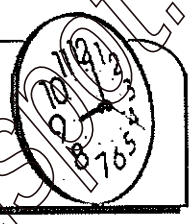
Model Test Paper-1



Time : $3\frac{1}{2}$ hours. *Maximum Marks :* 200

PHYSICS

1. What is the dimensional formula for the gravitational constant?
(a) $[M^{-1} L^3 T^{-1}]$ (b) $[M^{-2} L^{-1} T^3]$
(c) $[M^{-1} L^3 T^{-2}]$ (d) $[M^{-2} L^3 T^{-2}]$.

2. An ideal gas is heated from 27°C to 627°C at constant pressure. If initial volume was 4 m^3, then the final volume of the gas will be
(a) 2 m^3 (b) 4 m^3
(c) 6 m^3 (d) 12 m^3.

3. The tension in piano wire is 10 N. What should be the tension in the wire to produce a note of double the frequency?
(a) 5 N (b) 20 N
(c) 40 N (d) 80 N.

4. Which of the following is a dimensionless quantity?
(a) strain (b) stress
(c) specific heat (d) quantity of heat.

5. When we heat a gas sample from 27°C to 327°C, then the initial average kinetic energy of the molecules was E. What will be the average kinetic energy after heating?
(a) $327E$ (b) $300E$
(c) $2E$ (d) $\sqrt{2}E$.

6. A certain radioactive element has a half-life of 20 years. If we have a block with 10 gm of the element in it, after how many years will there be just 2.5 g of the element in the block?
(a) 40 years (b) 60 years
(c) 80 years (d) 100 years.

7. A ray of light having wavelength 720 nm enters in a glass of refractive index 1.5. The wavelength of the ray within the glass will be
(a) 360 nm (b) 480 nm
(c) 720 nm (d) 1080 nm.

8. The reactance of an inductance of 0.01 Hz to a 50 Hz A.C. is
(a) 6.28 Ω (b) 3.14 Ω
(c) 1.04 Ω (d) 0.59 Ω.

9. Ten identical cells each of potential E and internal resistance r are connected in series to form a closed circuit. An ideal voltmeter connected across three cells, will read
(a) $3E$ (b) $7E$
(c) $10E$ (d) $13E$.

10. Which of the following, when added as impurity into the silicon, produces n-type semiconductor?
(a) P (b) Al
(c) B (d) Mg.

11. A tube closed at one end containing air produces fundamental note of frequency 512 Hz. If the tube is open at both ends, the fundamental frequency will be
(a) 256 Hz (b) 768 Hz
(c) 1024 Hz (d) 1280 Hz.

12. Which of the following is an essential requirement for initiating the fusion reaction?
(a) critical mass (b) thermal neutrons
(c) high temperature (d) critical temperature.

13. If an electron is brought towards another electron, the electric potential energy of the system
(a) increases (b) decreases
(c) becomes zero (d) remains the same.

14. The photoelectrons emitted from a given cathode on the incidence of a given monochromatic beam of light, have a/an
(a) energy spread with a lower limit

(b) energy spread with an upper limit
(c) energy spread with no sharp limits
(d) definite energy only.

15. The angular velocity of rotation of a star (of mass M and radius R) at which the matter starts to escape from its equator, is

(a) $\sqrt{\frac{2GR}{M}}$ (b) $\sqrt{\frac{2GM}{R^3}}$

(c) $\sqrt{\frac{2GM}{R}}$ (d) $\sqrt{\frac{2GM^2}{R}}$

16. Greater accuracy in the determination of the position of a particle with an optical microscope can be had, if the beam of light used
(a) is polarised
(b) has greater intensity
(c) has higher wavelength
(d) has higher frequency.

17. A body of mass 5 kg is raised vertically to a height of 10 m by a force of 170 N. The velocity of the body at this height will be
(a) 37 m/s (b) 22 m/s
(c) 15 m/s (d) 9.8 m/s.

18. An intrinsic semiconductor, at the absolute zero temperature, behaves like a/an
(a) insulator (b) superconductor
(c) n-type semiconductor
(d) p-type semiconductor.

19. The periodic time of a body executing SHM is 4 sec. After how much interval from time $t = 0$, its displacement will be half of its amplitude?
(a) $\frac{1}{2}$ sec (b) $\frac{1}{3}$ sec
(c) $\frac{1}{4}$ sec (d) $\frac{1}{6}$ sec.

20. Time period of pendulum, on a satellite orbiting the earth is
(a) zero (b) infinity
(c) $1/\pi$ (d) π.

21. For an enclosure maintained at 1000 K, the maximum radiation occurs at wavelenghth λ_m. If the temperature is raised to 2000 K, the peak will be shift to
(a) $\frac{1}{2}\lambda_m$ (b) $\frac{3}{2}\lambda_m$
(c) $\frac{5}{2}\lambda_m$ (d) $\frac{7}{2}\lambda_m$.

22. It is possible to have a positively charged body at
(a) zero potential (b) negative potential
(c) positive potential (d) all of these.

23. If two lenses of power +1.5 D and +1.0 D are placed in contact, then the effective power of combination will be
(a) 2.5 D (b) 4.2 D
(c) 4.5 D (d) 5.4 D.

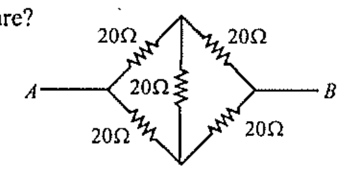
24. Simple capacitor filters are good for
(a) low voltage supply (b) low current supply
(c) high current supply
(d) low voltage and high current supply.

25. The heat produced by a 100 W heater in 2 minutes is equal to
(a) 16.3 kcal (b) 14.2 kcal
(c) 10.5 kcal (d) 2.8 kcal.

26. Curies temperature of iron is the temperature below which, it is
(a) radioactive (b) superconducting
(c) ferromagnetic (d) diamagnetic.

27. An X-ray beam of wavelength 10^{-10} m falls on a crystal of atomic spacing 2×10^{-10} m. The Bragg angle for the second order reflection will be
(a) 15° (b) 30°
(c) 45° (d) 60°.

28. What is the equivalent resistance between A and B in the given figure?



(a) 10 Ω
(b) 20 Ω
(c) 40 Ω
(d) 50 Ω.

29. A certain mass of gas at 273 K is expanded to 81 times its volume under adiabatic conditions. If γ= 1.25 for the gas then its final temperature is
(a) 0°C (b) −91°C
(c) −182°C (d) −235°C.

30. In a phase-shift oscillator, the positive feedback is taken from the
(a) anode directly (b) grid and anode
(c) load resistance (d) RC network.

31. The moment of inertia of a disc of mass M and radius R about an axis which is tangential to the circumference of the disc and parallel to its diameter, is

(a) $\frac{3}{2}MR^2$ (b) $\frac{2}{3}MR^2$

(c) $\frac{5}{4}MR^2$ (d) $\frac{4}{5}MR^2$.

32. Crystalline solids are

(a) anisotropic (b) isotopic

(c) amporphus (d) none of these.

33. The motion of a rocket is based on the principle of conservation of

(a) mass (b) kinetic energy

(c) linear momentum (d) angular momentum.

34. Which of the following relation is called as current density?

(a) $\frac{I}{A}$ (b) $\frac{A}{I}$

(c) $\frac{I^2}{A}$ (d) $\frac{I^3}{A^2}$.

35. A body weighed 250 N on the surface assuming the earth to be a sphere of uniform mass density, how much would it weight half way down to the centre of the earth?

(a) 240 N (b) 210 N

(c) 195 N (d) 125 N.

36. Radius of gyration of a body depends upon

(a) axis of rotation (b) translation motion

(c) shape of the body (d) area of the body.

37. Ten identical wires each having a resistance of one ohm are connected in parallel. The combination will have a resistance of

(a) 10 Ω (b) 1 Ω

(c) 0.1 Ω (d) 0.01 Ω.

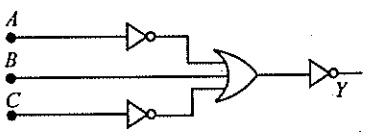
38. The logic circuit given in the figure performs the logic operation

(a) $\overline{A}BC$

(b) $A\overline{BC}$

(c) $\overline{ABC}$

(d) $AB\overline{C}$.



39. A nucleus of ${}_4Be^9$ absorbs an alpha particle and emits a neutron. The resulting nucleus will be

(a) ${}_6C^{12}$ (b) ${}_4BE^8$

(c) ${}_5C^{13}$ (d) ${}_6C^{13}$.

40. If a p-n diode is reverse biased, then the resistance measured by an ohm-meter, will be

(a) zero (b) low

(c) high (d) infinite.

Directions for Q.41 to 60 : *These questions consists of two statements each, printed as* ***Assertion*** *and* ***Reason****. While answering these questions you are required to choose any one of the following four responses.*

(a) If both Assertion and Reason are true and the Reason is a correct explanation of the Assertion.

(b) If both Assertion and Reason are true but Reason is not a correct explanation of the Assertion.

(c) If Assertion is true but the Reason is false.

(d) If both Assertion and Reason are false.

41. *Assertion (A) :* Evaporation has a cooling effect.
Reason (R) : At the surface of the liquid, some of the faster upward-moving molecules have enough kinetic energy to overcome the attractions from other molecules and escape from the liquid. With these faster molecules gone, the average kinetic energy of those left behind is reduced.

42. *Assertion (A) :* Room heaters and refrigerators lose most of their heat by convection.
Reason (R) : A hot surface heats the air next to it. The hot air rises, to be replaced by cooler air which then heats up, and so on.

43. *Assertion (A) :* The diameter of an atom is ~ 10^4 times that of its nucleus.
Reason (R) : The diameter of the nucleus is ~ 10^{-14}m

44. *Assertion (A) :* Many solids have a molar heat capacity close to 25 J mol^{-1} K^{-1}
Reason (R) : The molar heat capacity is the heat capacity per mole.

45. *Assertion (A) :* In conductors the electrons are free to move between atoms.
Reason (R) : In conductors the conduction band is only partly filled. It has unoccupied energy levels.

46. *Assertion* : The relative velocity of two photons travelling in opposite directions is C.
Reason : The rest mass of photon is zero.

47. *Assertion* : Brilliant colours are seen in thin layer of oil on the surface.
Reason : White light is composed of several colours.

48. *Assertion* : Activity of 10^8 undecayed radioactive nuclei of half life 50 days is equal to that of 1.2×10^8 undecayed nuclei of some other material with half life 60 days.
Reason : Activity is proportional to half life.

49. *Assertion* : Any hollow metallic closed container maintained at a uniform temperature can act as a source of black body radiation.
Reason : All metals act as black bodies.

50. *Assertion* : In LCR series circuit. The reasonance occurs at one frequency only.
Reason : At resonance the inductive reactance is equal to the capacitive reactance.

51. *Assertion* : The comets do not obey Kepler's laws of planetary motion.
Reason : The comets do not have elliptical orbit.

52. *Assertion* : Water kept in an open vessel will quickly evaporate on the surface of the moon.
Reason : The temperature at the surface of the moon is much higher than the boiling point of water.

53. *Assertion* : A domestic electrical appliance, working on a three pin, will continue working even if the top pin is removed.
Reason : The third pin is used only as a safety device.

54. *Assertion* : A needle placed carefully on the surface of water may float, whereas a ball of the same material will always sink.
Reason : The bouyancy of an object depends both on the material and shape of the object.

55. *Assertion* : Electric appliances with metallic body, *e.g.* heaters have three-pin connection, whereas an electric bulb has a two pin connection.
Reason : Three pin connection reduces heating of connecting cables.

56. *Assertion* : Machine parts are jammed in winter.
Reason : The viscosity of lubricant used in machine parts increase at low temperatures.

57. *Assertion* : A normal eye can clearly see all the objects beyond a certain minimum distance.
Reason : The human eye has the capacity to suitably adjust the focal length of its lens to a certain extent.

58. *Assertion* : On a rainy day, it is difficult to drive a car or bus at high speed.
Reason : The value of coefficient of friction is lowered on wetting the surface.

59. *Assertion* : The Sun looks bigger in size at sunrise and sunset than during day.
Reason : The phenomenon of diffraction bends light rays.

60. *Assertion* : The rainbow is seen sometimes in the sky when it is raining. When one sees a rainbow, one's back is towards the Sun.
Reason : Internal reflection from water droplet causes dispersion. The final ray is in the backward direction.

CHEMISTRY

61. The number of unpaired electron in $1s^2\ 2s^2\ 2p^3$ is
(a) 1 (b) 2
(c) 3 (d) 5.

62. The oxidation number of oxygen atom in O_2^{2-} ion is
(a) −1 (b) −2
(c) −3 (d) −5.

63. Maximum covalency of an element of atomic number 7 is
(a) 2 (b) 3
(c) 4 (d) 5.

64. Lithopone, a white pigment, consists of
(a) PbS and MgO (b) $BaSO_4$ and $PbSO_4$
(c) ZnS and $BaSO_4$ (d) Al_2O_3 and $CaCO_3$.

65. The number of electrons required to deposit 1 gm equivalent aluminium (at. wt. = 27) from a solution of aluminium chloride will be
(a) 1 (b) 2
(c) 3 (d) 4.

66. The amount of zinc (at. wt. = 65) necessary to produce 224 ml of H_2 by the reaction with an acid will be
(a) 0.065 gm (b) 0.65 gm
(c) 6.5 gm (d) 7.5 gm.

67. The volume of carbon dioxide gas evolved at S.T.P. by heating 7.3 gm of $Mg(HCO_3)_2$ will be
(a) 1120 ml (b) 2000 ml
(c) 2240 ml (d) 2340 ml.

68. The molarity of pure water is
(a) 1.16 M (b) 5.56 M
(c) 18.36 M (d) 55.56 M.

69. A certain gas diffuses four times as quickly as oxygen. The molecular weight of the gas is
(a) 1 (b) 1.5
(c) 2 (d) 16.

70. The equivalent weight of oxygen, when it is converted to oxide is equal to
(a) molecular weight (b) $\frac{\text{molecular weight}}{2}$
(c) $\frac{\text{molecular weight}}{3}$ (d) $\frac{\text{molecular weight}}{4}$

71. Which of the following is used in photography?
(a) AgCl (b) AgBr
(c) Ag_2S (d) $Ag_2C_2O_4$.

72. In the presence of mercuric ion and concentrated sulphuric acid, the reaction of acetylene with water produces
(a) CH_3-CHO (b) CH_3-COOH
(c) $CH_3-CO-CH_3$
(d) CH_3-CH_2-OH.

73. If an atom is reduced, its oxidation number
(a) increases (b) slightly decreases
(c) does not change (d) sharply decreases.

74. Which of the following has the maximum electronegativity?
(a) F (b) O
(c) C (d) N.

75. The property, which can be classified as an intensive property, is
(a) mass (b) temperature
(c) volume (d) heat capacity.

76. The temperature, at which the density of O_2 at 1 atm. is the same as that of CH_4 at S.T.P. is
(a) 100°C (b) 150°C
(c) 273°C (d) 546°C.

77. The important ore of aluminium is
(a) corundum (b) ruby
(c) kaolin (d) bauxite.

78. Which of the following oxyacids does not exist?
(a) $HBiO_3$ (b) H_3BiO_4
(c) H_3SbO_3 (d) H_3AsO_4.

79. The fractional distillation is used in
(a) crude oil (b) coal tar
(c) petroleum (d) all of these.

80. If pH value of a solution is 3 and by adding water, it becomes 6, then the dilution is increased by
(a) 10 times (b) 100 times
(c) 500 times (d) 1000 times.

81. Which of the following kinds of catalysis can be explained by the adsorption theory?
(a) enzyme catalysis (b) acid base catalysis
(c) heterogeneous catalysis
(d) homogeneous catalysis.

82. The element, with atomic number 118, will be
(a) alkali (b) nobel gas
(c) transition element (d) alkaline earth metal.

83. Which of the following molecule has regular geometry?
(a) PF_3 (b) SF_6
(c) H_2O (d) XeF_4.

84. The complete combustion of CH_4 gives
(a) $CO + H_2$ (b) $CO + N_2$
(c) $CO + H_2O$ (d) $CO + N_2O$.

85. Which of the following alkaline earth metal has highest ionic mobility in aqueous solution?
(a) Ca^{2+} (b) Mg^{2+}
(c) Be^{2+} (d) Ba^{2+}.

86. Rutherford's scattering experiment is related to the size of
(a) nucleus (b) proton
(c) electron (d) neutron.

87. Which of the following compounds is not soluble in HNO_3?

(a) CuS (b) CdS
(c) PbS (d) AgCl.

88. Which of the following molecule or ions is a bidentate ligand?
(a) Br_2^+ (b) $CH_3 — C \equiv N$
(c) $C_2O_4^{2-}$ (d) CH_3NH_2.

89. What is the correct bond angle in dimethyl ether?
(a) 109° (b) 110°
(c) 120° (d) 180°.

90. The molality of a solution having 18 gm of glucose (mol. wt. = 180) dissolved in 500 gm of water is
(a) 0.1 M (b) 0.5 M
(c) 0.2 M (d) 2.2 M.

91. Nessler's reagent is used in the test of
(a) NH_3 (b) NH_4^+
(c) NH_4Cl (d) all of these.

92. How many gm of silver will be displaced from a solution of $AgNO_3$ by 4 gm of magnesium?
(a) 4 gm (b) 16 gm
(c) 18 gm (d) 36 gm.

93. The IUPAC name of the compound having the formula CCl_3CH_2CHO is
(a) 1, 1, 1 - trichloropropanal
(b) 1, 2, 1 - dichloromethanal
(c) 2, 2, 2 - trichloropropanal
(d) 3, 3, 3 - trichloropropanal.

94. In the presence of an acid, hydrolysis of methyl cyanide produces
(a) acetic acid (b) methylamine
(c) methyl alcohol (d) formic acid.

95. Chloroform by reacting with concentrated HNO_3 produces
(a) water gas (b) laughing gas
(c) tear gas (d) producer gas.

96. Euchlorine is produced by heating a mixture of
(a) KCl + Conc. HCl (b) $KClO_3$ + Conc. HCl
(c) KCl + Conc. H_2SO_4
(d) K_2ClO_3 + Conc. H_2SO_4.

97. Which of the following is a condensation polymer?
(a) dacron (b) neoprene
(c) teflon (d) polystyrene.

98. Which of the following is the electronic configuration of Cu^{2+} ($Z = 29$)
(a) [Ar] $4s^1\,3d^8$ (b) [Ar] $4s^1\,3d^{10}$
(c) [Ar] $3d^9$ (d) [Ar] $4s^2\,3d^{10}\,4p^1$.

99. Atom bomb is based on the principle of
(a) radioactivity (b) nuclear fusion
(c) nuclear fission (d) fusion and fission.

100. In which of the following reaction $K_p > K_c$?
(a) $H_2 + I_2 \rightarrow 2HI$ (b) $N_2 + 3H_2 \rightarrow 2NH_3$
(c) $PCl_3 + Cl_2 \rightarrow PCl_5$ (d) $2SO_3 \rightarrow O_2 + 2SO_2$.

Directions for Q. 101 to 120 : *These questions consists of two statements each, printed as* ***Assertion and Reason****. While answering these questions you a re required to choose any one of the following four responses.*

(a) If both Assertion and Reason are true and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are true but Reason is not a correct explanations of the Assertion.
(c) If Assertion is true but the Reason is false.
(d) If both Assertion and Reason are false.

101. *Assertion :* Alpha (α)-amino acids exist as internal salt in solution as they have amino and carboxylic acid groups in near vicinity.
Reason : H^+ ion given by carboxylic group (—COOH) is captured by amino group ($—NH_2$) having lone pair of electrons.

102. *Assertion :* Methanoic acid reduces mercuric chloride to mercurous chloride on heating while ethanoic acid does not.
Reason : Methanoic acid is a stronger acid than ethanoic acid.

103. *Assertion :* Sulphur dioxide and chlorine are both bleaching agents.
Reason : Both are drying agents.

104. *Assertion :* In case the central atom in a molecule is surrounded only by shared pairs of electrons, the molecule has a regular geometry.
Assertion : The shared electron pairs repel each other with equal force so all bonds are equidistant from each other.

105. *Assertion :* Nitrous acid (HNO_2) may act as an oxidising as well as a reducing agent.
Reason : The oxidation number of nitrogen remains same in all the compounds.

106. *Assertion :* The bond order in a molecule can have any value, positive or negative, integral

or fractional or zero.
Reason : The bond order of a molecule depends upon the number of electron in the bonding and antibonding molecular orbitals.

107. *Assertion :* Phenol undergoes Kolbe's reaction whereas ethanol does not.
Reason : Phenoxide ion is more basic than ethoxide ion.

108. *Assertion :* A spectral line will be observed for a $2p_x - 2p_y$ transition.
Reason : The energy is released in the form of wave of light when electron drops from $2p_x$ to $2p_y$ orbital

109. *Assertion :* Aromatic aldehydes and also formaldehyde undergo Cannizzaro reaction with strong alkali.
Reason : Aldehydes which have α-hydrogen atoms undergo cannizzaro reaction.

110. *Assertion :* With halogens and alkali, amides give primary amines having one carbon atom less.
Reason : The reaction of amides with alkali is a qualitative test of amides.

111. *Assertion :* Formic acid reduces mercuric chloride to mercurous chloride on heating, while acetic acid does not.
Reason : Formic acid is a stronger acid than acetic acid.

112. *Assertion (A) :* The graphite is a better lubricant on the moon than on the earth.
Reason (R) : On the moon, there is lack of gravity on the motion of machines.

113. *Assertion :* Enthalpy of graphite is lower than that of diamond.
Reason : Entropy of graphite is greater than that of diamond.

114. *Assertion :* Copper liberates hydrogen from a solution of dilute hydrochloric acid.
Reason : Hydrogen is below copper in the electrochemical series.

115. *Assertion :* Phenol undergoes Kolbe reaction whereas ethanol does not.
Reason : Phenoxide ion is more basic than ethanoxide ion.

116. *Assertion :* Alkali metals impart colour to the flame.
Reason : Their ionisation energies are low.

117. *Assertion :* Bond order in a molecule can assume any value positive or negative; integral or fractional, including zero.
Reason : It depends on the number of electrons in the bonding and antibonding orbitals.

118. *Assertion :* The molecularity of the reaction $H_2 + Br_2 = 2\,HBr$ is two.
Reason : The order of this reaction is 3/2.

119. *Assertion :* Cyclobutane is less stable than cyclopentane.
Reason : Presence of 'blent bonds' causes "loss of orbital overlap".

120. *Assertion :* The Dumans method is more applicable to nitrogen containing organic compounds than the Kjeldahl's method.
Reason : The Kjeldahl's method does not give satisfactory results for compounds in which nitrogen is directly linked to oxygen.

BIOLOGY

121. Single filament of *Nostoc* without mucilage sheath is known as
(a) trichome (b) colony
(c) mycelium (d) hyphae.

122. Which type of cancer is found in lymph nodes and spleen?
(a) leukaemia (b) sarcoma
(c) carcinoma (d) lymphoma.

123. A plant cell has potential to develop into full plant. This property of the plant cell is called
(a) pleuripotency (b) totipotency
(c) tissue culture (d) gene cloning.

124. Phytotron is a device by which
(a) protons are liberated
(b) plants are grown in controlled environment
(c) mutations are produced in plants
(d) leaf fall occurs on abscission layer.

125. When the gametophyte is not formed by spores but by any other part of sporophyte, it is known as
(a) apospory (b) polyspory
(c) multispory (d) germination.

126. Eggs having yolk in their centre and cytoplasm in peripheral layer, are called
(a) centrolecithal (b) microlecithal
(c) isolecithal (d) telolecithal.

127. Passive immunity is defined as immunity
(a) acquired through first exposure to the disease
(b) achieved through vaccination
(c) inherited from the parents
(d) achieved through the sera of other animals enriched in antibodies.

128. Sensation of stomach pain is due to
(a) proprioceptors (b) exteroceptors
(c) interoceptors (d) teloreceptors.

129. Sympathetic nerves in mammals arise from
(a) thoraco-lumbar region
(b) cervical region
(c) sacral region
(d) 3rd, 7th, 9th and 10th cranial nerves.

130. The genes, which are confirmed to differential region of Y-chromosomes only, are called
(a) holandric (b) autosomal
(c) mutant
(d) completely sex-linked.

131. The asexual production of seed is called
(a) fragmentation (b) advention
(c) apomixis (d) self-fertilization.

132. Recent reports of acid rains in big industrial cities are due to the effect of atmospheric pollution by excessive release of
(a) NH_3 by coal gas industries
(b) CO_2 by burning of coal/wood, cutting of forests
(c) NO_2 and SO_2 by burning of fossil fuels.
(d) CO_2 by incomplete combustion of carbon fuel.

133. The C_4 plants differ from C_3 plants with reference to the
(a) substrate that accepts CO_2 in carbon assimilation
(b) number of ATP that are consumed in preparing sugar
(c) type of end product
(d) type of pigment involved in photosynthesis.

134. Perisperm is
(a) peripheral part of endosperm
(b) persistent of *nucellus*
(c) remnant of endosperm
(d) disintegrated secondary nucleus.

135. Translocation of organic materials is best explained by
(a) imbibition theory
(b) transpiration pull
(c) active transport
(d) mass flow hypothesis.

136. How much amount of oxygen is present in one gram of haemoglobin?
(a) 20 ml (b) 13.4 ml
(c) 1.34 ml (d) 40 ml.

137. Which proteolytic enzyme induces lysis of firbin during fibrinolysis?
(a) firbin (b) thrombin
(c) plasmin (d) all of these.

138. Which of the following is an example of sex-linked inheritance?
(a) night-blindness (b) cretinism
(c) anaemia (d) colour-blindness.

139. There is an irregular mating population. If the frequency of an autosomal recessive lethal gene is 0.4, then the frequency of the carriers in a population of 200 individuals is
(a) 96 (b) 72
(c) 36 (d) 104.

140. The compound, which is soluble in water but does not impede the oxygen transportation, is
(a) NO (b) SO_3
(c) SO_2 (d) CO.

141. Major source of sugar in the world is
(a) *Citrulus vulgaris* (b) *Annona squamosa*
(c) *Beta vulgaris*
(d) *Saccharum officinarum.*

142. During photosynthesis oxygen, in glucose comes from
(a) oxygen in air (b) carbon dioxide
(c) water (d) both (a) and (b).

143. Red Data Book deals with
(a) plants on the verge of extinction
(b) plants that are extinct
(c) endemic plant
(d) plant showing photoperiodism.

144. Which of the following correctly represents the flow of genetic information?
(a) DNA → RNA → protein
(b) protein → RNA → DNA
(c) RNA → DNA → protein
(d) RNA → protein → DNA.

145. When ovules at two points are developed, from the inner wall of the unilocular ovary, the placentation is called
(a) marginal (b) basal
(c) parietal (d) superficial.

146. Which of the following is most convincing reasons for increasing population growth in a country?
(a) low population of old people
(b) low mortality rate (c) high birth rate
(d) high population of young children.

147. Which of the following is not applicable to coelenterates?
(a) coelenteron (b) nematoblasts
(c) choanocytes (d) radial symmetry.

148. The horns of Rhinoceros are composed of
(a) chitin (b) cartilage
(c) bone (d) keratin.

149. Chordae tendinae are found in
(a) ventricles of brain (b) atria of heart
(c) joints of legs (d) ventricles of heart.

150. The amphids are cuticular elevations on the ventro-lateral lips of *Ascaris*. These are
(a) tactoreceptors (b) tangoreceptors
(c) chemoreceptors (d) olfactoreceptors.

151. The cell organelle associated with photorespiration is
(a) mesosome (b) lysosome
(c) ribosome (d) glyoxysome.

152. The 3 sub-families of leguminose are distinguished mainly on the basis of
(a) nature and habit of plants
(b) inflorescence and flower characters
(c) nature of gynoecium
(d) nature of fruit and its germination.

153. Which of the following plant yields powerful analgesic?
(a) *Rauwolfia serpentina*
(b) *Ferula asafoetida*
(c) *Carcuma longa*
(d) *Papaver somniferum*.

154. Black wood is obtained from
(a) *Dalbergia* (b) *Acacia*
(c) *Albizzia* (d) *Manihot*.

155. Velamen is found in
(a) *Viscum* (b) *Rosa*
(c) *Vanda* (d) *Santalum*.

156. The shade of a tree is cooler than the shade of a roof due to
(a) transpiration
(b) green leaves
(c) guttation
(d) photosynthesis.

157. Preganglionic sympathetic fibres are
(a) synergic (b) cholinergic
(c) adrenergic (d) hypergonic.

158. Homonids were originated during
(a) miocene (b) palaeocene
(c) pliocene (d) oligocene.

159. Meroblastic cleavage refers to which type of division of eggs?
(a) incomplete (b) spiral
(c) total (d) horizontal.

160. Glycosidic bond is broken during the digestion of
(a) lipid (b) starch
(c) protein (d) all of these.

Directions for Q. 161 to 180 : *These questions consist of two statements each, printed as assertion and reason. While answering these questions you are required to choose any one of the following four responses.*
(a) If both assertion and reason are true and the reason is a correct explanation of the assertion.
(b) If both assertion and reason are true but the reason in not a correct explanation of the assertion.
(c) If assertion is true but the reason is false
(d) If both assertion and reason are false.

161. *Assertion :* Mitochondria are semi autonomous bodies.

Reason : Mitochondria produce ATP by the breakdown of carbohydrates into CO_2 and H_2O.

162. *Assertion* : Protostele has no pith in centre.
Reason : It is the most primitive stele in plant kingdom.

163. *Assertion* : Some of the monocots show increase in girth
Reason : Vascular cambium is absent in monocot.

164. *Assertion* : Plasma membrane is selectively permeable.
Reason : It allows some solutes to pass through it readily along with solvents.

165. *Assertion* : Plasmolysis occurs due to phenomenon of exosmosis.
Reason : It occurs because of hypertonic solution outside.

166. *Assertion* : Male *Anopheles* does not spread malaria.
Reason : It does not carry *Plasmodium*.

167. *Assertion* : Termites and ants are social insects.
Reason : They make fungus garden in their nests.

168. *Assertion* : In frog cleavage is unequal and holoblastic.
Reason : Their eggs are macrolecithal.

169. *Assertion* : Patella and fabella are sesamoid bones
Reason : They are formed by ossification of tendons.

170. *Assertion* : Deamination occurs by transaminase enzyme in the kidney.
Reason : Removal of an amino group from an amino acid is used in production of Ammonia.

171. *Assertion* : Meiotic division results in the production of four dissimilar cells.
Reason : Synapses occurs during zygotene of meiosis.

172. *Assertion* : Minerals are not part of biologically active substances.
Reason : Some individuals suffer anaemia due to the deficiency of iron.

173. *Assertion* : Submerged plants get CO_2 in the form of carbonates and bicarbonates.
Reason : Stomata are not present in submerged plants.

174. *Assertion* : In alcoholic drink, the alcohol is converted into glucose in the liver.
Reason : Liver cells are able to produce glucose from alcohol by back fermentation.

175. *Assertion* : Generally, a woman does not conceive during the lactation period.
Reason : The hormone 'prolactin' initiates and maintains lactation in a postpartum woman

176. *Assertion* : *Drosophila melanogaster* is widely used in genetic research.
Reason : *Drosophila melanogaster* is a readily available insect.

177. *Assertion* : The 'absorption spectrum' of chlorophyll 'a' shows close correlation with its 'action spectrum'
Reason : Chlorophyll 'a' is present in both the pigment systems I and II.

178. *Assertion* : Ionizing radiations are harmful for the living organism.
Reason : They form toxic photoproducts in the cells.

179. *Assertion* : The development in cockroach is heterometabolous metamorphosis.
Reason : The young ones resemble the adults in all.

180. *Assertion* : The aerobic respiration is bioenergically more efficient than the anaerobic glycolysis.
Reason : The aerobic respiration occurs in the mitochondria, while glycolysis is purely cytosolic.

GENERAL KNOWLEDGE

181. The human skeleton is divided into
(a) two parts (b) three parts
(c) four parts (d) six parts.

182. Who said these words "Play the game in the spirit of the game".
(a) Rajiv Gandhi (b) Indira Gandhi
(c) Chandrashekar (d) Jawahar Lal Nehru

183. The chief metabolic function of vitamin 'D' is to
(a) afford antiachitic activity
(b) prevent night blindness
(c) prevent blood coagulation
(d) prevent the loss of muscle.

184. The capital of 'Barbados' is
(a) Capetown (b) Bridgetown (c) Belarus (d) Berlin.

185. Mother Teresa won the Nobel Prize for peace in
(a) 1992 (b) 1989
(c) 1984 (d) 1979.

186. First Woman Congress President was
(a) Annie Besant (b) Sarojini Naidu
(c) Indira Gandhi
(d) Vijayalakshmi Pandit.

187. Sri Aurbindo was a great
(a) writer (b) actor
(c) philosopher (d) sport person.

188. "Bharat Bharti" was written by
(a) Amrita Pretam (b) Mulkraj Anand
(c) Suryakant Tripathi
(d) Maithili Saran Gupta.

189. Aravali range is situated in the
(a) north-west region (b) south-west region
(c) north-east region (d) south-east region.

190. 'Prince of Wales Cup' is related with
(a) Golf (b) Hockey
(c) Football (d) Cricket.

191. 'Diesel Engine' was invented by
(a) Carnot (b) H.W. Seeley
(c) Edison (d) Rudolf Diesel.

192. Astrology deals with the study of
(a) space (b) bacteria
(c) plants life
(d) stars and future forecasting.

193. Integrated Rural Development Progress (IRDP) was initiated during
(a) 1975-1976 (b) 1969-1970
(c) 1976-1977 (d) 1980-1981.

194. The natural growth rate of population during any year is the difference between the
(a) birth rate and death rate per 1000
(b) death rate and birth rate per 1000
(c) birth rate and average population
(d) average population and birth rate per 1000.

195. Latitude is the distance in degrees on the earth's surface is measured
(a) north and south poles of the equator
(b) east and west poles of the equator
(c) upper and lower position of the earth
(d) temperature difference between different areas on earth.

196. 'GATT' stands for
(a) general agreement on toures and travels
(b) general agreement on to traffic's and track
(c) general agreement on trade and tourism
(d) general agreement on telephone and telegraph.

197. The attorney general of India is the legal adviser to
(a) Prime Minister on foreign policies
(b) Government of India
(c) President of India
(d) Government on finance policies.

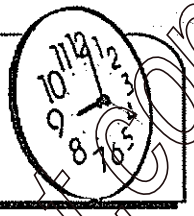
198. First speaker of Lok Sabha was
(a) G.V. Mavalankar
(b) Sardar Hukum Singh
(c) Bali Ram Bhagat
(d) Neelam Sanjiva Reddy.

199. The first chief justice of India was
(a) J.C. Shah (b) S.R. Das
(c) Patanjali Shastri (d) Harilal J. Kania.

200. 'Vande Matram. was first published in
(a) Anand math (b) Vinay patrika
(c) Gitanjali (d) Nandini.

■■■

Model Test Paper-2



Time : $3\frac{1}{2}$ hours. *Maximum Marks : 200*

PHYSICS

1. A person wants to see two pillars distant 11 km as separate and distinct. The distance between the pillars must be approximately
(a) 0.25 m (b) 3 m
(c) 1 m (d) 0.5 m

2. An electromagnetic radiation has an energy 14.4 keV. To which region of electromagnetic spectrum does it belong ?
(a) X-rays region (b) Visible region
(c) Infra red region (d) γ-ray region

3. A circuit element X when connected to an a.c. supply of peak voltage 200V gives a peak current of 5A which is in phase with the voltage. A second circuit element Y, when connected by itself with the same supply also gives the same value of the peak current, but the current now lags the voltage by 90°. If a series combination of X and Y is connected to the same supply, what will be the r.m.s. value of the current ?
(a) 5 A (b) $2.5\sqrt{2}$ A
(c) 2.5 A (d) $5\sqrt{2}$ A

4. If applied voltage on a motor is 200 volt and back e.m.f. is 160 volt. The efficiency of the motor is
(a) 50% (b) 80%
(c) 100% (d) 25%

5. The value of relative magnetic permeability (μ_r) for ferromagnetic materials is
(a) $\mu_r = 1$ (b) $\mu_r >> 1$
(c) $\mu_r < 1$ (d) $\mu_r > 1$

6. A circular disc of area $\left(4\hat{i}+5\hat{j}\right) \times 10^{-3}\ m^2$ is placed in a uniform magnetic field of intensity $\left(0.2\hat{i}+0.3\hat{j}\right)$ tesla. The flux crossing the disc will be
(a) 23×10^{-3} weber (b) 23×10^{-2} weber
(c) 23 weber (d) 23×10^{-4} weber

7. The resistance required to be connected in parallel to an ammeter in order to increase its range 10 times, will be
(a) Ten times the resistance of ammeter
(b) Nine times the resistance of ammeter
(c) One tenth of the resistance of ammeter
(d) One ninth of the resistance of ammeter

8. The magnetic flux density applied in a cyclotron is 3.5 tesla. The frequency of the electric field that must be applied between the dees in order to accelerate protons, will be
(a) 5.34×10^7 Hz (b) 3.55×10^7 Hz
(c) 6.53×10^7 Hz (d) None of these

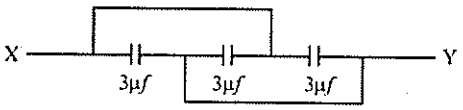
9. The cold junction of a thermocouple is maintained at 10°C. No thermo-e.m.f. is developed when the hot junction is maintined at 530°C. The neutral temperature is
(a) 540°C (b) 520°
(c) 530°C (d) 270°C

10. If two bulbs of wattage 25 and 100 respectively each rated at 220-volt are connected in series with the supply of 440 volt, then which of the bulbs will fuse ?
(a) 100 watt bulb (b) 25 watt bulb
(c) None of these (d) Both (a) and (b)

11. A cell of e.m.f 2 volt and internal resistance 1.5 Ω is connected to the ends of 1 m long wire. The resistance of wire is 0.5 Ω/m. The value of potential gradient on the wire will be
(a) 0.05 V/m (b) 5 V/m
(c) 0.5 V/m (d) 4.005 V/m

12. The resistance of a wire is 10 Ω. Its length is increased by 10% by stretching. The new resistance will now be
(a) 13 Ω (b) 1.2 Ω
(c) 12 Ω (d) 11 Ω

13. The equivalent capacity in the following figure between the points X and Y will be



(a) 1 μf (b) 9 μf
(c) 4.5 μf (d) 6 μf

14. Two small spheres each having the charge + Q are suspended by insulating threads of length L from a hook. This arrangement is taken in space where there is no gravitational effect, then the angle between the two suspensions and the tension in each thread will be

(a) $180°, \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{2L^2}$ (b) $90°, \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{L^2}$

(c) $180°, \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{(2L)^2}$ (d) $\frac{1}{180°}, \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{L^2}$

15. The electric flux entering and emanating out of a closed surface is 2×10^3 and 8×10^3 volt-meter respectively. The charge enclosed by the closed surface is
(a) 0.53 μC (b) Zero
(c) 1 coulomb (d) 0.053 μC

16. In Meldis experiment the string vibrates in 7 segments under tension of 9 gm-wt. If the string is to be vibrated in 3 segments, the tension required will be
(a) 61 gm-wt (b) 49 gm-wt
(c) 1.4 gm-wt (d) 13 gm-wt

17. The temperature of the filament of a lamp is 2100 K and its surface area is 4×10^{-4} m^2. If the emissivity of the filament is 0.453 then the power of lamp is
(a) 400 watt (b) 200 watt
(c) 100 watt (d) 0 watt

18. Equal volumes of monoatomic and diatomic gases of same initial temperature and pressure are mixed. The ratio of the specific heats of the mixture $\left(\frac{C_p}{C_v}\right)$ will be
(a) 1.52 (b) 1.5
(c) 1 (d) 1.53

19. 5 gm air is heated from 4°C to 6°C. If the specific heat of air at constant volume be 0.172 cal/gm-°C, the increase in the internal energy of air will be
(a) 7.2 calorie (b) 17.2 joule
(c) 7.2 erg (d) 1.72 calorie

20. At a certain instant of time the mass of a rocket going up vertically is 100 kg. If it is ejecting 5 kg of gas per second at a speed of 400 m/s, the acceleration of the rocket would be (Taking g = 10 m/s^2)
(a) 2 m/s^2 (b) 10 m/s^2
(c) 20 m/s^2 (d) 1 m/s^2

21. If the change in the value of 'g' at a height h above the surface of the earth is the same as at a depth x below its surface then (both x and h being much smaller than the radius of the Earth)
(a) $x = \frac{h}{2}$ (b) $x = 2h$
(c) $x = h$ (d) $x = h^2$

22. A constant torque acting on a circular wheel changes its angular momentum from A_0 to $4A_0$ in 4 second. The magnitude of this torque is
(a) 4 A_0 (b) A_0
(c) $\frac{3A_0}{4}$ (d) 12 A_0

23. A body of 5 kg moves on a frictionless horizontal surface with a speed 3 m/s. It compresses a spring put along its way and stops. What is the compession in spring ? The force constant of spring = 10 kg wt per metre.
(a) 0.2 m (b) 1 m
(c) 0.68 m (d) None of these.

24. A 12 HP motor has to be operated 8 hour/day. How much will it cost at the rate of 1.50 rupees per kilowatt-hour in 10 days ?
(a) Rs. 950 (b) Rs. 1500
(c) Rs. 1000 (d) Rs. 1074.24

25. A man is at rest in the middle of a pond on perfectly smooth ice. He can get himself to the shore by

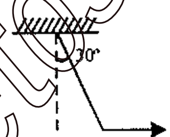
making use of Newton's
(a) Third law (b) Second law
(c) First law (d) All the laws

26. The mass of a rocket is 10,000 kg. The velocity of the gases escaping from it is 1000 m/s. At what rate should the fuel be burnt so that the rocket may just take off ?
(a) 19.6 kg/minute (b) 19.06 kg/s
(c) 9.8 kg/s (d) 98 kg/s

27. A block of mass 2 kg rests on a rough inclined plane making an angle of 30° with the horizontal. The coefficient of static friction between the block and the plane is 0.7. The frictional force on the block is
(a) $9.8 \times \sqrt{3}\, N$ (b) $0.7 \times 9.8 \times \sqrt{3}\, N$
(c) $9.8\, N$ (d) $0.7 \times 9.8\, N$

28. Which of the following is an example of motion in three dimensions ?
(a) Motion in a vertical circle
(b) Motion of blades of rotating fan
(c) A vertically falling object
(d) Motion of an electron in the atom

29. A pendulum bob of weight $2N$ is pulled to the right by a horizontal force F until the string makes an angle of 30° to the vertical. What is the force and tension in the string needed to sit at 30°?
(a) 3 newton, 3.5 newton
(b) 4 newton, 3 newton
(c) 2 newton, 1 newton
(d) 1.2 newton, 2.3 newton



30. Dimensions of permeability of a medium are
(a) $[MLT^{-2}A^{2}]$ (b) $[MLT^{-2}A^{-2}]$
(c) $[ML^{-1}T^{2}A^{-2}]$ (d) $[ML^{-1}T^{-2}A^{-2}]$

31. What is the number of significant figures in 0.002305×10^{-27} kg ?
(a) 4 (b) 6
(c) 7 (d) 3

32. The maximum number of the photoelectrons released in a photocell is independent of
(a) Intensity of radiations incident on cathode surface
(b) Frequency of the incident ray
(c) Nature of the cathode surface
(d) None of the above

33. A transformer has 50 turns in its primary winding and 25 turns in its secondary winding. If the current in the secondary winding is 4 ampere, what is the current in primary winding ?
(a) 3 amp (b) 2 amp
(c) 1 amp (d) 4 amp

34. Calculate the resonant frequency of a circuit consisting of an inductor of 0.2 mH and a capacitor of $2\mu F$ capacitance
(a) 10112 Hz (b) 9000 Hz
(c) 7962 Hz (d) 5550 Hz

35. A circuit having a resistor, an inductor and a capacitor in series is connected to a 150 V A.C. mains. For the circuit R = 9 ohm, X_L = 28 ohm and X_c = 16 ohm. Calculate the current in the circuit
(a) 20 amp (b) 15 amp
(c) 10 amp (d) 7.5 amp

36. The armature current in D.C. motor is maximum when the motor has
(a) Intermediate speed
(b) Just started
(c) Picked up maximum speed
(d) Just been switched off

37. Iron is ferromagnetic
(a) More than 770°C
(b) At normal temperature
(c) At all temperatures
(d) Below 770°C

38. The magnetic moment of a magnet (10 cm × 2 cm × 1 cm) is 1 amp × m². What is the intensity of magnetisation ?
(a) 540 amp/m (b) 4×10^5 amp/m
(c) 45 amp/m (d) 5×10^4 amp/m

39. A long straight wire carries a current of 4 amp. A proton travels with a velocity of 4×10^4 m/s parallel to the wire 0.2 m from it and in a direction opposite to the current. What is the force on which the magnetic field of current exerts on the moving proton ?

(a) 2.56×10^{-20} newton
(b) 5.62×10^{-20} newton
(c) 6.52×10^{-20} newton
(d) 2.56×10^{-20} dyne

40. Which of the following planets is called the goddess of beauty ?
(a) Mars (b) Mercury
(c) Venus (d) Jupiter

Instructions for Q. No. 41 to 60

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are falses

41. *Assertion (A) :* A pulsar is a source of radiowaves that vary in intensity at regular intervals.
Reason (R) : A pulsar is a rotating neutron star.

42. *Assertion (A):* For a given mass of an ideal gas, at constant temperature the product of the pressure and volume is constant.
Reason (R) : The mean square velocity of the molecules is inversely proportional to their masses at constant temperature.

43. *Assertion (A)* : γ for a diatomic gas is more than for a monoatomic gas.
Reason (R) : The molecules of a monoatomic gas have more degrees of freedom than those of a diatomic gas.

44. *Assertion (A) :* Radio waves can be polarised.
Reason (R) : Sound waves are longitudinal waves.

45. *Assertion (A) :* In series LCR circuit, reasonance occurs when inductive reactance is equal to capacitive reactance.
Reason (R) : At resonance the impedance of the circuit is minimum and is purely resistive.

46. *Assertion (A) :* If a pendulum falls freely, then its time period becomes infinite.
Reason (R) : Free falling body has acceleration equal to g.

47. *Assertion (A) :* Sound waves can not propagate through vaccuum but light waves can.
Reason (R) : Sound waves can not be polarised but light waves can be.

48. *Assertion (A)* : The frequencies of incident, reflected and refracted beam of monochromatic light incident from one medium to another medium are same.
Reason (R) : The incident, reflected and refracted rays are coplanar.

49. *Assertion (A) :* Machine parts are jammed in winter.
Reason (R) : The viscosity of lubricant used in machine parts increases at low temperatures.

50. *Assertion (A) :* The comets do not obey Kepler's laws of planetary motion.
Reason (R) : The comets do not have elliptical orbits.

51. *Assertion (A) :* Lightening conductors are made pointed at the end.
Reason (R) : An oppositely charged electric wind starts from the pointed end.

52. *Assertion (A) :* The internal resistance of a cell depends on the concentration of the electrolyte used in the cell
Reason (R) : Dilution increases the ionisation of the electrolyte.

53. *Assertion (A) :* For a given mass of an ideal gas, the product of the pressure and volume is constant, at constant temperature.
Reason (R) : The root-mean-square speed of the molecules is inversely proportional to the square root of their mass.

54. *Assertion (A) :* The ratio of C_p/C_v for a diatomic gas is more than that for a monoatomic gas.
Reason (R) : The molecules of a monoatomic gas have more degrees of freedom than those of a diatomic gas.

55. *Assertion (A) :* Newton's corpuscular theory of light could not explain refraction of light.

Reason (R) : It predicted that light should travel faster in denser media than in rarer media.

56. *Assertion (A) :* When temperature of a semi-conductor is increased, then its resistance decreases.
Reason (R) : The energy gap between conduction band and valence band is very small.

57. *Assertion (A) :* Electric appliances with metallic body have three connections, whereas an electric bulb has a two pin connection.
Reason (R) : Three pin connections reduce heating of connecting wires.

58. *Assertion (A) :* Environmental damage has increased the amount of ozone in the atmosphere.
Reason (R) : Increase of ozone increases the amount of ultra violet radiation on earth.

59. *Assertion (A) :* The ratio of $\frac{C_p}{C_v}$ is more for helium than for hydrogen gas.
Reason (R) : Atomic mass of helium is more than that of hydrogen.

60. *Assertion (A) :* A number of T.V. programmes can be simultaneously transmitted through water by means of laser.
Reason (R) : Laser beam is not absorbed by water.

