.b	103. a	104. c	105. d	106. b	107. d	108. d	109. b	110. b
111. b	112. d	113. b	114. b	115. d	116. a	117. c	118. a	119. a	120. a
121. b	122. d	123. b	124. d	125. b	126. a	127. d	128. a	129. b	130. d
131. b	132. c	133. b	134. d	135. b	136. b	137. a	138. b	139. d	140. a
141. c	142. b	143. b	144. d	145. d	146. d	147. a	148. b	149. d	150. d
151. c	152. c	153. d	154. c	155. c	156. c	157.b	158. a	159. b	160. c
161. d	162. d	163. d	164. c	165. c	166. a	167. c	168. d	169. b	170. b
171. c	172. b	173. b	174. a	175. c	176. d	177. c	178. a	179. a	180. c
181. d	182. b	183. b	184. b	185. a	186. a	187. c	188. b	189. c	190. a
191. a	192. d	193. a	194. c	195. c					

18 BODY FLUID AND CIRCULATION

1. Which of the following use water from their environment as circulating fluid –
(a) Sponges (b) Coelenterates (c) a and b (d) Fishes
2. Blood, a special type of connective tissue –
(a) Consists of a fluid matrix (Plasma)
(b) Has formed elements
(c) Is the most commonly used body fluid by most of the higher organisms
(d) All
3. Plasma is a straw coloured, viscous fluid constituting nearly _____% of blood –
(a) 55 (b) 45 (c) 90 (d) 10
4. The amount of water present in blood plasma is –
(a) 99% (b) 90 - 92% (c) 10% (d) 55%
5. I. Proteins contribute 6 - 8% of the blood plasma
II. Plasma contains very high amount of minerals
III. Plasma without the clotting factors is called serum
IV. Glucose, amino acids, lipids, etc., are also present in the plasma as they are always in transit in the body.
Of the above statements –
(a) All are correct (b) Only II is false (c) Only I is correct (d) All are false
6. Match List I with List II and select the correct option.

List I	**List II**
Plasma protein	Functions
I. Fibrinogen	A. Defence mechanism
II. Globulins	B. Osmotic balance
III. Albumins	C. Coagulation of blood

(a) I - C, II - A, III, - B (b) I - A, II - C, III - B (c) I - C, II - B, III - A (d) I - B, II - A, III - C
7. Formed elements of blood include –
(a) RBC, WBC and blood platelets (b) Proteins present in blood
(c) All solutes present in blood (d) All minerals (elements)
8. Which of the following statements is false?
(a) Erythrocytes / RBC are the least abundant of all the cells in blood
(b) The number of RBCs in adult man per mm^3 of blood is 5 million to 5.5. million
(c) RBC are formed in the red bone marrow in the adults
(d) RBCs are enucleate in most of the mammals
9. Life span of human RBC is –
(a) 120 hours (b) 120 month (c) 120 days (d) 102 days
10. What is the amount of haemoglobin present in 100 ml blood of human blood?
(a) 45 g (b) 18 - 20 g (c) 12 - 16 g (d) 10 - 12 g
11. Mammalian RBCs are _____ in shape –
(a) Oval (b) Biconvex (c) biconcave (d) Sickle like
12. All of the following statement are correct about WBCs except –
(a) They are nucleate and least constancy in shape (b) They are lesser in number (6000 - 8000 per mm^3 blood)
(c) They are generally short lived (d) They help in blood clotting
13. All of the following are granulocytes except –
(a) Neutrophils (b) Eosinophils (c) Basophils only (d) Lymphocytes and monocytes

14. Match list I with list II correctly –

List I Types of leucocytes / WBCs	List II Their % (of total WBC)
I. Neutrophils	A. 20 - 25
II. Basophils	B. 2 - 3
III. Monocytes	C. 6 - 8
IV. Eosinophils	D. 0.5 - 1
V. Lymphocytes	E. 60 - 65

(a) I - E, II - D, III - C, IV - A, V - B (b) I - A, II - B, III - C, IV - E, V - D
(c) I - E, II - D, III - C, IV - B, V - A (d) I - B, II - D, III - A, IV - C, V - A

15. Match the following –

Column I	Column II
I. Basophils	A. Phagocytes
II. Neutrophils	B. Secrete histamin, serotonin, heparin and involved in inflammatory response
III. Monocytes	C. Resist infections and are also involved in allergic reaction
IV. Eosinophils	D. Immunity
V. Lymphocytes	

(a) I - B, II and III - A, IV - C, V - D (b) I - B, II and III - C, IV - A, V - D
(c) I - C, II and III - A, IV - B, V - D (d) I - D, II and III - C, IV - A, V - B

16. Megacaryotes produce –
(a) Leucocytes (b) Lymphocytes (c) Bone cells (d) Blood platelets (thrombocytes)

17. Which of the following is cell fragments?
(a) Leucocytes (b) RBCs (c) Blood platelets (d) None

18. 1 mm^3 blood has how many blood platelets?
(a) 150000 - 350000 (b) 1.5 million to 3.5 million
(c) 1500 - 3000 (d) 10 to 15 lacs

19. During blood clotting - platelets release –
(a) Thrombin (b) Fibrinogen
(c) Prothrombin (d) Thrombokinase and other blood clotting factor

20. ABO blood grouping is based on the presence or absence of _____ surface antigens
(a) 2 (b) 3 (c) 6 (d) 12

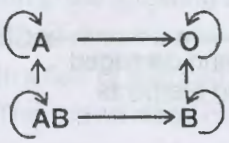
21. Fill up gaps given below in the table –

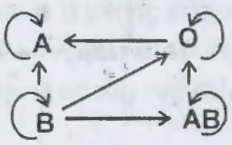
Blood group	Antigens on RBCs	Antibody in Plasma	Donor groups
A	A	Anti-B	A, O
B	B	Anti-A	B, O
AB	AB	II	A, B, ABO
O	I	III	IV

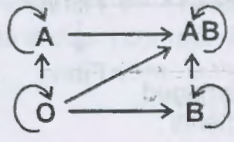
	I	II	III	IV
(a)	Nil	Nil	Nil	O
(b)	Nil	Nil	Anti-A, B	AB
(c)	Nil	Anti-A, B	Nil	O
(d)	Nil	Nil	Anti-A, B	O

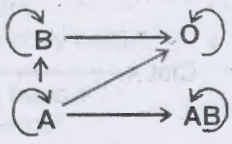
22. Which of the following blood groups is universal donor and universal acceptors respectively?
(a) AB, O (b) O, AB (c) AB, A (d) A, AB

23. Which of the following representations is correct about blood groups and donor compatibility?

(a) 

(b) 

(c) 

(d) 

24. Rh factor is concerned with blood grouping. It derives its name from–
(a) Man (b) Chimpanzee (c) Monkey (d) Rat

25. Rh factor is responsible for –
(a) Sickle cell anaemia (b) erythroblastosis foetalis
(c) AIDS (d) Turner syndrome

26. In developing foetus erythroblastosis foetalis is caused by –
(a) Haemolysis (b) Clumping of RBCs
(c) Failure of blood clotting (d) Phagocytosis by WBC

27. In erythroblastosis foetalis, which of the following factors passes through placenta into foetus –
(a) Rh antigens (b) Rh antibodies (c) Agglutinins (d) ABO antibodies

28. A doctor suggested to a couple not to have more than one child because of –
(a) Rh^+ male and Rh^- female (b) Rh^- male and Rh^+ female
(c) Rh^- male and Rh^- female (d) Rh^+ male and Rh^+ female

29. Find the correct descending order of percentage proportion of leucocytes in human blood.
(a) Neutrophils → Basophils → Lymphocytes → Acidophils(Eosinophils) → Monocytes
(b) Neutrophils → Monocytes → Lymphocytes → Acidophils → Basophils
(c) Neutrophils → Lymphocytes → Monocytes → Acidophils → Basophils
(d) Neutrophils → Acidophils → Basophils → Lymphocytes → Monocytes

30. In case of emergency which blood group could be safely transfused?
(a) AB Rh^- (b) AB Rh^+ (c) O Rh^- (d) O Rh^+

31. Which of the following is expected if husband is Rh^+ and wife is Rh^-?
(a) No problem with 1st pregnancy (b) Problem would be expected with future pregnancies
(c) Both (d) No problem could be expected in any pregnancy

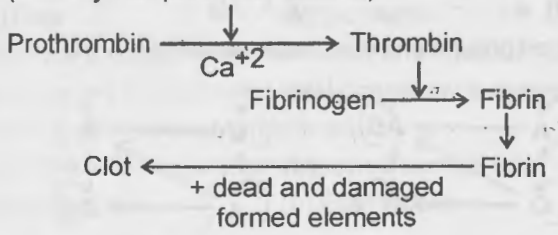
32. Which of the following statements is correct?
(a) Rh compatibility must be tested before pregnancy establishment and blood transfusion
(b) Rh antibodies can cross placenta
(c) At the time of 1st delivery some of Rh^+ RBCs from the baby (Rh^+) mix the mother's blood (Rh^-) due to tear in placenta mother's blood for Rh^- antibodies
(d) All

33. What is the correct order of these events?
1. Conversion of fibrinogen to fibrin
2. Clot retraction and leakage of serum
3. Thromboplastin formation
4. Conversion of prothrombia to thrombin
(a) 3, 2, 1, 4 (b) 3, 4, 1, 2 (c) 3, 4, 2, 1 (d) 4, 1, 3, 2

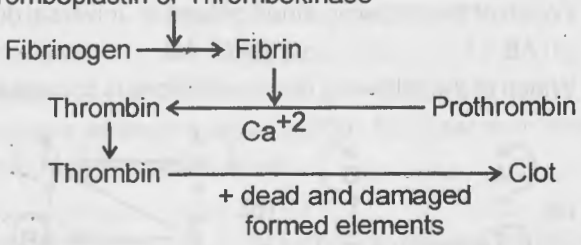
34. Which of the following statement are correct?
I. Ca^{+2} is necessary for blood coagulation
II. Coagulation in blood vessel is prevented during normal condition by heparin
III. Clotting of blood involves changes of fibrinogen to fibrin by thrombin
IV. Blood clotting involves cascading process involving a number of factors present in the active form always
(a) I, III, IV (b) II, IV (c) I, II, III (d) III, IV

35. Which of the following pathways is correct for blood clotting

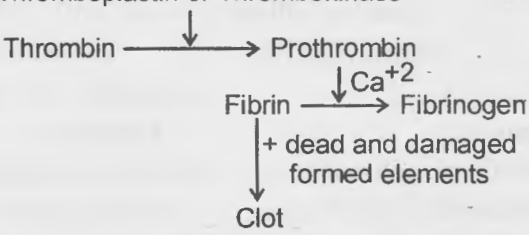
(a) Thromboplastin or Thrombokinase (from injured platelets / tissues)



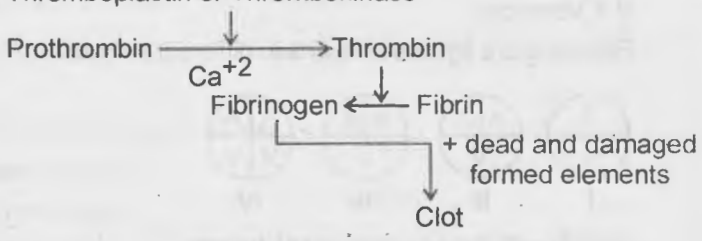
(b) Thromboplastin or Thrombokinase



(c) Thromboplastin or Thrombokinase



(d) Thromboplastin or Thrombokinase



36. Which of following statements is wrong about lymph.
I. Lymph is colourful as it has haemoglobin but no RBC
II. The fluid present in lymphatic system is called lymph
III. It contains specilized lymphocytes which are responsible for immunity of the body
IV. Lymph is an important carrier for nutrients and hormones
V. Fats are absorbed through lymph in the lacteals present in the intestinal villi
(a) Only I (b) III and IV (c) II and III (d) Only IV

37. Which of the following statements is correct?
I. Lymphatic system collects tissue fluid / interstitial fluid and drains it back to the major veins
II. Interstitial fluid (tissue fluid) and lymph have almost similar composition
III. Lymph and interstitial fluid have no larger proteins and RBC
IV. Exchange of nutrients and gases, etc. between the blood and cells always occurs through tissue fluid
V. Interstitial fluid has the same mineral distribution as that in plasma
VI. Lymph can be defined as blood minus RBC but has specialized lymphocytes
(a) All (b) Only III and IV (c) V and VI (d) I, III, V

38. Blood clotting pathways cause –
(a) Conversion of Vit. K to prothrombin (b) Conversion of fibrin to fibrinogen
(c) Conversion of thrombin to prothrombin (d) None of the above

39. Open circulatory system is found in –
(a) Arthopods and molluscs (b) Annelids and Chordates
(c) Annelids and arthopods (d) Fishes and molluscs

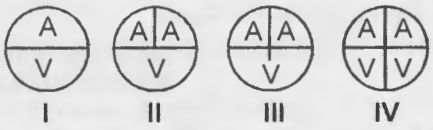
40. Closed circulatory system is found in –
(a) Arthopod and chordates (b) Molluscs and chordates
(c) Amphibians and molluscs (d) Annelids and chordates

41. In an open circulatory system –
(a) There is no heart
(b) There is no need of blood vessels
(c) There is no distinction between blood and tissue fluid
(d) There are no open spaces or sinuses in the body

42. Advantages of closed circulatory system over open circulatory system includes which of the following?
(a) Closed system can direct blood to specific tissues
(b) Exchange occurs more rapidly
(c) Close circulatory system can support higher levels of metabolic activity
(d) All

43. Which of the following statements is wrong about the closed circulatory system?
(a) Blood remains within blood vessels and never comes in direct contact with the body cells
(b) In it flow of fluid can be more precisely regulated
(c) There is no blood capillary
(d) Blood flow is more rapid due to higher pressure

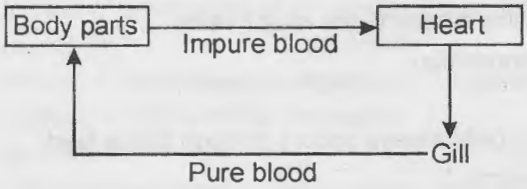
44. A = Auricle
V = Ventricle
Following are figures of hearts in different animals



Identify with their characteristic hearts –

	I	II	III	IV
(a)	Fishes	Reptiles	All reptiles	Birds, Mammals
(b)	Fishes	Birds	Reptiles, birds	Mammal
(c)	Fishes	Amphibians	Reptiles	Crocodiles, Birds, Mammal
(d)	Fishes	Crocodile	Amphibians, Reptiles	Birds, Mammals

45. In fishes the blood circulation is represented as –



The above flow of blood indicates it is a –
(a) Double circulation (b) Single circulation
(c) Incomplete single circulation (d) Incomplete double circulation

46. Incomplete double circulation is found in which of the following animals?
(a) Birds (b) Mammals (c) Birds and Mammals (d) Amphibians and Reptiles

47. Which of the following statements is not true?
(a) Heart is ectodermal in origin
(b) In human beings heart is situated in the thoracic cavity, in between the two lungs slightly lifted to the left
(c) Human heart has the size of a clenched fist.
(d) Double wall membranous bag (pericardium) with pericardial fluid protects heart

48. Which of the following is correct about human heart?
(a) The volume of both atria > the volume of both ventricles
(b) The volume of both ventricle > the volume of both atria
(c) The volume of both atria = the volume of both ventricles
(d) Ventricles are upper chambers and atria are lower chambers in our heart

49. Bicuspid valve / mitral valve is found between –
(a) Left atrium and left ventricle (b) Right atrium and right ventricle
(c) Right atrium and left ventricle (d) Left atrium and right ventricle

50. Tricuspid valve is present between the –
(a) Two atria (b) Two ventricles
(c) Left atrium and left ventricle (d) Right atrium and right ventricle

51. Chordae tendinae are found in –
(a) Joints (b) Atria of heart (c) Ventricles of heart (d) Ventricles of brain

52. Ventricles are thick-walled as compared to atrium because –
(a) it is to receive blood from atria (b) It is present on the posterior side

(c) It is to pump blood (d) None

53. Which of the following has thickest wall?
(a) Left auricle (b) Left ventricle (c) Right auricle (d) Right ventricle

54. Match the Columns –

Column I	Column II
A. Superior vena cava	p. carries deoxygenated blood to lungs
B. Inferior vena cava	q. carries oxygenated blood from lungs
C. Pulmonary artery	r. brings deoxygenated blood from lower part of body to right atrium
D. Pulmonary vein	s. bring deoxygenated blood from upper part of body to right atrium

(a) A - q, B - s, C - r, D - p (b) A - s, B - p, C - q, D - r
(c) A - s, B - r, C - p, D - q (d) A - s, B - p, C - r, D - q

55. Origin of heart beat and its conduction is represented by –
(a) SA-node ⟶ Purkinje fibres ⟶ AV-node ⟶ Bundle of His
(b) AV-node ⟶ Bundle of His ⟶ SA-node ⟶ Purkinje fibres
(c) Purkinje fibres ⟶ AV-node ⟶ SA-node ⟶ Bundle of His
(d) SA-node ⟶ AV-node ⟶ Bundle of His ⟶ Purkinje fibres

56. 'Heart of heart' is –
(a) SA-node (b) AV-node (c) Bundle of His (d) Purkinje fibres

57. SA node is located in –
(a) Upper lateral wall of left atrium (b) Lower lateral wall of left atrium
(c) Lower lateral wall of right atrium (d) Upper lateral wall of right atrium

58. SA node is called pace maker of the heart. Why?
(a) It can change contractile activity generated by AV node
(b) It delays the transmission of impulse between the atria and ventricles
(c) It gets stimulated when it receives neural signal
(d) It initiates and maintains the rhythmic contractile activity of heart

59. Sino-atrial node (SAN) can generate impulses –
(a) 70 - 75 min^{-1} (b) 50 - 55 min^{-1} (c) 35 - 40 min^{-1} (d) 100 - 150 min^{-1}

60. The impulse of heart beat originate from –
(a) SAN (b) AVN (c) Vagus nerve (d) Cardiac nerve

61. Rate of heart is determined by –
(a) SAN (b) AVN (c) Purkinje fibres (d) Bundle of His

62. Bundle of His is a group of –
(a) Ganglia (b) Nerve fibres (c) Muscular fibres (d) Connective tissue

63. Bundle of His / AV-bundle found in –
(a) Right auricle (b) Left auricle (c) Bone (d) Interventricular septum

64. Atrio-ventricular node (AVN) is situated in –
(a) Lower left corner of left auricle, close to AV-septum
(b) Lower left corner of right auricle, close to AV-septum
(c) Upper left corner of right auricle, close to AV-septum
(d) Upper left corner of left auricle, close to AV-septum

65. Purkinje fibres are present in –
(a) Left auricle (b) Right auricle
(c) Ventricular myocardium (d) SAN

66. The chordae tendineae –

(a) Close the AV-valves (b) Prevent the AV-valves flaps from everting
(c) Open semilunar valves (d) Are present in auricles

67. Which of the following correctly traces the electrical impulses that trigger each heart beat –
(a) Pacemaker → AV node → Atria → Ventricles
(b) Pacemaker → Atria → AV node → Ventricles
(c) AV node → Pacemaker → Auricles → Ventricles
(d) Ventricle → pacemaker → AV node → Auricle

68. An atrioventricular valve prevents the back flow or leakage of blood from –
(a) The right ventricle into the right atrium (b) The left atrium into the left ventricle
(c) The aorta into the left ventricle (d) The pulmonary vein into the right atrium

69. How many double circulation are normally completed by the human heart in one minute?
(a) 8 (b) 16 (c) 36 (d) 72

70. The duration of cardiac cycle in a normal man is –
(a) 0.8 seconds (b) 80 seconds (c) 60 seconds (d) 72 seconds

71. During systole of heart –
(a) Only atria contract (b) only ventricles contract
(c) Auricles and ventricles contract separately (d) Auricles and ventricles contract simultaneously

72. During ventricular systole –
(a) Oxygenated blood is pumped into the aorta and deoxygenated blood is pumped into the pulmonary artery
(b) Oxygenated blood is pumped into the pulmonary artery and deoxygenated blood is pumped into the artery
(c) Oxygenated blood is pumped into aorta and deoxygenated blood is pumped into pulmonary vein
(d) Oxygenated blood is pumped into pulmonary vein and deoxygenated blood is pumped into pulmonary artery

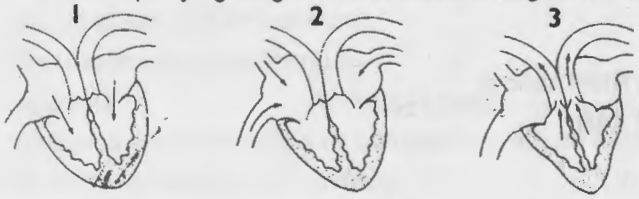
73. Contraction of right ventricle pumps blood into –
(a) Dorsal aorta (b) Pulmonary vein (c) Coronary artery (d) Pulmonary artery

74. When ventricular systole occurs –
(a) Auricular diastole coincides
(b) Tricuspid and bicuspid valves close
(c) Semilunar valves guarding pulmonary artery and aorta are forced to open
(d) All

75. During cardiac cycle about _____% of ventricular filling occurs prior to atrial contraction. _____% ventricular filling occurs due to atrial contraction –
(a) 50, 50 (b) 70, 30 (c) 30, 70 (d) 10, 90

76. Which of the following events do not occur during joint diastole?
I. All 4 chambers of heart are in relaxed state
II. Tricuspid and bicuspid valves open
III. Action potential is conducted from SAN to AVN
IV. Blood from the pulmonary veins and vena cava flows into the left and right ventricles respectively through the left and right atria
V. The Semilunar valves are closed
(a) Only V (b) Only III (c) Only IV (d) Only I and II

77. The accompanying diagram shows three stages in the cardiac cycle –



Which of the following sequence is correct?

(a) 2, 3, 1 (b) 1, 2, 3 (c) 2, 1, 3 (d) 3, 1, 2

78. Cardiac output is determined by –

(a) Heart rate (b) Stroke volume (c) Blood flow (d) Both a and b

79. The amount of blood to be pumped out by each ventricle / minute is –

(a) Stroke volume (b) Cardiac output (c) Tidal volume (d) Residual volume

80. During cardiac cycle each ventricle pumps out about 70 ml of blood which is called –

(a) Stroke volume (b) Cardiac output (c) Tidal volume (d) Residual volume

81. A red blood cell, entering the right side of the heart passes by or through the following structures –

1. Atrioventricular valves
2. Semi-lunar valves
3. Right atrium
4. Right ventricle
5. SAN

(a) 2 → 3 → 1 → 4 → 5 (b) 3 → 1 → 5 → 2 → 4

(c) 3 → 5 → 1 → 2 → 4 (d) 5 → 3 → 1 → 4 → 2

82. Cardiac output is –

(a) Stroke volume (SV) x Heart rate (HR) = 5L / m (b) SV x HR = 500 ml

(c) SV x HR = 72 ml / m (d) SV x HR = 70 ml / m

83 Which of the following statement is not true?

(a) Cardiac output of an athlete is much higher than that of an ordinary man

(b) In each minute a single cardiac cycle is performed

(c) Cardiac sounds are of clinical diagnostic significances

(d) Cardiac cycle includes Auricular systole, ventricular systole and joint diastole / complete diastole

84. First cardiac sound (lub) is associated with –

(a) Closure of tricuspid and bicuspid valves (b) Opening of tricuspid and bicuspid valves

(c) Closure of semilunar valves (d) Opening of semilunar valves

85. Which of the following statement is wrong for second cardiac sound?

(a) It is heard as dup (b) It is produced due to closure of semilunar valves

(c) It is clinically significant (d) It is clinically non significant

86. Electrocardiogram is a measure of –

(a) Heart rate (b) Ventricular contraction (c) Volume of blood pumped (d) Electrical activity of heart

87. Which of the following is a false statements?

(a) ECG is of a great clinical significance

(b) Electrocardiograph is the recording of electrical changes during the cardiac cycle

(c) To obtain a standard ECG, a patient is connected to the machine with 3 electrical electrodes (one to each wrist and to the left ankle)

(d) Normal activities of the heart are regulated intrinsically

88. P-wave represents –

(a) Depolarization of ventricles (b) Repolarization of ventricle

(c) Repolarization of atria (d) Depolarization of atria

89. QRS complex represents the –

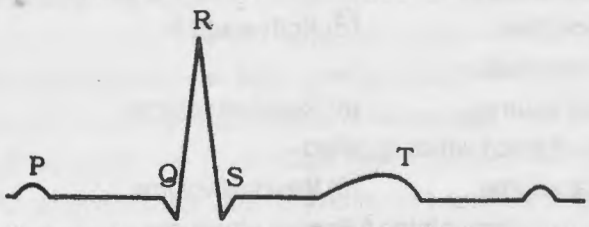
(a) Depolarization of ventricles (b) Repolarization of ventricles

(c) Repolarization of atria (d) Depolarization of atria

90. T wave on an ECG represents –

(a) Depolarization of ventricles (b) Repolarization of ventricle
(c) Repolarization of atria (d) Depolarization of atria

91. The below figure is the diagrammatic representation of standard ECG.



Column I	Column II
A. P-wave	I. Ventricular depolarization followed by ventricular contraction
B. QRS complex	II. Atrial depolarization followed by systole of both atria
C. T-wave	III. Ventricular repolarization followed by ventricular relaxation

(a) A - I, B - II, C - III (b) A - III, B - II, C - I (c) A - II, B - I, C - III (d) A - II, B - III, C - I

92. Match the Column I with Column II –

Column I	Column II
A. Counting the number of QRS complex in a given time period	I. A detailed evaluation of the heart function
B. Potential generated by the recovery of ventricles from the depolarization state	II. Determination of heart beat
C. Multiple leads are attached to the chest region	III. T-wave

	A	B	C
(a)	I	II	III
(b)	III	II	I
(c)	II	I	III
(d)	II	III	I

93. Which of the following options represents the pulmonary circulation in human being –

(a) Left Auricle $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Lungs $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Right ventricle

(b) Left Auricle $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Lungs $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Right Ventricle

(c) Right Ventricle $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Lungs $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Left Auricle

(d) Right Ventricle $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Lungs $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Left Auricle

94. Which of the following options represent correct systemic circulation in human being –

(a) Left Ventricle $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Tissues $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Right Ventricle

(b) Right Ventricle $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Tissues $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Right Auricle

(c) Left Ventricle $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Tissues $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Right Auricle

(d) Left Ventricle $\xrightarrow[\text{blood}]{\text{Oxygenated}}$ Tissues $\xrightarrow[\text{blood}]{\text{Deoxygenated}}$ Right Auricle

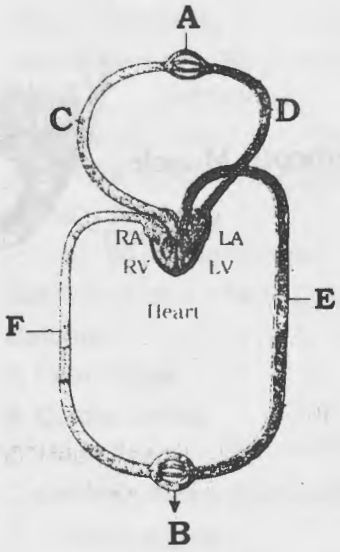
95. Note the following blood vessels –
A. Arteriole
B. Capillary
C. Aorta
D. Muscular artery
E. Vein

F. Venule

Choose the correct path that lists the blood vessels in order, blood passes through them as it leaves the heart, travels to tissue and returns to heart –

(a) C, D, B, A, E, F (b) C, D, A, B, F, E (c) D, C, A, B, E, F (d) D, C, B, A, E, F

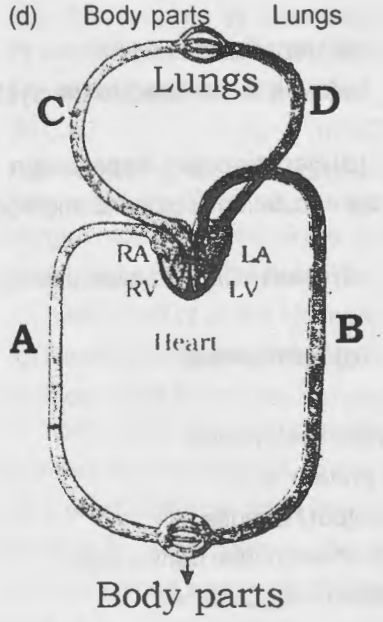
96.



The above figure is the systematic plant of blood circulation in human. Identify to A to F

	A	B	C	D	E	F
(a)	Lungs	Body parts	Pulmonary vein	Pulmonary artery	Dorsal aorta	Vena cava
(b)	Lungs	Body parts	Pulmonary artery	Pulmonary vein	Dorsal aorta	Vena cava
(c)	Lungs	Body parts	Pulmonary artery	Pulmonary vein	Vena cava	Dorsal aorta
(d)	Body parts	Lungs	Pulmonary artery	Pulmonary vein	Vena cava	Dorsal aorta

97.



What is the nature of blood passing through blood vessels (A, B, C and D)?

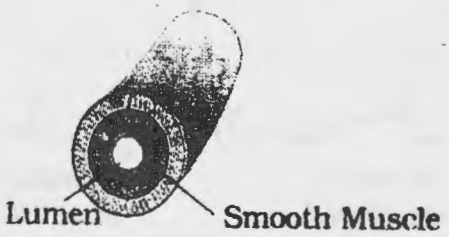
	A	B	C	D
(a)	Deoxygenated	Oxygenated	Deoxygenated	Oxygenated
(b)	Deoxygenated	Deoxygenated	Oxygenated	Oxygenated
(c)	Oxygenated	Oxygenated	Deoxygenated	Deoxygenated
(d)	Oxygenated	Deoxygenated	Oxygenated	Deoxygenated

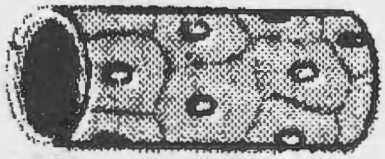
98. Which of the following blood vessels possess semilunar valves

(a) Vena cava and aorta (b) Aorta and pulmonary artery
(c) Pulmonary artery and pulmonary vein (d) Pulmonary vein and vena cava

99. Identify the following blood vessels –

A B C





	A	B	C
(a)	Artery	Vein	Capillary
(b)	Capillary	Artery	Vein
(c)	Artery	Capillary	Vein
(d)	Vein	Capillary	Artery

100. Systemic circulation –
(a) Provides nutrient, O_2 and other essential substances to the tissues
(b) Takes CO_2 and other harmful substances away for elimination
(c) Both a and b
(d) Carries blood from heart to lungs

101. The blood circulation which starts and ends into capillaries is –
(a) Portal circulation (b) Renal circulation (c) Hepatic circulation (d) Lymphatic circulation

102. Vascular connection between the digestive tracts and liver is called –
(a) Hepatic circulation (b) Hepatic portal system (c) Both a and b (d) Hepatic sinusoid

103. The hepatic portal vein carries blood from _____ to the _____ before it is delivered to the systemic circulation –
(a) Liver, intestine (b) Pancreas, intestine (c) Intestine, liver (d) Hepatic artery, hepatic vein

104. A special coronary system of blood vessels present in our body exclusively for the circulation of blood to and from the –
(a) Corneocytes (b) Cornea (c) Cori cycle (d) Heart / Cardiac musculature

105. Cardiac centre lies in –
(a) Medulla oblongata (b) Pons (c) Cerebrum (d) Epithalamus

106. Cardiac centre can moderate the cardiac functions through –
(a) Somatic neural system (b) Parasympathetic nervous system only
(c) Autonomic nervous system (ANS) (d) Sympathetic nervous system only

107. Neural signal through the sympathetic nerve (part of ANS) increases cardiac output because of –
(a) Increasing the rate of heart beat (b) Increasing the strength of ventricular contraction
(c) Both a and b (d) Increasing the stimulation of vagus nerve

108. Parasympathetic neural signal decreases cardiac put by –
(a) Decreasing the rate of heart beat
(b) Decreasing the speed conduction of action potential
(c) Both
(d) Increasing adrenal medulla hormones secretion

109. Heart beat increases –
(a) On stimulation of sympathetic nerves

(b) On stimulation of vagus nerve (para sympathetic nerve)

(c) By adrenaline secreted by adrenal medulla

(d) Both a and c

110. In adult, normal blood pressure is –

(a) 80 / 120 mmHg (b) 100 / 80 mmHg (c) 120 / 80 mmHg (d) 100 / 120 mmHg

111. Normal BP = 120 / 80 mmHg in an adult. In this measurement 120 mmHg is the _____ pressure and 80 mmHg is _____ pressure –

(a) Diastolic, systolic (b) Systolic, diastolic (c) Pulse, diastolic (d) Pulse, systolic

112. Which one indicates B.P. or hypertension?

(a) 120 / 80 mmHg (b) 80 / 120 mmHg

(c) 140 / 90 mmHg or higher (d) 40 / 60 mmHg

113. Match the Column I with Column II –

Column I	**Column II**
A. Heart failure	I. Heart muscle is suddenly damaged by an inadequate blood supply
B. Cardiac arrest	II. Chest pain due to inadequate O_2 reaching the heart muscles
C. Heart Attack	III. Atherosclerosis
D. Coronary Artery disease (CAD)	IV. Heart not pumping blood effectively enough to meet the needs of the body
E. Angina pectoris	V. Heart stops beating

	A	B	C	D	E
(a)	IV	V	I	III	II
(b)	V	IV	I	III	II
(c)	IV	V	I	II	III
(d)	V	IV	II	III	I

114. It is often referred as atherosclerosis, affects the blood vessels that supply blood to the heart muscles. It is caused by deposition of Ca, fat, cholesterol and fibrous tissues making the lumen of arteries narrow –

The above facts are related to

(a) CAD (b) SCID (c) Blue baby (d) Heart arrest

115. Haemoglobin (Hb) transports oxygen from lungs to tissues. The partial pressure of oxygen in lungs is different from that in tissues. Each Hb can bind to up to four oxygen molecules. Suppose we have an equal number of Hb and oxygen molecules and all the oxygen molecules are in bound form. Then, which of the following is TRUE?

(a) Almost all the Hb molecules have one bound oxygen molecule.

(b) Nearly half of all the Hb molecules are each bound to two oxygen molecules.

(c) Nearly one-fourth of all the Hb molecules are bound to four oxygen molecules each.

(d) Most of the Hb molecules have one bound oxygen molecule each; the rest either have no bound oxygen or have two or more bound oxygen molecules.

116. Arteries are best defined as the vessels which

(a) Carry blood from one visceral organ to another visceral organ

(b) Supply oxygenated blood to the different organs

(c) Carry blood away from the heart to different organs

(d) Break up into capillaries which reunite to form a vein

117. Which one of the following plasma proteins is involved in the coagulation of blood?

(a) Fibrinogen (b) An albumin (c) Serum amylase (d) A globulin

118. 'Bundle of His' is a part of which one of the following organs in humans?

(a) Pancreas (b) Brain (c) Heart (d) Kidney

119. Which one of the following statements is correct regarding blood pressure?

(a) 190/110 mmHg may harm vital organs like brain and kidney

(b) 130/90 mmHg is considered high and requires treatment
(c) 100/55 mmHg is considered an ideal blood pressure
(d) 105/50 mmHg makes one very active

120. Go through the statements
Statement - I : The AV node and the bundle of His constitute the only electrical link between the atria and the ventricles.
Statement - II : The *Bundle of His* is a bundle of electrical nodes which allow the ventricles to contract
Statement - III : The *bundle of His* is a group of fibres that carry electrical impulses through the center of the heart
Statement - IV : The bundle of His is located in the proximal intraventicular septum
How many of the above statements are correct?
(a) One (b) Two (c) Four (d) Three

121. During joint diastole
(a) Both atria relax but ventricles contract (b) Both ventricles relax but atria contract
(c) Both semi lunar valves are open (d) Tricuspid and bicuspid valves are open

122. Mark incorrect statement regarding normal ECG
(a) Patient is connected to 3 electrical leads (one to each wrist and to the left ankle)
(b) 'T' wave represents atrial repolarization
(c) Q marks the beginning of ventricular systole
(d) R represents ventricular depolarization

123. Hepatic portal system carries
(a) Oxygenated blood from liver to intestine (b) Deoxygenated blood from liver to intestine
(c) Oxygenated blood from intestine to liver (d) Deoxygenated blood from intestine to liver

124. Fastest distribution of some injectable material/medicine and with no risk of any kind can be achieved by injecting it into the
(a) Muscles (b) Arteries (c) Veins (d) Lymph vessels

125. Given below are four statements (a-d) regarding human blood circulatory system
(i) Arteries are thick-walled and have narrow lumen as compared to veins
(ii) Angina is acute chest pain when the blood circulation to the brain is reduced
(iii) Persons with blood group AB can donate blood to any person with any blood group under ABO system
(iv) Calcium ions play a very important role in blood clotting
Which two of the above statements are correct ?
(a) (i) & (iv) (b) (i) & (ii) (c) (ii) & (iii) (d) (iii) & (iv)

126. Go through the following statements.
I. Blood cannot get from an artery into a vein without passing through at least one capillary bed.
II. Blood cannot flow from point A to point B in a vessel unless the pressure is higher at A than at B.
III. Blood capillaries has no muscle.
IV. Glucose is carried from digestive tract to liver by Hepatic portal vein.
How many of the above statement(s) are correct?
(a) 1 (b) 2 (c) 3 (d) 4

127. The blood buffer system is controlled by an amino acid of Hb_4; its chemical nature is
(a) acidic (b) basic (c) neutral (d) achiral

128. If a snake poison is found to be lowering BP (blood pressure) of a healthy person, the condition of his B.M.R. will
(a) Increases (b) remains as before (c) decreases (d) unpredictable.

129. Given below is the ECGT of a normal human. Which one of its components is **correctly** interpreted below?

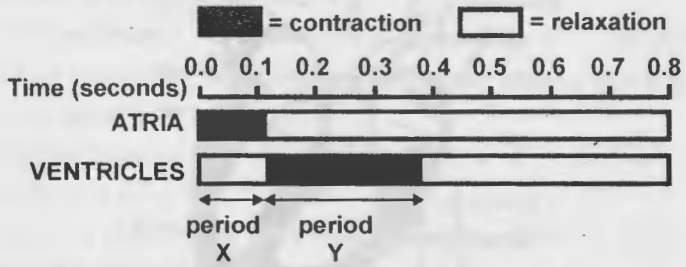
(a) Complex QRS – One complete pulse

(b) Peak T – Initiation of total cardiac contraction

(c) Peak P and Peak R together – systolic and diastolic blood pressures

(d) Peak P – Initiation of left atrial contraction only

130. Diagram represents one cardiac cycle lasting 0.8 s and to the possible answers that follow it. Which answer describes the events that occur during period X?



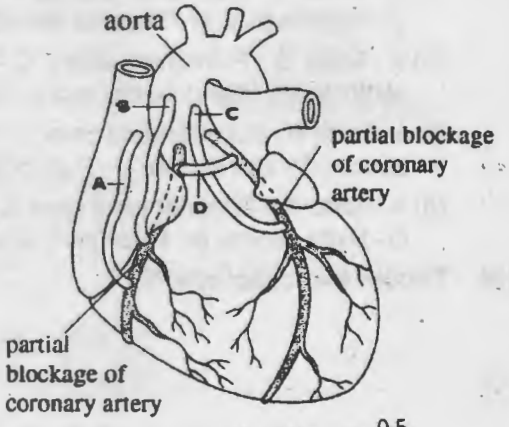
(a) Atrial diastole and ventricular systole

(b) Atrial diastole and ventricular diastole

(c) Atrial systole and ventricular systole

(d) Atrial systole and ventricular diastole

131. Which tube in the accompanying diagram of a heart correctly represents the result of a successful coronary bypass operation?



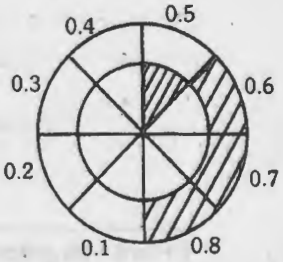
(a) A

(b) D

(c) B

(d) C

132. Please observe the Cardiac Cycle below. For how much duration does joint diastole occur in the given cardiac cycle.



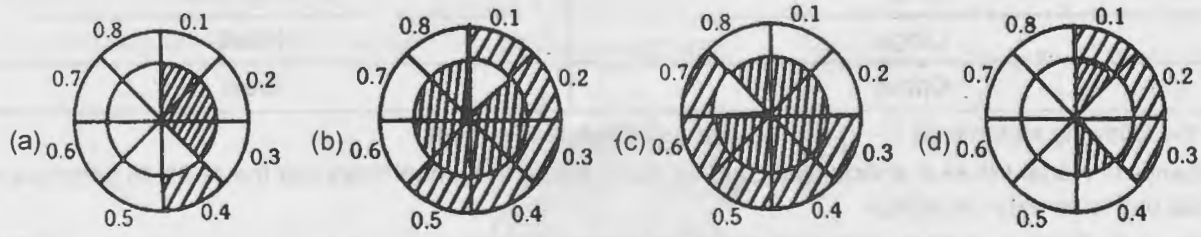
(a) 0.4 seconds

(b) 0.3 seconds

(c) 0.7 seconds

(d) None

133. Which of the below given cardiac cycle is possible in case of human heart, if the shaded and nonshaded sectors represent different events (systole or diastole)



134. Which of the following diagrams shows the correct blood circulation.

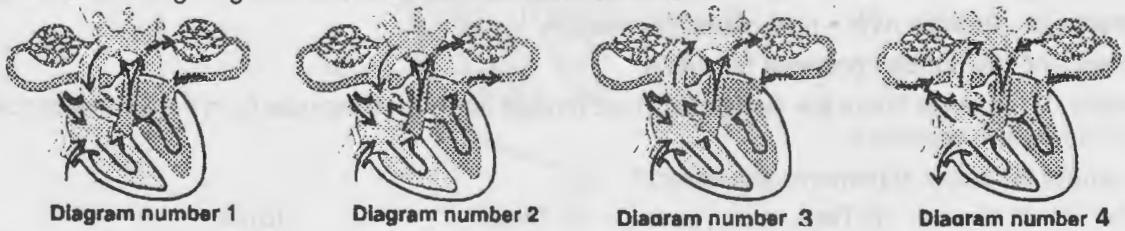
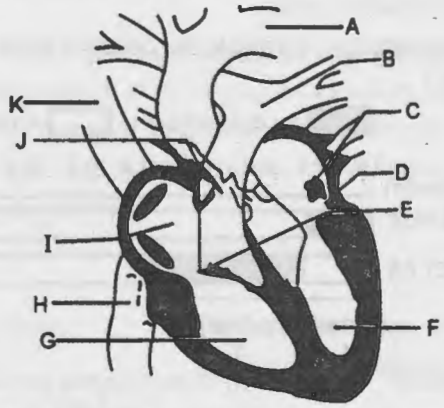


Diagram number 1 Diagram number 2 Diagram number 3 Diagram number 4

(a) Diagram 4 (b) Diagram 3 (c) Diagram 2 (d) Diagram 1

135. In the diagram of the vertical section of human heart given below certain parts have been indicated by alphabets; choose the answer in which these alphabets have been correctly matched with parts they indicate.



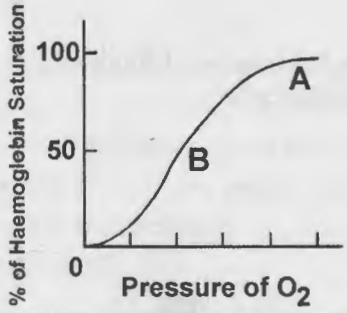
(a) A - Aorta; B - Pulmonary vein, C - Pulmonary arteries; D - Left ventricle; E - Semilunar valves; F - Left auricle; G - Right auricle; H - Superior vena cava; I - Right ventricle; J - Tricuspid valves; K - Inferior vena cava

(b) A - Aorta; B - Pulmonary artery; C - Pulmonary veins; D - Left auricle; E - Tricuspid; F - Left ventricle; G - Right ventricle; H - Inferior vena cava; I - Right auricle; J - Semi lunar valves; K - Superior vena cava

(c) A - Aorta; B - Superior vena cava; C - Inferior vena cava; D - Right ventricle; E - Tricuspid and mitral valves; F - Right auricle; G - Left auricle; H - Pulmonary vein; I - Left ventricle; J - Semilunar valves; K - Pulmonary artery

(d) A - Aorta; B - Superior vena cava; C - Inferior vena cava; D - Left ventricle; E - Semilunar valves; F - Left auricle; G - Right auricle; H - Pulmonary artery; I - Right ventricle; J - Tricuspid valves; K - Pulmonary vein

136. Choose the correct option.



	Point A on graph reflects blood haemoglobin behavior at	Point B on graph reflects blood hemoglobin behavior a
(a)	Liver	Lungs
(b)	Lungs	Tissue cells
(c)	Lungs	Heart
(d)	Kidney	Brain

137. Read the following statements (I - V) and answer as asked next to them.

Statement - I : Nodal tissue is specialised Cardiac musculature in human heart has the ability to generate action potential due to an external stimuli.

Statement - II : Position of SAN - right corner of right atrium.

Statement - III : Position AVN – right corner of ventricle.

Statement - IV : AV bundle continues from AVN.

Statement - V : Purkinje fibers are modified cardiac muscle fibers that originate from the atrioventricular node and spread into the two ventricles.

How many of the above statements are correct?

(a) One (b) Two (c) Three (d) All

138. Why is blood that flows from the lungs to the heart bright red rather than dark red?
(a) Oxygen makes it red.
(b) Carbon dioxide makes it red.
(c) Gastric juices produce the red colour of the blood.
(d) The lungs add a pigment (dye) to blood as it flows through them.

139. Which of the following can best be compared to soldiers?
(a) Lungs (b) Capillaries (c) Red blood cells (d) White blood cells

140. What happens to blood when it is pumped into the thin-walled blood vessels of the lungs?
(a) Platelets are exchanged for plasma.
(b) Carbon dioxide is replaced with oxygen.
(c) Blood fills the lungs and causes coughing.
(d) Nothing — the lungs are just a place blood goes throughon its way back to the heart.

141. How many major types of blood have scientists discovered?
(a) One: Type "O" (b) Two: white cells and red cells
(c) Three: white cells, red cells, and plasma (d) Four: Types A, B, AB, and O

142. The mitral valve is on the same side of the heart as the _____.
(a) superior vena cava (b) tricuspid valve (c) pulmonary semilunar valve (d) aortic semilunar valve

143. The tricuspid valve prevents the backflow of blood from the _____.
(a) right ventricle to the right atrium (b) left ventricle to the left atrium
(c) pulmonary trunk to the right ventricle (d) right atrium into the left atrium

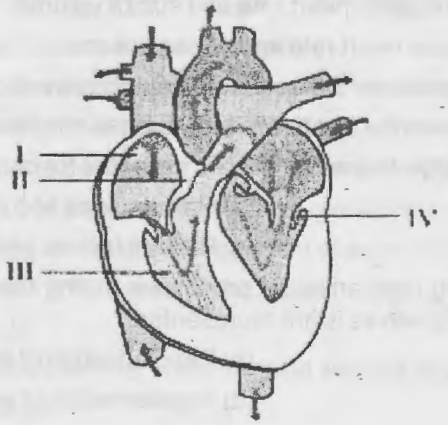
144. Name the conductile tissue in the heart located on the posterior wall of the right atrium that has the highest rate of depolarization in the heart.
(a) Medulla oblongata. (b) Atrioventricular (AV) node.
(c) Sinoatrial (SA) node. (d) Cranial nerve X - Vagus nerve.

145. What portion of the ECG indicates ventricular repolarization?
(a) P wave. (b) QRS complex. (c) R spike. (d) T wave.

146. Compared to an artery, the wall of a vein differs in which of the following ways?
(a) It consists of three coats called tunics. (b) It is lined by a thin layer of endothelium.
(c) It contains smooth muscle. (d) The middle tunic is thin.

147. The cardiac cycle includes all of the following events EXCEPT
(a) the closing and opening of the heart valves during each heart beat.
(b) the movement of impulse from the SA node to all regions of the heart wall.
(c) the number of times the heart beats in one minute.
(d) the changes in blood volume in all chambers of the heart.

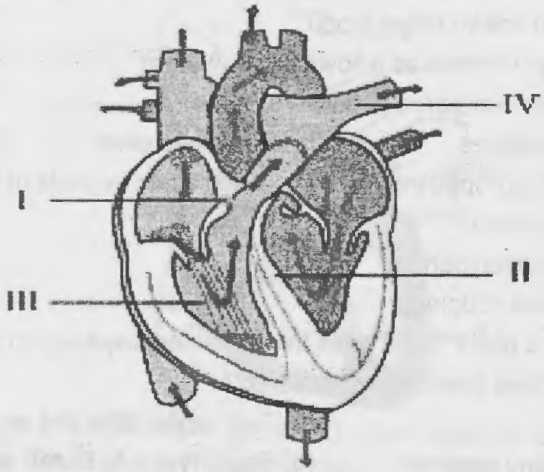
148. The given diagram illustrates a section through the human heart.



Which labelled structure represents the site for the generation of action potential in human heart?

(a) I (b) II (c) III (d) IV

149. The given diagram illustrates human heart.



Which labelled structure in the diagram illustrates bundle of His?

(a) I (b) II (c) III (d) IV

150. Which one of the following human organs is often called the .graveyard. of RBCs ?

(a) Gall bladder (b) Kidney (c) Spleen (d) Liver

151. 'Lubb' sound produced during heart beat is caused by

(a) ventricular diastole (b) ventricular systole (c) atrial diastole (d) atrial systole.

152. A certain road accident patient with unknown blood group needs immediate blood transfusion. His one doctor friend at once offers his blood. What was the blood group of the donor?

(a) Blood group B (b) Blood group AB (c) Blood group O (d) Blood group A

153. Mark, among the following a cell which does not exhibit phagocytotic activity

(a) Monocytes (b) Neutrophil (c) Basophil (d) Macrophage

154. One of the common symptoms observed in people infected with Dengue fever is

(a) Significant decrease in RBC count (b) Significant decrease in WBC count

(c) Significant decrease in platelets count (d) Significant increase in platelets count

155. Which among the following is correct during each cardiac cycle?

(a) The volume of blood pumped out by the Rt and Lt ventricles is same.

(b) The volume of blood pumped out by the Rt and Lt ventricles is different

(c) The volume of blood received by each atrium is different

(d) The volume of blood received by the aorta and pulmonary artery is different

156. Cardiac activity could be moderated by the autonomous neural system. Tick the correct answer:

(a) The parasympathetic system stimulates heart rate and stroke volume

(b) The sympathetic system stimulates heart rate and stroke volume

(c) The parasympathetic system decreases the heart rate but increase stroke volume

(d) The sympathetic system decreases the heart rate but increase stroke volume

157. Mark the pair of substances among the following which is essential for coagulation of blood.

(a) Heparin and calcium ions (b) Calcium ions and platelet factors

(c) Oxalates and citrates (d) Platelet factors and heparin

158. ECG depicts the depolarisation and repolarisation processes during the cardiac cycle. In the ECG of a normal healthy individual one of the following waves is not represented.

(a) Depolarisation of atria (b) Repolarisation of atria

(c) Depolarisation of ventricles (d) Repolarisation of ventricles

159. Which one of the following type of cells lack nucleus?
(a) RBC (b) Neutrophils (c) Eosinophils (d) Monocytes

160. Which one of the following blood cells is involved in antibody production.
(a) B-Lymphocytes (b) T-Lymphocytes (c) RBC (d) Neutrophils

161. The cardiac impulse is initiated and conducted further upto ventricle. The correct sequence of conduction of impulse is
(a) S A Node A V Node Purkinje fiber A V Bundle
(b) S A Node Purkinje fiber A V Node A V Bundle
(c) S A Node A V Node A V Bundle Purkinje fiber
(d) S A Node Purkinje fiber A V Bundle A V Node

162. The cells involved in inflammatory reactions are
(a) Basophils (b) Neutrophils (c) Eosinophils (d) Lymphocytes

163. The second heart sound (dubb) is associated with the closure of
(a) Tricuspid valve (b) Semilunar valves
(c) Bicuspid valve (d) Tricuspid and bicuspid valves.

164. Which of the following correctly explains a phase/ event in cardiac cycle in a standard electrocardiogram?
(a) QRS complex indicates atrial contraction.
(b) QRS complex indicates ventricular contraction.
(c) Time between S and T represents atrial systole.
(d) P-wave indicates beginning of ventricular contraction.

165. Which of the following statements is incorrect?
(a) A person of 'O' blood group has anti 'A' and anti 'B' antibodies in his blood plasma.
(b) A person of 'B' blood group can't donate blood to a person of 'A' blood group.
(c) Blood group is designated on the basis of the presence of antibodies in the blood plasma.
(d) A person of AB blood group is universal recipient.

166. What would be the cardiac output of a person having 72 heart beats per minute and a stroke volume of 50 ml?
(a) 360 mL (b) 3600 mL (c) 7200 mL (d) 5000 mL

167. Match the terms given under Column 'A' with their functions given under Column 'B' and select the answer from the options given below:

Column A	**Column B**
(A) Lymphatic System	i. Carries oxygenated blood
(B) Pulmonary vein	ii. Immune Response
(C) Thrombocytes	iii. To drain back the tissue fluid to the circulatory system
(D) Lymphocytes	iv. Coagulation of blood

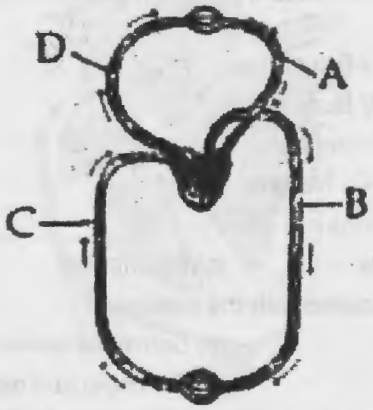
Options:
(a) A-ii, B-i, C-iii, D-iv (b) A-iii, B-i, C-iv, D-ii (c) A-iii, B-i, C-iii, D-iv (d) A-ii, B-i, C-iii, D-iv

168. Read the following statements and choose the correct option
Statement 1 : Atria receive blood from all parts of the body which subsequently flows to ventricles.
Statement 2 : Action potential generated at sino-atrial node passes from atria to ventricles.
(a) Action mentioned in Statement 1 is dependent on action mentioned in Statement 2
(b) Action mentioned in Statement 2 is dependent on action mentioned in Statement 1
(c) Action mentioned in Statements 1 and 2 are independent of each other.
(d) Action mentioned in Statements 1 and 2 are synchronous.

