26-03-2019

Code - B

Aakash
Medical | IIT-JEE | Foundations
(Divisions of Aakash Educational Services Limited)
Regd. Office **:** Aakash Tower, 8, Pusa Road, New Delhi-110005; Ph.: 011-47623456

MM : 720

Test Series for NEET - 2019
Test – 2

Time : 3 Hrs.

Topics Covered :

Physics : Laws of Motion, Work, Energy and Power.

Chemistry : Classification of Elements and Periodicity in Properties, Chemical Bonding and Molecular structure, States of Matter: Gases and Liquids

Botany : Morphology of Flowering Plants, Anatomy of Flowering Plants.

Zoology : Structural Organization in Animals, Biomolecules

Instructions :

(i) Use Blue/Black ballpoint pen only to darken the appropriate circle.
(ii) Mark should be dark and should completely fill the circle.
(iii) Dark only one circle for each entry.
(iv) Dark the circle in the space provided only.
(v) Rough work must not be done on the Answer sheet and do not use **white-fluid** or any other **rubbing material** on Answer sheet.
(vi) Each question carries **4 marks**. For every wrong response **1 mark** shall be deducted from total score.

PHYSICS

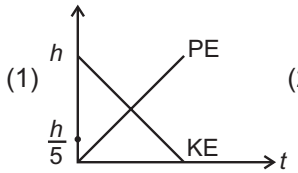
Choose the correct answer :

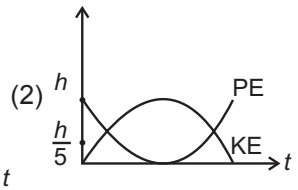
1. A body of mass 5 kg is pulled by a force $\vec{F} = (-4\hat{i} + 3\hat{j})$ N from rest on a smooth horizontal table in x-z plane. The time at which it will attain a speed of 4 m/s is
   (1) 3 s (2) 4 s
   (3) 5 s (4) 3.25 s

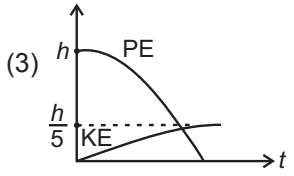
2. Position of a particle of mass 1 kg varies according to the equation $x(t) = (2 \text{ m/s})t + \left(3 \text{ m/s}^2\right)t^2 + \left(5 \text{ m/s}^2\right)t^3$ (where t is in s). The force acting on the body at time t = 1 s is.
   (1) 36 N (2) 134 N
   (3) 66 N (4) 30 N

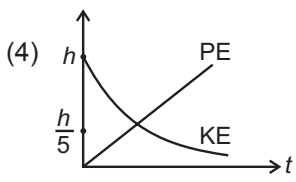
3. The velocity (in m/s) of a body of mass 2 kg as a function of time (t) (in s) is given as $\vec{v}(t) = 2t\hat{i} + 3t^2\hat{j}$ .The momentum and the force acting on the body at time t = 1 s respectively are
   (1) $(4\hat{i} + 3\hat{j})$ kg m s^{-1}, $(4\hat{i} + 3\hat{j})$ N
   (2) $(4\hat{i} + 3\hat{j})$ kg m s^{-1}, $(4\hat{i} + 6\hat{j})$ N
   (3) $(2\hat{i} + 3\hat{j})$ kg m s^{-1}, $(4\hat{i} + 6\hat{j})$ N
   (4) $(4\hat{i} + 6\hat{j})$ kg m s^{-1}, $(4\hat{i} + 12\hat{j})$ N

4. A raindrop falling from a height h above the ground attains the terminal velocity when it has fallen through a height $\frac{4}{5}h$. The diagrams shown in figure, which correctly shows the change in potential and kinetic energy of the drop during its fall up to ground is

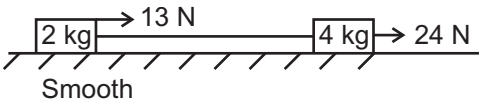
(1) 

(2) 

(3) 

(4) 

5. Two blocks of mass 2 kg and 4 kg kept on smooth horizontal surface and connected by a light rope are being pulled by 13 N and 24 N force as shown in the figure. The tension force in the string connecting the block is



(1) 4 N (2) 17.5 N

(3) 11 N (4) Zero

6. A rocket with a lift-off mass 30000 kg is blasted upwards with an initial acceleration 4.9 m s^{-2}. The initial force due to ejecting fuel is (g = 9.8 ms^{-2})

(1) 441 kN

(2) 294 kN

(3) 300 kN

(4) 500 kN

7. Two billiard balls each of mass 0.06 kg moving in opposite directions with speed 5 m s^{-1} collide and rebound with same speed. The impulse imparted to each ball due to the other are

(1) 0.6 kg m s^{-1} each, in same directions

(2) 0.6 kg m s^{-1} each, in opposite directions

(3) 0.6 kg m s^{-1} each, in transverse directions

(4) 1.2 kg m s^{-1} on one and zero on other

8. Water is flowing through a horizontal pipe with speed 2 m/s and power required to maintain the flow is 20 W. If speed becomes double then power required will be

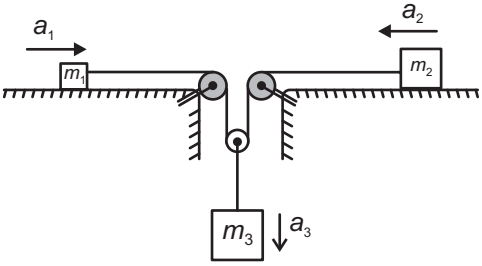
(1) 160 W

(2) 80 W

(3) 320 W

(4) 40 W

9. As shown in the figure, the pulleys and the strings are light and all surfaces are frictionless. If acceleration of masses m_1, m_2 and m_3 are a_1, a_2 and a_3 (with their directions shown in the figure), then which of the following is correct?



(1) $a_1 + 2a_2 = a_3$ (2) $2a_1 + a_2 = 2a_3$

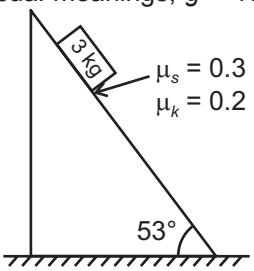
(3) $a_1 + a_2 = 2a_3$ (4) $a_1 + a_2 = a_3$

10. Consider inelastic collision of a ball with ground. If ball is released from a height h, then total time in which ball finally comes to rest is [Coefficient of restitution is e]

(1) $\left[\frac{1+e}{1-e}\right]\sqrt{\frac{2h}{g}}$ (2) $\left[\frac{1+e^2}{1-e^2}\right]\sqrt{\frac{2h}{g}}$

(3) $\left[\frac{1+e}{1-e}\right]\sqrt{\frac{h}{g}}$ (4) $\left[\frac{1+e}{1-e}\right]\sqrt{\frac{h}{2g}}$

11. A block of mass 3 kg slides on a fixed rough inclined plane of inclination angle 53°. The force of friction on the block as shown in figure is (symbols have their usual meanings, g = 10 m s^{-2})



(1) 2.4 N (2) 3.6 N

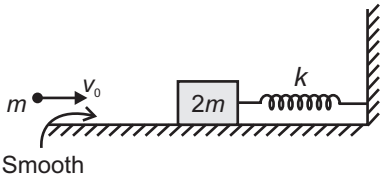
(3) 5.4 N (4) 6.4 N

12. A particle in motion and connected to a string is just able to complete a vertical circle of radius r. Acceleration of the particle when its velocity becomes vertical is [g = 10 m/s^2]

(1) 10 m/s^2 (2) $10\sqrt{10}$ m/s^2

(3) $10\sqrt{2}$ m/s^2 (4) 40 m/s^2

13. A ball of mass m is thrown horizontally with speed v_0 as shown in the figure. The ball strikes the block of mass 2m and sticks to it. The maximum compression of the spring connected to the block will be



(1) $v_0\sqrt{\frac{m}{3k}}$ (2) $v_0\sqrt{\frac{m}{2k}}$

(3) $v_0\sqrt{\frac{2m}{k}}$ (4) $v_0\sqrt{\frac{3m}{k}}$

14. A ball is projected from ground with some speed at an angle from the horizontal. The power of force of gravity for the ball during journey is

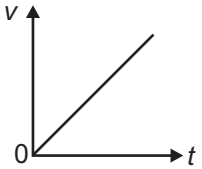
(1) Positive

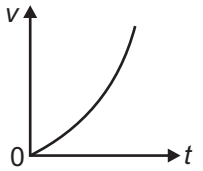
(2) Negative

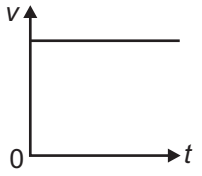
(3) Initially positive and finally negative

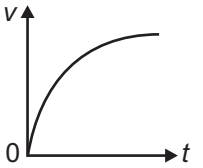
(4) Initially negative and finally positive

15. A body is moving unidirectionally under the influence of a source of constant power. Which of the graph correctly shows the velocity-time (*v*-*t*) curve for its motion?

(1) 

(2) 

(3) 

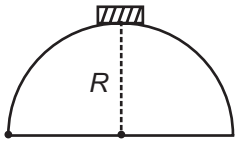
(4) 

16. A particle initially at rest starts its motion with uniform acceleration. Graph between kinetic energy and displacement of the particle is

(1) Straight line (2) Symmetric parabola

(3) Asymmetric parabola (4) Elliptical

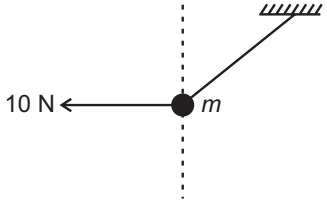
17. Figure shows a body at the top of a fixed and smooth hemispherical bowl of radius *R*. If the body starts slipping from the highest point then the horizontal distance travelled by the body before leaving the contact with the bowl is



(1) $\frac{\sqrt{2}R}{\sqrt{3}}$ (2) $\sqrt{3}R$

(3) $\frac{\sqrt{5}R}{3}$ (4) $\frac{\sqrt{5}R}{2}$

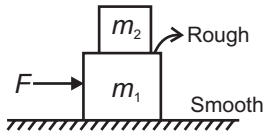
18. A particle of mass m = 1 kg is tied to a string and a horizontal force F = 10 N is applied on the particle as shown in figure. The tension in the string is [g = 10 m/s^2]



(1) 20 N (2) 10 N

(3) $10\sqrt{2}$ N (4) $5\sqrt{2}$ N

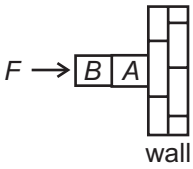
19. m_1 and m_2 are masses of two blocks placed one above the other as shown in the figure. There is no friction between the lower block and ground. The lower block is being pushed by a constant horizontal force F. There is sufficient friction between the blocks so that they do not slip over each other. The work done by friction on upper block if the arrangement moves through distance S is



(1) FS (2) $\frac{m_2}{m_1}FS$

(3) $\frac{m_2}{m_1+m_2}FS$ (4) $\frac{m_1}{m_1+m_2}FS$

20. Two blocks A and B are pushed against the wall with the force F as shown in the figure. The wall is smooth but surfaces of A and B in contact with each other are rough. Which of the following is true for the system of blocks to be at rest against the wall?