CHEMISTRY

61. For a dilute solution, Raoult's law states that
(a) The relative lowering of vapour pressure is proportional to the amount of solute in solution
(b) The relative lowering of vapour pressure is equal to the mole fraction of solute
(c) The lowering of vapour pressure is equal to the mole fraction of the solute
(d) The vapour pressure of the solution is equal to the mole fraction of the solvent

62. The formula of metallic hydroxide (eq. wt = 150) is $M(OH)_2 . xH_2O$. If the atomic wt. of metal is 176 then the value of x will be
(a) 3 (b) 5
(c) 2 (d) 6

63. Why are strong acids generally used as standard solutions in acid-base titrations ?
(a) Strong acids form more stable solutions than weak acids
(b) They can be used to titrate both strong and weak bases
(c) The pH of the equivalence point will always be 7
(d) The salts of the strong acids do not hydrolyse

64. For which of the following reactions $k_p = k_c$?
(a) $H_{2(g)} + Cl_{2(g)} \rightleftharpoons 2HCl_{(g)}$
(b) $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$
(c) $2NOCl_{(g)} \rightleftharpoons 2NO_{(g)} + Cl_{2(g)}$
(d) $N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)}$

65. The hydrogen ion concentration in weak acid of dissociation constant K_a and concentration C its nearly equal to
(a) K_aC (b) $\frac{C}{K_a}$
(c) $\sqrt{\frac{K_a}{C}}$ (d) $\sqrt{K_aC}$

66. Diazonium salt decomposes as
$C_6H_5N_2^+Cl^- \rightarrow C_6H_5Cl + N_2$
At 0°C, the evolution of N_2 becomes two times faster when the initial concentration of the salt is doubled. Therefore, it is a
(a) First order reaction with molecularity two
(b) Second order reaction
(c) First order reaction
(d) Second order reaction with molecularity one

67. Milk is an example of
(a) Gel (b) Emulsion
(c) Pure solution (d) Suspension

68. If a chemical change is brought about by one or more methods, in one or more steps, then the amount of heat evolved or absorbed during complete change is the same, whichever method was followed. This rule is known as
(a) Joule Thomson effect
(b) Hess law
(c) Le Chatelier principle
(d) None of these

69. Out of Cu, Ag, Fe and Zn, the metal which can displace all other from their salt solutions is
(a) Zn (b) Cu
(c) Ag (d) Fe

70. Hydrogen oxygen fuel cells are used in space craft to supply
(a) Oxygen
(b) Power for pressure
(c) Power for heat and light
(d) Water

71. Ge(II) compounds are powerful reducing agents, whereas Pb(IV) compounds are strong oxidants. It can be due to
(a) The ionic radii of Pb^{2+} and Pb^{4+} are larger than those of Ge^{2+} and Ge^{4+}
(b) The ionisation potential of lead is less than that of germanium
(c) Lead is moe electropositive than germanium
(d) More pronounced inert pair effect in lead than in germanium

72. Glass reacts with
(a) HNO_3
(b) HF
(c) Olium
(d) $K_2Cr_2O_7$

73. Anhydrous $AlCl_3$ is prepared from
(a) Dry HCl gas + Heated Al metal
(b) Aluminium and Cl_2
(c) Conc. HCl and Al metal
(d) Dil. HCl and aluminium metal

74. In diborane, banana bond is formed between
(a) 2 electrons, 2 atoms
(b) 2 electrons, 1 atom
(c) 2 electrons, 3 atom
(d) 1 electron, 2 atoms

75. Lithopone is a combination of ZnS and
(a) $SrSO_4$ (b) $CaSO_4$
(c) $PbSO_4$ (d) $BaSO_4$

76. Microcosmic salt is
(a) $(NH_4)_2HPO_4.2H_2O$
(b) $Na(NH_4)HPO_4.4H_2O$
(c) $Na_2HPO_4.2H_2O$
(d) None of the above

77. Which of the following statements is false for alkali metals ?
(a) Li^+ ion is exceptionally small
(b) Sodium is amphoteric in nature
(c) Lithium is strongest reducing agent
(d) All alkali metals give blue solution in liquid ammonia

78. Mac Arthur process is used for
(a) Cl (b) Fe
(c) Ag (d) O_2

79. Fenton reagent is
(a) $CuSO_4$ + NaOH (b) $AgNO_3$ + NH_4 OH
(c) $SnCl_2$ + HCl (d) $FeSO_4$ + H_2O_2

80. D_2O is used more in
(a) Pharmaceutical preparations
(b) Nuclear reactor
(c) Chemical industry
(d) Insecticide preparation

81. Arrange the elements in increasing order of atomic radius Na, Rb, K, Mg
(a) Mg, Na, K Rb (b) Na, K, Mg, Rb
(c) Na, K, Mg, Rb (d) Rb, K, Mg, Na

82. Which of the following is paramagnetic ?
(a) Cu^+ (b) Ni^{2+}
(c) Zn^{2+} (d) None of these.

83. Which of the following elements will have the lowest first ionisation energy ?
(a) Li (b) Rb
(c) Mg (d) Ca

84. An element with atomic number 20 will be placed in which period of periodic table ?
(a) 2 (b) 3
(c) 4 (d) 1

85. In modern periodic table, elements are arranged in
(a) Increasing atomic number
(b) Increasing volume
(c) Increasing mass
(d) Alphabetically

86. Anline when treated with HNO_2 and HCl at 0°C gives
(a) A diazo compound
(b) Nitro benzene
(c) Phenol
(d) None of these.

87. Oxalic acid may be distinguished from tartaric acid by
(a) Litmus paper
(b) Ammoniacal silver nitrate solution
(c) Sodium bicarbonate solution
(d) Phenolphthalein

88. The weakest acid among the following is
(a) $CH_2ClCOOH$ (b) CH_3COOH
(c) $CHCl_2COOH$ (d) CCl_3COOH

89. Which compound undergoes aldol condensation?
(a) Ethyl methyl ketone
(b) Phenyl acetaldehyde
(c) Acetaldehyde
(d) All of these

90. Phenol condenses with phthalic anhydride in presence of conc. H_2SO_4 to form
(a) Phenyl red (b) Phenolphthalein
(c) Methyl orange (d) Salicylic acid

91. A gas X at 1 atm is bubbled through a solution containing $1MY^-$ and $1MZ^-$ ions at 25°C. If reduction potential of Z > Y > X then
(a) Y will oxidise both X and Z
(b) Y will oxidise Z and not X
(c) Y will oxidise X and not Z
(d) Y will reduce both X and Z

92. In an electroplating experiment m gram of silver is deposited when 4 amp current flows for 2 minutes. The amount (in grams) of silver deposited by 6 amp of current flowing for 40 sec will be
(a) $\frac{m}{4}$ (b) $\frac{m}{2}$
(c) $4m$ (d) $2m$

93. Identify the intensive quantity from the following
(a) Enthalpy and volume
(b) Volume and temperature
(c) Enthalpy and temperature
(d) Temperature and refractive index

94. The extra stability of lyophilic colloid is due to
(a) The smaller size of their particles
(b) A layer of medium of dispersion on their particles
(c) Charge on their particles
(d) The large size of their particles

95. The inversion of cane-sugar is represented by
$C_{12}H_{22}O_{11} + H_2O \rightarrow C_6H_{12}O_6 + C_6H_{12}O_6$
It is a reaction of
(a) Pseudo unimolecular
(b) Unimolecular (c) Second order
(d) None of these

96. The concentration of $[H^+]$ and concentration of $[OH^-]$ of 0.1 M aqueous solution of 2% ionised weak acid is (K_w for water = 1×10^{-14})
(a) 2×10^{-3} M and 5×10^{-12} M
(b) 1×10^{-3} M and 5×10^{-12} M
(c) 0.02×10^{-2} M and 5×10^{-11} M
(d) 3×10^{-12} M and 4×10^{-13} M

97. In which of the following case, does the reaction go farthest to completion ?
(a) K = 10 (b) $K = 10^{-2}$
(c) $K = 10^2$ (d) K = 1

98. 10 ml of conc. H_2SO_4 (18M) is diluted to one litre. The approx. strength of dilute acid could be
(a) 0.09 N (b) 0.36 N
(c) 0.18 N (d) 18.0 N

99. The hydrogen phosphate of certain metal has formula $MHPO_4$. The formula of metal chloride would be
(a) M_2Cl_2 (b) MCl_2
(c) MCl (d) MCl_3

100. Normality of 2M H_2SO_4 is
(a) $\frac{N}{2}$ (b) 4N
(c) 2N (d) $\frac{N}{4}$

Instructions for Q. No. 101 to 120

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are falses

101. *Assertion (A) :* Pure water obtained from different sources such as, river, well, spring, sea etc. always contains hydrogen and oxygen combined in the ratio 1 : 8 by mass.
Reason (R) : A chemical compound always contain elements combined together in same proportion

by mass, it was discovered by French chemist, Joseph Proust (1799).

102. *Assertion (A) :* In CO molecule 12 parts by mass of carbon combine with 16 parts by mass of oxygen and in CO_2, 12 parts by mass of carbon combine with 32 parts by mass of oxygen.
Reason (R) : When two elements combine separately with a fixed mass of a third element, then the ratio of their masses in which they do so is either the same or whole number multiple of the ratio in which they combine with each other.

103. *Assertion (A) :* The ratio by volume of gaseous reactants and products is in agreement with their molar ratio.
Reason (R) : Volume of a gas is inversely proportional to the number of moles of a gas.

104. *Assertion (A) :* Enthalpy of graphite is lower than that of diamond.
Reason (R) : Entropy of graphite is greater than that of diamond.

105. *Assertion (A) :* For the combustion reactions, the value of ΔH is always negative.
Reason (R) : the combustion reactions are always endothermic.

106. *Assertion (A) :* The value of enthalpy of neutralisation of weak acid by strong base is numerically less than 57.1 kJ.
Reason (R) : All OH^- ions of strong base are not completely neutralised by H^+ ions obtained from acid.

107. *Assertion (A) :* Copper liberates hydrogen from the solution of dilute hydrochloric acid.
Reason (R) : Hydrogen is below copper in the electrochemical series.

108. *Assertion (A) :* The dehydration of alcohols by conc H_2SO_4 involves the formation of intermediate carbocation.
Reason (R) : The protonated alcohol molecule loses water molecule in the second step.

109. *Assertion (A) :* Acetylene on reacting with sodamide gives sodium acetylide and ammonia.
Reason (R) : Sp hybridised carbon atoms of acetylene are considerably electro-negative.

110. *Assertion (A) :* Chlorine and sulphur dioxide are both bleaching agents.
Reason (R) : Both are reducing agents.

111. *Assertion (A) :* The conjugated dienes are more stable than the corresponding alkenes containing one double bond or even the dienes containing two isolated double bonds.
Reason (R) : Conjugated dienes are regarded as hybrids of several contributing structures.

112. *Assertion (A) :* Alkanes can have an infinite number of conformations.
Reason (R) : In configurational isomerism, the isomers are distinct individual substances.

113. *Assertion (A) :* As a salt such as NaCl dissolves, the Na^+ and Cl^- ions leaving the crystal lattice acquire far greater freedom.
Reason (R) : In thermodynamic terms, the formation of solution occurs with a favourable change in free energy *i.e.* ΔH has a high positive value and $T\Delta S$ a low negative value.

114. *Assertion (A) :* Water is specially effective in screening the electrostatic interactions between the dissolved ions.
Reason (R) : The force of ionic interactions depends upon the dielectric constant (e) of the solvent.

115. *Assertion (A) :* When two uncharged similar atoms are brought very close together, their surrounding electron clouds influence each other, and a force of attraction is built up between them.
Reason (R) : The random variation in the positions of electrons around one nucleus may create a transient electric dipole, which induces a transient opposite electric dipole in the nearby atom.

116. *Assertion (A) :* The equilibrium constant is fixed and a charascteristic for any given chemical reaction at a specified temperature.
Reason (R) : The composition of the final equilibrium mixture at a particular temperature depends upon the starting amount of reactants.

117. *Assertion (A) :* The degree of ionization of water is small at 25° C, only about one of every 10^7 molecules in pure water is ionized at any instant.
Reason (R) : In pure water at 25° C, the molar concentration of water is essentially constant.

118. *Assertion (A) :* The p^{ka} of a weak acid becomes equal to pH of the solution at the midpoint of of its titration.
Reason (R) : The molar concentrations of proton acceptor and proton donor become equal at the midpoint of titration of a weak acid.

119. *Assertion (A) :* Maleic and fumeric acids are well defined compounds. These two compound are stereo isomers but not enantiomers.
Reason (R) : Maleic and fumeric acids have same molecular formula but they are not mirror images of each other.

120. *Assertion (A) :* The nearly tetrahedral arrangement of the orbitals about the oxygen atom allows each water molecule to form hydrogen bonds with as many as four neighbouring water molecules.
Reason (R) : In ice each water molecule forms four hydrogen bonds as molecule is fixed in the space.

BIOLOGY

121. Group of related species with the potential, directly or indirectly, of forming fertile hybrids with one another, is called
(a) sibling species (b) subspecies
(c) coenospecies (d) none of these

122. The generalization that the evolution does not proceed back along its own path, or repeat routes is known as
(a) Cope's law (b) Allen's law
(c) Dollo's law (d) Gloger's law

123. Which of these is present only in the inert extracellular stage of the life cycle of virus ?
(a) ribosomes (b) proteins
(c) capsid (d) all of these

124. Erythropoietin hormone that stimulates red blood cell production is
(a) gamma-globulin (b) beta-globulin
(c) alpha-globulin (d) none of these

125. The term infusoria is applied to
(a) bacteria (b) protozoa
(c) rotifers (d) all of these

126. Salmon fish is
(a) anadromous (b) catadromous
(c) both (a) and (b) (d) none of these

127. In obese persons, the adipose (fat) tissues are present beneath the skin in
(a) hypodermis (b) dermis
(c) epidermis (d) all of these

128. Order salientia of phylum amphibia includes
(a) frogs (b) toads
(c) salamanders (d) both (a) and (b)

129. Platelets are derived from
(a) lymphoblast (b) monoblast
(c) myeloblast (d) megakaryoblast

130. ATP synthetase complex is found in inner mitochondrial membrane, and has two major cofactors, these are
(a) F_1 and F_2 (b) T_s and T_n
(c) F_1 and F_0 (d) R_1 and R_2

131. Fine branching protein fibres forming an extracellular network in many vertebrate connective tissues and holding tissues and organs together is called
(a) white elastic fibres
(b) yellow elastic fibres
(c) reticulin fibres (d) none of these

132. Which of the following is cobalt and nucleotide containing vitamin ?
(a) thiamine (b) cyanocobalamine
(c) ascorbic acid (d) none of these

133. Gerdy's fibres are
(a) ligament of neck (b) ligament of ankles
(c) ligament of palm (d) ligament of face

134. Gerlach's valve is present
(a) between right auricle and right ventricle
(b) between aorta and left ventricle
(c) between appendix and caecum
(d) none of these

135. Which of the following is iron storing protein ?
(a) ferritin (b) gamma-globulin
(c) alpha-globulin (d) albumins

136. Which of these first enter lacteals of the villi and then pass into blood vessels in the shoulder area?
(a) glucose (b) vitamin C
(c) amino acids (d) cholesterol

137. Which of the following enzyme is secreted by infants but not by adults ?
(a) rennin (b) pepsinogen
(c) lipase (d) trypsin

138. Which of the following is characterized by an extremely under-weight condition by limiting food consumption ?
(a) amenorrhea (b) bulimina
(c) anorexia nervosa (d) none of these

139. The rare disease progeria is associated with
(a) osteoporosis (b) leukoplakia
(c) premature old age (d) osteoarthritis

140. Synovial fluid is found in
(a) intercellular spaces
(b) around the brain
(c) freely movable joints
(d) internal ear

141. Pashmina wool is obtained from
(a) rabbit (b) goat
(c) sheep (d) deer

142. Desmosomes are related with
(a) cell division (b) cell excretion
(c) cell adherence (d) cytolysis

143. Action potential on outer surface of plasma membrane is
(a) variable (b) neutral
(c) positive (d) negative

144. Which of the following does not produce any digestive enzyme ?
(a) pancreas (b) gastric mucosa
(c) mouth (d) liver

145. Regulator of Basal Metabolic Rate (BMR) is
(a) thyroid hormones
(b) sympathetic nervous system
(c) parasympathetic nervous system
(d) adrenaline

146. Which of the following is a living fossil ?
(a) *Sphenodon* (b) *Latimaria*
(c) *Heloderma* (d) both (a) and (b)

147. Cleistogamy is found in
(a) *Commelina* (b) *Ficus*
(c) *Vallisneria* (d) all of these

148. Restriction enzymes are used in genetic engineering because
(a) they can cut DNA at specific base sequence
(b) they can join different DNA fragments
(c) they are nuclease that cut DNA at variable sites
(d) they are proteolytic enzymes which can degrade harmful proteins

149. Which of the following cell organelles is considered to be rich in hydrolytic enzymes ?
(a) ribosomes (b) ER
(c) lysosomes (d) chloroplast

150. Xanthophyll is chiefly responsible for
(a) yellow colour (b) green colour
(c) red colour (d) no colour

151. The green mould is commonly called
(a) *Penicillium* (b) *Polysiphonia*
(c) *Aspergillus* (d) *Spirogyra*

152. Detritus food chain accounts for more energy flow than grazing food chain because
(a) no organism dies
(b) most organisms die after having been eaten
(c) most organisms die without having been eaten
(d) all of the above are correct

153. The thermal algae can survive in a hot water spring at
(a) 40°C (b) 70°C
(c) 60°C (d) 15°C

154. Endodermal cells can be distinguished by the presence of
(a) elongated cells
(b) barrel shaped cells
(c) thin-walled cells
(d) cambial cells

155. Abscisic acid causes
(a) retardation of growth
(b) faster leaf fall
(c) dormancy of tubers
(d) all of the above

156. The first case of polyembryony was reported in certain
(a) grape seed (b) orange seed
(c) pulse seed (d) mango seed

157. The free energy change ΔG from the conversion of one molecule of glucose to 6 molecules of CO_2 is –686 k cal/mol, yet only about 266 k cal/mol of this is captured within ATP molecules. The rest is
(a) transferred to H_2O molecules
(b) converted to heat
(c) used to form lactate
(d) reutilized in the ATP formation

158. Which of the following plant's roots are medicinal and leaves, flowers and fruits are eaten as vegetables?
(a) *Aleuritis fordii*
(b) *Holostemma adakodien*
(c) *Helianthus annuus*
(d) all of the above

159. Hydrogen cyanide binds to the active site of an enzyme that is part of the pathway that forms ATP in the cells, in this way, it prevents the enzyme activity. Therefore, hydrogen cyanide can best be described as
(a) coenzyme
(b) cofactor
(c) allosteric modulator
(d) competitive inhibitor

160. Which gene sanctuary has been created for an insectivorous plant ?
(a) Kumbhalgarh sanctuary
(b) Bori sanctuary
(b) Nepenthes sanctuary
(c) all of the above

Instructions for Q. No. 161 to 180

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are falses

161. *Assertion (A) :* Xylem is made of four types of cells.
Reason (R) : This type of composition of the xylem is extremely clear in hydrophytes.

162. *Assertion (A) : Raphanobrassica* is the cross between *Raphanus* and *Brassica*.
Reason (R) : It is allopolyploid.

163. *Assertion (A) :* Auxins were the first growth hormones discovered in plants.
Reason (R) : In most of plants tip movement in seedling stage led to the discovery of auxins.

164. *Assertion (A) :* The frequency of polyploidy is higher in plants than in animals.
Reason (R) : Polyploidy is useful in the natural selection of new species of plants.

165. *Assertion (A) :* Housewives keep cut potatoes pieces submerged in water if not required for immediate use for cooking.
Reason (R) : This helps in softening the potato pieces.

166. *Assertion (A) :* More elastic fibres are found in artery walls than vein walls.
Reason (R) : Elastic fibres are absent from tendons.

167. *Assertion (A) :* The maximum change of potential difference across the membrane during an action potential is 110V approx.
Reason (R) : Action potential is self propagating.

168. *Assertion (A) :* A man's urine turned green when treated with ferric chloride.
Reason (R) : He is suffering from diabetes.

169. *Assertion (A) :* A woman is capable of sueing a man for refusing to own this child whose blood group is O. The blood group of woman is A and man is B.
Reason (R) : Genetically she is right he can be father of the child.

170. *Assertion (A) :* In coronary heart disease, there is impairment of heart muscles.
Reason (R) : Coronary heart disease is due to reduced blood supply.

171. *Assertion (A) : Fasciola hepatica* is hermaphrodite.
Reason (R) : The gonads are well developed

and the male and female genital ducts open into a common chamber, the genital atium.

172. *Assertion (A) :* In mitotic division, most of the ordered sequence of phases takes place during interphase.
Reason (R) : Synthesis of *m* RNA, *t* RNA and ribosomes occurs during G_1-phase and replication of DNA occurs in S-phase.

173. *Assertion (A) :* Role of erythrocytes in CO_2 transport is primary to form HCO_3^- ions for carriage in the plasma and reconvert them back to CO_2.
Reason (R) : About 42% of CO_2 carried in human blood is in the form of erythrocytic carbamino-haemoglobin; which breaks down in the lungs to release oxygen again.

174. *Assertion (A) :* The chewing and lapping mouthparts consist of a long tongue which is formed from the glossae of the labium.
Reason (R) : The galeae are much elongated and coiled, each forming a half tube, which makes a complete tube when both are locked together.

175. *Assertion (A) :* When a foreign object, such as a sand grain gets in between the shell and mantle, it results in the formation of a pearl.
Reason (R) : The inner nacreous layer of iridiscent nacre is called the 'mother of pearl' which is formed of many thin and alternating layers of calcium carbonate and concholin.

176. *Assertion (A) :* *Neurospora* is an ideal material for genetical and biochemical studies.
Reason (R) : Because of its suitability in the studies of heredity and genetic material contained within it.

177. *Assertion (A) :* Heterosis is defined as superiority of F_1 hybrid of two genetically dissimilar parents.
Reason (R) : Heterosis can be measured in terms of growth rate, size and yield.

178. *Assertion (A) :* Left-handed DNA is known as B-DNA.
Reason (R) : Right-handed DNA is known as Z-DNA.

179. *Assertion (A) :* Rhizoidal aggregates have been observed at distinct sites on curled root hairs.
Reason (R) : The infection thread is formed b a process of invagination of the hair cell walls : the region of curling.

180. *Assertion (A) :* Mendelian recombinations are due to crossing over.
Reason (R) : Crossing over bring about exchange of genes through chiasmata formation.

GENERAL KNOWLEDGE

181. Which 13th Century Indian poet and discipline of Sufi Saint Hazrat Nizamuddin Aulia is buried next to his mentor in Delhi?
(a) Amir Khusro (b) Salim Shah Chishti
(c) Moin-ud-din chishti
(d) Kublia Khan

182. Men's team final of the NTPC Commonwealth Table Tennis Championship, held during April 2001 in New Delhi, was won by
(a) England (b) Singapore
(c) Nigeria (d) India

183. Which one of the following liquid gases is used as a fuel for a cryogenic engine?
(a) liquid oxygen (b) liquid hydrogen
(c) liquid nitrogen (d) liquid chlorine

184. Who among the following is a Bharatnatyam dancer?
(a) Kaushalya Reddy (b) Navtej Singh Johar
(c) Sunil Mehra (d) Rajeev Lochan

185. Which of the following is not one of the three basic instruments carried by NASA's Mars mission–2001 : *A Space Odyssey*?
(a) MARIE (b) GRS
(c) THEMIS (d) DANICS

186. Osteoporosis is a disease that affects
(a) heart (b) lungs
(c) bones (d) kidneys

187. Which of the following is not a mascot for the 2002 Football World Cup?
(a) Ato (b) Nik
(c) Kaz (d) Mik

188. 'Darshak', which was in the news during April 2001, is a/an
(a) indigenously-built hydrographic survey ship commissioned into the Indian Navy
(b) indigenously-built submarine commissioned into the Indian Navy
(c) indigenously-built missile frigate commissioned into the Indian Navy
(d) none of these

189. Majuli, the world's largest riverine island, is surrounded by waters of the river
(a) Amazon (b) Ganga
(c) Brahmaputra (d) Nile

190. Who among the following is the recipient of Saraswati Samman for the Year 2000 for his novel *Amruta Phala*?
(a) Dr. Indira Parthasarathy
(b) Manoj Das (c) Shri Ramakant Rath
(d) Subir Das

191. Most of the Ajanta paintings were completed during the rule of the
(a) Vardhanas (b) Sakas
(c) Satvahanas (d) Guptas

192. Budhism in Nepal was introduced in the reign of
(a) Samudragupta (b) Ashoka
(c) Chandragupta (d) Harsha

193. Which region of India receives rainfall due to western disturbance in winter?
(a) western region (b) central region
(c) eastern region
(d) north–western region

194. Which bank in India first introduced the Credit Card system?
(a) Andhra Bank (b) Central Bank
(c) Canara Bank (d) State Bank of India

195. The Association of South East Asian Nations (ASEAN) has its headquarters at
(a) Manila (b) Jakarta
(c) Kuala Lumpur (d) Bangkok

196. Certain bacteria living in human digestive system are beneficial because they synthesize vitamin
(a) D (b) B–Complex
(c) K (d) A

197. Who among the following was recently crowned Miss Universe 2001
(a) Miss Greece (b) Miss U.S.A.
(c) Miss Puerto Rico (d) Miss India

198. The Oscar Award for the Best Film for 2001 has been given to
(a) Crouching Tiger, Hidden Dragon
(b) American Beauty
(c) Gladiator
(d) Shakespeare in Love

199. Carnivorous animals are those that live on
(a) gram and grains of different types
(b) grass (c) human flesh
(d) animal flash

200. *Nag* is the name of the indigenously developed
(a) medium range missile
(b) anti–tank missile
(c) torpedo
(d) submarine

Model Test Paper-3

Time : $3\frac{1}{2}$ hours. *Maximum Marks : 200*

PHYSICS

1. There are two combination of n equal resistances. In combination A, all the resistances are in series and in combination B, all the resistances are in parallel. The ratio of the resistances of combination A to that of combination B is
(a) $n^2 : 1$ (b) $n : 1$
(c) $1 : 1/n$ (d) $1 : n^2$

2. If the time period of a magnet is T when $T \alpha \sqrt{x}$, then x represents
(a) length of the magnet
(b) moment of inertia of the magnet
(c) breadth of the magnet
(d) mass of the magnet

3. The electric intensity E, current density J and specific resistance p are related to each other through the relation
(a) $E = p/J$ (b) $E = Jp$
(c) $E = J/p$ (d) $E = JE$

4. The distances of two planets from the Sun are 10^{13} and 10^{12} metres respectively. The ratio of time periods of these two planet is
(a) $10\sqrt{10}$ (b) 100
(c) $1\sqrt{10}$ (d) 10

5. There will be an increase in potential energy of the system, if work is done upon the system by
(a) a conservative force
(b) a non-conservative force
(c) any conservative or nonconservative force
(d) none of the above

6. The amplitude of a particle in SHM decreases from 20 cm to 15 cm in 2 minutes. Its energy decreases by nearly
(a) 22.5% (b) 25%
(c) 50% (d) 12.5%

7. A small masses of rock like material surrounded by vapours of large masses and revolving in highly elliptical orbits are called
(a) meteorites (b) galaxy
(c) comets (d) asteroids

8. In a n - p - n transistor circuit, the collector current is 10 mA. If 90% of the electrons emitted reach the collector, then
(a) the base current will be 2 mA
(b) the emitter current will be 11 mA
(c) the emitter current will be 9 mA
(d) the base current will be 0.1 mA

9. What led to the discovery of proton ?
(a) scattering of α-particles by the heavier nuclei
(b) artificial disintegration of ${}_7N^{14}$ with α-particles.
(c) artificial disintegration of ${}_4Be^9$ with α-particles
(d) radioactive decay of certain elements

10. Maxwell's equation involving $d\vec{B}/dt$ is obtained from
(a) Biot-Savart's law (b) Ampere's law
(c) Gauss' law (d) Faraday's law

11. Two coils of self-inductances L_1 and L_2 are placed so close together that effective flux in one coil is completely linked with the other. If M is the mutual inductance between them, then
(a) $M = (L_1L_2)^2$ (b) $M = L_1/L_2$
(c) $M = L_1 L_2$ (d) $M = \sqrt{(L_1L_2)}$

12. The north pole of a bar magnet is rapidly introduced into a solenoid at the end A. Which of the following statements taking place ?
(a) the end A of the solenoid behaves like a north pole
(b) the end A of the solenoid behaves like a south pole
(c) no induced e.m.f. is developed
(d) the end A of the solenoid acquires positive potential

13. A material produces a magnetic field which opposes the applied magnetic field, then it is
(a) electromagnetic (b) paramagnetic
(c) diamagnetic (d) ferromagnetic

14. To reduce the range of voltmeter, its resistance need to be reduced. A voltmeter has resistance R_0 and range V. Which of the following resistances when connected in parallel will convert it into a voltmeter of range V/n ?
(a) $(n-1)R_0$ (b) $(n+1)R_0$
(c) nR_0 (d) none of these

15. What is the magnetic field at the point of intersections of diagonals of a current carrying square loop of each side L while the current through the loop is I ?
(a) $\frac{\mu_0 8\sqrt{2}I}{4\pi L}$ (b) $\frac{\mu_0 4\sqrt{2}I}{4\pi L}$
(c) $\frac{\mu_0\sqrt{2}I}{4\pi L}$ (d) none of these

16. The radius of the trajectory of a charged particle in a uniform magnetic field is proportional to
(a) momentum of the particle
(b) energy of the particle
(c) charge on the particle
(d) magnetic field

17. A wire of resistance 3Ω is cut into three equal pieces, which are joined to form a triangle. The equivalent resistance between any two corners of the triangle is
(a) $\frac{1}{4}\Omega$ (b) $\frac{2}{3}\Omega$
(c) $\frac{3}{2}\Omega$ (d) 4Ω

18. Two capacitors of capacitances 4 μF and 6 μF are connected across a 120 V battery in series with each other. What is the potential difference across the 4 μF capacitor ?
(a) 60 V (b) 48 V
(c) 40 V (d) 72 V

19. The persistence of sound in a hall is called
(a) reverberation (b) acoustics
(c) resonance (d) articulation

20. Which of the following statements is correct about the stationary wave ?
(a) particles at the consecutive anti-nodes are in same phase
(b) particles at the consecutive anti-nodes differ in phase by π
(c) all the particles of the medium vibrate in the same phase
(d) the phase lag between the particles continuously varies with the increase in distance

21. When a tuning fork produces sound waves in air, which one of the following properties of sound is same in the material of tuning fork as well as air?
(a) velocity (b) frequency
(c) wavelength (d) amplitude

22. The relation between velocity amplitude a, the displacement amplitude 'A' and the angular frequency ω of $S.H.M.$ is
(a) $A = \omega a$ (b) $a = \omega A$
(c) $A = \omega y$ (d) $a = \omega A^2$

23. Two steam engines X and Y have their source at 1000 K and 1100 K and their sinks are at 500 K and 400 K respectively. If η_x and η_y be their efficiencies, then which of the following statements about their efficiencies is true ?
(a) $\eta_x = \eta_y$ (b) $\eta_x < \eta_y$
(c) $\eta_x > \eta_y$
(d) the data is not sufficient to make the above prediction

24. What are thermal radiations ?
(a) electromagnetic waves
(b) mechanical longitudinal waves
(c) mechanical transverse waves
(d) none of these

25. Cloudy nights are usually warmer, because clouds
(a) have low thermal conductivity
(b) do not radiate heat
(c) do not absorb heat
(d) have high thermal conductivity

26. Let R be the radius of soap bubble and σ be the surface tension of soap solution. If p be the excess of pressure inside the soap bubble, then
(a) $p \alpha R\sigma$ (b) $p\alpha\frac{R}{\sigma}$
(c) $p\alpha\frac{\sigma}{R}$ (d) $p\alpha\frac{1}{R_\sigma}$

27. A gale blows over a house. The force due to the gale on the roof is
(a) in the direction of gale
(b) upward (c) downward
(d) in the direction of gale

28. Density of ice is ρ and that of water is σ. What will be the decrease in volume when a mass M of ice melts?
(a) $M\left(\frac{1}{\rho}-\frac{1}{\sigma}\right)$ (b) $\frac{\sigma-\rho}{M}$
(c) $\frac{M}{\sigma-\rho}$ (d) $\frac{1}{M}\left(\frac{1}{\rho}-\frac{1}{\sigma}\right)$

29. A bird is sitting in a wire cage, which is hanging from a spring balance. How will the reading change when the bird flies inside the cage?
(a) it will be more than earlier one
(b) it will be less than earlier one
(c) it will remain unchanged
(d) it cannot be predicted

30. The bulk modulus of rubber is $9 \times 10^8\ Nm^{-2}$. To what depth below the surface of sea should the rubber ball be taken as to decrease its volume by 0.1% ?
(a) 100 m (b) 10 m
(c) 1 m (d) 1 km

31. We have two wires W_1 and W_2. Both are made of same material and have the same length. The radius of cross-section of W_2 wire is twice that of W_1. Same load is suspended from both of them. If the strain in W_1 be 4, then in W_2 it will be
(b) 4 (b) 2
(c) 1 (d) 8

32. Two wires, made of the same material and of same area of cross section, are respectively one metre and two metres long. Force required to change the length of one metre wire by 1 cm is F_1. The force required to change the length of the $2m$ wire by 1 cm will be
(a) F_1 (b) $\frac{F_1}{4}$
(c) $\frac{F_1}{2}$ (d) $2F_1$

33. A planet is revolving around the Sun in an elliptical orbit. Its closest distance from the Sun is r and the farthest distance is R. If the orbital velocity of the planet closest of the Sun be v, then what is the velocity at the farthest point?
(a) $\left(\frac{r}{R}\right)^{1/2}$ (b) $\frac{vR}{r}$
(c) $\frac{vr}{R}$ (d) $v\left(\frac{R}{r}\right)^{1/2}$

34. Which of the following is not true for stationary satellite of the earth ?
(a) it is stationary in space
(b) its angular speed is equal to that of earth about its own axis.
(c) its time period is 24 hours
(d) it revolves from west to east

35. Two identical copper spheres of radius k are in contact with each other. If the gravitational attraction between them is R, then which of the following relations is correct ?
(a) $F\alpha\frac{1}{R^2}$ (b) $F \alpha R^4$
(c) $F \alpha R^2$ (d) $F\alpha\frac{1}{R^4}$

36. If the gravitational mass of a body on the moon be denoted by M_m and that on the earth by M_e, then
(a) $M_m = \sqrt{M_e}$ (b) $M_m = M_e$
(c) $M_m = \frac{1}{6}M_e$ (d) $M_m = 6M_e$

37. If the radius of the circular path of particle going round the circle is double without changing its frequency of rotation, then centripetal force on it will be
(a) doubled (b) unchanged
(c) halved (d) quadrupled

38. It is easier for a swimmer jumping into water from a height to describe a loop in the air by
(a) keeping the arms and legs straight
(b) spreading the arms and legs
(c) pulling the arms and legs closer
(d) none of these

39. Three identical balls each of radius 10 cm and

mass 1 kg each are placed touching one another on a horizontal surface. Where is their centre of mass located ?
(a) at the centre of one ball
(b) at the point of contact of any two spheres
(c) on the horizontal surface
(d) none of these

40. A nucleus of mass number A originally at rest emits α-particle with speed v. What will be the recoil speed of the daughter nucleus ?
(a) $v/(A-4)$ (b) $4v/(A+4)$
(c) $4v(A-4)$ (d) $v/(A+4)$

Instructions for Q. No. 41 to 60

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are falses

41. *Assertion (A) :* In a radioactive disintegration an electron is emitted by the nucleus.
Reason (R) : Electrons are always present inside the nucleus.

42. *Assertion (A) :* In Rutherford's experiment, α-particles from a radium source were allowed to fall on a 10^{-4} mm thick gold foil. Most of α-particles passed straight through the foil.
Reason (R) : The entire positive charge and nearly whole of the mass of the nucleus is concentrated in the nucleus.

43. *Assertion (A) :* The relative velocity of two photons travelling in opposite direction is C.
Reason (R) : The rest mass of a photon is zero.

44. *Assertion (A) :* Tiny drops of liquid resist deforming forces better than bigger drops.
Reason (R) : Excess pressure inside a drop is directly proportional to the surface tension.

45. *Assertion (A) :* The couple acting on a body is not equal to the rotational K.E. of the body.
Reason (R) : Couple and K.E. have different units

46. *Assertion (A) :* A thin aluminium disc spinning freely about a central pivot is quickly brought to rest when placed between the poles of a strong U-shaped magnet.
Reason (R) : A current induced in a disc rotating in a magnetic field produces a force which tends to oppose the disc's motion.

47. *Assertion (A) :* The period of simple pendulum is independent of the mass of the bob.
Reason (R) : Inertial and gravitational masses are equivalent.

48. *Assertion (A) :* The frequencies of incident, reflected and refracted beam of monochromatic light incident from one medium to another are the same.
Reason (R) : The incident, the reflected and the refracted rays are coplanar.

49. *Assertion (A) :* Radio waves can be polarised.
Reason (R) : Sound waves in air are longitudinal in nature.

50. *Assertion (A) :* A hollow metallic closed container maintained at a uniform temperature can act as a black body for radiations.
Reason (R) : All metals acts as black bodies.

51. *Assertion (A) :* The Sun appears bigger at sunrise and sunset than at mid-day.
Reason (R) : The phenomenon of interference bends light rays.

52. *Assertion (A) :* On a rainyday it is safer to drive a car or a bus at high speed.
Reason (R) : Coefficient of friction is higher on wetting the surface.

53. *Assertion (A) :* Electric appliances with metallic body *e.g.* heaters have two pin connections, whereas an electric bulb has three pin connection.
Reason (R) : Three pin connections reduce heating of connecting wires.

54. *Assertion (A) :* Environmental damage has increased the amount of ozone in the atmosphere.
Reason (R) : Increase of ozone increases the amount of ultraviolet radiation on the earth.

55. *Assertion (A) :* The rainbow is seen sometimes in the sky when it is raining to an observer with his back towards the Sun.
Reason (R) : Total internal reflection from water droplets causes dispersion. The final rays are in the backward direction.

56. *Assertion (A) :* The relative velocity of two photons travelling in opposite directions is C.
Reason (R) : The rest mass of photon is zero.

57. *Assertion (A) :* Brilliant colours are seen in thin layer of oil on the surface.
Reason (R) : White light is composed of several colours.

58. *Assertion (A) :* Activity of 10^8 undecayed radioactive nuclei of half life 50 days is equal to that of 1.2×10^8 undecayed nuclei of some other material with half life 60 days.
Reason (R) : Activity is proportional to half life.

59. *Assertion (A) :* Any hollow metallic closed container maintained at a uniform temperature can act as a source of black body radiation.
Reason (R) : All metals act as black bodies.

60. *Assertion (A) :* In LCR series circuit, The resonance occurs at one frequency only.
Reason (R) : At resonance the inductive reactance is equal to the capacitive reactance.

CHEMISTRY

61. 'Placedo' is often given to patients. It is
(a) a sugar pill
(b) a broad spectrum antibiotic
(c) an anti-depressant
(d) a tonic

62. The presence of a bacterium, virus or foreign protein triggers the production of specialised protein molecules known as antibodies or
(a) immunoglobulin (b) lymphocyte
(c) myoglobin (d) antigen

63. A tyndall effect would most likely be observed in which one of the following ?
(a) sol (b) precipitate
(c) solution (d) solvent

64. Natural rubber is a
(a) polyisoprene (b) polyamide
(c) polyester (d) polysaccharide

65. The radio element has half-life of one day. After three days, the amount of element disintegrated will be
(a) $\frac{1}{16}$ of original amount
(b) $\frac{1}{3}$ of original amount
(c) $\frac{1}{8}$ of original amount
(d) $\frac{7}{8}$ of original amount

66. Which one among the following is not an organometallic compound ?
(a) trimethoxy titanium chloride
(b) trimethyl aluminium
(c) trimethyl boron
(d) tetracarbonyl nickel

67. Which of the following electronic configurations will have the highest magnetic moment ?
(a) d^7 (b) d^4
(c) d^3 (d) d^5

68. Green colour is imparted to the flame by
(a) potassium salt (b) calcium salt
(c) sodium salt (d) barium salt

69. The alkaline earth metals have an outer electronic configuration of
(a) ns^1 (b) ns^2np^6
(c) ns^2 (d) ns^2np^1

70. The energy associated with adenosine triphosphate molecule is stored in
(a) C – O bonds (b) C – N bonds
(c) C – C bonds (d) O – P bonds

71. A peptide bond consists of a
(a) acetal linkage (b) hemiacetal linkage
(c) glycosidic linkage (d) amide linkage

72. In a chemical reaction, negative catalyst will increase the value of
(a) reaction rate
(b) ΔS
(c) ΔH
(d) activation energy

73. Beta rays have greater penetrating power than the alpha rays of similar energy because
(a) α-rays are positively-charged species carrying 2 units of charge
(b) β-rays have negligible mass and consequently very high velocities
(c) β-rays are a steam of electrons with negative charge
(d) α-rays are attracted by the electron while the beta particles are repelled by the cloud

74. I.U.P.A.C. name of complex, $K_3[Al(C_2O_4)_3]$ is
(a) potassium aluminium (III) oxalate
(b) potassium trioxalato-aluminate (III)
(c) potassium alumino oxalate
(d) potassium trioxalato-aluminate

75. From the following oxides of nitrogen which is paramagnetic ?
(a) N_2O_3 (b) N_2O
(c) N_2O_5 (d) NO_2

76. Which will be the major product when an alkyl halide reacts with potassium cyanide ?
(a) nitro compounds (b) isocyanides
(c) nitriles (d) amines

77. Reduction of ethanoic acid with Li AlH_4 produces
(a) ethanoic anhydride (b) ethanal
(c) ethanol (d) lithium ethanoate

78. A tertiary alcohol is obtained
(a) by the reaction of a ketone and a Grignard reaction
(b) when an aldehyde is reduced by $LiAlH_4$
(c) by the reaction is obtained
(d) when a ketone is reduced with $LiAlH_4$

79. When trichloromethane is slowly oxidised by air in the presence of light the product formed is
(a) phosgene (b) phosphine
(c) carbon-dioxide (d) diethylcarbonate

80. The reaction N_2O_5 (soln.) $\rightleftharpoons$ $2NO_2$ (soln.) + 1/2 O_2 (g), is found to be first order with respect to N_2O_5. Given that the first order rate constant is 6.2×10^{-4} S^{-1}, the rate of the reaction when N_2O_5 is 1.25 mol L^{-1} is
(a) 3.10×10^{-5} mol L^{-1} S^{-1}
(b) 7.75×10^{-4} mol L^{-1} S^{-1}
(c) 1.55×10^{-4} mol L^{-1} S^{-1}
(d) 15.50×10^{-4} mol L^{-1} S^{-1}

81. Electrical conductivity is affected by
(a) the viscosity of the solvent (i.e., solute-solvent interaction)
(b) the solvation of ions (i.e., solute-solvent interaction)
(c) the interionic attraction (i.e., solute-solute interaction)
(d) all of these.

82. Of the following combinations, predict the Fe that could lead to a reaction. Use the information provided below : Fe^{3+} (aq) + $e^- \rightarrow Fe^{2+}$ (aq), $E^0 = +0.77$ V
Cl_2 (g) + 2 $e^- \rightarrow Cl^-$ (aq), $E^0 = +1.36$ V
(a) Fe^{2+} (aq) + Cl^- (aq)
(b) Fe^{3+} (aq) + Cl_2 (g)
(c) Fe^{2+} (aq) + Cl_2 (g)
(d) Fe^{3+} (aq) + Cl^- (aq)

83. Bond dissociation energies for H_2(g), Cl_2(g) and HCl(g) are 104, 58 and 103 k cals respectively. The enthalpy of formation of HCl(g) is
(a) 59 k cals (b) –22 k cals
(c) 22 k cals (d) –59 k cals

84. Animal cell swells when placed in
(a) hypotonic solution (b) hypertonic solution
(c) isotonic solution (d) saturated solution

85. Which of the following has 8 : 8 coordination ?
(a) CsCl (b) NaCl
(c) CaF_2 (d) Na_2O

86. For the angular momentum quantum number $l = 4$, the magnetic quantum number m has a set of
(a) 8 values (b) 5 values
(c) 4 values (d) 9 values

87. The energy of the ground state of the hydrogen atom is -2.17×10^{-18} J per atom. Its value in J mol^{-1} will be
(a) -2.17×10^{-18} J mol^{-1}
(b) -4.34×10^{-18} J mol^{-1}
(c) -2.624×10^{6} J mol^{-1}
(d) -1.312×10^{6} J mol^{-1}

88. Identify the incorrect statement regarding monosaccharides
(a) they also contain either an aldehyde or a keto functional group
(b) all monosaccharides are polyhydroxy com-

pounds containing a number of alcoholic groups

(c) there are about twenty naturally occurring monosaccharides

(d) two important monosaccharides are starch and cellulose

89. The molecular formula of an organic compound with a molecular weight of 78 and empirical formula of CH is

(a) C_4H_4 (b) C_8H_8

(c) C_6H_6 (d) C_3H_3

90. For complete hydrogenation of one mole of propyne, the quantity of hydrogen required is

(a) three moles (b) two moles

(c) one mole (d) less than one mole

91. Treatment of ethyne with ozone followed by treatment with zinc and water, leads to the formation of

(a) formaldehyde (b) an ozonide

(c) a diketone (d) a diol

92. The number of secondary carbons in 2, 2-dimethyl butane is

(a) 1 (b) 0

(c) 4 (d) 2

93. Hard steel can be further hardened by heating it to red hot and then cooling it by plunging it into cold water. This process is called

(a) tempering (b) annealing

(c) quenching (d) smelting

94. Extraction of iron from its ore consists of smelting and refining. Smelting is carried out in a

(a) electric furnace

(b) open health convertor

(c) bessemer convertor

(d) blast furnace

95. The element that does not belong to group 13 of the periodic table is

(a) rubidium (b) aluminium

(c) boron (d) gallium

96. Identify the statement that is not correct as far as structure of diborane is concerned

(a) the hydrogen atoms are not in the same plane in diborane

(b) each boron atom forms four bonds in diborane

(c) there are two bridging hydrogen atoms in diborane

(d) all B-H bonds in diborane are similar

97. Concentrated sulphuric acid has a charring action on carbohydrates because it

(a) has strong acidic properties

(b) has strong affinity towards water

(c) acts as an oxidising agent

(d) is a diprotic acid

98. Which of the following methods is used to remove permanent hardness of water ?

(a) addition of calcium chloride solution to water

(b) addition of sodium carbonate solution to water

(c) addition of magnesium chloride solution to water

(d) boiling water sufficiently

99. The factor that does not affect the rate of a chemical reaction in solution is

(a) the presence of a catalyst

(b) the temperature of the reactions

(c) the concentration of the reactants

(d) a change in pressure

100. Standard electrode potential refers to the electrode potential of

(a) the metal in combination with 1 mol L^{-1} solution of its ions

(b) the metal in combination with its ions of any concentration

(c) the metal alone

(d) the metal in combination with 1 N solution of its ions

Instructions for Q. No. 101 to 120

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion

(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion

(c) If the assertion is true, but the reason is false

(d) If both assertion and reason are falses

101. *Assertion (A) :* The lactic acid shows the geometrical isomerism.
Reason (R) : Lactic acid has carbon-carbon double bond.

102. *Assertion (A) :* 2-Hydroxy i.e. butane dioic acid is known as malic acid.
Reason (R) : It is present in unripe apples.

103. *Assertion (A) :* During the fermentation of grape juice, a reddish brown coloured crust is formed.
Reason (R) : Impure potassiam hydrogen tartrate is of reddish brown colour and it is known as argol.

104. *Assertion (A) :* Amines are more basic than ethers and esters.
Reason (R) : Nitrogen is less electronegative than oxygen, it is in better position to accommodate the positive charge of the proton.

105. *Assertion (A) :* An orbital cannot have more than two electrons, moreover, if an orbital has two electrons they must have opposite spins.
Reason (R) : No two electrons in an atom can have same set of all the four quantum numbers

106. *Assertion (A) :* The pairing of electrons in the orbitals of a particular sub-shell does not occur until all the orbitals of the sub-shell are singly occupied.
Reason (R) : Singly occupied orbitals must have the electrons with parallel spins.

107. *Assertion (A) :* Fluorine molecules has bond order one.
Reason (R) : The number of electrons in antibonding molecular orbitals is two less than that in bonding molecular orbitals.

108. *Assertion (A) :* The molality of the solution does not change with change in temperature.
Reason (R) : The molality is expressed in units of moles per 1000 gm of solvent.

109. *Assertion (A) :* The molecularity of the reaction $H_2 + Br_2 \rightarrow 2HBr$ is two.
Reason (R) : The order of this reaction is 3/2.

110. *Assertion (A) :* Sodium ammonium hydrogen phosphate tetrahydrate is used in the bead test.
Reason (R) : The colourless transparent sodium metaphosphate combines with metallic oxides giving coloured orthophosphates.

111. *Assertion (A) :* Alpha (α) - amino acids exist as internal salt in solution as they have amino and carboxylic acid groups in near vicinity.
Reason (R) : H^+ ion given by carboxylic group (-COOH) is captured by amino group ($-NH_2$) having lone pair of electrons.

112. *Assertion (A) :* Methanoic acid reduces mercuric chloride to mercurous chloride on heating while ethanoic acid does not.
Reason (R) : Methanoic acid is a stronger acid than ethanoic acid.

113. *Assertion (A) :* Sulphur dioxide and chlorine are both bleaching agents.
Reason (R) : Both are drying agents.