169. Go through the following statements
I. The kind of epithelium which forms the inner walls of blood vessels is Squamous epithelium
II. Murmur is a disorder of Heart valves

III. In a cardiac output of 5250 ml/minute, with 75 heart beats per minute, the stroke volume is 70 ml
IV. Oxygenated blood occurs in Pulmonary artery
How many of the above statements are incorrect
(a) One (b) Two (c) Three (d) Four

170. Figure shows schematic plan of blood circulation in humans with labels A to D. Identify the label and give its function(s)



(a) B - Pulmonary artery - takes blood from heart to lungs, PO_2 = 90mm Hg
(b) C - Vena Cuva - takes blood from body parts to right auricle, PCO_2 = 45mm Hg
(c) D - Dorsal aorta - takes blood from Heart to body Part PO_2 = 95mm Hg
(d) A - Pulmonary vein - takes impure blood from body parts, PO_2 = 60 mm Hg

171. The diagram given here is the standard ECG of a normal person, The P - wave represents the:

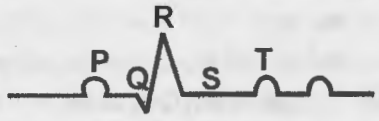
(a) Initiation of the ventricular contraction (b) Beginning of the systole
(c) End of systole (d) Contraction of both the atria

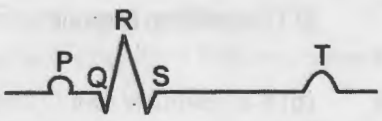
172. A substance present over the surface of RBC and is genetically heritable is called
(a) Blood group (b) Haemoglobin (c) Antibody (d) None of these

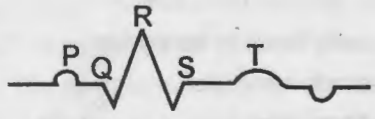
173. If heart sound recording and ECG are superimposed, the first heart sound would occurs
(a) At P-wave (b) Just after P-wave (c) Just before QRS complex (d) Just after QRS complex.

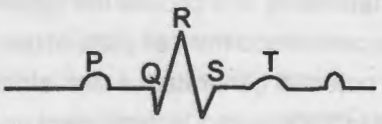
174. Valves which allow blood flow from ventricles into arteries and not in opposite direction and are
(a) Aortic valve and mitral valve (b) AV valves and semilunar valves
(c) Bicuspid and tricuspid valves (d) Semilunar valves and tricuspid valves

175. Which of the following is the diagrammatic representation of standard electrocardiogram (ECG)?

(a) 

(b) 

(c) 

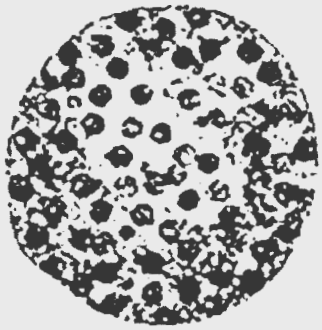
(d) 

176. Approximately seventy percent of carbon-dioxide absorbed by the blood will be transported to the lungs :
(a) as bicarbonate ions (b) in the form of dissolved gas molecules
(c) by binding to R.B.C. (d) as carbamino - haemoglobin

177. Person with blood group AB is considered as universal recipient because he has :
(a) both A and B antigens on RBC but no antibodies in the plasma.
(b) both A and B antibodies in the plasma.
(c) no antigen on RBC and no antibody in the plasma.

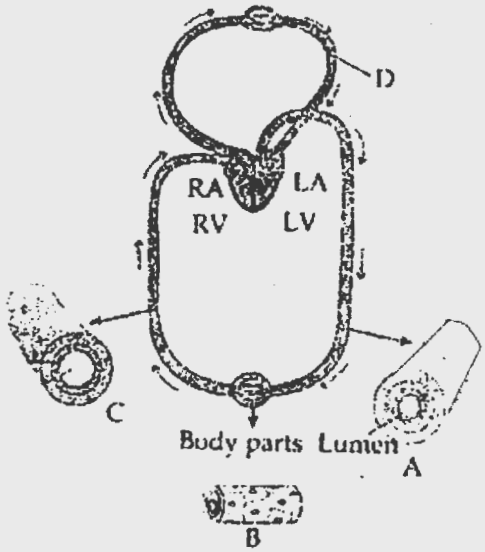
(d) both A and B antigens in the plasma but no antibodies.

178. The figure shows a human blood cell. Identify it and give its characteristics.



	Blood Cell	Characteristics
(a)	Monocyte	Life span 3 days, produce antibodies
(b)	Basophil	Secrete serotonin, inflammatory response
(c)	B-lymphocyte	Form about 20% of blood cells involved in immune response
(d)	Neutrophil	Most abundant blood cell, phagocytic

179. Figure shows blood circulation in humans with labels A to D. Select the option which gives correct identification of label and functions of the part:



(a) A – Artery – thick walled and blood flows evenly

(b) B – Capillary – thin without muscle layers and wall two cell thick

(c) C – Vein – thin walled and blood flows in jerks/spurts

(d) D – Pulmonary vein – takes oxygenated blood to heart PO_2 = 95 mmHg

180. Which valve is present at the opening of coronary sinus?

(a) Mitral valve (b) Eustachian valve (c) Thebesian valve (d) Tricuspid valve

181. Which blood cells can engulf bacteria by phagocytosis?

(a) Eosinophil and Basophil (b) Basophil and Lymphocyte

(c) Neutrophil and Monocyte (d) Neutrophil and Lymphocyte

182. Which of the following factor(s) increase blood pressure ?

A. Increase of cardiac output B. Constriction of blood vessel

C. Activation of parasympathetic nerve C. Increase of blood volume

(a) A, B, D are correct (b) B, C, D are correct (c) A, C, D are correct (d) All are correct

183. Which type of blood contains A antibodies (but not B antibodies) in the plasma and lack Rh antigen?

(a) AB negative (b) A positive (c) B negative (d) O positive

184. Which of the following statement/s are incorrect w.r.t. regulation of cardiac activity?
A. Neural signals through the sympathetic nerves can increase the rate of heart beat and cardiac output.
B. Parasympathetic neural signals decrease the speed of conduction of cardiac impulse, so stroke volume is increased.
C. Sympathetic nervous system increases the strength of ventricular contraction and stroke volume is same.
D. Parasympathetic nervous system decreases the heart rate, cardiac output and stroke volume.
Incorrect statements are
(a) B and C (b) C and D (c) A and C (d) B and D

185. If due to some injury the chordae tendinae of the bicuspid valve of the human heart is partially non-functional, what would be the immediate effect?
(a) Heart beat would become irregular
(b) Blood will tend to move back into the right atrium.
(c) The flow of blood into the aorta will be slowed down.
(d) The flow of blood into pulmonary artery will be reduced.

186. Which of the following is incorrect identification of

A.  B.  C. 

(a) A – Vein : The tunica media is comparatively thin
(b) B – Capillary : Made up of a single layer of squamous epithelium
(c) C – Artery : Tunica media and externa appear like a single layer
(d) A – Vein : Not capable of vasoconstriction and dilation.

187. Read the statements A and B given below and choose the correct option.
A. Human heart transplanted is denervated but still keeps beating.
B. Human heart is myogenic
(a) Both the statements A and B are correct and B is the correct reason of statement A.
(b) Statement A is wrong but B is correct
(c) Both the statements A and B are correct but B is not the correct reason of A
(d) Statement A is correct but B is wrong.

188. Which of the following pair of substance play very important role in clotting of blood?
(a) Potassium oxalate and sodium citrate
(b) Calcium ions and platelet factors
(c) Platelet factors and oxalates
(d) Heparin and citrates

189. Which of the following statement is not true about blood pressure?
(a) High blood pressure leads to heart diseases and also affects vital organs like brain and kidney.
(b) If the blood pressure of an individual is 140/190 mm Hg or higher it is hypertension.
(c) If the blood pressure is 220/120 mm Hg it can lead to cerebrovascular accident
(d) Hypertension can lead to 'angina pectoris'.

190. Which of the following cannot clot?
(a) Lymph only (b) Plasma only (c) Serum only (d) Lymph and serum

191. During each cardiac cycle two prominent sounds are produced which can be easily heard through a stethoscope. If during check up the heart sounds are not clear it indicates
(a) Cardiac arrest (b) Heart failure (c) Leaky valves (d) Atherosclerosis

192. Which of the following disorders of circulatory system is not correctly stated?
(a) Hypertension – a sustained high blood pressure of 140 / 90 or above

(b) CAD – The lumen of coronary arteries become narrower due to deposits of calcium, fat, cholesterol and fibrous tissue.

(c) Angina – Acute chest pain appears when heart muscle is suddenly damaged by inadequate blood supply, because of blockage

(d) Heart failure – Usually called congestive heart failure because congestion of lungs is one of the main symptoms of the disease.

193. The nucleated blood cells whose number averages 6000-8000 mm^{-3} of blood have all of the following functions / characteristics, except

(a) Secretion of histamine (b) Phagocytosis

(c) Diapedesis (d) Secretion of thromboplastin

194. Which is not the function of lymph?

(a) Transport RBCs (b) Drain excess tissue fluid

(c) Transport lymphocyte and antibodies (d) Transport absorbed fat

195. Heaviness with severe chest pain which may disappear with rest indicates

(a) Angina pectoris (b) Atherosclerosis (c) Arteriosclerosis (d) Hyperthyroidism

196. Select correct combination of statements for lymph.

(i) It helps to maintain fluid balance of the body.

(ii) It is contained in lymphatic vessels and lymphatic organs in mammals.

(iii) It is derived from tissue fluid.

(iv) It contains less antibodies than plasma

(v) It flows in both directions.

(vi) It helps to conserve proteins and remove bacteria

(a) (i), (ii), (iii) and (v) (b) (ii), (iii), (iv) and (vi)

(c) (i), (iv), (v) and (vi) (d) (iii), (iv), (v) and (vi)

197. Which chamber of the heart shows the greatest pressure changes during one cardiac cycle?

(a) Left atrium (b) Left Ventricle (c) Right atrium (d) Right ventricle

198. Aged and damaged erythrocytes are broken down by macrophages in the

(a) spleen. (b) liver. (c) bone marrow. (d) spleen, liver, and bone marrow.

199. The diagram shows the valves inside the heart.

Which valves are open or closed when the atria are relaxed and the ventricles contracted?

	Valves open	Valves closed
(a)	3 and 4	1 and 2
(b)	2 and 4	1 and 3
(c)	2 and 3	1 and 4
(d)	1 and 4	2 and 3

200. Blood pressure in the mammalian aorta is maximum during
(a) Systole of the left ventricle (b) Diastole of the right atrium
(c) Systole of the left atrium (d) Diastole of the right ventricle

201. Which one of the following is correct?
(a) Lymph = Plasma + RBC + WBC (b) Blood = Plasma + RBC + WBC + Platelets
(c) Plasma = Blood – Lymphocytes (d) Serum = Blood + Fibrinogen

202. Erythropoiesis is associated with
I. Spleen
II. Red bone marrow
III. Kidney
IV. Liver
(a) I and II only (b) II and IV only (c) I and IV only (d) I, II, III and IV

203. Which one of the following animals has two separate circulatory pathways?
(a) Whale (b) Shark (c) Frog (d) Lizard

204. Doctors use stethoscope to hear the sounds produced during each cardiac cycle. The second sound in heard when
(a) AV node receives signal from SA node
(b) AV valves open up
(c) Ventricular walls vibrate due to gushing in of blood from atria
(d) Semilunar valves close down after the blood flows into vessels from ventricles

205. Louder sound of heart beat occurs during closure of
(a) Tricuspid valve (b) Auriculo-ventricular valves
(c) Mitral valve (d) Semilunar valves

206. If liver is removed, the component that increases in blood
(a) Protein (b) Urea (c) Uric acid (d) Ammonia

207. 'Heart of heart' is
(a) SA node (b) AV node (c) Bundle of His (d) Purkinje fibres

208. A labeled red blood corpuscle is released into the arterial circulation in the left leg. It is recaptured 30 seconds later in the left lung. What is the minimum number of chambers of the heart it must have passed through?
(a) 0 (b) 1 (c) 2 (d) 3

209. Most common blood group is
(a) AB (b) A (c) B (d) O

210. Systematic circulation of oxygenated blood starts from
(a) Right atrium (b) Left atrium (c) Left ventricle (d) Right ventricle

211. Systemic heart refers to
(a) Heart that contracts under stimulation from nervous system
(b) Left auricle and left ventricle in higher vertebrates.
(c) Entire heart in lower vertebrates
(d) The two ventricles together in humans

212. Blood vessel carrying least CO_2 is
(a) Pulmonary vein (b) Pulmonary artery (c) Vena cava (d) Hepatic vein

213. Middle man of the body is
(a) Plasma (b) Lymph (c) WBC (d) RBC

214. Heart block is the failure of stimulation of the ventricles following atrial contraction. Which one of the following heart structures could not be involved in heart block?
(a) Atrioventricular node (b) Bundle of His fibres (c) Purkinje fibres (d) Sinoatrial node

215. Go through the following diagram of two mammalian blood vessels (A and B) connected by a capillary bed. Blood pressure is higher in B than in A. The arrows indicate the direction of net diffusion for O_2 and CO_2.

	Capillary bed is part of	Vein	Blood flow from
(a)	Systemic circuit	A	B to A
(b)	Pulmonary circuit	B	A to B
(c)	Either Systemic circuit or Pulmonary circuit	A	B to A
(d)	Either Systemic circuit or Pulmonary circuit	B	A to B

216. In a normal ECG recording, heart sound will occur

(a) On the P wave and at the end of QRS complex (b) On the QRS complex and at the end of T wave

(c) At the end of P wave and on the T wave (d) At the end of QRS complex and on T wave

217. On the ECG recording the maximum ventricular pressure would be

(a) At QRS complex (b) At T wave

(c) Between QRS complex and T wave (d) Between P and QRS complex

218. Valves occur in

(a) Arteries, veins and auricles (b) Atria, ventricles and veins

(c) Arteries, veins and ventricles (d) SA mode, AV node and veins.

219. A patient is hooked upto a monitoring machine that shows voltage traces on a screen and make the sound "..... pip ..... pip ..... pip ..... peeeeeee" as the patient goes into –

(a) Heart failure (b) Heart attack (c) Cardiac arrest (d) All

220. What is the state of heart in the interval after end of second heart sound and before beginning of first heart sound again?

(a) Ventricle remain systole auricles undergo first diastole and the systole

(b) Ventricle remain in diastole, auricles undergoes first diastole and then systole

(c) Ventricles undergo first systole and then diastole, auricles remain in diastole.

(d) Ventricles remain in diastole, auricles remain in systole.

221. Reduction in pH of blood will :-

(a) reduce the rate of heart beat. (b) reduce the blood supply to the brain.

(c) decrease the affinity of hemoglobin with oxygen. (d) release bicarbonate ions by the liver.

222. Blood pressure in the pulmonary artery is :-

(a) same as that in the aorta. (b) more than that in the carotid.

(c) more than that in the pulmonary vein. (d) less than that in the venae cavae.

223. Serum differs from blood in :-

(a) Lacking clotting factors (b) Lacking antibodies

(c) Lacking globulins (d) Lacking albumins

224. Name the blood cells, whose reduction in number can cause clotting disorder, leading to excessive loss of blood from the body.
(a) Neutrophils (b) Thrombocytes (c) Erythrocytes (d) Leucocytes

225. Which white blood cell releases chemical to inhibit blood clotting ?
(a) Monocyte (b) Eosinophil (c) Basophil (d) Neutrophil

226. Which of the following statements on the Red blood cells in human cells in human is/are True?
(a) Measures about 15 μm in diameter.
(b) Do not contain mitochondria.
(c) Have a life span of 120 days in the circulation.
(d) Are released from the bone marrow as mature red blood cells.
(a) I and IV are correct. (b) II and III are correct (c) II and IV are correct (c) III and IV are correct

227. Hardening of arteries due to precipitation of ca salts and cholesterol causes:
(a) Heart attack (b) Arteriosclerosis (c) Atherosclerosis (d) Hypertension

228. Which of the following body systems facilitates (but doesn't regulate) the functions of the other systems?
(a) Respiratory system (b) Endocrine system (c) Digestive system (d) Circulatory system

229. When the proteins involved in clotting are removed from blood plasma, the remaining liquid is called _____.
(a) water (b) urea (c) ground substance (d) serum

230. The surfaces of erythrocytes contain genetically determined types of proteins that are responsible for the two major blood group classifications, which are
(a) ABO and Rh (b) Type A and Type B (c) Type AB and O (d) Rh^- and Rh^+

231. Lymphocytes are involved in producing certain proteins known as _____ that inactivate foreign chemicals known as _____.
(a) antigens, antibodies (b) antibodies, antigens (c) basophils, eosinophils (d) neutrophils, monocytes

232. The heartbeat begins in the _____.
(a) sino-atrial node (b) S-A node (c) pacemaker (d) all of the above

233. A wave of contraction spreads from the S-A node across the walls of the atria to the _____, which transmits impulses to the ventricles via _____.
(a) atrio-ventricular node, a bundle of branching fibers
(b) A-V node, bundle of His
(c) Atrio-ventricular node, bundle of His
(d) All of the above

234. The blood pressure exerted on the wall of any blood vessel when the ventricle is contracted is the _____, and the pressure exerted on the wall of any vessel when the heart is relaxed is the _____.
(a) systolic pressure, diastolic pressure (b) diastolic pressure, systolic pressure
(c) sphygmomanomic pressure, blood pressure (d) ventricular pressure, auricular pressure.

235. What produces systolic blood pressure?
(a) Contraction of the right atrium (b) Contraction of the right ventricle
(c) Contraction of the left atrium (d) Contraction of the left ventricle

236. The hepatic portal vein drains blood to liver from :
(a) Stomach (b) Kidneys (c) Intestine (d) Heart

237. Frog's heart when taken out of the body continues to beat for sometime.
Select the best option from the following –
Statements :
I. Frog is a poikilotherm.
II. Frog does not have any coronary circulation.
III. Heart is "myogenic" in nature.

IV. Heart is autoexcitable

Options:

(a) Only IV (b) I and II (c) III and IV (d) Only III

238. Venous valves are responsible for
(a) preventing anterograde flow. (b) channeling blood away from the heart.
(c) channeling blood toward the heart. (d) preventing blood from re-entering a ventricle.

239. What vessels hold the largest percentage of the blood supply?
(a) artery (b) arteriole (c) capillary (d) vein

240. As blood travels from arteries to veins,
(a) pressure builds. (b) pressure drops.
(c) flow becomes turbulent. (d) diameter of the blood vessels gets progressively smaller.

241. The blood pressure inside capillaries connected to the arterioles and venules is 32 mm Hg and 7mm Hg respectively. What will be the pressure of interstitial fluid?
(a) 22 mm Hg (b) 0 mm Hg (c) 7 mm Hg (d) 32 mm Hg

242. Blood pressure is highest in _____ and lowest in _____.
(a) Arteries; Veins (b) Arteries; Ventricles
(c) Arteries; Relaxed atria (d) Arterioles; Veins

243. Blood flow velocity is slowest in the
(a) Arteries (b) Arterioles (c) Capillaries (d) Venules

244. Arteries have _____ and _____ walls when compared to veins
(a) Thicker; stronger (b) Thicker; weaker (c) Thinner; stronger (d) Thinner; weaker

245. Movement of lymph within the lymphatic vessels is result of
(a) High blood pressure
(b) Contraction of skeletal muscles
(c) Contraction of smooth muscles found around the lymphatic vessels
(d) Both (a) and (c) only

246. Lymph (tissue fluid) is composed of
(a) Plasma (b) Large proteins (c) Formed elements (d) All of them

247. Which blood vessels have walls only one cell thick?
(a) Capillaries (b) Venules (c) Veins (d) Arterioles

248. Which phase of the ECG indicates ventricular excitation and contraction?
(a) P wave (b) QRS wave (c) T wave (d) XYZ wave

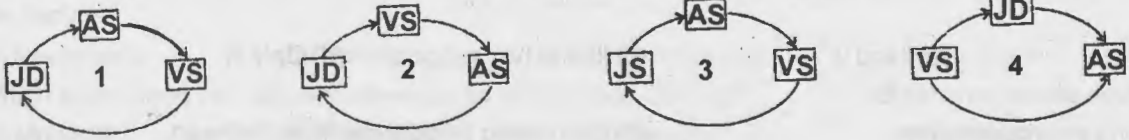
249. Which of the following is most responsible for the movement of blood to the lungs?
(a) Left ventricle (b) Left atrium (c) Right atrium (d) Right ventricle

250. The blood from a person with an AB blood type
(a) Would agglutinate with both anti-A and anti-B antibodies
(b) Would not agglutinate with either anti-A and anti-B antibodies
(c) Would agglutinate with anti-A antibodies only
(d) Would agglutinate with anti-B antibodies only

251. Innervation of heart in a living animals is primarily meant for :–
(a) Initiation of heart beat (b) Regulation of heart beat
(c) Release of acetylcholine only (d) Release of adrenalineonly

252. Considering size, which of the following series is the most appropriate ?
(a) bacteria > viruses > yeast
(b) hornwords > mosses > liverworts
(c) smooth muscle cell < striated muscle cell < cardiac muscle cell
(d) platelets < human erythrocytes < human eosinophils

253. Which of the following diagram is/are wrong representation of cardiac cycle?



(a) 1 and 2 (b) 2 and 3 (c) 3 and 4 (d) 1 and 4

254. A cardiac impulse leads to the contraction and relaxation of the heart. Which of the following arrow diagrams correctly represents the flow of cardiac impulse in the heart?

(a) SA node ➧ contraction of auricle ➧ AV node ➧ bundle of HIS ➧ purkinje fibres ➧ contraction of ventricle

(b) SA node ➧ AV node ➧ contraction of auricle ➧ purkinje fibres ➧ bundle of HIS ➧ contraction of ventricle

(c) SA node ➧ contraction of auricle ➧ bundle of HIS ➧ AV node ➧ purkinje fibres ➧ contraction of ventricles

(d) SA node ➧ AV node ➧ bundle of HIS ➧ purkinje fibres ➧ contraction of auricle ➧ contraction of ventricle

255. Match the items given in Column I with those in Column II and select the correct option given below :

Column I	Column II
a. Tricuspid valve	i. Between left atrium and left ventricle
b. Bicuspid valve	ii. Between right ventricle and pulmonary artery
c. Semilunar valve	iii. Between right atrium and right ventricle

	a	b	c
(a)	i	ii	iii
(b)	i	iii	ii
(c)	iii	i	ii
(d)	ii	i	iii

256. Match the items given in Column I with those in Column II and select the correct option given below :

Column I	Column II
a. Fibrinogen	(i) Osmotic balance
b. Globulin	(ii) Blood clotting
c. Albumin	(iii) Defence mechanism

	a	b	c
(a)	(i)	(iii)	(ii)
(b)	(i)	(ii)	(iii)
(c)	(iii)	(ii)	(i)
(d)	(ii)	(iii)	(i)

257. During the joint diastole heart receive?

(a) Deoxygenated blood (b) Oxygenated blood (c) Venous blood (d) None

258. Which one is the reason for fast conduction of impulse in heart muscles?

(a) Presence of intercalated discs (b) SA node

(c) AV node (d) Purkinje fibers

259. Which of the following has highest pH?

(a) Human saliva (b) Human blood (c) Gastric juice (d) Urine

260. Which fat soluble vitamin helps in synthesis of prothrombin?

(a) Vit K (b) Vit A (c) Vit B (d) Vit C

261. Which of the following statements is incorrect?

(a) The fibrous cords attached to the flaps of the bicuspid and tricuspid valves are chordae tendinae.

(b) The opening of inferior vena cava is guarded by Eustachian valve.

(c) The right atrio-ventricular opening is guarded by the mitral valve

(d) Impulses received from carotid sinuses decreases heart rate whereas impulses received from vena cava increases heart rate.

262. When the ECG of a person was analysed, the Q and R waves was found to be enlarged. It could be due to
(a) myocardial infarction (b) hypertension (c) cardiac arrest (d) bradycardia.

263. Which of the following statements is correct for cardiac cycle?
(a) The ventricular systole is stimulated by the SA node.
(b) The first heart sound coincides with the closure of semilunar valves and relaxation of ventricles.
(c) The blood flows from auricles to ventricles during the atrial systole via bicuspid and tricuspid valves.
(d) The fall in ventricular pressure causes the closure of semilunar valve to prevent the back-flow of blood into ventricles.

264. Select important functions of lymph.
(i) It absorbs and transports fat and fat soluble vitamins from intestine.
(ii) It regulates the pH of the body.
(iii) It transports nutrients, hormones, etc., to the body cell.
(iv) It destroys invading microorganisms.
(a) (i) only (b) (i), (iii) and (iv) (c) (i) and (ii) only (d) (i), (ii), (iii) and (iv)

265. If the heart rate of a person has increased but the stroke volume is same. The cardiac output will
(a) increase (b) decrease (c) remains same (d) first increase then decrease.

266. Which of the following statements is correct?
(a) Peripheral circulation is the flow of deoxygenated blood from the right ventricle to the lungs and return of oxygenated blood from the lungs to the left atrium.
(b) Pulmonary circulation carries deoxygenated blood from pulmonary and bronchial arteries.
(c) Hepatic portal system is a unique vascular connection which exists between digestive tract and heart.
(d) Coronary circulation is the flow of oxygenated blood from ascending aorta to heart muscle and return of deoxygenated blood from heart muscle to the right atrium.

267. Identify the incorrect statement regarding plasma:
(a) It constitutes about 55% of the blood
(b) The most common plasma protein is albumin
(c) Globulins are mainly responsible for colloid osmotic pressure in the blood
(d) If clotting factors are removed from the plasma, what remains is the serum

268. Match each item in COLUMN I with one in COLUMN II and choose the correct answer from the codes given below:

COLUMN I [WBC]	**COLUMN II [Function]**
A. Monocyte	I. Inflammatory responses
B. Basophils	II. Allergic reactions
C. Eosinophils	III. Pahgocytosis
D. Lymphocytes	IV. Adaptive immunity

Codes

	A	B	C	D
(a)	III	I	IV	II
(b)	I	III	IV	II
(c)	III	I	II	IV
(d)	I	IV	II	III

269. If type A agglutinogens are present on the surface of RBCs of a person but type B are absent, then what type of agglutinin will be present in the plasma of this person?
(a) Anti-A (b) Anti-B (c) Nil (d) Both Anti-A and Anti-B

270. What class of antibodies are responsible for the condition – erythroblastosis fetalis?
(a) IgA (b) IgM (c) IgD (d) IgG

271. Which of these are involved in the early stages of blood clotting?
(a) low-density lipoproteins (b) erythropoietin
(c) epinephrine (d) platelets

272. Compared to the right ventricle, the left ventricle:
(a) holds less blood (b) develops less pressure during contraction
(c) has a thicker wall (d) increases in diameter during contraction

273. Which of the following events is not recorded on the surface ECG?
(a) Atrial depolarization (b) Atrial repolarization
(c) Ventricular depolarization (d) Ventricular repolarization

274. The neural center that regulates cardiac activity through ANS is located in:
(a) Cerebrum (b) Hypothalamus (c) Pons (d) Medulla

275. Which term refers to the severe chest pain evident during an attack of myocardial ischemia?
(a) hypoxia (b) infarction (c) angina (d) diaphoresis

276. Go through the following statements.
I. In the patients of emphysema, the total lung capacity increases largely as a result of increase FRC.
II. Residual volume is important because it prevents the lungs from collapsing.
III. Residual volume prevents the inner surfaces of the lungs sticking together.
How many statement or statements is / are correct?
(a) Only One (b) Only two (c) All three (d) None

277. How would the blood pumped per minute by the left ventricle compare with that pumped by the right ventricle?
(a) Normally greater than that of the right ventricle
(b) Probably lower than the right ventricle if the person has systemic edema.
(c) Probably lower than the right ventricle if the person has pulmonary edema.
(d) Probably higher than the right ventricle if the person has pulmonary edema.

278. In which one of the following is extra blood stored and is released when shortage occurs
(a) Adrenal gland (b) Pancreas (c) Spleen (d) Thyroid gland

279. When a child is born, what happens to its blood circulation?
(a) Its blood flows for the first time (b) Its blood reverse its flow through the heart
(c) Its blood causes to pass from one atrium to the other (d) Its blood carries wastes for the first time.

280. Match the Column-I with Column-II

Column-I	Column-II
(A) P - wave	(i) Depolarisation of ventricles
(B) QRS complex	(ii) Repolarisation of ventricles
(C) T - wave	(iii)Coronary ischemia
(D) Reduction in the	(iv) Depolarisation of size of T-wave atira
	(v) Repolarisation of atria

Select the correct option.

	(A)	(B)	(C)	(D)
(a)	(iv)	(i)	(ii)	(iii)
(b)	(iv)	(i)	(ii)	(v)
(c)	(ii)	(i)	(v)	(iii)
(d)	(ii)	(iii)	(v)	(iv)

281. What would be the heart rate of a person if the cardiac output is 5 L, blood volume in the ventricles at the end of diastole is 100 mL and at the end of ventricular systole is 50 mL?
(a) 50 beats per minute (b) 75 beats per minute (c) 100 beats per minute (d) 125 beats per minute

282. All the components of the nodal tissue are autoexcitable. Why does the SA node act as the normal pacemaker?
(a) SA node has the highest rate of depolarisation.
(b) SA node has the lowest rate of depolarisation.
(c) SA node is the only component to generate the threshold potential.
(d) Only SA node can convey the action potential to the other components.

283. A specialised nodal tissue embedded in the lower corner of the right atrium, close to Atrio-ventricular septum, delays the spreading of impulses to heart apex for about 0.1 sec. This delay allows
(a) the atria to empty completely.
(b) blood to enter aorta.
(c) the ventricles to empty completely.
(d) blood to enter pulmonary arteries.

18 BODY FLUID AND CIRCULATION

1. c	2. d	3. a	4. b	5. b	6. a	7. a	8. a	9. c	10. c
11. c	12. d	13. d	14. c	15. a	16. d	17. c	18. a	19. d	20. a
21. d	22. b	23. c	24. c	25. b	26. a	27. b	28. a	29. c	30. c
31. c	32. d	33. b	34. c	35. a	36. a	37. a	38. d	39. a	40. d
41. c	42. d	43. c	44. c	45. b	46. d	47. a	48. b	49. a	50. d
51. c	52. c	53. b	54. c	55. d	56. a	57. d	58. d	59. a	60. a
61. a	62. c	63. d	64. b	65. c	66. b	67. b	68. a	69. d	70. a
71. c	72. a	73. d	74. d	75. b	76. b	77. c	78. d	79. b	80. a
81. d	82. a	83. b	84. a	85. d	86. d	87. b	88. d	89. a	90. b
91. c	92. d	93. c	94. d	95. b	96. b	97. a	98. b	99. c	100. c
101. a	102. b	103. c	104. d	105. a	106. c	107. c	108. c	109. d	110. c
111. b	112. c	113. a	114. a	115. c	116. c	117. a	118. c	119. a	120 c
121. d	122. b	123. d	124. c	125. a	126. c	127. b	128. c	129. a	130. d
131. d	132. a	133. c	134. b	135. b	136. b	137. c	138. a	139. d	140. b
141. d	142. d	143. a	144. c	145. d	146. d	147. c	148. a	149. b	150. c
151. b	152. c	153. c	154. c	155. a	156. b	157. b	158. b	159. a	160.a
161. c	162. a	163. b	164. b	165. c	166. b	167. b	168. b	169. a	170. b
171. d	172. d	173. d	174. b	175. d	176. a	177. a	178. b	179. d	180. c
181. c	182. a	183. c	184. a	185. c	186. c	187. a	188. b	189. d	190. c
191. c	192. c	193. d	194. a	195. a	196. b	197. b	198. d	199. c	200. a
201. b	202. d	203. a	204. d	205. b	206. d	207. a	208. c	209. d	210. c
211. b	212. a	213. b	214. d	215. a	216. b	217. a	218. b	219. c	220. b
221. c	222. c	223. a	224. b	225. c	226. b	227. c	228. d	229. d	230. a
231. b	232. d	233. d	234. a	235. d	236. c	237. c	238. c	239. d	240. b
241. a	242. a	243. c	244. a	245. b	246. a	247. a	248. b	249. d	250. a
251. b	252. d	253. b	254. a	255. c	256. d	257. a	258. a	259. b	260. a
261. c	262. a	263. c	264. b	265. a	266. d	267. c	268. c	269. b	270. d
271. d	272. c	273. b	274. d	275. c	276. c	277. c	278. c	279. d	280. a
281. c	282. a	283. a							

SOLUTION

241. (I) Blood pressure in interstitial fluid is less than B.P. in capillaries connected with arteriole.
(II) Blood Pressure in interstitial fluid is greater than B.P. in capillaries connected with venules.

19 EXCRETORY PRODUCTS AND THEIR ELIMINATION

1. Excretory means –
   (a) Removal of substances which have never been a part of body
   (b) Removal of substances not required by the body
   (c) Formation of useful substances in the body
   (d) All of the above
2. Ammonia and urea are waste products derived from the metabolic breakdown of –
   (a) Lipids (b) Carbohydrates (c) Proteins (d) Sugars
3. Which of the following molecules is the most toxic to the cells?
   (a) NaCl (b) Urea (c) Uric acid (d) Ammonia
4. The terms "ammonotelic", "Ureotelic", and "Uricotelic" are used to describe –
   (a) Modes of excretory system development
   (b) The actions of hormones on the excretory systems
   (c) The types of nitrogenous waste produced by various classes of vertebrates
   (d) Modification of kidney tubules to enhance excretion
5. Which of the following statements is correct?
   (a) Many bony fishes, aquatic amphibia and aquatic insects are ammonotelic
   (b) Ammonia is readily soluble
   (c) NH_3 is generally excreted by the body surface or through gills (in fishes) as NH_4^+
   (d) All
6. Which of the following statements is wrong?
   (a) Kidney does not play any significant role in the removal of ammonia
   (b) Ureotelic animals excrete most of the nitrogenous waste as urea
   (c) Ammonia and urea are the waste products derived from the metabolic breakdown of proteins
   (d) None of the above is wrong
7. Urea and uric acid are –
   (a) More toxic than NH_3 (b) Less toxic than NH_3 (c) Equally toxic to NH_3 (d) Non-toxic
8. Which of the following group of animals is ureotelic?
   (a) many terrestrial amphibians (b) Mammals
   (c) Marine fishes (d) All
9. NH_3 is converted into urea in –
   (a) Kidney (b) Liver (c) Spleen (d) Intestine
10. Which of the following groups of animals is uricotelic?
    (a) Reptiles (b) Insects (c) Birds and land snail (d) All
11. Excretion of nitrogenous products in semisolid forms by –
    (a) Uricotelic animals (b) Ureotelic animals (c) Ammonotelic animals (d) Amniotes
12. Least toxic nitrogenous waste is –
    (a) NH_3 (b) Urea (c) Uric acid (d) NH3 and urea
13. Which of following in small amount is retained in kidney matrix of some animals to maintain a desired osmolarity?
    (a) NH_3 (b) Urea (c) Uric acid (d) NH_3 and uric acid
14. Terrestrial organisms must conserve water. The least amount of water is lost with the excretion of which nitrogenous waste product?
    (a) NH_3 (b) Uric acid (c) Urea (d) CO_2
15. The less amount of water is lost with the excretion of which nitrogenous product?
    (a) NH_3 and urea (b) NH_3 and uric acid (c) NH_3 (d) Urea and uric acid
16. Which of the following is correct about protonephridia / flame cells?

(a) Protonephridia are the excretory structures in platyhelminthes (e.g Planaria), rotifers and some annelids
(b) Protonephridia are the excretory structures in the cephalochordates e.g. Amphioxus
(c) Protonephridia are primarily concerned with ionic and fluid volume regulation i.e. osmoregulation
(d) All

17. Match the Column I with Column II

Column I	Column II
A. Nephridia	I. Crustaceans (Prawn)
B. Malpighian tubules	II. Annelids (Earthworm)
C. Antennal gland or Green glands	III. Insects (Cockroach)

(a) A - I, B - II, C - III (b) A - III, B - II, C - I (c) A - II, B - III, C - I (d) A - II, B - I, C - III

18. Which of the following statements is wrong about the human excretory system?
(a) Excretory system consists of one pair of bean shaped kidneys, one pair of ureter, a urinary bladder and a urethra
(b) Kidneys are situated between the 12th thoracic and 3rd lumbar vertebrae close to the dorsal wall in abdominal cav
(c) Right kidney is a little higher level than the left one
(d) All

19. Each kidney of an adult human measures –

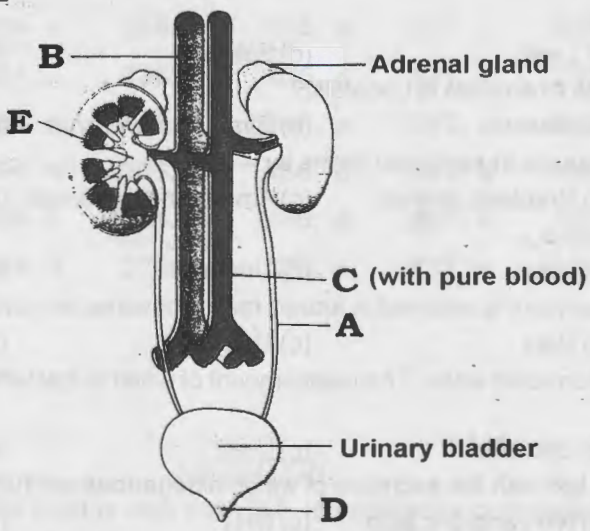
	Length	Width	Thickness	Weight
(a)	10 - 12 cm	5 - 7 cm	2 - 3 cm	120 - 170 gm
(b)	10 - 20 cm	10 - 12 cm	6 - 12 cm	40 - 50 gm
(c)	2 - 6 cm	10 - 12 cm	6 - 12 cm	40 - 50 gm
(d)	10 - 12 mm	5 - 7 mm	2 - 3 mm	120 - 170 mg

20. The part of kidney, gateway for ureter, nerves and blood vessels is –
(a) Hilum (b) Renal pore (c) Minor calyx (d) Major calyx

21. Inner to the hilum of kidney is a broad funnel shaped space called :
(a) Cortex (b) Medulla (c) Pelvis (d) Calyx

22. Which of the following statements is false?
I. Outer cortex and inner medulla are the two zones in kidney
II. Medulla is divided into about 8 to 18 renal pyramids
III. Pyramid projects into calyx
IV. Inwards extension of cortex between the pyramids is called renal column of Bertini.
(a) I and IV (b) II and IV (c) IV (d) None

23. Observe the following figure –



Figure–Human Urinary system

Identify A to E structure –

	A	B	C	D	E
(a)	Superior vena cava	Inferior vena cava	Dorsal Aorta	Urethra	Pelvis
(b)	Inferior vena cava	Superior vena cava	Dorsal Aorta	Urethra	Pelvis
(c)	Ureter	Inferior vena cava	Dorsal Aorta	Urethra	Pelvis
(d)	Dorsal Aorta	Inferior vena cava	Urethra	Cortex	Pelvis

24. Go through the following figure –

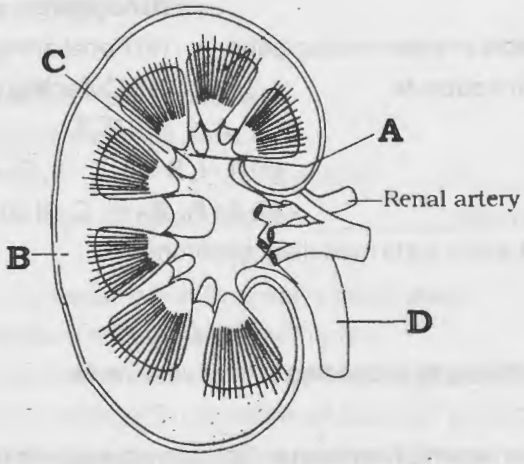


Figure- Longitudinal section of Kidney

Identify A to D –

	A	B	C	D
(a)	Cortex	Calyx	Renal Column	Ureter
(b)	Calyx	Cortex	Renal Column	Ureter
(c)	Medulla	Cortex	Renal Column	Urethra
(d)	Calyx	Cortex	Renal Column	Urethra

25. Each kidney has how many nephrons?
(a) About 2 millions (b) About 1 million (c) About 5000 (d) About 50000

26. Which one of the following is the structural and functional unit of kidney?
(a) Urethra (b) Urinary bladder (c) Renal column (d) Nephron

27. Renal corpuscle or Malpighian body is –
(a) Glomerulus only (b) Glomerulus along with Bowman's capsule
(c) Bowman's capsule (d) Glomerulus with afferent arteriole

28. Which one of the following is a tube that carries urine from kidney to the urinary bladder?
(a) Loop of Henle (b) Ureter (c) Urethra (d) Uvula

29. The bed of capillaries in the vertebrate kidney where water, urea and salts are filtered out of the blood is the –
(b) Bowman's capsule (b) Collecting duct (c) Glomerulus (d) Loop of Henle

30. All of the following structures are situated in the renal cortex except –
(a) Loop of Henle (b) Malpighian corpuscle (c) PCT (d) DCT

31. The DCTs of many nephrons open into a straight tube called –
(a) PCT (b) Loop of Henle (c) Collecting duct (d) Bowman's capsule

32. Which of the following statements is false?
(a) Renal tubule starts with a double walled cup like structure called Bowman's capsule
(b) In majority of nephrons, the loop of Henle is too short and such nephrons are cortical nephrons
(c) Juxta medullary nephron has long loop of Henle
(d) None

33. Which is the correct pathway for passage of urine in humans?
(a) Collecting tubule → ureter → bladder → urethra
(b) Renal vein → renal ureter → bladder → urethra
(c) Pelvis → Medulla → bladder → urethra (d) Cortex → Medulla → bladder → ureter

34. Match the Column I with Column II –

Column I	Column II
A. Delivers blood to glomerulus	(I) Ascending and descending limb
B. Carries urine to pelvis, also acts in water reabsorption	(II) Renal artery
C. Collects filtrate from Bowman's capsule	(III) Collecting duct
D. Loop of Henle	(IV) PCT

(a) A - II, B - III, C - IV, D - I (b) A - I, B - III, C - II, D - IV
(c) A - II, B - IV, C - I, D - III (d) A - IV, B - III, C - II, D - I

35. Which of the following is correct about juxta medullary nephrons?
(a) Vasa recta is prominent
(b) Loop of Henle is long
(c) NaCl is returned to the interstitium by ascending limb of vasa recta
(d) All

36. Which of the following places the region of nephron in their correct sequence with respect to flow of tubular fluid?
(a) PCT → Descending limb of Henle (DLH) → Ascending limb of Henle (ALH) → DCT → Collecting duct (CD)
(b) PCT → ALH → DLH → DCT → CD
(c) ALH → DLH → PCT → DCT → CD
(d) DCT → ALH → DLH → PCT → CD

37. Vasa recta is –
(a) L-shaped (b) S-shaped (c) U-shaped (d) J-shaped

38. In glomerulus, afferent arteriole –
(a) Is wider than efferent arteriole (b) Is narrower than efferent arteriole
(c) And efferent arteriole have similar diameter (d) Is narrow than efferent capillaries

39. Which of the following is incorrect?
(a) Blood vessel leading to glomerulus is called efferent arteriole
(b) Vasa recta, peritubular capillaries, Glomerulus all have blood
(c) Cortical nephron has no or highly reduced vasa recta
(d) Vasa recta runs parallel to the Henle's loop in juxtamedullary nephrons

40. Urine formation involves –
(a) Ultra filtration and reabsorption occuring in different parts of nephron
(b) Ultrafiltration and reabsorption occuring in same part of nephron
(c) Ultrafiltration, reabsorption and secretion occuring in different parts of nephron
(d) Ultrafiltration, reabsorption and secretion occuring in same part of nephron

41. Match column I with column II –

Column I	Column II
A. PCT	I. Concentrated urine formation
B. DCT	II. Filtration of blood
C. Loop of Henle	III. Reabsorption of 70 - 80% electrolytes
D. Counter - current mechanism	IV. Ionic balance
E. Renal corpuscle	V. Maintenance of conc. gradient in medulla

	A	B	C	D	E
(a)	III	IV	I	V	II
(b)	III	V	IV	II	I
(c)	I	III	II	V	IV
(d)	III	I	IV	V	II

42. Which of the following statements is correct?
I. Renal vein take blood away from kidney
II. Loop of Henle conserves water
III. Podocytes occur in inner wall of Bowman's capsule
IV. Ultrafiltrate / nephric filtrate is plasma minus proteins.
(a) I and II (b) I and III (c) III and IV (d) I, II, III, IV

43. The glomerular capillaries cause filtration of blood through _____ layers –
(a) 1 (b) 2 (c) 3 (d) 6

44. The layers between the blood in glomerular blood Bowman's space are –
(a) Tunica media + Cuboidal epithelium + Basement's membrane
(b) Endothelium + Epithelium of Bowman's capsule + Basement membrane between the 2 layers
(c) Endothelium of glomerular blood vessel + Endothelium of Bowman's capsule + Parietal layer of Bowman's

45. On average, _____ ml of blood is filtrated by the kidney per minute which constitute roughly _____ of the blood pumped out by each ventricle of heart in a minute
(a) 125 ml, 1/6th (b) 100 - 125 ml, 1/6th (c) 1100 - 1200 ml, 1/5th (d) 5 L, 1/10th

46. The amount of the filtrate formed by the kidney / minute is called GFR (Glomerular Filtration Rate). The GFR of a healthy adult is –
(a) 80 ml / m (b) 125 ml / m (c) 300 ml / m (d) 20 ml / m

47. The GFR / day in a healthy adult is –
(a) 5L (b) 180 L (c) 200 L (d) 20 L

48. Juxtaglomerular apparatus, a special sensitive cellular region is formed in –
(a) PCT and DCT
(b) PCT and DCT at the location of their contact
(c) PCT and loop of Henle at the location their contact
(d) DCT and afferent arteriole at the location of their contact

49. Of the filtrate, nearly how many of it is reabsorbed by the renal tubules?
(a) 5% (b) 99% (c) 50% (d) 25%

50. Which of following statements is false?
(a) The kidney have built in mechanism for regulation of GFR
(b) Tubular secretion does not play any significant role in urine formation
(c) The amount of urine output per day in normal adult is about 1.5 L
(d) During urine formation tubular cells secrete H^+, K^+ and NH_3 in the filtrate

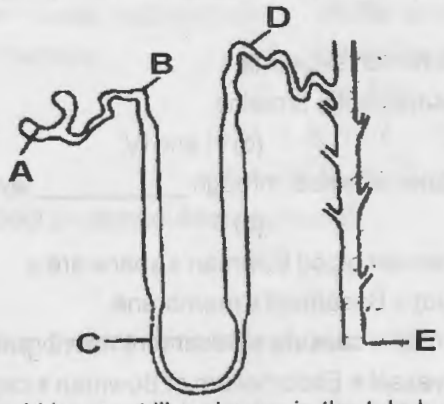
51. Which of the following statements about proximal convoluted tubule (PCT) is false?
(a) It is lined by simple cuboidal brush border epithelium which increases the surface area
(b) Nearly all the essential nutrients, 70 - 80% electrolytes, 70% H_2O are reabsorbed by PCT.
(c) PCT is not the site of selective secretion
(d) PCT helps to maintain the pH and ionic balance of body fluids

52. PCT helps to maintain the pH and ionic balance of body fluids by –
(a) Selective secretion of H^+, NH_3 and K^+ ions in filtrate
(b) Reabsorption of HCO_3^- from filtrate
(c) Both a and b

(d) Secreting regulatory hormone like renin and angiotensinogen

53. If Loop of Henle were absent from mammalian nephrons, which of the following is to be expected?
(a) The urine will be more dilute
(b) There will be no urine formation
(c) The urine will be more concentrated
(d) There will be hardly any change in quality and quantity of urine formed

54. Use following diagram to complete the statements about the human nephron –



I. The composition of the filtrate would be most like plasma in the tubule next to the letter.
II. The urine would be most concentrated in the collecting duct next to letter
III. Most of the glomerular filtrate is reabsorbed into peritubular capillary next to the letter
IV. Conducting of urine to pelvis of the kidney from the structure next to the letter
V. Most water is reabsorbed by the structure next to the litter

	I	II	III	IV	V
(a)	A	C	B	E	D
(b)	A	E	B	C	D
(c)	A	B	E	C	D
(d)	A	E	B	E	B

55. I. Reabsorption in this region is minimum.
II. This region plays a significant role in the maintenance of high osmolarity of intestinal fluid
III. Its descending limb is permeable to water but almost impermeable to electrolytes
IV. Its ascending limb is impermeable to water but allows transport of electrolyte actively or passively
V. In descending limb filtrate is hypertonic while in ascending limb filtrate is hypotonic
The above characteristics are associated with –
(a) PCT (b) Loop of Henle (c) DCT (d) Bowman's capsule

56. Which of the following statements is correct?
I. Reabsorption of water occurs passively in the initial segment of nephron
II. Nitrogenous waste are absorbed by passive transport
III. Conditional reabsorption of Na+ and water takes place in DCT
IV. DCT reabsorbs HCO_3^-
V. DCT is capable of selective secretion of H^+, K^+ and NH_3 to maintain pH and Na^+ - K^+ balance in blood
VI. Substances like glucose, amino acids, Na^+, etc in the filtrate are reabsorbed actively
(a) I and II (b) II and IIII (c) IV and V (d) All

57. Tubular secretion helps to maintain a proper acid-base balance by removing one of the following from blood –
(a) H^+ and NH_3 (b) Uric acid (c) H^+ and urea (d) NH_3 and creatinine

58. Which of the following statements is false regarding the collecting duct?
I. Collecting duct is a straight duct

II. It extends from the cortex to medulla
III. Large amount of water could be reabsorbed from it to produce concentrated urine
IV. Small amount of urea diffuses out from it into the medulla to keep up the osmolarity
V. It plays a role to maintain pH and ionic balance of blood by the selective secretion of H+ and K+ ions
(a) Only I (b) Only IIII (c) IV and V (d) None

59. Mammals have the ability to produce _____ urine –
(a) Hypotonic (b) Hypertonic (c) Isotonic (d) Alkaline

60. Which one plays an important role in counter current mechanism?
(a) Vasa recta (b) PCT (c) Loop of Henle (d) a and c

61. In which of the following counter current operates –
(a) In ascending limb of loop of Henle
(b) In descending limb of loop of Henle
(c) In ascending limb or descending limb of vasa recta
(d) Between the 2 limb of Henle's loop and those of vasa recta

62. Medullary gradient is developed by all the following except –
(a) Reabsorption of Na^+ from ascending limb of Henle's loop into medullary interstitium
(b) Reabsorption of Na^+ from descending limb of Henle's loop
(c) Diffusion of small amount of urea from collecting duct into medullary interstitium
(d) Proximity between Henle's loop and vasa recta as well as the counter current in them

63. The medullary gradient is mainly caused by –
(a) Urea & K^+ (b) H^+ and K^+ (c) NaCl and Urea (d) Urea and H^+

64. The counter current mechanism helps to maintain a concentration gradient. This gradient helps in –
(a) Easy passage of water from medulla to collecting tubule and thereby concentrating urine
(b) Easy passage of water from collecting tubule and thereby concentrating urine
(c) Easy passage of water from medullary interstitial fluid to collecting tubule and thereby diluting urine
(d) Inhibition of passage of water between the collecting tubule and medulla and so isotonic urine is formed

65. NaCl is transported by the ascending limb of Henle's loop which is exchanged with –
(a) DCT (b) PCT
(c) Ascending limb of vasa recta (d) Descending limb of vasa recta

66. NaCl is returned to the _____ by the ascending limb of vasa recta –
(a) Ascending limb of Henle's loop (b) DCT
(c) PCT (d) Interstitial fluid of medulla

67. Human kidney can produce urine nearly how many times concentrated than the initial filtrate formed?
(a) 4 (b) 2 (c) 10 (d) 100

68. The high osmolarity of the renal medulla is maintained by all of the following except –
I. Diffusion of salt from the ascending limb of the loop of Henle
II. Active transport of salt from the upper region of the ascending limb
III. The spatial arrangement of juxtamedullary nephrons
IV. Diffusion of urea from the collecting duct
V. Diffusion of salt from the descending limb of the loop of Henle
(a) Only I (b) Only V (c) IIII and IV (d) I and V

69. Which one of the following is produced in the kidneys?
(a) Rennin (b) Renin (c) Uricase (d) Arginase

70. Reabsorption of Na+ is controlled by –
(a) Vasopressin or ADH (b) Aldosterone (c) Renin (d) Rennin

Excretory Products and their Elimination

71. The reabsorption of water in the kidneys is under the control of a hormone –
(a) STH (b) ACTH (c) LH (d) ADH / Vasopressin

72. Antidiuretic hormone secretion increases when the hypothalamus is stimulated by –
(a) Angiotensin receptors (b) glucose receptors (c) Osmoreceptors (d) Renin receptors

73. The kidneys help regulate acid-base balance by controlling the level of _____ in the blood –
(a) CO_2 (b) H^+ (c) HCO_3^- (d) b and c

74. The functioning of the kidneys is efficiently monitored and regulated by hormonal feedback mechanisms involving –
(a) Hypothalamus only (b) JGA only
(c) The heart only (d) Hypothalamus, JGA and heart (to certain extent)

75. Osmoreceptors in the body are activated by changes in –
(a) Blood volume but not body fluid volume
(b) Body fluid volume but not blood volume
(c) Blood volume and body fluid volume
(d) Blood volume, body fluid volume and ionic concentration

76. Which of the following sequences is correct for regulation of kidney function?
(a) An excess loss of water from body → Stimulates hypothalamus → osmoreceptor → Neurohypophysis → ADH → Increases water permeability of DCT and CT → Prevention of diuresis
(b) An excess loss of fluid from body → Osmoreceptors → Hypothalamus → Neurohypophysis → ADH → Increases water permeability of DCT and CT → Prevention of diuresis
(c) An excess loss of fluid from body → Osmoreceptors → Hypothalamus → Neurohypophysis → Aldosterone → Water permeability of DCT and CT increases → Prevention of diuresis
(d) An excess loss of fluid from body → osmoreceptor → Hypothalamus → Adenohypophysis → ADH → Increases water permeability of DCT and CT → Prevention of diuresis

77. Osmoregulation is the function of –
(a) Oxytocin (b) Prolactin (c) Vasopressin (ADH) (d) None of the above

78. ADH is synthesised by _____, released by _____ and acts on _____ –
(a) Hypothalamus, Neurohypophysis, DCT and CT
(b) Hypothalamus, Neurohypophysis, Loop of Henle
(c) Hypothalamus, Adenohypophysis, DCT and CT
(d) Hypothalamus, Adenohypophysis, Loop of Henle

79. Which of the following sequence is correct?
(a) An increase in body fluid volume → switch off the osmoreceptors → suppresses the ADH release
(b) ADH → Constricting effect on blood vessel → B.P. high → Glomerular blood flow more → GFR more
(c) Angiotensinogen → Angiotensin I → Angiotensin II → Adrenal cortex → Aldosterone
(d) All