(1) F should be equal to the weight of A and B

(2) F should be more than the weight of A and B

(3) F should be three time the weight of A and B

(4) System cannot be in equilibrium

21. A block placed on a rough horizontal floor is being pushed by a force F making an angle α with the vertical. The coefficient of friction between block and surface is μ. The force required to slide the block with uniform velocity without losing contact with the floor is ($\tan\alpha > \mu$)

(1) $mg \sin\alpha$

(2) μmg

(3) $\frac{\mu mg}{(\sin\alpha - \mu\cos\alpha)}$

(4) $\frac{(\sin\alpha - \mu\cos\alpha)mg}{\mu}$

22. A toy car starts from rest along the circular track of radius R on a horizontal board with a tangential acceleration a_0. At the same instant, board starts from rest and accelerate upward with an acceleration a_1. The coefficient of friction between board and car is μ. The speed of car relative to board at which it will skid is

(1) $\left[\left\{\mu^2(g+a_1)^2 - a_0^2\right\}R^2\right]^{\frac{1}{4}}$

(2) $\left[\left\{\mu^2(g+a_1)^2 - a_0^2\right\}^{\frac{1}{4}}R\right]$

(3) $\left[\left\{\mu(g+a_1) - a_0\right\}R^2\right]^{\frac{1}{4}}$

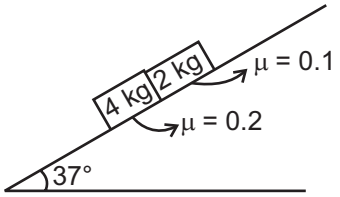
(4) $\left[\mu^2(a_1^2 - a_0^2)R^2\right]^{\frac{1}{4}}$

23. A machine gun fires a bullet of mass 50 g with a velocity of 500 ms^{-1}. The man holding it can exert a maximum force of 160 N on the gun to keep it stationary. The maximum number of bullets that he can fire per second is

(1) 6 (2) 7

(3) 2 (4) 9

24. Two blocks of masses 4 kg and 2 kg are sliding down an inclined plane as shown in the figure. The acceleration of 2 kg block is (g = 10 m/s^2)



(1) 2.66 m/s^2 (2) 4.66 m/s^2

(3) 5.2 m/s^2 (4) Zero

25. A block of mass 60 kg is attached to a spring balance, attached to roof of a truck. The truck begins its motion on a horizontal road with its acceleration increasing slowly to a constant value. The reading of spring balance will be

(1) 60 kgf (2) Less than 60 kgf

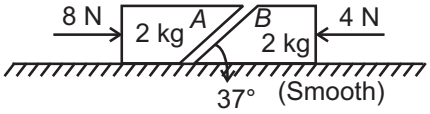
(3) More than 60 kgf (4) Zero

26. An aircraft executes a horizontal loop at *a* speed of 720 kmph with its wings banked at 10°. The radius of loop will be nearly (g = 10 m/s^2 and tan10° = 0.176)

(1) 20 km (2) 18 km

(3) 23 km (4) 25 km

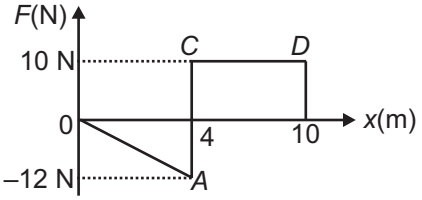
27. In the figure shown, block *A* does not slide on block *B*. The normal contact force acting between two blocks is (assume all surfaces to be smooth)



(1) 4 N (2) 5 N

(3) 10 N (4) 20 N

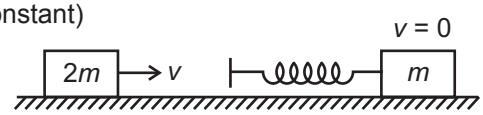
28. The graph of force (F) versus displacement (x) for a body of mass 2 kg is shown in figure. If the body has a velocity of 20 m/s at x = 0, then the kinetic energy of body at x = 10 m is



(1) 436 J (2) 460 J

(3) 484 J (4) 282 J

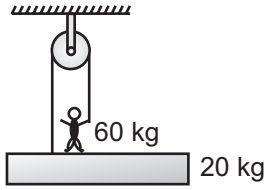
29. In the figure shown here, the maximum compression in the ideal spring is (K is spring constant)



(1) $\sqrt{\frac{mv^2}{2K}}$ (2) $\sqrt{\frac{2mv^2}{3K}}$

(3) $\sqrt{\frac{3mv^2}{2K}}$ (4) $\sqrt{\frac{mv^2}{3K}}$

30. The force F with which a man must pulls the rope in order to keep the platform at rest on which he stands as shown in the figure is (mass of man is 60 kg and that of platform is 20 kg)



(1) 40 kg-wt (2) 60 kg-wt

(3) 80 kg-wt (4) 100 kg-wt

31. Power P (in watt) given to a particle, changes with time t (in s) as $P = t^2 + t + 1$. The change in kinetic energy from t = 0 to t = 1 s is

(1) $\frac{11}{6}$ J (2) 11 J

(3) 6 J (4) $\frac{22}{3}$ J

32. A body of mass m rests on a horizontal floor. The coefficient of static friction between floor and body is μ. The minimum possible force that has to be applied to make the body move is

(1) μmg (2) $\left(\sqrt{\mu^2+1}\right) mg$

(3) $\frac{\mu mg}{\sqrt{\mu^2+1}}$ (4) $\frac{mg}{\sqrt{\mu^2+1}}$

33. A particle of mass m is moving in a circle of radius r such that its centripetal acceleration a varies with time t as $a = Kt^2$, where K is constant. The work done on the particle in first t seconds is

(1) $2mKrt^2$ (2) $mKrt^2$

(3) $\frac{mKt^2r}{3r}$ (4) $\frac{mKrt^2}{2}$

34. The force exerted on an object is $F = f_0\left(\frac{x}{a}-1\right)$ (where f_0 and a are constants). The work done in moving the object from x = 0 to x = 3a

(1) $\frac{3}{2}f_0a$ (2) $\frac{1}{2}f_0a$

(3) f_0a (4) Zero

35. Which of the following statements is correct about inelastic collision?

(1) Kinetic energy of colliding objects is conserved

(2) Mechanical energy of colliding objects is conserved

(3) Total energy is conserved

(4) Total energy is not conserved

36. A ball at rest is dropped from a height h on a smooth floor. The coefficient of restitution is 1/2.

The total distance covered by the ball till it comes to rest is

(1) $\frac{5}{3}h$ (2) $5h$

(3) $3h$ (4) $\frac{4}{3}h$

37. Due to internal forces acting on a system, kinetic energy of the system

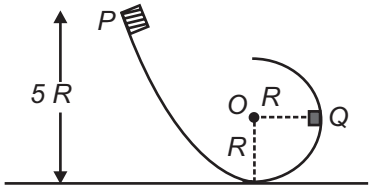
(1) Always increases

(2) Is always constant

(3) Always decreases

(4) May change

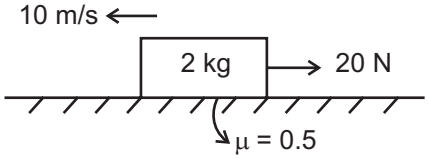
38. A small block of mass m slides along a smooth track connected with a smooth circular track of radius R. If it starts from rest at P, then the resultant force acting on it at Q will be



(1) 8 mg (2) $\sqrt{65}\,mg$

(3) $\sqrt{60}\,mg$ (4) $\sqrt{50}\,mg$

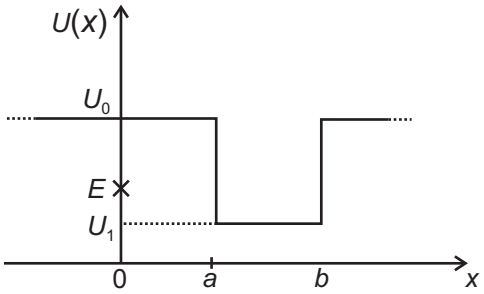
39. A block of mass 2 kg is moving with initial velocity 10 m/s enters on a rough horizontal surface. An extra force of 20 N is opposing the motion and trying to stop the block. The time after which the block will stop momentarily is (g = 10 m/s^2)



(1) 1 s (2) 0.5 s

(3) 0.67 s (4) 0.33 s

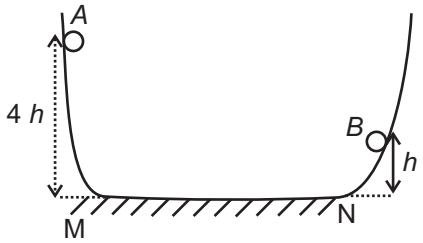
40. The potential energy function $U(x)$ for a particle moving in one dimension is shown in the figure. The total energy (E) of the particle is indicated by cross on the coordinate axis. For the given energy, region in which particle cannot be found, is



(1) $-\infty < x < a$ (2) $b < x < \infty$

(3) $a < x < b$ (4) Both (1) and (2)

41. Two identical balls A and B are released from the positions shown in the figure. They collide elastically on horizontal portion MN. The ratio of the respective heights attained by A and B after collision will be (neglect friction)