114. *Assertion (A) :* In case the central atom in a molecule is surrounded only by shared pairs of electrons, the molecule has a regular geometry.
Reason (R) : The shared electron pairs repel each other with equal force so all bonds are equidistant from each other.

115. *Assertion (A) :* Nitrous acid (HNO_2) may act as an oxidising as well as a reducing agent.
Reason (R) : The oxidation number of nitrogen remains same in all the compounds.

116. *Assertion (A) :* The bond order in a molecule can have any value, positive or negative, integral or fractional or zero.
Reason (R) : The bond order in a molecule depends upon the number of electrons in the bonding and antibonding molecular orbitals.

117. *Assertion (A) :* Phenol undergoes Kolbe's reaction whereas ethanol does not.
Reason (R) : Phenoxide ion is more basic than ethoxide ion.

118. *Assertion (A) :* A spectral line will be observed for a $2p_x$-$2p_y$ transition.
Reason (R) : The energy is released in the form of wave of light when electron drops from $2p_x$ to $2p_y$ orbital.

119. *Assertion (A) :* Aromatic aldehydes and also formaldehyde undergo Cannizzaro reaction with strong alkali.
Reason (R) : Aldehydes which have α - hydrogen atoms undergo Cannizzaro reaction.

120. *Assertion (A) :* With halogens and alkali, amides give primary amines having one carbon atom less.
Reason (R) : The reaction of amides with alkali is a qualitative test of amides.

BIOLOGY

121. Where would you find chondrin secreting chondrocytes ?
(a) nerve cells (b) bone
(c) cartilage (d) muscles

122. Dermis in frog's skin comprises
(a) stratum spongiosum and compactum
(b) compactum and malpighian
(c) corneum and malpighian
(d) malpighian and stratum spongiosum

123. Hairs in mammals are developed from
(a) stratum compactum
(b) stratum corneum
(c) stratum germinativum
(d) stratum spongiosum

124. Eutheria are characterised by
(a) skin with glands (b) true- placenta
(c) hair (d) skin with glands

125. In the flying birds, the quill feathers are useful for
(a) giving shape to the bird
(b) gaining external heat
(c) flight in air
(d) preventing loss of heat from the body

126. A four-chambered heart is found in
(a) men
(b) all vertebrates
(c) all animals
(d) some reptiles, birds and mammals

127. Among mammals, placenta is not found in
(a) *Platypus* (b) man
(c) mouse/horse (d) kangaroo

128. Tadpole larva is a connecting link between
(a) reptiles and aves
(b) amphibians and mammals
(c) fishes and amphibians
(d) amphibians and reptiles

129. Ontogenetically, liver is
(a) endodermal (b) mesodermal
(c) ectodermal (d) none of these

130. In frog, micromeres and megameres are formed during
(a) third cleavage (b) second cleavage
(c) first cleavage (d) fourth cleavage

131. Which of the following constitutes symbiosis ?
(a) mutualism and commensalism
(b) commensalism and predation
(c) proto-cooperation and mutualism
(d) commensalism only

132. The type of inter-specific interaction in which one of the species is unaffected, and other is harmed, is called as
(a) predation (b) parasitism
(c) neutralism (d) antibiosis

133. What percentage of Earth surface forms the grassland ?
(a) 48% (b) 10%
(c) 3% (d) 19%

134. Besides leucoplasts, starch grains can be stored in
(a) chromoplasts (b) chloroplast
(c) mitochondria (d) lysosome

135. Fraternal twins are produced when
(a) single ovum is fertilized by two sperms
(b) single fertilized ovum divides into two
(c) two ova are fertilized simultaneously
(d) two ova develop partheno-genetically

136. The genetic constitution of klinefelter's syndrome is
(a) 44 + XY (b) 44 + XO
(c) 44 + XX (d) 44 + XXY

137. Polyploidy brings about
(a) instant speciation (b) gradual speciation
(c) both (a) and (b) (d) none of these

138. The book Voyage of the Beagle has a relationship with which one of the following ?
(a) atavism (b) lamarckism
(c) theory of natural selection
(d) none of these

139. Which of the following statements about photosynthesis is not true ?
(a) photosynthesis is rapid in green light
(b) oxygen is produced during photosynthesis from the breakdown of water
(c) carbon dioxide is absorbed by the leaves in bright light
(d) plants can photosynthesise without an increase in dry weight

140. The products of light reaction in photosynthesis are
(a) ferrodoxin and cytochrome b_6
(b) ATP and NADPH
(c) ADP and glucose
(d) plastoquinone and cytochrome *f*

141. Grana and stroma lamellae are the parts of
(a) chloroplast (b) golgi body
(c) ribosome (d) mitochondria

142. Which of the following plant shows whole plant senescence ?
(a) gram (b) mustard
(c) wheat (d) all of these

143. The pigment phytochrome was discovered by
(a) Borthwick & Hendricks
(b) Skoog (c) Went
(d) Melchers

144. A green scum suddenly appears on the village pond, most likely cause is
(a) increase in O_2 (b) increase in excreta
(c) increase in CO_2
(d) increase in inorganic minerals

145. Which of the following can determine the distribution of a plant of animal species ?
I. rainfall II. temperature
III. sources of fond
IV. sex of the individual
(a) II and IV (b) I and III
(c) I, II and III (d) Only IV

146. Which of the following techniques is an important aspect of *in vitro* culture in the field of experimental embryology ?
(a) aeration (b) aseptic conditions
(c) nutrient medium (d) all of these

147. In a seed, developing from a bitegmic ovule, the testa is the mature
(a) both outer and inner integuments
(b) outer integument (c) inner integument
(d) none of these

148. Which of the following statements is correct
(a) the lateral meristems are present at the tip of the root
(b) the primary permanent tissue can never become meristematic
(c) the secondary meristems are those which develop into permanent tissues
(d) cambium of roots is a primary meristems

149. The example of monocots showing secondary growth in stem is
(a) *Asparagus* (b) *Cocos*
(c) *Lilium* (d) *Yucca*

150. When T.S. of a dicot plant is seen under microscope, the middle region is dark but the outer region is light; the outer region is known as
(a) annual ring (b) sapwood
(c) heartwood (d) growth ring

151. Wounds in plants are healed by the activity of
(a) intercalary meristem
(b) lateral meristem
(c) apical meristem
(d) hemicellulose

152. Wood is a general term for
(a) vessels
(b) secondary xylem
(c) primary xylem
(d) secondary vascular elements

153. The perianth is the term used when
(a) calyx is absent and corolla is similar to calyx
(b) androecium and gynoecium are similar
(c) calyx and corolla are similar
(d) none of these

154. *Utricularia* is a
(a) leafless plant
(b) stemless plant
(c) rootless plant
(d) non-flowering plant

155. Which of the following functions are carried out by the leaf ?
I. photosynthesis II. transpiration
III. respiration IV. translocation
(a) II and III (b) I and II
(c) I and III (d) all of the above

156. Botanical name of pitcher plant is
(a) *Dionoea* (b) *Drosera*
(c) *Nepenthes* (d) *Utricularia*

157. Quinine, important in the treatment of malaria, is extracted from
(a) stem of *Hevea*
(b) bark of *Cinnamon*
(c) bark of *Cinchona*
(d) leaves of *Ocimum*

158. The pulse among following is
(a) *Ocimum sanctum*
(b) *Dalbergia latifolia*
(c) *Coffea arabica* (d) *Cicer arietium*

159. Hemp fibres are obtained from
(a) *Linum* (b) *Cannabis*
(c) *Corchorus* (d) *Hibiscus*

160. Which is a medicinal plant ?
(a) *Aconitum* (b) *Linum*
(c) *Dalbergia* (d) *Tectona*

Instructions for Q. No. 161 to 180

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are falses

161. *Assertion (A) :* Symbiosis is also furnished by mycorrhiza.
Reason (R) : In this case symbiosis is established between alga and virus.

162. *Assertion (A) :* Starved leaves show protoplasmic respiration.
Reason (R) : They have protein as their respiratory substrates.

163. *Assertion (A) :* R.Q. during anaerobic respiration is always infinity.
Reason (R) : Oxygen is never evolved.

164. *Assertion (A) :* All food chains will come to stand still if bacteria disappear from earth.
Reason (R) : Bacteria are only associated with the soil fertility and hardly have any role for food chains.

165. *Assertion (A) :* Fruits are stored in CO_2 environment.
Reason (R) : With increase in CO_2, the rate of respiration decreases.

166. *Assertion (A) : Monocystis* parasites in one hosts.
Reason (R) : Monocystis is monogenetic.

167. *Assertion (A) :* Chordates have poor regeneration power while non chordates have good regeneration power.
Reason (R) : Non chordates have asexual reproduction so they have good regeneration power.

168. *Assertion (A) :* Earthworms mate in April-June.
Reason (R) : Copulation in earthworm lasts for one month.

169. *Assertion (A) :* Blood takes no part in reproduction in cockroaches.
Reason (R) : Blood in them lacks respiratory pigments.

170. *Assertion (A) :* In a graafian follicle, the primary oocyte and the follicle cells may be considered as sibling cells.
Reason (R) : Both are derived from oogonia.

171. *Assertion (A) :* Glycolysis begins in the cytoplasm and causing split into 2 three-carbon intermediates, then rearranged further to yield two molecules of pyruvate.

Reason (R) : During glycolysis four ATP and two NADPH molecules are produced and net yield is only two ATP molecules.

172. *Assertion (A) :* Translocations involve transfers of genetic material between non-homologous chromosomes.
Reason (R) : Translocation involve shifting, not deleting or adding genetic material which can cause chromosomal defects when gametes are formed.

173. *Assertion (A) :* A tadpole whose thyroid gland has been removed may not metamorphose.
Reason (R) : Calcitonin and thyroxine are produced from thyroid gland. These hormones stimulate protein synthesis which are important for tissue growth and development in amphibian tadpoles.

174. *Assertion (A) :* Gene conversion in eukaryotes occurring mainly at synapsis during meiosis, whereby a donor DNA sequence, a few hundred bases or perhaps a kilobase in length is transferred from one gene to another having substantial sequence homology.
Reason (R) : It may be responsible for much diversity in some mammalian immunoglobulin production.

175. *Assertion (A) :* Cortisol is a protein hormone of mammals which promotes gluconeogenesis and lowers blood pressure.
Reason (R) : Low plasma cortisol level promotes release of corticotropin releasing factor (CRF) from the cortex, causing release in turn of ACTH from the posterior pituitary.

176. *Assertion (A) :* Molecules of 3 phosphoglyceraldehyde get isomerized to produce dihydroxy acetone phosphate.
Reason (R) : The isomerization is catalyzed by the enzyme *phosphate triose isomerase.*

177. *Assertion(A):* Antitranspirants are material applied to plants for retarding transpiration.
Reason (R) : Abscisic acid and phenyl mercuric acetate are not antitranspirants.

178. *Assertion(A):* When the chromosomes are highly coiled and condensed at the time of cell division, it is possible to photograph and count them.
Reason (R) : Each species has a characteristic chromosome number.

179. *Assertion(A):* DNA replicates after mitosis.
Reason (R) : In mitosis the chromosomal number does not stay constant.

180. *Assertion(A):* In collateral vascular bundles phloem is situated towards the inner side.
Reason (R) : In monocot stem the cambium is present.

GENERAL KNOWLEDGE

181. The time difference between I.S.T. and G.M.T. is
(a) $5\frac{1}{2}$ hrs (b) 9 hrs
(c) $12\frac{1}{2}$ hrs (d) $8\frac{1}{2}$ hrs.

182. 'Pulitzer' prizes are awarded to Americans for excellence in
(a) films (b) social work
(c) journalism (d) meidcine.

183. Doldrum is an area of
(a) low temperature (b) low rainfall
(c) low pressure (d) low humidity.

184. The U.N. Day is observed on
(a) 24th October (b) 24th January
(c) 24th Septemper (d) 24th June.

185. Triputi temple is located in
(a) Karnataka (b) Andhra Pradesh
(c) Tamil Nadu (d) Kerala.

186. Port Blair is situated in
(a) North Andaman (b) South Andaman
(c) Middle Andaman (d) Little Andaman.

187. The first of the GAEL (Global Alliance for the elimination of Leprosy) was held in
(a) New Delhi (b) Bombay
(c) Culcutta (d) Paris.

188. Which of the following are the recipient of Bharat Ratan Award for year 2000.
(a) Lata Mangeshkar
(b) Ustad Bismillah Khan
(c) Asha Bhosle (d) Both (a) and (b).

189. Which mirror is used as a rear view mirror in vehicles?
(a) plain (b) convex
(c) concave (d) spherical.

190. Dronacharya Award is for
(a) best sports persons
(b) best coaches
(c) best persons in archery
(d) best shooters.

191. Tehri Dam is being built on the river
(a) Yamuna (b) Godavari
(c) Kaveri (d) Bhagirathi.

192. The state in South India which generates electricity based on hydel power only is
(a) Karnataka (b) Kerala
(c) Tamil Nadu (d) Andhra Pradesh.

193. The acid present in lemons and oranges is
(a) acetic acid (b) hydrochloric acid
(c) citric acid (d) oxalic acid.

194. Who wrote "Sare Jahanse Achchha Hindustan Hamara"?
(a) Ghalib (b) Iqbal
(c) Nehru (d) Azad.

195. Which country is honoured by having all the three International beauty crowns in the same year
(a) Venezuala (b) Italy
(c) South America (d) India.

196. Who among the following is the author of the book "Bradman's Best"?
(a) Roland Perry
(b) Barry Richards
(c) Richard Mulvaney (d) Jom Brokaw.

197. Which of the following computer viruses is named after a cherry and caffeine soft drink popular with programmes?
(a) Sircam (b) Code Pink
(c) Code Red (d) Malisa.

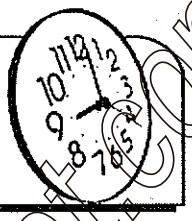
198. Megger is an instrument to measure
(a) very low resistance
(b) insulation resistance
(c) inductance of a coil
(d) all of the above.

199. A red object, when seen through a thick blue glass, appears
(a) red (b) violet
(c) green (d) black.

200. The most important and the main musical instrument in "Nautanki" from of folk theatre is
(a) nagara (b) tabla
(c) flute (d) mohuri.

■■■

Model Test Paper-4



Time : $3\frac{1}{2}$ *hours.* *Maximum Marks :* 200

PHYSICS

1. In Huygen's wave theory, the focus of all points in the same state of vibration called
   (a) wave front (b) a half-period zone
   (c) vibrator (d) a ray

2. A spring has been kept fixed with immovable wall and a force of 1 newton has been applied on it. The spring extends upto a length I. Now if 2 newton force is applied on it, it will extend
   (a) $2/3\ I$ (b) $3/2\ I$
   (c) $2I$ (d) I^2

3. Refractive index is greater for
   (a) light of greater wavelength
   (b) light of shorter wavelength
   (c) light of low frequency
   (d) all of these

4. A thin circular copper plate, a sphere and a cube of same mass and material are heated to 100°C temperature. Now if they are allowed to cool, which of the three will cool first ?
   (a) sphere (b) copper plate
   (c) cube (d) all at same time

5. If we bring N-pole of a magnet towards the coil. The face of the coil acquires
   (a) zero-polarity (b) north polarity
   (c) south polarity (d) none of these

6. In a closed end organ pipe which of the following notes is not present if fundamental note is 50?
   (a) 100 (b) 250
   (c) 150 (d) none of these

7. In a semiconductor diode P-side is earthed and N-side is applied a potential of 2 volt, the diode shall
   (a) breakdown (b) not conduct
   (c) conduct (d) conduct partially

8. The sensitivity of galvanometer depends on
   (a) moment of inertia of coil
   (b) angle of deflection
   (c) earth's magnetic field
   (d) none of these

9. If v_e be the escape velocity and v_o be the orbital velocity, then v_e/v_o is equal to
   (a) $2\sqrt{2}$ (b) $\sqrt{2}$
   (c) $\sqrt{2}$ (d) 2

10. A pendulum of time period T is kept suspended in a train accelerating uniformly, then its time period
    (a) decreases (b) increases
    (c) remains unchanged
    (d) none of these

11. The difference in the acceleration due to gravity at the pole and equator is given by
    (a) $R\omega^2$ (b) $\Omega \cos \theta^2$
    (c) $R\omega^2 \cos^2\theta$ (d) $\frac{R\omega^2\theta}{g^2}$

12. If two bulbs one of 60 W and other of 100 W are connected in parallel, then which one of the following will glow more ?
    (a) 60 W bulb (b) 100 W bulb
    (c) both equally (d) none of these

13. The number of electrons ejected from photoelectric surface depends upon
    (a) the wavelength of light
    (b) the frequency of light
    (c) the intensity of incident light
    (d) none of these

14. An n-type semiconductor is formed
(a) only from germanium
(b) when germanium is doped with impurity containing $3d$ valence electrons
(c) when germanium is doped with impurity containing 5-valence electrons
(d) only from pure silicon

15. Which one of the following is essential feature of SHM ?
(a) acceleration is directly proportional to displacement from mean position and is directed towards it
(b) restoring force is inversely proportional to displacement from mean position
(c) acceleration and amplitude
(d) constant amplitude

16. Which of the following wavelengths will suffer maximum deviation while passing through a prism?
(a) orange (b) green
(c) violet (d) red

17. A spectrum which contains all wavelengths without any break is called
(a) continuous emission spectrum
(b) line spectrum
(c) emission spectrum
(d) all of these

18. Seebeck emf depends on
(a) neutral temperature
(b) temperature of cold junction
(c) temperature of hot junction
(d) none of these

19. A hollow cylinder and a solid cylinder having same mass and same diameter are released from rest simultaneously from top of an inclined plane which one will reach bottom first ?
(a) solid (b) hollow
(c) both equally
(d) one with greator density

20. A hollow charged metal sphere has radius r. If the potential difference between its surface and a point at a distance of $3r$ from the centre is V, then electric field intensity at a distance of $3r$ from centre is

(a) $\frac{V}{2}r$ (b) $\frac{V}{4}r$

(c) $-\frac{V}{3r}$ (d) $\frac{V}{6}r$

21. In an A.C. circuit V and I is given by
$V = 100 \sin (1000\ t)$ volt
$I = 1000 \sin (1000\ t + \pi/3)$ mA The power dissipated in the circuit is
(a) 10 W (b) 25 W
(c) 10^4 W (d) 250 W

22. A series LCR circuit is tuned to resonance. The angular frequency of the applied AC voltage is ω. If resistance of the circuit is R, the impedance of circuit will be

(a) $R^2 + \left(\omega L + \frac{1}{\omega C}\right)^2$ (b) $R + \omega L + \left(\frac{1}{\omega C}\right)$

(c) R (d) $\sqrt{R + \left(\omega L - \frac{1}{\omega C}\right)}$

23. Choose the correct answer
Heat in metals is produced due to
(a) collision of conduction electrons with protons
(b) collision of conduction electrons with atoms
(c) collision of electrons with electrons
(d) in all these ways as mentioned in above options

24. A proton enters a magnetic field parallel to the direction of field, then the path following by it is
(a) straight line (b) hyperbola
(c) circular (d) helical

25. The negative sign in the equation $e = \frac{-d\phi}{dt}$ indicates
(a) induced emf opposes the cause producing it
(b) current density is negative
(c) emf is always taken negative
(d) none of the above

26. Fission reaction was discovered by
(a) Seaborg
(b) Otto Han and Strassman
(c) Einstein (d) S. Hawking

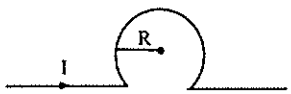
27. If 200 MeV energy is released in a fission of a single nucleus of $_{92}U^{235}$. How many fissions must occur per second to produce a power of kW ?
(a) 3.125×10^{13} (b) 3.12×10^{12}
(c) 0.312×10^{13} (d) none of these

28. Some water drops of radius r each coalesec to form a big drop of radius R. Then rise in temperature is given by

(a) $\left(\frac{3T}{J}\right)\left(\frac{1}{r}-\frac{1}{R}\right)$ (b) $\frac{3T}{J.r}$

(c) $\frac{rT}{J}$ (d) $\frac{3T}{J}\left(\frac{1}{r}+\frac{1}{R}\right)$

29. A long straight conductor is bent into shape as shown. If it carries I ampere



and its radius is R, then magnetic field ($\vec{B}$) at the centre of circular coil is

(a) $\frac{\mu_0 I(\pi+1)}{2\pi R}$ (b) Zero

(c) ∞ (d) $\frac{\mu_0 I(\pi-1)}{2\pi R}$

30. An engineer claims to have made an engine delivering 10 kW power with fuel consumption of 1g sec^{-1}. The calorific value of fuel is 2k cal/gm. His claim is
(a) depends on engine
(b) valid (c) non-valid
(d) depends on load

31. If two drops of same radius are falling through air with a velocity of 5 cm sec^{-1}. If the two drops coalesec to form one drop, the terminal velocity of the drop is
(a) $5\sqrt{2}$ cm/sec (b) 10 cm/sec
(c) 2.5 cm/sec (d) $5 \times 4^{1/3}$ cm/sec

32. The frequency of open organ pipe is f. If half part of the organ pipe is dipped in water, then frequency is
(a) $3f/4$ (b) $f/2$
(c) f (d) zero

33. A particle is acted upon by a force of constant magnitude which is always perpendicular to the velocity of particle. The motion of the particle takes place in a horizontal plane. It follows
(a) it moves in a circular path
(b) velocity is constant
(c) linear momentum is constant
(d) none of these

34. The number of turns in the coil are doubled, the emf will get
(a) quadrupled (b) halved
(c) doubled (d) none of these

35. Nucleus contains
(a) protons, electrons and neutrons
(b) electrons and neutrons
(c) protons and electrons
(d) protons and neutrons

36. Diamond shines due to
(a) total internal reflection
(b) refraction (c) reflection
(d) none of these

37. The frequency of sonometer wire is n. If its tension is increased four times and length is doubled, the new frequency will be
(a) n (b) $2n$
(c) $n/2$ (d) $4n$

38. Which of the following combination would give maximum emf ?
(a) Sb and Bi (b) Fe and Bi
(c) Ni and Cr (d) Cu and Fe

39. According to Bohr's theory, the radius of electron in an orbit described by principal quantum number n and atomic number Z is proportional to

(a) $\frac{n^2}{Z^2}$ (b) $\frac{n^2}{Z}$

(c) Z^2n^2 (d) $\frac{Z^2}{n}$

40. $\frac{kg.m^2}{s^2}$ is the unit of

(a) Momentum (b) Power
(c) Energy (d) Impulse

Instructions for Q. No. 41 to 60

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion

(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion

(c) If the assertion is true, but the reason is false

(d) If both assertion and reason are falses

41. *Assertion (A) :* A dip needle becomes vertical at magnetic equator of the earth.
Reason (R) : The magnetic field due to the earth at the magnetic equator is vertical.

42. *Assertion (A) :* When two electrons are brought close to each other, the electrical potential energy increases.
Reason (R) : Work must be done against electrical force of repulsion.

43. *Assertion (A) :* If Young's double slit experiment is performed in water, the fringe with width will decrease
Reason (R) : Wavelength of light in water is smaller than in air.

44. *Assertion (A) :* Interference pattern is obtained on a screen due to two identical coherent sources of monochromatic light. The intensity at the central part of the screen becomes one half if one of the sources is blocked.
Reason (R) : The resultant density is the sum of the densities due to two sources; if one is blocked the intensity obviously reduces to one-half.

45. *Assertion (A) :* Insulators do not allow flow of current through them.
Reason (R) : They have no free charge carriers.

46. *Assertion (A) :* The shape of an automobile is so designed that its front resembles the streamline pattern of the fluid through which it moves.
Reason (R) : the resistance offered by the fluid is maximum.

47. *Assertion (A) :* Two satellites of mass m_1 and m_2 ($m_1 > m_2$) are going around the earth in orbits of radii r_1 and r_2 ($r_1 > r_2$).
Reason (R) : They will have same velocity.

48. *Assertion (A) :* In Thomson's experiment all the positive ions with the same value of specific charge are focussed on the same parabola irrespective of their velocities.
Reason (R) : The ions of same velocities arrive at different points on the same parabola.

49. *Assertion (A) :* In the process of nuclear fission the fragments emit two or three neutrons as soon as they are formed and subsequently emit particles.
Reason (R) : As the fragments contain an excess of neutrons over protons emission of neutrons and particles bring their neutron/proton ratio to stable values.

50. *Assertion (A) :* While passing round the corners of an obstacle the light spreads out to some extent into the region of the geometrical shadow.
Reason (R) : The bending is greater for light of longer wavelengths and less for shorter wavelengths.

51. *Assertion (A) :* An e.m.f. is induced in a circuit whenever there is a change in the magnetic flux linked with the circuit and the magnitude of the induced e.m.f. is equal to the negative rate of change of flux.
Reason (R) : The direction of the induced e.m.f. is such that it opposes the very cause to which it is due.

52. *Assertion (A) :* If a heavy nucleus is split into two medium sized parts, each of the new nuclei will have more binding energy per-nucleon than the original nucleus.
Reason (R) : Combining two light nuclei to form a single relatively heavy nucleus means more binding energy per nucleon in the new nucleus.

53. *Assertion (A) :* When two vibrating tuning forks having frequencies 256Hz and 512Hz are held near each other, beats can not be heard.
Reason (R) : The principle of superposition is valid only if the frequencies of the oscillators are nearly equal.

54. *Assertion (A) :* In the absence of space charge, the potential gradient between cathode and the anode will be uniform.
Reason (R) : The space charge reduces the potential in the cathode and anode region non-uniformly.

55. *Assertion (A) :* A thin aluminium disc, spinning freely about a central pivot, is quickly brought to rest when placed between the poles of strong U-shaped magnet.
Reason (R) : Current induced in the disc rotating in a magnetic field produces a force which opposes the motion of the disc.

56. *Assertion (A) :* When white light is incident on a thin oil film on the surface of water, colours are seen.
Reason (R) : White light is composed of several colours.

57. *Assertion (A) :* The work done in bringing a body from the top to the base along a frictionless inclined plane is the same as the work done in bringing it down along the vertical side.
Reason (R) : The gravitational force on the body along the inclined plane is the same as that along the vertical side.

58. *Assertion (A) :* A vibrating tuning fork sounds louder when its stem is put against a desk top.
Reason (R) : When a wave reaches another denser medium, a part of the wave is reflected.

59. *Assertion (A) :* Isotopes of an element can be separated by using a mass spectrometer.
Reason (R) : Separation of isotopes is possible because of the difference in electron numbers of isotopes.

60. *Assertion (A) :* A large soap bubble expands while a small bubble shrinks, when they are connected to each other by a capillary tube.
Reason (R) : The excess pressure inside bubble (or a drop) is inversely proportional to its radius

CHEMISTRY

61. Consider the following reaction occurring in an automobile
$2C_8H_{18(g)} + 25O_{2(g)} \rightarrow 16CO_{2(g)} + 18H_2O_{(g)}$
The sign ΔH, ΔS and ΔG would be
(a) −, +, + (b) −, +, −
(c) +, −, + (d) +, +, −

62. Equivalent conductance of NaCl, HCl and CH_3COONa at infinite dilution are 126.45, 426.16 and 91 ohm^{-1} cm^2 respectively. The equivalent conductance of CH_3COOH at infinite dilution would be
(a) 390.71 ohm^{-1} cm^2 (b) 253.71 ohm^{-1} cm^2
(c) 101.38 ohm^{-1} cm^2 (d) 678.90 ohm^{-1} cm^2

63. Which does not exist ?
(a) $[CCl_6]^{2-}$ (b) $[GeF_6]^{2-}$
(c) $[SiCl_6]^{2-}$ (d) $[GeF_6]^{2-}$

64. The type of hybridisation of boron in diborane is
(a) sp^3 (b) sp^2
(c) sp^2 (d) sp^3d^2

65. Boron compounds behave as Lewis acids because of their
(a) electron deficient character
(b) covalent nature
(c) acidic nature
(d) ionising property

66. All the following substances react with water. The pair that yields the same gaseous product is
(a) Ca and CaH_2 (b) Na and Na_2O_2
(c) K and KO_2 (d) Ba and BaO_2

67. Epsom salt is
(a) $2CaSO_4.H_2O$ (b) $MgSO_4.2H_2O$
(c) $MgSO_4.7H_2O$ (d) $BaSO_4.2H_2O$

68. Squashes are stored by adding
(a) Na_2SO_3 (b) KCl
(c) Citric acid
(d) Sod. metabisulphite

69. In Goldschmidt aluminothermic process, reducing agent used is
(a) Na (b) Al powder
(c) Coke (d) Al_2O_3

70. Which one of the following pairs of substances on reaction will not evolve H_2 gas ?
(a) iron and H_2SO_4 (aq)
(b) iron and steam
(c) copper and HCl (aq)
(d) sodium and ethanol

71. The oxide that gives hydrogen peroxide on treatment with dil acid is
(a) MnO_2 (b) Na_2O_2
(c) PbO_2 (d) TiO_2

72. The energy required to remove an electron of a gaseous atom from its ground state is called
(a) electrode potential
(b) ionisation energy
(c) potential energy
(d) activation energy

73. Chloride of an element A gives neutral solution in water. In the periodic table, the element A belongs to
(a) fifth group
(b) third group
(c) first group
(d) first transition series

74. If the valency shell electronic configuration of an element is $ns^2\ np^5$, this element belongs to the group of
(a) noble gases (b) inert metals
(c) alkali metals (d) halogens

75. Main product of reaction $CH_3CONH_2 + HNO_2 \rightarrow ?$ is
(a) CH_3NH_2 (b) $CH_3CH_2NH_2$
(c) CH_3COOH (d) CH_3NO_2

76. Paraldehyde is
(a) a hexamer of formaldehyde
(b) a trimer of acetaldehyde
(c) a trimer of formaldehyde
(d) a hexamer of acetaldehyde

77. An aldehyde when treated with an alkali gives an acid and an alcohol. Such reaction is named as
(a) cannizzaro reaction
(b) hydrolysis reaction
(c) aldol condensation
(d) claisen condensation

78. Reaction $\underbrace{CO + H_2}$ $+ H_2 \xrightarrow[Cr_2O_3\text{-}ZnO]{673\ K,\ 300\ atm}$ may be used for the manufacture of
(a) HCHO (b) HCOOH
(c) CH_3OH (d) CH_3COOH

79. An organic compound A reacts with sodium metal and forms B. On heating with conc. H_2SO_4, A gives diethyl ether. A and B are respectively
(a) CH_3OH, CH_3ONa
(b) C_3H_7OH, C_3H_7ONa
(c) C_2H_5OH, C_2H_5ONa
(d) C_4H_9OH, C_4H_9ONa

80. Glucose molecule reacts with 'X' number of phenyl hydrazine molecules to yield osazone. The value of 'X' is
(a) 3 (b) 2
(c) 1 (d) 4

81. The sugar present in fruits is
(a) sucrose (b) glucose
(c) fructose (d) galactose

82. To become a carbohydrate a compound must contain at least
(a) 4 carbons (b) 3 carbons
(c) 2 carbons (d) 6 carbons

83. Vitamin D is also known as
(a) reporductive vitamin
(b) ascorbic acid
(c) growth vitamin
(d) sunshine vitamin

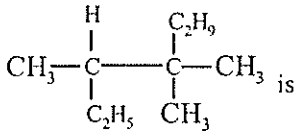
84. Zwitter ion is formed by
(a) benzoic acid (b) acetanilide
(c) aniline (d) lysine

85. Aspirin is an acetylation product of
(a) m-hydroxybenzoic acid
(b) o-dihydroxy benzene
(c) o-hydroxybenzoic acid
(d) p-dihydroxy benzene

86. The olefin which on ozonolysis gives CH_3CH_2CHO and CH_3CHO is
(a) 1-pentene (b) 2-butene
(c) 1-butene (d) 2-pentene

87. An isomer of ethanol is
(a) diethyl ether (b) dimethyl ether
(c) methanol (d) ethylene glycol

88. IUPAC name of



(a) 3, 4, 4-trimethyl heptane
(b) 2-ethyl-3, 3-dimethyl heptane
(c) 2-butyl-2-methyl-3 ethyl butane
(d) 3, 4, 4-trimethyl octane

89. The most-suitable method of separation of 1 : 1 mixture of *o*-and *p*-nitrophenols is
(a) crystallisation (b) chromatography
(c) sublimation (d) steam distillation

90. Consider the reaction
$M^{n+}_{(aq)} + ne^- \rightarrow M_{(s)}$
The standard reduction potential values of the metals M_1, M_2 and M_3 are –0.34V, –33.05V and –1.66V respectively. The order of their reducing power will be
(a) $M_1 > M_3 > M_2$ (b) $M_3 > M_2 > M_1$
(c) $M_1 > M_2 > M_3$ (d) $M_2 > M_3 > M_1$

91. Specific conductance of 0.1 N KCl solution at 25°C is 0.012 ohm^{-1} cm^{-1}. The resistance of the cell containing the solution at the same temperature was found to be 55 ohm. The cell constant will be
(a) 0.918 cm^{-1} (b) 0.66 cm^{-1}
(c) 0.142 cm^{-1} (d) 1.12 cm^{-1}

92. $S + \frac{3}{2} O_2 \rightarrow SO_3 + 2x$ k cal

$SO_2 + \frac{1}{2} O_2 \rightarrow SO_3 + y$ k cal

Find out the heat of formation of SO_2
(a) (x + y) (b) (2x + y)
(c) (2x – y) (d) $\frac{2x}{y}$

93. How many layers are adsorbed in chemical adsorption ?
(a) several (b) 2
(c) 1 (d) zero

94. Activation energy of a chemical reaction can be determined by
(a) evaluating rate constants at two different temperatures
(b) evaluating velocities of reaction at two different temperatures
(c) evaluating rate constant at standard temperature
(d) changing concentration of reactants

95. The pH of a solution obtained by mixing 50 ml 0.4N HCl and 50 ml 0.2N NaOH is
(a) 1.0 (b) –log 0.2
(c) –log 2 (d) 2.0

96. In which case K_p is less than K_c ?
(a) $2SO_2 + O_2 \rightleftharpoons 2SO_3$
(b) $H_2 + Cl_2 \rightleftharpoons 2HCl$
(c) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$
(d) $2SO_3 + O_2 \rightleftharpoons 2SO_3$

97. How many grams of dibasic acid (mol. wt. 200) should be present in 100 ml of the aqueous solution to give 0.1N normality ?
(a) 2 g (b) 20 g
(c) 1 g (d) 10 g

98. The ratio between the two mean square speed of H_2 at 50 K and that of O_2 at 800 K is
(a) 1 (b) 2
(c) 4 (d) $\frac{1}{4}$

99. If we mix a pentavalent impurity in a crystal lattice of germanium, what type of semi-conductor formation will occur ?
(a) *p*-type (b) *n*-type
(c) both (a) and (b) (d) none of the two

100. A solid has a structure in which 'W' atoms are located at the corners of a cubic lattice, 'O' atoms at the centre of edges and 'Na' atoms at the centre of the cube. The formula of the compound is
(a) Na_2WO_3 (b) $NaWO_3$
(c) $NaWO_2$ (d) $NaWO_4$

Instructions for Q. No. 101 to 120

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion

(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion

(c) If the assertion is true, but the reason is false

(d) If both assertion and reason are falses

101. *Assertion (A) :* Lead is a metal with a high density. It readily dissolves in moderately concentrated nitric acid giving colourless fumes which turn red in contact with air.
Reason (R) : Nitric oxide (NO) is a colourless oxide of nitrogen while NO_2 is a coloured oxide of nitrogen.

102. *Assertion (A) :* The reaction of ammonia solution with calomel is a disproportionation reaction in which mixture of Hg (ii) amido chloride and Hg are formed.
Reason (R) : In a disproportionation reaction species under reaction is neither oxidised nor reduced.

103. *Assertion (A) :* Sodium thiosulphate dissolves the white precipitate of silver chloride.
Reason (R) : The thiosulphate ions act as strong complexing agents.

104. *Assertion (A) :* When $SnCl_2$ solution is added to $HgCl_2$ solution, a milky white precipitate is obtained and on adding excess of $SnCl_2$, a black precipitate is formed.
Reason (R) : The disproportionation of Hg(II) is easier than its reduction only.

105. *Assertion (A) :* The electron affinity of chlorine is greater than that of fluorine.
Reason (R) : Chlorine is more electronegative than fluorine.

106. *Assertion (A) :* The boiling point of *n*-alkanes increases regularly with the increase in the number of carbon atoms.
Reason (R) : The magnitude of van der Waal's forces increases with the increases in molecular mass and molecular size.

107. *Assertion (A) :* *p*-nitroaniline is stronger base than *p*-toluidine.
Reason (R) : The electron with drawing NO_2 group in the *p*-nitroaniline makes it a stronger base.

108. *Assertion (A) :* All the amines, except tertiary amines are capable of forming intermolecular hydrogen bonds.
Reason (R) : Tertiary amines have larger molecules and surface area.

109. *Assertion (A) :* Phenol is strongly acidic than ethanol.
Reason (R) : Phenoxide ion is more stabilized by resonance than ethoxide ion.

110. *Assertion (A) :* The nuclear isomers are the atoms with the same atomic number and same mass number, but with different radioactive properties.
Reason (R) : The nucleus in the excited state will evidently have a different half-life as compared to that in the ground state.

111. *Assertion (A) :* Balloons made of Mylar films are better at containing helium than the conventional rubber balloons
Reason (R) : The root-mean-square speed of helium is very high so helium atoms can effuse rapidly through rubber balloons.

112. *Assertion (A) :* To separate ^{235}U from the more abundant ^{238}U isotope, all the uranium is converted into UF_6.
Reason (R) : UF_6 is one of the few compounds that exists in gaseous state under ordinary conditions.

113. *Assertion (A) :* One mole of helium atoms should occupy 22.4 litre volume at STP.
Reason (R) : Taking 31 pm as radius of helium atom, if we pack together a mole of helium atoms, the mole of atoms should have a volume of 22.4 litre.

114. *Assertion (A) :* A sample of 8.00 moles of chlorine gas in a 4.00 litre tank 27 C leads to a pressure of 49.2 atm according to ideal gas law.
Reason (R) : The actual pressure of the sample of chlorine is nearly 20 atmosphere less than the ideal pressure.

115. *Assertion (A) :* The pressure of a gas is inversely proportional to its volume at constant temperature and *n*.
Reason (R) : The gas volume is directly proportional to *n* at constant temperature and pressure.

116. *Assertion (A) :* Not only is the fraction of oxygen is reduced in diving gases, but nitrogen of normal air is replaced by helium.
Reason (R) : Nitrogen becomes more soluble in the body fluids at high pressure and causes a condition similar to alcohol intoxication.

117. *Assertion (A) :* When one talks after breathing helium, the sound becomes like that of Donald Duck.
Reason (R) : The vocal cords vibrate faster in an atmosphere less dense than air and the pitch of voice is raised.

118. *Assertion (A) :* The reacting gases combine in volumes that are ratios of small whole numbers.
Reason (R) : The partial pressure of a gas in a mixture is given by its mole fraction times the total pressure of the mixture.

119. *Assertion (A) :* The oxidation numbers are artificial, they are useful as a 'book-keeping' device of electrons in reactions.
Reason (R) : The oxidation numbers do not usually represent real charges on atoms, they are simply conventions that indicate what the maximum charge could possibly be on an atom in a molecule.

120. *Assertion (A) :* The structural-pair geometry of Formaldehyde molecule is trigonal planar.
Reason (R) : In H_2CO molecule, the carbon atom is surrounded by 3 sigma bonding electron pairs.

BIOLOGY

121. In which of the following animal, all the three important chordate characters exist throughout life ?
(a) amphibians (b) mammals
(c) *Amphioxus* (d) all of the above

122. Which cranial nerve has the highest number of branches ?
(a) vagus nerve (b) facial nerve
(c) trigeminal (d) all of the above

123. What is common among silver fish, crab, honey bee and prawn ?
(a) metamorphosis (b) compound eye
(c) poison gland (d) all of the above

124. The maximum formation of m-RNA occurs in
(a) ribosome (b) nucleolus
(c) cytoplasm (d) nucleoplasm

125. The most striking example of point mutation is found in a disease, called
(a) down's syndrome (b) night blindness
(c) thalassemia
(d) sickle-cell anaemia

126. At high altitude, the RBCs in the human blood will
(a) increase in number
(b) decrease in size
(c) increase in size (d) decrease in number

127. Typhus disease in humans is caused by
(a) rickettsiae (b) protozoans
(c) virus (d) none of the above

128. Rickettsiae form a group of
(a) bacterium-like prokaryotes
(b) viruses (c) fungi
(d) none of the above

129. In the fertile human female, approximately on which day of the ovulation takes place ?
(a) 14th day (b) 8th day
(c) 1st day (d) 18th day

130. Which of the following is regarded as an unit of nervous tissue?
(a) neuron (b) dendrite
(c) axon (d) myelin sheath

131. Which of the follwing carries absorbed product from digestive tract ?
(a) pulmonary vein
(b) hepatic portal vein
(c) hepatic artery
(d) none of the above

132. Who proposed the 'signal hypothesis' meant for the biosynthesis of secretory type of proteins?
(a) Blobel and Sabatini
(b) Camillo Golgi (c) Baltimore
(c) Sheeler and Bianchi

133. Which of the following carries protein and lipid to other parts of the cell?
(a) rough endoplasmic reticulum
(b) smooth endoplasmic reticulum
(c) both (a) and (b)
(d) none of the above

134. Epidermal layer consisting of dividing cells, is
(a) stratum granulosum
(b) stratum malpighii
(c) stratum lucidum
(d) stratum corneum

135. The tissue having least power of regeneration is
(a) skeletal tissue of long bones
(b) endothelium of blood vessels
(c) epidermis of skin
(d) nervous tissue of brain

136. Which of the following evidences does not favour the Lamarckian concept of inheritance of acquired chracters ?
(a) lack of pigment in cave dwelling animals
(b) presence of webbed toes in aquatic birds
(c) absence of limbs in snakes
(d) melanization in peppered moth

137. A disease caused by eating fish contaminated with mercury, is called
(a) osteosclerosis (b) minimata disease
(c) bright's disease
(d) hashimoto's disease

138. Although much CO_2 is carried in blood, yet blood does not become acidic, because
(a) buffer system of blood plays an important role
(b) CO_2 continuously diffuses through the tissues
(c) CO_2 combines with water to form H_2CO_3, which is neutralized by $NaCO_3$
(d) all of the above

139. The concept that 'population tends to increase geometrically while food supply increases arithmetically' was put forward by
(a) Thomas Malthus (b) Adam Smith
(c) Stuart Mill (d) Charles Darwin

140. The transgenic animals are those which have
(a) foreign DNA is some of its cells
(b) foreign RNA in all its cells
(c) foreign DNA in all of its cells
(d) both (b) and (c)

141. Which of the following metabolic disease occurs only in males ?
(a) Lesch–Nyhan disease
(b) Gaucher's disease
(c) Fabry's disease
(d) Hunter's disease

142. Hurthle cells are present in
(a) spleen (b) liver
(c) thyroid gland (d) lymph

143. Phylogenetic classification is one which is based on
(a) overall similarities
(b) common evolutionary descent
(c) habits
(d) utilitarian system

144. In mitochondira, cristae act as sites for
(a) oxidation-reduction reaction
(b) protein synthesis
(c) breakdown of macromolecules
(d) phosphorylation of flavoporteins

145. A product may bind to the regulatory enzyme's active site, preventing it from binding substrate and temporarity shutting down the metabolic pathway. This is called
(a) allosteric inhibition
(b) competitive inhibition
(c) negative feedback
(d) non-competitive inhibition

146. During the formation of cell wall the secreted outermost layer of cellulose is
(a) primary wall (b) secondary wall
(c) middle lamella (d) both (b) and (c)

147. Segments of DNA which are capable of moving in and out of a chromosome are termed as
(a) transposons (b) recon
(c) muton (d) replicon

148. The transition reactions
(a) connect glycolysis to the Krebs cycle
(b) give off CO_2
(c) utilize NAD^+
(d) include all of the above

149. Who among the following placed gymnosperms between monocots and dicots as third taxon ?
(a) Englar and Prantl
(b) Bentham and Hooker
(c) Hutchinson
(d) all of the above

150. Plasmodesmata are formed around the membranes of
(a) golgi bodies (b) nucleus
(c) chloroplast (d) none of the above

151. Which of the following statements is/are correct?
(a) both plasmids and viruses can serve as vectors
(b) vectors carry only the foreign gene into the host cells
(c) plasmids can carry recombinant DNA but viruses can not
(d) all of the above

152. In hypogynous type of flowers all floral parts arise below the
(a) sepals (b) gynoecium
(c) petals (d) androecium

153. In *Selaginella*, heterosporous spores are
(a) sexual and asexual
(b) large and small
(c) haploid and diploid
(d) all spores are of the same size

154. Which of the following plants contains mercury in their tissues ?
(a) *Fucus* (b) *Laminaria*
(c) both (a) and (b) (d) *Fusarium*

155. Protein 'canaralin' is obtained from
(a) carrots (b) almonds
(c) jack beans (d) grapes

156. Certain pollutants remain unchanged for a long time in the environment. These are not easily degradable and are termed as
(a) persistent (b) non-biodegradable
(c) both (a) and (b) (d) biodegradable

157. When the procedure of bacterial staining is carried out, the negative bacteria stain
(a) purple (b) red
(c) green (d) both (b) and (c)

158. Diatoms are placed under
(a) protozoans (b) fungi
(c) plantae (d) protista

159. A group of isodiametric cells with intercellular spaces must be
(a) prosenchyma (b) collenchyma
(c) sclerenchyma (d) parenchyma

160. Man's utilization of starch as energy source depends on the ability to convert it completely to individual glucose units. This process is initiated by the action of enzymes
(a) *Amylases* (b) *Cellulases*
(c) *Proteases* (d) none of the above

Instructions for Q. No. 161 to 180

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are falses

161. *Assertion (A) : Gibberella fujikuroi* was first called as *Fusarium moniliforme.*
Reason (R) : Its sexual stage was not discovered.

162. *Assertion (A) :* Tyloses are abundant in duramen.
Reason (R) : They provide rigidity and strength to heartwood.

163. *Assertion (A) :* Gram, pea and mango show epigeal germination.
Reason (R) : In epigeal germination radicle grows after hypocotyl.

164. *Assertion (A) :* Antitranspirants are material applied to plants for retarding transpiration.
Reason (R) : Abscisic acid and phenyl mercuric acetate are not antitranspirants.

165. *Assertion (A) :* The first activity in light reaction of photosynthesis is the photolysis of H_2O.
Reason (R) : PS I is not involved in the photolysis of water.

166. *Assertion (A) :* Olecranon process is present at the distal end of Ulna.
Reason (R) : It articulate with the trochlea.

167. *Assertion (A) :* Mule is an example of heterosis.
Reason (R) : Heterosis is the superiority of offspring to their parents.

168. *Assertion (A) :* Cardiac output is the volume of blood pumped by left or right ventricle in one minute.
Reason (R) : It is calculated by multiplying the heart rate by the stroke volume.

199. *Assertion (A) :* Tea, coffee and alcohols are diuretic.
Reason (R) : They suppress ADH (vasopressin).

170. *Assertion (A) :* Nephritis is the inflammation of kidney.
Reason (R) : It is caused by bacterial infection.

171. *Assertion (A) :* Enzymes are protein that catalyses biochemical reactions.
Reason (R) : The enzyme itself is unchanged in the reaction to take place.

172. *Assertion (A) :* Mimicry is a device adopted by the nature to protect the individuals for their own purposes.
Reason (R) : It helps the animal in self defence and survival.

173. *Assertion (A) :* The sustaining surface for the gliding in certain animals, is a fold or series of folds of the skin known as patagium.
Reason (R) : The gliding flights are performed by arboreal animals.

174. *Assertion (A) :* Aldosterone is a steroid hormone and is important in the control of sodium and potassium ion concentration in mammals.
Reason (R) : It upgrades sodium ion concentration in the ECF by promoting reabsorption of sodium ions from renal tubules and excretion of potassium ions in urine.

175. *Assertion (A) :* Thyroid stimulating hormone is smallest polypeptide hormone of adenohypophysis of pituitary.
Reason (R) : Its role is to intensify the synthesis of hormones in adrenal cortex under a direct 'feedback' regulation.

176. *Assertion (A) :* There is a gradual decrease in the energy content at successive trophic level from producer to consumer.
Reason (R) : Pyramid of energy shows energy shows energy accumulation pattern at different trophic levels.

177. *Assertion (A) :* Meselson and stahl tested the Watson and Crick theory of DNA replication.
Reason (R) : They confirmed the mechanism of DNA replication by using the isotopic and centrifugation techniques.

178. *Assertion (A) :* Desired improved variety of economically useful crops are obtained by hybridization.
Reason (R) : When an ovary develops into a fruit without fertilization is called hybridization.

179. *Assertion (A) :* Chromosome appears longer during leptotene.
Reason (R) : The term chromosome was coined by Waldeyer.

180. *Assertion (A) :* Chromosome number is halved during Telophase-I.
Reason (R) : Chromosomes whose arms are equal, termed as submetacentric.