80. Which of the following factors can active the JG cells to release renin?
(a) A fall in glomerular blood pressure (GBP)
(b) A fall in glomerular blood flow (GBF)
(c) A fall in GFR
(d) A fall in GFR / GBP / GBF

81. Which of the following statements is false?
(a) Angiotensin II, being a powerful vasoconstrictor, increases glomerular pressure and thereby GFR
(b) Angiotensin II activates the adrenal cortex to release aldosterone
(c) Aldosterone promotes reabsorption of Na+ and water from the DCT and CT leading to an increase in B.P. and GFR
(d) ANF causes vasoconstriction

82. RAAS (Renin - Angiotensinogen - Aldosterone System) –

(a) Is triggered when the juxtaglomerular cells of JGA releases renin in response to various stimuli
(b) Is responsible for regulation of kidney function
(c) Are stimulated when ANF is more in blood
(d) a and b are correct

83. Which of the following is true about Atrial Natriuretic factor (ANF)?
(a) An increase in blood volume and B.P. stimulates cardiac atria to release ANF
(b) ANF promotes vasoconstriction and thereby decrease B.P.
(c) ANF acts as a check on RAAS
(d) a and c

84. Renin-angiotensin pathway controls –
(a) Ultrafiltration (b) Blood pressure (c) Glucose reabsorption (d) Cardia output

85. RAAS secretes which of the following hormones?
(a) Glucocorticoids (b) Renin (c) Mineralocorticoids (d) All

86. The expulsion of urine from the urinary bladder is called –
(a) Uricolysis (b) Micturition (c) Uremia (d) Anuria

87. In micturition –
(a) Urethra relaxes (b) Ureter relaxes (c) Ureter contracts (d) Urethra contracts

88. The outline of principal event of urination is given below in unordered manner –
I. Stretch receptors on the wall of urinary bladder send signal to the CNS
II. The bladder fills with urine and becomes distended
III. Micturition
IV. CNS passes on motor messages to initiate the contraction of smooth muscles of bladder and simultaneous relaxation of urethral Sphincter
The correct order of steps for urination is –
(a) I → II → III → IV (b) IV → III → II → I (c) II → I → IV → III (d) III → II → I → IV

89. The neural mechanisms causing urination is called –
(a) Scarth reflex (b) Withddrawal reflex (c) Micturition reflex (d) None

90. Average pH of human urine is –
(a) 6 (b) 9 (c) 3 (d) 7

91. Match the Column I with Column II –

Column I	Column II
A. Uremia	I. Henle's loop
B. Ketonuria	II. Ketone bodies in urine
C. Glycosuria	III. Artificial kidney
D. Blood dialyser	IV. Glucose in urine
E. Concentration of urine	V. Accumulation of urea in blood

(a) A - V, B - II, C - IV, D - III, E - I (b) A - III, B - II, C - IV, D - I, E - V
(c) A - I, B - II, C - IV, D - III, E - V (d) A - I, B - II, C - IV, D - V, E - III

92. Diabetes mellitus is characterised by –
(a) Oligonuria (b) Ketonuria and glycosuria (c) Anuria (d) Haematuria

93. How much urea is excreted per day by a normal adult?
(a) 0 gm (b) 25 - 30 gm (c) 50 gm (d) 1 - 2 gm

94. Other than kidneys, which of the following also helps in the elimination of excretory wastes?
(a) Skin (b) Liver (c) Lungs (d) All

Excretory Products and their Elimination

95. How much CO_2 is removed per minute by our lungs –
(a) 18 ml (b) 200 ml (b) 1 litre (d) 8 litres

96. Which of the following statements is false?
(a) Micturition is carried out by a reflex
(b) Cholesterol is excreted in the bile and waxes are excreted in the sebum
(c) The primary function of sweat is excretion while its cooling function is minor
(d) Saliva also eliminates small amount of nitrogenous wastes

97. Liver (largest gland) is both secretory and excretory organ. It secretes bile. Which of the following are major excretory products of bile?
(a) Degraded and steroid hormones
(b) Vitamins and drugs
(c) Bilirubin and biliverdin
(d) Cholesterol

98. Most of excretory products of bile ultimately pass out along with –
(a) Urine (b) Digestive wastes (c) Urea (d) Sweat

99. I. The human skin posseses sweat and sebaceous glands which eliminate some wastes in their secretion.
II. Sweat is waxy protective secretion having sterols, hydrocarbons and fatty acids
III. Sebum is an aquous fluid having NaCl, lactic acid, urea, amino acids, glucose
Which one of the above statement is correct?
(a) Only I (b) II and III (c) Only II (d) I and II

100. In uremia, artificial kidney is used for removing accumulated waste products like urea by the process called –
(a) Micturition (b) Haemolysis (c) Ureolelism (d) haemodialysis

101. In artificial kidney dialysing fluid contains all the constituents as in plasma except –
(a) Na^+ (b) Water (c) Glucose (d) Nitrogenous wastes

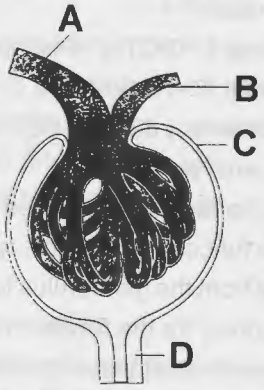
102. Kidney stone is produced by –
(a) Deposition of sand particles (b) Crystallization of Ca-oxalate
(c) Precipitation of protein (d) KCl or NaCl

103. Bright's disease / Glomerulonephritis is –
(a) Glycosuria (b) Cystitis (c) Inflammation of glomeruli (d) Ketonuria

104. Which of the following statements is correct?
(a) Kidney transplantation is the ultimate method at the stage where drug or dialysis do not help
(b) Close relatives are often used as kidney donors to minimise risk of rejection
(c) Cyclosporin A is used as immunosuppressive agent in kidney transplant patient
(d) All

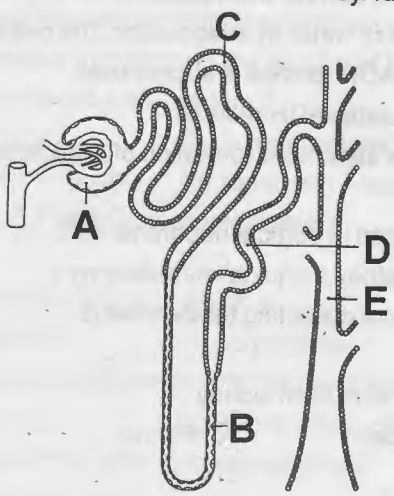
105. Following are the steps of dialysis –
A. Blood is passed into a vein.
B. Blood is mixed with heparin.
C. Blood is mixed with anti-heparin.
D. Blood is drained from convenient artery.
E. Blood is passed through a coiled and porous cellophane tube bathing in dialysis fluid.
F. Removal of nitrogenous wastes from blood.
The correct sequence of steps is –
(a) A → B → C → D → E → F (b) F → C → E → B → A → D
(c) D → B → E → F → C → A (d) D → C → E → F → B → A

106. The following diagram represent the Malpighian body. Identify A to D –



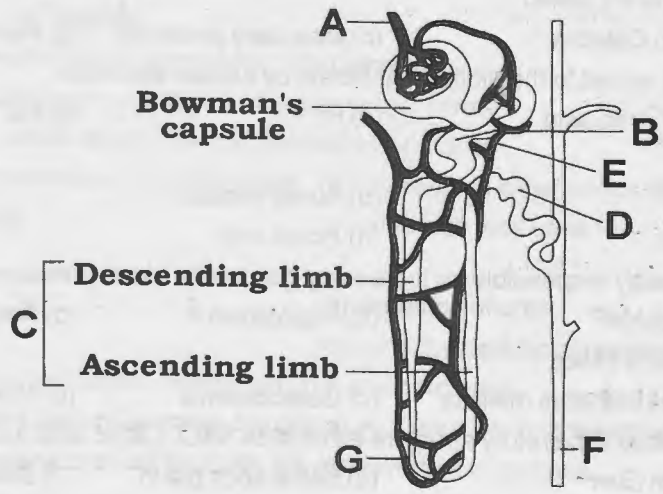
(a) A - Efferent arteriole, B - Afferent arteriole, C - Bowman's capsule, D - Proximal convulated tubule
(b) A - Afferent arteriole, B - Efferent arteriole, C - renal corpuscle, D - Proximal convulated tubule
(c) A - Afferent arteriole, B - Efferent arteriole, C - Bowman's capsule, D - Proximal convulated tubule
(d) A - Afferent arteriole, B - Efferent arteriole, C - Bowman's capsule, D - DCT

107. The diagram represents a single nephron from a mammalian kidney. Identify which of the numbered regions is –



I. The site of ultrafiltration.
II. Particularly sensitive to ADH.
III. The main site for the reaborption of glucose and amino acid.
IV. Largely responsible for the adjustment of blood pH.
(a) I - A, II - E, III - C, IV - D
(b) I - A, II - B, III - C, IV - D
(c) I - A, II - B, III - C, IV - E
(d) I - A, II - B, III - D, IV - E

108. Match the correct one –



(a) A - Afferent arteriole, B - Proximal convulated tubule, C - Henle's loop, D - Distal convulated tubule, E - Peritubular capillaries, F - Collecting duct, G - Vasa recta

(b) A - Efferent arteriole, B - PCT, C - Henle's loop, D - DCT, E - Peritubular capillaries, F - Collecting duct, G - Vasa recta

(c) A - Afferent arteriole, B - Peritubular capillaries, C - Henle's loop, D - DCT, E - PCT, F - Collecting duct, G - Vasa recta

(d) A - Afferent arteriole, B - Henle's loop, C - Collecting duct, D - PCT, E - DCT, F - Peritubular capillaries, G - Vasa recta

109. Which one of the following is not a part of a renal pyramid?

(a) Loops of Henle (b) Peritubular capillaries (c) Convoluted tubules (d) Collecting ducts

110. Which one of following correctly explains the function of a specific part of a human nephron?

(a) Afferent arteriole : Carries the blood away from the glomerulus towards renal vein

(b) Podocytes : Create minute spaces (slit pores) for the filtration of blood into the Bowman's capsule

(c) Henle's loop : Most reabsorption of the major substances from the glomerular filtrate

(d) Distal convoluted tubule: Reabsorption of K^+ ions into the surrounding blood capillaries

111. Uricotelic mode of passing out nitrogenous wastes in found in

(a) Insects and Amphibians (b) Reptiles and Birds

(c) Birds and Annelids (d) Amphibians and Reptiles

112. Which one of the following statements is correct with respect to kidney function regulation?

(a) During summer when body loses lot of water by evaporation, the release of ADH is suppressed

(b) When someone drinks lot of water, ADH release is suppressed

(c) Exposure to cold temperature stimulates ADH release

(d) An increase in glomerular blood flow stimulates formation of Angiotensin II

113. Mark the correct statement

(a) Vasa recta is absent or highly reduced in cortical nephrons

(b) Maximum number of nephrons in kidney are juxta-medullary type

(c) DCT of only one nephron opens into a collecting tubule always

(d) All of these

114. Which of the following hormone is secreted from kidney

(a) ANF (b) Erythropoetin (c) Rennin (d) Aldosterone

115. Filtration slits are formed by

(a) Endothelial lining of glomerular capillaries (b) Inner epithelium of Bowman's capsule

(c) Basement membrane (d) The participation of all of these

116. Juxta glomerular apparatus is formed by cellular modification in the

(a) Afferent arteriole and DCT (b) Efferent arteriole and PCT

(c) Afferent arteriole and PCT (d) Efferent arteriole and DCT

117. The projections of renal pelvis are called

(a) Hiluses (b) Calyces (c) Medullary pyramids (d) Renal columns

118. Which of the following is not added to the glomerular filtrate by tubular secretion

(a) NH_3 (b) Uric acid (c) H^+ (d) Na^+

119. Glomerular capillaries are

(a) Purely arterial (b) Purely venous

(c) Arterial as well as venous (d) Portal only

120. Which of the following is directly responsible for increasing glomerular blood pressure and hence GFR

(a) Aldosterone (b) ANF (c) Angiotensin II (d) Renin

121. Presence of glucose in urine is called

(a) Diabetes insipidus (b) Diabetes mellitus (c) Galactosemia (d) None of these

122. Which of the following accessory excretory structure eliminates NaCl, Lactic acid and Urea

(a) Kidney (b) Liver (c) Sebaceous gland (d) Sweat gland

Excretory Products and their Elimination

123. Urea from the blood can be removed by
(a) Uraemia (b) Diuresis (c) Dialysis (d) Micturition

124. In which one of the following organism its *excretory organs* are correctly stated ?
(a) Humans – Kidneys, sebaceous glands and tear glands
(b) Earthworm – Pharyngeal, integumentary and septal nephridia
(c) Cockroach – Malpighian tubules and enteric caeca
(d) Frog – Kidneys, skin and buccal epithelium

125. Glomerular filtrate consists of _____ .
(a) All the constituents of blood
(b) all the constituents of blood except blood cells
(c) all the constituents of blood except blood cells and proteins larger then $80A^0$
(d) excess water, waste products and toxic substances

126. Ammonia is a very toxic substance especially to the brain cells. Injection of very dilute solutions of it in the blood can comatose a person. This is because
(a) toxic NH_4^+ ions are formed which penetrate easily through the plasma membrane of brain cells
(b) neutral molecules of ammonia readily combine with glutamate in the blood to yield toxic glutamine molecules
(c) molecules of ammonia readily pass through the mitochondrial membranes cells and consume a-ketoglutrated
(d) NH_4^+ ions affect the brain cell function by changing the polarity of the cell membranes

127. Which option is correct with respect to blood urea content ?
(a) hepatic vein – less, renal vein – much (b) pulmonary vein – less, hepatic vein – much
(c) hepatic vein – less, bsu-clavian vein – much (d) renal vein – less, hepatic vein – much.

128. What is the pH difference between C.S.F and Glomerular filtrate ?
(a) 1.2 (b) 1 (c) 0 (d) 1.26

129. 'RAAS' acts against a hormone, chemical nature of which is
(a) steroid (b) sphyngolipid (c) polypeptide (d) catecholamine

130. All of the following structures are in direct association with the renal hilus EXCEPT the
(a) Renal pelvis (b) Renal artery (c) Renal corpuscle (d) Renal vein

131. The blood supply to the kidney changes from arterial to venous blood
(a) Before the blood enters the glomerular capillaries
(b) Within the capillaries of the the glomerulus
(c) Upon leaving the glomerular capillaries
(d) Upon leaving the peritubular capillaries

132. Constriction of the afferent arteriole would result in
(a) An increase in blood flow into the efferent arteriole
(b) A decrease in glomerular filtration
(c) An increase in hydrostatic (blood) pressure in the glomerulus
(d) An increase in the protein concentration of the glomerular filtrate.

133. In response to increased levels of aldosterone, the kidneys produce
(a) urine with a lower concentration of sodium ions. (b) urine with a lower concentration of potassium ions.
(c) a larger volume of urine. (d) urine with less urea.

134. Micturition is
(a) a reflex (b) secretion of acid.
(c) production of urine. (d) a mechanism for concentrating urine.

135. One of the roles of the countercurrent mechanism in the nephron is to
(a) produce a urea gradient that will promote the diffusion of urea into the collecting tubule.
(b) produce a glucose gradient that will facilitate the reabsorption of glucose.

(c) produce a salt gradient that will allow the kidney to retain salt ions.
(d) produce a concentration gradient that will allow the nephron to concentrate filtrate.

136. The ability to concentrate urine depends on the functions of
(a) the collecting duct. (b) PCT. (c) the renal corpuscle. (d) the loop of Henle.

137. Which substance below would probably have the lowest reabsorption rate?
(a) Glucose (b) Amino acids (c) Urea (d) Potassium

138. Which substance would NOT be expected in urine normally?
(a) Nitrogenous waste (b) Water (c) Sodium (d) Protein

139. Which urine formation process below results in acid elimination?
(a) Filtration (b) Secretion (c) Reabsorption (d) Excretion

140. Arrange the following structures in the correct sequence in which urine passes through them to the external environment.
(1) ureter (2) renal pelvis (3) calyx (4) urinary bladder (5) urethra
(a) 3,4,1,5,2 (b) 3,2,1,4,5 (c) 1,2,3,4,5 (d) 2,4,1,3,5

141. If the efferent arteriole constricts while the afferent arteriole remains unchanged, the glomerular filtration rate
(a) decreases. (b) increases. (c) does NOT change. (d) cannot be determined.

142. Death of mitochondria in the ascending limb of the loop of Henle would result in
(a) decreased Na^+ and Cl^- ions in the urine output. (b) increased Na^+ and Cl^- ions in the urine output.
(c) decreased Ca^{2+} ions in the urine. (d) decreased only Cl^- ions in the urine.

143. The reabsorption of amino acids and glucose when filtrate concentration is high is by
(a) Filtration. (b) active transport. (c) facilitated diffusion. (d) simple diffusion.

144. All of the following are layers of the filtration membrane in the Glomerular membrane except the
(a) Bowman's membrane. (b) fenestrated endothelium.
(c) basement membrane. (d) renal capsule.

145. All of the following functions are carried out in the renal tubules except
(a) reabsorption. (b) filtration. (c) formation of urine. (d) secretion.

146. Which one of the following options gives the correct categorisation of six animals according to the type of nitrogenous wastes (A, B, (c), they give out?

	A - AMMONOTELIC	B - UREOTELIC	C - URICOTELIC
(a)	Pigeon, Humans	Aquatic Amphibia, Lizards	Cockroach, Frog
(b)	Frog, Lizards	Aquatic Amphibia, Humans	Cockroach, Pigeon
(c)	Aquatic Amphibia	Frog, Humans	Pigeon, Lizards, Cockroach
(d)	Aquatic Amphibia	Cockroach, Humans	Frog, Pigeon, Lizards

147. A fall in glomerular filtration rate (GFR) activates :
(a) juxta glomerular cells to release renin (b) adrenal cortex to release aldosterone
(c) adrenal medulla to release adrenaline (d) posterior pituitary to release vasopressin

148. Which one of the following characteristics is common both in humans and adult frogs ?
(a) Four - chambered heart (b) Internal fertilisation
(c) Nucleated RBCs (d) Ureotelic mode of excretion

149. The maximum amount of electrolytes and water (70 - 80 percent) from the glomerular filtrate is reabsorbed in which part of the nephron?
(a) Ascending limb of loop of Henle (b) Distal convoluted tubule
(c) Proximal convoluted tubule (d) Descending limb of loop of Henle

150. Difference between glomerular filtrate and blood plasma is of
(a) proteins (b) potassium
(c) first is white and second is yellow (d) first is yellow and second is white

Excretory Products and their Elimination

151. Go through the following statements.
I. Least concentration of urea is present in Renal vein.
II. The highest concentration of urea is found in Hepatic vein.
III. Vasa recta is well developed in cortical nephrons.
IV. Urethra is not the part of kidney.
V. Liver is the site of urine formation.
How many of the above statements are correct?
(a) 3 (b) 2 (c) 5 (d) 0

152. Under normal conditions which one is completely reabsorbed in the renal tubule?
(a) Urea (b) Uric acid (c) Salts (d) Glucose

153. Liquid which collects in the cavity of Bowman's capsule is
(a) concentrated urine (b) plasma minus blood proteins
(c) glycogen and water (d) sulphates and water

154. Excretion means
(a) Removal of useless substances and substances present in excess.
(b) Formation of those substances which have some role in the body.
(c) Removal of such substances which have never been part of the body.
(d) All of these.

155. Kidneys are not only organs of excretion, their work is supplemented by
(a) Liver (b) Skin (c) Heart (d) Large intestine

156. The function of kidney in mammals is to excrete
(a) Extra urea, extra water and extra amino acids
(b) Extra urea, extra water and carbohydrate
(c) Extra urea, salts and excess water
(d) Extra salts, urea and excess water

157. Select the correct statement with respect to locomotion in humans:
(a) Accumulation of uric acid crystals in joints causes their inflammation
(b) The vertebral column has 10 thoracic vertebrae.
(c) The joint between adjacent vertebrae is a fibrous joint
(d) The decreased level of proggesterone causes osteoporosis in old people

158. Choose the correctly matched pair :-
(a) Inner lining of salivary ducts – Ciliated epithelim
(b) Moist surface of buccal cavity – Glandular epithelium
(c) Tubular parts of nephrons – Cuboidal epithelium
(d) Inner surface of bronchioles – Squamous epithelium

159. Which of the following causes an increase in sodium reabsorption in the distal convoluted tubule ?
(a) Increase in aldosterone levels (b) Increase in antidiuretic hormone levels
(c) Decrease in aldosterone levels (d) Decrease in antidiuretic hormone levels

160. The shared terminal duct of the reproductive and urinary system in the human male is :
(a) Urethra (b) Ureter (c) Vas deferens (d) Vasa efferentia.

161. Proximal convoluted tubule of nephron is responsible for
(a) Filtration of blood
(b) Maintenance of Glomerular Filtration Rate
(c) Selective reabsorption of glucose, amino acid, NaCl and water
(d) Reabsorption of salts only

162. An X-ray of the lower abdomen shows a shadow in the region of the ureter suspected to be an ureteric calculus. A possible clinical symptom would be
(a) acute renal failure (ARF) (b) anuria and haematuria
(c) motor aphasia (d) chronic renal failure (CRF)

163. What will happen if one kidney is removed from the body of a human being?
(a) Death due to poisoning (b) Uremia and death
(c) Stoppage of urination (d) The person will survive

164. The following is / are removed during hemodialysis.
(a) urea (b) glucose (c) amino acids (d) all the above.

165. Which of the following two compounds play main role in maintaining the osmolarity gradient in medulla?
(a) NaCl and H^+ (b) K^+ and H^+ (c) Ammonia and H^+ (d) NaCl and Urea.

166. Which of the following reasons cannot be attributed to cause of renal failures?
(a) Uremia (b) Hypertension (c) Diabetes mellitus (d) Diabetes insipidus

167. Choose the incorrect statement.
(a) During urine formation tubular cells secrete substances such as H^+, K^+ and NH_4^+ into the filtrate
(b) Glomerular filtration rate is 180 litres per hour in healthy individuals
(c) Glucose and amino acids are reabsorbed completely in PCT.
(d) PCT helps to maintain pH and ionic balance of the body fluids by secretion of H^+ into the filtrate and reabsorption of HCO_3^- from it.

168. Which of the following does not favour the formation of large quantities of dilute urine?
(a) Renin (b) Atrial-natriuretic factor (c) Alcohol (d) Caffeine

169. Removal of proximal convulated tubule from the nephron will result in
(a) No change in quality and quantity of urine
(b) No urine formation
(c) More diluted urine
(d) More concentration urine

170. Human urine is usually acidic because
(a) Potassium and sodium exchange generates acidity
(b) Hydrogen ions are actively secreted into the filtrate
(c) The sodium transporter exchanges one hydrogen ions for each sodium ion, in peritubular capillaries
(d) Excreted plasma proteins are acidic

171. In which of the following locations is filtrate osmolarity highest?
(a) End of Proximal Convulated Tubule
(b) Tip of the Loop of Henle
(c) End of Distal Convulated Tubule
(d) Beginning of Distal Convulated Tubule

172. The glomerular capillary blood pressure causes filtration of blood through three layers in a sequence of
(a) Endothelium ⟶ Basement membrane ⟶ Epithelium of Bowman's capsule.
(b) Epithelium of Bowman's capsule ⟶ Endothelium ⟶ Basement membrane
(c) Basement membrane ⟶ Endothelium ⟶ Epithelium of Bowman's capsule.
(d) Epithelium of Bowman's capsule ⟶ Basement membrane ⟶ Endothelium

173. Renal fluid isotonic to cortical fluid and blood occurs in
(a) Distal convulated tubule and ascending limb (b) Collecting duct and ascending limb
(c) PCT and DCT (d) Ascending limb and descending limb.

174. Which of the following factors decreases renin secretion?
I. Increased BP
II. Increased plasma Na+ concentration
III. Prostaglandins
IV. Angiotensin II
(a) I, II and IV are correct (b) Only III is correct (b) All are correct (c) All are incorrect

175. In mammals, which blood vessel would normally carry largest amount of urea ?
(a) Renal Vein (b) Dorsal Aorta (c) Hepatic Vein (d) Hepatic Portal Vein

176. The part of nephron involved in active reabsorption of sodium is :-
(a) Bowman's capsule (b) Descending limb of Henle's loop
(c) Distal convoluted tubule (d) Proximal convoluted tubule

177. Which of the following statements on human kidney is false?

(a) Renal plasma flow is normally 660 ml/minute
(b) Blood flow in the cortex is greater than that in the medulla
(c) Reabsorption of ions and water occurs mainly in the distal convoluted tubules
(d) The renal blood flow is decreased in dehydration

178. Where majority of the reabsorption takes place ?
(a) Renal capsule (b) Proximal convoluted tubule
(c) Collecting duct (d) Ascending limbs of the loop of Henle

179. Which one of the following is not a zymogen?
(a) Trypsinogen (b) Pepsinogen (c) Angiotensin - II Procollagenase

180. Intake of ORS inhibits the secretion of
(a) Vasopressin (b) Oxytocin (c) Melatonin (d) Thyroxine

181. The greatest amount of hydrogen ion secreted by the proximal tubule is associated with :
(a) excretion of potassium ion (b) excretion of hydrogen ion
(c) reabsorption of calcium ion (d) reabsorption of bicarbonate ion

182. The amount of potassium excreted by the kidney will decreases if :
(a) distal tubular flow increases (b) circulating aldosterone level increase
(c) dietary intake of potassium increase (d) Na^+ reabsorption by the distal nephron decreases

183. Which of the following statements concerning the composition of the filtrate formed by the renal corpuscle of the human kidney is correct?
(a) Blood and filtrate are identical in composition.
(b) Filtrate has a higher concentration of the waste product urea than blood does.
(c) The filtrate is similar to blood but without proteins and blood cells.
(d) The filtrate has a lower concentration of glucose than blood does.

184. Which of the following represents the primary driving force for the filtration of blood within the renal corpuscle?
(a) Pressure within the glomerular capillaries is lower than pressure in Bowman's capsule.
(b) Pressure within the glomerular capillaries is greater than pressure in Bowman's capsule.
(c) The collecting duct creates a suction that draws fluid into Bowman's capsule.
(d) The filtration slits are present in the glomerular capillaries.

185. Which statement most accurately describes the primary role of the loop of Henle in urine formation?
(a) The loop of Henle deposits Na^+ and Cl^- in the medullary region of the kidney, increasing its osmolarity
(b) The hormone ADH acts on the loop of Henle to increase water reabsorption.
(c) The ascending limb of the loop of Henle contributes to the high osmolarity of the medullary region by depositing urea.
(d) The loop of Henle is responsible for most of the Na^+ reabsorbed by the nephron tubule.

186. The amount of Na^+ excreted in the urine is primarily determined by:
(a) the amount of Na^+ secreted into the proximal convoluted tubule
(b) the amount of Na^+ reabsorbed by the proximal convoluted tubule
(c) the amount of ADH released by the posterior pituitary gland
(d) hormonal regulation of Na^+ reabsorption in the distal convoluted tubule

187. Which of the following would result in the production of hypotonic urine?
(a) dehydration in an individual
(b) an increase in the permeability of the collecting duct to water
(c) a decrease in ADH release by the brain
(d) a decrease in water reabsorption by the loop of Henle

188. From an evolutionary perspective, which of the following adaptations makes the most sense?
(a) long loops of Henle in the kidneys of a river otter
(b) long loops of Henle in the kidneys of a desert fox

(c) an extensive Malpighian tubule system in a freshwater beetle
(d) renal corpuscles that are few in number and small in size in the kidney of a freshwater fish

189. Which of the following nitrogenous wastes requires hardly any water for its excretion?
(a) amino acid (b) urea (c) uric acid (d) ammonia

190. The most concentrated urine is excreted by
(a) frogs (b) kangaroo rats (c) humans (d) desert tortoises

191. Which group possess excretory structures known as protonephridia?
(a) flatworms (b) earthworms (c) insects (d) vertebrates

192. Which group possess excretory organs known as Malpighian tubules?
(a) earthworms (b) flatworms (c) insects (d) jellyfish

193. The transfer of fluid from the glomerulus to Bowman's capsule
(a) results from active transport.
(b) transfers large molecules as easily as small ones.
(c) is very selective as to which subprotein sized molecules are transferred.
(d) is mainly a consequence of blood pressure in the capillaries of the glomerulus

194. Which of the following would contain blood in a normally functioning nephron?
(a) vasa recta (b) Bowman's capsule (c) loop of Henle (d) proximal tubule

195. What substance is secreted by the proximal-tubule cells and prevents the pH of urine from becoming too acidic?
(a) bicarbonate (b) salt (c) glucose (d) ammonia

196. Which structure passes urine to the renal pelvis?
(a) loop of Henle (b) collecting duct (c) Bowman's capsule (d) proximal tubule

197. Which of the following processes of osmoregulation by the kidney is the least selective?
(a) salt pumping to control osmolarity (b) H^+ pumping to control pH
(c) reabsorption (d) filtration

198. Proper functioning of the human kidney requires considerable active transport of sodium in the kidney tubules. If these active transport mechanisms were to stop completely, how would urine production be affected?
(a) No urine would be produced.
(b) A less-than-normal volume of hypoosmotic urine would be produced.
(c) A greater-than-normal volume of isoosmotic urine would be produced.
(d) A greater-than-normal volume of hyperosmotic urine would be produced.

199. Which one of the following is extremely important for water conservation in mammals?
(a) juxtamedullary nephrons (b) Bowman's capsule
(c) urethra (d) podocytes

200. Processing of filtrate in the proximal and distal tubules accomplishes what important function?
(a) sorting plasma proteins according to size (b) converting toxic ammonia to less toxic urea
(c) maintaining a constant pH in body fluids (d) regulating the speed of blood flow through the nephron

201. What is unique about transport epithelial cells in the ascending loop of Henle in humans?
(a) They are the largest epithelial cells in the body.
(b) They are not in contact with interstitial fluid.
(c) Their membranes are impermeable to water.
(d) 50% of their cell mass is comprised of smooth endoplasmic reticulum.

202. What is the typical osmolarity of human blood?
(a) 30 mosm/L (b) 100 mosm/L (c) 200 mosm/L (d) 300 mosm/L

203. Which one of the following, if present in a urine sample, would likely be caused by trauma?
(a) amino acids (b) glucose (c) salts (d) erythrocytes

204. What would account for increased urine production as a result of drinking alcoholic beverages?
(a) increased aldosterone production
(b) increased blood pressure
(c) inhibition of antidiuretic hormone secretion (ADH)
(d) increased reabsorption of water in the proximal tubule

205. Which of the following activities would initiate an osmoregulatory adjustment brought about primarily through the renin-angiotensin-aldosterone system?
(a) sleeping
(b) spending several hours mowing the lawn on a hot day
(c) eating a bag of potato chips
(d) eating a pizza with olives and pepperoni

206. How does ADH function at the cellular level?
(a) ADH stimulates the reabsorption of glucose through channel proteins.
(b) It triggers the synthesis of an enzyme that makes the phospholipid bilayer more permeable to water.
(c) It causes membranes to include more phospholipids that have unsaturated fatty acids.
(d) It causes an increase in the number of aquaporin molecules of collecting duct cells.

207. How do ADH and RAAS work together in maintaining osmoregulatory homeostasis?
(a) ADH monitors osmolarity of the blood and RAAS regulates blood volume.
(b) ADH monitors appropriate osmolarity by reabsorption of water, and RAAS maintains osmolarity by stimulating Na+ reabsorption.
(c) ADH an RAAS work antagonistically; ADH stimulates water reabsorption during dehydration and RAAS removal of water when it is in excess in body fluids.
(d) Both stimulate the adrenal gland to secrete aldosterone which increases both blood volume and pressure.

208. Which of the following is not a normal response to increased blood osmolarity in humans?
(a) increased permeability of the collecting duct to water
(b) production of more dilute urine
(c) release of ADH by the pituitary gland
(d) increased thirst

209. The high osmolarity of the renal medulla is maintained by all of the following except
(a) diffusion of salt from the thin segment of the ascending limb of the loop of Henle.
(b) active transport of salt from the upper region of the ascending limb.
(c) the spatial arrangement of juxtamedullary nephrons.
(d) diffusion of salt from the descending limb of the loop of Henle.

210. Which process in the nephron is least selective?
(a) filtration (b) reabsorption (c) active transport (d) secretion

211. The urine is
(a) hypotonic to blood and isotonic to medullary fluid
(b) hypertonic to blood and isotonic to medullary fluid
(c) isotonic to blood and hypotonic to medullary fluid
(d) Isotonic to blood and hypertonic to medullary fluid

212. Which of the following statements is correct?
(a) The descending limb of loop of Henle is impermeable to water.
(b) The ascending limb of loop of Henle is permeable to water.
(c) The descending limb of loop of Henle is permeable to electrolytes.
(d) The ascending limb of loop of Henle is impermeable to water.

213. Fish gills are:
(a) only respiratory in function. (b) only excretory in function.
(c) osmoregulatory in function. (d) All the three are correct.

214. Select the incorrect match w.r.t. materials reabsorbed in different parts of the nephron of kidney.

	Parts of nephron	Reabsorbed
(a)	Ascending limb of loop of Henle	NaCl
(b)	Descending limb of loop of Henle	Water and NaCl
(c)	PCT	Glucose, amino acids, vitamin C
(d)	DCT	NaCl, HCO_3^-

215. Which of the following reaction is catalysed by renin secreted by juxtaglomerular cells in kidney?
(a) Angiotensin II → Angiotensinogen (b) Angiotensin II → Angiotensin I
(c) Angiotensinogen → Angiotensin I (d) Angiotensin I → Angiotensin II

216. When you feel thirsty or there is dehydration, it results in increase in osmolarity of blood above 300 mos mL–1. It would stimulate the release of all the following, except
(a) Increase in osmolarity may also trigger the release of atrial natriuretic hormone
(b) A lowering of blood volume stimulates the release of renin
(c) This triggers the release of ADH. ADH causes the walls of the distal convoluted tubules and collecting ducts in the kindney to become more permeable to water
(d) Aldosterone will stimulate the distal convoluted tubules and collecting ducts to reabsorb Na^+.

217. Excretion of nitrogenous waste products in semisolid form occur in :
(a) Ureotelic animals (b) Ammonotelic animals (c) Uricotelic animals (d) Amniotes

218. Arrange the following in sequence from upper to lower portions and select the right option.
1. Kidney
2. Ureter
3. Urinary bladder
4. Urethra
(a) 1 → 2 → 3 → 4 (b) 4 → 3 → 2 → 1 (c) 1 → 3 → 2 → 4 (d) 1 → 2 → 4 → 3

219. Match the items given in Column I with those in Column II and select the correct option given below :

Column I	Column II
A. Glycosuria	i. Accumulation of uric acid in joints
B. Gout	ii. Mass of crystallised salts within the kidney
C. Renal calculi	iii. Inflammation in glomeruli
D. Glomerular	iv. Presence of nephritis glucose in urine

	A	B	C	D		A	B	C	D
(a)	ii	iii	i	iv	(b)	i	ii	iii	iv
(c)	iii	ii	iv	i	(d)	iv	i	ii	iii

220. Match the items given in Column I with those in Column II and select the correct option given below:

Column I (Function)	Column II (Part of Excretory system)
A. Ultrafiltration	i. Henle's loop
B. Concentration of urine	ii. Ureter
C. Transport of urine	iii. Urinary bladder
D. Storage of urine	iv. Malpighian corpuscle
	v. Proximal convoluted tubule

	A	B	C	D		A	B	C	D
(a)	v	iv	i	ii	(b)	iv	i	ii	iii
(c)	iv	v	ii	iii	(d)	v	iv	i	iii

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221. Which of the following are about 90% absorbed in the nephron?
(a) Glucose and amino acids – Active process (b) Glucose and amino acids – Passive process
(c) Cl^-, NH_3, K^+ – Passive process (d) Cl^-, NH_3, K^+ – Active process

222. Creatinine is formed by –
(a) Urea (b) Uric acid
(c) Breakdown of creatine phosphate in muscle (d) Kidney

223. Which exocrine glands are present in skin?
(a) Sweat gland, eccrine (b) Sweat gland, merocrine
(c) Sweat gland, apocrine (d) Sweat gland, sebaceous gland

224. Which of the following hormones coordinate with each other to maintain ideal blood Ca level?
(a) Thyrocalcitonin and glucagon (b) Parathyroid hormone and cortisol
(c) Thyrocalcitonin and Thyroxin (d) Thyrocalcitonin and Parathyroid hormone

225. Uric acid forms in body by :
(a) Phospholipid (b) Glucose (c) DNA (d) RNA

226. In old age persons defects in kidney is due to:-
(a) GFR is increased (b) ADH is increased (c) Nephrons degeneration (d) Reabsorption is increased

227. During conc. of urine by the human kidneys, NaCl is returned to the medullary interstitium by
(a) DL of Loop of Henle (b) AL of Loop of Henle (c) DL of Vasa recta (d) Al of Vasa recta

228. Identify the correct statement regarding the excretion of acids by the human kidney.
(a) The filtered HCO_3^- is absorbed by anion transport.
(b) Intercalated cells of Distal tubule secrete H+ to reabsorbed HCO_3^- from tubular fluid.
(c) All the filtered HCO_3^- ions are normally absorbed in the first half of the distal tubule.
(d) Urine pH is normally greater than that of plasma.

229. Blood doping means use of banned substances by athlets that have a favourable effect on erythrocyte count by stimulating the bone marrow. The source of such a hormone can be the human.
(a) Spleen (b) Heart (c) Kidney (d) Lung

230. The main disadvantage of urea as an excretory product for animals, it would be
(a) Its highly toxic (b) Needs lot of water to be eliminated
(c) It being osmolyte (d) Energy expenditure to produce it

231. Juxtaglomerular apparatus is a special sensitive region formed by cellular modifications in the
(a) DCT & efferent arteriole at point of their contact (b) DCT & afferent arteriole at point of their contact
(c) PCT & afferent arteriole at point of their contact (d) PCT & efferent arteriole at point of their contact

232. Which of the following statements about the kidneys is incorrect?
(a) They consumes over 20% of the oxygen used by the body at rest.
(b) Approximately 1200 ml of fluid is filtrated by the kidneys each day.
(c) 120 - 125 ml of plasma is forced into the renal tubules each time.
(d) They compose less than 1% of the body weight

233. Describe urine in relationship to glomerular filtration, tubular reabsorption and tubular secretion.
(a) GF – TR – TS (b) GF + TR + TS (c) GF + TR – TS (d) GF – TR + TS

234. A decrease in blood pressure/volume will not cause the release of :–
(a) Renin (b) Atrial Natriuretic Factor
(c) Aldosterone (d) ADH

235. A person with a high blood volume than the normal would show –
(a) increased renin secretion (b) increased aldosterone secretion
(c) decreased ANF secretion (d) increased urinary Na^+

Excretory Products and their Elimination

236. Organisms categorized as osmoconformers are most likely
(a) Found in fresh water lakes and streams
(b) Marine
(c) Found in arid terrestrial environments.
(d) Found in terrestrial environments with adequate moisture.

237. The advantage of excreting wastes as urea rather than as ammonia is that
(a) Urea can be exchanged for Na+.
(b) Urea is less toxic than ammonia.
(c) Urea requires more water for excretion than ammonia.
(d) Urea does not affect the osmolar gradient.

238 What substance is secreted by the proximal-tubule cells and prevents the pH of urine from becoming too acidic?
(a) Bicarbonate (b) NaOH (c) Glucose (d) Ammonia

239. If these active transport mechanisms for sodium ions in human kidney were to stop completely, how would urine production be affected?
(a) A less-than-normal volume of hypoosmotic urine would be produced.
(b) A greater-than-normal volume of isoosmotic urine would be produced.
(c) A greater-than-normal volume of hyperosmotic urine would be produced.
(d) A less-than-normal volume of isoosmotic urine would be produced.

240. Processing of filtrate in the proximal and distal tubules accomplishes what important function?
(a) Sorting plasma proteins according to size
(b) Converting toxic ammonia to less toxic urea
(c) Maintaining a constant pH in body fluids
(d) Reabsorbing urea to maintain osmotic balance

241. Which one of the following, if present in a urine sample, would likely be caused by trauma?
(a) Amino acids (b) Glucose (c) Salts (d) Erythrocytes

242. In a laboratory experiment with three groups, one group of people drinks pure water, a second group drinks an equal amount of beer and a third group drinks an equal amount of concentrated salt solution all during the same time period. Their urine production is monitored for several hours. At the end of the measurement period, which group will have produced the greatest volume of urine and which group the least?
(a) Beer the most, salt solution the least
(b) Salt solution the most, water the least
(c) Water the most, beer the least
(d) Beer the most, water the least

243. What will happen to glomerular filtration rate (GFR) if efferent arteriole smooth muscle is contracted?
(a) GFR will increase
(b) GFR will decrease
(c) GFR will remain constant
(d) GFR can either increase or decrease

244. Glomerular filtration rate can be determined by calculating renal clearance of
(a) Ammonia
(b) Inulin
(c) Para-aminohippuric acid.
(d) Urea

245. The mucosa of the bladder is comprised of:
(a) Smooth muscle
(b) Squamous epithelium
(c) Transitional epithelium
(d) Simple columnar epithelium

246. What causes urine to flow from the kidneys to the bladder?
(a) Gravity
(b) Hydrostatic pressure
(c) Peristalsis
(d) Osmotic pressure

247. Which of the following statements about the urinary system is INCORRECT?
(a) It produces renin, which helps regulate blood pressure.
(b) It metabolizes vitamin D to its active form.
(c) It carries out the majority of gluconeogenesis in the body.
(d) It produces erythropoietin, which stimulates red blood cell formation.

Excretory Products and their Elimination

248. Peristaltic muscular contractions are important for conveying urine through the excretory system, much like peristalsis in the digestive tract. Peristalsis of the detrusor muscle of the urinary bladder is controlled by:
(a) Conscious control of the skeletal muscle
(b) Sympathetic nervous impulses
(c) Parasympathetic nervous impulses
(d) Impulses from the cerebral cortex

249. Aldosterone:
(a) is the major mineralocorticoid hormone secreted by the kidney
(b) promotes the secretion of Na+ in the late distal convoluted tubule and the cortical region of the collecting duct
(c) stimulates the secretion of K+ from the peritubular blood into the distal convoluted tubule
(d) is a protein hormone secreted by the adrenal cortex

250. Which of the following statements regarding renal handling of water by the kidneys is correct?
(a) In the absence of vasopressin, urine is isoosmotic with plasma.
(b) In the absence of vasopressin, water cannot be reabsorbed in the proximal tubules.
(c) In the absence of vasopressin, the cortical collecting ducts have very low permeability to water.
(d) In the absence of vasopressin, the distal tubules secrete water

251. If the pH of the blood decreases, the pH of the urine will
(a) Decrease. (b) Increase (c) Be unaffected (d) first increase than decrease

252. A blockage in a glomerulus would directly obstruct blood flow into which vessel
(a) Afferent arteriole (b) Efferent arteriole (c) Interlobular artery (d) Interlobar artery

253. Kidneys are not only organs of excretion, their work is supplemented by :
(a) Liver (b) Skin (c) Heart (d) Large Intestine

254. Which of the following factors is responsible for the formation of concentrated urine?
(a) Low levels of antidiuretic hormone
(b) Maintaining hyperosmolarity towards inner medullary interstitium in the kidneys.
(c) Secretion of erythropoietin by Juxtaglomerular complex
(d) Hydrostatic pressure during glomerular filtration

255. Use of an artificial kidney during hemodialysis may result in:
A. Nitrogenous waste build-up in the body
B. Non-elimination of excess potassium ions
C. Reduced absorption of calcium ions from gastro-intestinal tract
D. Reduced RBC production
Which of the following options is the most appropriate?
(a) A. and B. are correct (b) B. and C. are correct
(c) C. and D. are correct (d) A. and D. are correct

256. Match the following parts of a nephron with their function :

(A) Descending limb	(i) Reabsorption of of Henle's loop salts only
(B) Proximal	(ii) Reabsorption of convoluted tubule water only
(C) Ascending limb	(iii) Conditional of Henle's loop reabsorption of sodium ions and water
(D) Distal convoluted	(iv) Reabsorption of tubule ions, water and organic nutrients

Select the correct option from the following :
(a) (A)-(iv), (B)-(i), (C)-(iii), (D)-(ii) (b) (A)-(i), (B)-(iii), (C)-(ii), (D)-(iv)
(c) (A)-(ii), (B)-(iv), (C)-(i), (D)-(iii) (d) (A)-(i), (B)-(iv), (C)-(ii), (D)-(iii)

257. Match the items in Column-I with those in Column-II

Column-I	Column-II
(A) Podocytes	(i) Crystallised oxalates
(B) Protonephridia	(ii) Annelids
(C) Nephridia	(iii)Amphioxus
(D) Renal calculi	(iv) Filtration slits

Select the correct option from the following :
(a) (A)-(iv), (B)-(ii), (C)-(iii), (D)-(i) (b) (A)-(iii), (B)-(iv), (C)-(ii), (D)-(i)
(c) (A)-(iii), (B)-(ii), (C)-(iv), (D)-(i) (d) (A)-(iv), (B)-(iii), (C)-(ii), (D)-(i)

19 EXCRETORY PRODUCTS AND THEIR ELIMINATION

1. b	2. c	3. d	4. c	5. d	6. d	7. b	8. d	9. b	10. d
11. a	12. c	13. b	14. b	15. d	16. d	17. c	18. c	19. a	20. a
21. c	22. d	23. c	24. b	25. b	26. d	27. b	28. b	29. c	30. a
31. c	32. d	33. a	34. a	35. d	36. a	37. c	38. a	39. a	40. c
41. a	42. d	43. c	44. b	45. c	46. b	47. b	48. d	49. b	50. b
51. c	52. c	53. a	54. d	55. b	56. d	57. a	58. d	59. b	60. d
61. d	62. b	63. c	64. b	65. d	66. d	67. a	68. b	69. b	70. b
71. d	72. c	73. d	74. d	75. d	76. b	77. c	78. a	79. d	80. d
81. d	82. d	83. d	84. b	85. c	86. b	87. a	88. c	89. c	90. a
91. a	92. b	93. b	94. d	95. b	96. c	97. c	98. b	99. a	100. d
101. d	102. b	103. c	104. d	105. c	106.c	107. a	108. a	109. c	110. b
111. b	112. b	113. a	114. b	115. b	116. a	117. b	118. d	119. a	120. c
121. d	122. d	123. c	124. b	125. c	126. d	127. d	128. c	129. c	130. c
131. d	132. b	133. a	134. a	135. d	136. d	137. c	138. d	139. b	140. b
141. b	142. b	143. c	144. d	145. b	146. c	147. a	148. d	149. c	150. a
151. a	152. d	153. b	154. a	155. a	156. c	157. a	158. c	159. a	160. a
161. c	162. b	163. d	164. a	165. d	166. d	167. b	168. a	169. c	170. b
171. b	172. a	173. c	174. a	175. c	176. d	177. c	178. b	179. c	180. a
181. d	182. d	183. c	184. b	185. a	186. d	187. c	188. b	89. c	190. b
191. a	192. c	193. d	194. a	195. d	196. b	197. d	198. c	199. a	200. c
201. c	202. d	203. d	204. c	205. b	206.d	207. b	208. b	209. d	210. a
211. b	212. d	213. d	214. b	215. c	216. a	217. c	218. a	219. d	220. b
221. a	222. c	223. d	224. d	225. c	226. c	227. d	228. b	229. c	230. d
231. b	232. b	233. d	234. b	235. d	236. b	237. b	238. d	239. b	240. c
241. d	242. a	243. a	244. b	245. c	246. c	247. c	248. c	249. c	250. c
251. a	252. b	253. a	254. b	255. c	256. c	257. d			

Solution

228. Urine pH is normally less than that of plasma.

230. Normal Blood Urea Level = 15 - 40 mg percent.

234. A decrease in blood pressure / volume stimulates the release of renin, aldosterone and ADH while increase in blood pressure / volume stimulates the release of Atrial Natriuretic Factor (ANF) which cause vasodilation and also inhibits RAAS (Renin Angiotensin Aldosterone System) mechanism that decrease the blood volume / pressure.

20 LOCOMOTION AND MOVEMENT

1. Streaming of cytoplasm / cyclosis is seen in –
   (a) *Amoeba* (b) Macrophages (c) Leucocytes (d) All
2. Which of the following statements is correct?
   (a) Cytoplasmic streaming helps in pseudopodia formation or amoeboid movement
   (b) Cytoplasmic streaming is caused by contracting microfilament
   (c) Both a and b
   (c) Locomotion is not a voluntary movement
3. I. *Paramecium* employs cilia for pushing food in cytopharynx and in locomotion
   II. *Hydra* takes help of tentacles for both food capturing and locomotion
   III. All locomotions are movements and vice-versa
   IV. Methods of locomotion vary with habitats and the demands of situation
   V. Ciliated epithelium is found in respiratory tract, renal tubules and reproductive tracts
   Which of the above statements is false?
   (a) I and III (b) III (c) III and V (d) IV and V
4. Which of the following statements is false?
   (a) Locomotion and many other movements required coordinated muscular activities
   (b) Muscle is a specialised tissues of endodermal in origin
   (c) There are about 639 muscles which contribute about 40 - 50 % of adult body wall
   (d) Muscles show contractibility, excitability and conductivity
5. Which of the following statements about the skeletal muscles is correct?
   (a) They are striated muscles
   (b) They are voluntary muscles
   (c) They are primarily involved in locomotory actions
   (d) All
6. Which of the following statements about visceral muscles is correct?
   (a) They are non-striated muscles (smooth muscles)
   (b) They are involuntary muscles
   (c) They have various functions
   (d) All
7. Cardiac / heart muscles are –
   (a) Striated and involuntary (b) Branched
   (c) Not fatigued (d) All
8. Which of the following statements is false?
   (a) Smooth muscles are found in urinary bladder, alimentary canal and genital tract
   (b) A striated muscle is syncytium (multinucleate)
   (c) The cytoplasm of striated muscle is called endoplasm
   (d) The plasma membrane and ER of striated muscles are called sarcolemma and sarcoplasmic reticulum respectively
9. The source of Ca^{+2} for the muscle is –
   (a) T-tubule (b) Sarcosome (c) Sarcolemma (d) Sarcoplasmic reticulum
10. The fascia surrounding a muscle is made up of –
    (a) Cartilage (b) Collagenous connective tissues
    (c) Adipose tissue (d) Blood vessels

11. Contractile fibrils of muscles are called –
(a) Neurofibrils (b) Collagen fibres (c) Myofibrils (d) Yellow fibres

12. Myofibrils show alternate dark and light bands in –
(a) Cardiac muscles (b) Smooth muscles (c) Striped muscles (d) a and c

13. Select the true statement(s) –
(a) A-band is present in the middle of sarcomere (b) H-zone is present in the middle of A-band
(c) M-line is present in the middle of H-zone (d) All of the above

14. Which is the smallest one?
(a) Muscle fibre (b) Myofibril (c) Actin (d) Sarcomere

15. Match Column I with Column II –

Column I	Column II
A. Structural and functional unit of a myofibril	I. H-zone
B. Protein of thin filament	II. Myosin
C. Protein of thick filament	III. Sarcomere
D. The central part of thick filament not overlapped by thin filament	IV. Actin

(a) A - I, B - II, C - III, D - IV (b) A - I, B - III, C - II, D - IV
(c) A - I, B - IV, C - III, D - II (d) A - III, B - IV, C - II, D - I

16. Z-line divides the myofibrils into –
(a) Sarcomere (b) Sarcolemma (c) Sarcosome (d) Microtubules

17. Sarcomere is the area between –
(a) 2 H-zones (b) 2 Z-lines (c) 2 M-lines (d) 2 A-bands

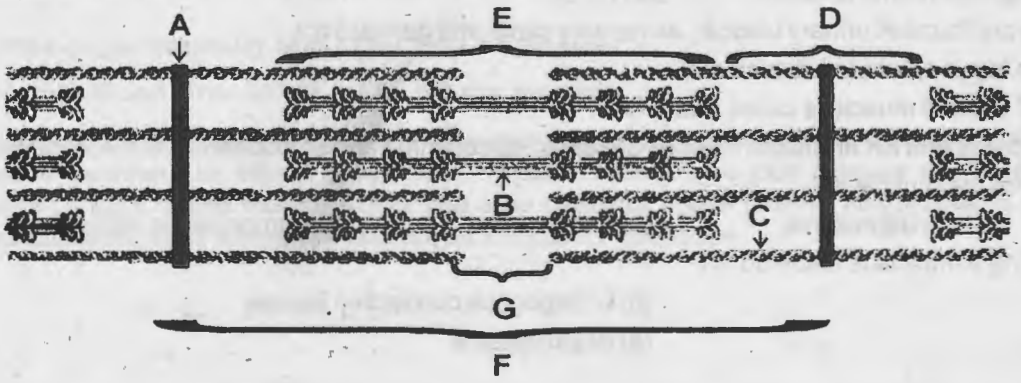
18. Light bands (thin filaments) contain actin and are called –
(a) A-bands or Isotropic band (b) A-bands or Anisotropic bands
(c) I-bands or Isotropic bands (d) I-bands or Anisotropic bands

19. Dark bands (thick filaments) contain myosin and are called –
(a) A-bands or Isotropic band (b) A-bands or Anisotropic bands
(c) I-bands or Isotropic bands (d) I-bands or Anisotropic bands

20. Which of the following statements about the striated muscles is false?
I. In the centre of each I-band is an elastic fibre (Z-line) which bisects it
II. Thin filaments are firmly attached to the Z-line
III. M-line is a fibrous membrane in the middle of A-bands
IV. A sarcomere comprises one full A-bands and 2 half I-bands
(a) All (b) IV (c) I and II (d) None

21. The region between the ends of the A-bands of 2-adjoining sarcomeres is called –
(a) The Z-band (b) The H-zone (c) The T-tubule (d) The I-band

22. Choose the letter from the figure that most appropriately corresponds to the structure –



I. A-band
II. I-band
III. Sarcomere
IV. H-zone
V. Myosin
VI. Actin, Troponin, Tropomyosin
VII. Z - line

(a) I - E, II - D, III - F, IV - G, V - B, VI - C, VII - A (b) I - E, II - D, III - C, IV - G, V - B, VI - A, VII - F
(c) I - E, II - D, III - F, IV - G, V - C, VI - A, VII - B (d) I - E, II - D, III - F, IV - A, V - B, VI - C, VII - G

23. An individual sarcomere consist of –
(a) A stack of actin fibres (b) A stack of myosin units
(c) Overlapping actin and myosin (d) Overlapping myosin and membrane

24. Which of the following statements about the molecular arrangement of actin and myosin in myofibrils is false?
I. Each actin (thin filament) is made of 2F (filamentous) actins
II. F-actin is the polymer of G (globular) actin.
III. 2F-actins are twisted into a helix
IV. Two strands of tropomyosin (protein) lie in the grooves of F-actin
V. Troponin molecules (complex proteins) are distributed at regular intervals on the tropomysin
VI. Troponin forms the head of the myosin molecule
VII. The myosin is a polymerised protein
(a) I, III, VII (b) Only VII (c) Only VI (d) Only III

25. One myosin filament in the myofibril of skeletal muscle fibres is surrounded by how many actin filaments –
(a) 8 (b) 2 (c) 6 (d) 4

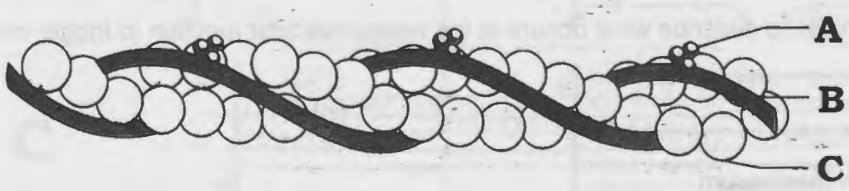
26. The cross bridges of the sacromere in skeletal muscle are made up of –
(a) Actin (b) Myosin (c) Troponin (d) Myelin

27. The functions of tropomyosin in skeletal muscle include –
(a) Sliding on actin to produce shortening.
(b) Release Ca^{+2} after initiation of contraction
(c) Acting as "relaxing protein" at rest by covering up the sites where myosin binds to actin
(d) Generates ATP

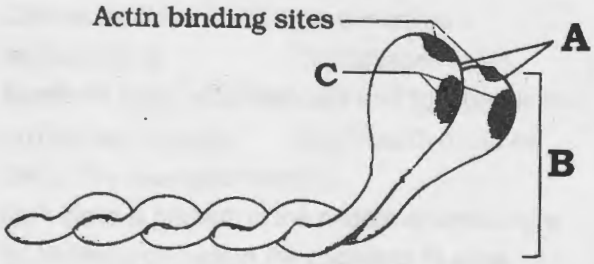
28. Tropomysin is moved by which of following proteins –
(a) Calmodulin (b) Actin (c) Troponin (d) Acetylcholine

29. Ca^{+2} bind _____ in the skeletal muscles and leads to exposure of the binding site for _____ on the filament _____.
(a) Troponin, myosin, actin (b) Troponin, actin, relaxin
(c) Actin, myosin, troponin (d) Tropomysin, myosin, actin

30. Following is the figure of actin (thin) filaments. Identify A, B and C.



(a) A - Tropomyosin, B - Troponin, C - F-actin (b) A - Troponin, B - Myosin, C - Tropomyosin
(c) A - Troponin, B - Tropomyosin, C - Myosin (d) A - Troponin, B - Tropomyosin, C - F-actin

31. 