(1) 1 : 4

(2) 2 : 5

(3) 2 : 1

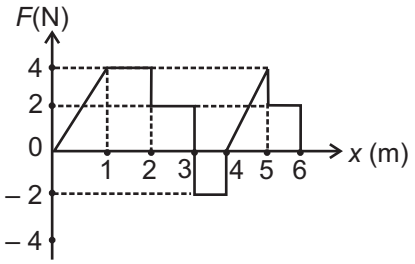
(4) 4 : 13

42. A block of mass 10 kg is displaced from position (1, 0, 1) m to (1, 5, 3) m by a constant force $\vec{F} = (2\hat{i} + 3\hat{j} + 2\hat{k})$ N. The work done by the force is

(1) 21 J (2) 15 J

(3) 19 J (4) 23 J

43. The relationship between force (F) and position (x) of a body of mass 1 kg is shown in the figure. If initially body is at rest at x = 0, then speed of the body at position x = 5 m is



(1) 2 m/s

(2) 4 m/s

(3) $2\sqrt{2}$ m/s

(4) $\sqrt{2}$ m/s

44. The bob of a pendulum at rest is given a horizontal velocity of $\sqrt{7g\ell}$, where ℓ is length of string of pendulum. The tension when bob will reach the highest point of its circular motion is (*m* is mass of bob)

(1) 2 *mg* (2) *mg*

(3) 4 *mg* (4) 7 *mg*

45. Water falls from a height of 50 m at the rate of 20 kg/s to operate a turbine. The losses due to frictional forces are 20% of energy incident on the turbine. The power generated by the turbine is (g = 10 ms^{-2})

(1) 10 kW (2) 12 kW

(3) 8 kW (4) 9 kW

CHEMISTRY

46. The species having maximum bond angle

(1) CH_4 (2) NH_3

(3) H_2O (4) H_2S

47. The pair which is isostructural and isoelectronic among the following is

(1) CO_3^{2-}, PO_4^{3-}

(2) ClO_4^-, SO_3^{2-}

(3) PO_4^{3-}, ClO_4^-

(4) PO_4^{3-}, SO_3^{2-}

48. The first ionization potential (kJ/mol) of Be and B respectively are

(1) 899, 801 (2) 899, 899

(3) 801, 801 (4) 801, 899

49. The element having maximum tendency of catenation belongs to

(1) Period 2 and Group 15

(2) Period 2 and Group 14

(3) Period 3 and Group 15

(4) Period 3 and Group 14

50. Most basic oxide among the following is

(1) BeO (2) MgO

(3) K_2O (4) Rb_2O

51. The compound having sp^3d^2 hybridisation of central atom is

(1) $XeOF_2$ (2) XeO_2F_2

(3) XeF_4 (4) XeF_6

52. The molecule that possesses permanent dipole moment is

(1) CF_4 (2) SF_4

(3) CS_2 (4) SF_6

53. Elements with similar atomic sizes and resemblance in properties are

(1) Sn, Pb (2) Zr, Hf

(3) Ca, Sr (4) B, Al

54. Correct order of ionic radii is

(1) $O^{2-} > F^- > Na^+ > Mg^{2+}$

(2) $F^- > O^{2-} > Mg^{2+} > Na^+$

(3) $F^- > O^{2-} > Na^+ > Mg^{2+}$

(4) $Mg^{2+} > Na^+ > F^- > O^{2-}$

55. The slope of isochore plotted between P vs T for van der Waals equation having negligible molecular attractions is

(1) $\frac{R}{P}$ (2) R

(3) Zero (4) $\frac{R}{V-b}$

56. The ratio of total K.E. of 1.87 g of H_2 and 5.53 g O_2 at 300 K is

(1) 5.4 : 1 (2) 1 : 5.4

(3) 2.7 : 1 (4) 1 : 2.7

57. Which of the following has maximum boiling point?

(1) $H_2O(l)$ (2) HF(l)

(3) $NH_3(l)$ (4) $CH_3OH(l)$

58. Which of the following will have highest critical temperature?

(1) H_2 (2) He

(3) NH_3 (4) F_2

59. The percentage increase in temperature of gas when it is heated at constant pressure to increase the volume by 30% is

(1) 20% (2) 30%

(3) 23.08% (4) 40.15%

60. Which can be found in liquid state at 35°C?

(1) Ga (2) Cs

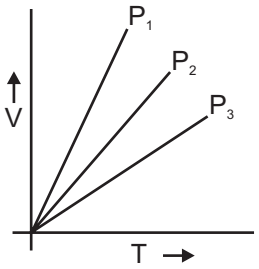
(3) Hg (4) All of these

61. Ratio of lone pair electrons to bond pair electrons on central atom of I_3^- ion is

(1) 1 : 1 (2) 1 : 2

(3) 3 : 2 (4) 3 : 1

62. For the graph,



(1) $P_1 < P_2 < P_3$ (2) $P_1 = P_2 = P_3$

(3) $P_1 > P_2 > P_3$ (4) $P_1 < P_2 > P_3$

63. Density of liquid water is 1 g ml^{-1} and density of water vapours is 5.0×10^{-4} g ml^{-1} at 100ºC and 1 atm. The volume occupied by water molecules (in mL) in one dm^3 of steam at same temperature

(1) 5 (2) 0.5

(3) 0.005 (4) 0.05

64. The ratio of density of CO_2 and N_2O gases at same conditions is

(1) 1 : 1 (2) 1 : 3

(3) 2 : 1 (4) 3 : 2

65. The correct increasing order of the covalent character of group I chlorides is

(1) LiCl < NaCl < KCl (2) LiCl < KCl < NaCl

(3) NaCl < KCl < LiCl (4) KCl < NaCl < LiCl

66. The number of π bonds present in $CH_2(CN)_2$ and $C_2(CN)_2$ respectively are

(1) 2, 4 (2) 4, 4

(3) 4, 6 (4) 6, 6

67. The bond order of C_2^{2-} is

(1) 2 (2) 2.5

(3) 3 (4) 3.5

68. The pair containing electron deficient species is

(1) NF_3, BF_3 (2) CCl_4, SF_4

(3) SF_4, $AlCl_3$ (4) BF_3, $AlCl_3$

69. The incorrect statement among the following is

(1) The dipole moment of NH_3 is greater than NF_3

(2) The dipole moment of CO_2 is zero.

(3) The dipole moment of PCl_3 is zero.

(4) The dipole moment of $CHCl_3$ is lesser than CH_3Cl.

70. $p\pi - p\pi$ bond(s) is/are present in

(1) PH_3

(2) NO_3^-

(3) PCl_3

(4) PCl_5

71. The total number of antibonding electron pair(s) in N_2 as per molecular orbital theory is

(1) 1 (2) 2

(3) 3 (4) 4

72. Which of the following element is most electronegative?

(1) O (2) N

(3) Cl (4) F

73. van der Waals constant 'a' is least for

(1) $H_2(g)$ (2) $CO_2(g)$

(3) CO(g) (4) $NH_3(g)$

74. What is the bond order of N–O bond in NO_3^- ion?

(1) 1.25 (2) 1.33

(3) 1.50 (4) 1.75

75. Ratio of inversion temperature to Boyle's temperature for a real gas is

(1) 2 : 1 (2) 1 : 2

(3) 2 : 3 (4) 3 : 2

76. Select the set of species in which all atoms are in one plane.

(1) NO_3^-, SO_3^{2-}, CO_3^{2-}

(2) SO_4^{2-}, ClO_4^-, BrO_4^-

(3) CO_3^{2-}, SO_3, XeF_4

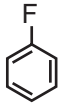
(4) NH_3, PH_3, ClO_3^-

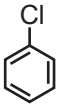
77. Charle's law is expressed as

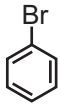
(1) $\left(\frac{dV}{dT}\right)_P = C$ (2) $V \propto T(K)$

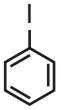
(3) $\left(\frac{dV}{dT}\right)_P = -C$ (4) Both (1) & (2)

78. Among the following, compound having highest dipole moment is

(1) 

(2) 

(3) 

(4) 

79. Hydrogen gas diffuses $3\sqrt{3}$ times to that of a hydrocarbon (C_nH_{2n-2}) ,under identical conditions of temperature and pressure, n is

(1) 2 (2) 3

(3) 4 (4) 5

80. Among the following, the most viscous liquid is

(1) Ethanol (2) Glycerol

(3) Acetic acid (4) Ethylene glycol

81. Root mean square speed of a gas is

(1) $\sqrt{\frac{3RT}{M}}$ (2) $\sqrt{\frac{3RT}{\pi M}}$

(3) $\sqrt{\frac{2RT}{M}}$ (4) $\sqrt{\frac{8RT}{\pi M}}$

82. The density of gas is found to be 1.55 g/L at 745 mm Hg pressure and 65ºC. Gas can be

(1) CO (2) CO_2

(3) SO_2 (4) CH_4

83. What percentage of the gas will be escaped out if open vessel is heated from 300 K to 500 K?

(1) 20% (2) 40%

(3) 50% (4) 70%

84. In the formation of O_2 from the O_2^-, the last electron is removed from which one of the following orbitals?

(1) σ^* (2) π^*

(3) σ (4) π

85. The incorrect statement among the following is

(1) Bond order of CO_3^{2-} is fractional due to resonance

(2) Bond strength of C – O bond in CO is more than that of CO_3^{2-}

(3) Bond order of CO and NO are same

(4) Bond strength of C – O bond in CO_2 is more than that of CO_3^{2-}

86. Li^+ is isoelectronic with which of the following?

(1) H^+ (2) Mg^{2+}

(3) K^+ (4) Be^{2+}

87. Salt having maximum lattice energy is

(1) LiF

(2) LiCl

(3) LiBr

(4) LiI

88. The exothermic process among the following is

(1) $H \rightarrow H^+$

(2) $O \rightarrow O^-$

(3) $O^- \rightarrow O^{2-}$

(4) $Mg \rightarrow Mg^+$

89. The incorrect statement for O_3 is

(1) It is angular in shape

(2) It has 2σ bonds

(3) It has 1π bond

(4) It has total 9 non-bonded electron pairs

90. The structure and hybridisation of N in $N(SiH_3)_3$ is

(1) Tetrahedral, d^3s

(2) Pyramidal, sp^3

(3) Trigonal planar, sp^2

(4) Square planar, sp^3d^2

BOTANY

91. Which of the following is/are the function(s) of the typical root system?

(1) Phytohormone synthesis

(2) Provide anchorage to the plant parts

(3) Food synthesis in the presence of light

(4) Both (1) and (2)