GENERAL KNOWLEDGE

181. 'Dazzler' is
(a) virus
(b) mascot for Cricket World Cup 2003
(c) bacteria
(d) none of these

182. Mohemmad Ali is associated with
(a) boxing (b) wrestling
(c) cricket (d) billiards

183. Who won the 2001 Miss World contest at the sun city resort in South Africa
(a) Zerelda Lee (b) Abgani Darego
(c) Diya Mirza (d) Juilet Jane Horne

184. 'Vande Matram' was taken from
(a) raj tarangani
(b) anand math
(c) akbar nama
(d) akbar khosa

185. 'Golden girl' is the biography of
(a) P.T.Usha
(b) Vijaya Lakshmi Pandit
(c) Sarojini Naidu
(d) Indira Gandhi

186. Who is the constitution head of our country?
(a) the President
(b) the Chief Justice
(c) the Attorney General
(d) the Prime Minister

187. When is the World Habitat Day?
(a) october 10 (b) october 8
(c) november 10 (d) october 3

188. Megasthenese visited India during the reign of
(a) Chandragupta II
(b) Chandragupta Maurya
(c) Ashoka
(d) Harsha

189. After returning from South Africa, Gandhiji launched his first successful 'Satyagraha' in
(a) chauri-chaura (b) dandi
(c) bardoli (d) champaran

190. The city which bore the brunt of the recent earthquake in Gujarat on January 26, 2001 is
(a) Ahmedabad (b) Bhuj
(c) Valsad (d) Gandhi Nagar

191. The Raga which is sung early in the morning is
(a) Todi (b) Darbari
(c) Bhopali (d) Bhimpalasi

192. For reproducing sound, CD (company disc) audioplayer uses a
(a) quartz crystal
(b) titanium needle
(c) laser beam
(d) barium titanate ceramic

193. Match List-I (Books) with List II (Authors) and select the correct answer using the codes given below the Lists :

List I	List II
A. My Music, My Life	1. Laxman Garkward
B. Adha Gaon	2. Rahi Massom Raja
C. Radha	3. Ramakanta Nath
D. The Pilferer	4. Ravi Shankar

(a) A B C D
3 2 4 1
(b) A B C D
4 2 3 1
(c) A B C D
4 1 3 2
(d) A B C D
3 1 4 2

194. Hiroshima day in Japan was remembered on
(a) August 6 (b) August 9
(c) October 7 (d) August 13

195. A test tube baby means fertilisation of the ovum and development taking place in the
(a) test tube
(b) uterus
(c) test tube and uterus respectively
(d) uterus and test tube respectively

196. The Bus started between India and Bangladesh flies from
(a) Delhi (b) Guwahati
(c) Calcutta (d) Asansol

197. Harappas used which type of ancient script?
(a) symbolic (b) hieroglyphic
(c) linear (d) pictographic

198. The fourth Buddist council was held during the reign of
(a) Ashoka
(b) Chandragupta
(c) Kanishka
(d) Chandragupta Vikramaditya

199. Which of the following is not a computer language
(a) BASIC (b) JAVA
(c) SUMATRA (d) FORTRAN

200. Who played the leading role in the founding of the Indian National Congress?
(a) A.O.Hume
(b) Surendranath Banerjee
(c) Gopal Krishna Gokhale
(d) Khan Abdul Ghafer Khan

■■■

Model Test Paper-5

Time : $3\frac{1}{2}$ hours. *Maximum Marks : 200*

PHYSICS

1. Light of wavelength 0.4 μm from a mercury vapour lamp falls on a photocell and causes the emission of photoelectrons for which the stopping potential is 1.5 volt. With light of wavelength 0.6 μm from a sodium lamp, the stopping potential is 0.5. V. The work function of the photoelectric material used in the photocell is
   (a) 1.5 eV (b) 2.0 eV
   (c) 2.5 eV (d) 3.0 eV.

2. Suppose we convert the masses of a proton and a neutron completely into energies E_p and E_n respectively. Then $(E_p - E_n)$ is
   (a) positive (b) zero
   (c) negative
   (d) positive or negative depending on the proton and the neutron come from the nucleus.

3. The earth's magnetic field acts as if the earth is a bar magnet. Then the equivalent *S*-pole
   (a) lies in Australia
   (b) is in the northern hemisphere
   (c) is located near the equator
   (d) coincides with the geographical south pole of the earth.

4. A neutral point is one at which two or more magnetic fields
   (a) cancel one another
   (b) act in the same direction
   (c) combine to give minimum intensity
   (d) combine to give maximum intensity.

5. A transparent material has three refractive indices 1.665, 1.650 and 1.68 for yellow, red and blue light respectively. The dispersive power of the substance is
   (a) 0.03 (b) 0.018
   (c) 2.0 (d) 0.045.

6. A lens of power +4.00 D is kept in contact with another lens. The combination has the focal length of 40 cm. The power of the second lens is
   (a) -2.00 D (b) -1.50 D
   (c) 2.50 D (d) 3.00 D.

7. The maximum velocity of an electron ejected from a photoelectric emitter when radiation falls on the latter is found to be 2×10^6 ms^{-1}. Assuming the charge to mass ratio of electron (e/m) to be 1.8×10^{11} coulomb/kg, the stopping potential is (in volt)
   (a) 1.2 (b) 2.1
   (c) 11.1 (d) 16.3.

8. Energy is not carried by
   (a) longitudinal progressive waves
   (b) electromagnetic waves
   (c) transverse progressive waves
   (d) stationary waves.

9. In nuclear reaction, which is conserved?
   (a) charge only (b) momentum only
   (c) sum of mass and energy
   (d) all of the above.

10. How will the image formed by a convex lens be affected if the upper half of the lens is wrapped in black paper?
   (a) the upper half of the image will be absent
   (b) size of the image will be reduced to one half
   (c) the brightness of image is reduced
   (d) there will be no effect.

11. Suppose there are 4 branches of 5 identical cells

connected in series, the internal resistance of each cell being 10 ohm. If the group of cells sends a current of 0.2 ampere through an external resistance of 25 ohm, then the e.m.f of each cell is (in volt)

(a) 1.5 (b) 1.25
(c) 2.5 (d) 1.75.

12. An unknown resistance R_1 is connected in series with a resistance 10 ohm. This combination is connected to one gap of a metre bridge while the other gap is connected to another resistance R_2. The balance point is at 50 cm. Now, when the 10 ohm resistance is removed, the balance point shifts to 40 cm. Then the value of R_1 (in ohm) is

(a) 60 (b) 40
(c) 20 (d) 10.

13. Around a temperature of 25°C, a p-type semiconductor has

(a) neither electrons nor holes
(b) a few free electrons and many holes
(c) a few holes and many free electrons
(d) many holes and many free electrons.

14. Suppose the binding energy per nucleon is plotted as a function of atomic mass number. The curve will have a sharp maximum for helium nucleus. This indicates

(a) helium is radioactive
(b) helium fissions very easily
(c) helium is very stable
(d) the rare occurrence of helium.

15. Two men talk on moon

(a) they hear each other with lower frequency
(b) they hear each other with higher frequency
(c) they can hear each other
(d) they can't hear each other at all.

16. 24 cells, each of internal resistance 0.5 Ω, are to be used to send maximum current through an external resistance of 3 Ω. The cells should be arranged

(a) all in series (b) all in parallel
(c) two rows of 12 cells each
(d) three rows of 8 cells each.

17. A bullet is shot from a gun when the angle of elevation of the gun is 30° and another when the angle of elevation is 60°.
For the two cases, which of the following is true?

(a) horizontal range as well as vertical height attained in both the cases will be same.
(b) horizontal range is same in both the cases but vertical height attained in the second case is three times than in the first case
(c) horizontal range in both the cases will be same but vertical height attained in the second case is two times than in the first case
(d) none of the above.

18. Amount of charge in coulomb required to deposit one gram equivalent in electrolysis is

(a) 96,490 (b) $48.0\sqrt{10^{-10}}$
(c) 6×10^{29} (d) 9608.

19. Given the relativistic mass of a particle

$$m = \frac{m_0}{\left(1 - \frac{v^2}{c^2}\right)^{1/2}}$$

where m_0 = rest mass, v = its velocity and c = velocity of light. Which of the following statements is true?

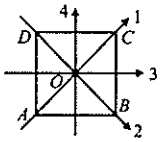
(a) increase in mass is due to its increase in potential energy
(b) increases in mass is equal to the increased in the kinetic energy divided by c^2
(c) there is no increase in mass
(d) mass increases when $v = 0$.

20. A particle is moving eastwards with a velocity of 5 ms^{-1}. In 10 second, the velocity changes to 5 ms^{-1} northwards. The average acceleration in this time is

(a) $\frac{1}{2}$ ms^{-2} towards N
(b) zero
(c) $\frac{1}{\sqrt{2}}$ ms^{-2} towards NE

(d) $\frac{1}{\sqrt{2}}$ ms^{-2} towards NW.

21. The moment of inertia of a thin square plate $ABCD$ of uniform thickness about an axis passing through the centre O and perpendicular to the plane of the plate is

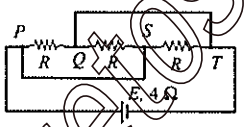


(a) $I_1 + I_2$ (b) $I_3 + I_4$
(c) $I_1 + I_3$ (d) $I_1 + I_2 + I_3 + I_4$.

22. An open and wide glass tube is immersed vertically in mercury in such a way that length 0.05 m extends above mercury level. The open end of the tube is closed and the tube is raised further by 0.43 m. The length of air column above mercury level in tube will be
(a) 0.215 m (b) 0.2 m
(c) 0.1 m (d) 0.4 m.

23. An equiconvex lens is made of material which has a refractive index of 1.6 for blue light and 1.5 for red light. Its focal length for red light is 0.20 m. What is the ratio of focal length for red light to focal length for blue light?
(a) 5/6 (b) 15/16
(c) 1 (d) 6/5.

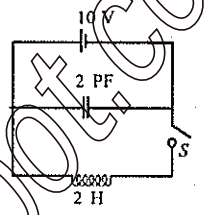
24. A battery of internal resistance 4 Ω is connected to the network of resistance



as shown in the figure. In order that the maximum power can be delivered to the network, the value of R in Ω should be
(a) 6 Ω (b) 12 Ω
(c) 8/3 Ω (d) 4/3 Ω.

25. A particle of mass 0.1 kg is projected with a velocity $U = \sqrt{10}$ ms^{-1} making an angle of 30° with the horizontal in x-y plane. The magnitude of the angular momentum of the particle about the point of projection when the particle is at its maximum height (H) is
(a) $\frac{\sqrt{30}}{160}(-\hat{k})$ kg m^2 s^{-1} (b) $\frac{\sqrt{30}}{160}(-\hat{k})$ kg m^2 s^{-1}
(c) zero (d) $\frac{\sqrt{30}}{160}(+\hat{k})$ kg m^2 s^{-1}

26. An LC circuit has an inductance of 2 H and a capacitance of 2 PF. The capacitor is initially charged with a 10 V battery when the switch S is open. The battery is then removed from the circuit, and the switch is closed so that the capacitor is shorted across the inductor



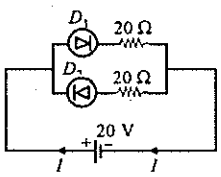
(a) the frequency of oscillation of the circuit is $\frac{10^6}{4\pi}$ Hz
(b) the maximum charge on the capacitor is 2×10^{-11} C
(c) the maximum current in the circuit is 10^{-5} A
(d) the maximum current in the circuit is $\frac{10^{-5}}{\pi}$ A.

27. An incubator made of material of thermal conductivity 2.5×10^{-4} $Wm^{-1}K^{-1}$ has the following dimension $l = 1$ m, $b = 0.5$ m, $h = 0.5$ m and wall thickness $= 1 \times 10^{-2}$ m. The interior of incubator is to be maintained at 40°C by a heater coil placed inside, connected across 100 V supply. If the outside temperature is 20°C, what is the resistance of the heater coil?
(a) 2 kΩ (b) 3 kΩ
(c) 4 kΩ (d) 5 kΩ.

28. The K_α line from molybdenum ($Z = 42$) has a wavelength 0.7078 Å. What will be the wavelength of K_α line of an element whose atomic number is 30?
(a) 1.414 Å (b) 2.12 Å
(c) 2.8 Å (d) 3.5390 Å.

29. An achromatic prism is made by combining two prisms P_1 ($\mu_f = 1.523$, $\mu_c = 1.515$) and P_2 ($\mu_f = 1.666$, $\mu_c = 1.650$). If the angle of prism P_1 is 10° then the angle of the prism P_2 will be
(a) 5° (b) 7.8°
(c) 10.6° (d) 20°.

30. In the circuit shown in figure, the value of the current I is



(a) 2 A
(b) 1 A
(c) zero
(d) 0.5 A.

31. Number of condensers, each of capacitance 1 μF and each one which gets punctured if a potential difference just exceeding 500 volt is applied, are provided. Then an arrangement suitable for giving a capacitor 2 μF across which 300 volt may be applied requires atleast
(a) 2 component capacitors
(b) 12 component capacitors
(c) 72 component capacitors
(d) 6 component capacitors.

32. In Young's double slit experiment, the intensity of central maximum is I_0. What will be the intensity at the same site when one slit is closed?
(a) I_0 (b) $I_0/2$
(c) $I_0/4$ (d) $I_0/16$.

33. The total energy of a particle executing simple harmonic motion is proportional to
(a) displacement from equilibrium position
(b) frequency of oscillation
(c) velocity in equilibrium position
(d) square of amplitude of motion.

34. Two racing cars of masses M_1 and M_2 are moving in circles of radii r_1 and r_2 respectively. Their speeds are such that they each move a complete circle in the same time t. The ratio of angular speed of the first to second car is
(a) $M_1 : M_2$ (b) $r_1 : r_2$
(c) 1 : 1 (d) $M_1v_1 : M_2v_2$.

35. If the coefficient of friction of a plane inclined at 45° is 0.5, the acceleration of a body sliding freely on it is
(a) $\frac{9.8}{\sqrt{2}}$ m/s² (b) 9.8 m/s²
(c) 4.9 m/s² (d) $\frac{9.8}{2\sqrt{2}}$ m/s².

36. The moment of inertia of a body (initially at rest) about a given axis is 1.2 kg-m². In order to produce a rotational kinetic energy of 1500 J, an angular acceleration of 25 rad/sec² must be applied about that axis for a period of
(a) 8 sec (b) 2 sec
(c) 1 sec (d) 10 sec.

37. R.M.S. velocity of a particle is V at pressure P. If the pressure increases by two times, then R.M.S. velocity will become
(a) $2V$ (b) V
(c) $0.5V$ (d) $4V$.

38. If the density of oxygen is 16 times that of hydrogen, what will be the corresponding ratio of their velocities of sound waves?
(a) 16 : 1 (b) 4 : 1
(c) 1 : 4 (d) 1 : 16.

39. Hydrogen balloon will carry which of the following body most easily?
(a) 10 kg feather (b) 10 kg iron
(c) 10 kg cotton (d) all of these.

40. Electromotive force is the force, which is able to maintain a constant
(a) resistance
(b) power
(c) current
(d) potential difference.

Instructions for Q. No. 41 to 60

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are falses

41. *Assertion (A) :* In a nuclear reactor graphite is used as moderator.
Reason (R) : Successive collisions of neutrons with the graphite nuclei result in loss of energy which slows the neutrons down.

42. *Assertion (A) :* White light contains the range of colours in light from violet with a wavelength of 4×10^{-7} m to red light with a wavelength of 7×10^{-7} m.
Reason (R) : When Young's double slit experiment is carried out with white light, multicoloured fringes are formed.

43. *Assertion (A) :* Insulators do not conduct electricity.
Reason (R) : In insulators the forbidden energy gap between the conduction and valence band is wide. On application of electric field the electrons fail to get required energy to cross over to conduction band which, therefore, remains empty.

44. *Assertion (A) :* Soft magnetic materials (*e.g.*, iron) have a high coercivity and do not demagnetise easily.
Reason (R) : Hard magnetic materials (*e.g.*, steel) have a low coercivity and become temporary magnets.

45. *Assertion (A) :* Laser can be used to measure huge distances by the method of pulse reflection.
Reason (R) : Light beam obtained from laser is highly collimative.

46. *Assertion (A) :* The velocity of an electron in an orbit is inversely proportional to the square of the radius of the orbit.
Reason (R) : The angular velocity of the electron is proportional to the radius of the orbit.

47. *Assertion (A) :* The maximum number of electrons in an orbit is $2n^2$ and the maximum number of electrons in a subshell is $2(2l + 1)$
Reason (R) : According to Pauli's exclusion principle no two electrons can have all their quantum numbers identical.

48. *Assertion (A) :* An ammeter is connected in series in an electrical circuit and it should have a low resistance.
Reason (R) : The introduction of the ammeter must not affect the main current.

49. *Assertion (A) :* In series A.C. circuit, the voltage across the combination of capacitor and inductor is zero at resonance.
Reason (R) : At series resonance the current in the circuit is zero.

50. *Assertion (A) :* If two or more different gases are mixed at the same temperature, there will be no exchange of energy among their molecules.
Reason (R) : Different gases at the same temperature have the same average kinetic energy per molecule and this energy is directly proportional to the absolute temperature of the gas.

51. *Assertion (A) :* When energy of hydrogen atom increases from -13.6eV to -1.51eV, its radius increases by 4.24Å.
Reason (R) : The energy of hydrogen atom is given by $E = -\frac{13.6}{n^2}$ eV and the radius is given by $r = 0.53\ n^2$:

52. *Assertion (A) :* The force with which one plate of a parallel plate capacitor is attracted towards the other plate is given by s^2/e_0 per unit area where s is the surface density of charge.
Reason (R) : The electric field due to one charged plate of the capacitor at the location of the other is $E = \sigma/\varepsilon_0$ and the force per unit area is given by $F = \sigma E$.

53. *Assertion (A) :* Air is more elastic than iron.
Reason (R) : Elasticity is directly proportional to compressibility and air is more compressible than iron.

54. *Assertion (A) :* A solid floats in a liquid so that it is just submerged. When the liquid is heated the solid sinks to the bottom.
Reason (R) : Weight of the solid increases with the rise in temperature.

55. *Assertion (A) :* When a man walks on a rough horizontal surface towards east, the frictional force on him is directed towards east.
Reason (R) : Frictional force always opposes the relative motion.

56. *Assertion (A) :* According to special theory of relativity a particle cannot travel with speed of light.
Reason (R) : In that case mass of the particle will be reduced to zero.

57. *Assertion (A) :* Electrons and protons having negligible initial velocity are accelerated through a certain potential difference. Protons will have larger momentum.
Reason (R) : An electron has negative charge while a proton has positive charge.

58. *Assertion (A) :* The velocity of sound in air increases due to the presence of moisture.
Reason (R) : The presence of moisture in air lowers the density of air.

59. *Assertion (A) :* Two systems which are both in thermal equilibrium with a third system are in thermal equilibrium with each other.
Reason (R) : The heat flows spontaneously from a system at a higher temperature to a system at lower temperature.

60. *Assertion (A) :* Tiny drops of liquid resist deforming forces better than bigger drops.
Reason (R) : Excess pressure inside a drop is directly proportional to surface tension.

CHEMISTRY

61. The mass of a neutron is
(a) less than that of a proton
(b) equal to that of an electron
(c) about one quarter of that of a helium atom
(d) much less than that of a hydrogen atom.

62. The difference between heats of reaction at constant pressure and constant volume for the reaction
$2C_6H_6(l) + 15O_2(g) \rightarrow 12\,CO_2(l) + 6H_2O(g)$ at 25° C in kJ is
(a) -7.43 (b) +3.72
(c) -3.72 (d) +7.43.

63. Which one of the following molecules is paramagnetic?
(a) CO (b) N_2O_4
(c) O_3 (d) O_2.

64. One mole of methanol, when burnt in oxygen, gives out 723 kJ $mole^{-1}$ heat. If one mole of oxygen is used, what will be the amount of heat evolved?
(a) 723 kJ (b) 482 kJ
(c) 964 kJ (d) 241 kJ.

65. Chlorine can be liberated from potassium chloride solution by the action of
(a) iodine solution (b) fluorine
(c) sodium chloride (d) potassium iodide.

66. Atomic number of an element is 30. Therefore its possible group in the periodic table is
(a) I *A* (b) II *B*
(c) II *A* (d) I *B*.

67. Oxygen is obtained when one of the following compound is heated.
(a) SiO_2 (b) Fe_2O_3
(c) KNO_2 (d) $KMnO_4$.

68. The electronic configuration $1s^1\ 2s^2\ 2p^5\ 3s^1$ describes which one of the following?
(a) an excited state of fluorine
(b) the ground state of neon atom
(c) an excited state of neon atom
(d) the ground state of fluoride ion.

69. The molecular weight of a gas is 128. The weight of 8.21 litres at 3 atmospheric pressure and 27° C is
(a) 64 g (b) 128 g
(c) 82.1 g (d) 821 g.

70. For the reaction
$2SO_3(g) \rightleftharpoons 2SO_2(g) + O_2(g)$
$K_c = 32$. If $[SO_3] = [O_2] = 2$ M, then $[SO_2]$ is
(a) 4 M (b) 8 M
(c) 16 M (d) 0.8 M.

71. 0.2 g of gas *X* occupies a volume of 440 ml and 0.1 g of carbon dioxide occupies 320 ml at the same temperature and pressure. The gas *X* could be
(a) O_2 (b) SO_2
(c) NO (d) C_4H_{10}.

72. Ammonia is considered to be a Lewis base because of
(a) polarity of the molecule
(b) high volatility
(c) presence of lone pair of electrons
(d) the peculiar shape of the molecule.

73. Which of the following oxides of nitrogen is a white solid?
(a) NO (b) NO_2
(c) N_2O_5 (d) N_2O_3.

74. The base catalysed aldol condensation will not occur with
(a) propionaldehyde
(b) benzaldehyde
(c) 2 - methyl propionaldehyde
(d) acetone.

75. When a colourless gas is passed through bromine water only decolourisation takes place. The gas is
(a) SO_2 (b) HCl
(c) HBr (d) H_2S.

76. The mass of a molecule of oxygen in g is
(a) 5.3×10^{23} (b) 1.92×10^{-23}
(c) 10.6×10^{-23} (d) 5.3×10^{-23}.

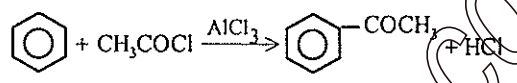
77. Which of the following statements is correct?
(a) ΔH is positive for exothermic reactions
(b) ΔH is negative for endothermic reactions
(c) enthalpy of fusion is negative
(d) enthalpy of neutralisation of strong acid with a strong base is always the same.

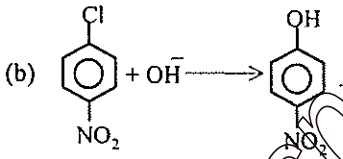
78. An ion, which has 18 electrons in the outermost shell is
(a) Th^{4+} (b) K^+
(c) Cs^+ (d) Cu^+.

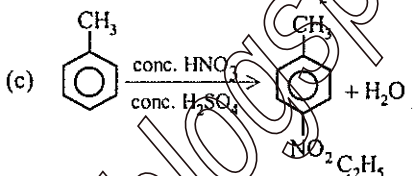
79. Hydrogen acts as an oxidising agent in its reaction with
(a) bromine (b) calcium
(c) nitrogen (d) sulphur.

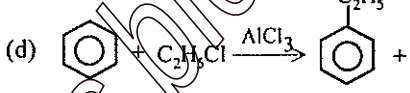
80. *p*H of 10^{-8} M HCl solution is
(a) 8 (b) 7
(c) 4 (d) between 6 and 7.

81. Which of the following is not an electrophilic substitution ?

(a) 

(b) 

(c) 

(d) 

82. Which of the following is the most reactive towards ring nitration?
(a) benzene (b) toluene
(c) mesitylene (d) *m* - xylene.

83. Which of the following is the strongest acid?
(a) *o* - methoxybenzoic acid
(b) salicylic acid
(c) 2, 6 - dihydroxy benzoic acid
(d) benzoic acid.

84. Alkanes and alkenes can be distinguished by their solubility in
(a) alcohol (b) ether
(c) H_2SO_4 (d) water.

85. Which of the following compounds is least soluble in water?
(a) phenol (b) benzene
(c) ethanol (d) benzoic acid.

86. Oils and fats in our food not only provide us energy but also act as carriers of certain vitamins, such as
(a) *A* and *B* (b) *A* and *C*
(c) *B* and *C* (d) *A* and *D*.

87. Thermite process is used to extract metals
(a) when their oxides cannot be reduced by carbon

(b) when their carbonates do not yield oxides by thermal decomposition
(c) when their sulphides cannot be converted into oxides by roasting
(d) when their melting points are very high.

88. A sodium salt was mixed with ammonium sulphate and heated. A colourless gas was evolved which was insoluble in hot water. But it dissolved in cold water to give a neutral solution. The sodium salt was
(a) sodium chloride (b) sodium carbonate
(c) sodium nitrate (d) sodium phosphate.

89. A colourless water-soluble organic liquid decomposes sodium carbonate and liberates carbon dioxide. It produces a black precipitate with Tollen's reagent. The liquid is
(a) acetaldehyde (b) acetic acid
(c) formaldehyde (d) formic acid.

90. Among naturally occurring carbohydrates, an instance of a furanose ring is found in
(a) the galactose unit of lactose
(b) the glucose unit of cellulose
(c) the fructose unit of canesugar
(d) the glucose unit of canesugar.

91. If ΔH is the change in enthalpy and ΔE the change in the internal energy accompanying a gaseous reaction,
(a) ΔH is always greater than ΔE
(b) ΔH is always less than ΔE
(c) $\Delta H < \Delta E$ only if the number of moles of the products is greater than the number of moles of the reactants
(d) $\Delta H < \Delta E$ only if the number of moles of the products is less than the number of moles of the reactants.

92. Two useful by-products, obtained in the Solvay process of manufacturing sodium carbonate are
(a) quicklime and carbon dioxide
(b) sodium bicarbonate and ammonium chloride
(c) ammonium chloride solution and quicklime
(d) sodium bicarbonate and carbon dioxide.

93. Two moles of nitrogen and two moles of hydrogen are taken in a closed vessel of five litre capacity and suitable conditions are provided for the reaction. When equilibrium is reached, it is found that half a mole of nitrogen is used up. The equilibrium concentration of ammonia is
(a) 0.4 (b) 0.3
(c) 0.2 (d) 0.1.

94. Which of the following statements does not apply for weak electrolytes?
(a) conductivity of weak electrolytes at moderate concentration is extremely poor
(b) law of chemical equilibrium can be applied to the dissociation of weak electrolytes
(c) dissociation constant for weak electrolyte is very low
(d) degree of dissociation of weak electrolyte is appreciably high at higher concentration.

95. An aqueous solution of colourless metal sulphate M, gives a white precipitate with NH_4OH. This was soluble in excess of NH_4OH. On passing H_2S through this solution a white precipitate is formed. The metal in the metal salt is
(a) aluminium (b) calcium
(c) barium (d) zinc.

96. Formaldehyde and acetaldehyde are manufactured by dehydrogenation of methanol and ethanol respectively. The catalyst used in this reaction is
(a) conc. H_2SO_4 (b) copper
(c) nickel (d) H_3PO_4.

97. Nessler's reagent is
(a) an alkaline solution of $HgCl_2$ and KI
(b) a solution of ammonium hydroxide
(c) a solution of KI and sodium thiosulphate
(d) a solution of I_2.

98. The reaction in which the yield of the product cannot be increased by the application of high pressure is
(a) $PCl_3(g) + Cl_2(g) \rightleftharpoons PCl_5(g)$
(b) $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$
(c) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
(d) $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$

99. The half-life for the reaction $N_2O_5 \rightleftharpoons 2NO_2 + \frac{1}{2}O_2$ is 24 hrs at 30°C. Starting with 10 g of N_2O_5, how many grams of N_2O_5 will remain after a period of 96 hours
(a) 1.25 g (b) 0.63 g
(c) 1.77 g (d) 0.5 g.

100. Aqua regia is a mixture
(a) 1 volume of conc. HCl + 3 volumes of conc. HNO_3
(b) 1 volume of conc. HNO_3 + 3 volumes of conc. HCl
(c) equal volumes of conc. HCl and conc. HNO_3
(d) 1 volume of conc. HCl + 3 volumes of conc. H_2SO_4.

Instructions for Q. No. 101 to 120

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are falses

101. *Assertion (A) :* To separate from the more abundant isotope, all the uranium is converted into UF_6.
Reason (R) : UF_6 is one of the few compounds that exists of gaseous state under ordinary conditions.

102. *Assertion (A) :* One mole of helium atoms should occupy 22.4 litre volume at STP.
Reason (R) : Taking 31 pm as radius of helium atom, if we pack together a mole of helium atoms, the mole of atoms should have a volume of 22.4 litre.

103. *Assertion (A) :* A sample of 8-00 moles of chlorine gas in a 4-00 litre tank at 27°C leads to a pressure of 49.2 atm according to ideal gas law.
Reason (R) : The actual pressure of the sample of chlorine is nearly 20 atomosphere less than the ideal pressure.

104. *Assertion (A) :* The pressure of a gas is inversely proportional to its volume, at constant temperature and n.
Reason (R) : The gas volume is directly proportional to n at constant temperature and pressure.

105. *Assertion (A) :* Not only is the fraction of oxygen is reduced in diving gases, but nitrogen of normal air is replaced by helium.
Reason (R) : Nitrogen becomes more soluble in the body fluids at high pressure and causes a condition similar to alcohol intoxication.

106. *Assertion (A) :* When one talks after breathing helium, the sound becomes like that of Donald Duck.
Reason (R) : The vocal cords vibrate faster in an atmosphere less dense than air and the pitch of voice is raised.

107. *Assertion (A) :* The reacting gases combine in volumes that are ratios of small whole numbers.
Reason (R) : The partial pressure of a gas in a mixture is given by its mole fraction times the total pressure of the mixture.

108. *Assertion (A) :* The oxidation numbers are artificial, they are useful as a 'book-keeping' device of electron in reactions.
Reason (R) : The oxidation numbers do not usually represent real charges on atoms, they are simply conventions that indicate what the maximum charge could possibly be on an atom in a molecule.

109. *Assertion (A) :* The structural-pair geometry of Formaldehyde molecule is trigonal planar.
Reason (R) : In H_2CO molecule, the carbon atom is surrounded by 3 sigma bonding electron pairs.

110. *Assertion (A) :* The conjugated dienes are more stable than the corresponding alkenes containing one double bond or even the dienes containing two isolated double bonds.
Reason (R) : Conjugated dienes are regarded as hybrids of several contributing structures.

111. *Assertion (A) :* As mole is the basic chemical unit, the concentration of the dissolved solute is usually specified in terms of number of moles of solute.
Reason (R) : The total number of molecules of reactants involved in a balanced chemical equation is known as molecularity of the reaction.

112. *Assertion (A) :* Ionic compounds are made of positive and negative ions arranged in a manner so as to acquire maximum potential energy.
Reason (R) : In order to acquire maximum stability ions in a crystal should be arranged in such a way that the forces of repulsion should overweight the forces of attraction.

113. *Assertion (A) :* When a trace amount of 'As' is added to extremely pure germanium a *n*-type of semiconductor is obtained.
Reason (R) : Four electrons of impurity are used in forming bonds and fifth electron remains free. This extra electron can serve to conduct electricity.

114. *Assertion (A) :* The half-life time of a first order reaction is always constant and it does not depends upon the initial concentration of reactants.
Reason (R) : For the first order reaction the half-life time is expressed as :

$$t_{1/2} = \frac{2.303}{k}\log 2$$

115. *Assertion (A) :* The kinetics of the reaction-
$mA + nB + pC \rightarrow m'X + n'Y + p'Z$
obeys the rate expression as-

$$\frac{dx}{dt} = k[A]^m[B]^n$$

Reason (R) : The rate of reaction does not depend upon the concentration of C.

116. *Assertion (A) :* The atoms of different elements having same mass number but different atomic number are known as isobars.
Reason (R) : The sum of protons and neutrons, in the isobars is always different.

117. *Assertion (A) :* The nuclear isomers are the atoms with the same atomic number and same mass number, but with different radioactive properties.
Reason (R) : The nucleus in the excited state will evidently have a different half-life as compared to that in the ground state.

118. *Assertion (A) :* In case of isoelectronic ions the ionic size increases with the increase in atomic number.
Reason (R) : The greater the attraction of nucleus, greater is the ionic radius.

119. *Assertion (A) :* Neither pure H_2SO_4 nor pure $HClO_4$ conducts electric current but a mixture of two does.
Reason (R) : Stronger acid $HClO_4$ donates a proton to H_2SO_4 which acts as a base.

120. *Assertion (A) :* The neutrons are better initiators of nuclear reactions than the protons, deutrons or α -particles of the same energy.
Reason (R) : Neutrons are uncharged particles and hence, they are not repelled by positively charged nucleus.

BIOLOGY

121. Which of the following contains hydrolytic enzyme?
(a) mitochondrion (b) lysosome
(c) ribosome (d) peroxisome.

122. Interferon is
(a) anti-viral (b) anti-bacterial
(c) anti-animal cell (d) bacteria.

123. What is the function of centrosome?
(a) cell wall formation (b) cell plate formation
(c) cell differentiation (d) cell division.

124. The vegetation of Rajasthan is
(a) xerophytic (b) deciduous
(c) alpine (d) arctic.

125. Which of the following gas is necessary for germination of pea seeds?
(a) H_2 (b) N_2
(c) O_2 (d) water vapour.

126. If the cell of root in wheat plant has 42 chromosomes, then the number of chromosomes in the synergid cell is

(a) 14 (b) 21
(c) 28 (d) 42.

127. Which of the following represents the correct order in prophase I?
(a) leptotene, zygotene, diplotene, pachytene, diakinesis
(b) leptotene, zygotene, pachytene, diplotene, diakinesis
(c) zygotene, diplotene, pachytene, leptotene, diakinesis
(d) diakinesis, zygotene, diplotene, leptotene, pachytene.

128. Which state in India is the maximum producer of peanut?
(a) Rajasthan (b) Gujarat
(c) Bihar (d) Uttar Pradesh.

129. The genetic preservation of exinct species is done in
(a) gene bank (b) national park
(c) herbarium (d) none of these.

130. Meiosis is best shown in
(a) anther wall (b) pollen grain
(c) gamete (d) microsporangium.

131. If a red eyed wild type *Drosophila* mates with a simple blue eyed (red is dominant while blue is recessive), then the ratio of red and blue eyed is
(a) 3 : 1 (b) 2 : 2
(c) 1 : 2 (d) 1 : 3.

132. Stalk of the ovule is called
(a) hilum (b) tigellum
(c) funicle (d) none of these.

133. Cypsella fruit develops from
(a) superior syncarpous ovary
(b) superior apocarpous ovary
(c) both (a) and (b)
(d) none of these.

134. System of binomial nomenclature in plants was given by
(a) Carolus Linnaeus
(b) Bentham and Hooker
(c) Robert Hooke
(d) Engler and Prantl.

135. The number of ATP formed after combustion of 1 mole of glucose is
(a) 36 (b) 38
(c) 40 (d) 30.

136. Which of the following plant is used in study of the photosynthesis?
(a) *Chlorella* (b) *Asparagus*
(c) *Amaranthus* (d) sunflower.

137. One quantasome contains
(a) 230 chlorophyll molecules
(b) 233 chlorophyll molecules
(c) 330 chlorophyll molecules
(d) some molecules of chlorophyll.

138. The leaf of *Mimosa* on touching becomes flaccid and droops down. This is due to
(a) water goes out of pulvini
(b) water movement
(c) based on water concentration
(d) none of these.

139. The proteins, which regulate life processes, are called
(a) structural protein (b) functional protein
(c) skeletal protein (d) all of these

140. In sex linkage, the speciality is
(a) gene flow
(b) criss-cross inheritance
(c) atavism (d) reversion

141. The modern theory of organic evolution is based on
(a) natural selection (b) genetic variation
(c) isolation (d) all of these

142. Which one of the following pairs is not correctly matched ?
(a) syphilis - *Trichuris trichura*
(b) sleeping sickness - *Trypanosoma gambiense*
(c) dengue fever - *Arbovirus*
(d) plague - *Yersinia pestis*

143. Animals, with radial symmetry in adult and bilateral symmetry in larva, are
(a) coelenterates (b) echinoderms
(c) annelids (d) platyhelminthes

144. In which of the following solution a cell get deplasmolyzed ?
(a) isotonic (b) detonic
(c) hypotonic (d) hypertonic

145. Linolenic acid is unsaturated fatty acid and its content is highest in
(a) sunflower oil (b) coconut oil
(c) cotton oil (d) groundnut oil

146. Common cold is caused by
(a) protozoa (b) unicellular algae
(b) bacteria (d) virus

147. Auxanometer is used to measure
(a) respiration (b) ascent of sap
(c) growth (d) transpiration

148. Stilt roots are present in
(a) *Helianthus* (b) maize
(c) banyan (d) *Tridax*

149. Commissural stigma is present in the family
(a) fabaceae (b) cruciferae
(c) solanaceae (d) liliaceae

150. The geranium oil is obtained from which part of *Pelargonium* ?
(a) roots (b) stem
(c) flower (d) leaves

151. The speed of development and metamorphosis of tadpole into adult frog is controlled by
(a) salinity of water (b) food availability
(c) pH of water (d) thyroid hormone

152. In which of the following, the calcified cartilage is found?
(a) vertebrae of shark
(b) suprascapula of pectoral girdle of frog
(c) scapula of pectoral girdle of man
(d) both 'a' and 'b'

153. Which of the following is a vestigial organ of human ?
(a) wisdom teeth (b) muscle of glottis
(c) hairs (d) intestine

154. A fungal disease of the poultry is
(a) Monoliasis (b) Coccodoisis
(c) Mareks (d) Coryza

155. Which of the following is prototherian ?
(a) *Opposum* (b) kangaroo
(c) *Platypus* (d) all of these

156. *Taenia saginata* differs from *T. solium* in the absence of
(a) hooks upon scolex (b) suckers upon scolex
(c) scolex (d) none of these

157. The term zymase for enzymes, in yeast, was coined by
(a) Louis Pasteur (b) Edward Buchner
(c) Sumner (d) Kuhne

158. Which one of the following is a structural protein?
(a) keratin (b) haemoglobin
(c) amino acid (d) gelatin.

159. Chromosomes start moving towards the pole in ..... of mitosis.
(a) anaphase (b) metaphase
(c) prophase (d) telophase.

160. The function of chalaza in hen's egg is to
(a) nourish the embryo
(b) to keep the blastoderm on top
(c) to balance the egg
(d) has no function at all.

Instructions for Q. No. 161 to 180

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion

(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion

(c) If the assertion is true, but the reason is false

(d) If both assertion and reason are falses

161. *Assertion (A) :* Bryophytes rarely attains a height of 20 cm.

Reason (R) : Largest bryophyte is *Dawsonia*.

162. *Assertion (A) :* Pyramid of energy is always upright.
Reason (R) : Loss of energy always takes place from one trophic level to another trophic level.

163. *Assertion (A) :* Self pollination takes place in cleistogamous flower.
Reason (R) : Cross pollination is the transfer of pollen grains in two genetically dissimilar flower.

164. *Assertion (A) :* In xerosere lichens are the pioneer.
Reason (R) : No other life form can survive on bare rock substratum.

165. *Assertion (A) :* Mycoplasmas are categorised under kingdom monera.
Reason (R) : They lack rigid cell wall.

166. *Assertion (A) :* PET scanning is more useful than CT scanning.
Reason (R) : PET is a computerised scanning technique.

167. *Assertion (A) :* In zero population growth the size of the population remains same or constant.
Reason (R) : Emigration is equal to immigration.

168. *Assertion (A) :* Bacteria do not have true sexual reproduction.
Reason (R) : Bacteria reproduce only by asexual means.

169. *Assertion (A) :* Karyotyping is done at mitotic metaphase.
Reason (R) : Karyotyping can detect the defect such as monosomy or trisomy.

170. *Assertion (A) :* In insects like bees, ants, & wasps the ploidy level is different in males & females.
Reason (R) : Males show arrhenotoky.

171. *Assertion (A) :* A body of nervous tissue integrating animal sensory and motor functions and providing through conduction pathways to transmit impulses rapidly, along the body.
Reason (R) : In vertebrates it comprises the brain and spinal cord, and in certain invertebrates a pair of solid ventral nerve chains.

172. *Assertion (A) :* The plasmalemmas of animal cells typically have the oligosaccharide chains of their glycolipids and glycopoteins exposed freely on their surfaces.
Reason (R) : These play important roles in immunological responses, in cell-cell adhesion and identification of cell surface changes.

173. *Assertion (A) :* A group of phosphorylated compounds transferring chemical energy required for cell work which depends upon their tendency to donate their phosphate group to water.
Reason (R) : Phosphate bond energy indicates the difference between free energies of reactants and products respectively before and after hydrolysis of a phosphorylated compound.

174. *Assertion (A) :* In placental mammals the placenta is connected to the embryo by the umblical cord and has an essential role in the immunological protection of the embryo.
Reason (R) : In mammals foetal components of the placenta derive initially from the chondroblast connected with embryonic blood stream either through its contact with the yolk sac.

175. *Assertion (A) :* Some bacterial and eukaryotic DNA polymerases can replace a nucleotide and insert incorrectly. DNA ligase then seals the phosphodiester bond. To avoid removing the nucleotide from the wrong strand, cells methylate DNA which has been formed some while; repair enzymes thus distinguish old from new DNA.
Reason (R) : Mutant lacking repair mechanisms are likely to be more susceptible to irradiating sources and express mutations so induced.

176. *Assertion (A) :* The first photochemical reaction in photosynthesis is the evolution of molecular oxygen.
Reason (R) : PS-II consists of the particle coloured dark green and the light gathering pigment complex shown to one side.

177. *Assertion (A) :* Synandrous condition is found in cucurbits.
Reason (R) : The male flower of cucurbits, generally, contains five stamens which are laterally fused (anthers and filaments both).

178. *Assertion (A) :* Hershey and Chase experiment showed that protein is the genetic material of T_2 bacteriophage.
Reason (R) : According to Hershey and Chase, RNA is the genetic material in T_2 bacteriophage.

179. *Assertion (A) :* Many globular proteins also undergo small conformational changes in the course of their biological function.
Reason (R) : These changes are associated with the binding of a ligand.

180. *Assertion (A) :* Elongation and division of cells are promoted by gibberellins.
Reason (R) : Gibberellins increase the formation of hydrolytic enzymes that release energy necessary for growth.

GENERAL KNOWLEDGE

181. The first Indian to receive the Megasaysay award was
(a) Dr. M.C. Modi (b) Vinoba Bhave
(c) Rabindra Nath Tagore
(d) Swami Vivekanand.

182. The first Indian woman to win an Olympic medal is
(a) Karnam Malleswari (b) P.T. Usha
(c) Ashwani Nachppa (d) None of these

183. How many years did Nehru spended in jails ?
(a) fifteen (b) nine
(c) ten (d) five

184. Where is the louvre Museum ?
(a) Paris (b) India
(c) New york (d) China

185. What does a bibliosphilist collect ?
(a) coins (b) stamps
(c) books (d) pens

186. The only category in which either an Indian or a person of Indian origin has not got a nobel prize is
(a) medicine (b) chemistry
(c) physics (d) literature

187. Which of the following is not been crowned as Miss World
(a) Diana Hayden (b) Ashwarya Rai
(c) Yukta Mukhi (d) Sushmita Sen

188. 'Alpha and Omega' means
(a) come and go
(b) the beginning and the end
(c) to win and to loose
(d) none of these

189. Gopichand and Aparna Popat play
(a) tennis (b) badminton
(c) chess (d) Table Tennis

190. The common name of iron oxide is
(a) magnetite (b) haemitite
(c) rust (d) smut

191. One megawatt is equal to
(a) 1,000,000 watts (b) 1000,000 watts
(c) 1,000,000,000 watts (d) 1000 watts

192. The instrument of music in which Ustad Amjad Ali Khan has distinguished himself is
(a) sarod (b) violin
(c) sitar (d) shehnai

193. The longest railway platform in the world is in
(a) India (b) United states
(c) Italy (d) Australia

194. The date which is considered as the date when India became small pox free was
(a) June 5, 1998 (b) July 5, 1995
(c) Dec 1, 1993 (d) Aug 13, 1990

195. The length of the river Indus is the same as
(a) Mahanadi (b) Brahmputra
(c) Kaveri (c) Ganga

196. Which of the following computer viruses is named after cherry and caffein soft drink popular with programmers ?
(a) sircam (b) code pink
(c) code Red (d) malisa

197. 'Rambola' is the original name of poet
(a) Tulsi das (b) Ram das
(c) Soordas (d) Kabir

198. Another name for the inherited blood disease thalassaemia ?
(a) looley's anaemia (b) grave's disease
(c) heamophilia (d) dypnoea

199. The most powerful supercomputer ever made in India is
(a) Param 1000 (b) Java 2000
(c) Arjun 100 (d) Vaibhav 2C.

200. The writer associated with 'Rally for the valley' (Narmada) is
(a) Salman Raished (b) Naipul
(c) Arundhati Roy (d) Isbal Perons

Model Test Paper-6

Time : $3\frac{1}{2}$ hours. *Maximum Marks : 200*

PHYSICS

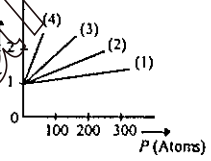
1. The temperature of the sink of a Carnot engine is 27°C. If the efficiency of the engine is 25%, the temperature of the source is
(a) 227°C (b) 327°C
(c) 127°C (d) 27°C.

2. Which is not a thermodynamical function?
(a) enthalpy (b) workdone
(c) Gibb's energy (d) internal energy.

3. Stream at 100°C is passing into 1.1 kg of water contained in a calorimeter of water equivalent to 0.02 kg at 15°C till the temperature of the calorimeter and its contents rises to 80°C. The mass of the steam condensed in kg is
(a) 0.130 (b) 0.065
(c) 0.260 (d) 0.135.

4. Melting point of ice
(a) increases with increasing pressure
(b) decreases with increasing pressure
(c) is independent of pressure
(d) is proportional to pressure.

5. A fixed amount of nitrogen gas (1 mole) is taken and is subjected to pressure and temperature variation. The experiment is performed at high pressure as well as high temperatures. The results obtained are shown in the fig.



The correct variation of PV/RT with P will be exhibited by
(a) curve (4) (b) curve (3)
(c) curve (2) (d) curve (1).

6. An aluminium rod, Young's Modulus is 7.0×10^9 N/m^2 has a breaking strain of 0.21. The minimum cross sectional area of the rod in m^2 in order to support a load of 10^4 N is
(a) 1×10^{-2} (b) 1×10^{-3}
(c) 1.4×10^{-2} (d) 7.1×10^{-4}.

7. In order that a floating object be in a stable equilibrium, its centre of buoyancy should be
(a) vertically above its centre of gravity
(b) vertically below its centre of gravity
(c) horizontally in lines with its centre of gravity
(d) may be anywhere.

8. A crown made of gold and copper weighs 210 gm in air and 198 gm in water. The weight of gold in crown is
(a) 93 gm (b) 100 gm
(c) 150 gm (d) 193 gm.
Density of gold = 19.3 gm/cm^3 and
Density of copper = 8.5 gm/cm^3.

9. When a 20 gm mass hangs attached to one end of a light spring of length 10 cm, the spring stretches by 2 cm. The mass is pulled down until the total length of the spring is 14 cm. The elastic energy J, stored in the spring is
(a) 2×10^{-3} (b) 4×10^{-2}
(c) 4×10^{-3} (d) 8×10^{-3}.

10. A spring having a spring constant K is loaded with a mass m. The spring is cut into two equal parts and one of these is loaded again with the same mass. The new spring constant is
(a) $K/2$ (b) K
(c) $2K$ (d) K^2.

11. A cord is used to lower vertically a block of mass M at a distance d at a constant downward acceleration of $g/4$. Then the work done by the cord on the block is

(a) $\frac{Mgd}{4}$ (b) $\frac{-Mgd}{4}$

(c) $\frac{3Mgd}{4}$ (d) $\frac{-3Mgd}{4}$.

12. A rifle bullet loses $(1/20)^{th}$ of its speed in passing through a plank. The least number of such planks required to stop the bullet is

(a) 5 (b) 10

(c) 11 (d) 20.

13. Two spheres of masses M and $2M$ are initially at rest at a distance R apart. Due to mutual force of attraction they approach each other. When they are at separation $R/2$, the acceleration of their centre of mass would be

(a) 0 (b) 1 g m/s^2

(c) 3 g m/s^2 (d) 12 g m/s^2.

14. Two masses m and M are connected by a light string that passes through a smooth hole O at the centre of a table. Mass m lies on the table and M hangs vetically. m is moved round in a horizontal circle with O as the centre. If l is the length of the string from O to m then the frequency with which m should revolve so that M remains stationary is

(a) $\frac{1}{2\pi}\sqrt{\frac{Mg}{ml}}$ (b) $\frac{1}{\pi}\sqrt{\frac{Mg}{ml}}$

(c) $\frac{1}{2\pi}\sqrt{\frac{ml}{Mg}}$ (d) $\frac{1}{\pi}\sqrt{\frac{ml}{Mg}}$.