The above figure is related with myosin monomer (meromyosin). Identify A to C –

(a) A - head, B - cross arm, C - GTP binding sites (b) A - head, B - cross arm, C - Ca^{+2} binding sites

(c) A - head, B - cross arm, C - ATP binding sites (d) A - cross arm, B - head, C - ATP binding sites

32. Which of the following statements is false?

(a) Each myosin is a polymerised protein

(b) Many meromysin constitute one thick filament (myosin)

(c) Each meromyosin's tail is called heavy meromyosin (HMM) and head is called light meromyosin (LMM)

(d) The globular head is an active ATPase enzyme and has binding sites for ATP and active sites for actin

33. The action potential that triggers a muscle contraction travels deep within the muscle cell by means of –

(a) Sarcoplasmic reticulum (b) Transverse tubules (c) Synapse (d) Motor end plates

34. ATP provides energy for muscle contraction by allowing for –

(a) An action potential formation in he muscle cell (b) Cross-bridge detachment of myosin from actin

(c) Cross-bridge attachment of myosin to actin (d) Release of Ca^{+2} from sarcoplasmic reticulum

35. A motor unit is best described as –

(a) All the nerve fibres and muscle fibres in a single muscle bundle

(b) One muscle fibre and its single nerve fibre

(c) A single motor neuron and all the muscle fibres that it innervates

(d) It is the neuron which carries the messsage from muscle to CNS

36. Motor end plate is a –

(a) Neuromuscular junction (b) Plate of motor neuron

(c) Dendron of motor neuron (d) Gradient of proton motive force

37. Electrical excitation in a muscle fibre most directly causes –

(a) Movement of tropomyosin (b) Attachment of the cross bridges to actin

(c) Release of Ca^{+2} from sarcoplasmic reticulum (d) Splitting of ATP

38. The energy for muscle contraction is most directly obtained from –

(a) Phosphocreatine (b) ATP

(c) Anaerobic respiration (d) Aerobic respiration

39. According to the sliding filament theory –

(a) Actin (thin filament) moves past myosin (thick filament)

(b) Myosin moves past actin

(c) Both myosin and actin move past each other

(d) None of these is correct

40. Put the following phrases in proper order to describe what occurs at the neuromuscular junction to trigger muscle contraction.

I. Receptor sites on sarcolemma.

II. Nerve impulse.

III. Realease of Ca^{+2} from sarcoplasmic reticulum

IV. The neurotransmitter acetylcholine is released

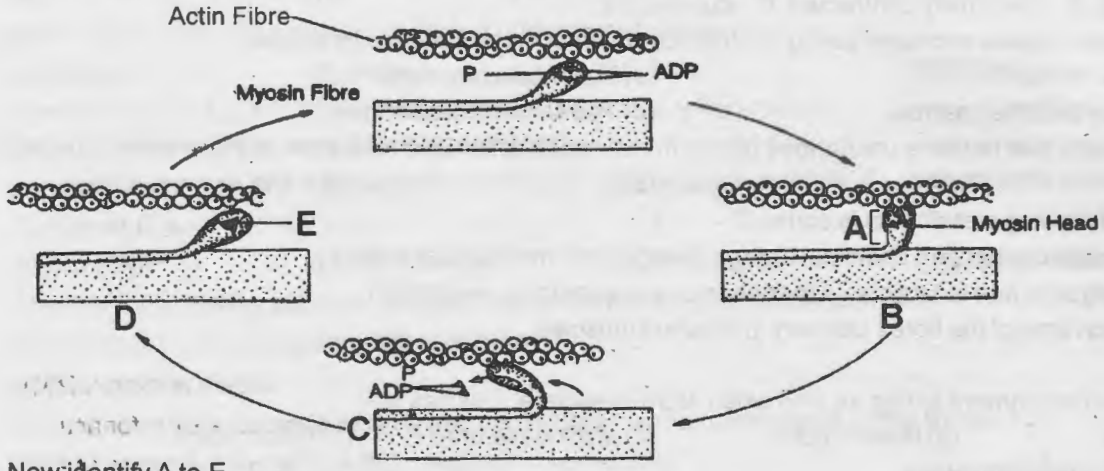
V. Sarcomere shortern

VI. Synaptic cleft

VII. Spread of impulses over sarcolemma on T-tubules

(a) II, IV, I, VI, VII, III, V (b) II, IV, VI, I, VII, III, V (c) I, II, III, IV, V, VI, VII (d) VII, VI, V, IV, III, II, I

41. Go through the following diagram describing muscle contraction



Now identify A to E.

(a) A - Cross bridge, B - Cross bridge formation, C - Breaking of cross bridge, D - Sliding (rotation), E - ATP

(b) A - Cross bridge, B - Cross bridge formation, C - Sliding / rotation, D - Breaking of cross bridge, E - ATP

(c) A - Cross bridge, B - Breaking of Cross bridge, C - sliding / rotation, D - Cross bridge formation, E - AMP

(d) A - Cross bridge, B - Cross bridge formation, C - Sliding / rotation, D - ADP, E - Breaking of cross bridge

42. How does the troponin-tropomyosin complex affect cross-bridge cycling?

(a) When $[Ca^{2+}]$ is low, the troponin-tropomyosin complex blocks actin's binding site for myosin. When $[Ca^{2+}]$ is high, the complex rolls out of the way, allowing myosin to bind to actin and initiate the cross-bridge cycle.

(b) The troponin-tropomyosin complex regenerates ATP for the myosin ATPase.

(c) The troponin-tropomyosin complex regulates calcium release from the terminal cisternae.

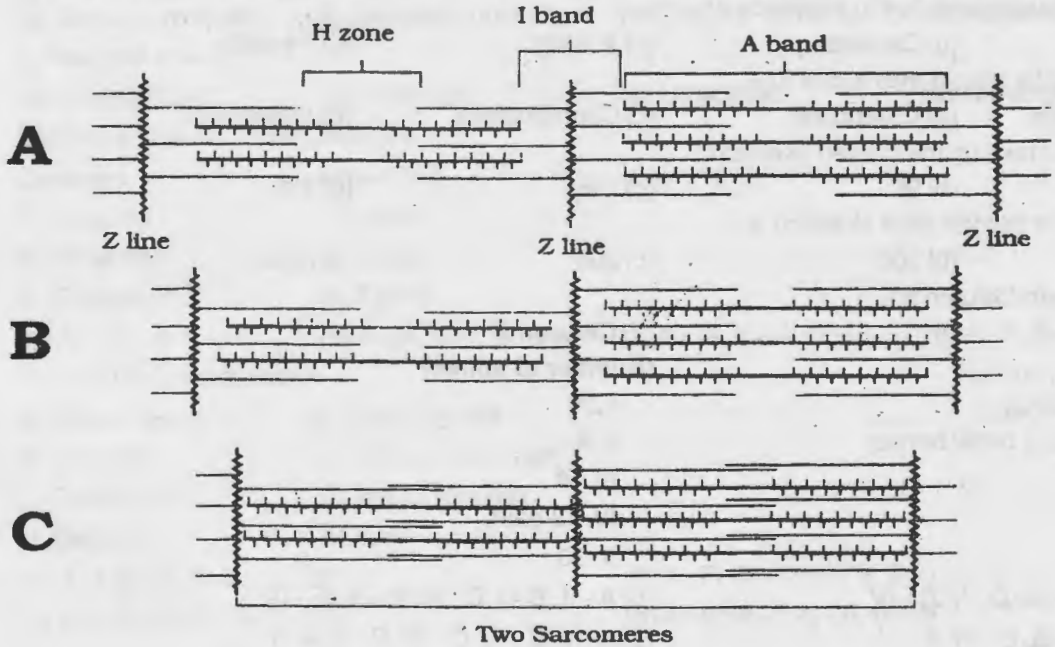
(d) The troponin-tropomyosin complex binds to the myosin head, facilitating contact with the actin filaments

43. Relaxation of muscle is due to –

(a) Pumping of Ca^{+2} into sarcoplasmic cisternae (b) Presence of ATP

(c) Confirmational change in troponin and masking of actin filaments (d) a and c

44.



Two Sarcomeres

The diagrams given above show 3 different condition of sarcomeres. Identify these conditions –
(a) A - contracting, B - relaxed, C - maximally contracted
(b) A - relaxed, B - contracting, C - maximally contracted
(c) A - maximally contracted, B - contracting, C - relaxed
(d) A - relaxed, B - maximally contracted, C - contracting

45. When a skeletal muscle shortens during contraction which of these statements is false?
(a) The I-band shortens (b) The A-band shortens
(c) The H-zone becomes narrow (d) The sarcomeres shorten

46. The muscle band that remains unchanged during muscle contraction and relaxation of the skeletal muscle is –
(a) I (b) A (c) H (d) Z-line

47. Which of the following statements is correct?
(a) During muscle contraction chemical energy changes into mechanical energy
(b) Muscle fatigue is due to lactic acid formation due to anaerobic respiration
(c) The reaction time of the fibres can vary in different muscles
(d) All

48. The compound or pigment acting as an oxygen store in skeletal muscles is –
(a) Myoglobin (b) Haemoglobin (c) Myokinase or ATP (d) Cytochrome

49. I. Number of mitochondria less.
II. Number of mitochondria more
III. Sarcoplasmic reticulum is abundant
IV. Myoglobin content high
V. Sarcoplasmic reticulum moderate
VI. Aerobic muscles
VII. Depend on anaerobic respiration for energy
VIII. Less myoglobin content
A. Red muscles B. White muscles
Identify above (I to VIII) traits as characteristic of A and B types of muscles –
(a) A - I, III, VII, VIII; B - II, IV, V, VI (b) A - II, IV, V, VI; B - I, III, VII, VIII
(c) A - I, III, IV, VII; B - II< V, VI, VIII (d) A - II, V, VI, VIII; B - I, III, IV, VII

50. Skeletal system consists of –
(a) Only bones (b) Only cartilage
(c) A framework of bones and a few cartilage (d) A framework of cartilage and a few bones

51. Bone has a very hard matrix due to presence of –
(a) NaCl (b) Ca-salts (c) K-salts (d) Fe-salts

52. Cartilage has slightly pliable matrix due to –
(a) Chondroitin salts (b) Osteoblast (c) Chondroclasts (d) Osteoclast

53. How many bones make up the human skeleton?
(a) 948 (b) 96 (c) 796 (d) 206

54. Number of bones in human axial skeleton is –
(a) 80 (b) 106 (c) 206 (d) None

55. Match Column I with Column II –

Column I	**Column II (Number of bones)**
A. Cranium / Brainbox	I. 29
B. Skull (Cranial and facial bones)	II. 8
C. Face	III. 14
D. Hind limb	IV. 12 pairs
E. Ribs	V. 30

(a) A - I, B - II, C - III, D - V, E - IV (b) A - II, B - I, C - III, D - V, E - IV
(c) A - I, B - II, C- III, D - IV, E - V (d) A - V, B - IV, C - III, D - II, A - I

56. Hyoid / Tongue bone is –
(a) T-shaped (b) J-shaped (c) U-shaped (d) L-shaped

57. Sonia Gandhi has how many ear ossicle –
(a) 3 (b) 6 (c) 9 (d) None

58. Which one of the following is not included under ear ossicles –
(a) Malleus (b) Ileum (c) Incus (d) Stapes

59. Human Cranium has small protuberance(s) at the posterior end called _____, and _____ in number that articulates with first vertebra (atlas vertebra) –
(a) occipital condyle, 6 (b) occipital condyle, 2 (c) occipital condyle, 4 (d) occipital condyle, 3

60. Human skull is –
(a) dicondylic (b) Monocondylic (c) Procoelous (d) Hetercoelous

61. Which of the following statements about human vertebral column is false –
(a) Vertebral column consists of 26 vertebrae
(b) It is ventrally placed
(c) It extends from the base of skull and constitutes the main framework of the trunk
(d) Neural canal in vertebra is the passage for spinal cord

62. Human adult vertebral formula is –
(a) $C_4\ T_8\ L_4\ S_8\ C_8$ (b) $C_7\ T_8\ L_5\ S_6\ C_7$ (c) $C_7\ T1_{12}\ L_2\ S_1\ C_2$ (d) $C_7\ T_{12}\ L_5\ S_1\ C_1$

63. Which of the following vertebra in adult human are fused ones?
(a) Thoracic and lumber (b) Thoracic and cervical (c) Sacral and coccygeal (d) Cervical and coccygeal

64. Which of the following is not the function of vertebral column?
(a) Protects spinal cord and supports the head
(b) Serves as the point of attachment for ribs and musculature of the back
(c) Both
(d) Supports Tarsals and Metacarpals

65. Which of the following is not correct about sternum?
(a) It is commonly called breast bone (b) It is flat bone
(c) It is 2 in number (d) It is located on the ventral midline of thorax

66. Each typical rib is a thin flat bone connected _____ to the vertebral column and _____ to the sternum–
(a) Dorsally, ventrally (b) Ventrally, dorsally (c) Dorsally, dorsally (d) Ventrally, Ventrally

67. Typical ribs are –
(a) Monocephalic (b) Dicephalic (c) Tricephalic (d) Tetracephalic

68. Match the Column I with Column II –

Column I	**Column II**
A. True ribs	I. 3 pairs
B. False ribs	II. 2 pairs
C. Floating ribs	III. 7 pairs

(a) A - I, B - II, C - III (b) A - III, B - I, C - II (c) A - III, B - II, C - I (d) A - II, B - I, C - III

69. Pick up the correct match –

A. False ribs	I. 1st to 7th pair
B. True ribs	II. 11th and 12th pair
C. Floating ribs	III. 8th to 10th pair
D. Sternum	IV. One

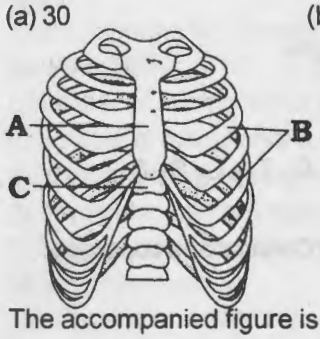
(a) A - I, B - II, C - III, D - IV (b) A - IV, B - III, C - II, D - I
(c) A - I, B - III, C - II, D - IV (d) A - III, B - I, C - II, D - IV

70. Identify the ribs –
A. Ribs are attached to the sternum ventrally and to the vertebrae dorsally.
B. Ribs are attached to sternum through costal cartilage (hyaline) of 7th rib
C. Ribs are not attached to sternum
I. True ribs
II. False ribs
III. Floating ribs
(a) A - I, B - II, C - III (b) A - I, B - III, C - II (c) A - II, B - I, C - III (d) A - III, B - II, C - I

71. Which of the following ribs are called vertebrochondral ribs?
(a) true ribs (b) False ribs (c) Gorilla ribs (d) Floating ribs

72. Rib cage is formed by all except –
(a) Thoracic vertebrae (b) Lumbar vertebrae (c) Ribs (d) Sternum

73. Each limb (upper or lower) consists of how many bones –
(a) 30 (b) 60 (c) 101 (d) 8

74. 

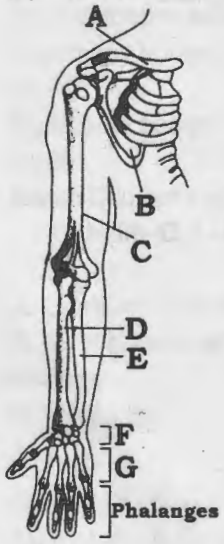
The accompanied figure is rib cage. Identify A, B and C respectively –
(a) Coccyx, ribs, vertebral column (b) Sternum, ribs, vertebral column
(c) Scapula, ribs, vertebral column (d) Tarsal, ribs, vertebral column

75. Number of bones in human appendicular skeleton is –
(a) 80 (b) 120 (c) 126 (d) 206

76. Number of bone in each upper limb is –
(a) 1, 1, 1 (b) 8, 5, 14 (c) 2, 2, 2, 16, 10, 28 (d) 1, 1, 1, 8, 5, 14

77. Phalangeal / digital formula for human hand / foot is –
(a) 0, 2, 2, 3 (b) 0, 2, 3, 3 ,3 (c) 2, 2, 3, 3, 3 (d) 2, 3, 3, 3, 3

78. The hand contains _____ carpals (wrist bones), _____ metacarpals (palm bones), and _____ phalanges –
(a) 14, 5, 8 (b) 5, 8, 14 (c) 8, 5, 14 (d) 1, 5, 5

79. 

The accompanied diagram shows right pectoral girdle and upper arm (frontal view). Identify A to G

(a) A - 1st Vertebra, B - Scapula, C - Humerus, D – Radius, E - Ulna, F - Carpals, G - Metacarpals

(b) A - Scapula, B - Clavicle, C - Humerus, D - Radius, E - Ulna, F - Carpals, G - Metacarpal

(c) A - Ilium, B - Scapula, C - Humerus, D - Radius, E - Ulna, F - Carpals, G - Metacarpals

(d) A - Clavicle, B - Scapula, C - Humerus, D - Radius, E - Ulna, F - Carpals, G - Metacarpals

80. An acromion process is characteristically found in –

(a) Pelvic girdle of mammals (b) Pectoral girdle of mammals

(c) Skull bone (d) Vertebrae of mammals

81. The shoulder blade is large triangular bone situated in the dorsal part of the thorax between the 2nd and the 7th ribs. It is called –

(a) Clavicle (b) Ilium (c) Scapula (d) Carpals

82. For articulation of head of humerus a depression found in scapula is called –

(a) Acetabulum (b) Manubrium (c) Occipital condyle (d) Glenoid cavity

83. Which of the following statement is correct?

(a) Pectoral and pelvic girdle bones help in the articulation of the upper and lower limbs respectively with the axial skeleton

(b) Each girdle is formed of 2 halves

(c) Each half of pectoral girdle consists of a clavicle (collar bone) and Scapula

(d) All

84. Which of the following statements is false?

(a) Scapula has the spine which projects as acromion process

(b) below acromion process is a glenoid cavity

(c) Each clavicle (collar bone) articulates with acromion

(d) Clavicle is long S-shaped bone with 4 curvatures

85. Which one of the following is the longest bone in human?

(a) Radius (b) Tibia (c) Femur (Thigh bone) (d) Clavicle (Collar bone)

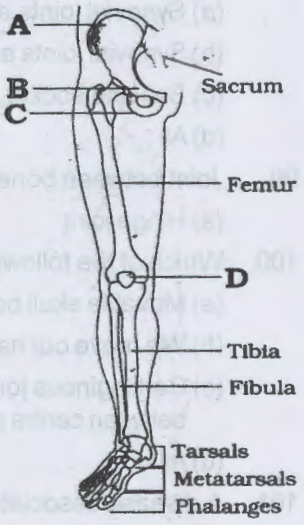
86. Human foot consists of 26 bones. What are the number of tarsals (ankle bones), metatarsals and phalanges?

(a) 7, 5, 14 (b) 5, 7, 14 (c) 1, 1, 5 (d) 5, 5, 5

87. A cup shaped bone covering knee ventrally is called –

(a) Cuneiform (b) tarsal (c) patella (d) Carpal

88. Study the accompanying figure. Identify A, B, C and D –



(a) A - Pubis, B - ilium,
C - Ischium, D - Patella

(b) A - Ischium, B - Pubis,
C - ileum, D - Patella

(c) A - ileum, B - Pubis,
C - Ischium, D - Patella

(d) A - ilium, B - Pubis,
C - Ischium, D - Patella

89. Acetabulum occurs in –

(a) Cranium (b) Pectoral girdle (c) Pelvic girdle (d) Vertebrae

90. Pelvic girdle (hip girdle) is composed _____ coxal (hip) bones –

(a) 3 (b) 2 (c) 4 (d) 5

91. Pelvic girdle consists of –
(a) Ileum, ischium and pubis (b) Ilium, ischium and pubis
(c) Ilium, ischium and Clavicle (d) Coracoid, Ischium and Pubis

92. Two halves of pelvic girdle articulate ventrally at a fibrocartilaginous joint called –
(a) Pubic symphysis (b) Synchodroses (c) Gamphoses (d) Sutures

93. Each coxal bone is formed by the fusion of 3 bones named as –
(a) ileum, ischium and pubis (b) ilium, ischium and pubis
(c) ilium, ischium and clavicle (d) Coracoid, ischium and pubis

94. In the middle lateral side a cup shaped cavity or acetabulum (for head of femur) is present in the region of union of –
(a) ilium and ischium (b) ilium and pubis
(c) ilium, ischium and pubis (d) ischium and pubis

95. Which of the following statements about the joints is false?
(a) Joints are essential for all types of movements involving bony parts
(b) Joints are contact between bones or between bones and cartilages
(c) Fibrous joints are immovable
(d) Cartilaginous joint permit great movement

96. Force generated by the muscles is used to carry out movement through joints. In this case joint acts as –
(a) Frenulum (b) Clavicle (c) Ligament (d) Fulcrum

97. Match the following and mark the correct option –

Column I	Column II
A. Hinge joint	I. Between humerus and pectoral girdle
B. Pivot joint	II. Between carpals and Metacarpals of thumb
C. Gliding joint	III. Between the carpals
D. Saddle joint	IV. Between atlas and axis
E. Ball and Socket joint	V. Knee joint

(a) A - V, B - IV, C - III, D - II, E - I (b) A - I, B - II, C - II, D - V, E - IV
(c) A - I, B - III, C - II, D - V, E - IV (d) A - V, B - III, C - II, D - I, E - II

98. Which of the following statements is correct?
(a) Synovial joints are characterised by synovial cavity with fluid between the articulating surface of two bones
(b) Synovial joints are freely movable
(c) Ball and socket, hinge joint, gliding joints, pivot joints and saddle joints are the types of synovial joints
(d) All

99. Joint between bones in the form of sutures of human skull is –
(a) Hinge joint (b) Synovial joint (c) Cartilaginous joint (d) Fibrous joint

100. Which of the following statements is correct?
(a) Movable skull bone is mandible
(b) We move our hands while walking for balancing
(c) Cartilaginous joints have little mobility due to fibrocartilage disc between its articular ends e.g. intervertebral disc between centre of vertebrae
(d) All

101. A disease associated with joint is –
(a) Glaucoma (b) Arthritis (c) Paget's disease (d) Horner's syndrome

102. Gout is the inflammation of joints due to accumulation of –
(a) Urea crystal (b) NH_3 (c) Uric acid crystal (d) $CaCO_3$ crystals

103. I. Age-related disorder characterised by decreased bone mass and increased chances of fracture.
II. Causative factor deficiency of estrogen is common.
The above characters are associated with –
(a) Gout (b) Osteoporosis (c) Arthritis (d) Polio

104. Myasthenia is an _____ disorder affecting neuromuscular junction leading to fatigue, weakening and paralysis of skeletal muscles –
(a) Arthritis (b) Autoimmune (c) Agnosic (d) Amnesic

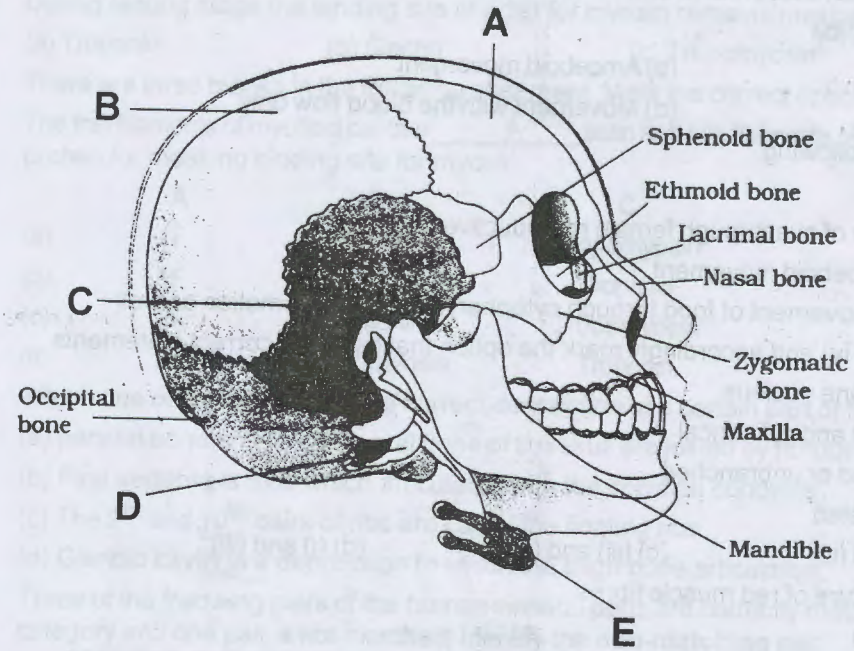
105. Tetany is the rapid spasm in muscles due to –
(a) High Ca^{+2} in body fluid (b) Low Ca^{+2} in body fluid
(c) High uric acid in body fluid (d) High urea in blood

106. Progressive degeneration of skeletal muscles due to genetic disorder is called –
(a) Myasthenia gravis (b) Tetany (c) Muscular dystrophy (d) Myopia

107. Arthritis is –
(a) Inflammation of muscles (b) Inflammation of joints
(c) Inflammation of bone (d) Inflammation of tongue

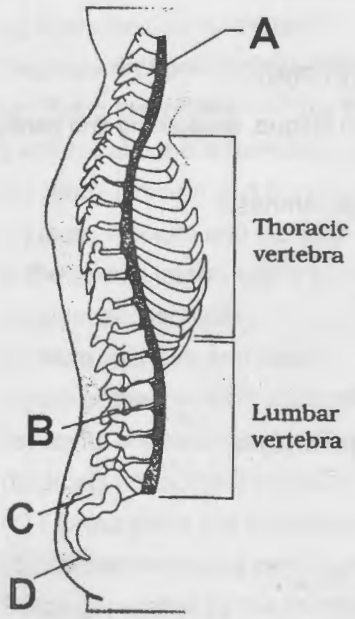
108. Joints have been classified into three major structural forms as follows except.
(a) Bony (b) Fibrous (c) Cartilaginous (d) Synovial

109. Consider the diagram given below –



Parts labelled as A, B, C, D and E respectively indicate –
(a) Frontal bone, Parietal bone, Temporal bone, Occipital condyle and Hyoid bone
(b) Frontal bone, Temporal bone, Parietal bone, Occipital condyle and Hyoid bone
(c) Frontal bone, Parietal bone, Temporal bone, Hyoid bone and Occipital condyle
(d) Parietal bone, Frontal bone, Temporal bone, Occipital condyle and Hyoid bone

110. The following indicates vertebral column of human (right lateral view). Parts labelled as A, B, C and D respectively indicate –



(a) Lumbar vertebra, Intervertebral disc, Sacrum and Coccyx
(b) Cervical vertebra, Intervertebral disc, Sacrum and Coccyx
(c) Cervical vertebra, Intervertebral disc, Lumbar vertebra and Coccyx
(d) Cervical vertebra, Intervertebral disc, Sacrum and Lumbar vertebra

111. The macrophages in human body exhibit
(a) Ciliary movement
(b) Amoeboid movement
(c) No movement
(d) Movement with the blood flow only

112. Mark the incorrect statement in the following.
(a) All movement lead to locomotion
(b) Ciliary movement help in passage of ova through female reproductive tract
(c) Microfilaments are involved in amoeboid movement
(d) In Paramecium the cilia help in movement of food through cytopharynx and in locomotion as well

113. Read the following 4-statements (i – iv) and accordingly mark the option that has both correct statements
(i) Cardiac fibres are branched with one nucleus
(ii) Smooth muscles are unbranched and cylindrical
(iii) Striated muscles can be branched or unbranched
(iv) Involuntary muscles are non-striated
(a) (i) and (iv)
(b) (ii) and (iii)
(c) (iii) and (iv)
(d) (i) and (iii)

114. Which of the following is not the feature of red muscle fibres
(a) They have plenty of mitochondria
(b) They have high content of Myoglobin
(c) They have high amount of Sarcoplasmic reticulum
(d) They are called aerobic muscles

115. What is not true about human skull
(a) It is dicondylic
(b) It includes 6 ear ossicles
(c) It includes 14 facial bones
(d) Hyoid is not included in skull bones

116. Which of the following is not the bone of cranium
(a) Occipital bone
(b) Zygomatic bone
(c) Ethmoid bone
(d) Sphenoid bone

117. In which option the number of bones of two corresponding parts are not the same
(a) Thigh and upper arm (b) Sole and Palm (c) Ankle and wrist (d) Leg and arm

118. The clavicle or collar bone articulates with
(a) Glenoid cavity (b) Cervical vertebrae (c) Coxal bone (d) Acromion process

119. Look at the following sets of bones and the type of joints, and select the correct combination of the two sets

(i) Atlas and Axis	(p) Cartilaginous joint
(ii) Two Parietals	(q) Fibrous joint
(iii) Two pubis bones	(r) Saddle joint
(iv) First carpal and first metacarpal	(s) Pivot joint

(a) (i–q) (ii–p) (b) (ii–q) (iii–r) (c) (iii–q) (iv–r) (d) (iv–r) (i–s)

120. Mark the correct statement
(a) All striated muscles are voluntary (b) Visceral muscles are faintly striated
(c) Cardiac muscles are not striated (d) All non-striated muscles are involuntary

121. Read the following A to D statements and select the one option that contains both correct statements
A. Z-line is present in the centre of the light band.
B. Thin filaments are firmly attached to the M-line
C. The central part of thick filaments, not overlapped by thin filaments is called Z-band
D. Light band contains only thin filaments
(a) A and D (b) B and C (c) A and C (d) B and D

122. The cross arm that forms the cross bridges during muscle contraction, is formed by
(a) HMM (b) LLM (c) Troponin (d) Both (a) and (b)

123. During resting stage the binding site of actin for myosin remains masked by
(a) Troponin (b) Gactin (c) Tropomyosin (d) Meromyosin

124. There are three blanks in the following statement. Mark the correct option having suitable words for filling the blanks
The thin filaments of myofibril contain ____A____ actin and two filaments of ____B____ protein along with ____C____ protein for masking binding site for myosin.

	A	B	C
(a)	1F	Troponin	Tropomyosin
(b)	1F	Tropomyosin	Troponin
(c)	2F	Troponin	Tropomyosin
(d)	2F	Tropomyosin	Troponin

125. Which one of the following is the correct *description* of a certain part of the normal human skeleton?
(a) parietal bone and the temporal bone of the skull are joined by fibrous joint
(b) First vertebra is axis which articulates with the occipital condyles
(c) The 9^{th} and 10^{th} pairs of ribs are called the floating ribs
(d) Glenoid cavity is a depression to which the thigh bone articulates.

126. Three of the following pairs of the human skeletal parts are correctly matched with their respective inclusive skeletal category and one pair is not matched. Identify the **non-matching** pair.

	Pairs of skeletal parts	Category
(a)	Sternum and Ribs	Axial skeleton
(b)	Clavicle and Glenoid cavity	Pelvic girdle
(c)	Humerus and Ulna	Appendicular skeleton
(d)	Malleus and Stapes	Ear ossicles

127. Questions refers to the following listing of characteristics of basic muscle types which are classified either by appearance or location.

	Type 1	Type 2	Type 3
1. Found in visceral organs		+	
2. Attached to skeleton	+		
3. Voluntary	+		
4. Unstriated		+	
5. One nucleus per cell		+	+
6. Branched network of cells			+
7. Involuntary		+	+
8. Intercalated discs			+

	Smooth muscle tissue	Cardiac muscle tissue
(a)	Type 1	Type 1
(b)	Type 2	Type 3
(c)	Type 3	Type 2
(d)	Type 1 or 3	Type 1 or 3

128. Which alternative lists the names of the bones present in the hind limb?

	Bone 1	Bone 2	Bone 3	Bone 4
(a)	Humerus	Radius	Ulna	Carpals
(b)	Humerus	Tibia	Fibula	Carpals
(c)	Femur	Radius	Ulna	Tarsals
(d)	Femur	Tibia	Fibula	Tarsals

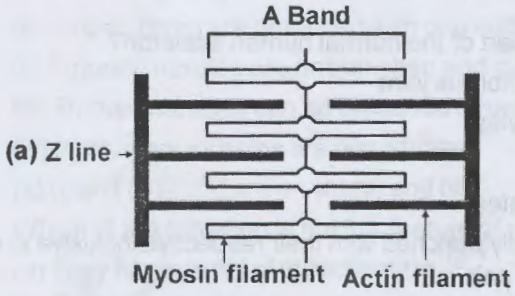
129. _____ and _____ pairs of ribs do not articulate directly with the sternum. The information in which alternative completes the given statement?

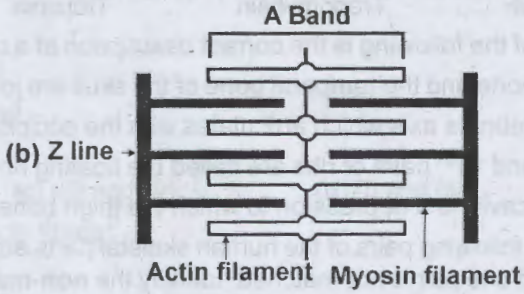
(a) i-6^{th}; ii-7^{th} (b) i-8^{th}; ii-9^{th} (c) i-10^{th}; ii-11^{th} (d) i-11^{th}; ii-12^{th}

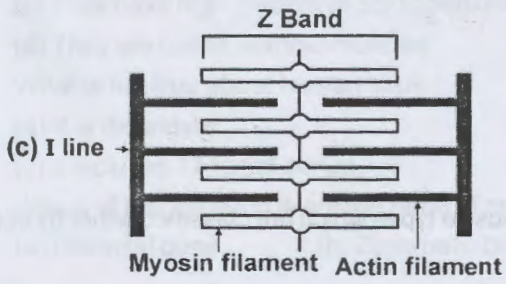
130. Which alternative lists the names of the skeletal parts present in the axial skeleton?

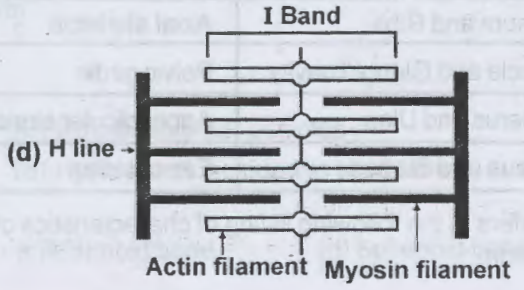
	Skeletal part 1	Skeletal part 2	Skeletal part 3	Skeletal part 4
(a)	Pectoral girdle	Pelvic girdle	Forelimbs	Vertebral column
(b)	Pectoral girdle	Skull girdle	Hind limbs	Forelimbs
(c)	Skull	Sternum	Pectoral girdle	Forelimbs
(d)	Skull	Ribs	Sternum	Vertebral column

131. Which of the following sarcomeres is labelled correctly?









132. Which one of the following pairs of, chemical substances, is correctly categorised ?
(a) Calcitonin and thymosin - Thyroid hormones
(b) Pepsin and prolactin - Two digestive enzymes secreted in stomach
(c) Troponin and myosin - Complex proteins in striated muscles
(d) Secretin and rhodopsin - Polypeptide hormones

133. The important muscle proteins that help in movement are
(a) actin and myosin (b) tropomyosin (c) troponin (d) all of these.

134. Select the correct statement regarding the specific disorder of muscular or skeletal system :-
(a) Muscular dystrophy - age related shortening of muscles.
(b) Osteoporosis - decrease in bone mass and higher chance of fractures with advancing age.
(c) Myasthenia gravis - Auto immune disorder which inhibits sliding of myosin filaments
(d) Gout - inflammation of joints due to extra deposition of calcium.

135. Match the following and mark the correct option

Column I	Column II
(A) Fast muscle fibres	i. Myoglobin
(B) Slow muscle fibres	ii. Lactic acid
(C) Actin filament	iii. Contractile unit
(D) Sarcomere	iv. I-band

Options:
(a) A-i, B-ii, C-iv, D-iii (b) A-ii, B-i, C-iii, D-iv (c) A-ii, B-i, C-iv, D-iii (d) A-iii, B-ii, C-iv, D-i

136. Ribs are attached to
(a) Scapula (b) Sternum (c) Clavicle (d) Ilium

137. What is the type of movable joint present between the atlas and axis?
(a) Pivot (b) Saddle (c) Hinge (d) Gliding

138. ATPase of the muscle is located in
(a) Actinin (b) Troponin (c) Myosin (d) Actin

139. Intervertebral disc is found in the vertebral column of
(a) Birds (b) Reptiles (c) Mammals (d) Amphibians

140. Which one of the following is showing the correct sequential order of vertebrae in the vertebral column of human beings?
(a) Cervical — lumbar — thoracic — sacral — coccygeal
(b) Cervical — thoracic — sacral — lumbar — coccygeal
(c) Cervical — sacral — thoracic — lumbar — coccygeal
(d) Cervical — thoracic — lumbar — sacral — coccygeal

141. Which one of the following options is incorrect?
(a) Hinge joint – between Humerus and Pectoral girdle
(b) Pivot joint – between atlas, axis and occipital condyle
(c) Gliding joint – between the carpals
(d) Saddle joint – between carpal and metacarpals of thumb

142. Knee joint and elbow joints are examples of
(a) Saddle joint (b) Ball and socket joint
(c) Pivot joint (d) Hinge joint

143. Macrophages and leucocytes exhibit
(a) Ciliary movement (b) Flagellar movement
(c) Amoeboid movement (d) Gliding movement

144. Which one of the following is not a disorder of bone?
(a) Arthritis (b) Osteoporosis (c) Rickets (d) Atherosclerosis

145. Which one of the following statement is incorrect?
(a) Heart muscles are striated and involuntary
(b) The muscles of hands and legs are striated and voluntary

(c) The muscles located in the inner walls of alimentary canal are striated and involuntary
(d) Muscles located in the reproductive tracts are unstriated and involuntary

146. Which one of the following statements is true:
(a) Head of humerus bone articulates with acetabulum of pectoral girdle.
(b) Head of humerus bone articulates with glenoid cavity of pectoral girdle.
(c) Head of humerus bone articulates with a cavity called acetabulum of pelvic girdle.
(d) Head of humerus bone articulates with a glenoid cavity of pelvic girdle.

147. Muscles with characteristic striations and involuntary are
(a) Muscles in the wall of alimentary canal
(b) Muscles of the heart
(c) Muscles assisting locomotion
(d) Muscles of the eyelids

148. Match the following and mark the correct option

	Column I	**Column II**
	(A) Sternum	i. Synovial fluid
	(B) Glenoid Cavity	ii. Vertebrae
	(C) Freely movable joint	iii. Pectoral girdle
	(D) Cartilaginous joint	iv. Flat bone

Options:
(a) A-ii, B-i, C-iii, D-iv (b) A-iv, B-iii, C-i, D-ii (c) A-ii, B-i, C-iv, D-iii (d) A-iv, B-i, C-ii, D-iv

149. The H-zone in the skeletal muscle fibre is due to:
(a) The central gap between myosin filaments in the (a)-band.
(b) The central gap between actin filaments extending through myosin filaments in the (a) band.
(c) Extension of myosin filaments in the central portion of the A - band.
(d) The absence of myofibrils in the central portion of A - band.

150. The characteristics and an example of a synovial joint in humans is :

	Characteristics	**Examples**
1	Fluid filled between two joints, provides cushion	Skull bones
2	Fluid filled synovial cavity between two bones	joint between atlas and axis
3	Lymph filled between two bones, limited movement	gliding joint between carpals
4	fluid cartilage between two bones, limited movements	Knee joint

(a) Option (1) (b) Option (2) (c) Option (3) (d) Option (4)

151. Select the correct matching of the type of the joint with the example in human skeletal system :

	Type of joint	**Example**
(a)	Cartilaginous joint	between frontal and parietal
(b)	Pivot joint	between third and fourth cervical vertebrae
(c)	Hinge joint	between humerus and pectoral girdle
(d)	Gliding joint	between carpals

152. Stimulation of a muscle fiber by a motor neuron occurs at :
(a) the neuromuscular junction (b) the transverse tubules
(c) the myofibril (d) the sacroplasmic reticulum

153. Knee joint is an example for
(a) pivot joint (b) ball and socket (c) gliding joint (d) hinge joint.

154 During muscle contraction in humans the
(a) Actin filaments shorten (b) Sarcomere does not shorten
(c) A-band remain same (d) A, H and I-bands shorten

155. Which of the followings is **NOT** involved in muscular contraction?
(a) Calcium ion (b) Troponin (c) Actin (d) Magnesium ion

156. What type of cartilaginous tissue is found in the inter-vertebral discs?
(a) Costal cartilage (b) Hyaline cartilage (c) White fibrous cartilage (d) Yellow elastic cartilage

157. The monomeric actin is called
(a) F-actin (b) M-actin (c) G-actin (d) N-actin

158. How many types of synovial joints are there?
(a) 4 (b) 3 (c) 2 (d) 5

159. Glenoid cavity articulates
(a) Clavicle with scapula (b) Humerus with scapula
(c) Clavicle with acromion (d) Scapula with acromion

160. Sliding filament theory can be best explained as
(a) Actin and myosin filaments do not shorten but rather slide pass each other
(b) When myofilaments slide pass each other, myosin filaments, shorten while actin filaments do not shorten
(c) When myofilaments slide pass each other actin filaments shorten while myosin filaments do not shorten
(d) Actin and myosin filaments shorten and slide pass each other

161. Which of the following is not a function of the skeletal system?
(a) production of body heat (b) Locomotion
(c) Production of erythrocytes (d) Storage of minerals

162. Which of the following joints would allow no movements?
(a) Synovial joint (b) Ball and Socket joint (c) Fibrous joint (d) Cartilaginous joint

163. Lack of relaxation between successive stimuli in sustained muscle contraction is known as :-
(a) Spasm (b) Fatigue (c) Tetanus (d) Tonus

164. Which type of tissue correctly matches with its location ?

	Tissue	Location
(a)	Smooth muscle	Wall of intestine
(b)	Areolar tissue	Tendons
(c)	Transitional epithelium	Tip nose
(d)	Cuboidal epithelium	Lining of stomach

165. Osteoporosis, an age–related disease of skeletal system, may occur due to :-
(a) Decreased level of estrogen
(b) Accumulation of uric acid leading to inflammation of joints.
(c) Immune disorder affecting neuro–muscular junction leading to fatigue.
(d) High concentration of Ca^{++} and Na^{+}.

166. Name the ion responsible for unmasking of active sites for myosin for cross–bridge activity during muscle contraction.
(a) Sodium (b) Potassium (c) Calcium (d) Magnesium

167. In the muscles carbohydrates are stored in the form of :
(a) Glycolipid (b) Cellulose (c) Starch (d) Glycogen

168. Which one of the following is not related with bone disorder ?
(a) Arthritis (b) Osteoporosis (c) Atherosclerosis (d) Ricket

169. Read the given given statements each with one or two blanks.
A. Repeated activation of the muscles can lead to the accumulation of ___I___ due to anaerobic breakdown of glycogen in them, causing fatigue.
B. The globular head of meromyosin is an active ATPase enzyme and has binding sites for ___II___ and active sites for ___III___.
C. The central part of thick filament, not overlapped by thin filaments is called ___IV___.
Which of the following options correctly fills the blanks in the given statements?
(a) I - Pyruvic acid, II - ATP, III - Myosin, IV - A band.
(b) I - Pyruvic acid, II - Troponin, III - Myosin, IV - H band.
(c) I - Lactic acid, II - ATP, III - Actin, IV - H band.
(d) I - Lactic acid, II - ATP, III - Troponin, IV - I band.

170. Which of the following does not belong with the others?
(a) multinucleated (b) skeletal (c) striated (d) involuntary

171. Which term is the smallest subdivision in this group?
(a) fiber (b) fibril (c) filament (d) actin

172. The pivot joint between atlas and axis is a type of :
(a) Cartilaginous joint (b) Synovial joint (c) Saddle joint (d) Fibrous joint

173. Out of 'X' pairs of ribs in humans only 'Y' pairs are true ribs. Select the option that correctly represents values of X and Y and provides their explanation:
(a) X = 12, Y = 5 True ribs are attached dorsally to vertebral column and sternum on the two ends.
(b) X = 24, Y = 7 True ribs are dorsally attached to vertebral column but are free on ventral side.
(c) X = 24, Y = 12 True ribs are dorsally attached to vertebral column but are free on ventral side.
(d) X = 12, Y = 7 True ribs are attached dorsally to vertebral column and ventrally to the sternum.

174. Floating ribs are named so since they are
(a) the only ribs surrounded by body fluid (b) without intercostal muscles
(c) not connected to sternum (d) not connected to vertebral column

175. Which of the following joints are found only in children till puberty :
(a) Symphysis (b) Synchondrosis
(c) Synarthrosis (Fibrous joint) (d) Synovial

176. Fused vertebrae in human are :
I. Sacral
II. Coccygeal
III. Lumbar
IV. Cervical
V. Thoracic
(a) II and III (b) I and III (c) I and V (d) I and II

177. Major protein in the thick filament of skeletal muscle fibre is :
(a) Tropomyosin (b) Myosin (c) Actin (d) Troponin

178. What is the type of joint between ribs and sternum?
(a) Cartilagenous joint (b) Synovial joint (c) Fibrous joint (d) Angular joint

179. The linear protein that has catalytic function is -
(a) actin (b) collagen (c) myosin (d) trypsin

180. Calcium is important in skeletal muscle contraction because it
(a) Detaches the myosin head from the actin filament.
(b) Activates the myosin ATPase by binding to it.
(c) Binds to troponin to remove the masking of active sites on actin for myosin.
(d) Prevents the formation of bonds between the myosin cross bridges and the actin filament.

181. Largest ear ossicle in human is –
(a) Malleus (b) Incus (c) Stapes (d) Columella Auris

182. Weakness of muscles & bones in elderly occurs due to deficiency of–
(a) Vitamin D (b) Vitamin C (c) Vitamin B complex (d) Vitamin A

183. Select the incorrect statement with respect to actin filament
(a) G-actin has an active site for binding with the head of myosin molecule
(b) The actin filament has a spiral groove to accommodate tropomyosin
(c) Troponin is a calcium binding protein which is attached to tropomyosin at regular intervals
(d) When a muscle fibre contracts, tropomyosin blocks the active site of G-protein and prevents myosin head from binding to it

184. One of the following statement is not true with respect to red muscle fibres
(a) Faster in contraction rate
(b) Rich in mitochondria
(c) Rich in myoglobin
(d) Carry out aerobic contraction without accumulating much lactic acid

185. Each organised skeletal muscle in our body is made of a number of muscle bundles or fascicles held together by a common collagenous connective tissue layer called _____.
(a) Endomysium (b) Epimysium (c) Aponeurosis (d) Fascia

186. Which one is the contractile protein?
(a) Troponin (b) Myosin (c) Tropomyosin (d) All

187. Component of Actin filament of a sarcomere is
(a) Troponin and Actin (b) Myosin and Troponin (c) Actin and Myosin (d) Actin, Troponin and Tropomyosin

188. When muscle cells are oxygen deprived, the heart still pumps. What must the heart cells be able to do?
(a) Derive sufficient energy from fermentation (b) Continue aerobic metabolism when skeletal muscle cannot
(c) Transform lactate to pyruvate again (d) Remove lactate from the blood

189. Cervical vertebrae differ from other vertebra in having -
(a) Spinous process (b) Centrum (c) Transverse process (d) Transverse foramen

190. Skeletal muscles are controlled by -
(a) Sympathetic nervous system (b) Parasympathetic nervous system
(c) Somatic nervous system (d) Sympathetic and parasympathetic both

191. Which of the following muscular disorders is inherited?
(a) Tetany (b) Muscular dystrophy (c) Myasthenia gravis (d) Botulism

192. Select the correct option.
(a) 8th, 9th and 10th pairs of ribs articulate directly with the sternum.
(b) 11th and 12th pairs of ribs are connected to the sternum with the help of hyaline cartilage.
(c) Each rib is a flat thin bone and all the ribs are connected dorsally to the thoracic vertebrae and ventrally to the sternum.
(d) There are seven pairs of vertebrosternal, three pairs of vertebrochondral and two pairs of vertebral ribs.

193. Match the following joints with the bones involved:

1. Gliding joint	(i) Between carpal and metacarpal of thumb
2. Hinge joint	(ii) Between Atlas and Axis
3. Pivot joint	(iii) Between the Carpals
4. Saddle joint	(iv) Between Humerus and Ulna

Select the correct option from the following :
(a) 1.-(i), 2.-(iii), 3.-(ii), 4.-(iv) (b) 1.-(iii), 2.-(iv), 3.-(ii), 4.-(i)
(c) 1.-(iv), 2.-(i), 3.-(ii), 4.-(iii) (d) 1.-(iv), 2.-(ii), 3.-(iii), 4.-(i)

194. Which of the following diseases is an autoimmune disorder ?
(a) Gout (b) Myasthenia gravis (c) Arthritis (d) Osteoporosis

20 LOCOMOTION AND MOVEMENT

1. d	2. c	3. b	4. b	5. d	6. d	7. d	8. c	9. d	10. b
11. c	12. d	13. d	14. c	15. d	16. a	17. b	18. c	19. b	20. d
21. d	22. a	23. c	24. c	25. c	26. b	27. c	28. c	29. a	30. d
31. c	32. c	33. b	34. b	35. c	36. a	37. c	38. b	39. a	40. b
41. b	42. a	43. d	44. b	45. b	46. b	47. d	48. a	49. b	50. c
51. b	52. a	53. d	54. a	55. b	56. c	57. b	58. b	59. b	60. a
61. b	62. d	63. c	64. d	65. c	66. a	67. b	68. b	69. d	70. a
71. b	72. b	73. a	74. b	75. c	76. d	77. d	78. c	79. d	80. b
81. c	82. d	83. d	84. d	85. c	86. a	87. c	88. d	89. c	90. b
91. b	92. a	93. b	94. c	95. d	96. d	97. a	98. d	99. d	100. d
101. b	102. c	103. b	104. b	105. b	106. c	107. b	108. a	109. a	110. b
111. b	112. a	113. a	114. c	115. d	116. b	117. c	118. d	119. d	120. d
121. a	122. a	123. a	124. d	125. a	126. b	127. b	128. d	129. b	130. d
131. a	132. c	133. d	134. b	135. c	136. b	137. a	138. c	139. c	140. d
141. a	142. d	143. c	144. d	145. c	146. b	147. b	148. b	149.b	150. b
151. d	152. a	153. d	154. c	155. d	156. c	157. c	158. d	159. b	160. a
161. a	162. c	163. c	164. a	165. a	166. c	167. d	168. c	169. c	170. d
171. d	172. b	173. d	174. c	175. b	176. d	177. b	178. a	179. c	180. c
181. a	182. a	183. d	184. a	185. d	186. b	187. d	188. b	189.d	190. c
191. b	192. d	193. b	194. b						

Explanation:

175. (b) : Such joints are found between the epiphysis and diaphysis of long bone before adult life.

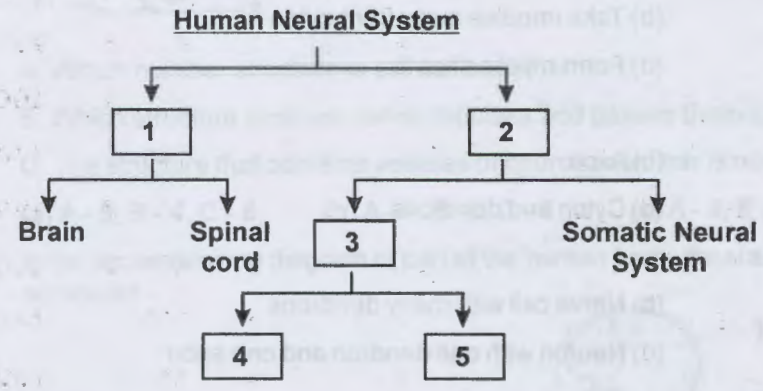
21 NEURAL CONTROL AND COORDINATION

1. Body coordination is maintained by –
(a) Nervous system (b) Excretory system (c) Endocrine system (d) Neuroendocrine system

2. Which of the following statements is false?
(a) The neural system provides an organised network of point to point connection for a quick coordination
(b) The endocrine system provides chemical integration through hormones
(c) The neural organisation is very complex in lower invertebrates
(d) The human neural system includes CNS and PNS

3. Which of the following is correct?
(a) CNS includes brain and spinal cord
(b) CNS is the site of information, processing and control
(c) PNS comprises of all the nerves of the body associated with CNS
(d) All

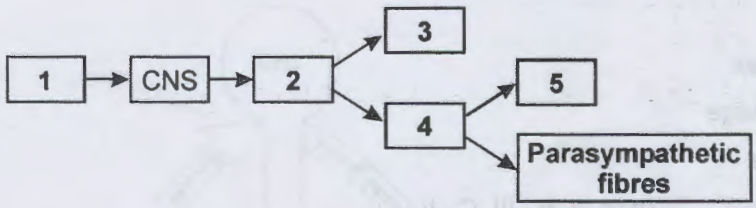
4.