92. Floral formula of *Brassica* flower is

(1) $\oplus \, ♀ \, \overset{\frown}{P}_{(3+3)} A_{3+3} \, \underline{G}_{(3)}$

(2) $\oplus \, ♀ \, K_{(5)} \, \overset{\frown}{C}_{(5)} A_5 \, \underline{G}_{(2)}$

(3) $\oplus \, ♀ \, K_{2+2} \, C_4 \, A_{2+4} \, \underline{G}_{(2)}$

(4) $\% \, ♀ \, K_{(5)} \, C_{1+2+(2)} \, A_{(9)+1} \, \underline{G}_1$

93. Select the plant having actinomorphic symmetry in flowers.

(1) Pea

(2) Tomato

(3) Gulmohur

(4) Bean

94. Which of the following is **not** true for trichomes?

(1) They prevent water loss

(2) They are epidermal hairs

(3) They may be branched or unbranched

(4) They are unicellular root hairs

95. How many of the given plants have marginal placentation?

Pea, Tomato, Marigold, Muliathi, *Petunia*, *Indigofera*, Lupin

(1) Two

(2) Four

(3) Five

(4) Six

96. Match the following columns and select the **correct** option.

	Column I		Column II
a.	China rose	(i)	Basal placentation
b.	*Argemone*	(ii)	Axile placentation
c.	*Dianthus*	(iii)	Parietal placentation
d.	Sunflower	(iv)	Free-central placentation

(1) a(ii), b(iii), c(iv), d(i) (2) a(ii), b(iv), c(iii), d(i)
(3) a(i), b(ii), c(iii), d(iv) (4) a(iii), b(ii), c(iv), d(i)

97. Mark the **incorrect** one (w.r.t. Solanaceae family)
(1) $K_{(5)}$
(2) Adventitious root
(3) Bicarpellary
(4) Valvate aestivation of petals

98. All are the features of meristematic cells, **except**
(1) Absence of intercellular spaces
(2) Dense cytoplasm and prominent nucleus
(3) Ability to undergo cell division
(4) Contain chloroplast, leucoplast or chromoplast

99. Read the given statements and select the **incorrect** one.
(1) In all angiosperms, the roots originate only from the base of the stem
(2) *Monstera* bears adventitious roots
(3) Pneumatophores are respiratory roots
(4) Tap roots system is formed from the radicle of the embryo

100. Exarch condition of xylem
(A) Is found in roots
(B) Show protoxylem towards periphery
(C) Is found in monocot stem
(D) Is found in radial vascular bundles
How many of the above statements are **incorrect**?
(1) Two (2) Four
(3) One (4) Three

101. In a leaf mesopodium is
(1) Leaf base (2) Petiole
(3) Stipule (4) Midrib

102. Well developed pith is present in
(1) Monocot stem and dicot root
(2) Monocot leaf and dicot leaf
(3) Dicot stem and monocot root
(4) Dicot stem and monocot stem

103. Highly thick-walled lignified cells generally found in fruit walls of nuts and pulp of fruits are
(1) Sclereids (2) Fibres
(3) Albuminous cells (4) Tracheids

104. A student while cutting transverse section of plant part observed scattered vascular bundles of various sizes, covered by bundle sheath cells. He also observed water containing cavities inside vascular bundle. This indicates that it is a transverse section of
(1) Cucurbit stem
(2) Maize stem
(3) Rice root
(4) Mustard root

105. The companion cells in phloem of angiosperms
(1) Help in maintaining the pressure gradient in the sieve tubes
(2) Are connected with sieve tubes by pit fields present between their common radial walls
(3) Possess peripheral cytoplasm and a large vacuole but lacks a nucleus
(4) Store food materials and substances like resins and latex

106. Which of the following plants should be used for the study of secondary growth?
(1) Teak, wheat (2) Mango, peepal
(3) Wheat, sugarcane (4) Mustard, maize

107. Casparian strips are present in
(1) Pericycle
(2) Endodermis
(3) Bulliform cells
(4) Epidermis

108. The spring wood differs from autumn wood in
(1) Having narrow vessels
(2) Being low in density and light in colour
(3) Being formed by less active cambium
(4) Not having large number of xylary elements

109. Lateral roots and root hairs in primary roots of dicot plants are dissimilar
(1) In their origin
(2) As only former is involved in absorption of water
(3) As only later increases the surface area for water absorption
(4) As only root hairs have chloroplasts in their cells

110. Edible part in berry fruit of *Psidium guajava* is/are
(1) Succulent testa
(2) Aril and seed
(3) Pericarp, placenta and thalamus
(4) Endosperm, aril and cotyledons

111. Which of the following plants have tetramerous flowers?
(1) Tomato (2) Tulip
(3) Sunhemp (4) Mustard

112. Mark the **odd** one (w.r.t. perigynous flower).
(1) Pea (2) Rose
(3) Peach (4) Plum

113. Mark the **incorrect** match.
(1) *Euphorbia* – Phylloclade
(2) Jasmine – Stolons
(3) Gourds – Stem tendrils
(4) *Gladiolus* – Rhizome

114. Stem of rice plant lacks
(1) Companion cell
(2) Phloem parenchyma
(3) Vessel
(4) Conjoint vascular bundles

115. Select the **correct** statements.
(a) Bast fibers are made up of collenchymatous cells.
(b) The companion cells are specialised parenchymatous cells.
(c) Gymnosperms lack sieve tubes and companion cells.
(d) Angiosperms have albuminous cells.
(1) (a) and (b) (2) (b) and (c)
(3) (c) and (d) (4) (a) and (d)

116. Lateral roots arise from
(1) Cambium ring (2) Epiblema
(3) Pericycle (4) Endodermis

117. How many of the following are mainly used as ornamental and medicinal plant, respectively?

Aloe, Belladonna, Lupin, *Lathyrus odoratus*, *Petunia*, *Muliathi*, *Gloriosa*

(1) Four; Three
(2) Two; Five
(3) One; Six
(4) Six; One

118. The main function of stem in most of plants is
(1) Conduction of water and minerals from leaves to roots
(2) Storage of food and photosynthesis
(3) Spreading out branches bearing leaves, flowers and fruits
(4) Vegetative propagation and protection from high light intensity

119. Modified adventitious root for mechanical support in sugarcane and banyan is respectively
(1) Prop root and stilt root
(2) Stilt root and prop root
(3) Fibrous root and stilt root
(4) Prop root and adventitious root

120. In a flower, filaments of stamens are united with each other which represents
(1) Cohesion of stamens
(2) Adhesion of stamens
(3) Tetradynamous condition
(4) Epipetalous condition

121. Inflorescence with definite growth of main axis is present in
(1) Pea
(2) Soyabean
(3) *Solanum*
(4) *Indigofera*

122. Quiescent centre in root apex
(1) Shows absence of DNA
(2) Has very little synthesis of proteins & RNAs
(3) Was reported by Clowes
(4) Both (2) & (3)

123. Non-endospermous seed are found in the plants like
(1) Bean and gram
(2) Bean and coconut
(3) Maize and barley
(4) Onion and maize

124. Passage cells in root
(1) Are present in pericycle
(2) Are not a modification of parenchyma
(3) Can give rise to lateral roots
(4) Are present in endodermis

125. _____is the scar on the seed coat through which the developing seeds were attached to the fruit.

(1) Testa (2) Hilum

(3) Micropyle (4) Tegmen

126. Select the **incorrect** statements w.r.t. leaf tendrils.

a. They are long, slender and thread like structure

b. They are found in sweet pea plants.

c. They may possess buds and scale leaf

d. They develop in the axil of leaf

(1) c & d

(2) a & d

(3) b & c

(4) a & b

127. How many functions are common in modified stem of ginger, potato, turmeric and *Colocasia*?

i. Food storage

ii. Mechanical support

iii. Food synthesis

iv. Perennation

v. Vegetative propagation

(1) iii, iv & v (2) i, iv & v

(3) ii, iii & v (4) i, iii & iv

128. The outer covering of endosperm separates the embryo by a proteinaceous layer in maize seed

(1) Is called aleurone layer

(2) Is triploid

(3) Develops before fertilisation

(4) Both (1) and (2)

129. Vascular cambium in stem is formed of

(a) Cork cambium

(b) Interfascicular cambium

(c) Intrafascicular cambium

(1) Only (a) and (b)

(2) Only (b) and (c)

(3) Only (c) and (a)

(4) Only (a), (b) and (c)

130. **Statement-A :** The peripheral region of the secondary xylem is lighter in colour and is known as the heartwood.

Statement-B : The region of wood that comprises of dead elements with highly lignified walls, is called sapwood.

(1) Only statement A is correct

(2) Only statement B is correct

(3) Both statements A and B are correct

(4) Both statements A and B are incorrect

131. Select the **incorrect** statement.

(1) The lens-shaped openings present on epidermis are called lenticles

(2) The phellogen develop, usually in the steler region

(3) Phellogen, phellem and phelloderm are collectively known as periderm

(4) Phellogen is made of narrow, thin walled and nearly rectangular cells

132. During secondary growth the structure that is formed early in the season is called ___A___ bark and that is formed late in the season is called ___B___ bark.

(1) A – Late, B – Early

(2) A – Hard, B – Soft

(3) A – Soft, B – Hard

(4) A – Hard, B – Early

133. The abundant starch grains may be found in endodermis of

(1) Dicot stem

(2) Monocot stem

(3) Dicot root

(4) Monocot root

134. The palisade parenchyma is absent in leaves of

(1) Pea

(2) Gram

(3) Maize

(4) Mustard

135. Which of the following statements is **correct**?

(1) The first formed xylary elements are called protophloem

(2) The later formed primary phloem elements are called metaphloem

(3) The later formed primary xylem elements are called protoxylem

(4) The first formed primary xylem elements are called metaxylem

ZOOLOGY

136. Read the following statements A and B and choose the **correct** option.

Statement A : If the tissue is fully burnt, all the carbon compounds are oxidised to gaseous form CO_2 and water vapour.

Statement B : The ash contains inorganic elements like calcium, magnesium etc.