15. A car is moving in a circular track of radius r with a constant speed v. A plumb bob is suspended from the roof of the car by a light spring of length l. The angle made by the string with the vertical is

(a) $\tan^{-1}\left(\frac{v^2}{rg}\right)$ (b) $\tan^{-1}\left(\frac{v^2}{lg}\right)$

(c) $\tan^{-1}\left(\frac{rg}{v^2}\right)$ (d) $\tan^{-1}\left(\frac{lg}{v^2}\right)$.

16. A cord is wound round the circumference of a wheel of radius r. The axis of the wheel is horizontal and its moment of inertia about this axis is I. A weight mg is attached to the end of the cord and is allowed to fall from rest. The angular velocity of the wheel, when the weight has fallen through a distance h, is

(a) $\left[\frac{2gh}{I+mr}\right]^{1/2}$ (b) $\left[\frac{2mgh}{I+mr^2}\right]^{1/2}$

(c) $\left[\frac{2mgh}{I+2mr^2}\right]^{1/2}$ (d) $(2gh)^{1/2}$.

17. At what depth below the surface of the earth is the value of g same as that of a height of 5 km?

(a) 10 km (b) 7.5 km

(c) 5 km (d) 2.5 km.

18. The mass of moon is 1/81 of earth's mass and its radius is 1/4 of that of earth. If the escape velocity from the earth's surface is 11.2 km/s, its value for the moon is

(a) 0.14 km/s (b) 0.5 km/s

(c) 2.5 km/s (d) 5.0 km/s.

19. For a planet moving around the sun in an elliptical orbit of semi-major and semi-minor axes a and b, respectively, and period T,

(a) the torque acting on the planet around the sun is non-zero

(b) the angular momentum of the planet around the sun is constant

(c) the areal velocity is $\frac{\pi ab}{T}$

(d) the planet moves with a constant speed around the sun.

20. A simple pendulum has a time period T. The pendulum is completely immersed in a non-viscous liquid whose density is $1/10^{th}$ of that of the material of the bob. The time period of the pendulum immersed in the liquid is

(a) T (b) $\sqrt{\frac{9}{10}}T$

(c) $\sqrt{\frac{10}{9}}T$ (d) $\frac{T}{10}$.

21. What is the common base current amplification factor (α) of a transistor, if the common emitter current amplification factor (β) is 200?

(a) 0.895 (b) 0.995

(c) 0.855 (d) 0.915.

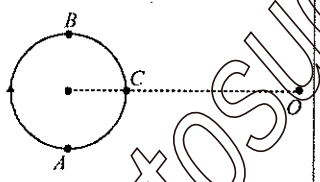
22. What isotope will be produced from $_{90}Th^{232}$ after 3α decays and two β decays?
(a) $_{88}Ra^{218}$ (b) $_{86}Rn^{218}$
(c) $_{88}Ra^{220}$ (d) $_{86}Rn^{220}$.

23. A transformer has a turns ratio of 100. The secondary supplies 16 W of power to a load. Assuming 80% efficiency, find the current in the primary if the input to the primary is 200 V A.C.
(a) 0.3 A (b) 0.2 A
(c) 0.05 A (d) 0.1 A.

24. The load resistance of a single transistor amplifier is 2000 Ω. If the transistor constant $\beta = 100$, what change in base current will produce a change in p.d. of 2 V across the load resistor?
(a) 1 μA (b) 20 μA
(c) 10 μA (d) 15 μA.

25. A convex lens of focal length 10 cm is made of glass of refractive index 1.5. It is immersed in a liquid of refractive index 1.3. What is the new focal length of the lens?
(a) 30.5 cm (b) 32.5 cm
(c) 27.5 cm (d) 33.5 cm.

26. A small source of sound moves along a circle as shown in the figure. The frequencies heard by a stationary listener at O when the source is at A, B and C are ν_1, ν_2, and ν_3 respectively. It follows that



(a) $\nu_1 > \nu_3 > \nu_2$ (b) $\nu_2 > \nu_3 > \nu_1$
(c) $\nu_1 > \nu_2 > \nu_3$ (d) $\nu_3 > \nu_2 > \nu_1$.

27. If more air is pushed into a soap bubble, the pressure in it
(a) remains the same
(b) becomes zero
(c) increases (d) decreases.

28. A particle falls through a vertical distance of 10 m on a fixed smooth plane making an angle α with the horizontal, If its impact with the plane is perfectly elastic, the time interval in seconds between the first and second impacts on the plane is
(a) $\frac{20}{7}\sin\alpha$ (b) $\frac{20}{7}\tan\alpha$
(c) $\frac{20}{7}\cos\alpha$ (d) $\frac{20}{7}$.

29. A small object is projected up along the surface of a rough inclined plane of angle 45°. The object takes η times to descend than to ascend. The coefficient of kinetic friction between the object and plane is
(a) $\left(\frac{\eta-1}{\eta+1}\right)^2$ (b) $\frac{\eta-1}{2\eta^2+1}$
(c) $\frac{\eta-1}{\eta^2+1}$ (d) $\frac{2\eta-1}{\eta^2+1}$.

30. A balloon of mass m descends with a constant acceleration a. To acquire an upward acceleration of the same magnitude, it should reject a mass of
(a) $\frac{m(a+g)}{2g}$ (b) $\frac{2ma}{a+g}$
(c) $\frac{1}{2}\left(\frac{ma}{a+g}\right)$ (d) $\frac{2m}{g}(a+g)$.

31. A ball falls freely under gravity. The distances covered in the first, second and third second of motion are in the ratio
(a) 1 : 2 : 3 (b) 1 : 4 : 9
(c) 1 : 4 : 6 (d) 1 : 3 : 5.

32. A uniform iron chain lies on a horizontal surface. The maximum fraction of the length of the chain that can hang over the edge of the horizontal surface is .....
Given: coefficient of static friction = 0.25.
(a) 10% (b) 15%
(c) 20% (d) 25%.

33. An athlete completes one round of a circular track of radius R in 40 second. The displacement at the end of 2 minute 20 second is
(a) 0 (b) 2R
(c) $2\pi R$ (d) $7\pi R$.

34. If $|\vec{v}_1 + \vec{v}_2| = |\vec{v}_1 - \vec{v}_2|$ and $\vec{v}_2$ is finite then
(a) $\vec{v}_1$ is parallel to $\vec{v}_2$ (b) $\vec{v}_1 = \vec{v}_2$

(c) $|\vec{v}_1| = |\vec{v}_2|$

(d) $\vec{v}_1$ and $\vec{v}_2$ are mutually perpendicular.

35. A car is moving along a straight horizontal road with a speed of 72 km h^{-1}. If the coefficient of static friction between the tyres and the road is 0.5, the shortest distance in which the car be stopped is .....

Given : $g = 10$ m s^{-2}.

(a) 30 m (b) 40 m

(c) 72 m (d) 20 m.

36. To shake off water from a wet cloth, it is common to give it a sudden jerk. In so doing, we are taking advantage of

(a) Newton's first law of motion

(b) Newton's second law of motion

(c) Newton's third law of motion

(d) impulse.

37. A lens of power +2 D and a lens of power –1 D are kept in contact. The combination behaves as:

(a) a lens of power +3 D

(b) a lens of power –3 D

(c) a lens of power +1 D

(d) a lens of power –1 D.

38. Two lenses of power +2 D and –5 D are kept in contact. The focal length of the combination is:

(a) –1/3 m (b) 1/3 m

(c) 3 m (d) –3 m.

39. Two spheres of equal masses but radii R and $2R$ are allowed to fall in a liquid. The ratio of their terminal velocities is:

(a) 1 : 4 (b) 1 : 2

(c) 2 : 1 (d) 1 : 16.

40. The displacement of a body is proportional to the cube of time elapsed. The magnitude of acceleration of the body is:

(a) increasing with time

(b) decreasing with time

(c) constant, but not zero

(d) zero.

Instructions for Q. No. 41 to 60

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion

(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion

(c) If the assertion is true, but the reason is false

(d) If both assertion and reason are falses

41. *Assertion (A) :* The internal resistance of a cell depends on the concentration of the electrolyte used in the cell.

Reason (R) : dilution increases the ionisation of the electrolyte.

42. *Assertion (A) :* For a given mass of an ideal gas, the product of the pressure and volume is constant, at constant temperature.

Reason (R) : The root-mean square speed of the molecules is inversely proportional to the square root of their mass.

43. *Assertion (A) :* The ratio of C_p/C_v for a diatomic gas is more than that for a monoatomic gas.

Reason (R) : The molecules of a monoatomic gas have more degrees of freedom than those of a diatomic gas.

44. *Assertion (A) :* Newton's corpuscular theory of light could not explain refraction of light.

Reason (R) : It predicted that light should travel faster in denser media than in rarer media.

45. *Assertion (A) :* When temperature of a semi-conductor is increased, then its resistance decreases.

Reason (R) : The energy gap between conduction band and valence band is very small.

46. *Assertion (A) :* Electric appliances with metallic body have three connections, whereas an electric bulb has a two pin connection.

Reason (R) : Three pin connections reduce heating of connecting wires.

47. *Assertion (A) :* Environmental damage has increased the amount of ozone in the atmosphere.

Reason (R) : Increase of ozone increases the amount of ultraviolet radiation on earth.

48. *Assertion (A) :* The ratio of $\frac{C_p}{C_v}$ is more for helium than for hydrogen gas.
Reason (R) : Atomic mass of helium is more than that of hydrogen.

49. *Assertion (A) :* Machine parts are jammed in winter.
Reason (R) : The viscosity of lubricant used in machine parts increases at low temperatures.

50. *Assertion (A) :* The phenomenon of pair production is not possible unless the energy of gamma ray photon is equal to or greater than 1.20 MeV.
Reason (R) : The rest mass of an electron is 0.51 MeV.

51. *Assertion (A) :* A dip needle becomes vertical at magnetic equator of the earth.
Reason (R) : The magnetic field due to the earth at the magnetic equator is vertical.

52. *Assertion (A) :* When two electrons are brought close to each other, the electrical potential energy increases.
Reason (R) : Work must be done against electrical force of repulsion.

53. *Assertion (A) :* If Young's double slit experiment is performed in water, the fringe width will decrease.
Reason (R) : Wavelength of light in water is smaller than in air.

54. *Assertion (A) :* Interference pattern is obtained on a screen due to two identical coherent sources of monochromatic light. The intensity at the central part of the screen becomes one half if one of the sources is blocked.
Reason (R) : The resultant intensity is the sum of the intensities due to two sources; if one is blocked the intensity obviously reduces to one-half.

55. *Assertion (A) :* If hydrogen and oxygen molecules have the same *rms* speeds, they must be at the same temperature.
Reason (R) : The *rms* speed of a given gas is directly proportional to the square root of its absolute temperature.

56. *Assertion (A) :* Insulators do not allow flow of current through them.
Reason (R) : They have no free charge carriers.

57. *Assertion (A) :* The shape of an automobile is so designed that its front resembles the streamline pattern of the fluid through which it moves.
Reason (R) : The resistance offered by the fluid is maximum.

58. *Assertion (A) :* Two satellites of mass m_1 and m_2 ($m_1 > m_2$) are going around the earth in orbits of radii r_1 and r_2 ($r_1 > r_2$).
Reason (R) : They will have same velocity.

59. *Assertion (A) :* It is not possible for a system, unaided by an external agency to transfer heat from a body at a lower temperature to another at a higher temperature.
Reason (R) : It is not possible to avoid the second law of thermodynamics.

60. *Assertion (A) :* In the process of nuclear fission the fragments emit two or three neutrons as soon as they are formed and subsequently particles.
Reason (R) : As the fragments contain an excess of neutrons over proton ratio to stable values.

CHEMISTRY

61. Energy of a electron in H-atom is given by: $E = -13.6/n^2$. Which one of the following statements is true when n is changed from 1 to 4? Energy will:
(a) decrease 4 times (b) increase 16 times
(c) increase 4 times (d) decrease 16 times

62. Of the following a copolymer is:
(a) neoprene (b) nylon
(c) PVC (d) natural rubber

63. Silver acetate when refluxed with Br_2 in CCl_4 gives:
(a) CH_3Br (b) CH_3COBr
(c) C_2H_5Br (d) $BrCH_2COOH$

64. The *p*H of 0.1 M methyl amine ($K_b = 5.0 \times 10^{-4}$) is
(a) 10.38 (b) 9.83
(c) 13.83 (d) 11.83

65. Addition of HOCl to allyl alcohol gives:
(a) 2-chloropropane 1, 3-diol
(b) 2, 3-dichloropane
(c) 3-chloropropane-1, 2-diol
(d) 1, 2, 3-trichloropropane

66. 0.2 g of organic compound on Kjehldahl's analysis gave enough NH_3 to just neutralise 20 cm^3 of 0.1N H_2SO_4. The percentage of nitrogen should be:
(a) 14 (b) 42
(c) 28 (d) 4.2

67. A hydrocarbon with molecular formula C_8H_{18} gives only one monochloro derivative. It should be:
(a) *n*-octane
(b) 2, 2, 4-tri methyl pentane
(c) 2-methyl heptane
(d) 2, 2, 3, 3 tetramethyl butane

68. To make a solution of *p*H 12, the amount of NaOH dissolved in 250 ml of solution should be:
(a) 0.1 (b) 0.3
(c) 0.2 (d) 0.25 g

69. Which of the following is a steroid hormone?
(a) insulin
(b) adrenaline
(c) testosterone
(d) oxytocin

70. Treatment of propionaldehyde with dilute NaOH causes an aldol condensation to give:
(a) $CH_3CH_2COOCH_2CH_2CH_3$
(b) $CH_3CH_2CH(OH)CH_2CH_2CHO$
(c) $CH_3CH_2CHOHCH(CH_3)CHO$
(d) $CH_3CH_2COOH(CH_3)CHO$

71. If *F* represents 1 faraday & *N* represents avogadro's number then the charge on the electron will be:
(a) *F/N* (b) *F·N*
(c) *N/F* (d) *F*

72. Natural rubber is a polymer of:
(a) 1, 3 butadiene
(b) 1, 2-butadiene
(c) 2-methyl-1, 3 butadiene
(d) 2-chloro-1, 3 butadiens

73. The magnetic moment (in Bm) of a transition metal ion containing three unpaired electron is:
(a) 1.73 (b) 2.45
(c) 3.87 (d) 3.46

74. Which of the following complexes has maximum molar conductivity in the solution:
(a) $CrCl_3$ $6NH_3$ (b) $CrCl_3$ $4NH_3$
(c) $CrCl_3$ $5NH_3$ (d) $CrCl_3$ $3NH_3$

75. Glyptal is polymer of:
(a) ethylene glycol and phthalic acid
(b) phenol and formaldehyde
(c) ethylene glycol and terephthalic acid
(d) melamine and formaldehyde

76. The raw material used for making nylon-6 is:
(a) glycol and phthalic acid
(b) adipic acid and hexamethylene diamine
(c) chloroprene
(d) caprolactum

77. Stephen's reaction is reduction of:
(a) alkyl cyanide with $LiAlH_4$
(b) alkyl isocyanide with Na and C_2H_5OH
(c) alkyl cyanide with $SnCl_2$ and HCl
(d) acylhalide in the presence of $Pd/BaSO_4$

78. Which one of the following legand cannot form chelate?
(a) EDTA (b) 2, 2′, 2″-tripyridine
(c) etheylene diamine (d) pyridine

79. Hydrolysis of an easter gives acid *A* and alcohol *B*. The acid *A* reduces Fehling's solution. Oxidation of alcohol *B* gives acid *A*. The ester is:
(a) methyl formate (b) methyl acetate
(c) ethyl formate (d) ethyl acetate

80. In the laboratory by dehydration of ethyl alcohol ethylene was obtained with 50% yield. The ethylene so obtained reacted with bromine to give ethylene dibromide with 80% yield. If the amount of ethyl alcohol was 0.5 mol then ethylene dibromide produced would be:
(a) 0.1 mol (b) 4.0 mol
(c) 0.2 mol (d) 0.8 mol

81. Lewisite, a poisonous gas used in world war-II, is formed by the action of $AsCl_3$ with:
(a) $CH \equiv CH$ (b) $CH_3 - CH_3$
(c) $CH_2 = CH_2$ (d) C_6H_6

82. Cassiterite is an ore of:
(a) tin (b) lead
(c) mercury (d) iron

83. German silver is an alloy of:
(a) Cu & Zn (b) Ag & Ni
(c) Au. Cu & Zn (d) Cu. Zn & Ni

84. For neutralising 0.183 gms of a monobasic acid dissolved in water, 15 ml of N/10 NaOH were required. The molecular mass of acid is:
(a) 63 (b) 122
(c) 90 (d) 140

85. Anti-Markownikoff's rule involves the formation of an intermediate
(a) carbocations (b) free radicals
(c) carbanions (d) carbenes

86. The rate of a particular reaction quadruples, when the temperature changes from 293 K to 313 K. The activation energy for such reaction would be:
(a) 50.855 KJ mol^{-1} (b) 54.855 KJ mol^{-1}
(c) 52.855 KJ mol^{-1} (d) 56.855 KJ mol^{-1}

87. The solubility product of silver carbonate be *ksp*, its solubility is:
(a) $3\sqrt{\frac{k_{sp}}{8}}$ (b) $3\sqrt{\frac{k_{sp}}{4}}$
(c) $3\sqrt{k_{sp}}$ (d) $3\sqrt{\frac{k_{sp}}{2}}$

88. Two moles of NH_3 gas are introduced into a previously evacuated one litre vessel in which it partially dissociates at high temperature as $2NH_{3\,(g)} \rightleftharpoons N_{2\,(g)} + 3H_{2\,(g)}$. At equilibrium, one mole of $NH_{3\,(g)}$ remains. The value of K_c is:
(a) 3/2 $mol^2\,l^{-1}$ (b) 3/2 mol
(c) 27/16 $mol^2\,l^{-2}$ (d) 27/64 $mol^2 l^{-2}$

89. The heat of combustion of ethane, ethylene and hydrogen are 370.44 k cal, 333.4 kcal and 68.4 kcal respectively. The heat evolved in the formation of ethane
($C_2H_4 + H_2 \rightarrow C_2H_6$) would be:
(a) –31.30 k cal (b) –62.60 k cal
(c) + 31.30 k cal (d) + 62.60 k cal

90. When the pressure is not too high, the Van der Waal's equation reduces to:
(a) $PV = RT - \frac{a}{V}$
(b) $PV = RT - \frac{a}{V^2}$
(c) $PV = RT + Rb$
(d) $PV = RT$

91. The enolic form of acetone contains:
(a) 9 sigma bonds, 1 pi bond and two lone pair
(b) 10 sigma bonds, 1 pi bond and 1 lone pair
(c) 8 sigma bonds, 2 pi bonds and 2 lone pair
(d) 9 sigma bonds, 2 pi bonds and 1 lone pair

92. The volume of 0.25 N tribasic acid required to neutralize 0.500 g, of $Ca(OH)_2$ completely is
(a) 45.0 ml (b) 27.0 ml
(c) 54.0 ml (d) .054 ml

93. The number of protons in 1 c.c. of a solution whose *p*H = 12 is:
(a) 6.02×10^{11} (b) 6.02×10^{8}
(c) 6.02×10^{-12} (d) 6.02×10^{23}

94. By increasing the salt concentration ten times in acidic buffer solution, the *p*H is:
(a) lowered by 1 unit
(b) increased by 2 units
(c) increased by 1 unit
(d) not changed

95. The *p*H of a solution made by mixing 50 ml of 0.01 M $Ba(OH)_2$ solution with 50 ml of water is:
(a) 8 (b) 12
(c) 10 (d) 7

96. Equal weights of methane and hydrogen are mixed in an empty container at 25°C. The fraction of total pressure exerted by hydroger. is:
(a) 1/2 (b) 1/9
(c) 8/9 (d) 1/4

97. In which of the following compounds iron has lowest oxidation state?
(a) $FeSO_4 \cdot (NH_4)_2 SO_4 \cdot 6H_2O$
(b) $K_4Fe(CN)_5$
(c) $Fe(CO)_5$
(d) K_2FeO_4

98. Potassium permanganate is converted to MnO_2 in a reaction. Equivalent weight of $KMnO_4$ is. Equivalent weight of $KMnO_4$ is:
(a) mol. wt/5 (b) mol. wt/2
(c) mol. wt/3 (d) mol. wt/1

99. A nucleide has half life of 25 min. If 100 gms of the nucleide decays for 100 min, the amount of nucleide left is:
(a) 1.0 gm (b) 4.0 gms
(c) 6.25 gms (d) 12.5 gms

100. Ordinary boron is a mixture of two isotopes B^{11} and B^{10}. If the atomic weight of boron is 10.81, the percentage of B_{11} in the mixture is:
(a) 50% (b) 81%
(c) 19% (d) 60%

Instructions for Q. No. 101 to 120

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.
(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are falses

101. *Assertion (A) :* Alkanes can have an infinite number of conformations.
Reason (R) : In configurational isomerism, the isomers are distinct individual substances.

102. *Assertion (A) :* As a salt such as NaCl dissolves, the Na^+ and Cl^- ions leaving the crystal lattice acquire far greater freedom.
Reason (R) : In thermodynamic terms, the formation of solution occurs with a favourable change in free energy *i.e.*, ΔH has a high positive value and $T\ \Delta S$ a low negative value.

103. *Assertion (A) :* Water is specially effective in screening the electrostatic interactions between the dissolved ions.
Reason (R) : The force of ionic interactions depends upon the dielectric constant (ε) of the solvent.

104. *Assertion (A) :* When two uncharged similar atoms are brought very close together, their surrounding electron clouds influence each other, and a force of attraction is built up between them.
Reason (R) : The random variation in the positions of electrons around one nucleus may creat a transient electric dipole, which induces a transient opposite electric dipole in the nearby atom.

105. *Assertion (A) :* The equilibrium constant is fixed and a characteristic for any given chemical reaction at a specified temperature.
Reason (R) : The composition of the final equilibrium mixture at a particular temperature depends upon the starting amount of reactants.

106. *Assertion (A) :* The degree of ionization of water is small at 25^0C, only about one of every 10^7 molecules in pure water is ionized at any instant.
Reason (R) : In pure water at 25^0C the molar concentration of water is essentially constant.

107. *Assertion (A) :* The p^{ka} of a weak acid becomes equal to pH of the solution at the midpoint of its titration.
Reason (R) : The molar concentrations of proton acceptor and proton donor become equal at the midpoint of titration of a weak acid.

108. *Assertion (A) :* Maleic and fumeric acids are well defined compounds. These two compound are stereo isomers but not enantiomers.
Reason (R) : Maleic and fumeric acids have same molecular formula but they are not mirror images of each other.

109. *Assertion (A) :* The nearly tetrahedral arrangement of the orbitals about the oxygen atom allow each water molecule to form hydrogen bonds with as

many as four neighbouring water molecules.
Reason (R) : In ice each water molecule forms four hydrogen bonds as each molecules is fixed in the space.

110. *Assertion (A) :* Hydrogen has three isotopes namely protium, deuterium and tritium.
Reason (R) : All the three isotopes of hydrogen have same number of protons in their nuclei.

111. *Assertion (A) :* Sodium ammonium hydrogen phosphate tetrahydrate is used in the bead test.
Reason (R) : The colourless transparent sodium metaphosphate combines with metallic oxides giving coloured orthophosphates.

112. *Assertion (A) :* Lead is a metal with a high density. It readily dissolves in moderately concentrated nitric acid giving colourless fumes which turn red in contact with air.
Reason (R) : Nitric oxide (NO) is a colourless oxide of nitrogen while NO_2 is a coloured oxide of nitrogen.

113. *Assertion (A) :* The reaction of ammonia solution with calomel is a disproportionation reaction in which a mixture of Hg (II) amido chloride and Hg are formed.
Reason (R) : In a disproportionation reaction species under reaction is neither oxidised nor reduced.

114. *Assertion (A) :* Sodium thiosulphate dissolves the white precipitate of silver chloride.
Reason (R) : The thiosulphate ions act as strong complexing agents.

115. *Assertion (A) :* When $SnCl_2$ solution is added to $HgCl_2$ solution, a milky white precipitate is obtained and on adding excess of $SnCl_2$, a black precipitate is formed.
Reason (R) : The disproportionation of Hg(II) is easier than its reduction only.

116. *Assertion (A) :* The electron affinity of chlorine is greater than that of fluorine.
Reason (R) : Chlorine is more electronegative than fluorine.

117. *Assertion (A) :* The boiling point of *n*-alkanes increases regularly with the increase in the number of carbon atoms.
Reason (R) : The magnitude of Van der Waal's forces increases with the increase in molecular mass and molecular size.

118. *Assertion (A) : p*-nitroaniline is stronger base than *p*-toluidine.
Reason (R) : The electron withdrawing NO_2 group in the *p*-nitroaniline makes it a stronger base.

119. *Assertion (A) :* All the amines, except tertiary amines are capable of forming intermolecular hydrogen bonds.
Reason (R) : Tertiary amines have larger molecules and surface area.

120. *Assertion (A) :* Phenol is strongly acidic than ethanol.
Reason (R) : Phenoxide ion is more stablized by resonance than ethoxide ion.

BIOLOGY

121. The maximum biomagnification would be in which of the following in case of aquatic ecosystem?
(a) fishes (b) birds
(c) zooplanktons (d) phytoplanktons.

122. In DNA when AGCT occurs, their association is as per which of the following pair?
(a) AG-CT (b) AC-GT
(c) AT-GC (d) all of these.

123. The process of replication in plasmid DNA other than initiation, is controlled by
(a) Plasmid gene (b) bacterial gene
(c) mitochondrial gene
(d) none of these.

124. Cholecystokinin is secreted by
(a) intestine (b) pancreas
(c) adrenal cortex (d) thyroid gland.

125. Koch's postulates are not applicable to
(a) TB (b) leprosy
(c) diphtheria (d) cholera.

126. The problem, due to Rh factor arises when the blood of two (Rh^+ and Rh^-) mix up
(a) in a test tube (b) through transfusion
(c) during pregnancy (d) both 'b' and 'c'.

127. The term 'humulin' is used for
(a) human insulin (b) isoenzyme
(c) hydrolytic enzyme (d) powerful antibiotic.

128. Which one of the following statements about cytochrome P450 is wrong?
(a) it has an important role in metabolism
(b) it contains iron
(c) it is present in coloured cell
(d) it is an enzyme involved in oxidation reactions.

129. Puccinia forms uredia and
(a) pycnia on barberry leaves
(b) aecia on wheat leaves
(c) telia on wheat leaves
(d) aecia on barberry leaves.

130. A few organisms are known to grow and multiply at temperatures of 100-105^0 C.They belong to
(a) thermophilic subaerial fungi
(b) marine archaebacteria
(c) thermophilic sulphur bacteria
(d) hot spring blue-green algae.

131. Botulism caused by *Clostridium botulinum* affects the
(a) spleen
(b) intestine
(c) lymph glands
(d) neuromuscular junction.

132. The functional unit of contractile system in striated muscle is
(a) cross bridges (b) myofibril
(c) sarcomere (d) Z-band.

133. Calcitonin is a thyroid hormone which
(a) elevates potassium level in blood
(b) lowers calcium level in blood
(c) elevates calcium level in blood
(d) has no effect on calcium.

134. Loss of a *X*-chromosome in a particular cell, during its development, results into
(a) diploid individual
(b) triploid individual
(c) gynandromorphs
(d) both 'a' and 'b'.

135. Which one among the following chemicals is used for causing defoliation of forest trees?
(a) amo-1618 (b) phosphon D
(c) malic hydrazide (d) 2,4-D.

136. Albinism is known to be due to an autosomal recessive mutation. The first child of a couple with normal skin pigmentation was an albino. What is the probability that their second child will also be an albino?
(a) 100% (b) 25%
(c) 50% (d) 75%.

137. Co-factor(prosthetic group) is a part of holoenzyme, it is
(a) loosely attached inorganic part
(b) accessory non-protein substance attached firmly
(c) loosely attached organic part
(d) none of these.

138. A fruit fly is heterozygous for sex-linked genes, when mated with normal female fruit fly, the male specific chromosome will enter egg cell in the proportion
(a) 1 : 1 (b) 2 : 1
(c) 3 : 1 (d) 7 : 1.

139. Which one of the following statements is correct regarding evolution of mankind?
(a) neanderthal man and cro-magnon man were living at the same time
(b) australopithecus was living in Australia
(c) homoerectus is preceded by homohabilis
(d) none of these.

140. The embryonated egg of *Ascaris* represents
(a) an egg with an egg
(b) an egg with gastrula
(c) an egg with blastula
(d) an egg with a juvenile.

141. Elater mechanism for seed dispersal is exhibited by
(a) *Riccia* (b) *Funaria*
(c) *Liverworts* (d) *Marchantia.*

142. The breeding place of *Flamingo* (Hansawar) in India is most likely
(a) Sambhar lake (b) Chilka lake
(c) Rann of Kutch (d) Ghana Vihar.

143. In C_4 plants, CO_2 combines with
(a) phosphoglyceric acid
(b) ribulose diphosphate
(c) phosphoenol pyruvate
(d) phosphoglyceraldehyde.

144. The polygenic genes show
(a) different genotypes
(b) different phenotypes
(c) different karyotypes
(d) none of these.

145. Which of the following statement is without exception for sponges?
(a) they are found only in marine water
(b) they are all radially symmetric
(c) they all have calcareous spicules
(d) they have high regenerative power.

146. What are the most diversed molecules in the cell?
(a) proteins (b) carbohydrates
(c) lipids (d) mineral salts.

147. Which of the following is common among mammals?
(a) they are carnivores
(b) they have ventral nerve cord
(c) they undergo no moulting
(d) they have seven cervical vertebrae.

148. The ornithine cycle removes two waste products from the blood in liver. These products are
(a) CO_2 and urea
(b) ammonia and urea
(c) CO_2 and ammonia
(d) ammonia and uric acid.

149. The black rust of wheat is a fungal disease caused by
(a) *Melampsore lini*
(b) *Claviceps purpurea*
(c) *Albugo candida*
(d) *Puccinia graminis tritici.*

150. The pigment, that absorbs red and far red light in plants is
(a) xanthophyll-II (b) cytochrome
(c) phytochrome (d) carotene.

151. The sympathetic nerves in mammals, arise from
(a) thoraco-lumber nerves
(b) cervical nerves (c) sacral nerves
(d) 3rd,7th,9th and 10th cranial nerves.

152. Identify the correct match between tiger reserve and its state
(a) Bandipur-Tamil Nadu
(b) Palanau-Orissa (c) Manas-Assam
(d) Corbett-Madhya Pradesh.

153. When two genetic loci produce identical phenotypes in *cis* and *trans* position, they are considered to be
(a) pseudoalleles
(b) different genes
(c) multiple alleles
(d) the parts of same gene.

154. Rickettsiae form a group under
(a) fungi
(b) a category between viruses and bacteria
(c) viruses (d) bacteria.

155. Which one of the following statements is correct with reference to a test tube baby?
(a) a prematurely born baby is reared in an incubator
(b) fertilization of the egg and growth of the embryo are effected in a large test tube
(c) fertilization of the egg is effected outside the body, the fertilized egg is then placed in the womb of the mother where the gestation is completed
(d) fertilization of the egg is effected in the female genital tract, it is then taken out and grown in a large test tube.

156. Organisms phenotypically similar but genotypically different are said to be
(a) multizygous (b) heterozygous
(c) homozygous (d) monozygous

157. Which of the following is the most evident source of evolution?
(a) fossils
(b) morphology
(c) embryos
(d) vestigial organs

158. Number of post-zygote nuclear divisions of synkaryon in exconjugant of *Paramecium* is
(a) one (b) five
(c) three (d) eight

159. Gigantism and acromegaly are due to increase of
(a) GH (b) STH
(c) ADH (d) none of these

160. The head of humerus articulated in the pectoral girdle, the joint is
(a) hinge
(b) immovable
(c) pivot joint
(d) ball and socket

Instructions for Q. No. 161 to 180

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are falses

161. *Assertion (A) :* Some roots perform photosynthesis.
Reason (R) : *Trapa* & *Tinospora* have these type of roots.

162. *Assertion (A) :* Water potential is represented by negative sign.
Reason (R) : Pure water has maximum water potential.

163. *Assertion (A) :* Growing plants in soilless culture is called hydroponics.
Reason (R) : This was first developed by Van Helmont.

164. *Assertion (A) :* Molybdenum deficiency causes whiptail disease of cauliflower.
Reason (R) : It is responsible for the synthesis of IAA.

165. *Assertion (A) :* Light is a limiting factor in photosynthesis.
Reason (R) : Pigment other than chlorophyll *a* are called accessory pigments.

166. *Assertion (A) :* Heavy perspiration results in muscular cramps.
Reason (R) : Skin is an accessory excretory organ.

167. *Assertion (A) :* Multiplicative growth takes place in embryos of animals.
Reason (R) : Growth in embryo occurs due to an increase in the number of cells.

168. *Assertion (A) :* Linkage and crossing over are inversely related.
Reason (R) : Crossing over is visible in prophase stage of meiosis-I.

169. *Assertion (A) :* The endocrine part of human pancreas is represented by α and β cells.
Reason (R) : Endocrine gland have ducts.

170. *Assertion (A) :* Inheritance of Kappa particles in *Paramecium* is a type of extra nuclear inheritance.
Reason (R) : Extra nuclear inheritance or cytoplasmic inheritance are inherited through nucleoplasm.

171. *Assertion (A) :* The nucleus is a membrane-bounded body found in cytoplasm of cell and contains DNA in the form of chromosomes.
Reason (R) : The nucleus is therefore the repository of the molecular information that controls the characteristics of cells and their progeny.

172. *Assertion (A) :* Histone proteins are synthesized during the S-phase when DNA synthesis occurs.
Reason (R) : Histone proteins form an association with DNA to form nucleosome.

173. *Assertion (A) :* Annelids, arthropods and molluscs are all protostomial coelomate.

Reason (R) : Adults of all the above have bilateral symmetry, the tube with-in-a-tube body plan and organs derived from three germ layers.

174. *Assertion (A) :* Sponges are primitive multicellular animals, that probably evolved a multicellular structure independently of other multicellular animals.
Reason (R) : Sponges are stationary, remain attached to substratum while water passes over them.

175. *Assertion (A) :* Active transport results in solute movement against a concentration gradient.
Reason (R) : Active transport of Na^+ and K^+ is energized by ATP.

sertion (A) : Lichens bear a composite structure consisting of two dissimilar organisms, a fungus and an alga.
Reason (R) : The fungal component of association is either a member of myxophyceae or chlorophyceae.

177. *Assertion (A) :* In C_4 plants, CO_2 fixation occurs at three sites.
Reason (R) : CO_2 fixation occurs in mesophyll cells, bundle sheath cells and vascular cambium.

178. *Assertion (A) :* Reduction division, in *Selaginella*, occurs during microspore formation only.
Reason (R) : It has been proved experimentally by Zacharich in 1963.

179. *Assertion (A) :* In case of *Nepenthes*, lamina is modified to capture insects to get nitrogenous food.
Reason (R) : The plant proteins are broken down to amino acids then absorbed by plants.

180. *Assertion (A) :* Energy can be transformed from one form into another but it can not be created or destroyed.
Reason (R) : When one form of energy is transformed into another form, some useful energy is always lost as heat, hence,energy can not be recycled.

GENERAL KNOWLEDGE

181. What kind of soil is treated with gypsum to make it suitable for cropping ?
(a) alkaline
(b) acidic
(c) water-logged
(d) soil with excessive clay content

182. Where is the world's first Integrated Solar Combined Cycle Power Project proposed to be set up ?
(a) Cuttack (b) Jaipur
(c) Patna (d) Jodhpur

183. Who started the Saka Era which is still used by the Government of India ?
(a) Kanishka (b) Vikramditya
(c) Samudra Gupta (d) Asoka

184. Which of the following districts is on the international border of India ?
(a) Gorakhpur
(b) West Khasi Hills
(c) Kinnaur
(d) Kullu

185. Laterite soil devlop as a result of -
(a) deposits of alluvial
(b) deposition of loess
(c) leaching
(d) continued vegetation cover

186. The variety of coffee largely grown in India is
(a) Old Chicks (b) Coorgs
(c) Aribica (d) Kents

187. Which one of the following is not an example of indirect tax
(a) sales tax
(b) excise duty
(c) custom duty
(d) expenditure tax

188. Structural unemployment arises due to -
(a) deflationary conditions
(b) heavy industry bias
(c) shortage of raw materials
(d) inadequate productive capacity

189. What can be the maximum interval between two sessions of Parliament ?
(a) three months (b) four months
(c) six months (d) nine months

190. Who amongst the following is renowned in Hindustani classical music (vocal) ?
(a) Shovana Narayan
(b) M. S. Subbalakshmi
(c) Pt. Jasraj
(d) M.S.Gopalakrishnan

191. What is the chemical name for 'baking soda' ?
(a) sodium carbonate
(b) sodium bicarbonate
(c) sodium nitrite
(d) sodium nitrate

192. An atomic pile is used for
(a) producing X- rays
(b) conducting nuclear fission
(c) conducting thermonuclear fusion
(d) accelerating atoms

193. Clove the commonly used spice, is obtained from the
(a) root (b) stem
(c) flower bud (d) fruit

194. What is the number of the permanent members of the security council of United Nations Organisation ?
(a) 6 (b) 4
(c) 5 (d) 7

195. Who was honoured with 'Bharat Ratna' on the Republic Day 2000 ?
(a) Pt. Ravi Shankar
(b) K.Kasturirangan
(c) A.P.J. Abdul Kalam
(d) none of these

196. A 'breath test' used by traffic police to check drunken driving uses -
(a) potassium dichromate-sulphuric acid
(b) potassium permanganate sulphuric acid
(c) turmeric on filter paper
(d) silica gel coated with silver nitrate

197. Who is the author of *Business @Speed of Thought?*
(a) Dick Francis (b) john Gray
(c) Bill Gates (d) David Baldacci

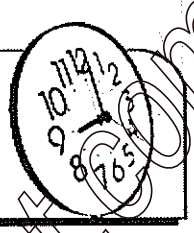
198. Anglo-Nubian is a breed of
(a) sheep (b) goat
(c) poultry (d) cattle

199. Who received the Dada Sahib Phalke award 2002 for film excellence ?
(a) Asha Bhosle
(b) Girish Kannad
(c) Dipti Naval
(d) Lata Mangeskar

200. Total no. of moons of planet jupiter is
(a) 18 (b) 16
(c) 17 (d) 30

■■■

Model Test Paper-7



Time : $3\frac{1}{2}$ hours. *Maximum Marks : 200*

PHYSICS

1. If 1000 droplets each of charge q and radius r are mixed to form a big drop, then the potential of big drop, as compared to small droplet, will be
   (a) 10 times (b) 500 times
   (c) 100 times (d) 1000 times

2. In uncontrolled chain reaction, the quantity of energy released, is
   (a) very high (b) normal
   (c) very low (d) first (a) then (b)

3. The angular velocity of the second needle of a watch will be
   (a) π (b) $\frac{60}{\pi}$
   (c) 2π (d) $\frac{\pi}{30}$

4. Which of the following gates can be served as a building block for any digital circuits?
   (a) OR (b) NOT
   (c) AND (d) NAND

5. The energy required to detatch one electron from the Balmer series of hydrogen spectrum will be
   (a) – 13.6 ev (b) – 3.4 eV
   (c) 10.2 eV (d) – 1.5 eV

6. There are five resistance of 1 Ω each. If the first three resistance are joined in parallel and rest two are joined is series, then the final resistance of the combination when joined in series is
   (a) 2/3 Ω (b) 7/3 Ω
   (c) 5/3 Ω (d) 8/3 Ω

7. A train is moving with a constant velocity. If a pendulum is hanging from its roof then its time-period
   (a) remains same (b) increases
   (c) decreases (d) none of these

8. The value of the surface tension of a liquid is 70 dyne/cm. What will be its value in N/m?
   (a) 70 N/m (b) 7×10^2 N/m
   (c) 7×10^{-2} N/m (d) 7×10^3 N/m.

9. In the Young's experiment the distance between two slits is increased by 2 times. What will be fringe width?
   (a) increased by two times
   (b) increased by four times
   (c) decreased by two times
   (d) decreased by four times

10. The force of cohesion is
    (a) maximum in solids
    (b) same in different matters
    (c) maximum in liquids
    (d) maximum in gases

11. The working of a dynamo is based on the principle of
    (a) heating effect of current
    (b) chemical effect of current
    (c) magnetic effect of current
    (d) electromagnetic induction

12. A nucleus emits one α-particle and forms a new nucleus. The mass and charge of the new nucleus is changed in which of the following way?
    (a) mass is reduced by 4 and charge is reduced by 6
    (b) mass is reduced by 2 and charge is reduced by 2
    (c) mass is reduced by 4 and charge is reduced by 2
    (d) mass is reduced by 2 and charge is reduced by 4

13. A boy aims a gun at a bird from a point at a horizontal distance of 100 m. If the gun can impart a velocity of 500 m/s to the bullet, at what height about the board must he aim his gun in order to hit it (Take $g = 10$ m/s^2)
(a) 20 m (b) 50 m
(c) 40 m (d) 100 m

14. If the momentum of a particle is 2×10^{-23} kg-m/s. then its wavelength will be
(a) 3.3×10^{-11} m (b) 8.2×10^{-5} m
(c) 6.3×10^{-7} m (d) 9×10^{-3} m

15. Atomic number of a nucleus is Z, while its mass number is M. What will be the number of neutrons in its nucleus ?
(a) M (b) $(M - Z)$
(c) Z (d) $(M + Z)$

16. The energy produced in the sun is due to
(a) fission reaction (b) chemical reaction
(c) fusion reaction
(d) motion of electrons and ions

17. In Young's experiment, the distance between slits is 0.28 mm and distance between slits and screen is 1.4 m. Distance between central bright fringe and third bright fringe is 0.9 cm. What is wavelength of used light
(a) 5000 Å (b) 5880 Å
(c) 6000 Å (d) 5800 Å

18. The radius of a planet is 1/4th of Earth's radius and its acceleration due to gravity is double to Earth's acceleration due to gravity. How many times be the value of escape velocity at the planet comparing to its value at the Earth?
(a) $1/\sqrt{2}$ (b) $2\sqrt{2}$
(c) $\sqrt{2}$ (d) 2

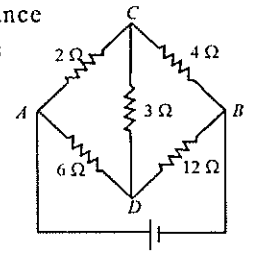
19. Initially a tyre at 27°C has 20 atm. pressure. What is the value of temperature when the tyre moves with pressure of 25 atmosphere
(a) 192 K (b) 350 K
(c) 240 K (d) 375 K

20. No. of images formed by an object kept between two plane mirrors at an angle 72° is
(a) 2 (b) 4
(c) 3 (d) 5

21. The half-life of a radioactive substance is 48 hr. How much time it will take to disintegrate to its 1/16th part
(a) 12 hr (b) 48 hr
(c) 16 hr (d) 192 hr

22. According to the Rutherford's atomic model. the electrons inside the atom are
(a) stationary (b) centralized
(c) not stationary (d) none of these

23. The equivalent resistance (R_{AB}) between the points A and B is
(a) 6 Ω
(b) 7.5 Ω
(c) 4.5 Ω
(d) 8 Ω



24. If a ball is thrown vertically upwards with 40 m/s, its velocity after two sec will be ($g = 10$ms^{-2})
(a) 10 m/s (b) 30 m/s
(c) 20 m/s (d) 40 m/s

25. A scooter ($m = 40$ kg) having velocity 4 m/s collides with another scooter ($m = 60$ kg) having velocity 2 m/s. If the collision is inelastic, then loss in kinetic energy is
(a) 48 J (b) 392 J
(c) 110 J (d) 440 J

26. A sphere of 0.2 m diameter bears 1 microcoulomb charge on it. The maximum electric intensity at a point due to the sphere will be
(a) 9×10^9 N/C (b) 9×10^{-9} N/C
(c) 9×10^5 N/C (d) 9×10^{-5} N/C.

27. A star is receding from earth at a speed 10^5 m/s. The line of wavelength 5700 Å in its spectrum will be shifted by
(a) 1.9 Å (b) 5700 Å
(c) 1.9 metre (d) 1.9 micron.

28. The waves moving from a sitar to a listener in air are
(a) longitudinal progressive
(b) longitudinal stationary
(c) transverse progressive
(d) transverse stationary.

29. Light of wavelength 2×10^{-3} m falls on a slit of width 4×10^{-3} m. The angular dispersion of the central maximum will be
(a) 30° (b) 60°
(c) 90° (d) 180°.

30. The distance between two coherent sources produced by a biprism is 1.0 mm. When the screen is 1 metre far from the sources, the fringe width is found to be 0.6 mm. What is the wavelength of light?
(a) 6000 Å (b) 5896 Å
(c) 5890 Å (d) 7800 Å.

31. The focal lengths of the objective and the eyepiece of an astronomical telescope are 20 cm and 5 cm respectively. If the final image is formed at a distance of 30 cm from the eyepiece, find the magnifying power.
(a) 44.6 (b) 4.68
(c) 64.4 (d) 6.44.

32. The luminous intensity of a 40 watt bulb is 300 candela. Calculate the efficiency of the bulb.
(a) 62.4 lm/watt (b) 42.6 lm/watt
(c) 94.25 lm/watt (d) 25.94 lm/watt.

33. A straight rod partially immersed in water appears to be inclined at 45° with the surface when viewed vertically through air. What is the actual inclination of the rod?
(a) 30° (b) 45°
(c) 53° (d) 60°.

34. Fraunhaufer lines become brighter during solar eclipse because
(a) the sun-rays get diffracted by moon
(b) solar radiations are completely blocked off by the moon and only the photosphere radiations reach the earth
(c) chromosphere radiations are stopped by the moon and only the photosphere radiations reach the earth
(d) photosphere radiations are stopped by the moon, but the chromosphere radiations are able to reach the earth.

35. In a cyclic process the change in internal energy of a system is
(a) minimum but not zero
(b) zero
(c) maximum but not infinite
(d) infinite.

36. The rms speed of the particles of fume of mass 5×10^{-17} kg executing Brownian motion in air at N.T.P. is
(a) 1.5 m/s (b) 3.0 m/s
(c) 1.5 cm/s (d) 3 cm/s.

37. A material breaks under a stress of 10^9 N/m^2. If the density of the material be 3×10^3 kg/m^3, what will be the length of the wire made of that material so that the wire breaks by its own weight when suspended.
(a) 3.4×10^4 m (b) 3.4×10^5 m
(c) 3.4×10^3 m (d) 3.4 m.

38. Which of the following bond is strongest?
(a) ionic (b) covalent
(c) Van der Waals (d) metallic.

39. Surface area of a soap bubble is 1.3×10^{-4} m^2. The work done to double the surface area will be (surface tension (T) for soap solution $= 3 \times 10^{-3}$ N/m.)
(a) 3.9×10^{-7} joule
(b) 3×10^{-7} joule
(c) 2.6×10^{-4} joule (d) $2.3 \times 10^{+1}$ joule.

40. A spacecraft is launched in a circular orbit very close to earth. What additional velocity should be given to the spacecraft so that it might escape the earth's gravitational pull
(Radius of the earth = 6400 km, $g = 9.8$ m/s^2)
(a) 11.2 km/s (b) 3.25 km/s
(c) 8 km/s (d) 20.2 km/s.

Instructions for Q. No. 41 to 60

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion

(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion

(c) If the assertion is true, but the reason is false

(d) If both assertion and reason are falses

41. *Assertion (A) :* When light passes from one medium to another of different density the only quantity which is unchanged is its wavelength.
Reason (R) : The wavelength is not related to the refractive index of the medium.

42. *Assertion (A) :* A plane mirror forms a real image when a converging beam of light falls on it.
Reason (R) : When a converging beam is reflected, the angle of reflection is not equal to the angle of incidence.

43. *Assertion (A) :* Light incident normally on the first face of an equilateral glass prism ($\mu = 1.5$) is certain to be totally internally reflected.
Reason (R) : The critical angle for the given glass is less than 60°.

44. *Assertion (A) :* Due to friction kinetic energy of a satellite increases.
Reason (R) : Air friction decreases the total mechanical energy of the system, consequently the planet comes nearer with greater velocity.

45. *Assertion (A) :* Rain drops fall to the earth with uniform velocity.
Reason (R) : All freely falling objects have zero weight.

46. *Assertion (A) :* A stream of water from a tap becomes narrower as it falls.
Reason (R) : The speed of water increases as it falls.

47. *Assertion (A) :* The internal energy of an ideal gas does not change during an isothermal process.
Reason (R) : The decrease in volume of the ideal gas is compensated by a corresponding increase in pressure when its temperature is held constant.

48. *Assertion (A) :* Cathode rays travel with speed of light.
Reason (R) : Cathode rays are electromagnetic in nature.

49. *Assertion (A) :* When a dielectric medium is filled between the plates of a condenser, its capacitance increases.
Reason (R) : The dielectric medium reduces the potential difference between the plates of the condenser.

50. *Assertion (A) :* A thin polythene bag weights the same when empty and when filled with air at atmospheric pressure.
Reason (R) : Air is weightless.

51. *Assertion (A) :* The lightening conductor at the top of high buildings has sharp pointed conductors.
Reason (R) : The surface density of charge at sharp points is very high resulting in setting up of electric wind.