The above diagram can be used to show the functional organization of the human nervous system. Identify 1 to 5

	1	2	3	4	5
(a)	PNS	CNS	ANS	Sympathetic nervous System	Parasympathetic nervous system
(b)	ANS	CNS	PNS	Sympathetic nervous System	Parasympathetic nervous system
(c)	CNS	PNS	ANS	Sympathetic nervous system	Parasympathetic nervous system
(d)	ANS	PNS	CNS	Sympathetic nervous system	Parasympathetic nervous system

5.



Which of the following shows the correct arrangement of fibres in above diagram –

	1	2	3	4	5
(a)	Afferent	Efferent	Somatic motor	Autonomic	Sympathetic
(b)	Efferent	Afferent	Somatic motor	Autonomic	Sympathetic
(c)	Afferent	Efferent	Autonomic	Somatic Motor	Sympathetic
(d)	Efferent	Afferent	Autonomic	Somatic Motor	Sympathetic

6. Which of the following systems transmits impulse from CNS to involuntary organs and smooth muscles?
(a) Somatic neural system (b) Sympathetic neural system
(c) Parasympathetic neural system (d) Autonomic neural system

7. Which of the following system relays impulse from CNS to skeletal muscles?
(a) Somatic neural system (b) Sympathetic neural system
(c) Parasympathetic neural system (d) Autonomic neural system

8. Neurons –
(a) Can detect different kinds of stimuli (b) Can receive different kinds of stimuli
(c) Can transmit different kinds of stimuli (d) All

9. The basic unit of the nervous system is –
(a) The axon (b) The dendrite
(c) Cell body (d) Neuron

10. Function of axon is to –
(a) Bring impulse into cyton (b) Take impulse away from cyton
(c) Support neuroglial cell (d) Form myelin sheath

11. Nissl's granules are absent in –
(a) Dendrons and dendrites (b) Axon
(c) Cyton (d) Cyton and dendrons

12. Unipolar neuron / Unipolar nerve cells means
(a) Nerve cell with one dendron (b) Nerve cell with many dendrons
(c) Nerve cell without dendrons (d) Neuron with one dendron and one axon

13. Multipolar neuron means –
(a) Neuron with one dendron and one axon (b) Neuron with many dendrons and one axon
(c) Neuron with one dendron and many axons (d) Neuron with many dendrons only

14. Bipolar neuron –
(a) Has two dendrons (b) Has one dendron and one axon
(c) Is interneuron (d) Has no dendron

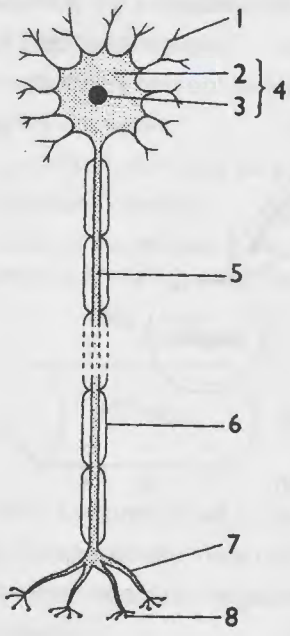
15. Pick out the correct combination –

Column I	**Column II**
A. Unipolar neuron	I. In cerebral cortex
B. Bipolar neuron	II. In embryonic stage
C. Multipolar neuron	III. In retina of eye

(a) A - I, B - II, C - III (b) A - I, B - III, C - II
(c) A - II, B - I, C - III (d) A - II, B - III, C - I

16. Which of the following cells form myelin sheath around axon –
(a) Neuroglial cell (b) Neuron
(c) Schwann cell (d) Astrocyte

17.



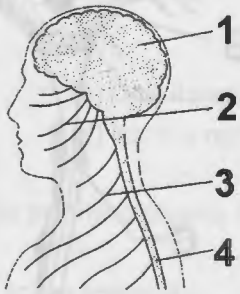
A. Which number structure is the cell body?

B. Which structure receives nerve impulses and passes them towards the cell body?

C. The structure that contains vesicles of neurotransmitter is numbered.

(a) A - 5, B - 4, C - 8 (b) A - 4, B - I, C - 8 (c) A - 8, B - 6, C - 1 (d) A - 4, B - 8, C - 6

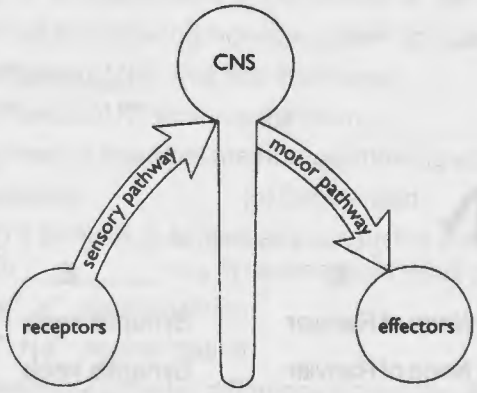
18. In the accompanying diagram of part of the human body, the structures belonging to the central nervous system are numbered –



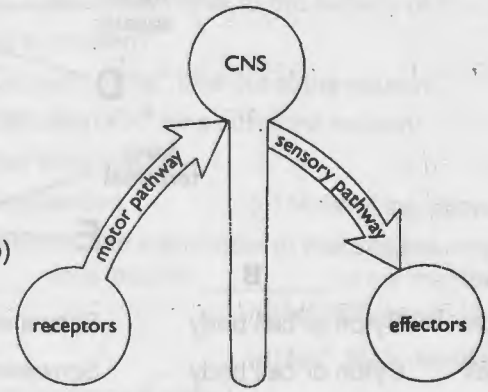
(a) 1 and 3 (b) 2 and 3 (c) 1 and 4 (d) 3 and 4

19. Which of the following diagrams correctly represent the flow of information through the nervous system?

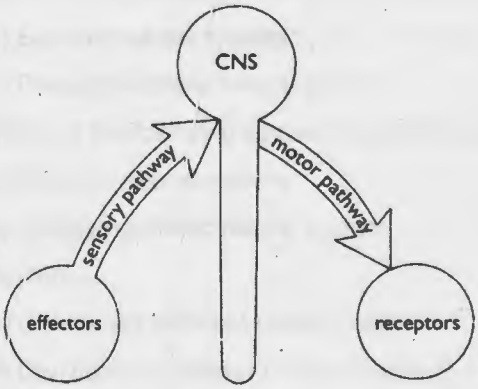
(a)



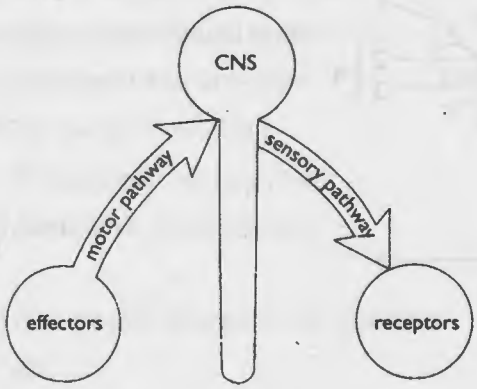
(b)



(c)



(d)



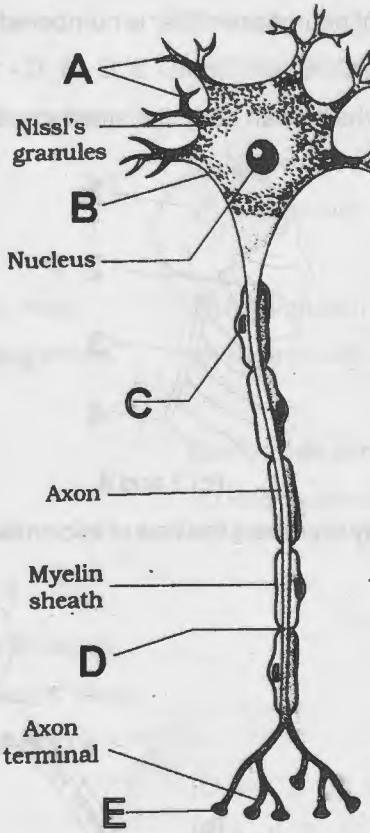
20. Nodes of Ranvier are –

(a) Areas of swellings of axon
(b) Found in the wall of stomach
(c) The gaps between two adjacent myelin sheath
(d) Bands in striated muscles

21. Myelin sheath is present around –

(a) Medullated nerve fibre
(b) Non-medullated nerve fibre
(c) Muscle fibre
(d) Medullated and non-medullated nerve fibre

22. The accompanying diagram show the structure of neuron. Identify A to E.



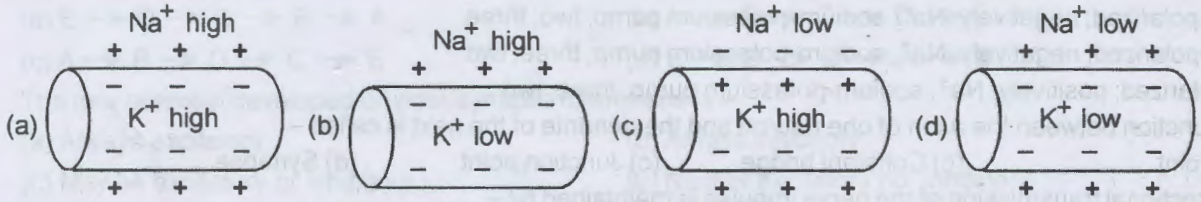
	A	B	C	D	E
(a)	Nerve fibre	Cyton or cell body	Schwann cell	Node of Ranvier	Synaptic knob
(b)	Dendrites	Cyton or cell body	Schwann cell	Node of Ranvier	Synaptic knob
(c)	Dendrites	Nerve cell	Schwann cell	Node of Ranvier	Synaptic knob
(d)	Dendrites	Cyton or cell body	Nerve cell	Node of Ranvier	Synaptic knob

23. Neurons are excitable cells because their membranes are in a –
(a) Depolarised state (b) Polarized state (c) Repolarized state (d) None of the above is correct

24. Ion channels present on neural membrane are –
(a) Impermeable (b) Semipermeable (c) Selective permeable (d) Fully permeable

25. A polarized neuron is said to be in –
(a) Action potential (b) Resting potential (c) Spike potential (d) None of these

26. Which of the following diagram illustrates the distribution of Na^+ and K^+ ions in a section of non-myelinated axon which is at resting potential?



27. When a neuron is not conducting any impulse i.e. resting, the axonal membrane is –
(a) Comparatively more permeable to K^+ and impermeable (nearly impermeable) to Na^+
(b) Impermeable to negatively charged proteins present in the axoplasm
(c) Both
(d) More permeable to Na^+ ions than K^+ ion.

28. What generally maintains the electrical charge across the neuronal membrane?
(a) Na^+ - K^+ pump (b) Action potential (c) resting potential (d) Voltage - gated channels

29. Na^+ - K^+ pump
I. Needs energy (ATP) to work
II. Expels 3 Na^+ for every 2K^+ ions imported
III. Works against a concentration gradient
IV. Maintains resting potential
(a) All are correct (b) Only II and III are correct
(c) Only I and III are correct (d) None is correct

30. Which of the following statements is correct?
(a) The electrical potential difference across the polarised plasma membrane is called as the resting potential
(b) The impulse is action potential
(c) Na^+ ions are responsible for generating an action potential (d) All

31. During depolarization of the neuronal membrane –
(a) Na^+ ions rapidly move to the inside of the cell (b) Na^+ ions rapidly move to the outside of the cell
(c) K^+ ions rapidly move to the outside of the cell (d) K^+ ions rapidly move to the outside of the cell

32. Which of the following increases when an action potential is initiated?
(a) Diffusion of Na^+ ions into the neuron (b) Diffusion of Na^+ ions out of the neuron
(c) Diffusion of K^+ ions into the neuron (d) Diffusion of K^+ ions out of the neuron

33. A segment of neuronal membrane showing action potential is said to be –
(a) Polarized (b) Depolarized (c) Repolarized (d) None of the above

34. When a stimulus is applied at a site on the polarized membrane, the membrane at that site becomes freely permeable to _____ ions. It causes rapid influx of _____ ions leading _____ of the membrane –
(a) Na^+, K^+, depolarization (b) K^+, K^+, depolarization
(c) K^+, Na^+, depolarization (d) Na^+, Na^+, depolarization

35. The electrical potential difference across the depolarized membrane is called –
(a) Action potential (b) Resting potential (c) Water potential (d) Solute potential

36. During repolarization of nerve –

(a) K^+ gate closes and Na^+ gate opens (b) Na^+ channels are closed and K^+ channels are opened
(c) Both K^+ and Na^+ gates are closed (d) Both gates remain opened

37. Nerve impulse is generated when the nerve cell undergoes –
(a) Hyperpolarization (b) Depolarization (c) Repolarization (d) Pseudopolarization

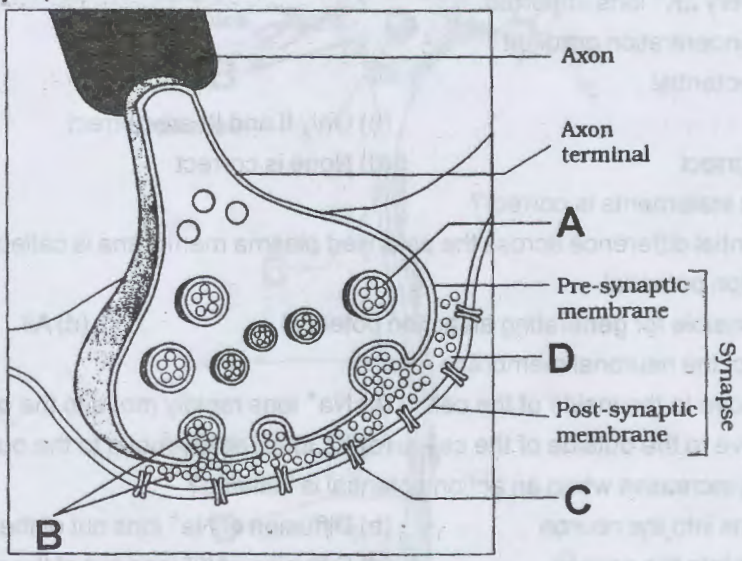
38. In the resting state, the axon membrane is _____ with more _____ charged ions outside than inside. This unequal distribution of ions is due to (1) the selective permeability of the membrane, which forms an almost impenetrable barrier to _____ and (2) the action of the _____, which pumps _____ Na^+ out of the neuron for every _____ K^+ brought in.
(a) polarized; positively; Na^+; sodium-potassium pump; two; three
(b) depolarized; negatively; Na^+; sodium-potassium pump; two; three
(c) depolarized; negatively; Na^+; sodium-potassium pump; three; two
(d) polarized; positively; Na^+; sodium-potassium pump; three; two

39. The junction between the axon of one neuron and the dendrite of the next is called –
(a) A joint (b) Constant bridge (c) Junction point (d) Synapse

40. Unidirectional transmission of the nerve impulse is maintained by –
(a) Interneurons (b) Myelin sheath (c) Synapse (d) Membrane polarity

41. Which of the following statements is false about the electrical synapse?
I. At electrical synapses, the membranes of pre and post synaptic neurons are in very close proximity
II. Electrical current can flow directly from one neuron into the other across the synapses
III. Transmission of an impulse across electrical synapses is very similar to impulse conduction along single axon.
IV. Electrical synapses pass electrical signal between cells with the use of Ach
V. Electrical synapses are fast
VI. Electrical synapses are rare in our system
(a) I and II (b) Only II (c) Only IV (d) Only V

42. Study the diagram of synapse –



I. Which numbered label indicate the location of the receptor molecules
II. Which number points to a synaptic vesicles
III. Which number points to neurotransmitter
IV. Which number points to synaptic cleft

	I	II	III	IV
(a)	C	A	B	D
(b)	B	A	C	D
(c)	C	A	D	B
(d)	C	D	A	B

43. Five events in the transmission of nerve impulse across the synapse –
A. Opening of specific ion channels allows the entry of ions, a new action potential is generated in the post-synaptic neuron.
B. Neurotransmitter binds to the receptor on post synaptic membrane
C. Synaptic vesicle fuses with pre-synaptic membrane, neurotransmitter releases into synaptic cleft.
D. Depolarization of pre-synaptic membrane
E. Arrival of action potential at axon terminal.
In which sequence do these events occur?
(a) E → D → C → B → A (b) A → B → C → D → E
(c) A → B → D → C → E (d) E → D → C → A → B

44. The new potential developed on post-synaptic membrane is –
(a) Always excitatory (b) Always inhibitory
(c) May be excitatory or inhibitory (c) Neither excitatory nor inhibitory

45. The hind brain develops into which structure?
(a) Medulla (b) Pons (c) Cerebellum (d) All

46. The forebrain develops into –
(a) Diencephalon and Cerebrum (b) Diencephalon and Cerebellum
(c) Diencephalon and Medulla (d) Diencephalon and Pons

47. The thalamus and hypothalamus develop from –
(a) Telencephalon (b) Diencephalon (c) Cerebrum (d) Cerebellum

48. The correct sequence meninges from inner to outerside is –
(a) Arachnoid → Duramater → Piamater (b) Duramater → Arachnoid → Piamater
(c) Piamater → Arachnoid → Duramater (d) Piamater → Duramater → Arachnoid

49. The name of nervous band connecting the cerebral hemispheres is –
(a) Corpus albicans (b) Corpus callosum (c) Corpus striatum (d) Corpus spongiosum

50. Which of the following statements is incorrect about cortex of cerebrum?
(a) It consists of grey matter
(b) It consists of white matter
(c) It shows prominent folds
(d) It contains motor areas, sensory areas and association areas.

51. Association areas in cerebral cortex are –
(a) Sensory areas
(b) Motor areas
(c) Responsible for intersensory associations, memory and communication
(d) None of the above is correct

52. The medulla of cortex, inner part of cerebral hemisphere consists of –
(a) Grey matter (b) White matter
(c) Both grey matter and white matter (d) Non myelinated nerve fibres

53. Myelinated fibres of the tract forms –
(a) White matter (b) Grey matter (c) White and grey matter (d) Red matter

54. The cerebrum wraps around a structure called thalamus, which is –
(a) A major coordinating centre for sensory signal only
(b) A major centre for motor signaling
(c) A major coordinating centre for sensory and motor signaling
(d) Not a nervous part of a brain

55. Hypothalamus does not control –
(a) Thermoregulation
(b) Urge for eating and drinking
(c) Produces hormones that regulate the synthesis and secretion of pituitary hormone
(d) Creative thinking and consciousness

56. The inner parts of cerebral hemispheres and a group of associated deep structures like amygdala, hippocampus, etc; form a complex structure called –
(a) Reticular system (b) Corpora quadrigemina (c) Limbic lobe / limbic system (d) Arbor vitae

57. Along with hypothalamus, limbic system is involved in the –
(a) Regulation of sexual behaviour
(b) Expression of emotional reaction (e.g. excitment pleasure, rage and fear)
(c) Motivation
(d) All

58. Which of the following statements or structures is not correct about the midbrain?
(a) Located between the thalamus / hypothalamus and pons
(b) Has arbor vitae
(c) Has a canal (Cerebral aqueduct)
(d) Its dorsal part consists of 4 lobes (corpora quadrigemina)

59. Brain stem includes –
(a) Mid brain only (b) Hind brain only
(c) Mid brain and hind brain only (d) Fore brain and hind brain only

60. Which of the following features is not related with pons?
(a) It forms floor of brain stem
(b) It serves as neural link between different parts of brain
(c) It can moderate the functions of respiratory rhythm centre
(d) It has a chemosensitive area for respiratory regulation

61. I. Cerebellum has very convoluted surface in order to provide the additional space for more neurons
II. The medulla is connected to the spinal cord
III. Medulla contains controlling centres for respiration, cardiovascular reflexes and gastric secretion
(a) All are correct (b) Only I is correct
(c) Only I and III are correct (d) Only II is correct

62. In the given diagram what does "A" represent?

(a) Pons (b) Midbrain (c) Cerebellum (d) Medulla oblongata

63. Immediate involuntary response to stimulus is –
(a) Reflex action (b) Autonomic response (c) Action control (d) None of these

64. Reflex action is controlled by –
(a) CNS (b) PNS (c) ANS (d) None of these

65. Reflex is controlled by –
(a) Spinal cord (b) ANS (c) PNS (d) Sympathetic nervous system

66. In reflex action, the reflex arc is formed by –
(a) Muscle, receptor, brain (b) Brain, spinal cord, muscle
(c) Receptor, spinal cord, muscle (d) muscle, spinal cord, receptor

67. Different components of reflex arc are given below –
I. Effector organ
II. Interneuron
III. Motor neuron
IV. Sensory neuron
V. Sensory receptor
Choose the correct order an action potential follows after a sensory receptor is stimulated –
(a) V, IV, III, II, I (b) V, IV, II, III, I (c) V, III, IV, I, II (d) V, II, IV, III, I

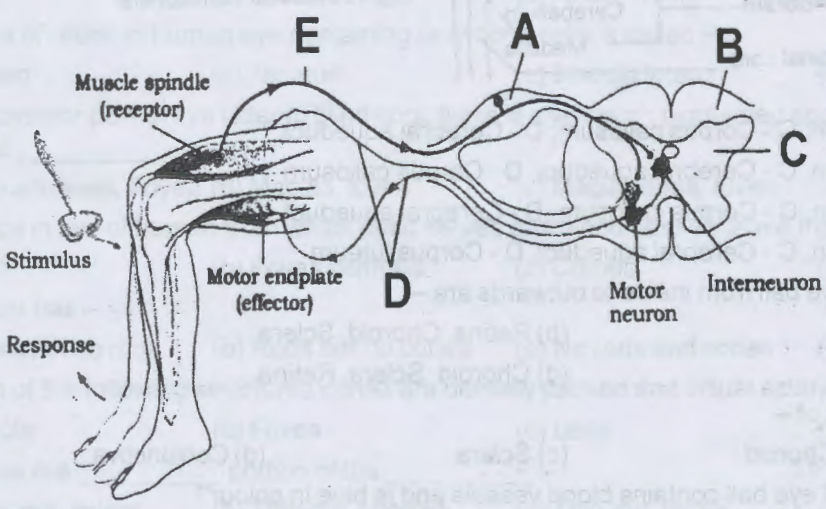
68. Where A stands for axon, D for dendrite, S for synapse, and CB for cell body, a typical sequence of structures between a receptor and an efferent is –
(a) D – CB – A – S – D – CB – A (b) A – D – CB – S – A – D – CB
(c) D – CB – A – S – A – CB – D (d) D – A – S – CB – D – A – CB

69. What is meant by a reflex arc in the nervous system?
(a) An inherited behaviour pattern that functions through a certain neural pathway
(b) A functional unit consisting of a receptor, neural pathway, and an effector
(c) Peripheral nerves, spinal cords and brain
(d) A homeostatic system of sensory nerves, synapses and motor nerves

70. The reflex pathway comprises –
(a) Atleast two afferent neurons and two efferent neurons
(b) Atleast one afferent neuron and one efferent neuron
(c) Atleast two afferent neurons and one efferent neuron
(d) Atleast one afferent neuron and four efferent neurons

71. A stimulus is received by a receptor, which initiates an impulse in the afferent neuron. The afferent neuron transmits the signal via _____ nerve root into _____ (at the level of spinal cord). The efferent neuron than carries signal from _____ to the _____.
(a) Ventral, CNS, PNS, sensory organs (b) Ventral, CNS, CNS, effector
(c) Dorsal, CNS, PNS, affector (d) Dorsal, CNS, CNS, effector

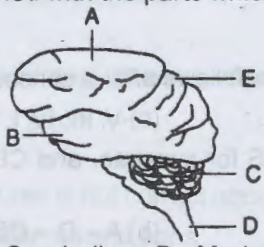
72. The following diagrammatic representation of reflex action shows knee jerk reflex.



In which of the following options corrects words for all the 5 blanks (A to E) are indicated?

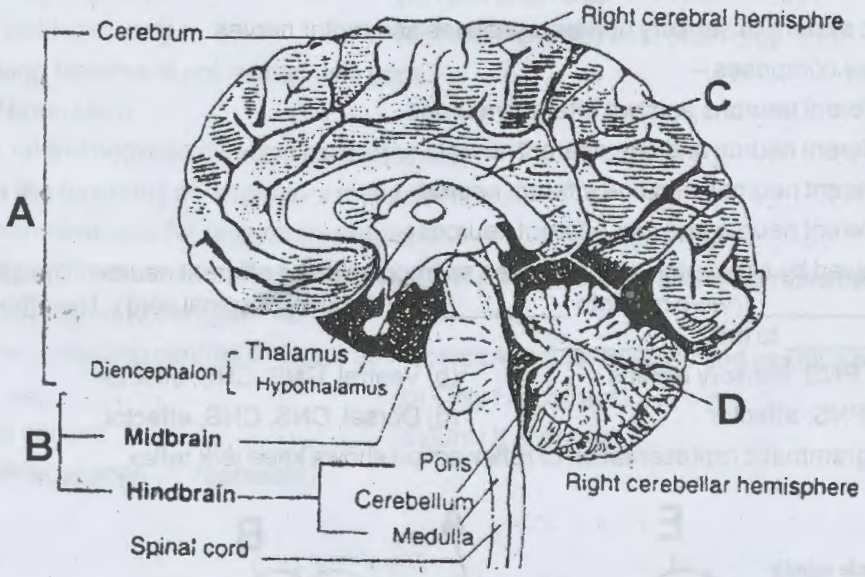
	A	B	C	D	E
(a)	Dorsal root ganglion	White matter	Gray matter	Afferent pathway	Efferent pathway
(b)	Dorsal root ganglion	White matter	Gray matter	Efferent pathway	Afferent pathway
(c)	Dorsal root ganglion	Gray matter	White matter	Efferent pathway	Afferent pathway
(d)	Ventral root ganglion	White matter	Gray matter	Efferent pathway	Afferent pathway

73. In the diagram of the lateral view of the human brain, parts are indicated by alphabets. Choose the answer in which these alphabets have been correctly matched with the parts which they indicate?



(a) A - Temporal lobe, B - Parietal lobe, C - Cerebellum, D - Medulla oblongata, E - Frontal lobe
(b) A - Frontal lobe, B - Temporal lobe, C - Cerebrum, D - Medulla oblongata, E - Occipital lobe
(c) A - Temporal lobe, B - Parietal lobe, C - Cerebrum, D - Medulla oblongata, E - Frontal lobe
(d) A - Frontal lobe, B - Temporal lobe, C - Cerebellum, D - Medulla oblongata, E - Parietal lobe

74. Identify A, B, C and D –



(a) A - Forebrain, B - Brainstem, C - Corpus callosum, D - Cerebral aqueduct
(b) A - Forebrain, B - Brainstem, C - Cerebral aqueduct, D - Corpus callosum
(c) A - Brainstem, B - Forebrain, C - Corpus callosum, D - Cerebral aqueduct
(d) A - Brainstem, B - Forebrain, C - Cerebral aqueduct, D - Corpus luteum

75. Three layers in wall of each eye ball from inside to outwards are –
(a) Sclera, Choroid, Retina (b) Retina, Choroid, Sclera
(c) Choroid, Retina, Sclera (d) Choroid, Sclera, Retina

76. Cornea is the transparent part of –
(a) Retina (b) Choroid (c) Sclera (d) Conjunctiva

77. Which of the following layer of eye ball contains blood vessels and is blue in colour?
(a) Choroid (b) Sclera (c) Retina (d) Cornea

78. Match the following structures of human eye with their respective functions?

Column I	Column II
A. Cornea	I. Provides opening for light to enter
B. Iris	II. Transduces blue, green and red light
C. Lens	III. Control the amount of light that enters
D. Optic nerves	IV. Alters the shape of lens
E. Pupil	V. Transmit information to the CNS
F. Ciliary muscles	VI. Focus light directly on retina
G. Fovea	VII. Bends light and protects inner eye

(a) A - VII, B - III, C - VI, D - V, E - I, F - IV, G - II (b) A - I, B - II, C - III, D - IV, E - V, F - VI, G - VII
(c) A - VII, B - VI, C - V, D - IV, E - III, F - II, G - I (d) A - VII, B - IV, C - VI, D - V, E - I, F - III, G - II

79. Colour of eye is due to –
(a) Iris (b) Lens (c) Pupil (d) Cornea

80. The size of pupil of eye is controlled by –
(a) Iris (b) Retina (c) Ciliary body (d) Lens

81. Iris is a part of –
(a) Retina only (b) Choroid only (c) Sclera only (d) Cornea only

82. The lens in eyeball is –
(a) Semitransparent crystalline (b) Semitransparent and non-crystalline
(c) Transparent crystalline (d) Opaque crystalline

83. Three layers of cells in retina from inside to outside are –
(a) Layers of ganglion cells, bipolar cells, photoreceptor cells
(b) Layers of ganglion cells, photoreceptor cells, bipolar cells
(c) Layers of photoreceptor cells, ganglion cells, bipolar cells
(d) Layers of bipolar cells, photoreceptor cells, ganglion cells

84. Which of the following cells are photoreceptor cells in human eye?
(a) Only cones (b) Only amacrine cells (c) Only rods (d) Only rods and cones

85. Sensitive pigmented layer of eye is –
(a) Retina (b) Cornea (c) Sclera (d) None of these

86. Photoreceptor cells are present in the _____ layer of wall of eye ball –
(a) Outer (b) Middle (c) Inner (d) Corneal

87. The area of retina in human eye containing only cone cells is called –
(a) Pecten (b) Tapetum (c) Macula lutea (d) Fovea centralis

88. At the posterior pole of eye latter to blind spot, there is a yellowish pigmented spot called _____ with a central pit called _____ –
(a) Corpus luteum, Fovea (b) Macula, fovea (c) Macula lutea, fovea (d) macula, columella

89. The place in eye of human from which optic nerves and blood vessels leave the eye ball is –
(a) Pupil (b) Fovea centralis (c) Cornea (d) Blind spot

90. Blind spot has –
(a) Cones but no rods (b) Rods but no cones (c) No rods and cones (d) Cones and rods

91. In which of the following structures cones are densely packed and visual acuity (resolution) is the greatest?
(a) Macula (b) Fovea (c) Lens (d) Cornea

92. The fovea is a _____ portion of the _____ –
(a) Thick-out, sclera (b) Thin-out, choroid (c) Thin-out, retina (d) Thick-out, retina

93. Which of the following statement is correct?
(a) Rods contain a purplish-red protein called rhodopsin / visual purple

(b) Rhodopsin is a derivative of vitamin A

(c) The twilight (scotopic) vision is a function of the rods

(d) All

94. Which of the following statements is false about cones?

I. The daylight (photopic) vision and colour vision are function of cones

II. In human eye, there are three types of cones having characteristic photopigments that respond to red, green and blue light

III. The sensations of different colours are produced by various combination of these 3 types of cones

IV. When these 3 types of cones are stimulated equally, a sensation of white light is produced.

(a) Only IV (b) Only I and IV (c) Only III (d) None

95. Cavity of vitreous humour (gel) is –

(a) Behind the lens (b) In front of lens

(c) Between choroid and retina (d) Between choroid and sclera

96. Cavity of aqueous humour (watery fluid) is –

(a) Behind the lens (b) Between choroid and retina

(c) Between cornea and lens (d) Between lens and retina

97. Given these structures –

A. Lens

B. Aqueous humour

C. Vitreous humour

D. Cornea

Choose the correct sequence of pathway of light from outside to inside the eyeball –

(a) D, B, A, C (b) A, B, C, D (c) D, C, B, A (d) A, D, B, C

98. Mechanism of vision includes following steps in random order –

A. Neural impulses are analysed and image formed on retina is recognised by visual cortex

B. Membrane permeability changes

C. Ganglion cells are excited

D. Bipolar cells are depolarised

E. Action potentials (impulse) are transmitted by optic nerves to visual cortex

F. Potential differences are generated in the photoreceptor cells

G. Light energy causes a change in shape of rhodopsin, leading to the dissociation of retinal (an aldehyde of vitamin A) from opsin (a protein)

H. Structure of opsin is changed

The correct sequence is –

(a) A, B, C, D, E, F, G, H (b) H, G, F, E, D, C, B, A

(c) A, D, C, B, G, H, F, E (d) G, H, B, F, D, C, E, A

99. Which of the following options is wrong?

(a) Eye muscles are attached with sclera

(b) Visual purple is concerned with dim light, while visual violet is concerned with bright light

(c) The colour differentiation is done by cones

(d) None

100. The blind spot is the region where –

(a) Image is dim (b) Image is formed in strong light

(c) Optic disc is present (d) Image is formed in the dark

101. Anatomically, human ear can be divided into _____ major sections.

(a) 2 (b) 3 (c) 4 (d) 6

102. The outer ear consists of –
(a) Only pinna (b) Only external auditory meatus (ear canal)
(c) Both (d) Pinna + Membranous labyrinth

103. The ear of human is enclosed in –
(a) Mastoid bone (b) Ethmoid Bone
(c) Frontal and parietal bone (d) Temporal bone

104. Match Column I with Column II

Column I	Column II
A. Pinna	I. Collects vibrations in the air which produces sound
B. Ear canal	II. Passage for sound wave from pinna to ear drum
C. Tympanic membrane	III. Transfers sound wave to ear ossicles
D. Ear Ossicles	IV. Increases the efficiency of transmission of sound waves to the inner ear
E. Cochlea	V. Has hearing receptors
F. Eustachian tube	VI. Equalizes the pressure on both sides of ear drum
G. Auditory nerves	VII. Impulse transfer from organ of Corti to auditory cortex in temporal lobe of cerebrum

(a) A - I, B - II, C - III, D - IV, E - V, F - VI, G - VII
(b) A - VII, B - VI, C - V, D - IV, E - III, F - II, G - I
(c) A - I, B - II, C - IV, D - III, E - V, F - VI, G - VII
(d) A - I, B - II, C - III, D - IV, E - V, F - VII, G - VI

105. The waxy substance secreting sebaceous glands present in skin of external auditory meatus are –
(a) Zeis gland (b) Harderian gland (c) Meibomian gland (d) Ceruminous gland

106. Which of the following is correct about ear drum (tympanic membrane)?
(a) It is composed of connective tissues covered with skin inside and with mucous membrane outside
(b) It consists of connective tissues covered with skin outside and mucus membrane inside
(c) It consists of proteins-lipids-proteins only
(d) It consists of hyaline cartilage

107. Which of the following is correct about ear ossicles?
(a) They are present in the middle ear
(b) The 3 ear ossicles (malleus, incus and stapes) are attached to one other in a chain-like fashion
(c) Malleus is attached to the ear drum and stapes to the oval window
(d) All

108. Which of the following options is wrong?
(a) Sound is amplified by ear ossicles
(b) In a person there are 2 malleus, 2 incus and 2 stapes
(c) The ear has two sensory functions (hearing + balancing of body)
(d) The ear has no role in body balancing

109. The structures for hearing and body balance are located in –
(a) External ear (b) Middle ear (c) Inner ear (d) Eustachian tube

110. The smallest bone in human body is –
(a) Incus (b) Stapes (c) Malleus (d) Columella auris

111. Eustachian tube connects –
(a) Middle ear with pharynx (b) Middle ear with inner ear
(c) Middle ear with external ear (d) Left auricle with left ventricle

112. The fluid filled inner ear is called –
(a) Labyrinth (b) Vestibule (c) Saccule (d) Utricle

113. The bony labyrinth is a –
(a) Solid structure (b) Triangular bone without any channel
(c) Series of channels (d) A series of channels present with lymph

114. The fluid present between bony labyrinth and membranous labyrinth is –
(a) Endolymph (b) Perilymph (c) Lymph (d) Serum

115. The fluid present inside the membranous labyrinth is –
(a) Endolymph (b) Perilymph (c) Lymph (d) Serum

116. The coiled portion of the labyrinth is called –
(a) Superior colliculi (b) Inferior colliculi (c) Cochlea (d) Fovea centralis

117. Bony labyrinth contains –
(a) Lymph (b) Endolymph (c) Perilymph (d) Haemolymph

118. In the ear of human, sound waves pass from middle ear to inner ear through –
(a) Foramen ovale (b) Fenestra ovalis (c) Fenestra rotundus (d) Tympanic membrane

119. Membranous labyrinth is stato-acoustic organ because it is concerned with –
(a) Hearing (b) Balancing (c) Both a and b (d) None

120. Which of the following structures is not involved in gathering sound, directing it to the sensors, or amplifying it?
(a) Ear ossicles (b) Pinna (c) Eustachian tube (d) Organ of Corti and cochlear canal

121. Which of the following is not a membrane in the cochlea?
(a) Reissner's membrane (b) Tectorial membrane (c) Tympanic membrane (d) Basilar membrane

122. Which of the following structures of the mammalian auditory system is involved in transduction of pressure changes in receptor potential?
(a) The tympanic membrane (b) The ear ossicles (c) The oval window (d) Organ of Corti

123. The hair cells in the ear that give auditory information are concentrated in the –
(a) oval window (b) Organ of Corti (c) Semicircular canal (d) Ear drum

124. The middle ear serves which auditory function?
(a) It converts air pressure waves into fluid pressure waves
(b) It converts fluid pressure waves into air pressure waves
(c) It converts air pressure waves into nerve impulses
(d) It converts fluid pressure waves into nerve impulses

125. Which of the following membrane gives us the ability to discriminate different pitches of sound?
(a) Tympanic membrane (b) Tectorial membrane (c) Basilar membrane (d) Oval window

126. Membranous structure separating the scala vestibuli and scala media of mammalian ear is called –
(a) Basilar membrane (b) Reissner's membrane (c) Tectorial membrane (d) Tympanic membrane

127. Which of the following is known as "Cochlear duct"?
(a) Scala media (b) Scala tympani (c) Scala vestibuli (d) None

128. In the internal ear, the "organ of Corti" bearing hair cells is located in –
(a) Scala media (b) Scala tympani (c) Scala vestibuli (d) Sacculus

129. Scala vestibuli is connected with –
(a) Scala media (b) Scala tympani (c) Fenestra ovalis (d) Foramen ovalis

130. Scala vestibuli, scala media and scala tympani contain –
(a) Endolymph, perilymph & endolymph respectively (b) Perilymph, endolymph & perilymph respectively
(c) Perilymph, endolymph & endolymph respectively (d) Perilymph, haemolymph & endolymph respectively

131. At the base of cochlea, scala vestibuli ends at the _____ window, while the scala tympani terminates at the _____ window which open into _____ ear –
(a) Oval, round, inner (b) Oval, round, outer (c) Round, oval, outer (d) Oval, round, middle

132. The organ of Corti is located on the –
(a) Basilar membrane (b) Reissner's membrane (c) Tectorial membrane (d) Tympanic membrane

133. Above the row of hair cells in organ of Corti, is a thin elastic membrane called –
(a) Basilar membrane (b) Reissner's membrane (c) Tympanic membrane (d) Tectorial membrane

134. The vestibular apparatus is composed of –
(a) 3 semicircular canals (b) Otolith organs (c) Oval window (d) a and b

135. The otolith organ consists of –
(a) 3 semicircular canals (b) Utricle and saccule
(c) Utricle and semicircular canal (d) Saccule and semicircular canal

136. 3 semicircular canals located above utricle lie –
(a) In a chain-likefashion (b) Perpendicular to each other
(c) In a triangular fashion (d) In the same plane

137. The saccule and utricle contain a projecting ridge called –
(a) Crista ampullaris (b) Jacobson's organ (c) Macula (d) Lateral line

138. Receptor cells in the human ear are located in –
(a) Organ of Corti only (b) Jacobson's organ only
(c) Organ of Corti, Utricle, saccule & semicircular canal (d) Eustachian canal only

139. Static equilibrium is maintained by –
(a) Utricle (b) Saccule (c) Both a and b (d) Semicircular canal

140. The swollen base of semicircular canals contain projecting ridge is called –
(a) Macula (b) Jacobson's organ (c) Crista ampullaris (d) Organ of Corti

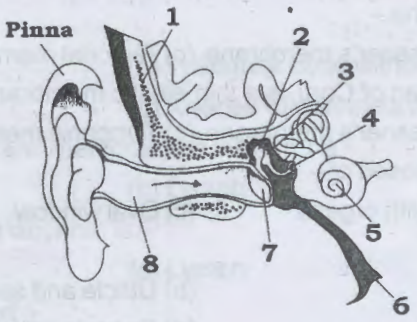
141. The crista and macula are the specific receptor of the vestibular apparatus responsible for –
(a) Hearing (b) Balance of body and posture
(c) Touch sensation (d) Thermal sensation

142. Crista ampullaris –
(a) Is a chemoreceptor (b) Maintains dynamic equilibrium
(c) Is a thermoreceptor (d) Is an olfactoreceptor

143. Identify the correct sequence of organs / regions in the organization of human ear as an auditory mechanoreceptor organ –
(a) Pinna → Auditory canal → Tympanic membrane → Malleus → Incus → Stapes → Cochlea → Auditory nerves
(b) Pinna → Cochlea → Tympanic membrane → Auditory canal → Malleus → Stapes → Incus → Auditory nerves
(c) Pinna → Tympanic membrane → Auditory canal → Incus → Malleus → Stapes → Cochlea → Auditory nerves
(d) Pinna → Malleus → Incus → Stapes → Auditory nerves → Tympanic membrane → Cochlea

144. Place each of the following statements by using the numbers 1 - 9 to describe the events that lead to the formation of an auditory impulse –
1. Vibration is transferred from the malleus to the incus to the stapes
2. Basilar membrane moves up and down
3. Nerve impulse is transmitted in cochlear nerve to auditory cortex area of brain for impulse analysis and recognitions
4. Sound waves pass through ear canal
5. Stereocilia of hair cells of organ of Corti rub against tectorial membrane
6. Sound waves cause ear drum to vibrate
7. Nerve impulse is generated
8. Vibrations move from fluid of vestibular canal to the fluid of tympanic canal.
9. Membrane at oval window vibrates
(a) 4, 6, 1, 9, 8, 2, 5, 7, 3 (b) 1, 2, 3, 4, 5, 6, 7, 8, 9
(c) 9, 8, 7, 6, 5, 4, 3, 2, 1 (d) 4, 6, 1, 8, 9, 2, 5, 7, 3

145.



Observe the above diagram. Identify 1 to 9

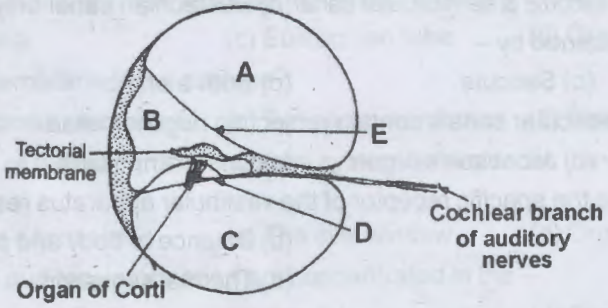
(a) 1 - Temporal bone, 2 - Malleus, 3 - Incus, 4 - Stapes, 5 - Cochlea, 6 - Eustachian tube, 7 - Tympanic membrane, 8 - External auditory canal

(b) 1 - Tympanic membrane, 2 - Malleus, 3 - Incus, 4 - Stapes, 5 - Cochlea, 6 - Eustachian tube, 7 - Temporal bone, 8 - External auditory canal

(c) 1 - Temporal bone, 2 - Incus, 3 - Malleus, 4 - Stapes, 5 - Cochlea, 6 - Eustachian tube, 7 - Tympanic membrane, 8 - External auditory canal

(d) 1 - Temporal bone, 2 - Malleus, 3 - Incus, 4 - Cochlea, 5 - Stapes, 6 - Eustachian tube, 7 - tympanic membrane, 8 - External auditory canal

146.



Go through the above sectional view of Cochlea. Identify A to E –

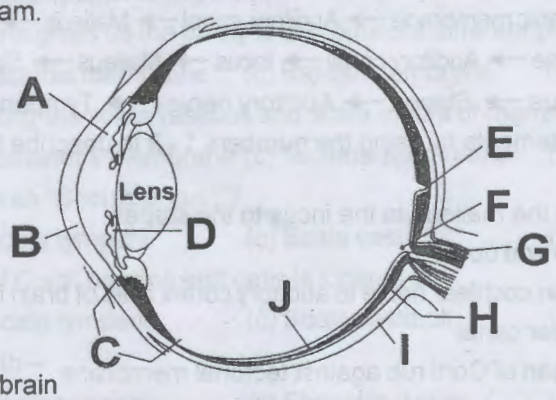
(a) A - Scala vestibuli, B - Scala media, C - Scala tympani, D - Basilar membrane, E - Reissner's membrane

(b) A - Scala media, B - Scala vestibuli, C - Scala tympani, D - Basilar membrane, E - Reissner's membrane

(c) A - Scala tympani, B - Scala media, C - Scala vestibuli, D - Basilar membrane, E - Reissner's membrane

(d) A - Scala vestibuli, B - Scala media, C - Scala tympani, D - Reissner's membrane, E - Basilar membrane

147. Go through the following diagram.



I. Carries nerve signals to the brain

II. Regulates the size of the pupil to let more or less light into the eye

III. Changes the shape of the lens

IV. Photoreceptors are highly concentrated at this center of focus

The correct match of the above functions with parts of the eye indicated by letters is –

(a) I - B, II - D, III - F, IV - H

(b) I - J, II - G, III - F, IV - C

(c) I - A, II - C, III - E, IV - G

(d) I - G, II - D, III - C, IV - E

148. The purplish red pigment rhodopsin contained in the rods type of photoreceptor cells of the human eye, is a derivative of
(a) Vitamin A (b) Vitamin B1 (c) Vitamin C (d) Vitamin D

149. When a neuron is in resting state i.e. not conducting any impulse, the axonal membrane is
(a) Comparatively more permeable to K^+ ions and nearly impermeable to Na^+ ions
(b) Comparatively more permeable to Na^+ ions and nearly impermeable to K^+ ions
(c) Equally permeable to both Na^+ and K^+ ions
(d) Impermeable to both Na^+ and K^+ ions

150. The impulses from CNS to skeletal muscles are relayed through
(a) SNS (b) Somatic neural system
(c) PSNS (d) All of these

151. Sodium – Potassium pump across membrane, actively transports
(a) 2-Na ions outwards and 3 K ions into the cell (b) 3-Na ions outwards and 2 K ions into the cell
(c) 2-K ions out wards and 3 Na ions into the cell (d) 3 K ions outwards and 2 Na ions into the cell

152. The polarity of the membrane is reversed
(a) During action potential (b) When there is nerve impulse at the site
(c) And the membrane is said to be depolarized (d) All of these statements are correct

153. Mark the correct statement
(a) Electrical synapses are more common in our neural system than chemical synapses
(b) The new potential in post synaptic neuron may be either excitatory or inhibitory
(c) Hypothalamus is the major coordination centre for sensory and motor signaling
(d) The tracts of nerve fibres that connect two cerebral hemispheres are called corpora bigemina

154. The cerebral cortex is
(a) The outer layer of cerebrum, called white matter (b) Inner layer of cerebrum, called white matter
(c) The outer layer of cerebrum, called grey matter (d) Inner layer of cerebrum, called grey matter

155. The secretion of gastric juice is controlled by
(a) Cerebellum (b) ANS (c) Cerebrum (d) Medulla

156. Afferent neurons transmit impulses via dorsal nerve root to
(a) Sensory organs
(b) Effector organs
(c) CNS
(d) The statement in incorrect since afferent neurons pass via ventral nerve root

157. Mark the correct statement
(a) Limbic system is involved in emotional expression
(b) Cerebral aqueduct passes through mid brain
(c) The meninx in contact of brain tissue is pia mater
(d) All of these

158. Accomodation is due to contraction of
(a) Rectus and oblique muscles (b) Iris muscles
(c) Ciliary body (d) Ciliary muscles

159. Which cells (layer) of retina faces the lens
(a) Ganglion cells (b) Photoreceptor cells (c) Bipolar cells (d) Pigmented cells

160. Twilight vision is also called
(a) Scotopic vision and is the function of rods (b) Scotopic vision and is the function of cones
(c) Photopic vision and is the function of rods (d) Photopic vision and is the function of cones

161. The thinned-out portion of retina where only cones are densely packed is, called
(a) Blind spot (b) Corpus luteum (c) Macula lutea (d) Fovea

162. Mark the correct statement
(a) The space between cornea and lens is filled with transparent gel
(b) When all cones are stimulated equally a sensation of no light (dark) is produced
(c) Rhodopsin is purplish red protein, hence called visual purple
(d) The anterior transparent portion of choroid is called cornea

163. The cochlea of ear contains
(a) Perilymph (b) Aqueous humour
(c) Perilymph and endolymph (d) Only endolymph

164. Mark the incorrect statement
(a) The ear ossicle attached to tympanic membrane is Malleus
(b) Opsin (of Rhodopsin) develops from vitamin A
(c) The pressure on ear drum is equalized by Eustachian tube
(d) Otolith organ consists of saccule and utricle

165. At the base of cochlea, the canal that ends at the oval window is
(a) Scala tympani (b) Scala media (c) Scala vestibuli (d) Auditory

166. The stereo cilia of hair cells or organ of Corti are covered with a thick elastic membrane called
(a) Reissner's membrane (b) Basilar membrane (c) Tympanic membrane (d) None of these

167. Macula of labyrinth is bathed in
(a) Aqueous humour (b) Vitreous humour (c) Perilymph (d) Endolymph

168. The ripples in basilar membrane press the hair cells against the _____ to generate nerve impulse for auditory corte
(a) Macula (b) Otolith (c) Round window (d) None of these

169. The region of vertebrate's eye where the optic nerve passes out of the retina is called
(a) Yellow spot (b) Optic chiasma (c) Fovea (d) Blnd spot

170. Mark the wrong statement
(a) The most developed part of human brain is cerebrum
(b) The pitch of sound in human ear is determined by the spot of cochlear coil stimulated
(c) The part of CNS that acts as a master clock is amygdala
(d) None of these

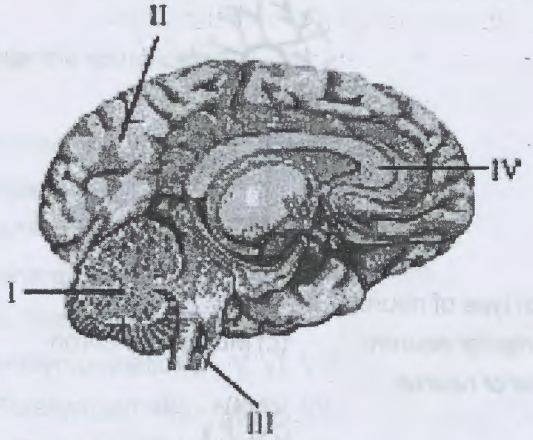
171. The amount of light that falls on retina is regulated by
(a) Lens (b) Cornea (c) Iris (d) Ciliary muscles

172. The path of extra sound in the ear is
(a) scala vestibuli → scala media → scala tympani → fenestra ovalis → tympanic cavity → Eustachian tube → pharynx
(b) scala vestibuli → helicotrema → scala media fenestra rotunda → Eustachian tube → pharynx
(c) scala vestibuli → helicotrema → scala tympani → fenestra rotunda → tympanic cavity → Eustachian tub → pharynx
(d) scala vestibuli → helicotrema → fenestra rotunda → Eustachian tube → pharynx.

173. The following structures are part of the human brain
A. medulla oblongata B. floor of mid brain C. thalamus D. cerebral hemispheres
E. cerebellum
For each of the following functions of the brain, Identify the correct letter of the structure concerned with that functio
I. involuntary breathing movements
II. accurate voluntary movements
III. seat of memory

	I	II	III		I	II	III		I	II	III		I	II	III
(a)	A	C	D	(b)	A	E	B	(c)	A	E	D	(d)	E	C	B

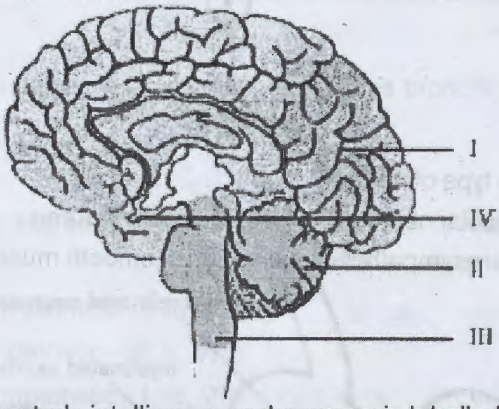
174. The given image is that of the human brain.



Which labelled part controls the process of breathing?

(a) I (b) II (c) III (d) IV

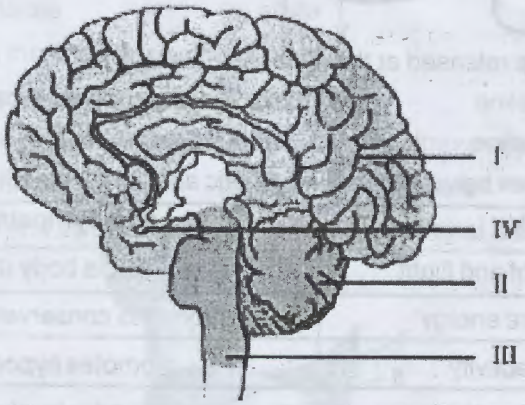
175. The given image is that of the human brain.



In the given figure, the part that controls intelligence and memory is labelled

(a) I (b) II (c) III (d) IV

176. The given image is that of the human brain.



Which of the following functions is performed by the part labelled III in the given figure?

(a) Regulation of body temperature (b) Regulation of heartbeat

(c) Controlling learning (d) Maintaining posture

177. Cochlea is divided into three chambers or space

A. Scala vestibuli B. Scala media C. Scala tympani

Basilar membrane and Reissner's membrane are respectively found between

(a) A and C & A and B (b) A and B & B and C (c) B and C & A and C (d) B and C & A and B

178. The illustration represents a type of neuron.

The illustration represents which type of neuron?

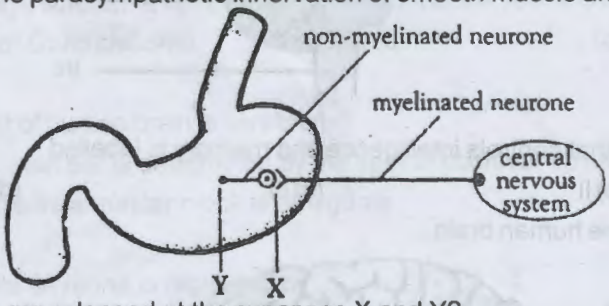
(a) Bipolar neuron (b) Unipolar neuron (c) Multipolar neuron (d) Pseudounipolar neuron

179. The illustration represents a type of neuron.

The illustration represents which type of neuron?