(1) Only statement A is correct
(2) Only statement B is incorrect
(3) Both statements are correct
(4) Both statements are incorrect

137. Match column I with column II and choose the **correct** option.

	Amino acid		**Chemical nature**
a.	Glutamic acid	(i)	Aromatic
b.	Lysine	(ii)	Neutral
c.	Valine	(iii)	Basic
d.	Tyrosine	(iv)	Acidic

(1) a(i), b(ii), c(iii), d(iv) (2) a(ii), b(iii), c(iv), d(i)
(3) a(iii), b(iv), c(i), d(ii) (4) a(iv), b(iii), c(ii), d(i)

138. Select the **odd** one w.r.t. primary metabolites.
(1) Amino acids (2) Sugars
(3) Drugs (4) Chlorophylls

139. Lecithin is an example of
(1) Phospholipids (2) Glycolipids
(3) Lipoproteins (4) Chromolipids

140. Tertiary structure of protein is like a hollow woollen wall is mainly shown by
(1) Haemoglobin (2) Myoglobin
(3) Collagen (4) Keratin

141. In below given equation, identify the 'A' from given options.

Glucose-6-phosphate $\overset{A}{\rightleftharpoons}$ Fructose-6-phosphate

(1) Dehydrogenases (2) Hydrolases
(3) Ligases (4) Isomerase

142. Pitch of the B-DNA is
(1) 34 Å (2) 3.4 Å
(3) 0.34 nm (4) 36 Å

143. The **incorrect** match of a biomolecule and its example is
(1) Unsaturated fatty acid – Stearic acid
(2) Globular protein – Egg albumins
(3) Chromoprotein – Cytochromes
(4) Mucopolysaccharide – Agar

144. Read the following statements :
I. Epithelial cells rest on a non-cellular layer.
II. Single unit smooth muscle possesses cell junctions.
III. Brush bordered columnar epithelium of intestine help in absorption of food.
IV. Saliva is an exocrine secretion.

Select the **correct** statements.
(1) II and III (2) I, II and III
(3) Only II and IV (4) I, II, III and IV

145. Find out the **correct** statement w.r.t. respiration in *Periplaneta americana.*
(1) Exchange of gases occurs at tracheoles by diffusion
(2) With relaxation of tergo-sternal muscles, expiration occurs.
(3) Its inspiration is an active process
(4) Malpighian tubules are attached to the alimentary canal at the junction of foregut and midgut

146. Long bones of the humans consist of
(1) Trabeculae mostly filled with yellow bone marrow
(2) Spongy bone only as they are rich in lacunae
(3) Compact bone only as they lack lamellae
(4) Both spongy and compact bone rich in bone marrow and calcium phosphate salts

147. A set of connective tissues is
(1) Ligaments, cartilages, skeletal muscles
(2) Areolar tissue, smooth muscles, adipose tissue
(3) Spongy bones, blood, calcified cartilage
(4) Dense irregular, urothelium, lymph

148. Select the **incorrect** statement w.r.t. cockroach.
(1) Heart consists of 13 funnel-shaped contractile chambers
(2) The stage in the development of an insect between two moults is called instar
(3) Stomodeal valve is present between gizzard and mesenteron
(4) Diurnal and omnivorous.

149. Find the **incorrect** match w.r.t *P.americana.*
(1) Hepatic caecae – Six to eight
(2) Ganglia in nerve cord – Nine
(3) Cone cells surrounding the crystalline cone – Four
(4) Ejaculatory ducts – Two in number

150. Select the **incorrect** statement w.r.t. starch.
(1) Stored food of plants.
(2) Polymer made of glucose units.
(3) Amylose and amylopectin are two types of components of starch.
(4) Amylose is branched chain consisting of glucose units.

151. A compact bone is similar to spongy bone in
(1) Being the site of haemopoiesis
(2) Having periosteum
(3) Having trabeculae
(4) Having haversian system

152. Select the **incorrect** statement.
(1) Zinc is a cofactor for proteolytic enzyme carboxypeptidase.
(2) Chitin is a homopolysaccharides found in exoskeleton of arthropods
(3) K_m (Michaelis constant) is numerically equivalent to 1/2 V_{max}
(4) Phenylalanine and tryptophan are aromatic amino acids.

153. The **correct** set of cells, their characters and locations is

	Cells	Characters	Locations
(1)	Adipocytes	Diapedesis	Matrix of supportive connective tissue
(2)	Fibroblasts	Ingest fibres and cell debris	White fibrous connective tissue
(3)	Mast cells	Secrete histamine	Areolar tissue
(4)	Osteoclasts	Bone forming	Cartilage and cartilaginous bones

154. Inhibition of succinic dehydrogenase by malonate which closely resembles the substrate succinate. This is an example of competitive inhibition in which
(1) Decrease in V_{max} and K_m unaffected
(2) No change in V_{max} and increase in K_m
(3) Decrease in both V_{max} and K_m
(4) Decrease in V_{max} and increase in K_m

155. A group of similar cells along with intercellular substances perform a specific function, is known as
(1) Organ system (2) Organ
(3) Tissue (4) Body

156. Choose the **odd** one w.r.t. location of compound epithelium.
(1) Lining of stomach
(2) Moist surface of buccal cavity
(3) Inner surface of ducts of salivary glands
(4) Inner surface of pancreatic ducts

157. Select the **odd** one w.r.t. location of non-striated muscles.
(1) Wall of blood vessels
(2) Arms
(3) Wall of stomach
(4) Wall of intestine

158. Select the **incorrect** statement w.r.t. bone.
(1) The red bone marrow in some bones is the site of production of blood cells.
(2) Osteocytes are present in the spaces called lacunae.
(3) Bone is solid and pliable and resists compression.
(4) Bones are rich in calcium salts and collagen fibres.

159. Neuroglia make up more than _____ the volume of neural tissue in our body.
Choose the option which fills the blank **correctly**.
(1) Two-half
(2) One-half
(3) Three-half
(4) Three-four

160. Structure which attach one bone to another, is
(1) Tendon
(2) Ligament
(3) Cartilage
(4) Dense irregular tissue

161. Which one is **not** the part of connective tissue?
(1) Areolar tissue (2) Blood
(3) Bone (4) Compound tissue

162. Choose the **correct** match pair.
(1) Cellulose – Trimeric protein.
(2) Myoglobin – Reducing sugar
(3) GLUT-4 – Enables glucose transport into cells
(4) Proline – Homopolysaccharides

163. Select the **odd** one w.r.t. RNA
(1) Adenylic acid (2) Guanylic acid
(3) Adenosine (4) Thymidylic acid

164. Zwitter ion has
(1) Either positive or negative charge
(2) Only positive charge
(3) Only negative charge
(4) Both positive and negative charge

165. Select **incorrect** statement w.r.t. coenzyme.
(1) Coenzyme NAD and NADP contain vitamin niacin
(2) Coenzymes are non-proteinaceous part of enzymes
(3) Every coenzyme is a cofactor and every cofactor is a coenzyme
(4) Every coenzyme is a cofactor but every cofactor is not a coenzyme

166. In the structure of amylopectin, α-1, 6-glycosidic linkages are
(1) Not present
(2) Present throughout the main chain
(3) Present at reducing ends *i.e.* right-sided ends
(4) Present at branching points

167. Vessel which has valves in earthworm
(1) Dorsal blood vessel
(2) Lateral oesophageal vessel
(3) Sub esophageal vessel
(4) Ventral blood vessel

168. The **correct** set containing same kinds of biomolecules is
(1) Agar, inulin, lecithin
(2) Hyaluronic acid, chondroitin sulphate, cellulose
(3) Chondroitin sulphate, Keratan sulphate, Agar
(4) PUFAs, starch, peptidoglycan

169. Which of the following can be associated with skin of the frog?
a. Mucous gland
b. Moist, smooth and slimy
c. Chromatophores
d. Scales
Choose the **correct** option.
(1) Only a and c (2) Only a
(3) a, b and c (4) b and d

170. Cyanide kills an animal by
(1) Blocking the active sites of cytochrome oxidase
(2) Having no effect on V_{max} or K_m, but distorting the structure of enzyme
(3) Irreversibly binding to either E or ES complex, but decreasing maximum velocity
(4) Breaking down the substrate *i.e.* cytochrome c

171. Select **incorrect** statement w.r.t. frog.
(1) Amphibians have positive pressure breathing.
(2) Tadpole larva is herbivorous, so intestine is long and coiled in the form of a spring.
(3) Frogs have four digits in the fore limbs which has webs and five digits in hind limbs, webs are poorly developed.
(4) Intestine is the longest part of alimentary canal

172. All of the following can be included in salient features of B-DNA, as proposed by Watson and Crick, **except**
(1) Guanine and cytosine form two hydrogen bonds
(2) Diameter of the helix is $\simeq$ 20 Å
(3) Has 10 bp per turn
(4) It follows Chargaff's rules

173. On which mode of respiration frogs live during hibernation and aestivation?
(1) Cutaneous respiration
(2) Buccopharyngeal respiration
(3) Pulmonary respiration
(4) Cutaneous and pulmonary respiration

174. A lobe which serves as a covering for the mouth in earthworm, is
(1) Peristomium (2) Peritoneum
(3) Prostomium (4) Metamers

175. Structure which increases the effective area of absorption in the intestine w.r.t. earthworm, is called as
(1) Intestinal caecum
(2) Intestinal lumen
(3) Typhosole
(4) Lymph glands

176. The respiratory system of cockroach consists of a network of trachea, that open through ____ of spiracles.
Choose the option which fills the blank **correctly**.
(1) 10 pairs
(2) 10
(3) 20 pairs
(4) 2 pairs

177. Select the **odd** one w.r.t. components of forebrain of frog.
(1) Paired cerebellar hemispheres
(2) Paired cerebral hemispheres
(3) Paired olfactory lobes
(4) Unpaired diencephalon

178. Structure which present in frog is

(1) Ribs (2) Incus

(3) Corpus callosum (4) Columella auris

179. In nervous system of cockroach, brain is represented by

(1) Suboesophageal ganglion

(2) Supraoesophageal ganglion

(3) Cerebral ganglion

(4) Thoracic ganglion

180. Read the following statements.

Statement A : In cockroach mosaic vision present.