52. *Assertion (A) :* If a convex lens of glass is immersed in water its power decreases.
Reason (R) : In water it behaves as a concave lens.

53. *Assertion (A) :* The power factor in a series of resonant circuit is unity.
Reason (R) : In case of series resonance the inductive and capacitive reactances are equal.

54. *Assertion (A) :* When a current is drawn from a cell, there is a fall in potential difference across its terminals.
Reason (R) : Every cell has internal resistance.

55. *Assertion (A) :* Ammeter is always connected in series with a circuit to measure the current flowing through it.
Reason (R) : Ammeter has very low resistance.

56. *Assertion (A) :* During boiling, if an amount ΔQ of heat is absorbed, $p\Delta V$ is the work done by the system, then $\Delta Q = p\Delta V$

Reason (R) : Boiling is an isothermal process, So $\Delta U = O$ in equation $\Delta Q = \Delta U + p\Delta V$, which is based on first law of thermodynamics.

57. *Assertion (A) :* When one mole of an ideal gas expands under adiabatic condition so that its state changes from (P_1, V_1, T_1) to (P_2, V_2, T_2), the work done by the gas is given by $\Delta W = C_v(T_1 - T_2)$.
Reason (R) : During adiabatic expansion $\Delta Q = 0$ and $\Delta U = C_v(T_2 - T_1)$ in the expression $\Delta Q = \Delta U + \Delta W$.

58. *Assertion (A) :* A beam of light which emerges from a convex lens must be convergent.
Reason (R) : A convex lens is a converging lens while a concave lens is diverging lens, whatever may be the medium in which they are placed.

59. *Assertion (A) :* When light passes from one medium to another of different density the only quantity which is unchanged is its wavelength.
Reason (R) : The wavelength of light is not related to the refractive index of the medium.

60. *Assertion (A) :* α - particles produce more intense ionization than β -particles.
Reason (R) : α -particles are positively charged.

CHEMISTRY

61. Which of the following has larger radius?
(a) Ca (b) F^-
(c) F (d) Na

62. Identify the transition element
(a) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$
(b) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^1$
(c) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^2 4s^2$
(d) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^1 4d^2$

63. Which of the following is most alkaline?
(a) PH_3 (b) AsH_3
(c) NH_3 (d) SbH_3

64. The oxide that gives hydrogen peroxide (H_2O_2) on the treatment with a dilute acid (H_2SO_4) is
(a) PbO_2 (b) MnO_2
(c) Na_2O_2 (d) TiO_2

65. Catalyst is used to
(a) increase the product
(b) increase the reactants
(c) decrease the product
(d) minimise the time of reaction

66. Chlorobenzene is prepared commercially by
(a) Dow's process
(b) Rasching process
(c) Deacon's process
(d) Etard's process

67. Which of the following is Lewis-acid?
(a) Cl^- (b) S^{--}
(c) Ag^+ (d) C_2H_5OH

68. Which of the following are the constituents of gun metal?
(a) Cu, Sn (b) Cu, Sn, Zn
(c) Cu, Sn, Pb (d) Cu, Zn, Sb, Pb

69. Formaldehyde + ammonia $\rightarrow$ *Y*, the product *Y* is
(a) methanol
(b) para-formaldehyde
(c) formamide
(d) hexamethylenetetramine

70. Oleic, stearic and palmitic acids are
(a) nucleic acid (b) fatty acids
(c) amino acid (d) nitric acid

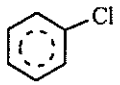
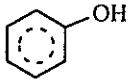
71. The most suitable method of the seperation of a mixture of ortho and para-nitrophenol mixed in the ratio of 1 : 1, is
(a) distillation (b) vapourisation
(c) crystallization (d) colour spectrum

72. When primary amine is heated with CS_2 in the presence of excess mercuric chloride it gives isothio cyanate. This reaction is called
(a) Perkin's reaction
(b) Hoffman-bromide reaction
(c) Carbyl-amine reaction
(d) Hoffman mustard oil reaction

73. If N and S both are present in an organic compound, then during Lassaigne's test, both will change into
(a) NaSCN (b) Na_2S and NaCN
(c) Na_2S and NaCNO (d) Na_2SO_3 and NaCN

74. In radioactive decay, the emitted electrons come from
(a) nucleus of the atom
(b) outermost orbit of the atom
(c) inner orbital of the atom
(d) orbit having principal quantum number one

75. $CH_3CONH_2 \xrightarrow{P_2O_5} Z + H_2O$, identify the product Z
(a) CH_3Br (b) CH_3OH
(c) CH_3CN (d) CH_3NH_2

76. Which of the following compound is easily attacked by an electrophile?
(a)  (b) 
(c)  (d) 

77. Paracetamol is used as a/an
(a) antipyretic (b) antimalarial
(c) antibiotic (d) tranquillizer

78. The number of water molecules in Mohr's salt is
(a) 5 (b) 7
(c) 6 (d) 8

79. A quantum of light energy is called
(a) proton (b) electron
(c) photon (d) neutron

80. Which of the following substance will give amide, when reacted with NH_3 ?
(a) nitrogen
(b) acetyl chloride
(c) hydrogen chloride
(d) potassium chloride

81. The bond order of nitrogen molecule is
(a) 1 (b) 4
(c) 3 (d) 7

82. Half-life of radium is 1580 yrs. Its average life will be
(a) 2.5×10^3 yrs (b) 2.275×10^3 yrs
(c) 1.832×10^3 yrs (d) 8.825×10^2 yrs

83. The reaction between copper and hot concentrated H_2SO_4 produces
(a) SO_3 (b) Cu
(c) H_2 (d) SO_2

84. Electronic configuration $1s^2 2s^2 2p_x^1 2p_y^1 2p_z^1$ represents which of the following elements?
(a) oxygen (b) nitrogen
(c) hydrogen (d) fluorine

85. The pH value of HCl (10^{-12} M) is
(a) –12 (b) –7
(c) 12 (d) 7

86. The function of enzymes in the living system is to
(a) transport oxygen
(b) provide energy
(c) provide immunity
(d) catalyse biochemical reactions

87. Which of the following is used as an anti-knocking material?
(a) T.E.L. (b) glyoxal
(c) freon (d) ethyl alcohol

88. Diazo-coupling is useful to prepare some
(a) dyes (b) pesticides
(c) proteins (d) vitamins

89. Which statement is not correct about alcohol?
(a) alcohol is lighter than water
(b) alcohol of less no. of carbon atoms is less soluble in water than alcohol of more no. of carbon atoms
(c) alcohol evaporates quickly
(d) all of these

90. Arrangement of Na, Rb, K, Mg in the increasing order of atomic radius will be
(a) Mg < Na < K < Rb
(b) Na < Mg < K < Rb

(c) K < Na < Mg < Rb
(d) Rb < K < Mg < Na

91. $C_3H_8 + CI_2 \xrightarrow{Light} C_3H_7CI + HCI$ is an example of which of the following types of reactions?
(a) substitution (b) addition
(c) elimination (d) rearrangement

92. Which of the following possesses highest melting point?
(a) chlorobenzene (b) *m*-dichlorobenzene
(c) *o*-dichlorobenzene (d) *p*-dichlorobenzene

93. Which of the following is not true in case of reaction with heated copper at 300°C?
(a) phenol → benzyl alcohol
(b) secondary alcohol → ketone
(c) primary alcohol → aldehyde
(d) tertiary alcohol → olefin

94. The heat of combusion of methane at 298 K is expressed by $CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O$ and $\Delta H = 890.2$ KJ. Magnitude of Δ E of reaction at this temperature is
(a) infinity (b) equal to ΔH
(c) less than ΔH (d) greater than ΔH

95. Which of the following species participate in sulphonation of benzene ring?
(a) H_2SO_4 (b) SO_3
(c) HSO_3^- (d) SO_2^-

96. IUPAC name of the compound

$CH_3 - CH = C - CH_2 - CH_3$

$CH_2 - CH_2 - CH_3$

(a) 3-ethyl 2-hexene (b) 3 propyl 3-hexene
(c) 3-propyl 2-hexene (d) 4-ethyl 4-hexene

97. *p*H of a solution can be expressed as
(a) $-\log_e (H^+)$ (b) $\log_e (H^+)$
(c) $-\log_{10} (H^+)$ (d) $\log_{10} (H^+)$

98. The concentration of $[H^+]$ and concentration of $[OH^-]$ of a 0.1 aqueous solution of 2% ionised weak acid is [ionic product of water = 1×10^{-14}]
(a) 0.02×10^{-3}M and 5×10^{-11} M
(b) 2×10^{-3} M and 5×10^{-12}M
(c) 1×10^{-3} M and 3×10^{-11} M
(d) 3×10^{-2} M and 4×10^{-13} M

99. A compound with empirical formula (CH_2O) has a vapour density of 30. Its molecular formula is
(a) CH_2O (b) $C_3H_6O_3$
(c) $C_2H_4O_2$ (d) $C_6H_{12}O_6$

100. The unit of equivalent conductivity is
(a) S-cm $^{-2}$
(b) ohm – cm^2 (*g*-equivalent)
(c) ohm-cm
(d) ohm $^{-1}$ cm^2 (*g* equivalent) $^{-1}$

Instructions for Q. No. 101 to 120

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are falses

101. *Assertion (A) :* The number of electron in an neutral atom is always equal to atomic number of that atom.
Reason (R) : The atomic number of the atom is equal to the number of protons in the nucleus of the atom.

102. *Assertion (A) :* The radioactivity of Ra and Ra^{2+} is always same.
Reason (R) : The radioactivity is an extra-nuclear phenomenon.

103. *Assertion (A) :* $_{14}Si^{30}$, $_{15}P^{31}$ and $_{16}S^{32}$ are a group of isotones.
Reason (R) : Isotones are atoms of different elements having different mass numbers of atomic numbers but same number of neutrons in their nuclei.

104. *Assertion (A) :* Nuclear isomers are the atoms with same atomic number, same mass number but with different radioactivity.
Reason (R) : One of the two nuclear isomeric nuclei one may be in the ground state whereas the other in the excited state.

105. *Assertion (A) :* Arenes can be obtained by the reaction of aromatic substrate with an alkylating agent in presence of acidic catalyst.
Reason (R) : This reaction is known as free radical substitution reaction.

106. *Assertion (A) :* Chlorobenzene reacts with potassium cyanide to give benzonitrile,
Reason (R) : Cyanide (CN^-) ion is a strong nucleophile.

107. *Assertion (A) :* Nuclide $_{13}Al^{30}$ is more stable as compared to nuclide $_{20}Ca^{40}$
Reason (R) : Nuclides having an odd number of protons and neutrons are generally less stable.

108. *Assertion (A) :* When butene-1 reacts with bromine (Br_2), two optical isomeres are obtained.
Reason (R) : Product contains one asymmetric carbon atom.

109. *Assertion (A) :* When an atom in group IA of the periodic table undergoes radioactive decay by emitting a positron, the resulting element belongs to zero group.
Reason (R) : When an atom emits a positron, its atomic number increases by one unit.

110. *Assertion (A) :* A certain element X, forms three binary compounds with chlorine containing 59.68%, 68.95% and 74.75% chlorine respectively. These data illustrate the law of multiple proportions.
Reason (R) : According to law of multiple proportions, the relative amounts of an element combining with some fixed amount of a second element in a series of compounds are the ratios of small whole numbers.

111. *Assertion (A) :* Water has greater dipole-dipole attraction than hydrogen sulphide.
Reason (R) : Oxygen has higher electronegativity than sulphur.

112. *Assertion (A) :* When 20 ml of ethanol is mixed with 20 ml of water, the volume of resulting solution will be less than 40 ml.
Reason (R) : The hydrogen bond between water and alcohol molecules is weaker than hydrogen bond between the like molecules.

113. *Assertion (A) :* Ortho-nitrophenol has much lower boiling point and lower solubility in water than meta and para isomers.
Reason (R) : Ortho-nitrophenol involves intramolecular hydrogen bonding and the possibility of association of the molecules is absent.

114. *Assertion (A) :* All molecules which have polar bonds have net dipole moment.
Reason (R) : Asymmetrical molecules with polar bonds have zero dipole moment.

115. *Assertion (A) :* In the covalent compounds of hydrogen, the hydrogen atom has the electronic configuration analogous to that of hydride ion.
Reason (R) : Hydride ion is formed when hydrogen atom loses an electron.

116. *Assertion (A) :* The bond order of helium is always zero.
Reason (R) : The number of electrons in bonding molecular orbital and antibonding molecular orbital is equal.

117. *Assertion (A) :* The H-N-H bond angle in NH_3 molecule is much greater than H-As-H bond angle in AsH_3.
Reason (R) : Formation of NH_3 molecule involves sp^3 hybridisation, while no hybridisation occurs in AsH_3.

118. *Assertion (A) :* The dipole-moment of CH_3F is greater than that of $CHCl_3$.
Reason (R) : Fluorine has greater electron affinity than that of chlorine.

119. *Assertion (A) :* Stannous chloride ($SnCl_2$) is a non-linear molecule.
Reason (R) : In $SnCl_2$ molecule Sn atom is present in sp hybridised state.

120. *Assertion (A) :* The bond angle H-C-H in the methane is the same as the bond angle Cl-C-Cl in the carbon tetrachloride.
Reason (R) : H-C-H bonds in methane are almost non-polar while Cl-C-Cl bonds in carbon tetrachloride are highly polar.

BIOLOGY

121. Transpiration-pull theory operates in
(a) active water absorption
(b) passive water absorption
(c) root pressure
(d) imbibition.

122. Photophosphorylation is a process in which
(a) O_2 comes out of the water by photolysis
(b) phosphoglyceric acid is formed
(c) aspartic acid is formed
(d) light energy is changed and stored into chemical energy in ATP.

123. The primary photochemical reaction in chloroplast occurs in
(a) stroma (b) periplast cavity
(c) quantasome (d) inner membrane.

124. Bacterial photosynthesis occurs in wavelength
(a) ultraviolet (b) blue
(c) red (d) far-red.

125. Which of the following will not be a limiting factor in photosynthesis?
(a) oxygen (b) carbon dioxide
(c) chlorophyll (d) light.

126. In photosynthesis, the special role of light is
(a) activation of chloroplast
(b) photolysis
(b) reduction of carbon dioxide
(d) synthesis of glucose.

127. In C_4-pathway, the first reaction is
(a) addition of CO_2 with PGA
(b) addition of CO_2 with PEPA
(c) addition of CO_2 with RuDP
(d) addition of CO_2 with RMP.

128. Emerson effect has given the view of
(a) two different photochemical reactions in photosynthesis
(b) light and dark reaction in photosynthesis
(c) photophosphorylation
(d) photorespiration.

129. In higher plants, the amount of light utilised in photosynthesis is about
(a) 100 percent (b) 50 percent
(c) 10 percent (d) 1 to 2 percent.

130. The initial enzyme of Calvin cycle is
(a) ribulose diphosphate carboxylase
(b) triose phosphate dehydrogenase
(c) phosphopentokinase
(d) cytochrome oxidase.

131. DCMU, a herbicide, kills plants by
(a) stopping respiration due to inhibition of dehydrogenase enzymes
(b) inhibiting photosystem-II of photosynthesis
(c) inhibiting photosystem-I of photosynthesis
(d) inhibition of photolysis.

132. Transpiration takes place from
(a) leaf
(b) stem
(c) all organs
(d) only aerial parts of land plant.

133. By increasing the CO_2 concentration around leaves in light
(a) stomata open rapidly
(b) stomata close
(c) there is no effect in stomatal movement
(d) stomata open slowly.

134. About what percentage of water absorbed by plants is lost again by transpiration?
(a) 80% (b) 60%
(c) 96% (d) 40%.

135. What happens by spraying of phenyl mercuric acetate (PMA) of abscisic acid (ABA) on leaves?
(a) transpiration rate increases

(b) transpiration rate decreases
(c) water absorption rate increases
(d) guttation rate increases.

136. Which of the following is a bacterial disease?
(a) rabies (b) measles
(c) small pox (d) tuberculosis.

137. For chlorophyll formation in plants, which of the following elements are needed
(a) iron and calcium
(b) calcium and potassium
(c) iron and magnesium
(d) sodium and copper.

138. Viruses are formed of
(a) nucleic acids
(b) DNA and RNA
(c) proteins
(d) proteins and nucleic acids.

139. Formation of fat (lipogenesis) begins in the body when
(a) blood sugar level is high
(b) glucose is converted into glycogen
(c) when liver and muscles cannot store any more glycogen
(d) when glucose combines with glycerol.

140. The reptiles and birds cannot afford to lose water and hence they excrete
(a) ammonia (b) urea
(c) creatinine (d) uric acid.

141. The fertilized secondary nucleus of the ovule, during double fertilization, establishes the
(a) seed coat (b) endosperm
(c) embryo plant (d) pericarp.

142. Kwashiorkor, an African word to signify "rejected ones" affecting children of underdeveloped and developing countries with symptoms of stunted growth, loss of appetite, anaemia, protruding bellies, match-stick legs, resulting in great mortality, is due to the deficiency of
(a) vitamins (b) proteins
(c) fats (d) carbohydrates.

143. Ginger is a stem, not a root because it has
(a) food storage
(b) nodes and internodes
(c) burning taste
(d) flowers.

144. The tusk of the elephant is formed
(a) from incisors
(b) from canines
(c) of prolongation of the skull
(d) by the thickening of the skin of the head.

145. The blood corpuscle which kills bacteria that get into our body is termed
(a) erythrocyte
(b) phagocyte
(c) thrombocyte
(d) eosinophils.

146. Mulberry-growing is associated with the
(a) control of insect pest
(b) silk worm culture (sericulture)
(c) support for the grape vine
(d) fodder for the cattle.

147. Which of the following disease is caused by air pollution?
(a) rheumatism (b) heart failure
(c) bronchitis (d) leukemia.

148. Cataract is caused by
(a) accumulation of dust in the eye
(b) lens getting opaque
(c) nerves supplying the eyes getting weak
(d) conjunction becoming thickened.

149. In fern plant, the ejection of spores with force is achieved by the
(a) sporangiophore (b) annulus
(c) stomium (d) indusium.

150. Which type of soil is best suited for the cultivation of cotton in India?
(a) loamy soil (b) black soil
(c) sandy soil (d) clayey soil.

151. For the first time viruses were crystallised and isolated by

(a) D. Ivanowski (b) F.C. Bawden
(c) K.M. Smith (d) W.M. Stanley.

152. Chlorophyll *a* occurs in
(a) all plants except algae
(b) all green plants except bacteria
(c) fungi only
(d) angiosperms only.

153. K.C. Mehta is famous for his work on
(a) the wheat rust
(b) viral diseases
(c) bacterial diseases
(d) none of the above.

154. Protonema is a stage in the life cycle of
(a) *Selaginella* (b) *Cycas*
(c) *Funaria* (d) *Rhizopus*.

155. Which one of the following is a fossil
(a) *Rhynia* (b) *Equisetum*
(c) *Selaginella* (d) none of the above.

156. Epidermal outgrowths are known as
(a) stem (b) stomata
(c) buds (d) trichomes.

157. Polyadelphous condition refer to
(a) stigma (b) androecium
(c) gynoecium (d) petals.

158. National Botanical Research Institute is situated at
(a) Shimla (b) Cuttack
(c) Delhi (d) Lucknow.

159. Saffron is produced from
(a) stamens of *Hibiscus*
(b) roots of *Rouwalfia*
(c) style and stigma of *Crocus*
(d) petals of *Musa*.

160. Cystolith is
(a) magnesium sulphate crystals
(b) crystals of calcium
(c) calcium carbonate crystals
(d) none of the above.

Instructions for Q. No. 161 to 180

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are falses

161. *Assertion (A)* : Casparian strips are formed on the inner tangential wall.
Reason (R) : In root, epidermis is not covered by cuticle.

162. *Assertion (A)* : The stem which has undergone secondary growth shows more phloem than xylem.
Reason (R) : Vascular cambium and cork cambium are synonymus.

163. *Assertion (A)* : Double fertilization is occurs in angiosperms only.
Reason (R) : Female gametophyte is not a food supplying structure in them.

164. *Assertion (A)* : Coconut fruit is considered as drupe and tomato a berry.
Reason (R) : Both are simple fleshy fruits.

165. *Assertion (A)* : Green oranges and tomatoes turn orange yellow coloured when sprayed with ABA.
Reason (R) : ABA possess anti-gibberellin property.

166. *Assertion (A)* : Lymph contain more protein than plasma.
Reason (R) : Haemopoietic organs produce lymph.

167. *Assertion (A)* : Patients are given sago starch.
Reason (R) : Sago starch is obtained from palm.

168. *Assertion (A)* : The glomerular filtrate becomes hypotonic in the ascending limb.
Reason (R) : Ascending limb is impermeable to water.

169. *Assertion (A) :* Spermatozoa produced in large number as compared to ova.
Reason (R) : Sperms are smaller than ova.

170. *Assertion (A) :* The coelenteron of *Hydra* is called gastrovascular cavity.
Reason (R) : Hydra is a monoblastic animal.

171. *Assertion (A) :* Each liver lobe is a compact network of closely set, branching and anastomosing lobules cemented together by connective tissues containing blood vessels, small blood sinuses and the fine bile canaliculi.
Reason (R) : Each lobule is formed of several large and cuboidal hepatic cells arranged in columns.

172. *Assertion (A) :* Lymphatic interstitium is packed with a gelatinous substance (tissue gel) in which long collagen fibre bundles are suspended to give tensional strength to the tissues. Tissue gel is formed by reticular network of coiled filaments of proteoglycan and a fluid trapped in minute spaces.
Reason (R) : Tissue gel allows transport water molecules, electrolytes, nutrients, O_2, CO_2, cellular waste products and hormones.

173. *Assertion (A) :* Conjunctiva is composed of stratified epithelium and is continuous with the epidermis that lines the eyelids.
Reason (R) : The conjunctiva is thin, little cornified and are not supplied with free nerve endings.

174. *Assertion (A) :* Within a liver cell, sporozoites of malarial parasite actively feed upon its cytoplasm and grow into large and spherical, adult like forms, called cryptozoites.
Reason (R) : Cryptozoites divide into about numerous minute cryptomerozoites by a special multiple fission called schizogony.

175. *Assertion (A) :* The ovarian cycle of follicles is control by gonadotropic hormones, follicles stimulating hormone (FSH) and luteinizing hormone (LH).
Reason (R) : During ovarian cycle follicles undergo maturation, contain a secondary oocyte and produce female sex hormone.

176. *Assertion (A) :* Zygospore fungi produce spores within sporangia.
Reason (R) : During sexual reproduction, a zygospore forms prior to meiosis and production of spores.

177. *Assertion (A) :* Club fungi usually reproduce sexually.
Reason (R) : In club fungi, the dikaryotic stage is prolonged and periodically produces fruiting bodies where spores are produced in basidia.

178. *Assertion (A) :* Rusts and smuts are club fungi that parasitize cereal crops.
Reason (R) : Some smuts enter seeds and exist inside the plant, becoming visible only near maturity.

179. *Assertion (A) :* Bacteria do not move by means of flagella.
Reason (R) : The 360° rotation of the flagellum does not cause the cell to spin and forward movement.

180. *Assertion (A) :* The tropical movements occurring in response to water stimulus are called rheotropic movements.
Reason (R) : Haptotropic movements occur in response to a light.

GENERAL KNOWLEDGE

181. Industrially most advanced state in India is
(a) Gujrat (b) Maharashtra
(c) Punjab (d) Madhya Pradesh

182. Mahabharat consist of
(a) 18 books & 10,000 couplets
(b) 18 books & 5,000 couplets
(c) 15 books & 10,000 couplets
(d) 13 books & 10,000 couplets

183. The maximum percentage of tribal population in India consists of
(a) Bhils (b) Santhals
(c) Nagas (d) Mundas

184. What is the playing time of the shorter version of our National Anthem which is played on

ceremonial occassion?
(a) 2 minutes (b) 1 minute
(c) 50 seconds (d) 48 seconds

185. Chaikar koothu is one of the most impressive dance forms of
(a) Kerala (b) Tamil Nadu
(c) Karnataka (d) Goa

186. The autobiography "A Brush with life" has been written by
(a) M.F.Hussain (b) Shobha De
(c) Satish Gujaral (d) Khushwant Singh

187. Of the 109 known elements, how many are occur in nature and how many are produced synthetically in particle accelerators
(a) 79 & 10 (b) 80 & 29
(c) 95 & 14 (d) none of these

188. Asia's oldest and largest Buddhist monastry is situated in
(a) Twang (b) Srilanka
(c) Lhasa (d) Mongolia

189. The Adi granth was compiled by
(a) Guru Ram Das (b) Guru Amar Das
(c) Guru Arjun Dev (d) Guru Teg Bahadur

190. Which of the following is a metal
(a) mercury (b) bromine
(c) chlorine (d) none of these.

191. Which of the following is a cash crop?
(a) gram (b) groundnut
(c) barley (d) jawar

192. Which continent is honoured by having consecutive three term General of U.N.O.
(a) South Africa (b) Australia
(c) South America (d) North America

193. In how many hours a geo stationary satellite completes one round of its orbit?
(a) 1 (b) 6
(c) 8 (d) 24

194. Cattle bone powder is used as fertilizer as it is rich in
(a) N (b) P
(c) Na (d) K

195. Which of the following is considered as the electronic city of India
(a) Hydrabad (b) Bangalore
(c) Calcutta (d) Mumbai

196. The Summer Olympics of 2004 will be organised at which of the following cities?
(a) Rome (b) Athens
(c) Tokyo (d) New Delhi

197. India had not received noble prize in which of the following field?
(a) chemistry (b) physics
(c) medicine (d) literature

198. The well known wonder drug against cancer 'Taxol' is extracted from the tree
(a) neem (b) yew
(c) oak (d) peepal

199. Aluminium in the earth's crust is found as
(a) cryolite (b) bauxite
(c) gypsum (d) none of these

200. Cloves are actually
(a) seeds (b) bark
(c) fruit
(d) unopened floral bud

■■■

Model Test Paper-8

Time : $3\frac{1}{2}$ hours. *Maximum Marks : 200*

PHYSICS

1. The refractive indices of the material of lens for violet, yellow and red colours of light are 1.66, 1.64 and 1.62 respectively, the mean focal length of the lens is 10 cm, then chromatic aberration of the lens between the violet and the red colours is
   (a) 0.857 (b) 0.825
   (c) 0.625 (d) 1.0

2. Which one of the following nuclear reactions is a source of energy in the sun?
   (a) $_{56}Ba^{144} + _{36}Kr^{92} \rightarrow _{92}U^{235} + _{0}n^{1}$
   (b) $_{2}He^{3} + _{2}He^{3} \rightarrow _{2}He^{14} + _{0}H^{1} + _{1}H^{1}$
   (c) $_{4}Be^{9} + _{2}He^{4} \rightarrow _{6}C^{12} + _{0}n^{1}$
   (d) $_{24}Fe^{56} + _{43}Ca^{112} \rightarrow 167\ _{74}W^{92} + _{0}n^{1}$

3. If an electron is moving with a speed of 3×10^7 m/s perpendicular to a uniform magnetic field of flux density 0.002 Wb.m^{-2}, then the radius of the path is
   (a) 0.084 m (b) 0.064 m
   (c) 0.038 m (d) 0.090 m

4. When a sound wave travels from air to water, which of these remains constant?
   (a) wavelength (b) frequency
   (c) velocity (d) all of these

5. A straight line conductor of length 0.4 m is moved with a speed of 7 m/s perpendicular to a magnetic field of intensity 0.9 Wb/m^2. The induced e.m.f. across the conductor is
   (a) 5.04 V (b) 2.52 V
   (c) 1.26 V (d) 25.2 V

6. In an intrinsic semiconductor, the fermi level varies linearly with the
   (a) thermal conductivity
   (b) pressure
   (c) temperature
   (d) none of these

7. An electron is moving with velocity 10^6 m/s in a circular path of radius 0.0077 m in a magnetic field of 10^{-3} Wb/m^2. The value of e/m for the electron is
   (a) 1.9×10^{11} C/kg (b) 1.35×10^{11} C/kg
   (c) 1.29×10^{11} C/kg (d) 2.6×10^{11}C/kg

8. The coefficient of thermal conductivity of a metal depends upon
   (a) thickness of metal plate
   (b) temperature difference between two sides
   (c) area of plate
   (d) all of these

9. A conducting rod is rotated with angular velocity ω in a horizontal plane perpendicular to a uniform magnetic induction B. The induced e.m.f. is
   (a) ωBI (b) $\frac{\omega BI^2}{2}$
   (c) $\frac{BI}{\omega}$ (d) $\frac{\omega^2 BI}{2}$

10. A block of wood is floating in a water tank. The loss of weight of the floating block is equal to
    (a) remains same
    (b) greater than the weight of block
    (c) weight of block
    (d) none of these

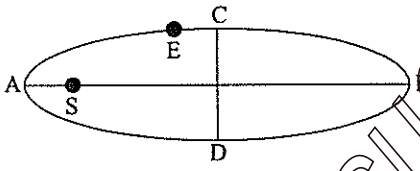
11. The internal energy of a real gas depends upon

(a) pressure (b) volume
(c) temperature (d) both (b) and (c)

12. The essential distinction between X-rays and γ-rays is that the γ-rays
(a) have greater ionizing power than X-rays
(b) emanate from nucleus, while X-rays emanate from outer part of the atom
(c) have smaller wave-length than X-rays
(d) are more penetrating than X-rays.

13. Which of the following mirror is used by dentist to examine a small cavity?
(a) convex mirror
(b) concave mirror
(c) combination of 'a' and 'b'
(d) none of these

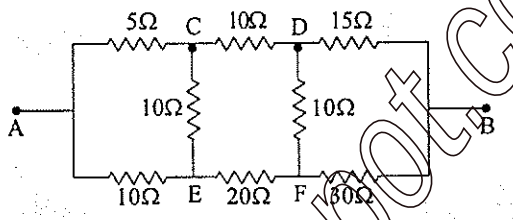
14. The earth E moves in an elliptical orbit with the Sun S at one of the focii as shown in figure. Its speed of motion will be maximum at the point
(a) B
(b) A
(c) C
(d) D



15. A space-station is set-up in space at a distance equal to earth's radius from the surface of earth. Suppose a statellite can be launched from the space station also. If υ_1 and υ_2 be the escape velocities of the satellite on the earth's surface and space station respectively, then
(a) $\upsilon_2 = \upsilon_1$ (b) $\upsilon_2 < \upsilon_1$
(c) $\upsilon_2 > \upsilon_1$ (d) $\upsilon_1^2 = \upsilon_2^2$

16. Current I_0 flows through a solenoid of length L having N number of turns, when it is connected to a DC e.m.f. If charged particle is projected along the axis of solenoid with a speed υ_0, then the force on the charged particle in the solenoid
(a) remains same (b) decreases
(c) increases (d) becomes zero

17. In the arrangement of resistances shown below, the effective resistance between points A and B is



(a) 90 W (b) 30 W
(c) 20 W (d) 110 W

18. Latent heat is defined as the amount of heat absorbed or given out by a body during a change of state, while its
(a) volume remains constant
(b) temperature remains constant
(c) pressure remains constant
(d) none of these

19. A beam of light of wave length λ and illumination L falls on a clean surface of sodium. If n photo electrons are emitted and each has a kinetic energy E, then
(a) $n \propto \lambda$ and $E \propto L$ (b) $n \propto L$ and $E \propto \frac{1}{\lambda}$
(c) $n \propto L$ and $E \propto \lambda$ (d) $n \propto \frac{1}{\lambda}$ and $E \propto \frac{1}{L}$

20. The phenomenon of beats is not observed in the case of visible light waves, because the difference between the two interfering frequencies
(a) has no difference (b) is very high
(c) is very small (d) none of these

21. An aluminium sphere of 10 cm radius is heated from 0°C to 100°C. The change in its volume
(a) 22.6 cm^3 (b) 12.3 cm^3
(c) 2.0 cm^3 (d) 28.9 cm^3

22. Two small spheres each carrying a charge q are placed r metre apart. If one of the spheres is taken around the other in a circular path, then work done will be equal to
(a) πρ (b) 2 πρ

(c) $2\pi\rho^2$ (d) zero

23. The electric current, passing through a metallic wire produces heat, because of
(a) the energy released in the ionization of the atoms of the metal
(b) collision of the atoms of the metal with each other
(c) collisions of conduction electrons with each other
(d) collisions of the conduction electrons with the atoms of the metallic wire.

24. Find the ratio of period of rotation of planet (Mars) about the Sun with that of the Earth around it. The mean distance of the Mars from the Sun is 1.42 A.U. and distance of earth from the sun = 1 A.U.
(a) 1.692 : 2 (b) 1 : 1.692
(c) 1.692 : 1 (d) 2 : 1.692

25. Electrical conductivities of Ge and Na are σ_1 and σ_2 respectively. If these substances are heated, then
(a) σ_1 decreases and σ_2 increases
(b) both σ_1 and σ_2 decreases
(c) both σ_1 and σ_2 increase
(d) σ_1 increases and σ_2 decreases

26. If the cross-sectional area of a pipe line increases, the velocity of the flow of liquid
(a) become zero (b) decreases
(c) increases (d) remains same

27. The excess pressure inside a soap bubble of radius (R) and surface tension (T) is
(a) $P = \frac{3T}{R}$ (b) $P = \frac{4T}{R}$
(c) $P = \frac{2T}{R}$ (d) $\frac{8T}{R}$

28. A black body radiates heat energy at the rate of 2×10^5 J/s-m^2 at the temperture of 120°C. Temperature of the black body at which rate of heat radiation is 32×10^5 J/s-m^2 is
(a) 400 K (b) 600 K
(c) 800 K (d) 200 K

29. Which of the following is not the characteristic of SHM?
(a) displacement time graph is a sine curve
(b) periodic nature
(c) projection of uniform circular motion on any straight line
(d) acceleration zero at the mean position

30. Slope of an adiabatic curve is always
(a) equal to isothermal curve
(b) less than isothermal curve
(c) greater than isothermal curve
(d) either 'b' or 'a'

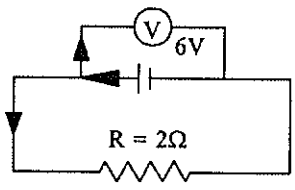
31. The value of the square of sum of two vectors $\vec{A}$ and $\vec{B}$ with θ as the angle between them is
(a) $\sqrt{A^2+B^2-2AB\sin\theta}$
(b) $\sqrt{A^2-B^2+2AB\cos\theta}$
(c) $\sqrt{A^2+B^2+2AB\cos\theta}$
(d) $\sqrt{A^2+B^2+2AB\sin\theta}$

32. A disc of mass 3 kg is rolling on a horizontal surface with a velocity 0.3 m/s. The total kinetic energy of the disc should be
(a) 0.98J (b) 0.35J
(c) 0.20J (d) 1.26J

33. Myopia is corrected by
(a) bifocal lens (b) concave lens
(c) convex lens (d) cylindrical lens

34. If the plate resistance of a triode valve is $3 \times 10^3\ \Omega$ and amplification factor (μ) is 8, the value of mutual conductance is
(a) $3.6 \times 10^{-4}\Omega^{-1}$ (b) $2.6 \times 10^{-3}\Omega^{-1}$
(c) $1.5 \times 10^{-2}\Omega^{-1}$ (d) $6.3 \times 10^{-3}\Omega^{-1}$

35. When we connected a voltmeter across the terminals of a cell, it measures 6 V. If a resistance of 2 ohms is connected across the terminals of a cell as shown in the figure, then current flowing through this resistance (R) will be



(a) 5A (b) 3A
(c) 2A (d) 7.5A

36. If a man pulls a cart of mass 100 kg with an acceleration of 2 m/sec^2, then force exerted by the man is
(a) 600 N (b) 400 N
(c) 200 N (d) 800 N

37. For steel, the breaking stress is 6×10^6 N/m^2 and the density is 8×10^3 kg/m^3. The maximum length of steel wire, which can be suspended without breaking under its own weight is ($g = 10 m/s^2$)
(a) 140 m (b) 120 m
(c) 75 m (d) 200 m

38. One light-year is approximately equivalent to
(a) 10^{18} m (b) 10^{16} m
(c) 10^{14} m (d) 10^{20} m

39. A 10 A ammeter has a resistance of 0.09 Ω. What resistance of the shunt will enable it read 100 A?
(a) 0.09 Ω (b) 9 Ω
(c) 1 Ω (d) 0.01 Ω

40. A sphere of mass 50 kg is attracted by a second sphere of mass 90 kg with a force equal to a weight of 0.5 mg and their centres are 20 cm apart. The gravitational constant is (weight of sphere = 10^{-6}kg)
(a) 3.3×10^{-11} Nm^2 kg^{-2}
(b) 6.23×10^{-15} Nm^2 kg^{-2}
(c) 4.2×10^{-11} Nm^2 kg^{-2}
(d) 4.36×10^{-11} Nm^2 kg^{-2}

Instructions for Q. No. 41 to 60

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows:

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are false

41. *Assertion (A) :* A balloon stops rising after attaining a certain maximum height.
Reason (R) : Upthrust due to air decreases with height till it just balances the weight of the balloon.

42. *Assertion (A) :* In series A.C. circuit, the voltage across the combination of capacitor and inductor is zero at resonance.
Reason (R) : At series resonance the current in the circuit is zero.

43. A*Assertion (A) :* It is necessary to use artificial satellite for long distance TV transmission.
Reason (R) : Ionospheric disturbances are minimised by satellite communication.

44. *Assertion (A) :* A table cloth can be pulled from a table without dislodging the dishes.
Reason (R) : To every action there is an equal but opposite reaction.

45. *Assertion (A) :* The dimensions of moment of force are the same as those of work.
Reason (R) : Moment of force is $r \times F$ while works is $r.F$.

46. *Assertion (A) :* Out of four Indian satellites, Rohini, Aryabhatt, Bhasker and Insat-1B, the time period of Insat-1B is maximum.
Reason (R) : Insat-1B is a communication satellite while others are orbital satellites.

47. *Assertion (A) :* A body is floating completely submerged in a liquid. When it is further pushed inside the liquid it remains in a position in which it is left.
Reason (R) : When a body floats in a liquid completely submerged, there is no net force acting on it.

48. *Assertion (A) :* The fundamental frequency of an open organ pipe increases as the temperature is increased.
Reason (R) : This is because as the temperature increases, the velocity of sound increases more rapidly than length of the pipe.

49. *Assertion (A) :* Alpha particles produce more intense ionisation than beta particles.
Reason (R) : Alpha particles are positively charged.

50. *Assertion (A) :* The lightening conductor at the top of high buildings has sharp pointed ends.
Reason (R) : The surface density of charge at sharp points is very high resulting in setting up of electric wind

51. *Assertion (A) :* In a radioactive disintegration an electron is emitted by the nucleus.
Reason (R) : Electrons are always present inside the nucleus.

52. *Assertion (A) :* In Rutherford's experiment, α - particles from a radium source were allowed to fall on a 10^{-4} mm thick gold foil. Most of α- particles passed straight through the foil.
Reason (R) : The entire positive charge and nearly whole of the mass of the nucleus is concentrated in the nucleus.

53. *Assertion (A) :* The relative velocity of two photons travelling in opposite directions is C.
Reason (R) : The rest mass of a photon is zero.

54. *Assertion (A) :* Tiny drops of liquid resist deforming forces better than bigger drops.
Reason (R) : Excess pressure inside a drop is directly proportional to the surface tension.

55. *Assertion (A) :* The couple acting on a body is not equal to the rotational K.E. of the body.
Reason (R) : Couple and K.E. have different units.

56. *Assertion (A) :* A thin aluminium disc spinning freely about a central pivot is quickly brought to rest when placed between the poles of a strong U-shaped magnet.
Reason (R) : A current induced in a disc rotating in a magnetic field produces a force which tends to oppose the disc's motion.

57. *Assertion (A) :* The period of simple pendulum is independent of the mass of the bob.
Reason (R) : Inertial and gravitational masses are equivalent.

58. *Assertion (A) :* The frequencies of incident, reflected and refracted beam of monochromatic light incident from one medium to another are the same.
Reason (R) : The incident, the reflected and the refracted rays are coplanar.

59. *Assertion (A) :* Radio waves can be polarised.
Reason (R) : Sound waves in air are longitudinal in nature.

60. *Assertion (A) :* A hollow metallic closed container maintained at a uniform temperature can act as a black body for radiations.
Reason (R) : All metals acts as black bodies.

CHEMISTRY

61. An e^- has magnetic quantum number as –3, what is its principal quantum number?
(a) 3 (b) 2
(c) 1 (d) 4.

62. Wavelength associated with electron motion
(a) decreases with increase in speed of e^-
(b) remains same irrespective of speed of electron
(c) increases with increase in speed of electron
(d) is zero.

63. A reaction is $A + B \rightarrow C + D$. Initially, we start with equal concentration of A and B. At equilibrium we find the moles of C is two times of A. What is the equilibrium constant of the reaction ?
(a) 1/4 (b) 2
(c) 4 (d) 1/2.

64. A catalyst in a chemical reaction -
(a) changes the equilibrium constant of a reaction
(b) increases the activation energy of the reaction
(c) does not initiate a reaction
(d) does not change the rate of the reaction.

65. Aromatic compounds undergo-
(a) electrophilic substitution
(b) electrophilic addition
(c) nucleophilic addition reaction
(d) none of these.

66. CH_3COOH is reacted with $CH \equiv CH$ in presence of Hg^{++}, the product is -
(a) $\begin{matrix} CH_2(OOCCH_3) \\ | \\ CH_2(OOCCH_3) \end{matrix}$

(b) $CH_3-C(CH_3)(OOC-CH_3)$

(c) $HC(CH_3)-(OOC-CH_3)_2$

(d) none of these.

67. Which of the following is an electrophile?
(a) $AlCl_3$ (b) NH_3
(C) H_2O (D) $C_2H_5NH_2$.

68. DDT is prepared by reacting chlorobenzene with
(a) $CHCl_3$ (b) CCl_3-CHO
(c) CCl_4 (d) ethane.

69. Which of the following has highest chlorine content?
(a) chloral (b) DDT
(c) pyrene (d) gammexane.

70. Which one of the following is the chiral molecule?
(a) $CHBr_3$ (b) CH_2Cl_2
(c) CH_3Cl (d) CHClBrI.

71. H_2S is passed through an acidified solution of Ag, Cu and Zn. Which forms precipitates ?
(a) Cu (b) Zn
(c) Ag (d) none of these.

72. Which of the following compounds volatilises on heating ?
(a) $ZnCl_2$ (b) $HgCl_2$
(c) $MgCl_2$ (d) none of these.

73. Which of the following oxides reacts with HCl and NaOH ?
(a) N_2O_5 (b) ZnO
(c) CaO (d) CO_2.

74. When acetylene is passed through dil. H_2SO_4 in the presence of $HgSO_4$ the compound formed is
(a) carbide of Hg (b) acetone
(c) C_2H_5OH (d) acetaldehyde.

75. Which metal is protected by a layer of its own oxide ?
(a) Al_2O_3 (b) MgO
(c) Na_2O (d) CaO.

76. The neutralisation of a strong acid by a strong base liberates an amount of energy per mole of H^+ that
(a) depends upon which catalyst is used
(b) depends upon the temperature at which the reaction takes place
(c) depends upon which acid and base are involved
(d) is always the same.

77. Albumin proteins are most abundant in
(A) egg (B) milk
(C) meat (D) soyabean.

78. One of the following is false for Hg
(a) it has high specific heat
(b) it is a metal
(c) it can evolve hydrogen from H_2S
(d) it is less reactive than hydrogen.

79. Equal volumes of methanoic acid and sodium hydroxide are mixed, if x is the heat of formation of water, then heat evolved on neutralisation is
(a) twice of x (b) equal to x
(c) more than x (d) less than x.

80. Which is not a macromolecule?
(a) palmitate (b) starch
(c) DNA (d) insulin.

81. Increase in boiling point of a sucrose solution is 0.1 K, then what is increase in boiling point of the same concentration of NaCl solution ?
(a) 0.4 K (b) 0.2 K
(c) 0.1 K (d) 0.58 K.

82. Specific heat of metal is 0.23 and its chloride contains 87% of chlorine. What is the exact atomic weight of the metal ?
(a) 62 (b) 54
(c) 24 (d) 26.2.

83. 240 g of urea is present in 10 litre solution, the active mass of urea will be
(a) 0.4 mol/lit (b) 0.06 mol/lit
(c) 0.2 mol/lit (d) 0.08 mol/lit.

84. Which of the following is most acidic?
(a) Al_2O_3 (b) MgO
(c) Na_2O (d) CaO.

85. The gas molecules have r.m.s. velocity of its molecules as 1000 m/s. What is its average velocity?
(a) 546 m/s (b) 921.58 m/s
(c) 1012 m/s (d) 960 m/s.

86. The IUPAC name of $C_2H_5CONH_2$ is
(a) propanamide (b) benzamide
(c) methanamide (d) ethanamide

87. The catalyst $SnCl_2/HCl$ is used in
(a) Clemmensen reduction reaction
(b) Cannizzaro's reduction reaction
(c) Stephen's reduction reaction
(d) Rosen mund's reduction reaction

88. Which of the following is correct?
(a) german silver-Cu + Zn + C
(b) duralumin-Al + Cu + Mg + Ag
(c) gun metal-Cu + Zn + Sn
(d) solder-Pb + Al

89. The Grignard reagent, on reaction with acetone forms
(a) acetic acid
(b) secondary alcohol
(c) tertiary alcohol
(d) acetaldehyde

90. The order of stability of carbonium ion is
(a) $3° > 1° > 2° > CH_3^+$
(b) $3° > 2° > 1° > CH_3^+$
(c) $CH_3^+ > 1° > 2° > 3°$
(d) $2° > 3° > 1° > CH_3^+$

91. The bond angle of sp^2-hybrid orbital is
(a) 105° (b) 180°
(c) 120° (d) 109°

92. The positron has mass equal to
(a) deutron (b) proton
(c) electron (d) α-particle

93. The square planar shape is for
(a) $[CrF_6]^{3-}$ (b) $[Cu(NH_3)_4]^{2+}$
(c) BF_4 (d) none of these

94. In which of the following reactions, the hydrogen peroxide is a reducing agent?
(a) $2HI + H_2O_2 \rightarrow 2H_2O + I_2$
(b) $Cl_2 + H_2O_2 \rightarrow 2HCl + O_2$
(c) $2FeCl_2 + 2HCl + H_2O_2 \rightarrow 2FeCl_3 + 2H_2O$
(d) $H_2SO_3 + H_2O_2 \rightarrow H_2SO_4 + H_2O$

95. If $[Zn^{2+}] = 0.1$ M and $E^0 = -0.76$ V then half cell potential at 298 K for the reaction
$Zn^{2+}(aq) + 2e^- \rightarrow Zn(s)$ is
(a) −0.698 V (b) −0.789 V
(c) 0.789 V (d) 0.698 V

96. The osmotic pressure of a 5% solution of cane sugar at 15°C is (Mol.wt. of cane sugar = 342)
(a) 3.57 atm (b) 3.45 atm
(c) 2.35 atm (d) 4 atm

97. The pH value of a solution whose hydronium ion concentration 6.2×10^{-9} mol L^{-1} is
(a) 7.75 (b) 7.21
(c) 6.21 (d) 8.21

98. Which of the following metal acts as the most efficient catalyst?
(a) alkaline earth metal
(b) transition metal
(c) alkali metal
(d) coloured metals

99. Silver chloride is soluble in methylamine due to the formation of
(a) $[Ag(CH_3NH_2)_2]Cl$ (b) $Ag(CH_3NH_2)Cl$
(c) AgOH
(d) $Ag + CH_3Cl + NH_4Cl$

100. Which of the following represents noble gas configuration?
(a) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5d^1 6s^2$
(b) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4f^{14} 5s^2 5p^6 5p^1$
(c) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5p^6$
(d) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5p^6 5d^5 6s^2$

Instructions for Q. No. 101 to 120

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) *If both assertion and reason are true and the reason is a correct explanation of the assertion*
(b) *If both assertion and reason are true but the reason is not a correct explanation of the assertion*
(c) *If the assertion is true, but the reason is false*
(d) *If both assertion and reason are falses*

101. *Assertion (A) :* The name butanol is not specific, whereas the name butanone represents one specific compound.
Reason (R) : Alcohols show phenomenon of isomerism where as ketones do not show isomerism

102. *Assertion (A) :* Alkenes and cycloalkanes series of hydrocarbons have same general formula.
Reason (R) : Either insertion of a double bond or formation of a ring reduce the number of hydrogen atoms of corresponding alkane by 2.

103. *Assertion (A) :* The carbon atoms of the benzene ring may be numbered for identification of substituent groups, just as a continuous chains of carbon atoms are numbered.
Reason (R) : Smallest set of numbers designating the substituents is the preferred set.

104. *Assertion (A) :* White precipitate of lead chloride ($PbCl_2$) is soluble in concentrated solution of potassium chloride.
Reason (R) : Tetrachloroplumbate (II) ion is formed when chloride ions attacks the Lead (II) chloride.

105. *Assertion (A) :* Mercurous chloride (Hg_2Cl_2) precipitate, on reacting with ammonia solution, gives a mixture of mercury (II) amidochloride and mercury metal.
Reason (R) : The reaction of ammonia and Hg_2Cl_2 involves disproportionation in which simultaneous oxidation and reduction take place.