(a) Bipolar neuron (b) Unipolar neuron (c) Multipolar neuron (d) Pseudounipolar neuron

180. The diagram below shows the parasympathetic innervation of smooth muscle and glands of the stomach.



What chemical transmitters are released at the synapses X and Y?

(a) **X**-acetylcholine; **Y**-acetylcholine (b) **X**-acetylcholine; **Y**-calcium ions

(c) **X**-acetylcholine; **Y**-noradrenaline (d) **X**-noradrenaline; **Y**-calcium ions

181. Which of the following differences between the sympathetic and parasympathetic nervous systems is INCORRECT?

	sympathetic	parasympathetic
(a)	prepares body for'fight and flight'	calms body down
(b)	involves expenditure energy	promotes conservation energy
(c)	promotes hyperactivity	promotes hypoactivity
(d)	operates under voluntary control	operates under involuntary control

182. The following table gives examples of the effect of the autonomic nervous system on certain parts of the body. Which entry is INCORRECT?

	branch of autonomic nervous system	part of body innervated	effect produced
(a)	parasympathetic	muscle of heart wall	rate of contraction decreased
(b)	sympathetic	sweat glands	secretion stimulated
(c)	parasympathetic	muscle of bronchi	relaxation promoted
(d)	sympathetic	salivary glands	secretion inhibited

183. Go through the following characterization of Sympathetic and Parasympathetic Nervous System.

I. Thoracolumbar outflow.

II. Ganglia in the form of trunk near the spinal cord.

III. Craniosacral outflow.

IV. Preganglionic fibres are short while post-ganglionic fibres are long.

V. Ganglia lie near the effector organs.

VI. Preganglionic fibres are long while post-ganglionic fibres are short.

VII. Postganglionic fibres are adrenergic.

VIII. Both Pre and Post ganglionic fibres are cholinergic.

(a) Sympathetic - I, II, IV, VII ; Parasympathetic - III, V, VI, VIII

(b) Sympathetic - III, V, VI, VIII; Parasympathetic - I, II, IV, VII

(c) Sympathetic - I, II, IV, VI, VIII; Parasympathetic - III, V, VII

(d) Sympathetic - III, V, VII; Parasympathetic - I, II, IV, VI, VIII

184. Go through the following characterization of Sympathetic and Parasympathetic Nervous System.

I. Dilates pupil.

II. ↑ Heart rate, ↑ BP (Vasoconstriction) ↑ Glycogenolysis, dilates bronchi.

III. Constricts pupil.

IV. Induces ejaculation.

V. ↑ Gastric secretion, ↑ salivary secretion, ↑ peristalsis.

VI. Erection and urination.

(a) Sympathetic - III, V, VI; Parasympathetic - I, II, IV

(b) Sympathetic - I, II, IV; Parasympathetic - III, V, VI

(c) Sympathetic - II, IV, VI; Parasympathetic - I, III, V

(d) Sympathetic - I, III, V; Parasympathetic - II, IV, VI

185. The optic lobes in human are represented by the corpora

(a) bigemina (b) arenacea (c) allata (d) quadrigemina

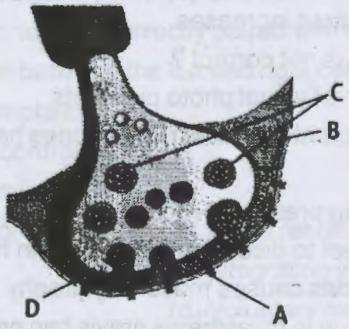
186. The human hind brain comprises three parts, one of which is :

(a) Spinal cord (b) Corpus callosum (c) Cerebellum (d) Hypothalamus

187. Which part of the human ear plays no role in hearing as such but is otherwise very much required ?

(a) Eustachian tube (b) Organ of corti (c) Vestibular apparatus (d) Ear ossicles

188. A diagram showing axon terminal and synapse is given. Identify correctly at least two of A - D



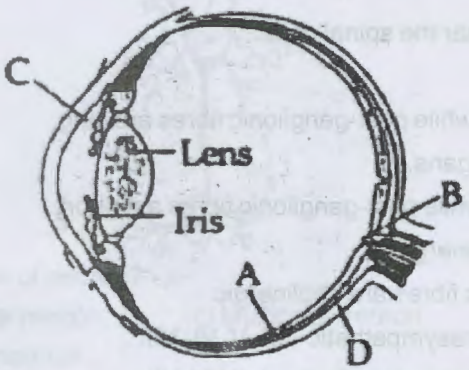
(a) B - Synaptic connection, D - K^+

(b) A - Neurotransmitter, B - Synaptic cleft

(c) C - Neurotransmitter, D - Ca^{++}

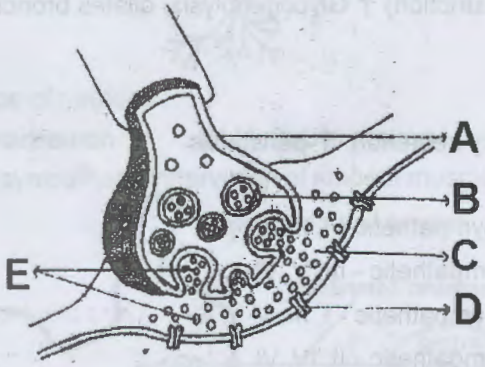
(d) A - Receptor, C - Synaptic vesicles

189. Parts A, B, C and D of the human eye are shown in the diagram. Select the option which gives correct identification along with its functions/characteristics



(a) B – Blind spot – has only a few rods and cones.
(b) C – Aqueous chamber – reflects the light which does not pass through the lens.
(c) D – Choroid – its anterior part forms ciliary body.
(d) A – Retina – contains photo receptors – rods and cones.

190. In the following diagram showing axon terminal and synapse A, B, C, D and E respectively represents:



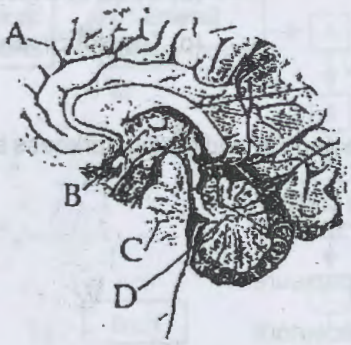
(a) axon terminal, synaptic cleft, synaptic vesicles, neurotransmitters and receptors
(b) axon terminal, synaptic vesicles, synaptic cleft, receptors and neurotransmitters
(c) synaptic cleft, synaptic vesicles, axon terminal, neurotransmitters and receptors
(d) synaptic cleft, axon terminal, synaptic vesicles, neurotransmitters and receptors

191. How do parasympathetic neural signals affect the working of the heart ?
(a) Reduce both heart rate and cardiac output.
(b) Heart rate is increased without affecting the cardiac output.
(c) Both heart rate and cardiac output increase.
(d) Heart rate decreases but cardiac output increases.

192. Which one of the following statements is not correct ?
(a) Retinal is the light absorbing portion of visual photo pigments.
(b) In retina the rods have the photopigment rhodopsin while cones have three different photopigments.
(c) Retinal is a derivative of Vitamin C.
(d) Rhodopsin is the purplish red protein present in rods only.

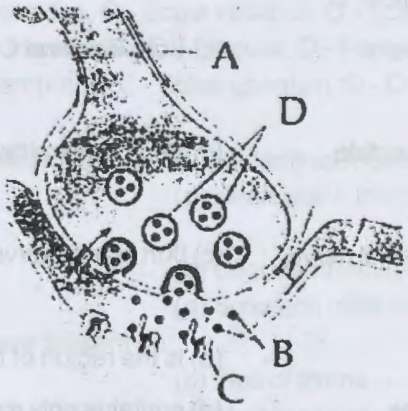
193. Select the correct statement with respect to disorders of muscles in humans
(a) Rapid contractions of skeletal muscles causes muscle dystrophy
(b) Failure of neuromuscular transmission in myasthenia gravis can prevent normal swallowing.
(c) Accumulation of urea and creatine in the joints cause their inflammation
(d) An overdose of vitamin D causes osteoporosis

194. A sagittal section of human-brain is shown here. Identify at least two labels from A-D.



(a) A – Cerebral hemispheres; B – Cerebellum (b) C – Mid brain; D – Cerebellum
(c) A – Cerebrum; C – Pons (d) B – Corpus callosum; D – Medulla

195. The figure shows an axon terminal and synapse. Select the option giving correct identifications of tables A-D



(a) A – Axon terminal; B – Serotonin complex (b) A – Action potential; C – Neurotransmitter
(c) B – Neurotransmitter; D – Receptor capsules (d) C – Receptor; D – Synaptic vesicles

196. Which excitatory neurotransmitter is involved in the transmission of impulse at the neuro-muscular junction?
(a) Epinephrine (b) Serotonin (c) Acetyl choline (d) Glycine

197. Which one of the following is the functional unit of hearing?
(a) Utricle (b) Organ of Zuckerkandl (c) Organ of Corti (d) Vestibular apparatus

198. Which one of the following is not a refractive medium of the eye?
(a) Lens (b) Vitreous humour (c) Aqueous humour (d) Pupil

199. A gymnast is able to balance his body upside down even in the total darkness because of
(a) tectorial membrane (b) Organ of corti (c) Cochlea (d) Vestibular apparatus

200. Which of the following regions of the brain is incorrectly paired with its function?
(a) Corpus callosum – Communication between the left and right cerebral cortices
(b) Cerebrum – Calculation and contemplation
(c) Medulla oblongata – Homeostatic control
(d) Cerebellum – Language comprehension

201. Destruction of the anterior horn cells of the spinal cord would result in loss of
(a) Commissural impulses (b) Integrating impulses
(c) Sensory impulses (d) Voluntary motor impulses

202. In mammalian eye, the 'fovea' is the center of the visual field, where
(a) Only rods are present (b) More rods than cones are found
(c) High density of cones occur, but has no rods (d) The optic nerve leaves the eye

203. Photosensitive compound in human eye is made up of :-

(a) Guanosine and Retinol (b) Opsin and Retinal

(c) Opsin and Retinol (d) Transducin and Retinene

204. Choose the correct statement.

(a) Photoreceptors in the human eye are depolarized during darkness and become hyperpolarized in response to the light stimulus.

(b) Receptors do not produce graded potentials.

(c) Nociceptors respond to changes in pressure.

(d) Meissner's corpuscles are thermo receptors.

205. Cerebrum is a part of :

(a) Mesencephalon (b) Metencephalon (c) Prosencephalon (d) Myelencephalon

206. Which cell in the retina recognize colour ?

(a) Rod cells (b) Cone cells (c) Both Rod and Cone cells (D)Epithelial cells

207. Acetylcholine is a :

(a) Hormone (b) Brain peptide (c) Neurotransmitter (d) Digestive enzyme

208. Vagus nerve is a :

(a) Vth cranial nerve (b) VIth cranial nerve (c) IXth cranial nerve (d) Xth cranial nerve

209. The fovea of eye

(a) has the lowest light threshold (b) is the region of highest visual activity

(c) contains only green and red cones (d) contains only rods

210. The function of our visceral organs are controlled by

(a) Sympathetic and somatic nervous system (b) Sympathetic and parasympathetic nervous system

(c) Central and somatic nervous system (d) None of the above

211. In homeotherms the brain centre which regulate body temperature is located in

(a) Cerebrum (b) Cerebellum (c) Medulla oblongata (d) Hypothalamus

212. The basilar membrane of the cochlea

(a) Is unaffected by movement of fluid in the scala of vestibule

(b) Covers the oval window and round window

(c) Vibrates in a pattern determined by the form of the travelling wave in the fluids of the choclea

(d) Vibrates when body is subjected to linear acceleration.

213. Third ventricle of brain is located in

(a) Diencephalon (b) Rhombencephalon (c) Mesencephalon (d) Cerebrum

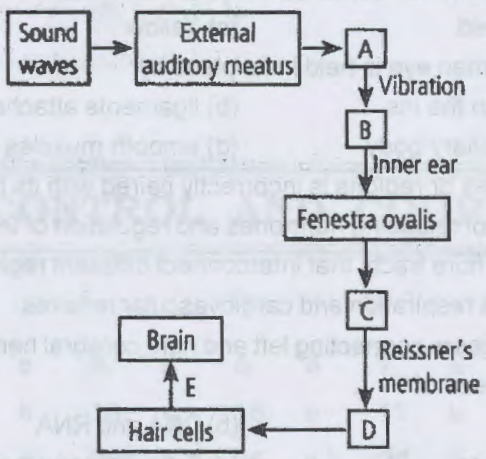
214. Left and right cerebral hemispheres are linked by a broad nerve band called

(a) Corpus callosum (b) Corpus luteum (c) Corpora quadregemina (d) Anterior choroid plexus

215. Human body temperature is regulated by the centre located in

(a) Cerebrum (b) Cerebellum (c) Medulla (d) Hypothalamus

216. Study the given flow chart of hearing mechanism and identify the labelled parts A-E.



(a) A - Tympanic cavity, B - Eustachian tube, C - Scala media, D - Scala vestibuli, E - Vestibular nerve
(b) A - Tympanic membrane, B - Ear ossides, C - Scala vestibuli, D - Scala media, E - Cochlear nerve
(c) A - Eustachian tube, B - Tympanic membrane, C - Ampulla, D - Fenestra rotunda, E - Trigeminal nerve
(d) A - Tunnel of Corti, B - Tectorial membrane, C - Spiral ganglion, D - Organ of Corti, E - Vagus nerve

217. Which one is correct?
(a) Biceps of upper arm – smooth muscle fibre.
(b) Abdominal muscle – smooth muscle fibre.
(c) Iris – Involuntary muscle
(d) Heart wall – Involuntary and unstriated muscle

218. Myelin sheath is produced by :
(a) Astrocytes and Schwann cells
(b) Oligodendrocytes and Osteoclasts
(c) Osteoclasts and Astrocytes
(d) Schwann cells and Oligodendrocytes

219. Receptor sites for neurotransmitters are present on :
(a) Pre-synaptic membrane
(b) Tips of axons
(c) Post-synaptic membrane
(d) Membrane of synaptic vesicles

220. Good vision depends on adequate intake of carotene rich food :
Select the best option from the following statements :
I. Vitamin A derivatives are formed from carotene
II. The photopigments are embedded in the membrane discs of the inner segment
III. Retinal is a derivative of Vitamin A
IV. Retinal is a light absorbing part of all the visual photopigments
Options :
(a) I, III and IV (b) I and III (c) II, III and IV (d) I and II

221. Information on the right side of our visual world is processed by which side(s) of the brain?
(a) Right (b) Left (c) Both right and left (d) Neither right nor left

222. If myelin sheath present completely around axon what will be happened?
(a) Conduction will be as usual
(b) Conduction is slow
(c) Conduction is fast
(d) Conduction is stoppped

223. In nerve resting membrane potential is maintained by :
(a) Active transport (b) Passive diffusion (c) Both (a) and (b) (d) Unidirectional flow of ion

224. Read the following statements and choose the correct answer of the question following them.
I. Both nose and tongue detect dissolve chemicals.
II. The chemical senses of gustation and olfactory are functionally similar
III. The chemical senses of gustation and olfactory are interrelated
IV. With each taste of food the brain integrates the differential input from the taste buds and a complex flavour is perceived.
How many of the above statements is / are correct.
(a) One (b) Two (c) Three (d) Four

225. If Chlorolab of retina is damaged which colour can not be visualised?
(a) Green (b) Red (c) Yellow (d) Many colours

226. The transparent lens in the human eye is held in its place by
(a) smooth muscles attached to the iris (b) ligaments attached to the iris
(c) ligaments attached to the ciliary body (d) smooth muscles attached to the ciliary body

227. Which of the following structures or regions is incorrectly paired with its functions?
(a) Hypothalamus : production of releasing hormones and regulation of temperature, hunger and thirst.
(b) Limbic system : consists of fibre tracts that interconnect different regions of brain; controls movement.
(c) Medulla oblongata : controls respiration and cardiovascular reflexes.
(d) Corpus callosum : band of fibers connecting left and right cerebral hemispheres.

228. Nissl bodies are mainly composed of
(a) Nucleic acids and SER (b) DNA and RNA
(c) Proteins and lipids (d) Free ribosomes and RER

229. Which of the following is not an autoimmune disease?
(a) Alzheimer's disease (b) Rheumatoid arthritis (c) Psoriasis (d) Vitiligo

230. When a person thinks and solve problems, which area of the cerebrum is envolved?
(a) Frontal lobe (b) Parietal lobe (c) Occipital lobe (d) Temporal lobe

231. The black pigment in the eye, which reduces the internal reflection, is located in
(a) retina (b) iris (c) sclerotic (d) cornea

232. The main reason for somw neurons being myelinated is to
(a) protect the nerve against physical damage.
(b) increase the diameter of the axon to slow the speed of the action potential.
(c) increase the speed of the action potential.
(d) increase metabolic activity to maintain nerve function.

233. Which maintains static equilibrium -
(a) Cerebrum (b) Utricle & Saccule (c) Cerebellum (d) Semicircular canal

234. Which part of the brain is responsible for thermoregulation?
(a) Cerebrum (b) Hypothalamus (c) Corpus callosum (d) Medulla oblongata

235. Which of the following statements is correct?
(a) Cornea is an external, transparent and protective proteinacious covering of the eye-ball.
(b) Cornea consists of dense connective tissue of elastin and can repair itself.
(c) Cornea is convex, transparent layer which is highly vascularised.
(d) Cornea consists of dense matrix of collagen and is the most sensitive portion the eye.

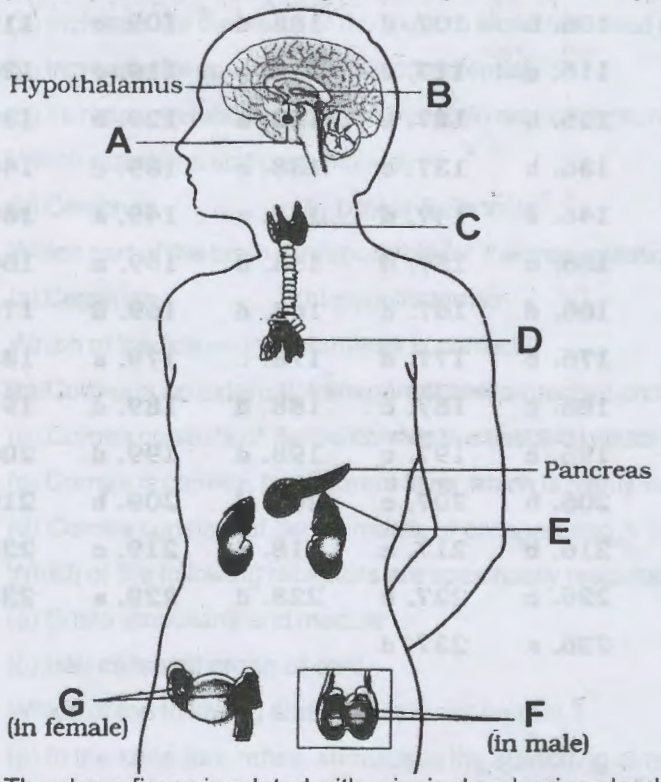
236. Which of the following receptors are specifically responsible for maintenance of balance of body and posture?
(a) Crista ampullaris and macula (b) Basilar membrane and otoliths
(c) Hair cells and organ of corti (d) Tectorial membrane and macula

237. Which of the following statements is not correct ?
(a) In the knee-jerk reflex, stimulus is the stretching of muscle and response is its contraction
(b) An action potential in an axon does not move backward because the segment behind is in a refractory phase
(c) Depolarisation of hair cells of cochlea results in the opening of the mechanically gated potassium-ion channels
(d) Rods are very sensitive and contribute to daylight vision

21 NEURAL CONTROL AND COORDINATION

1. d	2. c	3. d	4. c	5. a	6. d	7. a	8. d	9. d	10. b
11. b	12. c	13. b	14. b	15. d	16. c	17. b	18. c	19. a	20. c
21. a	22. b	23. b	24. c	25. b	26. a	27. c	28. a	29. a	30. d
31. a	32. a	33. b	34. d	35. a	36. b	37. b	38. d	39. d	40. c
41. c	42. a	43. a	44. c	45. d	46. a	47. b	48. c	49. b	50. b
51. c	52. b	53. a	54. c	55. d	56. c	57. d	58. b	59. c	60. d
61. a	62. c	63. a	64. a	65. a	66. c	67. b	68. a	69. b	70. b
71. d	72. b	73. d	74. a	75. b	76. c	77. a	78. a	79. a	80. a
81. b	82. c	83. a	84. d	85. a	86. c	87. d	88. c	89. d	90. c
91. b	92. c	93. d	94. d	95. a	96. c	97. a	98. d	99. d	100. c
101. b	102. c	103. d	104. a	105. d	106. b	107. d	108. d	109. c	110. b
111. a	112. a	113. c	114. b	115. a	116. c	117. c	118. b	119. c	120. c
121. c	122. d	123. b	124. a	125. c	126. b	127. a	128. a	129. b	130. b
131. d	132. a	133. d	134. d	135. b	136. b	137. c	138. c	139. c	140. c
141. b	142. b	143. a	144. a	145. a	146. a	147. d	148. a	149. a	150. b
151. b	152. d	153. b	154. c	155. d	156. c	157. d	158. d	159. a	160. a
161. d	162. c	163. c	164. b	165. c	166. d	167. d	168. d	169. d	170. c
171. c	172. c	173. c	174. c	175. a	176. b	177. d	178. c	179. a	180. a
181. d	182. c	183. a	184. b	185. d	186. c	187. c	188. d	189. d	190. b
191. a	192. c	193. b	194. c	195. d	196. c	197. c	198. d	199. d	200. b
201. d	202. c	203. b	204. a	205. c	206. b	207. c	208. d	209. b	210. b
211. d	212. c	213. a	214. a	215. d	216. b	217. c	218. d	219. c	220. a
221. b	222. d	223. c	224. d	225. d	226. c	227. b	228. d	229. a	230. a
231. a	232. c	233. b	234. b	235. 4	236. a	237. d			

22 CHEMICAL COORDINATION AND INTEGRATION

1. Endocrine glands are –
   (a) Ductless glands whose secretions pour directly into blood.
   (b) Have ducts and pour their secretions into blood directly
   (c) Have ducts which straightaway pour secretions into target organs
   (d) All of the above
2. Which of the following statements about hormones is / are correct?
   I. Hormones are non-nutrient chemicals
   II. Hormones act as intercellular messengers
   III. Hormones are produced in trace amount
   IV. Hormones may be proteins, steroids, glycoproteins and bigenic amines
   (a) All (b) I, II, III (c) IV (d) I, III
3. Which of the following statements is false?
   (a) Hormones provide chemical coordination, integration and regulation in the human body
   (b) Hormones regulate metabolism, growth and development of our organs
   (c) Besides hypothalamus, pituitary, pineal, thyroid, adrenal, parathyroid, thymus, etc., GIT, heart, kidney, etc also produce hormones.
   (d) Hormone can be used again and again like biocatalyst
4. 

   The above figure is related with principal endocrine glands in human. Identify A to G –
   (a) A - Pineal, B- Pituitary, C - Thyroid and parathyroid, D - Thymus, E - Adrenal, F- Testis, G - Ovary
   (b) A - Pituitary, B - Pineal, C - Thyroid and parathyroid, D - Thymus, E - Adrenal, F- Ovary, G - Testis
   (c) A - Pituitary, B - Pineal, C - Thyroid and parathyroid, D - Thymus, E - Kidney, F- Testis, G - Ovary
   (d) A - Pituitary, B - Pineal, C - Thyroid and parathyroid, D - Thymus, E - Adrenal, F- Testis, G - Ovary

5. Which of the following options is false?
   (a) Invertebrates possess very simple endocrine systems with few hormones
   (b) The hypothalamus is the upper part of diencephelon (part of fore brain)
   (c) The hypothalamus contains several groups of neurosecretory cells (nuclei) which produce hormones
   (d) The hypothalamus produces releasing hormones, inhibiting hormones, oxytocin and vasopressin

6. Hormones have various regulating functions. Which of the following statements does not describe how hormones function?
   (a) Hormones act in very low concentration (b) Hormones act at sites distant from where they are produced
   (c) Hormones are transported in blood (d) None of the above

7. Portal blood vessels connect the _____ to the _____ –
   (a) Hypothalamus, brain (b) Hypothalamus, posterior pituitary
   (c) hypothalamus, anterior pituitary (d) Anterior pituitary, posterior pituitary

8. Hormones released by the posterior pituitary (oxytocin and vasopressin) are produced in the –
   (a) Anterior pituitary (b) Hypothalamus (c) Pineal (d) Thymus

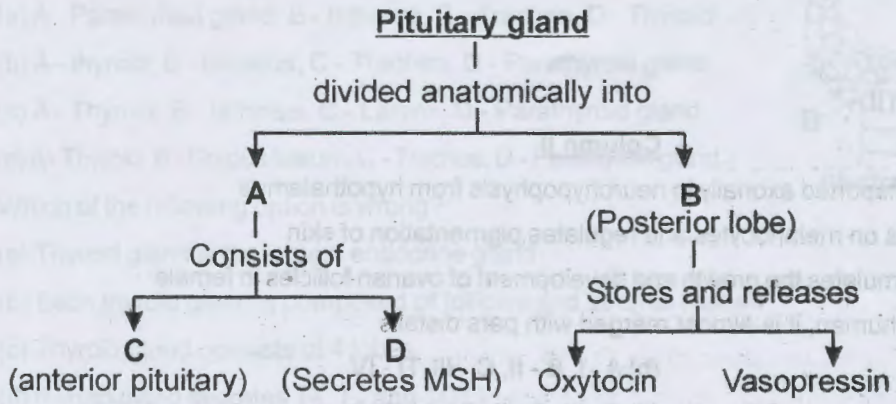
9. Pituitary gland is regulated by –
   (a) Adrenals (b) Pineal (c) Thyroid gland (d) Hypothalamus

10. Which of the following options is false?
   (a) The posterior pituitary is under the direct neural regulation of the hypothalamus
   (b) Somatostatin from the hypothalamus inhibits the release of growth hormone (GH) from the anterior pituitary
   (c) GnRH from the hypothalamus stimulates anterior pituitary to release gonadotrophins
   (d) None of the above

11. Which of the following options is correct?
   (a) Posterior pituitary is connected to hypothalamus by nerve fibres
   (b) Anterior pituitary is connected to hypothalamus by portal vessel
   (c) Posterior pituitary is connected to hypothalamus by portal vessel
   (d) Both a and b

12. The pituitary gland is located in a bony cavity called _____ and is attached to _____ by a stalk –
   (a) Sella tursica, hypothalamus (b) Sella tursica, cerebrum
   (c) Sella tursica, thyroid (d) Sella tursica, pineal

13.



Identify A, B, C and D –

(a) A - Neurohypophysis, B - Adenohypophysis, C - Pars distalis, D - Pars intermedia

(b) A - Adenohypophysis, B - Neurohypophysis, C - Pars intermedia, D - Pars distalis

(c) A - Adenohypophysis, B - Neurohypophysis, C - Pars distalis, D - Pars intermedia

(d) A - Neurohypophysis, B - Adenohypophysis, C - Pars intermedia, D - Pars distalis

14. Anterior lobe of Pituitary gland secretes –

I. FSH, GH and LH

II. GH, TSH and prolactin

III. TSH, ADH & prolactin

IV. ACTH, TSH and oxytocin

(a) I and II are correct (b) II and IV are correct (c) I and III are correct (d) I, II and III are correct

15. Which of the following hormones is mismatched with the stated functions?

(a) ACTH - Stimulates the adrenal cortex

(b) Oxytocin - Stimulates water reabsorption by the kidneys

(c) Prolactin (PRL) - regulates the growth of mammary glands and milk production in them

(d) TSH - Promotes the synthesis and secretion of thyroid hormones from thyroid gland

16. Which of the following statements is correct about oxytocin (pitocin)?

(a) It stimulates smooth muscles contraction

(b) In female, it stimulates a vigorous contraction of uterus at the time of child birth

(c) In female, it stimulates milk ejection from mammary gland

(d) All

17. Which of the following are gonadotrophins?

(a) FSH + GH (b) LH + FSH (c) LH + GH (d) GH

18. Which of the following options is not true?

(a) In males, LH stimulates synthesis and secretion of androgens (Testosterone) from testis.

(b) In males, FSH and androgens regulate spermatogenesis

(c) In female, LH induces ovulation of fully mature follicles (graafian follicles), and maintains corpus luteum.

(d) FSH is produced in only male

19. The corpus luteum –

(a) Is found in forebrain of human

(b) Is formed from the remnants of graafian follicles after ovulation

(c) Secretes mainly LH

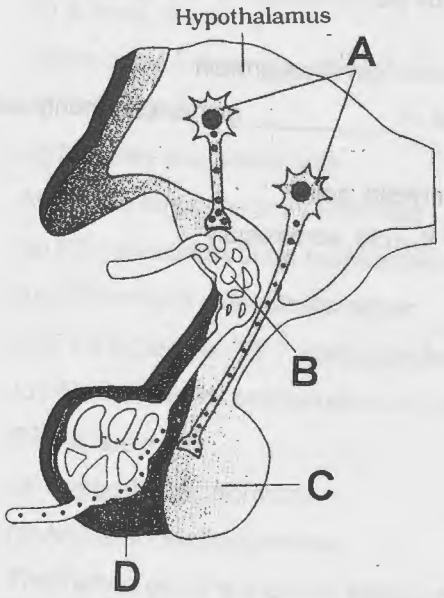
(d) Is found in testis

20. Match the Column I with Column II –

Column I	**Column II**
((a) FSH	I. Transported axonally to neurohypophysis from hypothalamus
((b) MSH	II. Acts on melanocytes and regulates pigmentation of skin
((c) Vasopressin (ADH)	III. Stimulates the growth and development of ovarian follicles in female
((d) Pars intermedia	IV. In human, it is almost merged with pars distalis

(a) A - III, B - II, C - I, D - IV (b) A - I, B - II, C - III, D - IV

(c) A - IV, B - III, C - II, D - I (d) A - III, B - II, C - IV, D - I

21. 

Observe the above diagrammatic representation. Identify A to D –

(a) A - Hypothalamic neurons, B - Hypothalamic artery, C - Posterior pituitary

(b) A - Epithalamic neurons, B - Hypothalamic vein, C - Pars distalis, D - Pars intermedia

(c) A - Hypothalamic neurons, B - Portal circulation, C - Anterior pituitary, D - Posterior pituitary

(d) A - Hypothalamic neurons, B - Portal circulation, C - Posterior pituitary, D - Anterior pituitary

22. Pineal gland is located on –

(a) Dorsal midbrain (b) Ventral midbrain

(c) Dorsal side of forebrain (d) Ventral side of hindbrain

23. Melatonin is a hormone secreted by –

(a) Pineal (b) Pituitary (c) thymus (d) Adrenal cortex

24. Which of the following functions is related with melatonin –

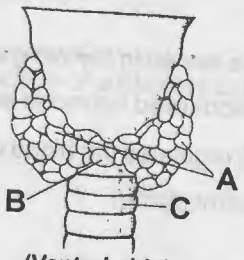
(a) Influence on metabolism, pigmentation, menstrual cycle, our defense capacity

(b) Regulation of the 24-hour (diurnal) rhythm of our body (eg - sleep-wake cycle, body temperature)

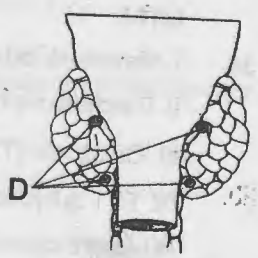
(c) Both a and b

(d) Does not oppose FSH and LH

25. Observe the following figures. Identify A to D –



(Ventral side)



(Dorsal side)

(a) A - Parathyroid gland, B - Isthmus, C - Trachea, D - Thyroid

(b) A - thyroid, B - Isthmus, C - Trachea, D - Parathyroid gland

(c) A - Thyroid, B - Isthmus, C - Larynx, D - Parathyroid gland

(d) A - Thyroid, B - Corpus luteum, C - Trachea, D - Parathyroid gland

26. Which of the following option is wrong?

(a) Thyroid gland is the largest endocrine gland

(b) Each thyroid gland is composed of follicles and stromal tissues

(c) Thyroid gland consists of 4 lobes

(d) thyroid gland secretes T_3, T_4 and TCT

27. Thyroxine (T_4) or tetraiodothyronine and Triiodothyronine (T_3), produced by the thyroid gland, are synthesised from iodine and –

(a) Phenylalanine (b) Cholesterol (c) Tyrosine (d) Glycoprotein

28. Iodine deficiency in our diet results in _____ and enlargement of _____ gland, commonly called _____.

(a) Hyperthyroidism, thyroid, goitre (b) Hypothyroidism, thyroid, goitre

(c) Hypoparathyroidism, parathyroid, goitre (d) Hyperthyroidism, thyroid, acromegaly

29. Which of the following function is related with thyroid hormones?

(a) They play an important role in the regulation of BMR

(b) They also support RBC formation

(c) They control the metabolism of carbohydrates, proteins and fat

(d) All

30. Match the Column I with Column II

Column I	**Column II**
A. Hypothalamic hormone	I. Skin
B. Thyrotropin (TSH)	II. Adrenal cortex
C. Corticotrophin	III. Thyroid
D. Gonadotrophins (LH, FSH)	IV. Gonad
E. Melanotrophin (MSH)	V. Pituitary

(a) A - I, B - II, C - III, D - IV, E - V (b) A - V, B - IV, C - III, D - II, A - I

(c) A - V, B - III, C - II, D - IV, E - I (d) A - V, B - II, C - III, D - IV, E - I

31. Cretinism in children is caused by –

(a) Hypothyroidism (b) Hyperthyroidism (c) Hypoparathyroidism (d) Hyperparathyroidism

32. The features of cretinism includes –

(a) mental retardation, low I.Q. (b) Abnormal skin, stunted growth

(c) Deaf-mutism (d) All

33. Which of the following statements is correct?

(a) In an adult woman, hypothyroidism may cause irregular menstrual cycle.

(b) Hyperthyroidism may be resulted due to thyroid cancer or nodules development in the thyroid glands

(c) Deficiency of iodine in our diet results in hypothyroidism

(d) All

34. I. Maximum iodine is stored in thyroid gland

II. Calcitonin is non-iodinised hormone secreted by parafollicular cells of thyroid gland.

III. Calcitonin (TCT) regulates the blood Ca^{+2} level.

IV. TCT is hypocalcemic factor

(a) All are correct (b) All are wrong

(c) Only I, II and III are correct (d) Only IV is correct

35. Which one of the following pairs of organs includes only the endocrine glands?

(a) Thymus and testes (b) Adrenal and ovary

(c) Parathyroid and adrenal (d) Pancreas and parathyroid

36. In humans, _____ parathyroid glands are present on _____ side of _____ gland –

(a) 2, back, thyroid glands (b) 4, back, thyroid glands
(c) 4, front, thyroid glands (d) 2, lateral, thyroid glands

37. Which of the following is / are influenced by parathyroid hormone (PTH) or Collip's hormone?
(a) Only kidney (b) Kidney & bones only
(c) Muscles and bones only (d) Kidney, bone, muscles and small intestine

38. All are the functions of PTH except –
(a) PTH stimulates bone reabsorption / dilution / demineralization
(b) PTH retards osteoclastic action
(c) PTH increases Ca^{+2} absorption from the digestive tube
(d) PTH stimulates reabsorption of Ca^{+2} by the renal tubules

39. PTH is a –
(a) Hypocalcemic hormone (b) Hypercalcemic hormone
(c) Antiosteoclastic hormone (d) A hormone which stimulates excretion of Ca^{+2} in urine

40. The thymus gland is a lobular structure located on _____ side of the _____ and _____ –
(a) Ventral, heart, aorta (b) Lateral, heart, aorta (c) Dorsal, heart, aorta (d) Dorsal, thyroid, trachea

41. Which of the following endocrine glands degenerates / atrophies in old age?
(a) Thyroid (b) Thymus (c) Parathyroid (d) Adrenal

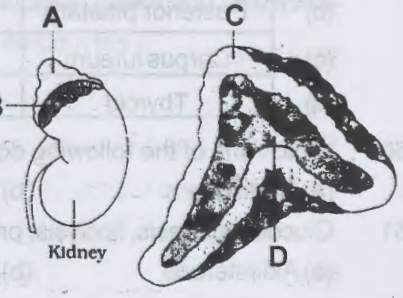
42. Thymus is mainly concerned with –
(a) Regulation of body temperature (b) Regulation of body growth
(c) Immunological functions (d) Secretion of thyrotropin

43. Damage to thymus in a child may lead to –
(a) A reduction in haemoglobin content of blood
(b) Loss of cell mediated immunity
(c) Promotion of antibody mediated immunity / humoral immunity
(d) A reduction in stem cell production

44. The thymus gland secretes the _____ hormone called _____ which play a major role in the differentiation of _____ lymphocytes.
(a) Glycoproteinaceous, thymosin, T (b) Steroid, thymosin, T
(c) Peptide, thymosin, T (d) Peptide, thymosin, B

45. Which of the following is not related with thymosins?
(a) In addition to cell mediated immunity, thymosins also promote production of antibodies to provide humoral immunity
(b) In old age, thymosins production is more, so immunity is strong
(c) Thymosins are produced by thyroid gland
(d) Both b and c

46. Observe the following diagrams and identify alphabetized items –
(a) A - Adrenal gland, B - Fat, C - Cortex, D - Medulla
(b) A - JGA, B - Fat, C - Cortex, D - Medulla
(c) A - Adrenal gland, B - Fat, C - Medulla, D - Cortex
(d) A - Adrenal gland, B - Fat, C - Pars distalis, D - pars intermedia



47. Adrenal medulla secretes –
(a) Adrenaline / epinephrine only (b) Nor-adrenaline / nor-epinephrine
(c) a and b (d) Corticoids

48. Adrenaline and nor-adrenaline are commonly called –
(a) Corticoids (b) Glucocorticoids (c) Catecholamines (d) Sex corticoids

49. Which of the following glands is called emergency gland of the body?
(a) Testis (b) Adrenal medulla (c) Thyroid (d) Pituitary

50. Which of the following hormone(s) is / are called emergency hormone(s) of "fight or flight"?
(a) ADH (b) Oxytocin
(c) Adrenaline and nor-adrenaline (d) Thymosis and PTH

51. Which of the following hormones increase alertness, pupillary dilation, piloerection, sweating, heart beat, strength of heart contraction, rate of respiration, glycogenolysis, lipolysis, proteolysis and glucose conc. in blood?
(a) thymosin and calcitonin (b) Norepinephrine and epinephrine
(c) Vasopressin and oxytocin (d) Insulin and glucagon

52. The fight-or-flight response is developed by the hormones of –
(a) Hypothalamus (b) Adrenal medulla (c) Adrenal cortex (d) Adrenal-pancreatic complex

53. B.P. is controlled by –
(a) Adrenal gland (b) Thymus (c) Corpus luteum (d) None

54. Adrenal cortex is composed of 3 layers. The sequence of layers from the outside to the inside is –
(a) Zona glomerulosa, zona fasciculata, zona reticularis
(b) Zona reticularis, zona glomerulosa, zona fasciculata
(c) Zona fasciculata, zona reticularis, zona glomerulosa
(d) Zona fasciculata, zona glomerulosa, zona reticularis

55. The adrenal cortex secretes many hormones, commonly called as –
(a) Epinephrine (b) Corticoids (c) Non-epinephrine (d) Secondary messengers

56. Match the Column I with Column II –

Column I	Column II
A. Glucocorticoids	I. Balance of water and electrolytes in our body
B. Mineralocorticoids	II. Carbohydrate metabolism
C. Gonadocorticoids	III. Secretion of estrogens and androgens

(a) A - II, B - I, C - III (b) A - I, B - II, C - III (c) A - III, B - II, C - I (d) A - III, B - I, C - II

57. Which of the following is the main glucocorticoid?
(a) Aldosterone (b) Gonadocorticoid (c) Cortisol (d) Mineralocorticoids

58. Which of the following hormones is the main mineralocorticoid?
(a) Aldosterone (b) Cortisol (c) ADH (d) Adrenaline

59. Match the source gland with its respective hormone and function and select the correct option.

	Source gland	Hormone	Function
(a)	Anterior pituitary	Oxytocin	Contraction of uterus muscles during child birth
(b)	Posterior pituitary	Vasopressin	Stimulates reabsorption of water in the distal tubules in the nephron
(c)	Corpus luteum	Oestrogen	Supports Pregnancy
(d)	Thyroid	Thyroxine	Regulates blood calcium level

60. Which one of the following does not act as a neurotransmitter?
(a) Cortisone (b) Epinephrine (c) Norepinephrine (d) Acetylcholine

61. Gluconeogenesis, lipolysis, proteolysis and inhibition of cellular uptake and utilization of amino acid are performed by –
(a) Aldosterone (b) Glucocorticoid (c) Insulin (d) Mineralocorticoid

62. Which of the following hormones produces anti-inflammatory reactions, suppresses immune response, stimulates RBC production, and is also involved in maintaining cardiovascular system and kidney functions?
(a) Aldosterone (b) Epinephrine (c) Cortisol (d) Norepinephrine

63. Which of the following adrenal cortical hormones play a role in the growth of axial hair, pubic hair and facial hair during puberty?
(a) Cortisol (b) Androgens (c) Norepinephrine (d) Epinephrine

64. Which of following statements is false about pancreas?
(a) Pancreas acts as both exocrine and endocrine glands
(b) Endocrine pancreas consists of "Islets of Langerhans"
(c) There are about 1-2 million Islets of Langerhans representing only 1-2% of pancreatic tissue
(d) Pancreas secretes only insulin

65. **Islet of Langerhans**
|
has 2 types of main cells
→ **A** - cells → secretes insulin → causes - **D**
→ **B** - cells → secretes - **C** → causes - **E**

Identify A to E –
(a) A - α, B - β, C - Glucagon, D - Hyperglycemia, E - Hypoglycemia
(b) A - β, B - α, C - Cortisol, D - Hypoglycemia, E - Hyperglycemia
(c) A - β, B - α, C - Cortisol, D - Hyperglycemia, E - Hypoglycemia
(d) A - β, B - α, C - Glucagon, D - Hypoglycemia, E - Hyperglycemia

66. Which of the following best describe the functions of corticosteroid hormones?
I. Depresses the immune response
II. Stimulates sexual and reproductive activity
III. Influences blood glucose concentration
IV. Influences ionic and osmotic concentration of blood
(a) All (b) I, II, III (c) IV (d) None

67. Cortisol, the stress hormone, has all the following effects except –
(a) metabolizing fat for energy (b) Increasing B.P.
(c) Stimulating the immune response (d) Slowing down the protein synthesis

68. Which of the following statements is correct about glucagon?
(a) Glucagon acts mainly on the liver cells (hepatocytes)
(b) Glucagon stimulates glycogenolysis, gluconeogenesis
(c) Glucagon reduces the cellular glucose uptake and utilization
(d) All

69. Insulin, a peptide hormone like glucagon, has all the following effects except –
(a) Insulin acts mainly on hepatocytes and adipocytes and enhances cellular glucose uptake and utilization
(b) Insulin causes a rapid movement of glucose from blood to hepatocytes and adipocytes
(c) Insulin is hypoglycemic factor
(d) Insulin reduces glycogenesis

70. The glucose homeostasis in blood is maintained jointly by –
(a) Insulin and epinephrine (b) Insulin and nor-epinephrine
(c) Insulin and glucagon (d) Glucagon and cortisol

71. Prolonged hyperglycemia leads to a complex disorder called –
(a) Diabetes mellitus (b) Diabetes insipidus (c) Cretinism (d) Myxoedema

72. A pair of testis is present in the _____ sac (outside abdomen) of male individual. Testis consists of _____ tubules and _____ or interstitial tissue
(a) Testicular, seminiferous, stromal (b) Scrotal, seminiferous, stromal
(c) Scrotal, uriniferous, stromal (d) Scrotal, seminiferous, seminal

73. Go through the following points –
I. Regulate the development, maturation and functions of epididymis, vas deferens, seminal vesicle, prostrate gland, urethra, etc.
II. Stimulate muscular growth of facial and axillary hairs, aggressiveness, low pitch of voice, etc.
III. Stimulates spermatogenesis
IV. Act on CNS and sexual behaviour (libido)
V. Produce anabolic (synthetic) effect on protein and carbohydrate metabolism
VI. The Leydig's cell / interstitial cells (present in intertubular space) secrete this hormone under the influence of LH
Above points are associated with _____ hormones –
(a) FSH (b) Progesterone
(c) Androgens (e.g. Testosterone) (d) Melatonin

74. Which of the following statements is incorrect?
(a) Testis and ovary function as a primary sex organ as well as endocrine gland
(b) Ovaries are located in thoracic cavity of females
(c) Ovary produces ovum, 2 groups of steroid hormones (estrogen and progesterone)
(d) Ovary is composed of ovarian follicles and stromal tissue

75. Find the odd one out with respect to site of hormones production –
(a) Epinephrine, Nor-epinephrine, Cortisol (b) FSH, TSH, GH
(c) Progesterone, Testosterone, Relaxin (d) Insulin, Glucagon, Thymosin

76. Find the odd one out –
(a) Insulin, Glucagon, Thymosin (b) Glucocorticoids, Mineralocorticoids, sex corticoids
(c) Relaxin, Oestrogen, progesterone (d) Nor-epinephrine, Adrenaline

77. The corpus luteum is the structure which –
(a) Releases ovum from ovary (b) Secretes progesterone
(c) Develops in Graafian follicle (d) Produces LH

78. After ovulation, the ruptured follicle is converted into –
(a) Graafian follicle (b) Corpus callosum (c) Corpus luteum (d) Corpus spongiosum

79. The estrogen is mainly synthesised and secreted by –
(a) Rupture follicles in ovary (b) Corpus luteum
(c) Growing ovarian follicles (d) Leydig cells

80. Progesterone –
(a) Supports pregnancy (b) Stimulates the formation of mammary alveoli
(c) Stimulates milk secretion (Lactation) (d) All

81. Which of the following hormones stimulates growth and development of female accessory sex organs and secondary sex character and also female sexual behaviour?
(a) Estrogen (b) Progesteron
(c) Androgen (Testosterone) (d) Gonadotrophic releasing hormone

82. Which of the following secretes hormones but is not considered as traditional glandular tissue?
(a) Pancreas (b) Testes (c) Heart (d) Adrenal gland

83. Production, secretion and ejection of milk requires the synergistic effects of prolactin and –

(a) Estrogen (b) Progesteron (c) Oxytocin (d) All

84. A hormone not involved in sugar metabolism is –
(a) Glucagon (b) Cortisone (c) Aldosterone (d) Insulin

85. Atrial natriuretic hormone / factor (ANF) secreted by atrial wall of our heart has exactly the opposite function of this hormone secreted by zona glomerulosa –
(a) ADH (b) Aldosterone (c) Androgen (d) Calcitonin

86. ANF –
(a) Decrease B.P. (b) Is secreted when B.P. increases
(c) Causes vasodilation (d) All

87. Juxtaglomerular cells of _____ produces a peptide hormone called _____ which stimulates _____ –
(a) Thyroid, erythopoietin, erythropoiesis (b) Kidney, erythropoietin, erythropoiesis
(c) Kidney, renin, erythropoiesis (d) Spleen, erythropoietin, erythropoiesis

88. Which one of the following part acts as an endocrine gland or tissue?
(a) Pars radiata (b) JG cells (c) Brunner's gland (d) Pancreatic acini

89. Gastrin, secretin, cholecystokinin (CCK) and gastric inhibitory peptide (GIP) are 4 major peptide hormone secreted by–
(a) Only stomach (b) Only small intestine (c) Gastro-intestinal tract (d) Only pancreas

90. Match Column I with Column II –

Column I	Column II
A. Gastrin	I. Acts on gastric gland and stimulates secretion of HCl and pepsinogen
B. Secretin	II. Acts on the exocrine part of pancreas and stimulates secretion of water and HCO_3^- ions
C. CCK	III. Acts on both pancreas and gall bladder and stimulates the secretion of both pancreatic enzymes and bile juice respectively –
D. GIP	IV. Inhibits gastric secretion and motility

(a) A - IV, B - III, C - II, D - I (b) A - II, B IV, C - III, D - I
(c) A - I, B - II, C - III, D - IV (d) A - I, B - III, C - II, D - IV

91. Which of the following statements is false?
(a) Growth factors / Hormones are also secreted by specific non-endocrine tissues
(b) These growth factors are essential for normal growth of tissues and their repairing / regeneration
(c) Hormone secreted during allergy is glucocorticoid
(d) None of the above

92. Match the Column I with Column II –

Column I	Column II
A. Peptide, polypeptide protein hormones	I. Epinephrine, nor-epinephrine
B. Steroid	II. T_3 and T_4 (thyroid hormones)
C. Iodothyronines	III. Cortisol, testosterone, estradiol, progesterone
D. Amino acid derivatives	IV. Pituitary hormones, pancreatic hormones, hypothalamic hormones

(a) A - I, B - II, C - III, D - IV (b) A - IV, B - III, C - II, D - I
(c) A - IV, B - III, C - I, D - II (d) A - I, B - II, C - IV, D - III

93. A steroid hormone typically alters the activity of its target cells by –
(a) Making holes in the membrane of the target cells
(b) Entering the cell and altering gene expression
(c) Making holes in the lysosome of target cells
(d) Activation of cAMP

94. The target tissues of hormones are those tissues that –
(a) Particular hormone can actually penetrate
(b) Have specific enzymes with which hormones directly interact

(c) Have high concentrations of the "second messenger".
(d) Have receptors for particular hormone

95. In order for a cell to be responsive to a lipid-soluble hormone, it must have –
(a) G - protein (b) cAMP
(c) A specific receptor in the cytoplasm or nucleus (d) A specific cell surface receptor

96. Steroid hormones initiate the production of target cell substances in which manner?
(a) They initiate second messenger activity (b) They bind with membrane protein
(c) They initiate DNA transcription (d) They activate enzyme pathways

97. Which of the following is not true of cyclic AMP (cAMP)?
(a) It is a second messenger
(b) The enzyme adenylate cyclase converts ATP into cAMP
(c) In the mechanism of a protein hormone, cAMP is involved
(d) None

98. Why do some hormones (first messenger) need to trigger a "second messenger" to activate a target cell?
(a) The first messenger needs activation of ATP
(b) The first messenger cannot cross a plasma membrane
(c) There are no specific cell surface receptors for first messenger
(d) The first messenger is not a water-soluble molecule

99. Which of the following is / are second messenger(s)?
(a) cAMP (b) IP_3 (c) Ca^{+2} (d) All

100. Which of the following hormones does not act by a second messenger system?
(a) Glucagon (b) Epinephrine (c) FSH (d) Testosterone

101. Which hormone binds to intracellular receptors –
(a) Insulin (b) GH (c) T_3 (d) TSH

102. Which of the following hormones does not act by a second messenger system?
(a) Glucagon (b) Epinephrine (c) LH (d) Aldosterone

103. Place in the correct order the action of water soluble hormones e.g. FSH
I. Physiological response e.g. ovarian growth
II. Biochemical response
III. Generation of second messenger
IV. Response I
V. Hormone binds to plasma membrane bind
(a) I → II → III → IV → V (b) V → IV → III → II → I
(c) V → IV → II → III → I (d) I → II → V → III → IV

104. Hormones produce their effect on target tissue by binding to specific ___A___ called hormone receptors located in the target tissues only. ___B___ soluble hormones usually need ___C___ receptor that generate ___D___ messengers for regulating cellular metabolism. ___E___ soluble hormones can pass through cell membrane and bind to ___F___ receptors, mostly ___G___ receptors. The hormone receptor complex enter the ___H___ and mostly regulate gene expression or chromosome function by interaction of hormone-receptor complex with the ___I___.
(a) A - Protein, B - Water, C - Membrane-bound, D - Second, E - Lipid, F - intracellular, G - Nuclear, H - Nucleus, I - Genome
(b) A - Lipid, B - Water, C - Membrane-bound, D - Second, E - Water, F - intracellular, G - Nuclear, H - Nucleus, I - Genome
(c) A - Protein, B - Water, C - Intracellular, D - Second, E - Lipid, F - Extracellular, G - Nuclear, H - Nucleus, I - Genome
(d) A - Protein, B - Water, C - Membrane-bound, D - Primary, E - Lipid, F - intracellular, G - Nuclear, H - Nucleus, I - Genome

105.

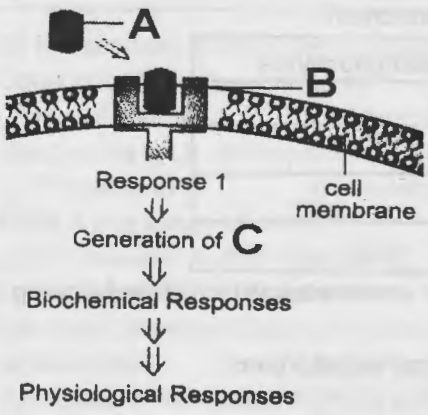


Figure - I

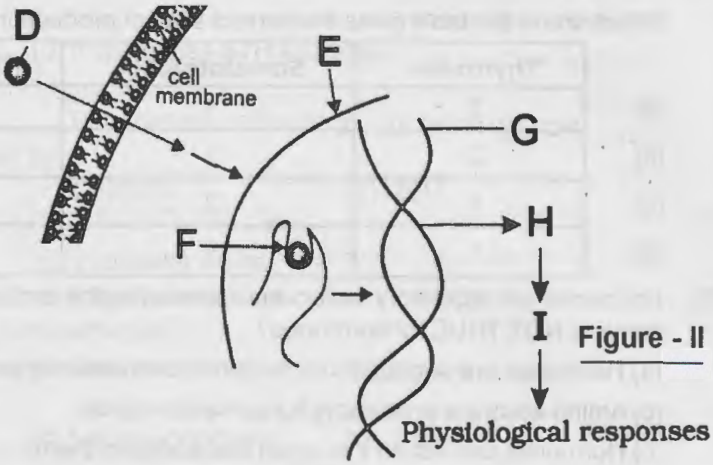


Figure - II

Go through the above diagrammatic representation of the mechanism of action for 2 categories of hormones. In which of the following options correct answers for blanks A to I are indicated.