Statement B : Mosaic vision has more sensitivity but less resolution.

Choose the **correct** option.

(1) Statement A is correct

(2) Statement B is incorrect

(3) Both statements are correct

(4) Both statements are incorrect

❖◆❖◆❖◆❖

26-03-2019

Code - B

Aakash

Medical | IIT-JEE | Foundations

(Divisions of Aakash Educational Services Limited)

Regd. Office **:** Aakash Tower, 8, Pusa Road, New Delhi-110005; Ph.: 011-47623456

MM : 720

Test Series for NEET - 2019
Test – 2

Time : 3 Hrs

ANSWERS

1.	(3)	37.	(4)	73.	(1)	109.	(1)	145.	(1)
2.	(1)	38.	(2)	74.	(2)	110.	(3)	146	(4)
3.	(4)	39.	(3)	75.	(1)	111.	(4)	147.	(3)
4.	(3)	40.	(4)	76.	(3)	112.	(1)	148.	(4)
5.	(4)	41.	(1)	77.	(4)	113.	(4)	149.	(4)
6.	(1)	42.	(3)	78.	(2)	114.	(2)	150.	(4)
7.	(2)	43.	(2)	79.	(3)	115.	(2)	151.	(2)
8.	(1)	44.	(1)	80.	(2)	116.	(3)	152.	(3)
9.	(3)	45.	(3)	81.	(1)	117.	(1)	153.	(3)
10.	(1)	46.	(1)	82.	(2)	118.	(3)	154.	(2)
11.	(2)	47.	(3)	83.	(2)	119.	(2)	155.	(3)
12.	(2)	48.	(1)	84.	(2)	120.	(1)	156.	(1)
13.	(1)	49.	(2)	85.	(3)	121.	(3)	157.	(2)
14.	(4)	50.	(4)	86.	(4)	122.	(4)	158.	(3)
15.	(4)	51.	(3)	87.	(1)	123.	(1)	159.	(2)
16.	(1)	52.	(2)	88.	(2)	124.	(4)	160.	(2)
17.	(3)	53.	(2)	89.	(4)	125.	(2)	161.	(4)
18.	(3)	54.	(1)	90.	(3)	126.	(1)	162.	(3)
19.	(3)	55.	(4)	91.	(4)	127.	(2)	163.	(4)
20.	(4)	56.	(1)	92.	(3)	128	(4)	164.	(4)
21.	(3)	57.	(1)	93.	(2)	129.	(2)	165.	(3)
22.	(1)	58.	(3)	94.	(4)	130.	(4)	166.	(4)
23.	(1)	59.	(2)	95.	(2)	131.	(2)	167.	(1)
24.	(2)	60.	(4)	96.	(1)	132.	(3)	168.	(3)
25.	(3)	61.	(3)	97.	(2)	133.	(1)	169.	(3)
26.	(3)	62.	(1)	98.	(4)	134.	(3)	170.	(3)
27.	(3)	63.	(2)	99.	(1)	135.	(2)	171.	(3)
28.	(1)	64.	(1)	100.	(3)	136.	(3)	172.	(1)
29.	(2)	65.	(4)	101.	(2)	137.	(4)	173.	(1)
30.	(1)	66.	(3)	102.	(3)	138.	(3)	174.	(3)
31.	(1)	67.	(3)	103.	(1)	139.	(1)	175.	(3)
32.	(3)	68.	(4)	104.	(2)	140.	(2)	176.	(1)
33.	(4)	69.	(3)	105.	(1)	141.	(4)	177.	(1)
34.	(1)	70.	(2)	106.	(2)	142.	(1)	178.	(4)
35.	(3)	71.	(2)	107.	(2)	143.	(1)	179.	(2)
36.	(1)	72.	(4)	108.	(2)	144.	(4)	180.	(3)

26-03-2019

Code - B

Aakash
Medical | IIT-JEE | Foundations
(Divisions of Aakash Educational Services Limited)

Regd. Office : Aakash Tower, 8, Pusa Road, New Delhi-110005; Ph.: 011-47623456

MM : 720

Test Series for NEET - 2019
Test – 2

Time : 3 Hrs.

Answers and Hints

PHYSICS

1. Answer (3)

$\vec{F} = -4\hat{i} + 3\hat{j}$

$\vec{a} = -\frac{4}{5}\hat{i}$ m/s

$\vec{v} = \vec{a}.t = -\frac{4}{5} \times t\hat{i}$

$|\vec{v}| = \frac{4}{5}t$

$4 = \frac{4t}{5}$

$\boxed{t = 5\,\text{s}}$

2. Answer (1)

$x(t) = 2t + 3t^2 + 5t^3$

$v(t) = 2 + 6t + 15t^2$

$a(t) = 0 + 6 + 30t$

$a(t = 1\text{ s}) = 36\text{ m/s}^2$

$F = 36 \times 1 = 36$ N

3. Answer (4)

$v(t) = 2t\hat{i} + 3t^2\hat{j}$

Momentum $\vec{p} = m\vec{v} = 2(2t\hat{i} + 3t^2\hat{j})$

at t = 1 s, $\vec{p} = (4\hat{i} + 6\hat{j})$ kg m s^{-1}

Force $\vec{F} = m\frac{d\vec{v}}{dt} = 4\hat{i} + 12t\hat{j}$

at t = 1 s, $\vec{F} = (4\hat{i} + 12\hat{j})$ N

4. Answer (3)

When raindrop falls, first velocity increases, hence, first KE also increase. After sometime speed is constant hence KE also becomes constant.

PE decrease continuously as drop is falling continuously.

5. Answer (4)

$a_{2\text{kg}} = \frac{13}{2} = 6.5\text{ m/s}^2$

$a_{4\text{kg}} = \frac{24}{4} = 6\text{ m/s}^2$

$a_{2\text{ kg}} > a_{4\text{ kg}} \Rightarrow$ Hence T = 0

6. Answer (1)

$F_{th} - mg = ma$

$F_{th} - 30000\,g = 30000\,a$

$F_{th} = 30000\,(g + a) = 30000\,(9.8 + 4.9)$

= 441 kN

7. Answer (2)

Impulse on each ball = $\Delta p = 0.06 \times 10 = 0.6$ kg m s^{-1}

The two impulses are in opposite direction.

8. Answer (1)

$\because \quad P \propto v^3$

9. Answer (3)

$Ta_1 + Ta_2 - 2Ta_3 = 0 \Rightarrow a_1 + a_2 = 2a_3$

10. Answer (1)

$T = \frac{u}{g} + \frac{2eu}{g} + \frac{2e^2u}{g} + \ldots \infty \quad \left[u = \sqrt{\frac{2h}{g}}\right]$

$T = \frac{u}{g} + \left(\frac{1+e}{1-e}\right) = \left(\frac{1+e}{1-e}\right)\sqrt{\frac{2h}{g}}$

11. Answer (2)

Friction is kinetic

$f_k = \mu mg \cos 53° = 0.2 \times 3 \times 10 \times \frac{3}{5} = \frac{18}{5} = 3.6$ N

12. Answer (2)

$\because \quad a = \sqrt{a_c^2 + a_t^2} = \sqrt{(3g)^2 + g^2}$

$a = 10\sqrt{10}\ \text{m/s}^2$

13. Answer (1)

$mv_0 = 3mv \ \Rightarrow \ v = \dfrac{v_0}{3}$

$\dfrac{1}{2}(3m)\dfrac{v_0^2}{9} = \dfrac{1}{2}kx^2 \Rightarrow x = v_0\sqrt{\dfrac{m}{3k}}$

14. Answer (4)

Initially angle between $\vec{v}$ and $m\vec{g}$ is greater than $\pi/2$ and after maximum height angle will be less than $\pi/2$ and angle is continuously changing.

15. Answer (4)

P = constant = $mv\dfrac{dv}{dt}$

$\Rightarrow \ v \propto t^{1/2}$

16. Answer (1)

$K = mad$

$\Rightarrow \ K \propto d$

17. Answer (3)

Block will leave contact at $\theta = \cos^{-1}(2/3)$ from vertical. Horizontal distance travelled

$= R\sin(\theta) = \dfrac{\sqrt{5}}{3}R$

18. Answer (3)

$\because \quad T = \sqrt{F_1^2 + F_2^2} = \sqrt{(10)^2 + (10)^2} = 10\sqrt{2}\ \text{N}$

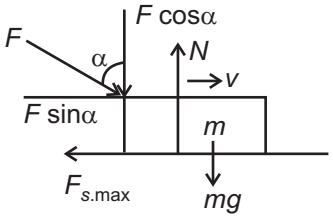
19. Answer (3)

$W_f = f\,s = m_2\dfrac{FS}{m_1 + m_2}$

20. Answer (4)

Since wall is smooth hence blocks will fall due to own weight and system will not be in equilibrium.