106. *Assertion (A) :* In a given electrical field beta particles (β) are deflected more than alpha particles (α).
Reason (R) : Beta particles have very low e/m value as compared to alpha particles.

107. *Assertion (A) :* Neutrons are better projectiles for nuclear reactions than protons or α-particles
Reason (R) : Neutrons are neutral particles and hence, their penetration in nucleus is rather difficult.

108. *Assertion (A) :* The solubility of *n*-alcohols in water decreases with increase in molecular weight.
Reason (R) : The relative proportion of the hydrocarbon part in alcohols increases with the increase in molecular weight which permits enhanced hydrogenbonding with water.

109. *Assertion (A) :* The nitro group, if present in ortho or para positions, would stabilise the phenoxide ion by dispersal of negative charge through mesomeric effect.
Reason (R) : The electron releasing substituents would intensify the negative charge. As a result electron releasing group in phenol should be acid-weakening.

110. *Assertion (A) :* The electronic arrangement with exactly half-filled or completely filled degenerate orbitals would be more stable that any other electronic arrangement.
Reason (R) : The electronic configuration with even or uniform or symmetrical distribution of charge in all directions would evidently be associated with high energy.

111. *Assertion (A) :* The lactic acid shows the geometrical isomerism.
Reason (R) : Lactic acid has carbon-carbon double bond.

112. *Assertion (A) :* 2-hydroxy 1, 4-butane dioic acid is known as malic acid.
Reason (R) : It is present in unripe apples.

113. *Assertion (A) :* During the fermentation of grape juice, a reddish brown coloured crust is formed.
Reason (R) : Impure potassium hydrogen tartrate is of reddish brown colour and it is known as argol.

114. *Assertion (A) :* Amines are more basic than ethers and esters.
Reason (R) : Nitrogen is less electronegative than oxygen, it is in better position to accomodate the positive charge of the proton.

115. *Assertion (A) :* An orbital cannot have more than two electrons, moreover, if an orbital has two electrons they must have opposite spins.
Reason (R) : No two electrons in an atom can have same set of all the four quantum numbers.

116. *Assertion (A) :* The pairing of electrons in the orbitals of a particular sub-shell are singly occupied.
Reason (R) : Singly occupied orbitals must have the electrons with parallel spins.

117. *Assertion (A) :* Fluorine molecule has bond order one.
Reason (R) : The number of electrons in antibonding molecular orbitals is two less than that in bonding molecular orbitals.

118. *Assertion (A) :* Nitrate ion (NO_3^-) is a Bronsted base.
Reason (R) : Bronsted base is a chemical species which can accept H^+ ions.

119. *Assertion (A) :* The molality of the solution does not change with change in temperature.
Reason (R) : The molality is expressed in units of moles per 1000 gm of solvent.

120. *Assertion (A) :* The molecularity of the reaction $H_2 + Br_2 \rightarrow 2HBr$ is two.
Reason (R) : The order of this reaction is 3/2.

BIOLOGY

121. The eukaryotic genome differs from the prokaryotic genome because
(a) the DNA is complexed with histones in prokaryotes
(b) repetitive sequences are present in eukaryotes
(c) the DNA is circular and single stranded in prokaryotes
(d) genes in the former case are organized into operons.

122. In DNA, when AGCT occurs, their association is as per which of the following pair?
(a) AT-GC (b) AG-CT
(c) AC-GT (d) all of these.

123. Edible part in litchi is
(a) endosperm (b) mesocarp
(c) pericarp (d) fleshy aril.

124. Which of the following is the main category of mutation?
(a) somatic mutation
(b) genetic mutation
(c) zygotic mutation
(d) all of these.

125. In soil, water available for plants is
(a) gravitational water
(b) capillary water
(c) chemically bound water
(d) hygroscopic water.

126. Green house effect refers to
(a) production of cereals
(b) cooling of earth
(c) warming of earth
(d) trapping of UV rays.

127. Energy transfer from one trophic level to other in a food chain is
(a) 10% (b) 1%
(c) 20% (d) 2%.

128. Carbon dioxide acceptor in C_3-plants is
(a) PGA (b) PEP
(c) RuDP (d) none of these.

129. In 1984, Bhopal gas tragedy was caused due to leakage of
(a) potassium isocyanate
(b) sodium monoxide
(c) methyl isocyanate
(d) sodium thiocyanate.

130. Land mass occupied by forest is about
(a) 30% (b) 11%
(c) 60% (d) 22%.

131. Which of the following is a secondary pollutant?
(a) PAN (b) CO
(c) aerosol (d) CO_2.

132. Which of the following is related to genetic engineering?
(a) heterosis (b) plastid
(c) mutation (d) plasmid.

133. Which part of the world has a high density of organisms?
(a) deciduous forests (b) grasslands
(c) tropical rain forests (d) savannah.

134. The maximum biomagnification would be in which of the following in case of aquatic ecosystem?
(a) zooplankton (b) fishes
(c) phytoplankton (d) birds.

135. The book '*Genera plantarum*' was written by
(a) Engler & Prantl (b) Bessey
(c) Bentham & Hooker (d) Hutchinson.

136. Columella is a specialized structure found in the sporangium of
(a) *Spirogyra* (b) *Ulothrix*
(c) *Rhizopus* (d) none of these.

137. A system of classification in which a large number of traits are considered is
(a) natural system (b) artificial system
(c) phylogenetic system
(d) synthetic system.

138. Which of the following is true about bryophytes?
(a) they are thalloid
(b) they posses archegonia
(c) they contain chloroplast
(d) all of these.

139. The endosperm of gymnosperm is
(a) diploid (b) triploid
(c) polyploid (d) haploid.

140. In which of the following would you place the plants having vascular tissue lacking seeds?
(a) pteridophytes (b) algae
(c) gymnosperms (d) bryophytes.

141. In prokaryotes, the genetic material is
(a) linear DNA without histones
(b) linear DNA, with histones
(c) circular DNA without histones
(d) circular DNA with histones.

142. Bryophytes have
(a) dominant phase of gametophyte which produces spores
(b) sporophyte is of longer duration
(c) small sporophyte phase and generally parasitic on gametophyte
(d) dominant phase of sporophyte which is parasitic.

143. The antherozoids of *Funaria* are
(a) multiciliated (b) aciliated
(c) monociliated (d) biciliated.

144. DNA is mainly found in
(a) nucleolus (b) nucleus only
(c) cytoplasm only (d) none of these.

145. Which of the following organ has single membrane?
(a) mitochondria (b) nucleus
(c) spherosomes (d) cell wall.

146. An oxidative phosphorylation is the formation of
(a) ATP in respiration
(b) $NADPH_2$ in respiration
(c) ATP in photosynthesis
(d) $NADPH_2$ in photosynthesis.

147. Lactose is a
(a) polysaccharide (b) disaccharide
(c) monosaccharide (d) none of these.

148. The end products of respiration in plants are
(a) sugar and O_2
(b) H_2O and energy
(c) CO_2, H_2O & energy
(d) starch and O_2.

149. The correct sequence in cell cycle is
(a) G_1-S-G_2-M (b) S-G_1-G_2-M
(c) M-G_1-G_2-S (d) S-M-G_1-G_2.

150. The high energy bonds at ATP are between
(a) C-N (b) C-C
(c) P-P (d) C-O.

151. The proper scientific name of cellobiose is
(a) 4N H_2SO_4-β-D-reductase
(b) 4-O-β-glucopyranosyl-D-glucose
(c) 6 NH_3PO_4-α-D-reductase
(d) 8-O-β-D-glucopyranosyl-D-glucose.

152. Feulgen reaction was developed by Feulgen and Rossenbeck to study
(a) protein (b) DNA
(c) lipid (d) RNA.

153. Chromonemata start associating into bivalent chromosomes during
(a) pachytene (b) zygotene
(c) diplotene (d) leptotene.

154. In meiosis, the centromere divides during
(a) anaphase-I (b) prophase I
(c) anaphase II (d) metaphase I.

155. During interphase, RNA and proteins are synthesized in
(a) G_2 phase
(b) S phase
(c) in both G_1 and G_2 phases
(d) G_1 phase.

156. Kreb's cycle takes place in
(a) chloroplast (b) mitochondria
(c) golgi bodies (d) ribosome.

157. Who got the Nobel Prize on working of enzymes in the year 1978?
(a) R. Misra
(b) W. Arber and D. Nathans
(c) G.G. Khorana
(d) Hass and Nass.

158. Plants life originated earlier than animal life because
(a) they can synthesize their food
(b) plants have simple structure
(c) plants are more in number
(d) none of the above.

159. During denaturation of proteins, which of the following bond is broken?
(a) peptide bonds
(b) H-bonds
(c) hydrophobic bonds
(d) electrostatic bonds.

160. End product of respiration is
(a) citric acid (b) malic acid
(c) pyruvic acid (d) none of these.

Instructions for Q. No. 161 to 180

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are falses

161. *Assertion (A) :* Photosynthesis is an anabolic process.
Reason (R) : Carbohydrate are used up during this process.

162. *Assertion (A) :* C_4 plants are capable of photosynthesizing under very low CO_2 concentration.
Reason (R) : RuBP carboxylase is present in them.

163. *Assertion (A) :* Vitamin deficiency are not seen in plants.
Reason (R) : Vitamins are essential for growth.

164. *Assertion (A) :* Fungi may be heterotrophic or autotrophic.
Reason (R) : Stored food material in fungi is starch.

165. *Assertion (A) :* Peptidoglycan is found in the cell wall of algae.
Reason (R) : Blue green algae are a group of eukaryotes.

16. *Assertion (A) :* Homozygous dominant individual can be used in a test cross to determine the genotype

of an individual showing the recessive phenotype.
Reason (R) : Test cross is a type of back cross.

167. *Assertion (A) :* Fatty liver syndrome is caused due to tobacco addiction.
Reason (R) : Cirrhosis is a disease of kidney.

168. *Assertion (A) :* Aortic semilunar valves become very weak in rheumatic heart disease.
Reason (R) : Rheumatic heart disease includes angina pectoris and coronary thrombosis.

169. *Assertion (A) :* Increase in substrate concentration increases the rate of reaction.
Reason (R) : This is due to occupation of more active sites by substrate molecules.

170. *Assertion (A) :* Stability of a biotic community is governed mainly by its diversity.
Reason (R) : Stability of biotic community is the absence of fluctuations in the population.

171. *Assertion (A) :* If the tadpoles are kept in water containing the element iodine or a weak solution of iodine it undergoes rapid metamorphosis.
Reason (R) : The process of metamorphosis is controlled and regulated by thyroxine hormone, which affects the growth and differentiation of cells.

172. *Assertion (A) :* Fibrinolysis dissolution of fibrin by fibrinolysin caused by the action of proteolytic enzyme system.
Reason (R) : Proteolytic enzyme system is continuously active in the body, but its action is greatly increased by various stress stimuli.

173. *Assertion (A) :* Hydrostatic pressure in blood forces water and low molecular mass solutes of the glomeruli into the Bowman's capsule.
Reason (R) : Kidneys play a major role in regulating the blood pH.

174. *Assertion (A) :* Oynchophora is a small group of animals with molluscan and arthropod affinities.
Reason (R) : It represents an early stage of evolution of annelids.

175. *Assertion (A) :* Emboly involves the invagination and involution through blotting process by the mesentoblast cells.
Reason (R) : Emboly is exhibited by the formation, elongation and ultimate recession of the primitive streak.

176. *Assertion (A) :* The division of extracellular protoplast is called cytokinesis.
Reason (R) : This division is accomplished either through the formation of cell plate in between the newly formed daughter cell or by means of peripheral furrowing.

177. *Assertion (A) :* Plasma membrane is exceedingly thin and not visible as a separate layer.
Reason (R) : It appears merely as a surface layer of cytoplasm.

178. *Assertion (A) :* Ribosomes are not self-replicating particles.
Reason (R) : Lysosomes are membrane bounded vesicles that contain hydrolytic enzymes.

179. *Assertion (A) :* Increase in the quantity of metabolically active protoplasm, accompanied by an increase in cell number and cell size or both called growth.
Reason (R) : Growth, in plants, is not restricted to any specific regions.

180. *Assertion (A) :* The preparation of r-DNA does not require restriction enzymes.
Reason (R) : Because they are not responsible for cleaving plasmid DNA.

GENERAL KNOWLEDGE

181. International Day Against Drug Abuse and Illicit Trafficking is observed on
(a) June 25 (b) July 26
(c) June 26 (d) Aug 26

182. The author of book "What went wrong" is
(a) Atal Bihari Vajpai (b) Kiran Bedi
(c) Sonia Gandhi (d) Seen Smith

183. Which of the following cricket teams set a new record of 12 successive test wins in December 2000.
(a) South Africa (b) Australia
(c) Pakistan (d) India

184. Name of the leader who was regarded by Mahatma Gandhi as his political guru
(a) Gopal Krishan Gokhale
(b) Lord Irwin (c) Leo Jolstoy
(d) Rabindra Nath Tagore

185. Which metal is also known as quick silver
(a) silver (b) mercury
(c) tin (d) zinc

186. Year 2001 is devoted to
(a) physical health (b) mental health
(c) environment (d) none of these

187. Who among the following made a history by becoming the first batsman to complete 10000 runs in one day cricket
(a) Sunil Gawaskar (b) Allen Border
(c) Sachin Tendulkar (d) Saurav Ganguly

188. Whom does the president of India send his resignation if he wants to quit his office
(a) Chief Justice of India
(b) Prime Minister
(c) Vice President of India
(d) Any of these

189. Bombay high is well known in India for
(a) oil exploration (b) hanging garden
(c) fishing in deep sea
(d) atomic reactor.

190. Which of the following is the oldest dynasty of India
(a) Vardhan (b) Kushan
(c) Maurya (d) Gupta

191. The line demarcating the boundary between India and China is called
(a) Radcliffe line (b) 68th parallel
(c) McMohan line (d) Durand line

192. The Jnanpith award for the year 2000-2001 is awarded to
(a) Ms Indira Goswami
(b) Arundhati Roy
(c) Birendra Kumar Bhattacharya
(d) both (a) and (c)

193. Which of the following in news who refused to accept the Arjun award for life time contribution?
(a) Venkatesh Prasad (b) Baljeet Singh Saini
(c) Milkha Singh (d) S. Vijayalakshmi

194. The National Bureau of Plant Genetics Resources (NBPGR) is in
(a) Lucknow (b) Hyderabad
(c) Mumbai (d) New Delhi

195. Who among the following is a famous flute singer
(a) Ravi Shankar (b) Shiv Kumar Sharma
(c) Jakir Hussain
(d) Hariprasad Chaurasia

196. At the equator, the duration of a day is
(a) 10 hrs (b) 12 hrs
(c) 14 hrs (d) 16 hrs

197. RDX is
(a) an instrument to measure blood pressure
(b) a gene
(c) a chemical used in the manufacture of fertilizers
(d) an explosive

198. When the sun reaches its maximum distance from equator, it is known as
(a) solstice (b) eclipse
(c) equinox (d) sidereal day

199. Heavy alcohol consuming people generally die of
(a) blood cancer (b) cirrhosis
(c) liver or stomach cancer
(d) rigor mortis

200. Which country is to host the first Afro Asian Games in 2001.
(a) Japan (b) India
(c) Egypt (d) South Africa

■■■

Model Test Paper-9

Time : $3\frac{1}{2}$ hours. *Maximum Marks : 200*

PHYSICS

1. The electron in a hydrogen atom makes a transition $n_1 \to n_2$ where n_1 and n_2 are the principal quantum numbers of the two states. Assume the Bohr model to be valid. The time period of the electron in the initial state is eight times that in the final state. What are the possible values of n_1 and n_2 ?
(a) $n_1 = 1, n_2 = 3, n_1 = 2, n_2 = 6$ ..... and so on
(b) $n_1 = 1, n_2 = 2, n_1 = 2, n_2 = 4$ ..... and so on
(c) $n_1 = 2, n_2 = 1, n_1 = 4, n_2 = 2$ ..... and so on
(d) $n_1 = 2, n_2 = 3, n_1 = 3, n_2 = 6$ ..... and so on

2. Two identical bar magnets each of length L and pole strength m are placed at right angles to each other with the north pole of one touching the south pole of the other. Magnetic moment of the system will be
(a) $\frac{mL}{2}$ (b) $\frac{mL}{3}$
(c) $\frac{mL}{\sqrt{2}}$ (d) $(\sqrt{2})\,mL$

3. A concave mirror of focal length 10 cm and a convex mirror of focal length 15 cm are placed facing each other 40 cm apart. A point object is placed between the mirrors, on their common axis and 15 cm from concave mirror. The position of image produced by the successive reflection first on concave mirror then at convex mirror is
(a) 10 cm behind the convex mirror
(b) 6 cm infront of the convex mirror
(c) 6 cm behind the convex mirror
(d) 10 cm infront of the convex mirror

4. A leaky parallel plate capacitor is filled completely with a material having dielectric constant $K = 5$ and electrical conductivity $\sigma = 7.4 \times 10^{-12}\ \Omega^{-1}m^{-1}$. If the charge on the plate at the instant $t = 0$ is $q = 8.85\ \mu C$, then the leakage current at the instant $t = 12$ sec will be
(a) 1.23 μA (b) 0.2μA
(c) 0.1 μA (d) 1.56 μA

5. An AC source of angular frequency ω is fed across a resistor R and a capacitor C in series. The current registered is 1. If now the frequency of the source is changed to $\omega/3$ (but maintaining the same voltage), the current in the circuit is founded to be halved. The ratio of reactance to resistance at the original frequency ω will be
(a) $\sqrt{\frac{5}{7}}$ (b) $\sqrt{\frac{6}{11}}$
(c) $\sqrt{\frac{2}{9}}$ (d) $\sqrt{\frac{3}{5}}$

6. Two guns, situated on the top of a hill of height 10 m, fire one shot each with the same speed $5\sqrt{3}$ m/sec at some interval of time. One gun fired horizontally and other fires upward at an angle of 60° with the horizontal. The shots collide in air at point, the time interval between the firings is
(a) 3 sec (b) 2 sec
(c) 1 sec (d) 4 sec

7. What is increased in a step down transformer?
(a) wattage (b) current
(c) voltage (d) nothing

8. Lines of constant dip are called
(a) isoclinic lines (b) isodynamic lines

(c) isogonic lines (d) isobaric lines

9. An electron and a proton of equal momentum enter a uniform magnetic field normal to the lines of force. If the radii of their paths be r_e and r_p respectively then

(a) $\frac{r_e}{r_p} = \sqrt{\frac{m_p}{m_e}}$ (b) $\frac{r_e}{r_p} = \frac{m_p}{m_e}$

(c) $\frac{r_e}{r_p} = 1$ (d) $\frac{r_e}{r_p}\sqrt{\frac{m_e}{m_p}}$

10. The e.m.f. of a cell is E volt and internal resistance is $r\,\Omega$. The resistance in external circuit is also $r\,\Omega$. The p.d. across the cell will be

(a) $2E$ (b) $\frac{E}{2}$

(c) E (d) $\frac{E}{4}$

11. In an achromatic doublet
(a) convex lens is made of flint glass
(b) concave lens is made of crown glass
(c) convex lens is made of crown glass
(d) both the lenses are made of the same glass

12. The horizontal range of a projectile is $4\sqrt{3}$ times its maximum height. The angle of projector is
(a) 60° (b) 45°
(c) 30° (d) none of these

13. The current gain of a transistor in common base circuit is 0.98. What change in collector current is to be produced in order to produce a change of 5 mA in emitter current ?
(a) 4.9 mA (b) 2.45 mA
(c) 0.196 mA (d) 5.1 mA

14. The binding forces in a metallic crystal are
(a) magnetic forces
(b) Van der Waal forces of attraction
(c) electrostatic forces of attraction
(d) covalent forces

15. The mass of helium nucleus is less than that of its constituent particles by 0.03 amu. The binding energy per nucleon of $_2He^4$ nucleus will be
(a) 3.5 MeV (b) 14 MeV
(c) 7 MeV (d) 21 MeV

16. A radiation worker receives a total dose equivalent of 450 μ S_v during a working week of 30 hour. Calculate the average dose equivalent rate
(a) 15 μ S_v per hour (b) 15 S_v per minute
(c) 45 S_v per second (d) none of these

17. The ratio of the radii of sulphur and helium atoms in the ground state will be
(a) $1 : \sqrt{8}$ (b) 1 : 4
(c) 1 : 8 (d) 1 : 3

18. The energy of a photon is 3×10^{-19} joule. Its momentum is
(a) 10^{-11} kg-m/sec (b) 9×10^{-11} kg-m/sec
(c) 10^{-27} kg-m/sec (d) 3×10^{7} kg-m/sec

19. In Millikan's oil drop experiment, a charged drop of mass 1.8×10^{-14} kg is stationary between the plates. The distance between the plates is 0.90 cm and potential difference between them is 2.0 kV. The number of electrons on the drop is
(a) 5 (b) 50
(c) 500 (d) 0

20. On increasing the length of microscope tube, its magnifying power will
(a) decrease (b) remain unchanged
(c) increase (d) become zero

21. The spectrum of the sun is
(a) line emission and continuous absorption
(b) line emission
(c) line absorption
(d) continuous emission and line absorption

22. A person can not see the objects beyond 50 cm. The power of a lens to correct this vision will be
(a) + 5D (b) − 2D
(c) + 2D (d) 0.5D

23. The frequency from 3×10^{9} Hz to 3×10^{10} Hz is
(a) metro high frequency band

(b) super high frequency band
(c) high frequency band
(d) very high frequency band

24. The average power dissipation in a pure capacitor in A.C. circuit is
(a) $2\,CV^2$ (b) zero
(c) $\frac{1}{2}CV^2$ (d) CV^2

25. A metal conductor of length 1m rotates vertically about one of its ends at angular velocity 5 radian per second. If the horizontal component of earth's magnetic field is 0.2×10^{-4} T, the e.m.f. developed between the two ends of the conductor is
(a) 50 mV (b) 5×10^{-4} V
(c) 5 mV (d) 50 μV

26. Research in nuclear and atomic physics caused the invention of
(a) nuclear bombs
(b) generators
(c) motors
(d) hydraulic machines

27. The value of $\frac{d}{dx}(x^2)$ is equal to
(a) $2x$ (b) $\frac{x}{2}$
(c) x (d) x^2

28. The mass and volume of a body are respectively 22.42 g and 4.7 cm^3 and the errors in their measurements are 0.01 g and 0.1 cm^3. The maximum error in the measurement of density will be
(a) 7% (b) 2.17%
(c) 0.2% (d) 10%

29. A car covers the first half of the distance between two places at a speed of 40 km/h and the other half at 60 km/h. The average speed of the car is
(a) 50 km/h (b) 48 km/h
(c) 40 km/h (d) 60 km/h

30. A helicopter is climbing vertically with a velocity of 15 ms^{-1}, when an object is released from it. If the object hits the ground 4*s* later, the velocity of the object as it hits the ground is
(a) 55 ms^{-1} downwards
(b) 25 ms^{-1} downwards
(c) 0
(d) none of the above

31. The resultant of $\vec{A} \times \vec{0}$ will be equal to
(a) zero vector (b) zero
(c) A (d) unit vector

32. The angle between the two vectors $\vec{A} = 3\hat{i} + 4\hat{j} + 5\hat{k}$ and $\vec{B} = 3\hat{i} + 4\hat{j} - 5\hat{k}$ will be
(a) 90° (b) 45°
(c) zero (d) 180°

33. A rod of mass 5 kilogram is used to push from rest a block of mass 15kg on a frictionless surface. The block moves a distance of 2 metre in 2 second. The net force acting on the stick is
(a) 15 newton
(b) 10 newton
(c) 5 newton
(d) 20 newton

34. When an elevator cabin falls down, the cabin and all the bodies fixed in the cabin are accelerated with respect to
(a) man standing in the cabin
(b) ceiling of the elevator
(c) floor of the elevator
(d) man standing on the earth

35. A particle of mass 4.65×10^{-26} kg moving towards the wall of a vessel with a velocity of 600 m/s. strikes the wall of the vessel at an angle 60° to the normal and rebounds at the same angle at the same speed. Find the impulse of the force r eived by the wall during the impact
(a) 2.79×10^{-25} newton
(b) 2.79×10^{-23} newton-sec
(c) zero
(d) 4×10^{-20} newton-sec

36. Machine of a constant power makes a body move on a straight path. The distance s travelled in t second is proportional to
(a) $t^{3/2}$ (b) t^3
(c) $t^{1/2}$ (d) t^2

37. The mass of an electron is 9.1×10^{-31} kg. Positron also has the same mass. On meeting they compose a photon by annihilation. What is the energy of photon ? ($c = 3 \times 10^8$ m/s)
(a) 100 eV (b) 10 MeV
(c) 1 keV (d) 1.02 MeV

38. If the value of g at the surface of the earth is 9.8 m/s^2, then the value of g at a place 480 km above the surface of the earth will be (Radius of the earth is 6400 km)
(a) 7.2 m/s^2 (b) 9.8 m/s^2
(c) 8.4 m/s^2 (d) 4.2 m/s^2

39. The intensity of earth's gravitational field at a point situated at a distance of 7400 km from the centre of the earth is 1.5 newton/kg. What is the gravitational potential at the point ?
(a) $+1.11 \times 10^7$ joule kg^{-1}
(b) 5×106 joule kg^{-1}
(c) 10×10^7 joule kg^{-1}
(d) -1.11×10^7 joule kg^{-1}

40. How much of heat is required to heat 2 mole of a monoatomic ideal gas from 0°C to 100°C if no mechanical work is done during heating. The specific heat of gas at constant pressure is 2.5 R, R is the universal gas constant
(a) 378.6 cal (b) 728.2 cal
(c) 592.8 cal (d) 417.1 cal

Instructions for Q. No. 41 to 60

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are falses

41. *Assertion (A) :* If a convex lens of glass is immersed in water its power decreases.
Reason (R) : In water it behaves as a concave lens.

42. *Assertion (A) :* The power factor in a series resonance circuit is unity.
Reason (R) : In case of series resonance the inductive and capacitive reactances are equal.

43. *Assertion (A) :* When a current is drawn from a cell, there is a fall in potential differences across its terminals.
Reason (R) : Every cell has internal resistance.

44. *Assertion (A) :* Ammeter is always connected in series with a circuit to measure the current flowing through it.
Reason (R) : Ammeter has very low resistance.

45. *Assertion (A) :* During boiling, if an amount dQ of heat is absorbed, pdV is the work done by the system, then $dQ = pdV$
Reason (R) : Boiling is an isothermal process, So $dU = 0$ in equation $dQ = dU + pdV$, which is based on first law of thermodynamics.

46. *Assertion (A) :* When one mole of an ideal gas expands under adiabatic condition so that its state changes from (P_1, V_1, T_1) to (P_2, V_2, T_2), the work done by the gas is given by $\Delta W = C_v (T_1 - T_2)$.
Reason (R) : During adiabatic expansion $\Delta Q = 0$ and $\Delta U = C_v(T_2 - T_1)$ in the expression $\Delta Q = \Delta U + \Delta W$.

47. *Assertion (A) :* A beam of light which emerges from a convex lens must be convergent.
Reason (R) : A convex lens is a converging lens while a concave lens is diverging lens, whatever may be the medium in which they are placed.

48. *Assertion (A) :* When light passes from one medium to another of different density the only quantity which is unchanged is its wavelength.
Reason (R) : The wavelength of light is not related to the refractive index of the medium.

49. *Assertion (A) :* α-particles produce more intense ionization than β-particles.
Reason (R) : α-particles are positively charged.

50. *Assertion (A) :* Lightning conductors protect buildings from damage.
Reason (R) : These send off the charge to earth.

51. *Assertion (A) :* Two bodies of unequal masses dropped from the same height hit the ground with equal kinetic energies.
Reason (R) : The force gravity acting on them are equal.

52. *Assertion (A) :* If the law of gravitation becomes inverse cubelaw even then a line joining the Sun and the planet sweeps equal areas in equal time intervals.
Reason (R) : A planet moves in an elliptical path.

53. *Assertion (A) :* A telescopic objective is rendered achromatic by cementing a convex lens of crown glass and a concave lens of flint glass.
Reason (R) : A convex lens produces greater chromatic aberration than a concave lens.

54. *Assertion (A) :* A solid floats in a liquid so that it is just submerged. When the liquid is heated the solid sinks to the bottom.
Reason (R) : Weight of the solid increases with the rise in temperature.

55. *Assertion (A) :* The resistance of a platinum wire increases as temperature is raised.
Reason (R) : This is because the length of the wire increases as the temperature is raised.

56. *Assertion (A) :* When a dielectric medium is filled between the plates of a condenser, its capacitance increases.
Reason (R) : The dielectric medium reduces the potential difference between the plates of the condenser.

57. *Assertion (A) :* A thin polythene bag weighs the same when empty and when filled with air at atmospheric pressure.
Reason (R) : Air is weightless.

58. *Assertion (A) :* A balloon stops rising after attaining a certain maximum height.
Reason (R) : Upthrust due to air decreases with height till it just balances the weight of the balloon.

59. *Assertion (A) :* In series A.C. circuit, the voltage across the combination of capacitor and inductor is zero at resonance.
Reason (R) : At series resonance the current in the circuit is zero.

60. *Assertion (A) :* It is necessary to use artificial satellite for long distance TV transmission.
Reason (R) : Ionospheric disturbances are minimised by satellite communication.

CHEMISTRY

61. The radius of the nucleus is related to the mass number A by
(a) $R = R_0A^2$ (b) $R = R_0A$
(c) $R = R_0A^{1/2}$ (d) $R = R_0A^{1/3}$
where $R_0 = 10^{-13}$ cm

62. Which of the following species has the highest ionisation energy ?
(a) Al^+ (b) Mg^+
(c) Li^+ (d) Ne

63. As per the modern periodic law the physical and chemical properties of elements are periodic function of their
(a) atomic weight
(b) electronic configuration
(c) atomic volume
(d) atomic size

64. The pH of a solution is increased from 3 to 6. Its H^+ ion concentration will be
(a) reduced by 1000 times
(b) doubled
(c) reduced to half
(d) increased by 1000 times

65. Silver chloride dissolves in excess of NH_4OH. The cation present in this solution is
(a) $[Ag(NH_3)_4]^+$ (b) $[Ag(NH_3)_2]^+$
(c) Ag^+ (d) $[Ag(NH_3)_6]^+$

66. Be^{2+} is isoelectronic with
(a) Li^+ (b) Na^+
(c) Mg^{2+} (d) H^+

67. The cell reaction of a cell is
$Mg_{(s)} + Cu^2{}_{(aq)} \rightarrow Cu_{(s)} + Mg^{2+}{}_{(aq)}$
If the standard reduction potentials of Mg and Cu are – 2.37 and + 0.34 V respectively. The EMF of the cell is
(a) + 2.71 V (b) – 2.03 V
(c) + 2.03 V (d) – 2.71 V

68. 4.5 mole each of H_2 and I_2 are heated in a sealed ten litre vessel. At equilibrium 3 mole of HI were found. The equilibrium constant for

$H_2 + I_2 \rightleftharpoons 2HI$ is

(a) 5 (b) 10
(c) 1 (d) 0.33

69. Mortar is a mixture of
(a) $CaCO_3$ + Silica + H_2O
(b) slaked lime + plaster of paris + H_2O
(c) plaster of paris + silica
(d) slaked lime + silica + H_2O

70. The number of moles of AgCl precipitated when excess of $AgNO_3$ is added to one mole of $[Cr(NH_3)_4Cl_2]Cl$ is
(a) 2.0 (b) 1.0
(c) zero (d) 3.0

71. A mixture contains four solid organic compounds A, B, C and D. On heating only C changes from solid to vapour state. *C* changes from solid to vapour state. C can be separated from rest in the mixture by
(a) fractional distillation
(b) sublimation
(c) distillation (d) crystallisation

72. The homologue of ethyne is
(a) C_3H_8 (b) C_2H_6
(c) C_2H_4 (d) C_4H_6

73. By which of the following reactions can one get N-methyl aniline from aniline ?
(a) benzoylation (b) acetylation
(c) alkylation (d) bromination

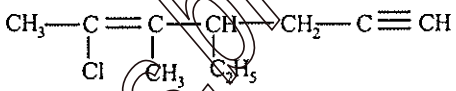
74. When an alkyl halides reacts with an alkoxide the product is
(a) ether
(b) unsaturated hydrocarbon
(c) hydrocarbon (d) alcohol

75. Acetaldehyde when treated with dilute NaOH gives
(a) $CH_3CH(OH)-CH_2-CHO$
(b) CH_3COOH
(c) CH_3CH_2OH
(d) H_3C-CH_3

76. C_2H_5CHO and $(CH_3)_2CO$ can be distinguished by testing with
(a) fehling solution (b) hydroxylamine
(c) phenyl hydrazine (d) sodium bisulphite

77. Silica is soluble in
(a) H_2SO_4 (b) HNO_3
(c) HCl (d) HF

78. The IUPAC name of



is
(a) 2-chloro-4-ethyl-3-methyl-hept-2-en-6-yne
(b) 6-chloro-4-ethyl-5-methyl-hept-1-yn-5-ene
(c) 6-chloro-4-ethyl-5-methyl-hept-5en-1-yne
(d) 2-chloro-4-ethyl-3-methyl-hept-6-yn-2-ene

79. Gammexane is
(a) chloral
(b) benzene hexachloride
(c) DDT
(d) hexachloro ethane

80. The ability of an ion to bring about coagulation of a given colloid depends upon
(a) magnitude of its charge
(b) sign of its charge alone
(c) its size
(d) both magnitude and sign of its charge

81. The compound obtained by heating a mixture of a primary amine and chloroform with ethanoic potassium hydroxide (KOH) is
(a) an amide
(b) an alkyl halide
(c) an alkyl isocyanide
(d) an amide and nitro compound

82. The function of enzymes in the living system is to
(a) catalyse biochemical reactions
(b) provide immunity
(c) transport oxygen
(d) provide energy

83. $_{92}U^{235} + {}_0n^1 \longrightarrow$ Fission products + Neutron + 3.20×10^{-11} J. The energy released, when 1 gram of $_{92}U^{235}$ finally undergoes fission is
(a) 8.21×10^5 kJ (b) 18.60×10^9 kJ
(c) 12.75×10^8 kJ (d) 6.55×10^6 kJ

84. Which one of the following is used to make 'non stick' cookware ?
(a) polyethylene terephthalate
(b) polystyrene
(c) PVC
(d) polytetrafluoroethene

85. Number of water molecules in Mohr's salt is
(a) 5 (b) 6
(c) 7 (d) 8

86. The poisonous gas that comes out with petrol burning in a car is
(a) CO_2 (b) C_2H_6
(c) CH_4 (d) CO

87. Philosopher's wool when heated with BaO at 1100°C gives a compound. Identify the compound
(a) $BaCdO_2$ (b) $Ba + ZnO_2$
(c) $BaZnO_2$ (d) $BaO_2 + Zn$

88. The lanthanide contraction is responsible for the fact that
(a) Zr and Hf have about the same radius
(b) Zr and Nb have similar oxidation state
(c) Zr and Y have about the same radius
(d) Zr and Zn have same oxidation state

89. Which of the following 0.1 m aqueous solutions will have the lowest f.p. ?
(a) KI (b) $C_5H_{10}O_5$
(c) $Al_2(SO_4)_3$ (d) $C_{12}H_{22}O_{11}$

90. Which of the following is redox reaction ?
(a) nitrogen oxides from nitrogen and oxygen by lightning
(b) in atmosphere, O_3 from O_2 by lightning
(c) H_2SO_4 with NaOH
(d) evaporation of water

91. In a reaction

$$CH_2=CH_2 \xrightarrow[\text{acid}]{\text{Hypochlorous}} M \xrightarrow{R} \begin{matrix}CH_2OH\\|\\CH_2OH\end{matrix}$$

M = Molecule, R = Reagent, M and R are
(a) CH_3CH_2OH and HCl
(b) $CH_2Cl—CH_2OH$ and aq. $NaHCO_3$
(c) CH_3CH_2Cl and NaOH
(d) $CH_2—CH_2$ (O) and heat

92. Who developed long form of periodic table ?
(a) Mendeleev (b) Niels Bohr
(c) Lothar Mayer (d) Mosley

93. The product D of the reaction
$CH_3Cl \xrightarrow{KCN} (A) \xrightarrow{H_2O} (B) \xrightarrow{NH_3} (C) \xrightarrow{\Delta} (D)$ is
(a) $HCONH_2$ (b) CH_3CN
(c) $CH_3CH_2NH_2$ (d) CH_3CONH_2

94. The IUPAC name of $K_3[Fe(CN)_6]$
(a) potassium ferrohexacyanate (II)
(b) potassium hexaferrocyanate (III)
(c) potassium ferrocyanide (II)
(d) potassium hexacyanoferrate (III)

95. Among the following compound which have more than one type of hybridisation for carbon atom?
(i) $CH_3—CH_2—CH_2—CH_3$
(ii) $H_3C—CH=CH—CH_3$
(iii) $H_2C=CH—C\equiv CH$
(iv) $H—C\equiv C—H$
(a) (iii) and (iv) (b) (i)
(c) (ii) and (iii) (d) (iv)

96. If the equilibrium constant for the reaction
$2AB \rightleftharpoons A_2 + B_2$ is 49.
What is the value of equilibrium constant for
$AB \rightleftharpoons \frac{1}{2}A_2 + \frac{1}{2}B_2$?
(a) 7 (b) 2401
(c) 49 (d) 0.02

97. The reagent used for converting ethanoic acid to ethanol is
(a) PCl_3 (b) BH_3
(c) $LiAlH_4$ (d) $K_2Cr_2O_7/H^+$

98. Compound A reacts with PCl_5 to get B which on treatment with KCN followed by hydrolysis gave propionic acid. What are A and B respectively?
(a) C_2H_5Cl and $C_2H_5Cl_2$
(b) C_2H_6 and C_2H_5Cl

(c) C_3H_8 and C_3H_7Cl
(d) C_2H_5OH and C_2H_5Cl

99. In Wurtz reaction the reagent used is
(a) Na/dry ether (b) Na/liq. NH_3
(c) Na (d) Na/dry alcohol

100. Which one of the following reactions is an example for calcination process ?
(a) $2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$
(b) $2Zn + O_2 \rightarrow 2ZnO$
(c) $2Ag + 2HCl + (O) \rightarrow 2AgCl + H_2O$
(d) $MgCO_3 \rightarrow MgO + CO_2$

Instructions for Q. No. 101 to 120

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are false.

101. *Assertion (A) :* In case of degenerate orbitals if two electrons with opposite spins are placed in the same orbital, a state of high stability will be obtained.
Reason (R) : The most stable electronic arrangement is one in which there is maximum number of paired electrons in the degenerate set of orbitals.

102. *Assertion (A) :* In transition elements *ns* orbital is filled up first and $(n-1)d$ afterwards, during ionization *ns* electrons are lost prior to $(n-1)$ *d* electrons.
Reason (R) : The effective nuclear charge felt by $(n-1)d$ electrons is higher as compared to that by *ns* electrons.

103. *Assertion (A) :* The carbonic acid is stronger acid than phenol.
Reason (R) : The hybrid of bicarbonate ion has two equivalent contributing structures, while hybrid of phenoxide ion does not contain such equivalent contributing structures.

104. *Assertion (A) :* Water has greater dipole-dipole attraction than hydrogen sulphide.
Reason (R) : Oxygen has higher electronegativity than sulphur.

105. *Assertion (A) :* When 20 ml of ethanol is mixed with 20 ml of water, the volume of resulting solution will be less that 40 ml.
Reason (R) : They hydrogen bond between water and alcohol molecules is weaker than hydrogen bond between the like molecules.

106. *Assertion (A) :* Ortho-nitrophenol has much lower boiling point and lower solubility in water than meta and para isomers.
Reason (R) : Ortho-nitrophenol involves intramolecular hydrogen bonding and the possibility of association of the molecules is absent.

107. *Assertion (A) :* All molecules which have polar bonds have zero dipole moment.
Reason (R) : Asymmetrical molecules with polar bonds have zero dipole moment.

108. *Assertion (A) :* In the covalent compounds of hydrogen, the hydrogen atom has the electronic configuration analogous to that of hydride ion.
Reason (R) : Hydride ion is formed when hydrogen atom loses an electron.

109. *Assertion (A) :* The bond order of helium is always zero.
Reason (R) : The number of electrons in bonding molecular orbital and antibonding molecular orbital is equal

110. *Assertion (A) :* The H—N—H bond angle in NH_3 molecule is much greater than the H—As—H bond angle in AsH_3.
Reason (R) : Formation of NH_3 molecule involves sp^3 hybridisation, while no hybridisation occurs in AsH_3.

111. *Assertion (A) :* Cyclobutane is less stable than cyclopentane.
Reason (R) : The presence of bent bonds causes loss of orbital overlap.

112. *Assertion (A) :* A spectral line will be seen for the transition *2px* to *2py*.
Reason (R) : Energy is released in the form of

wave of light when the electron drops from *2px* to *2py* orbital.

113. *Assertion (A) :* Sodium ions are discharged in preference of hydrogen ions at mercury cathode.
Reason (R) : The nature of the cathode affects the order of discharge of ions.

114. *Assertion (A) :* Among halogens fluorine can oxidise an element to its highest oxidation state.
Reason (R) : Due to small size of fluoride ion it is difficult to oxidise fluoride ion to fluorine. Hence reverse reaction takes place more easily.

115. *Assertion (A) :* A triester of glycerol and palmitic acid on boiling with aqueous sodium hydroxide gives a solid cake having soapy touch.
Reason (R) : Free glycerol is liberated which is a greasy solid.

116. *Assertion (A) :* When an atom in group 1A of the periodic table undergoes radioactive decay by emitting a positron, the resulting element belongs to zero group.
Reason (R) : When an atom emits a positron, its atomic number increases by one unit.

117. *Assertion (A) :* A certain element X, forms three binary compounds with chlorine containing 59.68%, 68.95% and 74.75% chlorine respectively. These data illustrate the law of multiple proportions.
Reason (R) : According to law of multiple proportions, the relative amounts of an element combining with some fixed amount of a second element in a series of compounds are the ratios of small whole numbers.

118. *Assertion (A) :* The name butanol is not specific, whereas the name butanone represents one specific compound.
Reason (R) : Alcohols show phenomenon of isomerism where as ketones do not show isomerism.

119. *Assertion (A) :* Alkenes and cycloalkanes series of hydrocarbons have same general formula.
Reason (R) : Either insertion of a double bond or formation of a ring reduce the number of hydrogen atoms of corresponding alkane by 2.

120. *Assertion (A) :* The carbon atoms of the benzene ring may be numbered for identification of substituent groups, just as a continuous chains of carbon atoms are numbered.
Reason (R) : Smallest set of numbers designating the substituents is the preferred set.

BIOLOGY

121. Pollination by snail and slug is known as
(a) ornithophilous (b) chiropterophilous
(c) entomophilous (d) malacophilous

122. Single filament of *Nostoc* without mucilage sheath is known as
(a) mycelium (b) colony
(c) trichome (d) hyphae

123. Which of the following is dissolved in water for making Bordeaux mixture?
(a) calcium chloride (b) copper sulphate
(c) sodium chloride (d) none of these

124. Phytotron is a device by which
(a) mutations are produced in plants
(b) plants are grown in controlled environment
(c) protons are liberated
(d) leaf fall occurs on abscission layer

125. Middle piece of a mammalian sperm contains
(a) nucleus (b) centriole
(c) mitochondria (d) vacuole

126. Antiserum contain
(a) antigens (b) leucocytes
(c) antibodies (d) none of these

127. Mechanism of uric acid excretion, in a nephron, is
(a) osmosis (b) diffusion
(c) secretion (d) ultrafiltration

128. Secretion of which of the following is under neurosecretory nerve axons ?
(a) pineal
(b) adrenal cortex
(c) anterior pituitary (d) posterior pituitary.

129. Galapagos islands are associated with the name of
(a) Wallace (b) Malthus
(c) Darwin (d) Lamarck

130. Malathion, parathion belong to group of
(a) triazines
(b) carbamates
(c) pyrethenoids
(d) organophosphates

131. In sweet peas, genes C and P are necessary for colour in flowers. The flowers are white in the absence of either or both the genes. What will be the percentage of coloured flowers in the offspring of the cross Ccpp × ccPp?
(a) 25% (b) 50%
(c) 75% (d) 100%

132. The plants in desert, in order to tolerate water stress, have
(a) no stomata
(b) long root system to reach the water level
(c) stipular spines
(d) stems which are converted into leaf type

133. Positive pollution of soil is due to
(a) reduction in soil productivity
(b) addition of wastes on soil
(c) excessive use of fertilizers
(d) all of these

134. The lining of bone marrow cavity is called
(a) endosteum (b) endomyosium
(c) endoneurium (d) endothelium

135. Which of the following is an example of sex-linked inheritance ?
(a) anaemia (b) cretinism
(c) night-blindness (d) colour-blindness

136. If the rate of addition of new members increases with respect to the individual host of the same population, then the graph obtained has
(a) declined growth
(b) exponential growth
(c) zero population growth
(d) none of these

137. Plants which can withstand wide range of temperature tolerance are called
(a) stenothermic
(b) eurythermic
(c) monothermic
(d) mesothermic

138. Starch and cellulose are the compounds of many units of
(a) glycerol (b) fatty acids
(c) amino acids (d) simple sugars

139. Which of the following is most convincing reasons for increasing population growth in a country?
(a) high birth rate (b) low mortality rate
(c) low population of old people
(d) high population of young children

140. Where does the conversion of harmful prussic acid into potassium sulphocyanide takes place?
(a) spleen (b) liver
(c) bone marrow (d) lymph glands

141. Knock-knee disease is due to
(a) hormonal imbalance
(b) genetical abnormality in males
(c) deficiency in tyrosine amino acid
(d) excess fluoride concentration in water body

142. In mammals, the digestion of starch starts from
(a) mouth (b) stomach
(c) oesophagus (d) duodenum

143. The major constituent of vertebrate bone is
(a) sodium chloride
(b) calcium phosphate
(c) potassium hydroxide
(d) calcium carbonate

144. The amphids are cuticular elevations on the ventro-lateral lips of *Ascaris*. These are
(a) chemoreceptors
(b) tangoreceptors
(c) tactoreceptors
(d) olfactoreceptors

145. Polyploidy leads to rapid formation of new species, because of
(a) genetic recombination
(b) mutation therapy
(c) isolation behaviour
(d) development of multiple sets of chromosomes

146. During interphase, RNAs and proteins are synthesized in
(a) G_1-phase (b) S-phase
(c) G_2-phase (d) all of these

147. Photosynthetic pigments in chloroplast are embedded in the membrane of
(a) matrix (b) photoglobin
(c) thylakoids (d) chloroplast envelope

148. Bulliform cells are present in
(a) mesophyll (b) epidermis
(c) bundle sheath (d) vascular bundles

149. Preganglionic sympathetic fibres are
(a) adrenergic (b) cholinergic
(c) synergic (d) hypergognic

150. Enzymes with two sites are called
(a) apoenzyme (b) holoenzyme
(c) allosteric enzyme (d) conjugate enzyme

151. Meroblastic cleavage refers to which type of division of eggs ?
(a) total (b) spiral
(c) incomplete (d) horizontal

152. Glycosidic bond is broken during the digestion of
(a) protein (b) starch
(c) lipid (d) all of these

153. The presence of continuous phenotypic variation in an F_1-generation suggests that a character is inherited by
(a) epistasis
(b) recombination
(c) gene linkage
(d) polygenic inheritance

154. 'Genera Plantarum' was written by
(a) Bessey
(b) Linnaeus
(c) Hutchinson
(d) Bentham and Hooker

155. Zonula adherens is a kind of
(a) desmosome (b) mesosome
(c) filament (d) membrane

156. Schuffner's dots are seen in red blood corpuscles of man due to which of the following disease ?
(a) kala-azar (b) filaria
(c) malaria (d) diabetes

157. In *Selaginella*, reduction division occurs during the formation of
(a) sperms (b) microspores only
(c) megaspores only (d) both (b) and (c).

158. The process of the escape of liquid from the tip of uninjured leaf is called
(a) guttation (b) transpiration
(c) evaporation (d) evapo-transpiration

159. Diabetes insipidus occurs due to hyposecretion of
(a) oxytocin (b) vasopressin
(c) thymosine (d) insulin

160. Which of the following RNAs picks up specific amino acid from amino acid pool in the cytoplasm to ribosome during protein synthesis ?
(a) *t*-RNA (b) *m*-RNA
(c) *r*-RNA (d) all of these

Instructions for Q. No. 161 to 180

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion
(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
(c) If the assertion is true, but the reason is false
(d) If both assertion and reason are falses

161. *Assertion (A) :* Smoke reduces photosynthesis.
Reason (R) : Smoke contains SO_2 and oxides of nitrogen and hydrocarbons.

162. *Assertion (A) :* Putrefying bacteria decompose proteins of dead plants and animals to ammonia.
Reason (R) : Nitrosomonas and *Nitrobacter* perform the process of ammonification.

163. *Assertion (A) :* A tree growing near Bombay does not show prominent annual rings.
Reason (R) : Annual rings are not seen in dicot root though secondary growth occur in them.