(a) A - Steroid hormone, B - Receptor, C - Secondary messenger, D - Non-steroid hormone, E - Nucleus, F - Hormone-receptor complex, G - Genome, H - mRNA, I - protein

(b) A - Non-steroid hormone, B - Receptor, C - Secondary messenger, D - Steroid hormone, E - Nucleus, F - Hormone receptor complex, G - Genome, H - mRNA, I - Protein

(c) A - Steroid hormone, B - Receptor, C - Primary messenger, D - Non-steroid hormone, E - Nucleus, F - Hormone-receptor complex, G - Genome, H - mRNA, I - protein

(d) A - Steroid hormone, B - Enzyme, C - Secondary messenger, D - Non-steroid hormone, E - Nucleus, F - Hormone-enzyme complex, G - Genome, H - mRNA, I - protein

106. Match each hormone (Column - I) with its effect on target cells (Column - II) and the gland where it is produced (Column - III) –

Column - I	Column - II	Column - III
1. Thyroxine	A. Lowers	P. Pineal gland
2. Insulin	B. Blood glucose stimulates ovary	Q. Testes
3. PTH	C. Triggers "fight or flight"	R. Parathyroid Gland
4. Epinephrine	D. Promotes male traits	S. Adrenal medulla
5. Melatonin	E. Regulate metabolism	T. Hypothalamus
6. ADH	F. Related to daily rhythm	U. Pancreas
7. Androgen	G. Rises blood Ca^{+2} level	V. Anterior pituitary
8. FSH	H. Boost water retention	W. Thyroid gland

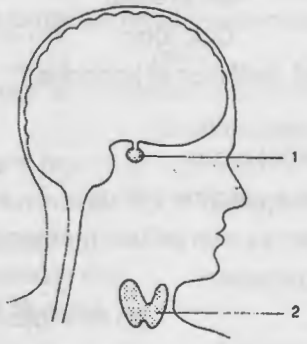
(a) 1 - E, W; 2 - A, U; 3 - G, R; 4 - C, S; 5 - F, P; 6 - H, T; 7 - D, Q; 8 - B, V

(b) 1 - E, W; 2 - A, R; 3 - V, R; 4 - C, U; 5 - F, T; 6 - H, S; 7 - D, Q; 8 - B, P

(c) 1 - B, V; 2 - E, U; 3 - G, W; 4 - C, S; 5 - A, P; 6 - H, T; 7 - D, Q; 8 - F, R

(d) 1 - A, W; 2 - C, U; 3 - G, R; 4 - E, S; 5 - F, P; 6 - H, T; 7 - D, Q; 8 - B, V

107. The numbered structures in the diagram represent two human endocrine glands.



Which line in the table gives the correct sites of production of the three hormones?

	Thyroxine	Somatotrophin	Thyroid-stimulating hormone
(a)	2	1	2
(b)	2	1	1
(c)	1	2	1
(d)	1	2	2

108. Hormones are regulatory molecules secreted by the endocrine systems in vertebrates. Which of the following statements is NOT TRUE for hormones?
(a) Hormones are secreted into the blood circulation system and they act on target organs.
(b) Amino acids are precursors for some hormones.
(c) Hormones can act on the organ that secretes them.
(d) Hormones are always short-lived molecules.

109. Choose the the false one.
(a) Thymus is degenerated in old aged persons resulting in a decreased thymosins production leading to weak immune response.
(b) Cortisol, a type of glucocorticoids stimulates the RBC production
(c) Small amount of androgenic steroids is secreted by adrenal cortex.
(d) Diabetes is not successfully treated with insulin

110. Along with which hormone parathyroid hormone plays a significant role in Ca-balance in the body?
(a) T3 (b) T4 (c) TCT (d) IAA

111. "Y" is hormone which acts mainly at the renal tubules and stimulates the absorption of Na^+ and water and excretion of K^+ and phosphate ions. Thus it helps in the maintenance of electrolytes body fluid volume, O-P and B.P. Y is
(a) Aldosterone / mineralocorticoids (b) GH
(c) GIP (d) ANF

112. Given below is an incomplete table about certain hormones, their source glands and one major effect of each on the body in humans. Identify the correct option for the three blanks A, B and C.

GLANDS	SECRETION	EFFECT ON BODY
A	Oestrogen	Maintenance of secondary sexual characters
Alpha cells of Islets of Langerhans	B	Raises blood sugar level
Anterior pituitary	C	Over secretion leads to gigantism

Options

	A	B	C
(a)	Placenta	Glucagon	Calcitonin
(b)	Ovary	Glucagon	Growth hormone
(c)	Placenta	Insulin	Vasopressin
(d)	Ovary	Insulin	Calcitonin

113. Which of the following is the more scientific definition of hormone ?
(a) They are extracellular messengers
(b) They always act at distantly located target organ
(c) They are the products of well organized endocrine glands
(d) They are non-nutrient chemicals that act as intercellular messengers

114. Mark the correct statement regarding somatostatin
(a) It is secreted from anterior pituitary (b) It inhibits the release of growth hormone

(c) It is secreted from posterior pituitary (d) It stimulates STH secretion

115. Gonadotrophins are secreted from
(a) Hypothalamus (b) Neurohypophysis (c) Pars distalis of Pituitary (d) None of these

116. Sleep-wake cycle and menstrual cycle are maintained by
(a) Progesterone (b) Melatonin (c) Oxytocin (d) MSH

117. What is true about calcitonin
(a) It is released from thyroid gland (b) It contains iodine
(c) It is released from parathyroid (d) It is an amino acid

118. Alertness, pupillary dilation and piloerection are due to the effect of
(a) Melatonin (b) Corticoids (c) Catecholamines (d) Thyroxine

119. Vasopressin, also called ADH, is synthesized by
(a) Adenohypophysis (b) Hypothalamus (c) Neurohypophysis (d) Kidney

120. Which statement, regarding PTH, is correct ?
(a) it is a peptide hormone (b) It stimulates bone resorption
(c) it is hypercalcemic hormone (d) All of these

121. Which of the following is not the hormone of anterior pituitary ?
(a) Prolactin (b) Oxytocin (c) ACTH (d) Growth hormone

122. Cell mediated as well as humoral immunity is provided by
(a) PTH (b) Glucocorticoid (c) Thymosin (d) Thiamine

123. Which hormone interacts with membrane bound receptor and does not normally enter the target cell
(a) FSH (b) Estrogen (c) Thyroxin (d) Cortisol

124. Which of the following is the function of testosterone
(a) It stimulates muscular growth and aggressiveness
(b) It influences male sexual behaviour (libido)
(c) It causes anabolic (synthetic) effect on protein/carbohydrate metabolism
(d) All of these

125. Which hormone acts on exocrine part of pancreas ?
(a) GIP (b) Insulin (c) Secretin (d) Steapsin

126. The hormone that supports pregnancy and stimulates mammary glands for the formation of alveoli for storing milk, is secreted from
(a) Ant. Pituitary (b) Post. Pituitary (c) Graafian follicle (d) Corpus luteum

127. The hormone that suppresses the immune system is
(a) Glucagon (b) Thymosin (c) Adrenaline (d) Cortisol

128. Juvenile diabetes mellitus is due to _____ .
(a) loss of pancreatic beta cells (b) resistance to insulin
(c) obesity (d) malnutrition

129. Which one among the following hormones has no sexual importance?
(a) Interstitial cell stimulating hormone (b) Prolactin
(c) Human chorionic gonadotropin (d) Antidiuretic hormone

130. Which of the following hormones stimulate production of estrogen at puberty ?
(a) FSH and LH (b) ACTH (c) TSH (d) GH

131. Which one among the following hormones is not secreted by adenohypophysis?
(a) FSH (b) ICSH (c) LH (d) hCG

132. The 24 hour (diurnal) rhythm of our body such as the sleep-wake cycle is regulated by the hormone :
(a) calcitonin (b) prolactin (c) adrenaline (d) melatonin

133. The given table enlists various hormones and their chemical nature.

No.	Hormone	Chemical composition
1.	*i*	Peptide
2.	Testosterone	*ii*
3.	Thyroxine	*iii*
4.	*iv*	Amino-acid derivative

The information in which alternative completes the given table?

(a) i-Cortisol; ii-Steroids; iii-Polypeptide; iv-Estradiol

(b) i-Insulin; ii-Proteins; iii-Polypeptide; iv-Epinephrine

(c) i-Cortisol; ii-Proteins; iii-Iodothyronines; iv-Estradiol

(d) i-Insulin; ii-Steroids; iii-Iodothyronines; iv-Epinephrine

134. The given table enlists various hormones produced in human body along with source gland.

No.	Hormone	Source gland
1.	Melatonin	*i*
2.	*ii*	Thymus
3.	*iii*	Kidneys

The information in which alternative completes the given table?

(a) i-Pineal gland; ii-Thymosin; ii-Erythropoietin

(b) i-Parathyroid gland; ii-Thymosin; iii-Erythropoietin

(c) i-Parathyroid gland; ii-Epinephrine; iii-Secretin

(d) i-Pineal gland; ii-Epinephrine; iii-Secretin

135. The *i* region of *ii*, which is also known as anterior pituitary produces *iii* and luteinizing hormones

(a) i-pars distalis; ii-adenohypophysis; iii-oxytocin

(b) i-pars distalis; ii-adenohypophysis; iii-prolactin

(c) i-pars intermedia; ii-neurohypophysis; iii-oxytocin

(d) i-pars intermedia; ii-neurohypophysis; iii-prolactin

136. The melanocyte stimulating hormone is produced by *i*, which is a part of *ii* region of the pituitary gland

(a) i-pars intermedia; ii-adenohypophysis

(b) i-pars intermedia; ii-neurohypophysis

(c) i-pars nervosa; ii-adenohypophysis

(d) i-pars nervosa; ii-neurohypophysis

137. The hormones labelled, I, II, III, and IV, are secreted by the respective organs listed in the table

Hormone	Organ
I.	Ovarian follicle
II.	Corpus luteum
III.	Adrenal medulla
IV.	Adrenal cortex

The information in which alternative correctly matches the secretions (hormones) by the respective organs?

(a) I-Progesterone; II-Epinephrine; III-Corticoids; IV-Estrogen

(b) I-Progesterone; II-Estrogen; III-Corticoids; IV-Epinephrine

(c) I-Estrogen; II-Progesterone; III-Epinephrine; IV-Corticoids

(d) I-Estrogen; II-Corticoids; III-Epinephrine ; IV-Progesterone

138. Which of the following tables represents the pancreatic cells and their secretions correctly?

(a) Cell α – Glucagon; Cell β – Insulin

(b) Cell α – Insulin; Cell β – Glucagon

(c) Cell α – Glucagon; Cell β – Glucagon

(d) Cell α – Insulin; Cell β – Insulin

139. Match diseases with hormone deficiency.

Diseases	Hormone deficiency
I. Dwarfism	A. Thyroxine
II. Acromegaly	B. GH
III. Simple goitre	C. Aldosterone and cortisol
IV. Exophthalmic goitre	D. Corticosteroid
V. Addison's disease	E. Mineralocorticoids (Aldosterone)
VI. Conn's disease	
VII. Cushing disease	

(a) I-B; II-B; III-A; IV-A; V-C; VI-E; VII-D

(b) I-B; II-A; III-A; IV-B; V-E; VI-D; VII-C

(c) I-A; II-B; III-B; IV-A; V-C; VI-E; VII-D

(d) I-A; II-A; III-B; IV-B; V-C; VI-D; VII-E

140. A person entering an empty room suddenly finds a snake right in front on opening the door. Which one of the following is likely to happen in his neuro-hormonal control system ?
(a) Sympathetic nervous system is activated releasing epinephrine and norepinephrine from adrenal medulla.
(b) Neurotransmitters diffuse rapidly across the cleft and transmit a nerve impulse.
(c) Hypothalamus activates the parasympathetic division of brain.
(d) Sympathetic nervous system is activated releasing epinephrine and norepinephrine from adrenal cortex.

141. The Leydig cells found in the human body are the secretory source of
(a) Progesterone (b) intestinal mucus (c) glucagon (d) androgens

142. Which one of the following pairs of hormones are the examples of those that can easily pass through the cell membrane of the target cell and bind to a receptor inside it (Mostly in the nucleus)
(a) Insulin, glucagon (b) Thyroxin, insulin
(c) Somatostain, oxytocin (d) Cortisol, testosterone

143. What is correct to say about the hormone action in humans
(a) Glucagon is secreted by β-cells of Islets of Langerhans and stimulates glycogenolysis
(b) Secretion of thymosins is stimulated with aging
(c) In females FSH first binds with specific receptors on ovarian cell membrane
(d) FSH stimulates the secretion of estrogen and progesterone

144. A pregnant female delivers a baby who suffers from stunted growth, mental retardation/low intelligence quotient and abnormal skin. This is the result of:
(a) Low secretion of growth hormone (b) Cancer of the thyroid gland
(c) Over secretion of pars distalis (d) Deficiency of iodine in diet

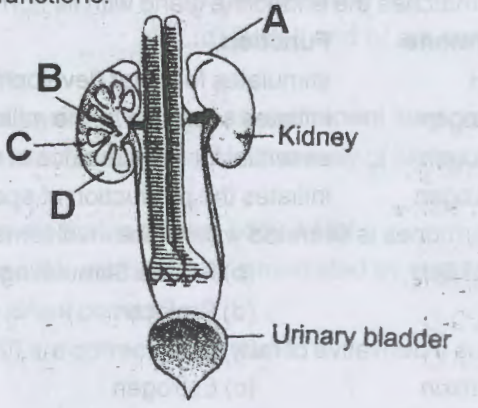
145. Which of the following statement is correct in relation to the endocrine system?
(a) Organs in the body like gastrointestinal tract, heart, kidney and liver do not produce any hormones.
(b) Non - nutrient chemicals produced by the body in trace amount that act as intercellular messenger are known as hormones.
(c) Releasing and inhibitory hormones are produced by the pituitary gland.
(d) Adenohypophysis is under direct neural regulation of the hypothalamus.

146. Select the answer which correctly matches the endocrine gland with the hormone it secretes and its function/ deficiency symptom

	Endocrine gland	**Hormone**	**Function/ deficiency symptoms**
(1)	Posterior pituitary	Growth Hormone (GH)	Over secretion stimulates abnormal growth
(2)	Thyroid gland	Thyroxine	Lack of iodine in diet results in goitre
(3)	Corpus luteum	Testosterone	Stimulates spermatogenesis
(4)	Anterior pituitary	Oxytocin	Stimulates uterus contraction during child birth

(a) Option (1) (b) Option (2) (c) Option (3) (d) Option (4)

147. Figure shows human urinary system with structures labelled A to D. Select option which correctly identifies them and gives their characteristics and / or functions.



(a) B - Pelvis - broad funnel shaped space inner to hilum, directly connected to loops of Henle.
(b) C - Medulla - inner zone of kidney and contains complex nephrons.
(c) D- Cortex - outer part of kidney and do not contain any part of nephrons
(d) A - Adrenal gland - located at the anterior part of kidney. Secrete Catecholamines which stimulate glycogen breakdown

148. Thyroxin act on every organ except –
(a) Brain (b) Testes (c) Thyroid (d) All of the these

149. When the normal heart of a frog is injected with physiological concentration of adrenaline, it shows –
(a) Systolic arrest (b) Sustained increase rate
(c) Decreased rate (d) First increase then normal rate

150. Injury localized to the hypothalamus would most likely disrupt :
(a) short - term memory. (b) co-ordination during locomotion.
(c) executive functions, such as decision making. (d) regulation of body temperature.

151. Identify the hormone with its correct matching of source and function :
(a) Oxytocin - posterior pituitary, growth and maintenance of mammary glands.
(b) Melatonin - pineal gland, regulates the normal rhythm of sleepwake cycle.
(c) Progesterone - corpus-luteum, stimulation of growth and activities of female secondary sex organs.
(d) Atrial natriuretic factor - ventricular wall increases the blood pressure.

152. Fight-or-flight reactions cause activation of :
(a) the parathyroid glands, leading to increased metabolic rate.
(b) the kidney, leading to suppression of reninangiotensin-aldosterone pathway.
(c) the adrenal medulla, leading to increased secretion of epinephrine and norepinephrine.
(d) the pancreas leading to a reduction in the blood sugar levels.

153. Which one of the following hormones also produces anti-inflammatory reactions in man and suppresses the immune response in addition to its primary functions?
(a) Thyrocalcitonin (b) Cortisol (c) Erythropoietin (d) Thymosin

154. Which of the following represents the action of insulin?
(a) Increases blood glucose levels by hydrolysis of glycogen
(b) Increases blood glucose levels by stimulating glucagon production
(c) Decreases blood glucose levels of forming glycogen
(d) Increases blood glucose level by promoting cellular uptake of glucose

155. Norepinephrine:
I. Is released by sympathetic fibres
II. Is released by parasympathetic fibres
III. Increases the heart rate
IV. Decreases blood pressure
Which of the above said statements are correct?
(a) I and IV (b) I and III (c) II and III (d) II and IV

156. Select the option which correctly matches the endocrine gland with its hormone and its function

	Endocrinegland	Hormone	Function
(a)	Ovary	FSH	stimulates follicular development and the secretion of estrogens.
(b)	Placenta	estrogen	initiates secretion of the milk.
(c)	Corpus luteum	estrogen	essential for maintenance of endometerium.
(d)	Leydig cells	androgen	initiates the production of sperms.

157. Which of the following pituitary hormones is secreted without the involvement of a releasing hormone (RH)?
(a) Thyroid Stimulating Hormone (TSH) (b) Follicle Stimulating Hormone (FSH)
(c) Oxytocin (d) Prolactin

158. Which of the following hormones is a derivative of fatty acid?
(a) Gastrin (b) Thyroxin (c) Estrogen (d) Prostaglandins

159. Find the incorrect match w.r.t. structure / cell and its hormone concerned.
(a) β-cells of pancreas – Insulin
(b) Zona fasciculata of adrenal cortex – Cortisol
(c) Follicular cells of thyroid gland – Thyrocalcitonin
(d) Juxta-glomerular cells of kidney – Erythropoietin

160. Which of the following hormone is not produced by hypothalamus?
(a) Oxytocin (b) GnRH (c) Somatostatin (d) Somatotrophic hormone

161. A chemical signal that has both endocrine and neural roles is
(a) Epinephrine (b) Cortisol (c) Melatonin (d) Calcitonin

162. Which one of the following hormones is not invovled in sugar metabolism?
(a) Insulin (b) Glucagon (c) Cortisone (d) Aldosterone

163. Which one of the following hormones though synthesised elsewhere, is stored and released by the master gland?
(a) Prolactin (b) Melanocyte stimulating hormone
(c) Antidiuretic hormone (d) Luteinising hormone

164. The amino acid Tryptophan is the precursor for the synthesis of :-
(a) Melatonin and Serotonin (b) Thyroxine and Triiodothyronine
(c) Estrogen and Progesterone (d) Cortisol and Cortisone

165. The posterior pituitary gland is not a 'true' endocrine gland because :-
(a) It is under the regulation of hypothalamus (b) It secretes enzymes
(c) It is provided with a duct (d) It only stores and releases hormones

166. Grave's disease is caused due to :-
(a) Hyposecretion of adrenal gland (b) Hypersecretion of adrenal gland
(c) Hyposecretion of thyroid gland (d) Hypersecretion of thyroid gland

167. Name a peptide hormone which acts mainly on hepatocytes, adipocytes and enhances cellular glucose uptake and utilization.
(a) Secretin (b) Gastrin (c) Insulin (d) Glucagon

168. The adrenal cortex synthesizes only :
(a) Steroid hormones (b) Peptide hormones (c) Glycopeptide hormones (d) Catecholamines

169. Oxytocin is synthesized in
(a) Adenohypophysis (b) Neurohypophysis (c) Hypothalamas (d) Epiphysis

170. Which of the following hormone is not chemically glycoprotein ?
(a) Growth hormone (b) Prolactin (c) Luteinizing hormone (d) Estrogen

171. Release of pancreatic juice is stimulated by :
I. Enterokinase II. Secretin III. Trypsinogen IV. Cholecystokinin
(a) All are correct (b) All are incorrect
(c) Both I and III are correct (d) Both II and IV are correct

172. Go throught the following statements.
I. Silicosis is the result of exposure to silica that causes permanent lung damage and death.
II. Transportation of gases and digested food materials in the body of higher animals causes muscle weakness and fatigue
III. ADH is a neurohypophysial hormone that regulates body water
IV. Myasthenia gravis is a neuromuscular disease that is mediated by circulatory system
Which of the following statement(s) is/are correct?
(a) I and II are correct (b) II and III are correct (c) II and IV (d) I, III and IV are correct

173. Which of the following hormones contains iodine ?
(a) Inhibin (b) FSH (c) Prolactin (d) Thyroxine

174. Secretin is a gastro intestinal tract hormone that
(a) Acts on exocrine portion of pancreas and stimulates the secretion of water and bicarbonate ions.
(b) Acts on endocrine portion of pancreas and stimulates α-cells to secrete glucagon.
(c) Acts on gastric glands and stimulates secretion of hydrochloric acid and pepsinogen.
(d) Stimulates secretion of gastric lipase from stomach

175. Which of the following is considered as a hyperglycemic factor?
(a) Insulin (b) Glucagon (c) Aldosterone (d) Parathormone

176. _____ hormone contracts gallbladder to release bile.
(a) Gastrin (b) Secretin (c) Enterogastrin (d) Cholecystokinin

177. The hormone which regulates the gene-expression of the target cell is
(a) Prolactin (b) Oxytocin (c) Thyroxin (d) Growth-hormone

178. A cell that contains proteins enabling a hormone to selectively bind to its plasma membrane is called a(n)
(a) secretory cell. (b) plasma cell. (c) endocrine cell. (d) target cell.

179. Which of the following statements about hormones is incorrect?
(a) They are secreted into the extracellular fluid. (b) They circulate in blood or hemolymph.
(c) They communicate messages throughout the body.
(d) They travel through a dedicated pathway.

180. Which of the following statements about hormones is incorrect?
(a) Glands that produce them are ductless glands. (b) They are produced only by organs called endocrine organs
(c) Some are water soluble and some are not. (d) They often maintain steady-state conditions.

181. Which of the following is the most likely explanation for hypothyroidism in a patient whose iodine level is normal?
(a) a disproportionate production of T_3 to T_4 (b) hyposecretion of TSH
(c) hypersecretion of TSH (d) hypersecretion of MSH

182. Excess secretion from this gland can cause a person to be thin, hyperactive, always hungry and irritable, with a high metabolic rate.
(a) adrenal cortex (b) thyroid (c) pancreas (d) thymus

183. A decrease in blood pressure / volume will not cause the release of :
(a) Atrial natriuretic factor (b) Aldosterone (c) ADH (d) Renin

184. A temporary endocrine gland in the human body is :
(a) Corpus cardiacum (b) corpus luteum (c) Corpus allatum (d) Pineal gland

185. GnRH, a hypothalamic hormone, needed in reproduction, acts on:
(a) anterior pituitary gland and stimulates secretion of LH and FSH.
(b) posterior pituitary gland and stimulates secretion of oxytocin and FSH.
(c) posterior pituitary gland and stimulates secretion of LH and relaxin.
(d) anterior pituitary gland and stimulates secretion of LH and oxytocin.

186. Hypersecretion of Growth Hormone in adults does not cause further increase in height, because:
(a) Epiphyseal plates close after adolescence. (b) Bones loose their sensitivity to Growth Hormone in adults
(c) Muscle fibres do not grow in size after birth. (d) Growth Hormone becomes inactive in adults.

187. Among various encountered in living cells the ions most commonly used as signals are -
(a) Fe^{++} (b) K^+ (c) Na^+ (d) Ca^{++}

188. Disorders caused by hypersecretion of concerned hormones are -
(a) gigantism and exophthalmic goiter (b) monogolism and cretinism
(c) cretinism, diabetes and goiter (d) rickets, diabetes mellitus

189.

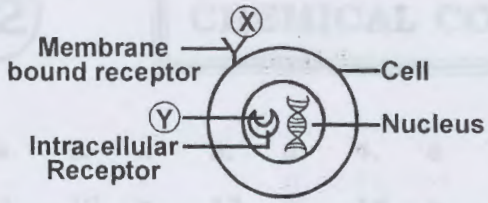


Diagram showing the different receptors present on cell X and Y.

Which group of hormone intract with 'Y'

(a) Thyroxine, estrogen (b) Thyroxine, FSH (c) FSH and Estrogen (d) FSH and LH

190. Read the following carefully.

I. Protein hormone interact with the intra cellular receptor

II. Iodothyronine hormone generate secondary messenger after interaction with receptor

III. Hormone is a cell specific

IV. Somatostatin hormone secrete only by hypothalamus

How many statements are not correct?

(a) 1 (b) 2 (c) 3 (d) 4

191. Which of the following is an amino acid derived hormone?

(a) Estradiol (b) Ecdysone (c) Epinephrine (d) Estriol

192. Which of the following hormones can play a significant role in osteoporosis?

(a) Estrogen and Parathyroid hormone (b) Progesterone and Aldosterone

(c) Aldosterone and Prolactin (d) Parathyroid hormone and Prolactin

193. Type-1 diabetes is -

(a) Insulin independent (b) Insulin dependent

(c) Caused by UV-radiation (d) Infectious

194. If the pH of duodenum decreases below 5, then secretion of _____ stop.

(a) Secretin (b) Enterokinase (c) CCK (d) Gastrin

195. Which of the following endocrine structure is not controlled by a tropic hormone from the anterior pituitary?

(a) Pancreatic islet cells (b) Thyroid gland (c) Adrenal cortex (d) Ovaries

196. A patient of diabetes mellitus excrets glucose in urine even when he is kept in a carbohydrate free diet. It is because

(a) fats are catabolised in adipose tissues to form glucose

(b) amino acids are catabolised in kidney to form glucose

(c) amino acids are discharged in blood stream from liver

(d) glycogen from muscles is released in blood stream

197. Which of the following statements is not correct ?

(a) In the knee-jerk reflex, stimulus is the stretching of muscle and response is its contraction

(b) An action potential in an axon does not move backward because the segment behind is in a refractory phase

(c) Depolarisation of hair cells of cochlea results in the opening of the mechanically gated potassium-ion channels

(d) Rods are very sensitive and contribute to daylight vision

198. Artificial light, extended work-time and reduced sleep-time disrupt the activity of –

(a) Posterior pituitary gland (b) Thymus gland (c) Pineal gland (d) Adrenal gland

199. Which of the following conditions will stimulate parathyroid gland to release parathyroid hormone ?

(a) Rise in blood Ca^{+2} levels (b) Fall in active Vitamin D levels

(c) Fall in blood Ca^{+2} levels (d) Fall in bone Ca^{+2} levels

200. Which of the following hormones is responsible for both the milk ejection reflex and the foetal ejection reflex?

(a) Relaxin (b) Estrogen (c) Prolactin (d) Oxytocin

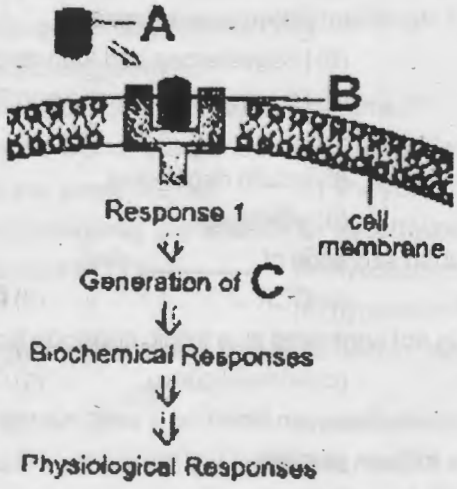
201. Match the following hormones with the respective disease

(A) Insulin	(i) Addison's disease
(B) Thyroxin	(ii) Diabetes insipidus
(C) Corticoids	(iii)Acromegaly
(D) Growth Hormone	(iv) Goitre
	(v) Diabetes mellitus

Select the correct option.

	(A)	(B)	(C)	(D)
(a)	(v)	(i)	(ii)	(iii)
(b)	(ii)	(iv)	(iii)	(i)
(c)	(v)	(iv)	(i)	(iii)
(d)	(ii)	(iv)	(i)	(iii)

202. Identify A, B and C in the diagrammatic representation of the mechanism of hormone action.



Select the correct option from the following :

(a) A = Protein Hormone; B = Cyclic AMP; C = Hormone-receptor Complex

(b) A = Steroid Hormone; B = Hormonereceptor Complex; C = Protein

(c) A = Protein Hormone; B = Receptor; C = Cyclic AMP

(d) A = Steroid Hormone; B = Receptor; C = Second Messenger

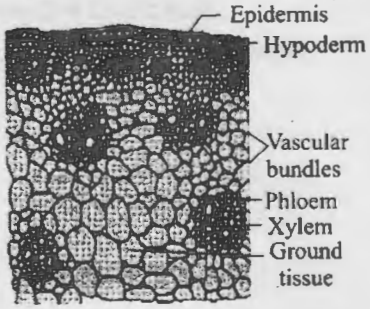
22 CHEMICAL COORDINATION AND INTEGRATION

1. a	2. a	3. d	4. d	5. b	6. d	7. c	8. b	9. d	10. d
11. d	12. a	13. c	14. a	15. b	16. d	17. b	18. d	19. b	20. a
21. d	22. c	23. a	24. c	25. b	26. c	27. c	28. b	29. d	30. c
31. a	32. d	33. d	34. a	35. c	36. b	37. d	38. b	39. b	40. a
41. b	42. c	43. b	44. c	45. d	46. a	47. c	48. c	49. b	50. c
51. b	52. b	53. a	54. a	55. b	56. a	57. c	58. a	59. b	60. a
61. b	62. c	63. b	64. d	65. d	66. a	67. c	68. d	69. d	70. c
71. a	72. b	73. c	74. b	75. d	76. a	77. b	78. c	79. c	80. d
81. a	82. c	83. d	84. c	85. b	86. d	87. b	88. b	89. c	90. c
91. d	92. b	93. b	94. d	95. c	96. c	97. d	98. b	99. d	100. d
101. c	102. d	103. b	104. a	105. b	106. a	107. b	108. d	109. d	110. c
111. a	112. b	113. d	114. b	115. c	116. b	117. a	118. c	119. b	120. d
121. b	122. c	123. a	124. d	125. c	126. d	127. d	128. a	129. d	130. a
131. d	132. d	133. d	134. a	135. b	136. a	137. c	138. a	139. a	140. a
141. d	142. d	143. c	144. d	145. b	146. b	147. d	148. c	149. d	150. d
151. b	152. c	153. b	154. c	155. b	156. d	157. c	158. d	159. c	160. d
161. a	162. d	163. c	164. a	165. d	166. d	167. c	168. a	169. c	170. d
171. d	172. d	173. d	174. a	175. b	176. d	177. c	178. d	179. d	180. b
181. b	182. b	183. a	184. b	185. a	186. a	187. d	188. a	189. a	190. d
191. c	192. a	193. b	194. d	195. a	196. a	197. b	198. c	199. c	200. d
201. c	202. c								

XI FULL SYLLABUS TEST - I

1. Wisdom teeth are
   (a) Last premolars (b) Last molars (c) Incisors (d) Canines
2. In human beings, carbohydrate is stored as glycogen in
   (a) Liver and muscles (b) Liver (c) Muscles (d) Spleen
3. Which ones are bile salts?
   (a) Haemoglobin and biliverdin (b) Bilirubin and biliverdin
   (c) Bilirubin and haemoglobin (d) Sodium glycolate and taurocholate
4. In India, *Nepenthes* is found in
   (a) Sundarbans (b) Western Ghats (c) Andaman and Nicobar (d) North-Eastern forests
5. The cells which destroy worn out white and red blood corpuscles, bacteria and other microorganisms pass through liver are
   (a) B-cells (c) Oxytocin (b) T-cells (d) Kupffer's cells
6. Mineral contained in B_{12} is
   (a) Fe (c) Ni (b) Co (d) Mg
7. Gametophyte offern is called
   (a) Prothallus (b) Protonema (c) Capsule (d) Columella
8. In eusporangiate fern sporangia develops from
   (a) Single cell initial (b) Group of cell initials (c) Spore (d) Protonema
9. Recognize the floral diagram:

   To which plant this floral diagram belongs
   (a) *Asparagus* (b) *Indigofera* (c) Mulaithi (d) *Datura*
10. In *Cycas* and *Pinus* leaves, the tissue which conducts both food and water is called
    (a) Conducting tissue (b) Transfusion tissue (c) Hydroid (d) Leptoid
11. Syconus fruit develops from
    (a) Catkin (c) Hypanthodium (b) Verticillaster (d) Cyathium
12. Out of 5 petals of a flower, two are completely internal, two completely external and remaining one is internal at one margin and external at the other margin, Aestivation is
    (a) Ascending imbricate (c) Quincuncial (b) Vexillary (d) Valvate
13. Anthesis is
    (a) Opening of floral bud (b) Development of anthers
    (c) Maturation of anthers (d) Reception of pollen by stigma
14. Science and practice of fruit culture is
    (a) Spennology (b) Pomology (c) Anthology (d) Dendrology
15. Recognize the figure:



    This figure show anatomical feature of
    (a) Monocot stem (b) Dicot stem (c) Monocot root (d) Dicot root

16. What is an explant?
(a) Small excised segment of plant used for tissue culture
(b) Plant raised in tissue culture and transferred to field
(c) Plant with roots excised
(d) Seed used for experimentation

17. Gymnosperms and dicots have
(a) Fibrous roots (b) Tap roots (c) Adventitious roots (d) Both A and B

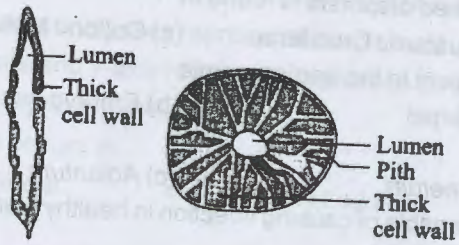
18. In moss, leaves possess
(a) No stomata, no chloroplast (b) No stomata, but chloroplast
(c) Stomata and chloroplast (d) Stomata, but no chloroplast

19. Kelp *(Laminaria)* and rock weed *(Fucus)* belong to
(a) Green algae (b) Red algae (c) Brown algae (d) BGA

20. Sexual reproduction is absent in
(a) Chlorophyceae (b) Pheophyceae (c) Rhodophyceae (d) Cyanophyceae

21. Ancestors of land plants or bryophytes are
(a) Green algae (b) Brown algae (c) Red algae (d) All of the above

22. Recognize the figure:



This figure shows the anatomical feature of
(a) Parenchyma (b) Collenchyma (c) Sclerenchyma (d) Xylem parenchyma

23. Indusium is found in
(a) Moss / *Funaria* / *Riccia* (b) *Fern* / *Dryopteris* / *Pteris* (c) Gymnosperms / *Cycas* (d) All ofthe above

24. Which one of the following statements is not correct?
(a) Pericarp has mainly protective function.
(b) Syngamy leads to the formation of specialized cells called gametes.
(c) At the end of meiosis in meiocyte, only one set of chromosomes gets incorporated into each microspore.
(d) Cell differentiation helps a group of cells to undergo certain modification to form specialized tissue and organ.

25. Chloroplast is found in the spores of
(a) *Funaria* (b) *Dryopteris* (c) *Selaginella* (d) *Cycas*

26. In ferns, dispersal of spores takes place through
(a) Indusium (b) Annulus (c) Stomium (d) Both B and C

27. In *Dryopteris* or ferns, neck canal cell are
(a) 4 (b) 4 - 6 (c) 6 - 10 (d) 1 with 2 nuclei

28. Circinate vernation is found in
(a) Moss (b) Fern (c) *Pinus* (d) Both A and B

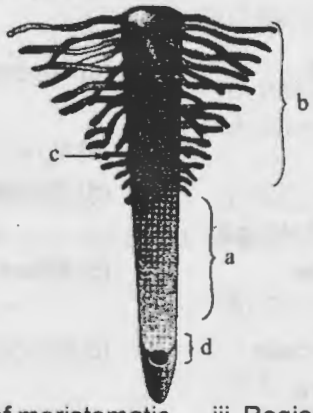
29. In ferns, the term frond is used for
(a) Root (b) Stem (c) Leaves (d) Capsule

30. Which one of the following in not an outbreeding
(a) Stigma inhibits the germination of pollen of same flower.
(b) Production of unisexual flowers.

(c) Production of cleistogamous flowers.
(d) Stigma becomes receptive much before the rease of pollen in the same flower.

31. In *Selaginella* and *Lycopodium* male gametes are
(a) Non-flagellate (b) Uni-flagellate (c) Biflagellate (d) Multi-flagellate

32. Recognize the different region in the root section.



i. Root hair activity ii. Region of meristematic iii. Region of elongation iv. Region of maturation
(a) a-iii, b-ii, c-iv, d-i (b) a-ii, b-iii, c-i, d-iv (c) a-iii, b-iv, c-i, d-ii (d) a-iii, b-iv, c-ii, d-i

33. Parachute type of mechanism of seed dispersal is found in
(a) Pea / Leguminesae (b) Mustard / Cruciferae (c) Cotton / Malvaceae (d) *Taraxacum / Compositae*

34. Megasporophyll of *Cycas* is equivalent to the angiospermic
(a) Stamen (c) Carpel (b) Embryo sac (d) Nucellus

35. Walking fern is
(a) *Ginkgo* (b) *Gnetum* (c) *Adiantum* (d) *Ephedra*

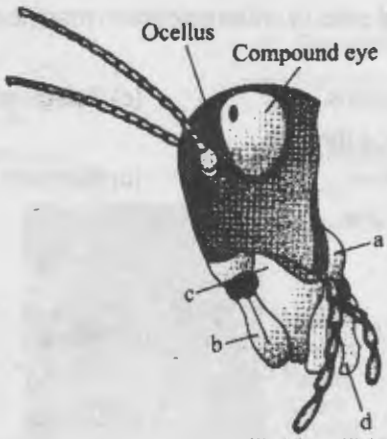
36. The fluid from unhealthy tobacco capable of causing infection in healthy plants was called *'Contagium Vivum Fluidum'* by
(a) M. W. Beijirinck (b) W. M. Stanley (c) D. J. Ivanowsky (d) L. Pasteur

37. Non-motile and thin walled spores of algae are known as
(a) Zygospores (b) Zoospores (c) Aplanospores (d) Hypnospores

38. A colourless parasitic red algae is
(a) *Cephaleuros* (b) *Polysiphonia* (c) *Harveyella* (d) *Gelidium*

39. The male gametophyte of *Selaginella* is 13 celled which has
(a) 2 prothallial cell + 11 celled antheridium (b) 1 prothallial cell + 12 celled antheridium
(c) 3 prothallial cell + 10 celled antheridium (d) 4 prothallial cell + 9 celled antheridium

40. Recognize the figure:



i. Labium ii. Labrum iii. Mandible iv. Maxilla
(a) a-ii, b-i, c-iv, d-iii (b) a-i, b-ii, c-iii, d-iv (c) a-iii, b-iv, c-i, d-ii (d) a-iv, b-ii, c-iii, d-i

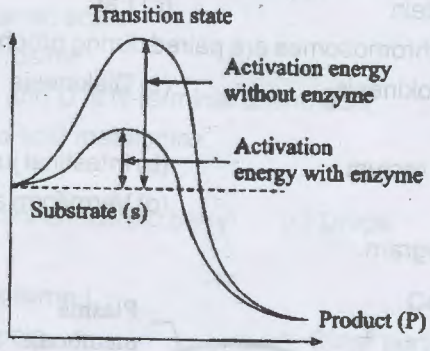
41. Genetic diversity of plants can be best protected in
(a) Botanical Gardens (b) Gene Banks (c) National Parks (d) DNA Libraries

42. Placentation in a syncarpous unilocular ovary where ovules occur on sutures is
(a) Apical placentation (b) Parietal placentation (c) Marginal placentation (d) Superficial placentation

43. Smallest flowering plant/flower is
(a) *Polyalthia* (b) *Rafflesia* (c) *Azadirachta* (d) *Wolffia*

44. Insectivorous plants usually grow in soils which are deficient in
(a) Nitrogen / nitrate (b) Water (c) Organic matter (d) Ca / Mg

45. The curve given below shows concept of activation energy. Find out the correct option.



(a) x-axis represents progress of reaction and y-axis represents potential energy
(b) x-axis represents potential energy and y-axis represents progress of reaction
(c) x-axis represents transition state and y-axis represents activation energy
(d) x-axis represents substrate and y-axis represents product.

46. Verticillaster type of inflorescence occurs in
(a) Cotton (b) *Datura* (c) *Leucas* (d) *Ocimum*

47. Amphibians of plant kingdom are
(a) Pteridophytes (b) Gymnosperms (c) Bryophytes (d) Algae

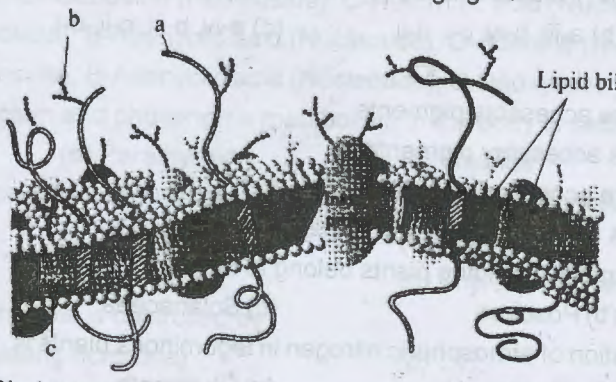
48. Dried fruit used in making a musical instrument is
(a) Snake Gourd (b) Bitter Gourd (c) Bottle Gourd (d) All the above

49. Pappus occurs in compositae for
(a) Air pollination (b) Air dispersal (c) Insect pollination (d) Animal dispersal

50. The smallest angiospermic/dicot parasite is
(a) *Arceuthobium* (b) *Wolffia* (c) *Cassytha* (d) *Rafftesia*

51. Photolithotrophs (photoautotrophs) obtain energy from
(a) Radiations and carbon from Inorganic compounds (b) Radiations and carbon from organic compounds
(c) Organic compounds (d) Inorganic compounds

52. Which of the following is correct option on the basis of following figure?



(a) a-Sugar, b-Protein, c-Cholesterol (b) a-Protein, b-Sugar, c-Cholesterol
(c) a-Protein, b-Cholesterol, c-Sugar (d) b-Protein, c-Sugar, a-Cholesterol

53. Censer mechanism of seed dispersal is found in
(a) Papaveraceae (b) Liliaceae (c) Leguminosae (d) Rosaceae

54. Deficiency of which vitamin produces keratomalacia?
(a) K (b) E (c) D (d) A

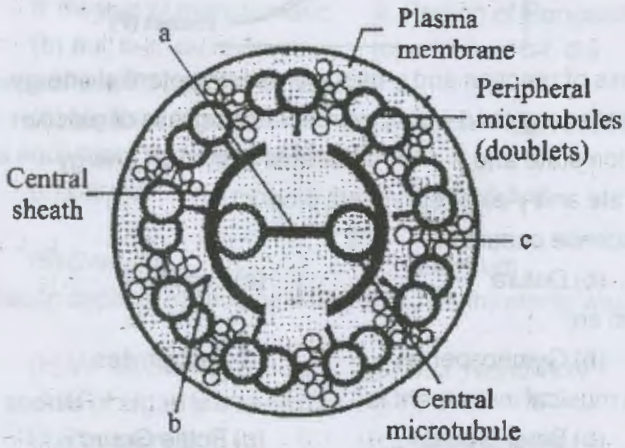
55. Vitamin needed for blood coagulation is
(a) E (b) D (c) K (d) C

56. pH of stomach is made 7. Which component of food would be affected?
(a) Starch (b) Protein (c) Fat (d) Sucrose

57. The process by which homologous chromosomes are paired during prophase-I is called
(a) Chaisma formation (b) Cytokinesis (c) Diakinesis (d) Synapsis

58. Succus entericus is
(a) Swollen area between ileum and rectum (b) Intestinal juice
(c) Any swelling in gut (d) Vermiform appendix

59. Identify a, band c in the following diagram.



(a) a-Radial spoke, b-Bridge, c-Linker (b) a-Bridge, b-Radial spoke, c-Linker
(c) a-Linker, b-Radial spoke, c-Bridge (d) a-Linker, b-Bridge, c-Radial spoke

60. Match column I and Column IT and identify the correct option.

Column I	Column II
(a) Parthenogenesis	(i) Many embryos arising in an ovule
(b) Xenogamy	(ii) Pollination by wind
(c) Polyembryony	(iii) Development of new organism from unfertilized female gamete
(d) Anemophily	(iv) Pollination between two flowers on different plants

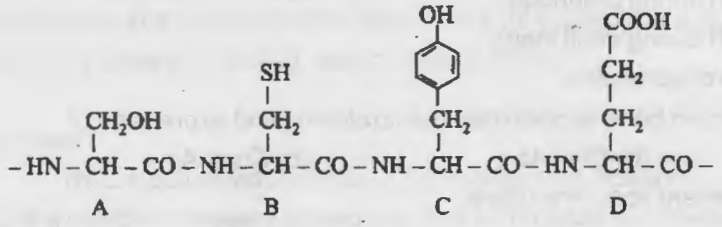
(a) a-ii, b-iii, c-iv, d-i (b) a-iii, b-iv, c-i, d-ii (c) a-iv, b-iii, c-ii, d-i (d) a-i, b-ii, c-iii, d-iv

61. PS-I has
(a) More chlorophylls and more accessory pigments
(b) More chlorophylls and less accessory pigments
(c) Less chlorophylls and more accessory pigments
(d) Less chlorophylls and less accessory photosynthetic pigments

62. Most of economically important fibre yielding plants belong to family
(a) Cruciferae (b) Poaceae (c) Solanaceae (d) Malvaceae

63. The first stable product of fixation of atmospheric nitrogen in leguminous plants is
(a) Ammonia (b) Nitrate (c) Glutamate (d) Nitrite

64. The figure shows a tetrapeptide hypothetical portion of a protein with parts labelled A–D. Which one of the following option is correct?



(a) D is the acidic amino acid-glutamic acid.
(b) C is an aromatic amino acid-tyrosine.
(c) A is the C-terrninal amino acid and D is N-terminal amino acid.
(d) A is a sulphur containing amino acid methionine.

65. Banana is
(a) Cremocarp (b) Parthenocarpic berry (c) Drupe (d) Capsule

66. Match the columns:

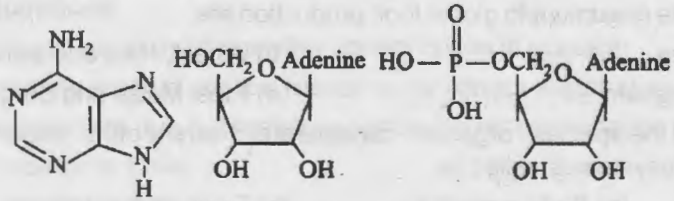
Column I	Column II
(a) Apple	1. Outer portion of receptacle
(b) Coconut	2. Fleshy thalamus
(c) Jackfruit	3. Thalamus and pericarp
(d) Guava	4. Endosperm
(e) Pineapple	5. Bract, perianth and seeds

(a) a-5, b-3, c-1, d-4, e-2 (b) a-2, b-3, c-1, d-5, e-4 (c) a-2, b-4, c-5, d-3, e-1 (d) a-2, b-3, c-4, d-5, e-1

67. Fruit developed from bicarpellary syncarpous ovary having a false septum is
(a) Achene (b) Siliqua (c) Capsule (d) Berry

68. DNA polymerase is required for synthesise of
(a) DNA from DNA (b) RNA from DNA (c) RNA from RNA (d) DNA from RNA

69. The three structural formulae A, B and C are given here. Identify them and select the correct option.



(A) (B) (C)

(a) A-Adenine (N-base), B-Adenosine (Nucleoside), C-Adenyclic acid
(b) A-Adenine (Nsbase), B-Adenosine (Nucleoside), C-Adenyclic acid (Nucleotide)
(c) A-Adenosine (Nucleoside), B-Adenyclic acid (Nucleotide), C-Adenine (N-base)
(d) A-Adenosine (Nucleoside), B-Adenyclic acid (Nucleotide), C-Deoxyadenylic acid.

70. Hormone regulating calcium and phosphorus metabolism in the body is secreted by
(a) Thyroid (b) Parathyroid (c) Thymus (d) Pancreas

71. Gigantism and acromegaly are two,defects produced due to improper functioning of
(a) Thyroid (b) Pituitary
(c) Thyroid and pituitary (d) Thyroid, pituitary and thymus

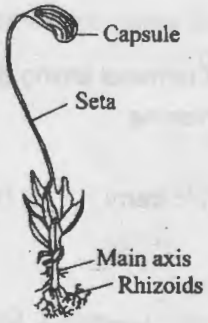
72. Spermatogenesis in mammals is controlled by
(a) F.S.H. (Follicle stimulating hormone) (b) L.H.
(c) F.S.H. and prolactin (d) Growth hormone and prolactin

73. Dwarfism is due to

(a) Absence of insulin
(b) Hyposecretion of GH during childhood
(c) Hyposecretion of GH during adult stage
(d) Excessive secretion of adrenaline

74. In transgenic corn, the corn borer is controlled due to cloning and expression of
(a) *Cry II Ab* (b) *Cry I Ab* (c) *Cry II Ac* (d) *Cry I Ac*

75. Select the correct statement about the figure.



(a) This plant shows the gametophyte of *Funaria*
(b) This plant shows the sporophyte of green moss
(c) This plant shows both the gametophyte and sporophyte of cord moss
(d) This plant shows gametophyte of a liverwort.

76. Largest flower is that of
(a) Sunflower (b) *Rafflesia* (c) *Nelumbo* (d) *Drosera*

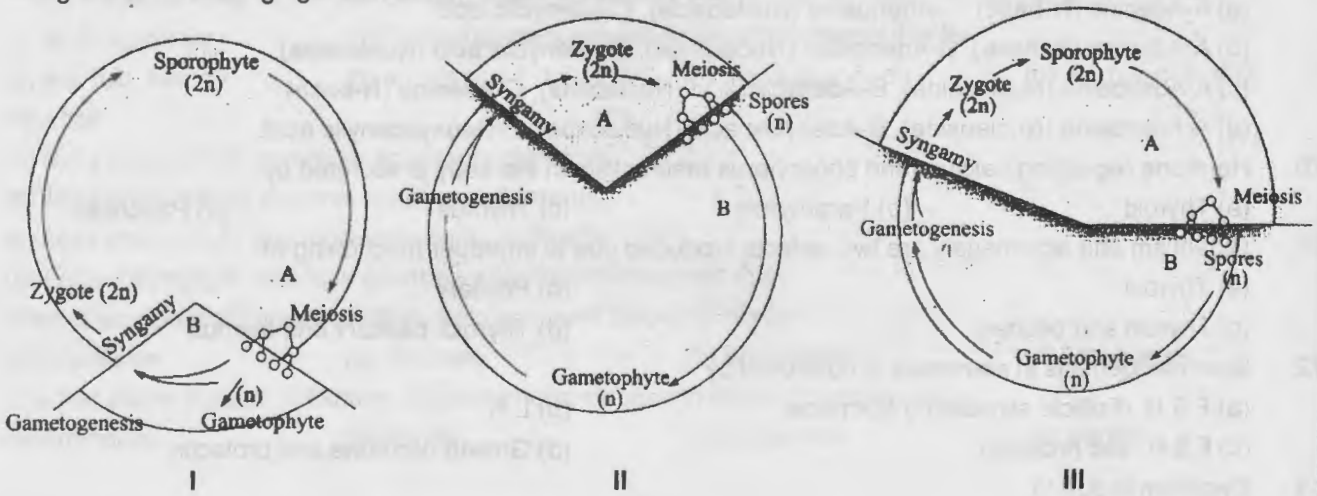
77. Tetradynamous condition occurs in
(a) *Petunia hybrid* (b) *Helianthus annuus* (c) *Brassica campestris* (d) *Hibiscus rosa sinensis*

78. Pappus is modification of
(a) Bracts (b) Bracteoles (c) Corolla (d) Calyx

79. Three crops that contribute maximum to global food production are
(a) Wheat, Rice and Maize (b) Wheat, Rice and Barley
(c) Wheat, Maize and Sorghum (d) Rice, Maize and Sorghum

80. A range of conditions that the species / organism can tolerate, diversity ofthe resources that it utilizes and a distinct role that it plays in the ecosystem is called its
(a) Niche (b) Biotic potential (c) Ecological amplitude (d) Habitat

81. Recognise the following figure and find the correct statement.



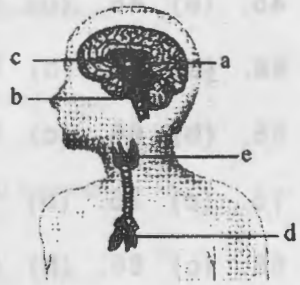
(a) 'I' is found in *Wolfia*, 'II' in *Spirogyra* and 'III' in *Sphaerocarpus*.
(b) In 'II' gametophyte is dominant and independent while in 'I' and 'III' sporophyte is dominant and independent.
(c) In 'II' zygotic meiosis occurs while in 'I' and 'III' sporic meiosis is found.
(d) All of the above

82. Which is absent in Asteraceae?
(a) Cypsella fruit (b) Capitulum inflorscence (c) Hypogynous flowers (d) Pappus calyx

83. Inflorescence consisting of a number of flowers arising from the same point with the same level at the top is
(a) Corymb (b) Corymbose-race (c) Capitulum (d) Umbel

84. Inflorescence in which flowers developing from different places of the peduncle reach the same level, is
(a) Catkin (b) Corymb (c) Umbel (d) Raceme

85. Find out the correct labelling.



i. Thyroid and parathyroid
ii. Hypothalamus
iii. Thymus
iv. Pituitary
v. Pineal

(a) a-v, b-ii, c-iv, d-i, e-iii (b) a-iv, b-v, c-ii, d-i, e-iii (c) a-v, b-iv, c-ii, d-iii, e-i (d) a-ii, b-iv, c-v, d-iii, e-i

Assertion-Reasoning Questions

Read the assertion and reason carefully to mark the correct option in question
(a) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(c) If assertion is true but reason is false.
(d) If both assertion and reason are false.

86. Assertion: Systematics is the branch of biology that deals with classification of living organisms.
Reason: The aim of classification is to group the organisms.

87. Assertion: TMV is a virus which causes mosaic disease.
Reason: TMV has RNA as genetic material.

88. Assertion: During zygotene, chromosomes show bivalent stage.
Reason: Bivalent is half the number of chromosomes.

89. Assertion: Upward movement of water is called ascent of sap.
Reason: Upward movement of water occurs through xylem and phloem.

90. Assertion: Lipases of bile help in the emulsification of fats.
Reason: Lipases can break large fat droplets into smaller ones.