21. Answer (3)



$N = mg + F\cos\alpha$

$F\sin\alpha = \mu N$

$F\sin\alpha = \mu\,(mg + F\cos\alpha)$

$F = \dfrac{\mu mg}{(\sin\alpha - \mu\cos\alpha)}$

22. Answer (1)

Since board is accelerating upward, the normal reaction on the car is N = $m(g + a_1)$. At the time of skidding, limiting friction provides the require acceleration

i.e. $\mu N = ma$

$\mu\, m(g + a_1) = m\sqrt{\left(\dfrac{v^2}{R}\right)^2 + a_0^2}$

$v = \left[\left\{\mu^2(g + a_1)^2 - a_0^2\right\}R^2\right]^{\frac{1}{4}}$

23. Answer (1)

$F_{\max} \geq N\left(\dfrac{mv}{t}\right)$

$F_{\max} \geq n\,mv \qquad \left(\because n = \dfrac{N}{t}\right)$

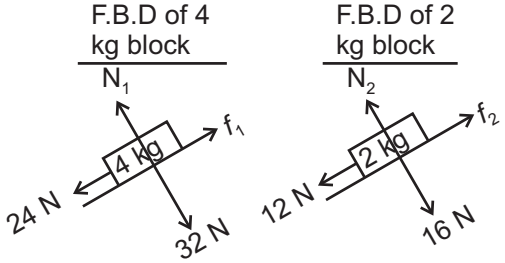
Now,

$n \leq \dfrac{160}{0.05 \times 500}$

$n \leq 6.4$

$\boxed{n \simeq 6}$

24. Answer (2)

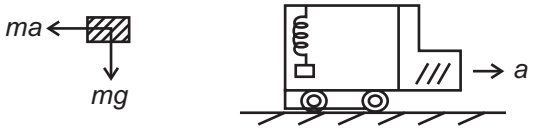


$f_1 = \mu_1 N_1 = 0.2 \times 40 \times \dfrac{4}{5} = 6.4\ \text{N}$

$f_2 = \mu_2 N_2 = 0.1 \times 20 \times \dfrac{4}{5} = 1.6\ \text{N}$

$a = \dfrac{24 + 12 - 6.4 - 1.6}{4 + 2} = \dfrac{36 - 8}{6} = 4.66\ \text{m/s}^2$

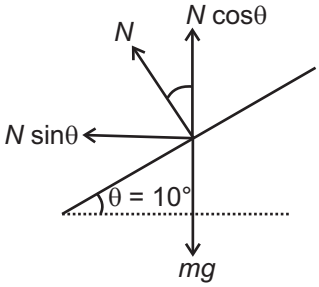
25. Answer (3)



$F_{sp} = m(a^2 + g^2)^{\frac{1}{2}}$

Hence, $\boxed{T > 60\ \text{kg}\,f}$

26. Answer (3)



$N\cos\theta = mg$

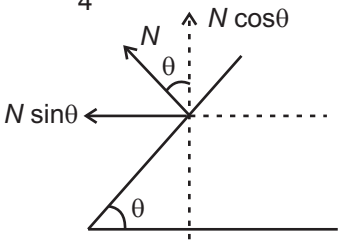
$N\sin\theta = \frac{mv^2}{R}$

$\tan\theta = \frac{v^2}{Rg}$

$R = \frac{v^2}{g\tan\theta} = \frac{200\times200}{10\times\tan10^\circ} \approx 23\,\text{km}$

27. Answer (3)

$a = \frac{8-4}{4} = 1\ \text{m/s}^2$



$8 - N\sin37^\circ = 2 \times 1$

$\frac{3N}{5} = 6 \Rightarrow N = 10$ N

28. Answer (1)

Area = ΔK

$\Rightarrow K_f - K_i = 36 \Rightarrow K_f - 400 = 36$

29. Answer (2)

At maximum compression both blocks have same velocity.

$P_f = P_i$ and $K_f = K_i$

$2mv = 3mv'$

$v' = \frac{2}{3}v$

$\frac{1}{2}(2m)v^2 - \frac{1}{2}(3m)\frac{4v^2}{9} = \frac{1}{2}Kx^2$

$x = \sqrt{\frac{2mv^2}{3K}}$

30. Answer (1)

$F + F = (60 + 20)g$

$F = 40$ kgf

31. Answer (1)

$\because \quad P = \frac{dK}{dt} \Rightarrow \Delta K = \int_0^t P\,dt$

32. Answer (3)

$F_{min} = \frac{\mu mg}{\sqrt{1+\mu^2}}$

33. Answer (4)

$\because \quad a = \frac{v^2}{r} = Kt^2$

$v^2 = Krt^2$

$\therefore \quad W = \frac{m}{2}v^2 = \frac{mKrt^2}{2}$

34. Answer (1)

$W = \int_0^{3a} F dx = \left|\frac{f_0x^2}{2a} - f_0x\right|_0^{3a} = \frac{3f_0a}{2}$

35. Answer (3)

Energy of colliding objects may be lost as heat but total energy is always conserved.

36. Answer (1)

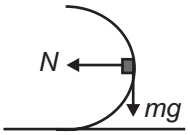
$h + 2e^2h + 2e^4h + 2e^6h + \ldots$

$h_{total} = \frac{1+e^2}{1-e^2}h$

37. Answer (4)

Due to internal forces, K.E. of system may change.

38. Answer (2)



$F = \sqrt{N^2 + (mg)^2}$

$\Rightarrow \quad N = \frac{mv^2}{R}$

$\Rightarrow \quad mg(5R) - mg(R) = \frac{1}{2}mv^2$

$\Rightarrow \quad \frac{mv^2}{R} = 8$ mg

$F = mg\sqrt{65}$

39. Answer (3)

$F_{net} = 20 + 0.5 \times 20 = 30$ N

Retardation $a = \frac{F_{net}}{m} = \frac{30}{2} = 15\,\text{m/s}^2$

$t = \frac{v}{a} = \frac{10}{15} = 0.67\,\text{s}$

40. Answer (4)

Since $E = K + U$

$K = E - U$

K can not be negative hence U should not be greater than E.

41. Answer (1)

Since collision is elastic hence velocities will be exchanged.

$\text{After collision } v_A = \sqrt{2gh}$

$v_B = \sqrt{8\,gh}$

$H_A = \frac{v_A^2}{2g} = h$

$H_B = \frac{v_B^2}{2g} = 4h$

$\frac{H_A}{H_B} = \frac{1}{4}$

42. Answer (3)

$\vec{r} = (1-1)\hat{i} + (5-0)\hat{j} + (3-1)\hat{k}$

$= (0\hat{i} + 5\hat{j} + 2\hat{k})\text{m}$

$\vec{F} = (2\hat{i} + 3\hat{j} + 2\hat{k})\ N$

$W = \vec{F}.\vec{r} = (2\hat{i} + 3\hat{j} + 2\hat{k}).(5\hat{j} + 2\hat{k})$

= 15 + 4 = 19 J

43. Answer (2)

$\Delta K = W$ = area under the F – x curve.

$K_i = 0$, $K_f = K$

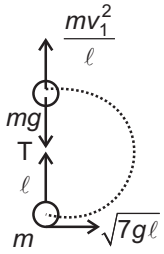
$K = 2 + 4 + 2 - 2 + 2 = 8$ J

$\frac{1}{2}mv^2 = 8$

$v^2 = 16$

$v = 4$ m/s

44. Answer (1)



From energy conservation

$\frac{1}{2}mv_1^2 + mg.2\ell = \frac{1}{2}mv^2$

$\frac{1}{2}mv_1^2 = \frac{7}{2}mg\ell - 2mg\ell$

$mv_1^2 = 3mg\ell$ ...(1)

Now,

$T = \frac{mv_1^2}{\ell} - mg = \frac{3mg\ell}{\ell} - mg$

$\boxed{T = 2mg}$

45. Answer (3)

$P_{out} = \eta\frac{W}{t} = \eta\frac{m}{t}gh$

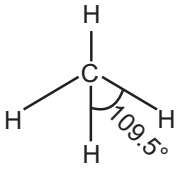
= 0.8 × 20 × 10 × 50

= 8000 W

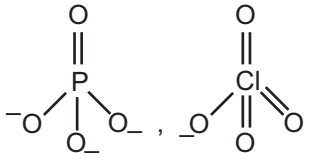
P_{out} = 8 kW

CHEMISTRY

46. Answer (1)



47. Answer (3)



48. Answer (1)

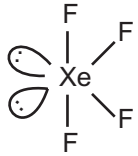
$IE_{1\ (Be)} > IE_{1\ (B)}$

49. Answer (2)

Carbon has maximum tendency of catenation.

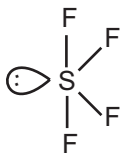
50. Answer (4)

51. Answer (3)



sp^3d^2

52. Answer (2)



$\mu \neq 0$

53. Answer (2)

54. Answer (1)

For isoelectronic ions, ionic radius $\propto \frac{1}{Z}$

55. Answer (4)

$P(V - b) = RT$

$$P = \frac{RT}{V - b}$$

56. Answer (1)

$$KE = \frac{3}{2}nRT$$

$$\therefore \text{ Ratio } = \frac{n_{H_2}}{n_{O_2}} = \frac{1.87/2}{5.53/32} = \frac{1.87 \times 32}{5.53 \times 2} = 5.4$$

57. Answer (1)

58. Answer (3)

59. Answer (2)

$$V_2 = V + \frac{30\ V}{100} = 1.3\ V$$

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}, \text{ So, } \frac{T_2}{T_1} = \frac{1.3\ V}{V} = 1.3$$

$\therefore \quad T_2 = 1.3\ T_1$

Increase in temperature = $T_2 - T_1$

$= 1.3\ T_1 - T = 0.3\ T_1$

Percentage increase = $\frac{0.3\ T_1}{T_1} \times \frac{100}{1} = 30\%$

60. Answer (4)

All have m.p. less than 35°C.

61. Answer (3)

3 lone pairs and 2 bond pairs are on central atom.

62. Answer (1)

63. Answer (2)

Mass of 1 dm^3 water vapour = 1000 × 0.0005 = 0.5 g

Volume of liquid water = $\frac{0.5}{1}$ = 0.5 ml

64. Answer (1)

$$P = \frac{dRT}{M}$$

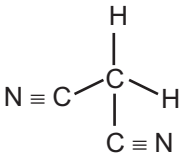
$$\frac{d_1}{d_2} = \frac{M_1}{M_2}$$

$$\Rightarrow \quad \frac{d_1}{d_2} = \frac{44}{44} = 1 : 1$$

65. Answer (4)

Smaller the size of cation greater will be the covalent character.

66. Answer (3)



π bonds = 4

$N \equiv C - C \equiv C - C \equiv N$ π bonds = 6

67. Answer (3)

C_2^{2-} has B.O. = 3

68. Answer (4)

BF_3 and $AlCl_3$ both have 6 electrons in their octet.

69. Answer (3)

PCl_3 has non zero dipole moment.

70. Answer (2)

71. Answer (2)

Bonding electron in N_2 = 10

Antibonding electron in N_2 = 4

So 2 pair of antibonding electrons.

72. Answer (4)

F is most electronegative element in periodic table.