164. *Assertion (A) :* Long day plants and short day plants are misnomers.
Reason (R) : Short day plant and long day plant growing in same location could not flower on the same day.

165. *Assertion (A) :* Blue and red both the lights are used directly for light reactions of photosynthesis.
Reason (R) : The absorption spectrum represents the graph plotted between the amount of CO_2 consumed and different wavelength of light absorbed by the same pigment.

166. *Assertion (A) :* Carbohydrates are more suitable to provide energy in the body than fat and proteins.
Reason (R) : Wheat and rice are the source of carbohydrates.

167. *Assertion (A) :* Oxygen enters the blood from alveolar air while carbon dioxide leaves the blood to enter the alveolar air.
Reason (R) : This is due to difference in the partial pressure of the gases.

168. *Assertion (A) :* Pulse can be feel on veins in each heart beat.
Reason (R) : Veins are deeply seated in the body.

169. *Assertion (A) :* Insulin is an anabolic hormone.
Reason (R) : It affects antagonistic to glucagon.

170. *Assertion (A) :* A man is unable to pass on a sex linked gene to his son.
Reason (R) : Sex linked genes are present on X-chromosome only.

171. *Assertion (A) :* Coenzyme is a non-protein group without which certain enzymes are inactive or incomplete.
Reason (R) : Coenzymes not only provide a point of attachment for the chemical group being transformed but also influence the properties of the group.

172. *Assertion (A) :* Transmission of the nerve impulse across a synapse is accomplished by neurotransmitters.
Reason (R) : Transmission across a synapse usually requires neurotransmitters because there is small space, the synaptic cleft, that separates one neuron from another.

173. *Assertion (A) :* It is the brain, not the sense organs, that interprets the stimulus.
Reason (R) : Sense organs are transducers; they transform the energy of a stimulus to the energy of nerve impulses.

174. *Assertion (A) :* Cartilage (protein matrix) and bone (calcium matrix) are rigid connective tissues.
Reason (R) : Blood is connective tissue in which plasma is the matrix.

175. *Assertion (A) :* Hair cells on the basilar membrane (the organ of Corti) are responsible for hearing.
Reason (R) : Pressure waves, which begin at the oval window, cause the basilar membrane to vibrate so that the cilia of the hair cells touch the tectorial membrane. This causes the hair cells to initiate nerve impulses, which are carried by the auditory nerve to the brain.

176. *Assertion (A) :* The gramineous type of stomata are commonly found in graminae and cyperaceae.
Reason (R) : The gramineous stomata possess guard cells of which the middle portions are much narrower than the ends so that cells appear in surface view like dumpbells.

177. *Assertion (A) :* The innermost distinct layer of the cortex is known as endodermis.
Reason (R) : The cells of endodermis are non-living and characterised by the presence of casparian strips.

178. *Assertion (A) :* Adenine can not pair with cytosine.
Reason (R) : Because there would be two hydrogen atoms near one of the bonding positions and none at the other.

179. *Assertion (A) :* Either megasporophyllous or microsporophyllous leaves occur in gymnosperms.
Reason (R) : The megasporophyllous leaves are small and less developed whereas microsporophyllous leaves are large, scaly and well developed.

180. *Assertion (A) :* Flagella found in green algae are of whiplash type.
Reason (R) : The flagella found in green algae have a smooth surface and are called tinsel or acronematic.

GENERAL KNOWLEDGE

181. Who gave the slogan 'Inquilab Zindabad'
(a) Mahatma Gandhi
(b) S.C.Bose
(c) Shaheed Bhagat Singh
(d) Lok Manya Tilak

182. Name the website which broke the cricket match fixing story earlier this year?
(a) bazee.com (b) tehelka.com
(c) tazaakhabar.com (d) goforcricket.com

183. 'Sati' was abolished by
(a) Lord William Bentinck
(b) Lord Cavin
(c) Lord Mountbatten
(d) none of these

184. The Kaziranga Wild Life Sanctuary is reserved for which animal
(a) great Indian bustard
(b) rhinoceros
(c) white elephants
(d) white tiger

185. The first feature film (talkie) to be produced in India was
(a) Hatimtai (b) Alam Ara
(c) Pundalik (d) Harish Chandra

186. The first writer to use Urdu as the medium of poetic expression was
(a) Amir Khusru (b) Mirza Ghalib
(c) Faiz (d) Bahadur Shah Zafar

187. Name the director of Indian origin who has become a celebrity after his film. The 'Sixth Sense' became a hit?
(a) Mira Nair (b) Shabana Azmi
(c) Girish Karnad (d) Manoj Shyamalan

188. The Alamatti dam is on the river
(a) godavari (b) krishna
(c) mahanadi (d) cauvery

189. Which one of the following dances involves solo performance
(a) bharatnatyam (b) kuchipudi
(c) mohiniattam (d) odissi

190. Tricolour was adopted as the National Flag in the
(a) Lahore congress
(b) Belgaum congress
(c) Allahabad congress
(d) Haripura congress

191. Which two states has a common High Court?
(a) Himachal Pradesh and Uttar Pradesh
(b) Haryana and Punjab
(c) Gujarat and Maharashtra
(d) Kerala and Tamil Nadu

192. Who is called the father of white revolution?
(a) Dr. Kurien Verghese
(b) Manjunda Swamy
(c) M.S.Swaminathan
(d) U.K.Rao

193. Which state has the highest number of illiterates in India?
(a) Bihar (b) Andhra Pradesh
(c) Orissa (d) Uttar Pradesh

194. The soil group which covers the largest area in India is the
(a) alluvial soil (b) black soil
(c) red soil (d) laterite soil

195. Teacher's day is celebrated in memory of
(a) Nehru (b) Rajaji
(c) Dr. Radhakrishnan (d) Kamaraj

196. The incidence of collapse of World Trade Tower took place on
(a) 11 September (b) 11 October
(c) 13 May (d) 13 September

197. The head of all the three defence field is
(a) Admiral (b) Air Chief Marshell
(c) General (d) President

198. The variety of coffee largely grown in India is
(a) old chicks (b) coorgs
(c) Arabica (d) kents

199. An atomic pile is used for
(a) producing X-rays
(b) conducting nuclear fission
(c) conducting thermonuclear fusion
(d) accelerating atoms

200. Who amongst the following won the Nobel Prize at least twice
(a) Winston Churchill (b) Octavio Paz
(c) Madame Curie (d) George Choupak

Model Test Paper-10

Time : $3\frac{1}{2}$ hours. *Maximum Marks : 200*

PHYSICS

1. Density of nuclear matter varies with A as
(a) $d \propto A^3$ (b) $d \propto A$
(c) $d \propto A^2$ (d) $d \propto A^0$

2. The unit of luminous intensity is
(a) watt (b) candle power
(c) photon (d) candela

3. For a transistor, the current amplification factor is 0.8. The transistor is connected in C.E. configuration. The change in the collector current when the base current changes by 6 mA is
(a) 4.8 m A (b) 2.8 m A
(c) 6.8 m A (d) 5.8 m A

4. If I_1 and I_2 be the currents in a diode under space charge limited conditions for the plate voltages of 400 volt and 200 volt respectively, then the ratio $\frac{I_1}{I_2}$ will be equal to
(a) $2\sqrt{2}$ (b) $\sqrt{2}$
(c) 2 (d) $\frac{1}{2}$

5. A double convex lens of focal length 20 cm is made of glass of refractive index $\frac{2}{3}$. When placed completely in water $\left({}_a\mu_w = \frac{4}{3}\right)$, its focal length will be
(a) 80 cm (b) 17.7 cm
(c) 15 cm (d) 22.5 cm

6. The K.E. of the electron is E when the incident wavelength is λ. To increase the K.E. of the electron to 2 E, the incident wavelength must be
(a) $\frac{h\lambda}{E\lambda - hc}$ (b) $\frac{h\lambda}{E\lambda + hc}$
(c) $\frac{hc\lambda}{E\lambda + hc}$ (d) $\frac{hc\lambda}{E\lambda - hc}$

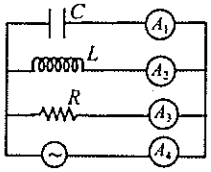
7. The focal lengths of objective and the eye-piece of a compound microscope are f_o and f_e respectively. Then
(a) $f_o > f_e$ (b) $f_o = f_e$
(c) $f_o < f_e$ (d) None

8. A plane mirror is approaching you at 10 cm per second. You can see your image in it. At what speed will your image approach you
(a) 10 cm/sec (b) 20 cm/sec
(c) 5 cm/sec (d) 15 cm/sec

9. In Millikan's oil drop experiment an oil drop of radius r and charge q is held in equilibrium when the applied potential is V. If the radius of the drop is 2 r for the same charge then the potential required to keep it in equilibrium will be
(a) V (b) $4V$
(c) $2V$ (d) $8V$

10. When two tuning forks A and B are sounded together x beats/s are heard. Frequency of A is n. Now when one prong of fork B is loaded with a little wax, the number of beats/s decrease. The frequency of fork B is:
(a) $n + x$ (b) $n - x^2$
(c) $n - x$ (d) $n - 2x$

11. A resistor R, an inductor L, a capacitor C and ammeters A_1, A_2, A_3 and A_4 are connected to an oscillator in the circuit shown in the figure. When the frequency of the oscillator is increased, that at resonant frequency, the reading of ammeter A_4 is same as that of



(a) A_1 (b) A_3

(c) A_2 (d) A_1, A_2 and A_3

12. For maximum output power in D.C. motor, the induced back e.m.f. (E) should be
(a) applied voltage
(b) half of applied voltage
(c) double of applied voltage
(d) one third of applied voltage

13. A cylinder of radius R made of a material of thermal conductivity K_1 is surrounded by a cylindrical shell of inner radius R and outer radius $2R$ made of a material of thermal conductivity K_2. The two ends of the combined system are maintained at two different temperatures. There is no loss of heat across the cylindrical surface and the system is in steady state. The effective thermal conductivity of the system is:

(a) $K_1 + K_2$ (b) $\frac{K_1K_2}{K_1+K_2}$
(c) $\frac{K_1+3K_2}{4}$ (d) $\frac{3K_1+K_2}{4}$

14. A step up transformer operates on a 230 volt line and supplies to a load 2 amp. The ratio of primary to secondary windings is 1 : 25. Determine the primary current.
(a) 12.5 amp (b) 8.8 amp
(c) 50 amp (d) 25 amp

15. Susceptibility has the unit of
(a) tesla (b) am^{-2}
(c) am^2 (d) no units

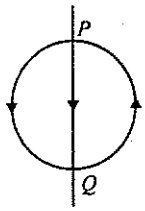
16. When an ideal diatomic gas is heated at constant pressure, the fraction of the heat energy supplied which increases the internal energy of the gas is:
(a) (2/5) (b) (3/7)
(c) (3/5) (d) (5/7)

17. For a paramagnetic material, the dependence of the magnetic susceptibility X on the absolute T is given by
(a) $X \propto T$ (b) $X \propto \frac{1}{T}$
(c) $X \propto$ constant $\times T$ (d) $X =$ constant

18. The magnetic induction at the centre of a current carrying loop of radius R is proportional to
(a) R (b) R^2
(c) $\frac{1}{R}$ (d) $\frac{1}{R^2}$

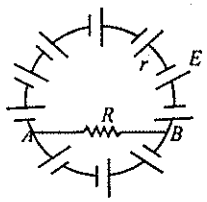
19. The door of a working refrigerator inside a room is left open. The correct statement out of the following one is
(a) the room will be cooled slightly
(b) the room will be cooled to the temperature inside the refrigerator
(c) the room will be warmed up gradually
(d) the temperature of the room will remain unaffected

20. A circular coil of wire carries a current. PQ is a part of very long wire carrying a current and passing close to the circular coil. If the directions of currents are those shown in figure. What is the direction of the force acting on PQ?



(a) parallel to PQ, towards P.
(b) at right angles to PQ, to the right.
(c) parallel to PQ, towards Q.
(d) at right angles to PQ, to the left.

21. There are n cells each of emf E and internal resistance R connected as shown in figure. A resistance r divided these cells into x and $(n-x)$ cells. The value of current through each cell and through the resistor r is



(a) 0, 0 (b) $\frac{E}{R}, \frac{E}{r}$
(c) $\frac{E}{r}, \frac{E}{R}$ (d) $\frac{E}{R}, 0$

22. For an adiabatic expansion of a prefect gas the value of $\Delta P/P$ is equal to:
(a) $\frac{\Delta V}{V}$ (b) $-\gamma\frac{\Delta V}{V}$
(c) $\gamma\frac{\Delta V}{V}$ (d) $-\gamma^2\frac{\Delta V}{V}$

23. An ammeter has a resistance G ohm and a range i ampere. The value of resistance used in parallel, to convert it into an ammeter of range nI ampere is

(a) nG (b) $(n-1)\,G$

(c) $\frac{G}{n}$ (d) $\frac{G}{n-1}$

24. A wire of resistance R is stretched so that its length increases by 10%. The resistance of the wire increases by

(a) 11% (b) 21%

(c) 15% (d) 28%

25. The freezing point on a thermometer is marked as 20° and the boiling point as 150°. A temperature of 60°C will be ready on this thermometer will be read as:

(a) 40° (b) 65°

(c) 98° (d) 110°

26. You are travelling in a car during a thunder storm, In order to protect yourself from lightning, you would prefer to

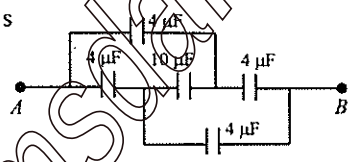
(a) remain in the car

(b) get out and lie flat on the ground

(c) take shelter under a tree

(d) touch the nearest electrical pole.

27. The capacitance between the points A, B in the circuit shown is



(a) 20 μ F

(b) 16 μ F

(c) 4 μ F

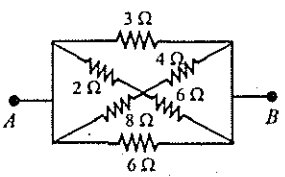
(d) 18 μ F

28. Which of the following expression does not represent SHM?

(a) $A\cos\omega t$ (b) $A\sin\omega t + B\cos\omega t$

(c) $A\sin 2\omega t$ (d) $A\sin^2\omega t$

29. In the given figure, the equivalent resistance between A and B is



(a) 29 Ω

(b) $\frac{17}{24}\ \Omega$

(c) $\frac{4}{3}\ \Omega$

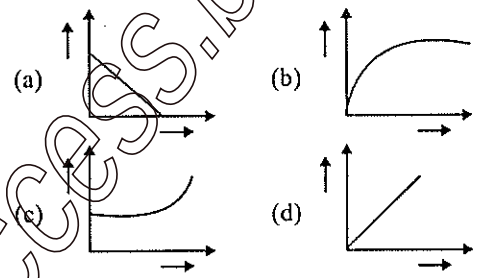
(d) $\frac{24}{17}\ \Omega$

30. Two charges 1 μ C each of opposite polarity are separated by 0.2 m. The force acting on another 1 μ C charge placed at the midpoint on the line joining the two charges will be

(a) zero (b) 1.8 N

(c) 0.9 N (d) 2.7 N

31. Which of the following figures represents the motion of a body moving in straight line under constant acceleration?



32. A shell is fired from a cannon with a velocity v m/sec at an angle θ with the horizontal direction. At the highest point in its path, it explodes into two pieces of equal masses. One of the pieces retraces its path to the cannon and the speed in m/sec of the other piece immediately after the explosion is

(a) $\frac{\sqrt{3}}{2}v\cos\theta$ (b) $2v\cos\theta$

(c) $3v\cos\theta$ (d) $\frac{3}{2}v\cos\theta$

33. If the density of the earth becomes one half but the radius remains the same, then the value of g on its surface will be

(a) $2g$ (b) $\frac{3g}{2}$

(c) $\frac{g}{2}$ (d) $\frac{g}{4}$

34. The earth's radius is R and acceleration due to gravity at its surface is g. If a body of mass m is sent to a height of $R/5$ from the earth's surface, the PE increases by:

(a) mgh (b) $\frac{5}{6}mgh$

(c) $\frac{4}{5}mgh$ (d) $\frac{6}{7}$ mgh

35. A ladder placed on a smooth floor slips. If at a given instant the velocity with which the ladder is slipping is v_1 and the velocity of that part of ladder which touching the wall is v_2, then the velocity of the centre of the ladder at the instant is

(a) v_1 (b) $\frac{(v_1+v_2)}{2}$

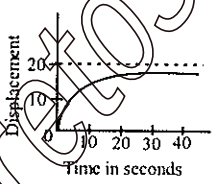
(c) v_2 (d) $\frac{\sqrt{v_1^2+v_2^2}}{2}$

36. If the momentum of a body increases by 50%, the K.E. will increase by
(a) 50% (b) 125%
(c) 100% (d) 150%

37. A body weighs 8 gm when placed in one pan and 18 gm when placed on the other pan of a false balance. If the beam is horizontal when both the pans are empty, the true weight of the body is
(a) 13 gm (b) 15.5 gm
(c) 12 gm (d) 15 gm

38. A stone is thrown at an angle θ with the horizontal such that the horizontal range is equal to the maximum height. The value of tan θ will be
(a) 1 (b) 3
(c) 2 (d) 4

39. The displacement of particle as a function of time is shown in figure.



The figure indicates
(a) the particle starts with a certain velocity, but the motion is retarded and finally the particle stops.
(b) the acceleration of the particle is constant throughout
(c) the velocity of particle is constant throughout
(d) the particle starts with constant velocity, the motion is accelerated and finally the particle moves with constant velocity.

40. A block A of mass 2 kg rests on another block B of mass 8 kg which rests on a horizontal floor. The coefficient of friction between A and B is 0.2 while that between B and floor is 0.5. When a horizontal force of 25 N is applied on the block B, the force of friction between A and B is:
(a) Zero (b) 5.0 N
(c) 3.9 N (d) 49 N

Instructions for Q. No. 41 to 60

Each of the questions given below consists of two statements, an assertion (A) and reason (R). Encircle the number corresponding to the appropriate response in the answer sheet as follows.
(a) *If both assertion and reason are true and the reason is a correct explanation of the assertion.*
(b) *If both assertion and reason are true but the reason is not a correct explanation of the assertion.*
(c) *If the assertion is true, but the reason is false.*
(d) *If both assertion and reason are false.*

41. *Assertion :* Germanium is a very good conductor of electricity.
Reason : The number density of free electrons for germanium is 8×10^{28} m^{-3}

42. *Assertion :* Semiconductors devices are easily damaged if they start to overheat.
Reason : At around 100 – 150° C breakdown in semiconductors occurs; there is a sudden fall in resistance, and a huge increase in current.

43. *Assertion :* A metal has resistance.
Reason : When free electrons drift through a metal, they make occasional collisions with the lattice. These collisions are inelastic and transfer energy to the lattice as internal energy.

44. *Assertion :* The conduction properties of a semiconductor can be kept unchanged by doping it with tiny amount of impurities.
Reason : A diode can be made by doping a piece of silicon so that a current in one direction increases its resistance while a current in the opposite direction decreases it.

45. *Assertion :* Heating engineers use u-values, rather than k-values when calculating heat losses through walls, windows and roofs.
Reason : The u-value of a single brick wall is 1.7 Wm^{-2} K^{-1}

46. *Assertion :* Reciprocal of resistivity is called the specific conductance.
Reason : Reciprocal of resistance is called the thermal conductivity.

47. *Assertion :* When some metals are cooled towards absolute zero, a transition temperature is reached at which the resistance suddenly falls to zero.
Reason : Some specially developed metal compounds have transition temperatures above 100 K.

48. *Assertion :* Total current out of a junction is equal to the total current into the junction.
Reason : In a complete circuit, charge is never gained or lost.

49. *Assertion :* Many solids have a molar heat capacity close to 25 J mol^{-1} K^{-1}
Reason (: The molar heat capacity is the heat capacity per mole.

50. *Assertion :* Energy levels must have negative values.
Reason : When detached from atom, an electron is at an energy level of zero. When attached, energy is given off and so the energy of electron is below zero and is, therefore, negative.

51. *Assertion :* A body can have acceleration even if its velocity is zero at a given instant of time
Reason : A body is momentarily at rest when it reverses its direction of motion

52. *Assertion :* Frequency of a simple pendulum when taken to moon will be reduced to 1/6 of its value on earth
Reason : The value of *g* on the moon is 1/6 that on the earth

53. *Assertion :* The dimensions of angular momentum are ML^2T^{-1}
Reason : Angular momentum is equal to the product of moment of inertia and angular velocity

54. *Assertion :* The accumulation of electrons between the anode and the cathode is called the space charge. In the absence of space charge, the potential gradient between cathode and the anode will be uniform
Reason : The space charge, reduces the potential in the cathode and anode region non-uniformly

55. *Assertion :* In electrolysis, the quantity of electricity needed for depositing 1 mole of silver is different from that required for 1 mole of copper
Reason : The molecular weight of silver and copper are different.

56. *Assertion :* An electron and a photon both travelling with same speed enter in a region containing a uniform magnetic field. They trace circles of equal radii but in opposite directions.
Reason : The radii of the circular path traced by a charged particle is independent of the mass of the particle and depends only on the charge and the velocity of the particle.

57. *Assertion :* The phenomenon of pair production is not possible unless the energy of gamma ray photon is equal to or greater than 1.02 MeV.
Reason : The rest mass of an electron is 0.51 MeV.

58. *Assertion :* When light passes from one medium to another of different density the only quantity which is unchanged is its wavelength.
Reason : The wavelength is not related to the refractive index of the medium.

59. *Assertion :* A plane mirror forms a real image when a converging beam of light falls on it.
Reason : When a converging beam is reflected, the angle of reflection is not equal to the angle of incidence.

60. *Assertion :* Light incident normally on the first face of an equilateral glass prism ($\mu = 1.5$) is certain to be totally internally reflected.
Reason : The critical angle for the given glass is less than 60°.

CHEMISTRY

61. What is not true about B_2H_6?
(a) there are two types of H-atoms in the molecule
(b) it has different conformations like C_2H_6
(c) the molecule is electron deficient
(d) both the boron (B) atoms lie in one plane

62. A certain unsaturated hydrocarbon on reductive ozonolysis produces glyoxal and formaldehyde. The hydrocarbon can be

(a) 1, 3-butadiene
(b) mixture of ethyne and ethane
(c) 2-butene (d) ethyne

63. If the solubility product of MOH is 1×10^{-10} mol^2 dm^{-6}, then pH of its aqueous solution will be
(a) 12 (b) 6
(c) 9 (d) 3

64. Which of the following will produce toluene with Zn dust?
(a) picric acid (b) p-cresol
(c) benzaldehyde
(d) benzene carbaldehyde

65. Which of the following statement about H_2O_2 is false?
(a) it can act as oxidant as well as reductant
(b) it is a pale blue liquid
(c) the two hydroxyl groups in H_2O_2 lie in same plane
(d) H_2O_2 can be oxidised by ozone

66. Cryoscopic constant is a characteristic feature of
(a) solvent (b) solution
(c) solute (d) none of these

67. The number of π bonds present in acrylonitrile is
(a) 2 (b) 3
(c) 1 (d) 4

68. A substance on treatment with dilute H_2SO_4 gives out a colourless gas which produces turbidity with lime water and also turns potassium dichromate green. The anion present in the substance is
(a) CO_3^{2-} (b) SO_3^{2-}
(c) NO_2^- (d) S^{2-}

69. $CH_3CONH_2 + P_2O_5 \longrightarrow$ .....
The organic compound formed in the above reaction is
(a) CH_3COOH (b) CH_3CN
(c) CH_3CHO (d) CH_3NC

70. 4.12 mg of a certain monohydric alcohol produces 1.12 cm^3 of methane at STP on treatment with Grignard's reagent. The molecular mass of the alcohol is
(a) 32 (b) 16
(c) 82.4 (d) 46

71. The reagent used for protection of amino group during the nitration of aniline is
(a) acetic acid (b) PCl_5
(c) acetic anhydride (d) $SOCl_2$/pyridine

72. An organic halide is shaken with aqueous NaOH followed by the addition of dil. HNO_3 and silver nitrate solution gave white ppt. The substance can be
(a) C_6H_5Cl (b) $C_6H_5CH_2Cl$
(c) $C_6H_4(CH_3)Br$ (d) p-$C_6H_4Cl_2$

73. $X \xrightarrow{-\alpha} Y \xrightarrow{-\beta} Z \xrightarrow{-\beta} W$
In the above sequence of reaction, the elements which are isotopes of each other are
(a) X and Z (b) Y and Z
(c) X and W (d) Z and W

74. The compound iso-octane has the formula
(a) C_8H_{16}
(b) $CH_3{\cdot}C(CH_3)_2{\cdot}(CH_2)_3{\cdot}CH_3$
(c) $(CH_3)_2CH{\cdot}(CH_2)C(CH_3)_3$
(d) $C_6H_5(CH_3)_2$

75. Streptomycin is effective in the treatment of
(a) tuberculosis (b) typhoid
(c) malaria (d) cholera

76. The radius of n^{th} orbit for hydrogen is given by the expression
(a) $0.529 \times n$ Å (b) $5.29 \times n^2$ Å
(c) $52.9 \times n^2$ Å (d) $0.529 \times n^2$ Å

77. Ra-226 belongs to distintegration series
(a) $4n$ (b) $4n + 2$
(c) $4n + 1$ (d) $4n + 3$

78. According to VSEPR theory
(a) electron pairs around the central atom in a molecule must remain as far apart as possible
(b) a non-bonding pair of electrons takes up more room on the surface of the atom than a bonding pair
(c) both (a) and (b) are correct
(d) none of these

79. Which of the following is antiseptic dye?
(a) indigo (b) alizarin
(c) gentian violet (d) none of these

80. The difference between 5.0 g and 5.00 g is that
(a) 5.0 has one significant figure while 5.00 has three significant figures
(b) both represent the same quantity
(c) 5.0 has two significant figures while 5.00 has three significant figures
(d) none of these

81. Which one of the following does not contain oxygen?
(a) bauxite (b) dolomite
(c) cryolite (d) zincite

82. Which of the following is the main product of reaction between $RCONH_2$ and Br_2/KOH?
(a) RCH_2NH_2 (b) RCOOH
(c) $R - N = C = O$ (d) RNH_2

83. The name *Aquadag* is associated with
(a) some kind of polymer
(b) colloidal sol of graphite in oil
(c) colloidal sol of graphite in water
(d) none of these

84. Which of the following is expected to be optically active?
(a) $CH_3CH = CH{\cdot}CH_3$
(b) $C_2H_5CH(CH_3)C_3H_7$
(c) $(CH_3)_4C$
(d) $(C_2H_5)_2CH{\cdot}CH_3$

85. Consider the reactions
$C_{(s)} + 2H_{2(g)} \rightarrow CH_{4(g)}$, $\Delta H = -x$ kcal
$C_{(g)} + 4H_{(g)} \rightarrow CH_{4(g)}$, $\Delta H = -x_1$ kcal
$CH_{4(g)} \rightarrow CH_{3(g)} + H_{(g)}$, $\Delta H = +y$ kcal
The bond energy of C – H bond is
(a) $x/4$ kcal mol^{-1}
(b) $x_1/4$ kcal mol
(c) y kcal mol^{-1}
(d) x_1 kcal mol

86. For which of the following reactions is the equilibrium constant independent of temperature
(a) $N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$
(b) $2NO_{2(g)} \rightleftharpoons N_2O_{4(g)}$
(c) $SO_{2(g)} + \frac{1}{2} O_{2(g)} \rightleftharpoons SO_{3(g)}$
(d) equilibrium constant is never independent of temperature

87. The second ionisation potential of an element M is the energy required to
(a) remove 2 moles of electron from one mole of gaseous atoms
(b) remove one mole of electrons from one mole of any gaseous cation of the element
(c) remove one mole of electron from one mole of gaseous anion
(d) remove one mole of electrons from one mole of unipositive gaseous ion of the element

88. The co-ordination and oxidation number of X in the compound $[X(SO_4)(NH_3)_5]Cl$ will be
(a) 10 and 3 (b) 6 and 3
(c) 2 and 6 (d) 6 and 4

89. If bond energies N ≡ N, H – H and N – H bonds are 945, 437 and 389 kJ respectively, ΔH for the following gaseous reaction is
$N_2 + 3H_2 \rightarrow 2NH_3$
(a) +1478 kJ (b) –156 kJ
(c) –1478 kJ (d) –78 kJ

90. Which of the following gaseous atoms has highest value of IE_1?
(a) Al (b) Mg
(c) Si (d) P

91. Which of the following is weakest base?
(a) NH_3 (b) $C_6H_5NH_2$
(c) $C_2H_5NH_2$ (d) $(C_2H_5)_2NH$

92. Isopropyl alcohol on oxidation gives
(a) acetone (b) propanoic acid
(c) propene (d) propane

93. Which of the following acids will be able to give silver mirror test?
(a) acetic acid (b) carboxylic acids
(c) butyric acid (d) formic acid

94. Identify the product B in the reaction

$$CH_3CHO \xrightarrow{CH_3MgI} A \xrightarrow{\text{Hydrolysis}} B$$

(a) CH_3OH (b) $(CH_3)_2CHOH$
(c) CH_3CH_2OH (d) $(CH_3)_3COH$

95. The conductivity of an aqueous solution of strong electrolyte
(a) bears no relationship with concentration
(b) remains constant at all concentration

(c) decreases with increases dilution
(d) increases slightly with dilution

96. Which of the following has the highest protective power on lyophobic colloids?
(a) gum arabic (b) albumin
(c) starch (d) gelatin

97. Out of the following hydrogen halides, which one has the highest boiling point?
(a) HI (b) HCl
(c) HBr (d) HF

98. When formaldehyde is heated with ammonia, the compound formed is
(a) methylamine
(b) hexamethylenetetramine
(c) amino formaldehyde
(d) formalin

99. For the transformation $^{14}_{7}N + ? \rightarrow {}^{14}_{6}C + {}^{1}_{1}H$ bombarding particle is
(a) proton (b) deutron
(c) neutron (d) electron

100. The hybrid state of positively charged carbon in vinyl ($CH_2 = CH^+$) cation is
(a) sp^2 (b) sp^3
(c) sp (d) unpredictable

Instructions for Q. No. 101 to 120
Each of the questions given below consists of two statements, an assertion (A) and reason (R). Encircle the number corresponding to the appropriate response in the answer sheet as follows.
(a) *If both assertion and reason are true and the reason is a correct explanation of the assertion.*
(b) *If both assertion and reason are true but the reason is not a correct explanation of the assertion.*
(c) *If the assertion is true, but the reason is false.*
(d) *If both assertion and reason are false.*

101. *Assertion* : The dipolemoment of CH_3F is greater than that of $CHCl_3$.
Reason : Fluorine has greater electron affinity than that of chlorine.

102. *Assertion* : Stanous chloride ($SnCl_2$) is a non-linear molecule.
Reason : In $SnCl_2$ molecule Sn atom is present in *sp* hybridised state.

103. *Assertion* : The bond angle H—C—H in the methane is the same as the bond angle Cl—C—Cl in the carbon tetrachloride.
Reason : H—C—H bonds in methane are almost non-polar while Cl—C—Cl bonds in carbon tetrachloride are highly polar.

104. *Assertion* : Xenon difluoride is a linear molecule having F—Xe—F bond angle of 180°.
Reason : Formation of XeF_2 molecule takes place by sp^3d hybridization of Xe orbitals.

105. *Assertion* : Molecule which gives rise to fluorescence is referred to as a fluorophore.
Reason : Aromatic amino acids, flavins and vitamin-A are important fluorophores.

106. *Assertion* : When two or more empty orbitals of equal energy are available, one electron must be placed in each until they are all half filled.
Reason : The pairing of electrons is an unfavourable phenomenon.

107. *Assertion* : The combining of atomic orbitals from two atoms is termed as hybridisation.
Reason : The process of hybridisation involves the combination of orbitals of different energies.

108. *Assertion* : The elements belonging to alkali metal group are most electropositive in their respective periods of periodic table.
Reason : The positive charge density on their positive ions is highest in the respective periods.

109. *Assertion* : The atomic mass actually is expressed in terms of atomic mass unit (amu).
Reason : The actual mass of an atom in gms is very small

110. *Assertion* : The atomic mass of carbon atom is expressed as 12.011 amu.
Reason : All carbon atoms have six protons and six neutrons in their nuclei.

111. *Assertion* : The enthalpy of formation of gaseous oxygen molecules at 298 K and under a pressure of one atmosphere is zero.

Reason : The entropy of formation of gaseous oxygen molecules under the same conditions is zero.

112. *Assertion* : A tri-ester of glycerol and palmitic acid on boiling with aqueous NaOH gives a solid cake having soapy touch
Reason : Free glycerol is liberated, which is a greasy solid.

113. *Assertion* : Amongst the halogens, fluorine can oxidise the elements to highest oxidation states
Reason : Due to small size of fluoride ion, it is difficult to oxidise fluoride ion to fluorine. Hence, reverse reaction takes place more easily.

114. *Assertion* : Nitrogen is unreactive at room temperature but becomes reactive at elevated temperatures (on heating) in presence of catalysts
Reason : In nitrogen molecules, there is extensive delocalization of electrons.

115. *Assertion* : Fluorescein is an adsorption indicator
Reason : The indicator fluorescein is a dye

116. *Assertion* : White precipitate of lead chloride ($PbCl_2$) is soluble in concentrated solution of potassium chloride.
Reason : Tetrachloroplumbate (II) ion is formed when chloride ions attacks the lead (II) chloride.

117. *Assertion* : In a given electrical field β-particles are deflected more than α-particles
Reason : β-particles have very low *e/m* value as compared to α-particles.

118. *Assertion* : Neutrons are better projectiles for nuclear reactions than protons or α-particles.
Reason : Neutrons are neutral particles and hence, their penetration in nucleus is rather difficult.

119. *Assertion* : The solubility of n-alcohols in water decreases with increase in molecular weight.
Reason : The relative proportion of the hydrocarbon part in alcohols increases with the increase in molecular weight which permits enhanced hydrogen bonding with water.

120. *Assertion* : The nitro group, if present in ortho or para positions, would stabilise the phenoxide ion by dispersal of negative charge through mesomeric effect.
Reason : The electron releasing substituents would intensity the negative charge. As a result electron releasing groups in phenol should be acid-weakening.

BIOLOGY

121. The umbilical cord in the mammals contain
(a) placenta (b) allantoic artery
(c) umbilicus (d) both (b) and (c)

122. Fraternal twins are
(a) monozygotic (b) siamese
(c) dizygotic (d) both (b) and (c)

123. Which of the following technique is used to measure cerebral blood volume?
(a) PET-scanning (b) ECG
(c) CT-scanning (d) EEG

124. Mark the incorrect statement about immunisation schedule:
(a) one booster dose of tetanus toxoid is given preferably 4 weeks before the expected date of delivery to the female who is immunised previously
(b) two doses of tetanus toxoid, the first dose between 16 and 24 weeks and the second dose between 24 and 32 to non-immunised females.
(c) one dose of tetanus toxoid is given 6 weeks before pregnancy to non immunised females
(d) first DPT dose is given between age of 3-12 months.

125. Following autosomal dominant disease is characterised by very long extremeties, spider like fingers and dislocation of eye lens
(a) Von willebrand's disease
(b) Huntington chorea
(c) Marfan syndrome
(d) Cat-cry syndrome

126. Match the commercial names of following:
(a) propoxur as furadan, carbofuran as temik and aldicarb as baygon
(b) propoxur as baygon, carbofuran as furadan and aldicarb as temik
(c) propoxur as temik, carbofuran as furadan and aldicarb as baygon

(d) propoxur is simazine, carbofuran as furadan and aldicarb as baygon

127. Monoclonal antibodies are effective as
(a) immuno suppressants in renal grafting
(b) immuno repressants in renal grafting
(c) immuno suppressants in cornea transplantation
(d) both (a) and (c)

128. The proper formation of collagen in a healing wound requires
(a) high levels of adrenocortical hormones
(b) cholesterol (c) vitamin C
(d) vitamin D.

129. Diversification of placental mammals took place in:
(a) paleocene (b) eocene
(c) miocene (d) pleistocene

130. Marine life can be classified into three main categories:
(a) plankton, nekton, benthonic
(b) phytoplankton. zooplankton and benthonic
(c) phytoplankton zooplankton and benthonic
(d) plankton, nektons and phytoplankton

131. Amensalism is
(a) an interaction between two living individuals of same species in which one organism does not allow other organism to grow or live near it.
(b) an interaction between two living individuals of different species which allow the growth of both organisms simultaneously.
(c) an interaction between two living individuals of different species in which one orga r: n does not allow other organism to grow or live near it.
(d) it is the relationship between two living individuals of different species in which one is benefitted while the other is neither harmed nor benefitted except to a negligible extent.

132. International Union of Conservation of Nature and Natural Resources (IUCN) describes endangered species as:-
(a) the species which are in danger of extinction and whose survival is unlikely if the causal factors continue to be operating
(b) which are vulnerable and rare
(c) the species with very small populations in the world
(d) all of these

133. Which human chromosome contains the HLA complex?
(a) chromosome 11 (b) chromosome 23
(c) chromosome 48 (d) chromosome 6

134. Tobacco smoke contains radioactive
(a) polonium-210 (b) cesium-138
(c) polonium-220 (d) carbon-14

135. *Neopilina* a living fossil was
(a) discovered in 1952, a connecting link between annelida and mollusc
(b) discovered in 1957, a connecting link between annelida and arthropoda
(c) discovered in 1954, a connecting link between annelida and mollusc
(d) none of these

136. Which of the following is correct about cockroach?
(a) nocturnal, omnivorous, fussorial, protandrous
(b) fossorial, carnivorous, protandrous hermaphrodite
(c) diurnal, omnivorous, fussorial, protandrous
(d) monoecious, omnivorous, diurnal, formation ootheca

137. Amphetamines have been used to treat all of the following disorders except
(a) attention-deficit hyperactivity disorder
(b) mild depression
(c) anorexia nervosa (d) obesity.

138. Which is true about gemmule formation?
(a) it is shown by fresh water sponges under favourable conditions
(b) it is shown by marine and fresh water sponges under favourable conditions
(c) it is shown by marine sponges under unfavourable conditions
(d) it is a feature of fresh water and marine sponges under unfavourable conditions

139. Myocardial infarction is
(a) inadequate flow of blood to a part of the heart caused by obstruction to its blood supply.

(b) death of a part of heart muscle following cessation of blood supply to it.
(c) heart pain of short duration usualy located in front of the chest
(d) hardening of blood vessels.

140. Vitamin B_{12} (cyanocobalamine) deficiency may be produced by
(1) pernicious anemia (2) Crohn's disease
(3) ileal resection (4) chronic pancreatitis
(a) 1 and 2 (b) 2 and 4
(c) 1, 2, 3, 4 (d) none of these.

141. The free part of the soft palate which hangs down freely as a small flap is called
(a) rugae (b) uvula
(c) frenulum (d) sulcus terminalis

142. Stroke volume is increased by
(a) sympathetic stimulation
(b) decreased systematic blood pressure
(c) increased preload
(d) increased heart rate.

143. Mark the correct statement:
(a) *Petromyzon* is marine, unisexual with 8 pairs of cranial nerves
(b) *Petromyzon* is marine and fresh water form unisexual with 12 pairs of cranial nerves
(c) *Myxine* is marine, unisexual
(d) *Petromyzon* is marine and fresh water form, unisexual with 10 pairs of cranial nerves

144. Negative symptoms of Schizophrenia include
(a) hallucination
(b) cognitive deficits
(c) loose associations
(d) strong behaviour.

145. First instar larva of house fly is:
(a) limbless and has one pair of posterior abdominal spiracles
(b) limbless and has one pair of anterior prothoracic and one pair of posterior abdominal spiracles
(c) limbless and has one pair of anterior prothoracic spiracles
(d) having 3 pairs of legs and one pair of posterior abdominal spiracles

146. DNA banking is particularly useful when
(a) a specific disease mutation is known to exist within a family
(b) a child has been shown to have a genetic disease due to a new dominant mutation
(c) the gene for a particular disease in a family has not yet been identified, but its pattern of inheritancen is clear
(d) a family is known to be segregating a balanced robertsonian translocation.

147. Gynandromorphs develop in *Drosophila* when the two cells in the two-celled proembryo will have one of the following chromosomal sets
(a) 2A + XX in one cell and 2A + X in the other
(b) 2A + XXX in both the cells
(c) 2A + X in both the cells
(d) all of these

148. The organism used for alcohol fermentation is
(a) *Pseudomonas* (b) *Aspergillus*
(c) *Penicillium* (d) *Saccharomyces*

149. The twining of tendrils around a support is a good example of
(a) nastic movements (b) phototropism
(c) thigmotropism (d) chemotropism

150. The sexual reproduction is absent in
(a) *Ulothrix* (b) *Spirogyra*
(c) *Volvox* (d) *Nostoc*

151. Which of the following has a cup shaped chloroplast?
(a) *Chlamydomonas* (b) *Spirogyra*
(c) *Pinus* (d) *Funaria*

152. Clinostat is used in studies on
(a) growth movements
(b) respiration
(c) osmosis
(d) photosynthesis

153. The female gametophyte of a typical dicot at the time of fertilization is
(a) 6-celled (b) 7-celled
(c) 8-celled (d) 4-celled

154. Haploid plants (or cells in culture) derived from microspore culture are preferred over diploids for mutation studies, because in haploids
(a) haploid cells can be easily cultured
(b) dominant mutations express immediately
(c) recessive mutations express immediately
(d) mutations are readily induced

155. Mendel studied inheritance for seven pairs of characters in pea. For a study of independent assortment seven characters can be arranged in 21 possible pairs. If you are told that in one of these 21 pairs, independent assortment was not observed in repeated later studies, what would be your reaction?
(a) all the later workers must have committed mistakes
(b) it is impossible
(c) Mendel's principle of independent assortment is not universal
(d) Mendel might not have studies all the 21 combinations

156. When the hilum, chalaza and micropyle of the ovule lie in the same longitudinal axis, it is known as
(a) orthotropous ovule
(b) amphitropous ovule
(c) anatropous ovule
(d) camphylotropous ovule

157. The maximum formation of *m*-RNA occurs in
(a) cytoplasm (b) ribosome
(c) nucleolus (d) nucleoplasm

158. Pyrenoids are the centre of the formation of
(a) starch (b) enzyme
(c) protein (d) fat

159. Haploid plants can be obtained by culturing
(a) young leaves (b) pollen grains
(c) endosperm (d) root lips

160. The floral formula $\oplus \, ♂ \, ♀ \; K_{2+2} C_{x4}, A_{2+4}, G_{(2)}$ is representative of
(a) *Brassica nigra* (b) *Solanum nigrum*
(c) *Allium cepa* (d) *Helianthus annuus*

Instructions for Q.No. 161 to 180
Each of the questions given below consists of two statements, an assertions (A) and reason (R). Encircle the number corresponding to the appropriate response in the answer sheet as follows.
(a) *If both assertion and reason are true and the reason is a correct explanation of the assertion*
(b) *If both assertion and reason are true but the reason is not a correct explanation of the assertion*
(c) *If the assertion is true, but the reason is false*
(d) *If both assertion and reason are false*

161. *Assertion :* Prophase I is the longest phase in meiosis.
Reason : It is divisible into five sub phases.

162. *Assertion :* Ribosomes occur in both eukaryotes and prokaryotes.
Reason : Organelle ribosomes do not occur in prokaryotes.

163. *Assertion :* Herkogamy promotes self pollination.
Reason : Prepotency is a self sterility technique.

164. *Assertion :* Root cap has no role in water absorption.
Reason : It has no direct relation with vascular system.

165. *Assertion :* Pollination in *Pinus* is anemophilous.
Reason : The pollen grains germinates *in situ*.

166. *Assertion :* DDT is found to be in body water.
Reason : DDT is soluble in water.

167. *Assertion :* The bones of middle ear are primarily responsible for locating the source.
Reason : Middle ear bones are two in number.

168. *Assertion :* Arboviruses are transmitted by animals.
Reason : They have single stranded DNA genome.

169. *Assertion :* Glucose has the lowest renal clearance.
Reason : It is completely reabsorbed.

170. *Assertion :* Notochord is present in protochordate vertebrates.
Reason : Notochord is always formed of bones.

171. *Assertion* : Phaeochromocytoma is a tumour of adernal cortex
Reason : Phaeochromocytoma leads to secondary hypertension

172. *Assertion* : Unit membrane of Robertson's model has a thickness of 75 Å
Reason : Membrane thickness could be 50-100 Å.

173. *Assertion* : Boring of pinna and nose of Indian women is inherited to next generation
Reason : When an individual acquires characters in its life time, they are transmitted to next generation

174. *Assertion* : *Pila* is asymmetrical
Reason : *Pila* shows torsion

175. *Assertion* : Rupture of a cerebral blood vessel may lead to sudden interruption of a blood flow to a portion of brain. This is called cerebrovascular accident.
Reason : Hypertension may cause vasodilation of cerebral blood vessels

176. *Assertion* : Cells of quiscent centre have low DNA, RNA & protein
Reason : It could be the site of hormone synthesis.

177. *Assertion* : Maximum evolution of oxygen of *Spirogyra* is observed in red & blue region
Reason : Blue & red region shows minimum photosynthetic activity

178. *Assertion* : Bacteriochlorophyll-*b* is found in *Rhodopseudomonas*
Reason : It's structure is not yet known.

179. *Assertion* : The bark is economically useful
Reason : The bark of Juglans is used for cleaning and shining teeth

180. *Assertion* : The first link in any food chain is a green plant
Reason : Because they alone have the capacity to fix the CO_2 in presence of sun light.

GENERAL KNOWLEDGE

181. The guardian of the constitution of India is
(a) Indian Parliament
(b) Supreme Court of India
(c) Prime Minister of India
(d) High Court of India.

182. Who is the new Director-General of UNESCO?
(a) Koichiro Matsuura
(b) Fiederico Mayor Zaragoza
(c) Ms. Gro Harlem Brundtland
(d) Thabo Mbeki.

183. With which of the following countries has India recently signed an extradition treaty?
(a) Israel (b) Russia
(c) France (d) UAE.

184. Nasir Hussain is cricket captain of which country?
(a) Bangladesh (b) Kenya
(c) England (d) Scotland.

185. The amount of money (in rupees) allegedly paid as kickbacks in the Bofors case in
(a) Rs. 102 crore (b) Rs. 56 crore
(c) Rs. 64 crore (d) Rs. 75 crore.

186. *Mr. Editor, How Close are You to the PM* is a book authored by
(a) Vinod Mehta (b) N. Ram
(c) Dileep Padgaonkar (d) Prabhu Chawla.

187. According to the Reserve Bank of India's New Credit Policy for the second half of 1999-2000, the Cash Reserve Ratio (CRR) has been reduced from 10 per cent to
(a) 9 per cent (b) 8 per cent
(c) 7 per cent (d) 6 per cent.

188. Name the country where people have voted against a republican form of Government
(a) Britain (b) Australia
(c) Jordan (d) Thailand.

189. WHO's Vision 2020 visualises to eliminate
(a) AIDS (b) hepatitis-C
(c) avoidable blindness
(d) none of these.

190. In which of the following places a baby boy was born as the world's six billionth inhabitant?
(a) Kosovo (b) Vienna
(c) Tokyo (d) Islamabad.

191. Which of the following is/are the Sydney 2000 Olympic mascot(s)?
(a) Millie (the *Echidna*)

(b) Olly (the *Kookaburra*)
(c) Syd (the *Platypus*) (d) all of these.

192. Who among the following is currently the Chairperson of the National Commission for Women?
(a) Hema Malini (b) Vibha Parthasarthy
(c) Abha Sharma (d) Mohini Giri.

193. Which one of the following films was named as the Best feature Film for the 47th National Film Awards announced on July 6, 2000?
(a) Vaanaprastham (Malayalam)
(b) Uttara (Bengali)
(c) Hey Ram (Hindi)
(d) Shaheed Udham Singh (Punjabi).

194. Who among the following won the Wimbledon 2000 Women's Singles title held in July
(a) Serena Williams (b) Venus Williams
(c) Lindsay Davenport (d) Martina Hingis.

195. National Waterway Number 1 will be linking which of the following two cities?
(a) Allahabad - Haldia
(b) Agra - Patna
(c) Cochin - Salem
(d) Dibrugarh - Haldia.

196. Who among the following is the President of International Court of Justice?
(a) Al-Khasawnch (b) Syed Pirzaba
(c) Gilbert Guillaume (d) Don Mckinnon.

197. Who among the following becomes the first and the only star from the Indian Cinema to be waxed at the famous Madame Tussaud's Wax Museum in London?
(a) Dilip Kumar
(b) Shatrughan Sinha
(c) Amitabh Bachchan
(d) Shah Rukh Khan.

198. Who among the following heads the reserach team on the Human Genome Project in Britain?
(a) Dr. Michael Dexter (b) Dr. John Sulston
(c) Dr. Andrew Hynes (d) Dr. John Dexter.

199. Sonal Mansingh is the exponent of which of the following dance forms?
(a) odissi (b) yakshagana
(c) manipuri (d) kuchipudi.

200. The booker prize winner for 2000 Margret Atwood has written which of the following book?
(a) The blind assassin (b) Survival
(c) Life before man (d) all of these.

■■■