XI FULL SYLLABUS TEST - I

ANSWERS

1.	(b)	2.	(a)	3.	(d)	4.	(b)	5.	(d)	6.	(b)	7.	(a)	8.	(b)	9.	(d)	10.	(b)
11.	(c)	12.	(c)	13.	(a)	14.	(b)	15.	(a)	16.	(b)	17.	(b)	18.	(b)	19.	(c)	20.	(d)
21.	(a)	22.	(c)	23.	(b)	24.	(b)	25.	(a)	26.	(d)	27.	(d)	28.	(b)	29.	(c)	30.	(c)
31.	(c)	32.	(c)	33.	(d)	34.	(c)	35.	(c)	36.	(a)	37.	(c)	38.	(c)	39.	(b)	40.	(d)
41.	(c)	42.	(b)	43.	(d)	44.	(a)	45.	(a)	46.	(d)	47.	(c)	48.	(c)	49.	(b)	50.	(a)
51.	(a)	52.	(b)	53.	(a)	54.	(d)	55.	(c)	56.	(b)	57.	(d)	58.	(b)	59.	(b)	60.	(b)
61.	(a)	62.	(d)	63.	(a)	64.	(b)	65.	(b)	66.	(c)	67.	(b)	68.	(a)	69.	(b)	70.	(b)
71.	(b)	72.	(a)	73.	(b)	74.	(b)	75.	(c)	76.	(b)	77.	(c)	78.	(d)	79.	(a)	80.	(a)
81.	(d)	82.	(c)	83.	(d)	84.	(b)	85.	(c)	86.	(b)	87.	(b)	88.	(b)	89.	(c)	90.	(d)

CLASS - XI FULL SYLLABUS TEST - II

1. Select the **correct** sequence of taxonomic categories of Mango in ascending order

(1) *Mangifera* → Anacardiaceae → Dicotyledonae → Sapindales → Angiospermae

(2) *Mangifera* → Anacardiaceae → Sapindales → Dicotyledonae → Angiospermae

(3) Angiospermae → Dicotyledonae → Sapindales → Anacardiaceae → *Mangifera*

(4) Angiospermae → Sapindales → Anacardiaceae → Dicotyledonae → *Mangifera*

2. Select **incorrect** statement w.r.t the following group of organisms and their characteristics

(1) Chrysophyte – Includes diatoms and desmids, Planktonic organism

(2) Dinoflagellate – Mostly marine and photosynthetic, cell wall has stiff cellulosic plate on outer surface

(3) Euglenoids – Majority of them are fresh water, cell wall is absent

(4) Slime mould – Saprophytic motile spores with true walls

3. *Chlamydomonas, Chlorella, Volvox, Ulothrix, Fucus, Dictyota, Polysiphonia, Gelidium, Acetabularia, Laminaria*

Out of these 10 organisms, how many organisms belong to the class chlorophyceae, phaeophyceae and rhodophyceae respectively?

(1) 4, 3, 3 (2) 4, 4, 2

(3) 5, 3, 2 (4) 6, 2, 2

4. Select **incorrect** option w.r.t. viral disease in both plant and animal

	Plant disease		Animal disease
(1)	Leaf rolling	–	Mumps
(2)	Yellowing	–	Herpes
(3)	Vein clearing	–	Influenza
(4)	Damping off	–	Diptheria

5. Gametophyte of Bryophyte is

(1) Green and vascular

(2) Independent, multicellular

(3) Dependent on sporophyte

(4) Foliose in nature

6. According to R.H. Whittaker *Chlamydomonas* and *Chlorella* will be kept under

(1) Monera (2) Protista

(3) Plantae (4) Both (2) & (3)

7. Select **incorrect** option w.r.t. given diagram

(1) Heterosporous

(2) Aquatic fern

(3) Belongs to class Pteropsida

(4) Gametophytic main plant body

8. The leaf of *Pinus* is

(1) Needle shaped (2) Compound leaf

(3) Having veinlets (4) Non-cutinised

9. Some plant groups exhibit intermediate condition w.r.t life cycle pattern. Which characteristic will **not** be exhibited by such kind of plant?

(1) Haplodiplontic life cycle pattern

(2) Both phases are multicellular and often free living

(3) They can differ in dominant phase

(4) Meiosis takes place in zygote

10. Select **correct** option w.r.t *Rhizophora*

(a) Grows in swampy area.

(b) Pneumatophores are present for respiration

(c) Is halophyte

(d) Shows *in-situ* germination of seed

(1) All are correct

(2) All are correct except (d)

(3) All are correct except (a) & (d)

(4) All are correct except (a), (c), & (d)

11. Morels and *Agaricus* have edible fruiting bodies and belong to their respective class as

(1) Ascomycetes and Basidiomycetes

(2) Basidiomycetes and Ascomycetes

(3) Ascomycetes and Phycomycetes

(4) Basidiomycetes only

12. In gourds and watermelon, the tendril is formed by the modification of

(1) Axillary bud

(2) Axillary bud and leaf respectively

(3) Leaf and axillary bud respectively

(4) Leaf

13. A pair of leaves arise at each node and lie opposite to each other as in

(1) *Calotropis*, called opposite decussate phyllotaxy

(2) Guava, called opposite superimposed phyllotaxy

(3) *Ocimum*, called opposite phyllotaxy

(4) More than one option is correct

14. Select **incorrect** option w.r.t. BGA and bacteria

(1) Both are prokaryote

(2) BGA is not motile in any stage of life but bacteria can be

(3) Heterocyst are formed in few BGA for nitrogen fixation and it is not formed in bacteria

(4) BGA and bacteria both can be autotrophic and heterotrophic

15. If the margins of sepals or petals overlap one another but not in particular direction, the aestivation is called

(1) Imbricate 

(2) Imbricate 

(3) Twisted 

(4) Twisted 

16. Which one is **correct** set of option w.r.t. Coconut?

(1) Mesocarp – Sclerenchymatous fibre
Endocarp – Sclereids
Edible part – Endosperm
Kind of fruit – Berry

(2) Mesocarp – Sclereids
Endocarp – Sclerenchymatous fibre
Edible part – Seed
Kind of fruit – Drupe

(3) Mesocarp – Sclerenchymatous fibre
Endocarp – Sclereids
Edible part – Endosperm
Kind of fruit – Drupe

(4) Mesocarp – Sclerenchymatous fibre
Endocarp – Sclereids
Edible part – Fruit
Kind of fruit – Drupe

17. $\text{Pyruvic acid} + \text{CoA} + \text{NAD}^+ \xrightarrow{A} B + CO_2 + NADH^+ + H^+$

in the above given reaction of respiration what can be placed at the place of A and B respectively?

(1) Iron and Citric acid

(2) Magnesium and Citric acid

(3) Dehydrogenase and Acetyl CoA

(4) Iron and Acetyl CoA

18. Out of the following examples, how many are belonging to Fabaceae, Solanaceae, Liliaceae?

Aloe, *Indigofera*, *Asparagus*, *Colchicine*, Belladonna, *Mulaithi*

	Solanaceae	Liliaceae	Fabaceae
(1)	3	2	1
(2)	2	2	2
(3)	1	3	2
(4)	4	1	1

19. Select the **incorrect** statement w.r.t vessel

(1) Devoid of protoplasm

(2) Lignified wall

(3) Long cylindrical tube like cells

(4) Presence of vessel is characteristic of gymnosperm

20. Which is **correct** set of option w.r.t. the following?

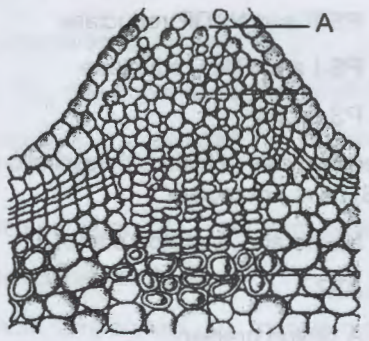
(1) Dicot stem – Differentiated ground tissue
Monocot stem – Endarch xylem
Dicot leaf – Isobilateral leaf
Monocot leaf – Dorsiventral leaf

(2) Dicot stem – Scattered vascular bundle
Monocot stem – Arranged vascular bundle
Dicot leaf – Amphistomatic
Monocot leaf – Hypostomatic

(3) Dicot stem – Endodermis is called starch sheath
Monocot stem – Vascular bundle surrounded by sclerenchymatous sheath
Dicot leaf – Palisade and spongy parenchyma
Monocot leaf – Stomata present on both surfaces

(4) Dicot stem – Arranged vascular bundle
Monocot stem – Endodermis is called starch sheath
Dicot leaf – Amphistomatatic
Monocot leaf – Palisade and spongy parenchyma

21. In the given diagram, which is **not** related with (A) as indicated in diagram?



(1) Complimentary cells

(2) Involved in exchange of gases

(3) Lens shaped opening called lenticels

(4) Found in herbaceous trees

22. Which of the following statement is **incorrect** w.r.t. endomembranous system?

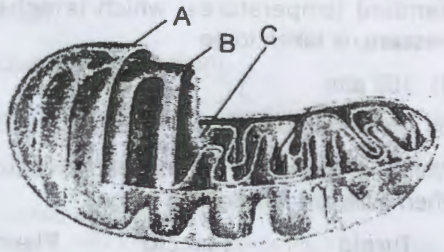
(1) Found only in eukaryotes

(2) The organelle of this system function in coordinated manner

(3) It includes endoplasmic reticulum, golgi complex, lysosome and vacuole

(4) Found in that cell in which cyclosis is absent

23. Which is **not** a feature w.r.t. given diagram of mitochondria (as indicated in diagram)?



(1) A → Continuous limiting boundary

(2) B → Forms number of folding called cisternae

(3) A & B → Both having own specific enzyme

(4) C → Site of Krebs' cycle

24. The chromosome in which centromere is situated close to its end forming one extremely short and one very long arm, is

(1) Telocentric (2) Submetacentric

(3) Acrocentric (4) Metacentric

25. In which phase of mitosis, chromosomes are moved to spindle equator and get aligned at equatorial plate through spindle fibers to both poles, is

(1) Prophase (2) Metaphase

(3) Anaphase (4) Telophase

26. When a cell is viewed under the microscope, it does not show golgi complex, endoplasmic reticulum, nucleolus, nuclear envelope in which stage of cell division?

(1) Early prophase (2) Late prophase

(3) Interphase (4) Telophase

27. These given statements are related with specific phase of meiosis, select the unrelated statement with the phase given below.

Statement		Phase
(1) The homologous chromosome separate, while sister chromatids remain associated at their centromere	–	Anaphase I

(2) The bivalent chromosomes align on the equatorial plate – Metaphase I

(3) Cytokinesis follows resulting in the formation of tetrad of cells – Telophase I

(4) Terminalisation of chiasmata – Final stage of prophase I

28. NADH synthesized in glycolysis of aerobic respiration is transferred into

(1) Cytoplasm for oxidative phosphorylation

(2) Mitochondria for oxidative phosphorylation

(3) Mitochondria for photooxidation

(4) ETS for photooxidation

29. By convention the water potential of pure water at standard temperatures, which is not under any pressure, is taken to be

(1) 100 atm (2) Zero

(3) More than 0 atm (4) Less than 0 atm

30. Which is **correct** w.r.t. osmotic pressure of cells when cells are in following stages?

	Turgid	Flaccid	Plasmolysed
(1)	OP = TP	OP = DPD	OP < DPD
(2)	OP = TP	OP > DPD	OP < DPD
(3)	OP = 0	OP > 0	OP < 0
(4)	OP = DPD	OP = TP	OP < TP

31. Symplastic movement of water in intracellular space of cell is aided by

(1) Cyclosis (2) Golgi body

(3) Plasmodesmata (4) Cell wall

32. Select the **correct** statement w.r.t given statements

(1) Water stomata is related with transpiration and guttation is related with stomata

(2) Transpiration is passive process but opening of stomata is active

(3) C_3 plants are twice efficient in photosynthesis as compared to C_4 plants whereas C_3 plants are less efficient w.r.t transpiration than C_4 plants

(4) Minerals uptake is passive whereas water absorption is active

33. Presence of oxygen is vital in aerobic respiration because

(1) It drives the whole process by removing hydrogen from ETS

(2) Oxygen causes phosphorylation which is light stimulated

(3) Oxygen directly stimulates complex V to generate ATP

(4) Oxygen is initial electron acceptor

34. Out of the following how many are micronutrient and macronutrient?

Cu, S, Ca, Zn, Mn, Mg, Cl, Fe, B

	Micronutrient	Macronutrient
(1)	5	4
(2)	6	3
(3)	7	2
(4)	4	5

35. Select the **correct** option w.r.t activator of element

(1) Mg – Carboxylase
Zn – Rubisco
Fe – Nitrogenase
Mo – Catalase

(2) Mg – Rubisco
Zn – Carboxylase
Fe – Catalase
Mo – Nitrogenase

(3) Mg – Carboxylase
Zn – Rubisco
Fe – Catalase
Mo – Nitrogenase

(4) Mg – Rubisco
Zn – Carboxylase
Fe – Nitrogenase
Mo – Catalase

36. Dark reaction of photosynthesis is driven by _____ and the product of most crucial step of dark reaction undergoes _____

(1) Light, phosphorylation

(2) Darkness, regeneration

(3) Products of light reaction, reduction

(4) Products of light reaction, carboxylation

37. Stroma lamella in plastid lacks

(1) PS II and PS I

(2) PS II and NADP reductase

(3) PS I and NAD reductase

(4) PS II only

38. Chemiosmosis (related with respiration, photosynthesis ETS) does **not** require

(1) Membrane, a proton pump

(2) ATP

(3) A proton gradient

(4) ATPase

39. If there are 12 molecules of CO_2 to be fixed in photosynthesis, then how many turns of Calvin cycle and how many molecules of glucose will be synthesized respectively?

(1) 9 turns, 2 molecules

(2) 12 turns, 1 molecule

(3) 6 turns, 1 molecule

(4) 12 turns, 2 molecules

40. In aerobic respiration, release of redox equivalents as H-atom for the first time in mitochondrial matrix is catalysed by

(1) PGAL dehydrogenase

(2) Isocitrate dehydrogenase

(3) Pyruvate dehydrogenase

(4) α-KGA dehydrogenase

41. Which hormone is derived from pigments in plants?

(1) ABA

(2) GA

(3) C_2H_4

(4) CK

42. A. _____ hormone is most widely used PGR in agriculture.

B. _____ hormone is related with Richmond Lang effect.

	A	B
(1)	Auxin	CK
(2)	Auxin	GA
(3)	Ethylene	CK
(4)	ABA	CK

43. The photoperiodic induction is **not** shown by plants when it is

(1) Decapitated

(2) Defoliated

(3) Apical meristem is removed

(4) More than one option is correct

44. What conditions are required for vernalisation in plants?

(1) Low temperature, CO_2, meristem cells

(2) Low temperature, O_2, leaf

(3) Optimum temperature, O_2, meristem cells

(4) Low temperature, O_2, meristem cells

45. Which statement is **incorrect** w.r.t photoperiodism in plants?

(1) The site of perception of light/dark duration is cotyledons or embryo

(2) It depends on duration of light/dark

(3) Critical exposure of light/dark is required

(4) When there is no correlation between exposure to light duration and induction of flowering response, plants are called day neutral plants

46. Which of the following epithelium is commonly found in the ducts of glands and tubular parts of nephrons in kidneys and its main functions are secretion and absorption?

(1) Squamous epithelium

(2) Cuboidal epithelium

(3) Columnar epithelium

(4) Ciliated epithelium

47. *Pheretima* resembles with *Nereis* in all the following features, **except**

a. Carnivorous feeding.

b. Nephridia to remove excretory waste.

c. Dioecious with sexual dimorphism.

d. Fertilization takes place in sea water.

e. Development is indirect.

(1) a, c, d & e only

(2) a, b, c & d only

(3) b, c, d & e only

(4) a, d & e only

48. Which one of the following animals is correctly matched with its one characteristics and the taxon?

	Animal	Characteristic	Taxon
(1)	Duckbilled platypus	Oviparous	Mammalian
(2)	Milipede	Ventral nerve cord	Arachnida
(3)	Sea Anemone	Triploblastic	Cnidaria
(4)	Silverfish	Pectoral & Pelvic fins	Chordata

49. Identify the organism and find the characteristic **not** suitable to the figure.

(1) Body is protected by chitinous shell
(2) Buccal cavity contains rasping organ radula
(3) Respiratory pigment is haemocyanin
(4) Metamorphosis through trochophore stage

50. One of the following features in aves may **not** be considered as a contributory factor in reducing the weight of body
(1) Presence of single ovary
(2) Presence of pneumatic bones
(3) Absence of urinary bladder
(4) Presence of four chambered heart

51. Reptiles share which of the following character with birds and mammals?
(1) Homeothermic
(2) Diaphragm
(3) Amniotes
(4) Seven cervical vertebrae

52. Find the **incorrect** statements
a. In hemodialysis, the dialysing unit contains a coiled cellophane tube surrounded by dialysing fluid, have the same composition as that of plasma except nitrogenous waste.
b. The production of uric acid is enhanced by excessive metabolism of nucleic acids.
c. Ionocytes in the gill membrane of fresh water fish can passively import Na^+ and Cl^- from surrounding water.
d. Marine teleosts remove nitrogenous waste in the form of urea.
(1) a & b only (2) c & d only
(3) b & c only (4) a & d only

53. After consuming beer and alcohol there is increase in rate of urine flow because
(1) They inhibit Na^+ reabsorption
(2) They inhibit secretion of ADH
(3) They inhibit action of aldosterone
(4) They inhibit absorption of K^+ ions

54. Under which of the following conditions appreciable amount of glucose does **not** appear in the urine?
a. Glucose concentration exceeds renal threshold value
b. Diabetes mellitus.
c. Diabetes insipidus.
d. Glucose concentration exceeds 180 mg/ 100 ml of blood
(1) a & c only (2) b & d only
(3) c only (4) a, b & d only

55. A person has 5 litres of blood in his body and his normal heart beat rate is 72 per minute. In fever the duration of cardiac cycle will be _____
(1) Higher than normal
(2) Less than normal
(3) Normal
(4) 0.8 seconds

56. By counting number of QRS complexes in ECG in a given time period we can determine
(1) Cardiac output
(2) Stroke volume
(3) Heart beat rate
(4) Electrical activity of heart

57. Identify the tissue shown in the diagram and match with its characteristics and its location

(1) Skeletal muscle, shows striations and closely attached with the bones of the limbs
(2) Smooth muscles, show branching, found in the walls of the heart
(3) Cardiac muscles, unbranched muscles, found in the walls of the heart
(4) Striated muscles, tapering at both-ends, attachedwith the bones of the ribs

58. Why is a capsule advantageous to a bacterium?

(1) It allows the bacterium to attach to the surface

(2) It protects the bacterium from desiccation

(3) It provides means of locomotion

(4) It allows bacterium to "hide" from host's immune system

59. Find the **incorrect** statement

(1) The enlarged Q and R waves in ECG are the indication of myocardial infarction

(2) Lubb sound appears during ventricular systole

(3) There is no effect on heart beat by increasing extracellular Ca^{+2}

(4) In Stokes-Adams syndrome, the atrial impulse fails to be transmitted to the ventricle, so artificial pacemaker is required

60. If renal plasma flow is 1000 ml/ min and filtration fraction is 24%. What will be glomerular filtration rate per hour?

(1) 240 ml (2) 1.44 lt.

(3) 14.4 ml (4) 14.4 lt.

61. A healthy person eats the following diet – 5 gm raw sugar, 4 gm albumin, 10 gm pure buffalo ghee adultrated with 2 gm vegetable ghee (hydrogenated vegetable oil) and 5 gm lignin. How many calories he is likely to get?

(1) 144 (2) 126 (3) 164 (4) 112

62. Which enzymes are likely to act on the baked potatoes eaten by a man, starting from the mouth and as it moves down the alimentary canal?

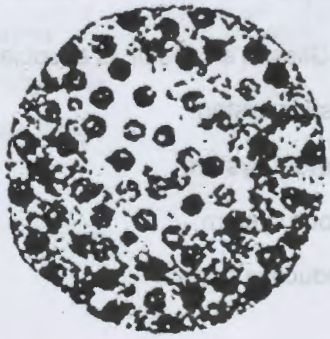
(1) Salivary maltase → carboxy peptidase → trypsinogen

(2) Pancreatic amylase → salivary amylase → lipases

(3) Disaccharidase like maltase → lipases → nucleases

(4) Salivary amylase → pancreatic amylase → disaccharidases

63. The figure shows a human blood cell. Identify it and give its characteristics.



Blood Cell	Characteristics
(1) Monocyte	Life span 3 days, produce antibodies.
(2) Basophil	Secrete serotonin, inflammatory response.
(3) B-lymphocyte	Form about 20% of blood cells involved in immuneresponse.
(4) Neutrophil	Most abundant blood cell, phagocytic.

64. Enzymes that catalyse removal of groups from substrates by mechanism other than hydrolysis and also form double bond

(1) Oxidoreductase

(2) Transferase

(3) Lyases

(4) Isomerase

65. Which of these fatty acids have high melting point?

(1) Oleic acid

(2) Stearic acid

(3) Linolenic acid

(4) Arachidonic acid

66. Which of the following does **not** act as buffer to maintain pH of blood?

(1) Carbonic acid

(2) Monobasic phosphate

(3) Dibasic phosphate

(4) Myoglobin

67. Which of the following amino acid is mono amino dicarboxylic?

(1) Glycine

(2) Lysine

(3) Tyrosine

(4) Aspartic acid

68. During muscle contraction in humans the

(1) Actin filaments shorten

(2) Sarcomere does not shorten

(3) A band remain same

(4) A, H and I bands shorten

69. Cristae and maculae are specific receptors responsible for maintenance of balance of the body and posture. Following are the regions where these receptors are **not** found

(1) Semicircular canals, otolith organ

(2) Vestibular apparatus

(3) Saccule, utricle

(4) Perilymph, cochlea

70. Norepinephrine:

(a) Is released by sympathetic fibres

(b) Is released by parasympathetic fibres

(c) Increases the heart rate

(d) Decreases blood pressure

Which of the above said statements are correct?

(1) (a) and (d) (2) (a) and (c)

(3) (b) and (c) (4) (b) and (d)

71. Which cranial nerve(s) does not innervate the taste buds but helps in movement of tongue during speech and swallowing?

(1) Facial

(2) Glossopharyngeal

(3) Hypoglossal

(4) Vagus

72. During depolarisation there is

(1) Closure of voltage gated Na^+ and K^+ channels

(2) Opening of voltage gated Na^+ channel but K^+ gated channels still closed

(3) Opening of voltage gated K^+ channel but Na^+ gated channels still closed

(4) Opening of voltage gated Na^+ and K^+ channels

73. Find odd one out w.r.t. inborn reflexes

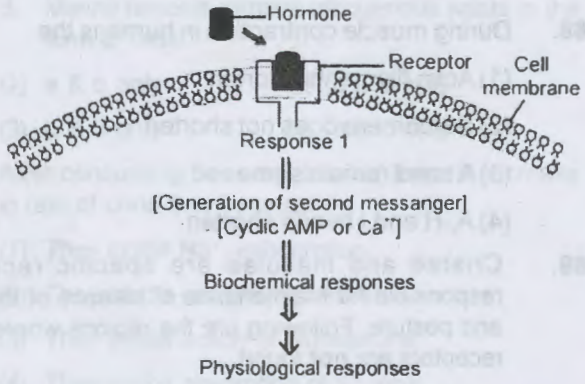
(1) Knee jerk

(2) Pupillary reflex

(3) Salivation on smelling the food

(4) Blinking of eyes

74. Identify the hormone which works through the following pathway



(1) Adrenaline (2) Glucocorticoid

(3) Aldosterone (4) Thyroxine

75. α-cells of islet of Langerhans can raise the glucose level by all the following process, **except**

(1) Accelerate glycogen breakdown in liver

(2) Promoting conversion of amino acid and lactic acid to glucose in liver

(3) Enhancing release of glucose into blood

(4) Promote synthesis of fats from glucose

76. Which of the following gland/s is/are directly under the neural control of sympathetic nervous system, and are not regulated by any hormone of hypothalamus?

A. Adrenal gland

B. Pineal gland

C. Anterior lobe of pituitary

D. Gonads

(1) A only

(2) A & B only

(3) A & D

(4) A, B & D

77. A low body temperature is not a characteristic of

(1) Cretinism

(2) Myxodema

(3) Exophthalmic goitre

(4) Simple goitre

78. Cells responsible for release of Castle's intrinsic factor are

(1) Peptic cells

(2) Paneth cells

(3) Parietal cells

(4) Chief cells

79. In man, Glisson's capsule is associated with the

(1) Digestive system

(2) Excretory system

(3) Nervous system

(4) reproductive system

80. Which of the following neural system relays impulses from CNS to skeletal muscles?

(1) Somatic neural system

(2) Sympathetic neural system

(3) Parasympathetic neural system

(4) Peripheral neural system

81. Find the **incorrect** w.r.t. breakdown of biomolecules under the influence of succus entericus.

(1) Maltose $\xrightarrow{\text{Maltase}}$ Glucose + Glucose

(2) Sucrose $\xrightarrow{\text{Invertase}}$ Glucose + Fructose

(3) Lactose $\xrightarrow{\text{Lactase}}$ Maltose + Galactose

(4) Isomaltose $\xrightarrow{\text{Isomaltase}}$ Glucose + Glucose

82. Carbohydrates, lipids and proteins are

(1) Macronutrient or proximate principles of food

(2) Micronutrient or protective principles of food

(3) Macronutrient or protective principles of food

(4) Micronutrient or proximate principles of food

83. The maximum amount of air that a person can expel from lungs after first filling the lungs to their maximum extent is

(1) Inspiratory reserve volume

(2) Expiratory reserve volume

(3) Inspiratory capacity

(4) Vital capacity

84. Which of the following conditions will favour the unloading of O_2 and shift oxyhaemoglobin dissociation curve towards right?

(1) Decrease in pCO_2 in blood

(2) Decrease in H^+ ion in blood

(3) Increase in H^+ ion in blood

(4) Decrease in DPG level in blood

85. In which respiratory disorder most of the space of alveolar sac is occupied by fluid with dead WBC's?

(1) Bronchitis

(2) Asthma

(3) Emphysema

(4) Pneumonia

86. Uricose glands store uric acid and helps in the formation of the wall of spermatophore. These glands are associated with which accessory reproductive gland and what is its location?

(1) Phallic gland; 6th abdominal segment

(2) Mushroom gland; 6-7th abdominal segment

(3) Conglobate gland; 4-6th abdominal segment

(4) Collaterial gland; 2-4th abdominal segment

87. Genital pouch in male is made up of

(1) 9th to 10th terga; 9th sterna

(2) 9th terga; 9th and 10th sterna

(3) 8th terga; 7th sterna

(4) It is present only in female

88. A nerve is a complex of several bundles of nerve fibres enclosed together by a common sheath of connective tissue. A bundle of nerve fibres, fasciculus is surrounded by

(1) Endoneurium

(2) Epineurium

(3) Perineurium

(4) Myelin sheath

89. Tendons form cord like structure which are made up of

(1) Yellow elastic connective tissue

(2) White fibrous connective tissue

(3) Dense irregular connective tissue

(4) Hyaline cartilage

90. Epinephrine is secreted by the

(1) Adrenal cortex (2) Parathyroid glands

(3) Anterior Pituitary (4) Adrenal Medulla

CLASS - XI FULL SYLLABUS TEST - II

ANSWERS

1.	(2)	2.	(4)	3.	(3)	4.	(4)	5.	(2)	6.	(2)	7.	(4)	8.	(1)	9.	(4)	10.	(1)
11.	(1)	12.	(1)	13.	(4)	14.	(4)	15.	(1)	16.	(3)	17.	(3)	18.	(3)	19.	(4)	20.	(3)
21.	(4)	22.	(4)	23.	(2)	24.	(3)	25.	(2)	26.	(2)	27.	(3)	28.	(2)	29.	(2)	30.	(1)
31.	(1)	32.	(2)	33.	(1)	34.	(2)	35.	(2)	36.	(3)	37.	(2)	38.	(2)	39.	(4)	40.	(3)
41.	(1)	42.	(3)	43.	(2)	44.	(4)	45.	(1)	46.	(2)	47.	(1)	48.	(1)	49.	(1)	50.	(4)
51.	(3)	52.	(2)	53.	(2)	54.	(3)	55.	(2)	56.	(3)	57.	(1)	58.	(4)	59.	(3)	60.	(4)
61.	(1)	62.	(4)	63.	(2)	64.	(3)	65.	(2)	66.	(4)	67.	(4)	68.	(3)	69.	(4)	70.	(2)
71.	(3)	72.	(2)	73.	(3)	74.	(1)	75.	(4)	76.	(2)	77.	(3)	78.	(3)	79.	(1)	80.	(1)
81.	(3)	82.	(1)	83.	(4)	84.	(3)	85.	(4)	86.	(2)	87.	(1)	88.	(3)	89.	(2)	90.	(4)

CLASS - XI FULL SYLLABUS TEST - III

1. Algae such as ___i___ have a haplo-diplontic life cycle, while *Fucus* has a ___ii___ life cycle.
   (a) **i**-*Ectocarpus;* **ii**-haplontic
   (b) **i**-*Spirogyra;* **ii**-diplontic
   (c) **i**-*Ectocarpus;* **ii**-diplontic
   (d) **i**-*Spirogyra;* **ii**-haplontic

2. Which of the following plants bear naked seeds?
   (a) *Ficus* **(b)** *Riccia*
   (c) *Sequoia* **(d)** *Adiantum*

3. Which photosynthetic pigment is present in the class Phaeophyceae?
   (a) Phycoerythrin **(b)** Chlorophyll-d
   (c) Chlorophyll-b **(d)** Fucoxanthin

4. Pteridophytes such as *Selaginella* and ___i___ are ___ii___ as they produce two different kinds of spores.
   (a) **i**-*Salvinia;* **ii**-homosporous
   (b) **i**-*Equisetum;* **ii**-heterosporous
   (c) **i**-*Salvinia;* **ii**-heterosporous
   (d) **i**-*Equisetum;* **ii**-homosporous

5. *Chlamydomonas* is unicellular, biflagellate, aquatic green algae. The common spores formed in it during favourable conditions are known as
   (a) zoospores **(b)** hypnospores
   (c) aplanospores **(d)** palmellospores

6. The gelatinous covering over cellulosic wall of Brown algae is known as
   (a) algin **(b)** pectin
   (c) suberin **(d)** carrageen

7. Double fertilization is a characteristic feature in which division of the plant kingdom?
   (a) Bryophyta **(b)** Pteridophyta
   (c) Gymnosperm **(d)** Angiosperm

8. In which of the following algae does food get stored in the form of Floridian starch?
   (a) Chlorophyceae **(b)** Phaeophyceae
   (c) Rhodophyceae **(d)** Chrysophyceae

9. Which division of the plant kingdom has vascular plants with naked seeds?
   (a) Bryophyte **(b)** Pteridophyte
   (c) Gymnosperm **(d)** Angiosperm

10. Agar is widely used as a culture medium. Which of the following algae are used for obtaining agar?
    (a) *Fucus* **(b)** *Chlorella*
    (c) *Geliduim* **(d)** *Rhodomela*

11. In *Spirogyra*, reproduction involves the fusion of two ___i___ gametes. This type of reproduction is known as ___ii___.
    (a) **i**-dissimilar; **ii**-anisogamous
    (b) **i**-similar; **ii**-isogamous
    (c) **i**-dissimilar; **ii**-isogamous
    (d) **i**-similar; **ii**-anisogamous

12. *Funaria* is an example of a bryophyte. In the life cycle of *Funaria*, the gametophytic
    (a) generation is diploid and the sporophytic generation is haploid
    (b) generation is haploid and the sporophytic generation is diploid
    (c) and sporophytic generations are haploid
    (d) and sporophytic generations are diploid

13. Pteridophytes are vascular plants. Which of the following plants bear strobili?
    (a) *Dryopteris* **(b)** *Adiantum*
    (c) *Equisetum* **(d)** *Pteris*

14. In an angiosperm, the ovary develops after fertilisation into ___i___ and ___ii___ develops into seeds.
    (a) **i**-embryo; **ii**-ovule **(b)** **i**-fruit; **ii**-stigma
    (c) **i**-fruit; **ii**-ovule **(d)** **i**-embryo; **ii**-stigma

15. The first word in a biological name of an organism represents the ___i___, which always start with a ___ii___ letter.
    (a) **i**-genus; **ii**-small **(b)** **i**-genus; **ii**-capital
    (c) **i**-species; **ii**-small **(d)** **i**-species; **ii**-capital

16. The figure illustrates a particular type of aestivation in a flower.

Which type of aestivation is illustrated in the given diagram?

(a) Valvate **(b)** Twisted

(c) Imbricate **(d)** Vexillery

17. The given figure represents a type of aestivation.

The type of aestivation shown in the given figure is known as

(a) valvate **(b)** twisted

(c) imbricate **(d)** vexillary

18. In alternate phyllotaxy, each leaf arises from a node on the opposite sides of the stem. Which of the following plants has alternate phyllotaxy?

(a) *Calotropis* **(b)** Mustard

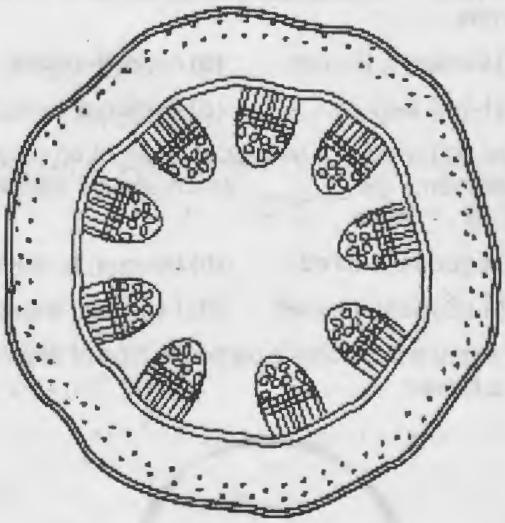
(c) *Alstonia* **(d)** Guava

19. Which of the following plants exhibits stilt roots?

(a) *Daucus* **(b)** Banyan

(c) Sugarcane **(d)** *Monstera*

20. The given figure shows the cross-section of a plant.



The given cross-section belongs to a

(a) monocot stem **(b)** monocot root

(c) dicot stem **(d)** dicot root

21. In ___i___ stem, the vascular bundles are scattered in the ground tissue and are conjoint and ___ii___.

(a) **i**-monocot; **ii**-open **(b)** **i**-dicot; **ii**-open

(c) **i**-monocot; **ii**-closed **(d)** **i**-dicot; **ii**-closed

22. In ___i___ bundle, a strip of cambium is present between the xylem and phloem. This type of vascular bundle is found in a ___ii___.

(a) **i**-an open; **ii**-monocot **(b)** **i**-a closed; **ii**-monocot

(c) **i**-a closed; **ii**-dicot **(d)** **i**-an open; **ii**-dicot

23. Guard cells surround the stomatal pore. Dumbbell-shaped guard cells are found in

(a) mango **(b)** grass

(c) bean **(d)** pea

24. The excretory product in frogs is ___i___. Therefore frog is a ___ii___ animal.

(a) **i**-urea; **ii**-uricotelic **(b)** **i**-uric acid; **ii**-uricotelic

(c) **i**-uric acid; **ii**-ureotelic **(d)** **i**-urea; **ii**-ureotelic

25. The mouth parts of cockroach consist of ___i___ which forms the upper lip and ___ii___, which acts as the lower lip.

(a) **i**-labrum; **ii**-labium **(b)** **i**-labrum; **ii**-maxilla

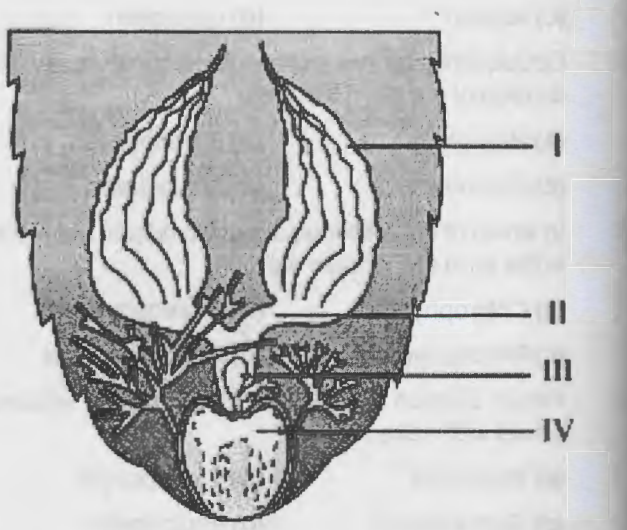
(c) **i**-maxilla; **ii**-mandible **(d)** **i**-mandible; **ii**-labrum

26. Who used the frquency of recombinant between ge pairs on the same chromosome as a measure of the distance between genes and mapped the position on the chromosome?

(a) Gregor Mendel (b) Correns

(c) Tschermark (d) Alfred Sturtevant

27. The given figure represents the female reproductive system of a cockroach.



Which labelled structure represents the site where sperms are temporarily stored before fertilisation?

(a) I (b) II

(c) III (d) IV

28. Sickle cell anaemia is caused by the substitution of

(a) valine by glutamic acid at sixth position of alpha chain of harmoglobin

(b) valine by glutamic acid at sixth position of beta chain of haemoglobin

(c) glutamic acid by valine at sixth position of alpha chain of haemoglobin

(d) glutamic acid by valine at sixth position of beta chain of haemoglobin

29. The cells of ___i___ are called ___ii___. They are arranged in the spaces called lacunae.

(a) **i**-bone; **ii**-chondrocytes

(b) **i**-skinchondrocytes

(c) **i**-bone; **ii**-osteocytes

(d) **i**-skin; **ii**-osteocytes

30. ___i___ and adipose tissues are examples of ___ii___ connective tissues.

(a) **i**-Areolar; **ii**-loose (b) **i**-Tendons; **ii**-dense

(c) **i**-Tendons; **ii**-loose (d) **i**-Areolar; **ii**-dense

31. Many factors affect the rate of an enzyme-catalyzed reaction. Which of the following factors does **not** affect the rate of an enzyme catalyzed reaction?

(a) Substrate concentration

(b) Enzyme concentration

(c) Size of enzyme

(d) Temperature

32. The figure illustrates a type of chromosome.

Which type of chromosome is represented in the given figure?

(a) Telocentric (b) Acrocentric

(c) Metacentric (d) Sub-metacentric

33. Which stage of mitosis occurs prior to cytokinesis?

(a) Telophase (b) Anaphase

(c) Metaphase (d) Prophase

34. ___i___ is an example of neutral amino acid while lysine is an example of ___ii___ amino acid.

(a) **i**-Valine; **ii**-acidic (b) **i**-Histidine; **ii**-basic

(c) **i**-Histidine; **ii**-acidic (d) **i**-Valine; **ii**-basic

35. The endoplasmic reticulum that bears ___i___ on its surface is known as the ___ii___ endoplasmic reticulum.

(a) **i**-ribosomes; **ii**-smooth

(b) **i**-lysosomes; **ii**-rough

(c) **i**-ribosomes; **ii**-rough

(d) **i**-lysosomes; **ii**-smooth

36. In which cell cycle stage does the process of condensation of chromosomes get completed?

(a) Prophase (b) Metaphase

(c) Anaphase (d) Telophase

37. The given table enlists various types of secondary metabolites and their examples.

Type of the metabolite	Example
Alkaloids	___i___
Terpenoides	___ii___
Toxins	___iii___
Polymers	Cellulose

The information in which alternative completes the given table?

(a) **i**-Morphine; **ii**-Curcumin; **iii**-Anthocyanin

(b) **i**-Vinblastin; **ii**-Curcumin; **iii**-Abrin

(c) **i**-Vinblastin; **ii**-Diterpenes; **iii**-Anthocyanin

(d) **i**-Morphine; **ii**-Diterpenes; **iii**-Abrin

38. The eukaryotic ribosomes are ___i___ and help in the process of ___ii___ synthesis.

(a) **i**-70 S; **ii**-protein (b) **i**-70 S; **ii**-lipid

(c) **i**-80 S; **ii**-protein (d) **i**-80 S; **ii**-lipid

39. Which stage of meiotic division involves the separation of homologous chromosomes, resulting in the reduction of the chromosome number?

(a) Prophase I (b) Anaphase I

(c) Metaphase I (d) Telophase I

40. ___i___ is a heteropolymer present in animals and cellulose is a ___i___ present in plants.

(a) i-Starch; ii-heteropolymer

(b) i-Chitin; ii-heteropolymer

(c) i-Starch; ii-homopolymer

(d) i-Chitin; ii-homopolymer

41. Tonoplast is a single-layered membrane. It is present around the

(a) vacuoles (b) centrioles

(c) chloroplasts (d) mitochondria

42. During the cell division of an animal cell, the replication of DNA and the duplication of centrioles occur in the

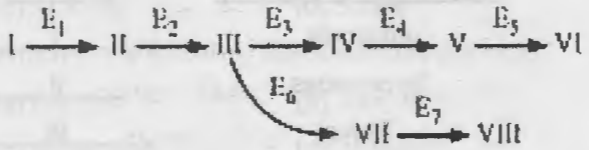
(a) cytoplasm and the nucleus respectively

(b) nucleus and the cytoplasm respectively

(c) cytoplasm

(d) nucleus

43. Tammy added substrate I to a beaker containing equal amounts of enzymes E_1 to E_7. The given figure illustrates the metabolic pathway of the reaction. After 20 minutes, Tammy added a competitive inhibitor in the reaction mixture for enzyme E_2.



The addition of the competitive inhibitor increases the concentration of substance

(a) II (b) IV

(c) VI (d) VIII

44. The forming face of the Golgi apparatus is ___i___ and is called the ___ii___ face.

(a) i-convex; ii-*trans* (b) i-concave; ii-*cis*

(c) i-concave; ii-*trans* (d) i-convex; ii-*cis*

45. Between which two cell cycle stages does karyokinesis lie?

(a) G_2 and cytokinesis (b) Cytokinesis and G_0

(c) G_0 and G_1 (d) G_1 and G_2

46. A cell has a solute concentration of 0.09%. Which of the following solute concentrations will the cause the cell to burst?

(a) 0.02% solute (b) 0.09% solute

(c) 0.1% solute (d) 0.5% solute

47. In the ___j___ pathway, water moves through the intercellular spaces and ___ii___ of a cell.

(a) i-apoplast; ii-protoplasm

(b) i-symplast; ii-cell wall

(c) i-symplast; ii-protoplasm

(d) i-apoplast; ii-cell wall

48. Which of the following statements about water potential is correct?

(a) The water potential of a solution is greater than that of pure water.

(b) The water potential of pure water is greater than that of a solution.

(c) The water potential of pure water is less than zero at a standard temperature and in the absence of pressure.

(d) The water potential of pure water is more than zero at a standard temperature and in the absence of pressure.

49. ___i___ such as phosphorous and ___ii___ are required in large quantity by the plants.

(a) i-Micronutrients; ii-magnesium

(b) i-Macronutrients; ii-manganese

(c) i-Micronutrients; ii-manganese

(d) i-Macronutrients; ii-magnesium

50. Which plant nutrient is a component of enzyme nitrogenase?

(a) Magnesium (b) Molybdenum

(c) Potassium (d) Phosphorus

51. Which plant nutrient is a component of enzyme nitrogenase and plays an important role in nitrogen metabolism?

(a) Magnesium (b) Molybdenum

(c) Potassium (d) Phosphorus

52. Chloroplast is the site of photosynthesis. Light-dependent reaction of photosynthesis takes place in which part of the chloroplast?

(a) Stroma (b) Thylakoid

(c) Inner membrane (d) Outer membrane

53. Which of the following plants is a C_4 plant?

(a) Pea (b) Potato

(c) Maize (d) Papaya

54. During aerobic respiration, pyruvic acid formed after glycolysis gets converted into ___i___ while during anaerobic respiration, it is converted into ___ii___

(a) i-acetyl-Co-A; ii-lactic acid

(b) i-2-phosphoglycerate; ii-succinic acid

(c) i-2-phosphoglycerate; ii-lactic acid

(d) i-acetyl-Co-A; ii-succinic acid

55. Glycolysis takes place in the

(a) mitochondria (b) lysosomes

(c) cytoplasm (d) nucleus

56. The two types of cellular respiration are aerobic and anaerobic respiration. Which step is common to both aerobic and anaerobic respiration?

(a) Glycolysis

(b) Kreb's cycle

(c) Electrons transport system

(d) Oxidative phosphorylation

57. Which of the following functions is **not** performed by ethylene?

(a) Inhibiting longitudinal growth

(b) Inducing ripening of fruits

(c) Inducing parthenocarpy

(d) Inhibiting geotropism

58. A gardener has to induce flowering in his mango orchard to get higher and better fruit yields. Which of the following chemicals can be used by the gardener to promote flowering in his mango orchard?

(a) GA_3 (b) 2, 4 – D

(c) Kinetin (d) Ethephon

59. Which plant hormone promotes the phenomenon of apical dominance in plants?

(a) Auxins (b) Cytokinins

(c) Abscisic acid (d) Gibberellic acid

60. ___i___ plant hormone is applied to the stem cuttings for initiating the formation of new roots. ___ii___ helps in synthesis of chloroplasts in the leaves.

(a) i-Gibberellins; ii-Ethylene

(b) i-Ethylene; ii-Auxins

(c) i-Auxins; ii-Cytokinins

(d) i-Cytokinins; ii-Gibberellins

61. ___i___ enzyme is secreted in the buccal cavity that helps in the hydrolysis of starch into ___i___ at pH 6.8. The information in which alternative completes the given statement?

(a) i-Maltase; ii-maltose (b) i-Maltase; ii-lactose

(c) i-Amylase; ii-maltose (d) i-Amylase; ii-lactose

62. The filtration of blood is carried out in which part of a nephron?

(a) Renal corpuscle

(b) Collecting tubule

(c) Distal convoluted tubule

(d) Proximal convoluted tubule

63. The enzyme in which alternative is matched with its respective function?

	Enzyme	Function
(a)	Lysozyme	Activates trypsinogen
(b)	Pepsin	Antibacterial agent
(c)	Rennin	Digestion of milk protein
(d)	Enterokinase	Absorption of water

64. Reabsorption of Na^+ from the distal part of the tubule is controlled by which hormone?

(a) Rennin (b) Thyroxin

(c) Aldosterone (d) Testosterone

65. The ___i___ guards the hepato-pancreatic duct that opens together into ___ii___.

(a) i-pyloric sphincter; ii-stomach

(b) i-pyloric sphincter; ii-duodenum

(c) i-sphincter of oddi; ii-stomach

(d) i-sphincter of oddi; ii-duodenum

66. Which of the following parts of the nephron is **not** situated in the cortical region of the kidneys?

(a) Proximal convoluted tubule

(b) Distal convoluted tubule

(c) Malpighian corpuscle

(d) Henle's loop

67. Which of the following statements about chyme is correct?

(a) It is the fully-digested food in the stomach

(b) It is the fully-digested food in the small intestine

(c) It is the partially-digested acidic food in the stomach

(d) It is the partially-digested alkaline food in the small intestine

68. The ___i___ hormone, released from the neuro-hypophysis, facilitates water absorption from the ___ii___ in the nephron.

(a) i-vasopressin; ii-collecting duct

(b) i-vasopressin; ii-loop of Henle

(c) i-aldosterone; ii-collecting duct

(d) i-aldosterone; ii-loop of Henle

69. The ___i___ cells of the stomach produce enzyme pepsin, which helps in the conversion of proteins into ___ii___.

(a) i-chief; ii-peptones (b) i-chief; ii-dipeptides

(c) i-parietal; ii-dipeptides (d) i-parietal; ii-peptones

70. Which of the following hormones is responsible for regulating the reabsorption of water?

(a) Adrenalin (b) Thyroxine

(c) Vasopressin (d) Testosterone

71. Which of the following statements about HCl is incorrect?

(a) It is secreted in the stomach

(b) It is secreted by the oxyntic cells

(c) It provides acidic medium, which is optimal for lipase

(d) It provides acidic medium, which is optimal for pepsin

72. Which of the following parts of a kidney facilitates counter current mechanism?

(a) Henle's loop and vasa recta

(b) Distal convoluted tubule and Henle's loop

(c) Vasa recta and proximal convoluted tubule

(d) Proximal convoluted tubule and distal convoluted tubule

73. I, II, III, and IV are secretions of hepatic, chief, oxyntic, and goblet cells respectively.

Cell	Secretion
Hepatic	I
Chief	II
Oxyntic	III
Goblet	IV

The information in which alternatives completes the secretions of the four cells.

(a) I-Bile; II-Pepsinogen; III-HCl; IV-Mucus

(b) I-Mucus; II-Bile; III-Pepsinogen; IV-HCl

(c) I-HCl; II-Mucus; III-Bile; IV-Pepsinogen

(d) I-Pepsinogen; II-HCl; III-Mucus; IV-Bile

74. When glomerular filtration rate ___i___; the juxta-glomerular cells are stimulated to release ___ii___ to regulate the filtration rate.

(a) i-rises; ii-rennin (b) i-rises; ii-renin

(c) i-falls; ii-rennin (d) i-falls; ii-renin

75. Which of the following disorders of the digestive system affects the liver, thereby leading to yellowing of the skin and eyes?

(a) Jaundice (b) Diarrhoea

(c) Indigestion (d) Constipation

76. In human eye, the light enters through ___i___. ___ii___ generates impulses in rods and cones, and the images of the objects are formed in ___iii___.

(a) i-iris; ii-cornea; iii-retina

(b) i-cornea; ii-iris; iii-lens

(c) i-cornea; ii-lens; iii-retina

(d) i-retina; ii-cornea; iii-lens

77. Which of the following statements about transmission of impulse is **correct**?

(a) The transmission of impulse is faster in chemical synapse.

(b) The transmission of impulse is slower in electrical synapse.

(c) It is transmitted from axon of first neuron to dendrite of next neuron.

(d) It is transmitted from dendrite of first neuron to axon of next neuron.

78. What is the function of the vestibular apparatus of the internal ear?

(a) It equalizes air pressure on the two sides of the ear drum.

(b) It maintains equilibrium of the body.

(c) It collects sound vibrations from air.

(d) It acts as auditory receptors.

79. The organ of corti is located on which membrane of the ear?

(a) Basilar membrane

(b) Tectorial membrane

(c) Tympanic membrane

(d) Reissner's membrane

80. Which of the following systems together controls and coordinates the physiological process?

(a) Neural and endocrine

(b) Circulatory and neural

(c) Respiratory and endocrine

(d) Circulatory and respiratory

81. Which part of the brain is linked to memory, intelligence, and learning power?

(a) Medulla (b) Cerebrum

(c) Cerebellum (d) Hypothalamus

82. Which part in human ear helps in equalizing the pressure on the two sides of the ear drum?

(a) Organ of corti

(b) Eustachian tube

(c) Vestibular apparatus

(d) Membranous labyrinth

83. Which of the following membranes of cochlea divides the bony labyrinth into scala vestibuli and scala tympani?

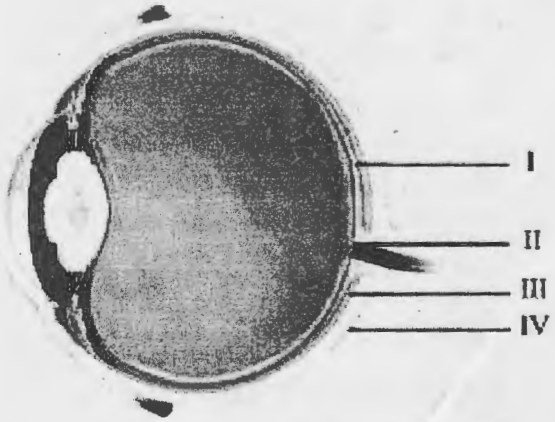
(a) Basilar and tectorial membrane

(b) Basilar and tympanic membrane

(c) Reissner's and basilar membrane

(d) Reissner's and tectorial membrane

84. The figure illustrates the structure of a human eye. Which part of human eye represents the point



(a) I (b) II

(c) III (d) IV

85. Which of the following functions is attributed to the Eustachian tube?

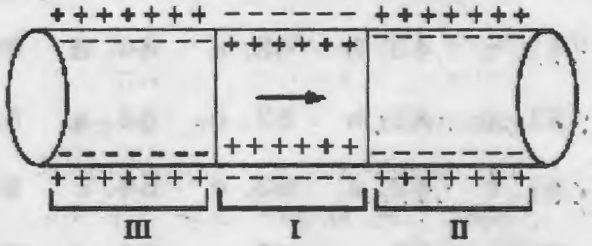
(a) It acts as auditory receptor.

(b) It collects the vibrations in the air.

(c) It maintains the balance of the body.

(d) It equalises the pressure on two sides of the eardrum.

86. The image illustrates the movement of an impulse in a nerve fibre. The labels, **I**, **II**, and **III**, represent the changes present on either sides of the membrane. When an action potential is generated, because of movement of ions, a positive charge inside and negative charge outside is established. Immediately after, the membrane returns to its original condition and is said to be repolarized. Resting membrane potential is established when the membrane gains positive charge outside and negative charge inside i.e., the membrane is said to be polarized.



The information in which alternative matches the labels with its respective names **correctly**?

(a) **I**-Depolarized; **II**-Polarized; **III**-Repolarized

(b) **I**-Depolarized; **II**-Repolarized; **III**-Polarized

(c) **I**-Polarized; **II**-Depolarized; **III**-Repolarized

(d) **I**-Polarized; **II**-Repolarized; **III**-Depolarized

87. Which region of human brain helps in maintaining the constant body temperature?

(a) Medulla (b) Cerebrum

(c) Cerebellum (d) Hypothalamus

88. Aqueous chamber is the space between __i__ and __ii__ and it contains aqueous humor.

(a) **i**-cornea; **ii**-retina (b) **i**-cornea; **ii**-lens

(c) **i**-lens; **ii**-retina (d) **i**-lens; **ii**-choroid

89. Which regions of the brain are involved in controlling the emotional reactions in humans such as excitement and pleasure?

(a) Medulla and cerebellum

(b) Cerebellum and cerebrum

(c) Hypothalamus and medulla

(d) Cerebrum and hypothalamus

90. The vision is finest and sharpest in which part of the eye?

(a) Fovea (b) Choroid

(c) Blind spot (d) Ciliary body

CLASS - XI FULL SYLLABUS TEST - III

ANSWERS

1. c	2. c	3. d	4. c	5. a	6. a	7. d	8. c	9. c	10. c
11. b	12. b	13. c	14. c	15. b	16. a	17. d	18. b	19. c	20. c
21. c	22. d	23. b	24. d	25. a	26. d	27. c	28. d	29. c	30. a
31. c	32. b	33. a	34. d	35. c	36. b	37. d	38. c	39. b	40. d
41. a	42. b	43. a	44. d	45. a	46. a	47. d	48. b	49. d	50. b
51. b	52. b	53. c	54. a	55. c	56. a	57. c	58. d	59. a	60. c
61. c	62. a	63. c	64. c	65. d	66. d	67. c	68. a	69. a	70. c
71. c	72. a	73. a	74. d	75. a	76. c	77. c	78. b	79. a	80. a
81. b	82. b	83. c	84. a	85. d	86. b	87. d	88. b	89. d	90. a