73. Answer (1)

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

74. Answer (2)

Bond order = $\frac{2+1+1}{3} = 1.33$

75. Answer (1)

76. Answer (3)

77. Answer (4)

78. Answer (2)

79. Answer (3)

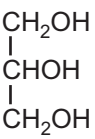
$$\frac{r_{H_2}}{r_{\mu C's}} = \sqrt{\frac{12n + 2n - 2}{2}} = \frac{3\sqrt{3}}{1}$$

$14n - 2 = 54$

$14n = 56$

$n = 4$

80. Answer (2)

Most H-bonded, 

81. Answer (1)

$$V_{rms} = \sqrt{\frac{3RT}{M}}$$

82. Answer (2)

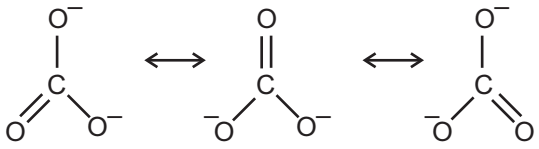
$$M = \frac{dRT}{P} = \frac{1.56 \times 0.0821 \times 338}{745/760} \approx 44 \text{ u}$$

83. Answer (2)

$n_1T_1 = n_2T_2$

84. Answer (2)

85. Answer (3)



$$B.O. = \frac{4}{3} = 1.33$$

B.O. of CO = 3

86. Answer (4)

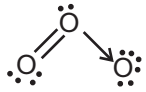
Both Li^+ and Be^{2+} are isoelectronic.

87. Answer (1)

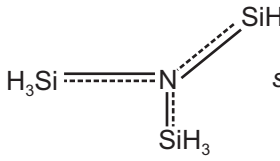
Smaller the size of ion greater will be its lattice energy.

88. Answer (2)

89. Answer (4)



90. Answer (3)



sp^2, Triagonal planar

BOTANY

91. Answer (4)

Synthesis of food in the presence of light is not the function of the root system.

92. Answer (3)

The floral formula of *Brassica* is

$\oplus \, ♀ \, K_{2+2} \, C_4 \, A_{2+4} \, \underline{G}_{(2)}$

93. Answer (2)

Pea, gulmohur and bean plants have zygomorphic symmetry of flower while tomato plants have actinomorphic flowers.

94. Answer (4)

Trichomes are absent in roots.

95. Answer (2)

The marginal placentation is a characteristic feature of Fabaceae family. The given four plants such as pea, muliathi, *Indigofera* and lupin are the members of Fabaceae family.

96. Answer (1)

China rose – Axile placentation

Argemone – Parietal placentation

Dianthus – Free-central placentation

Sunflower – Basal placentation

97. Answer (2)

Five united sepals ($K_{(5)}$), bicarpellary ovary, tap root and valvate aestivation of petals are characteristic features of Solanaceae family.

98. Answer (4)

Meristematic cells contain proplastids.

99. Answer (1)

Generally in monocots there are fibrous roots that arise from the base of the stem.

100. Answer (3)

Exarch xylem are found in monocot and dicot roots.

101. Answer (2)

Petiole is called mesopodium.

102. Answer (3)

Pith is absent in monocot stem.

103. Answer (1)

Sclereids are present in fruit walls of nuts and pulp of fruits like guava, pear and sapota etc.

104. Answer (2)

Monocot stem such as maize have this type of vascular bundles.

105. Answer (1)

Sieve tube and companion cells are connected through pit fields on longitudinal walls. The companion cell retain a nucleus throughout their life.

106. Answer (2)

Secondary growth occurs in dicots.

107. Answer (2)

Water molecules are unable to penetrate the endodermal layer in the area of casparian strip.

108. Answer (2)

109. Answer (1)

Lateral roots are endogenous and root hairs are exogenous in origin. Both have role in water absorption. Lateral root and root hairs both are non-green.

110. Answer (3)

Edible part in berry fruit of *Psidium guajava* are pericarp, placenta and thalamus.

111. Answer (4)

Brassica plants have tetramerous flowers.

112. Answer (1)

Plum, peach and rose plants have perigynous flowers while pea plants have superior ovary.

113. Answer (4)

Gladiolus plant stem is modified into corm.

114. Answer (2)

Monocot plants such as rice lacks phloem parenchyma.

115. Answer (2)

Albuminous cells – Gymnosperms

Bast fibers – Sclerenchymatous

Companion cells – Parenchymatous

Sieve tubes and companion cells – Absent in gymnosperms

116. Answer (3)

Lateral roots arise from pericycle.

117. Answer (1)

Ornamental : Lupin, Sweet pea, *Petunia*, *Gloriosa*.

Medicinal : *Aloe*, Belladonna, Muliathi.

118. Answer (3)

119. Answer (2)

Stilt roots – Sugarcane, Prop roots – Banyan tree

120. Answer (1)

The stamens may be united into one or more bunch is called cohesion of stamens.

121. Answer (3)

Cymose as in *Solanum*.

122. Answer (4)

The cells of this region show very low mitotic activity (quiescent).

123. Answer (1)

Seeds of coconut, onion, maize and barley are endospermous.

124. Answer (4)

Passage cells occur in endodermis.

125. Answer (2)

126. Answer (1)

The leaf tendrils develop in sweet pea.

127. Answer (2)

128 Answer (4)

129. Answer (2)

Both interfascicular cambium and intrafascicular cambium form the vascular cambium.

130. Answer (4)

(i) The peripheral region of the secondary xylem is lighter in colour and is known as the sapwood.

(ii) The region which comprises of dead elements with highly lignified walls, is called heartwood.

131. Answer (2)

The phellogen develops, usually in the cortex region.

132. Answer (3)

The structure that is formed early in the season is called soft or early bark and formed late in the season is called hard or late bark.

133. Answer (1)

The abundant starch grains may be found in endodermis of dicot stem.

134. Answer (3)

The mesophyll cells of monocot leaves are not differentiated into palisade and spongy parenchyma.

135. Answer (2)

The later formed primary phloem elements are called metaphloem.

The first formed primary xylem elements are called protoxylem.

ZOOLOGY

136. Answer (3)

137. Answer (4)

Acidic amino acids – Glutamic acid, aspartic acid

Basic amino acids – Lysine, arginine

Neutral amino acids – Valine, alanine, glycine, leucine, isoleucine

Aromatic amino acids – Tyrosine, phenylalanine, tryptophan

138. Answer (3)

Secondary metabolites are rubber, drugs, spices, and pigments.

139. Answer (1)

Glycolipids contain fatty acid, alcohol sphingosine and sugar (galactose).

Chromolipids contain pigments such as carotenoids e.g. carotene, vitamin A.

140. Answer (2)

Collagen and keratin have secondary structure of protein.

Haemoglobin has quaternary structure of protein.

141. Answer (4)

Dehydrogenases/oxidoreductases enzymes catalyse oxidoreduction between two substrates.

– Hydrolases enzymes catalysing hydrolysis of ester, ether, peptide, glycosidic, C–C, C-halide or P–N bonds.

– Ligases enzyme catalyses the linking together of two compounds, e.g. enzymes which catalyse joining of C–O, C–S, C–N, P–O etc. bonds.

142. Answer (1)

The base pairs in DNA are stacked 3.4 Å apart.

143. Answer (1)

Stearic acid is a saturated fatty acid.

144. Answer (4)

145. Answer (1)

Expiration occurs by contraction of tergo-sternal muscles. In cockroaches, inhalation is a passive process malpighian tubules are present at the junction of midgut and hindgut.

146 Answer (4)

Haversian system is the feature of shaft part of long mammalian bones.

147. Answer (3)

Muscles are not the connective tissues and urothelium is an epithelial tissue.

148. Answer (4)

Cockroach is nocturnal and omnivorous.

149. Answer (4)

There is single ejaculatory duct in male *P. americana.*

150. Answer (4)

Amylose consists of α, 1-4 glycosidic linkage between α-D glucose molecules. It is straight chain of 200-1000 glucose units.

151. Answer (2)

Compact bones have haversian system, site of haemopoiesis. Spongy bone consists of a network of many lines irregular bony plates of trabeculae.

152. Answer (3)

K_m (Michaelis constant) is the concentration of the substrate at which half the maximum velocity of the enzyme reaction is attained.

153. Answer (3)

Osteoclasts are found in bones only, not in cartilage and fibroblast cell secrete fibres and matrix.

154. Answer (2)

V_{max} remains same in the case of competitive inhibition.

155. Answer (3)

When two or more organs perform a common function by their physical and/or chemical interaction, they together form organ system.

156. Answer (1)

Simple columnar epithelium are found in the lining of stomach and intestine.

157. Answer (2)

Skeletal muscles are located at arms, legs, body wall, face and neck. Smooth muscles are non-striated muscle.

158. Answer (3)

Cartilage is solid and pliable and resist compression.

Bones have a hard and non-pliable ground substance.

159. Answer (2)

Neuroglial cells are specialised cells found in the brain and spinal cord supporting the neurons.

160. Answer (2)

Tendons, attach skeletal muscles to bones.

161. Answer (4)

Compound tissue is the part of epithelial tissue.

162. Answer (3)

Cellulose is not a protein. GLUT-4 enables glucose transport into cell. Proline is a heterocyclic amino acid and myoglobin is a protein, not sugar.

163. Answer (4)

In RNA, nitrogen base uracil present, so nucleotide will be uridylic acid RNA lacks thymine.

164. Answer (4)

Zwitter ion possesses both the charges.

165. Answer (3)

166. Answer (4)

Amylopectin is a part of starch and shows branching.

167. Answer (1)

Dorsal blood vessel has valves which prevent the back-flow of blood.

168. Answer (3)

The correct answer is a set of mucopoly-saccharides.

169. Answer (3)

In frog, scales are absent.

170. Answer (3)

Cyanide is a non-competitive inhibitor, hence does not bind to active site of enzyme.

171. Answer (3)

In frog, forelimb has four digit without web.

172. Answer (1)

In B-DNA, guanine and cytosine form three hydrogen bonds.

173. Answer (1)

The cutaneous respiration is carried out during summer sleep and winter sleep.

174. Answer (3)

The first body segment of earthworm is called the peristomium.

175. Answer (3)

Lymph glands are supposed to produce certain phagocytic cell.

176. Answer (1)

10 pairs of spiracles are present on the lateral side of the cockroach.

177. Answer (1)

Forebrain of frog, comprises two olfactory lobes, two cerebral hemispheres and unpaired diencephalon.

Hindbrain comprises cerebellum and medulla oblongata.

178. Answer (4)

In frog columella auris connects the tympanic membrane with the inner ear and transmits the sound.

179. Answer (2)

Brain of cockroach is represented by supra-oesophageal ganglion which is large bilobed mass located in head above oesophagous.

180. Answer (3)

In cockroach vision is mosaic and apposition image is formed.