FINAL TEST SERIES for NEET-2023

Test -2

MM : 720

Time : 3 Hrs. 20 Mins.

Topics covered :

Physics : Laws of Motion, Work, Energy and Power, System of Particles and Rotational Motion

Chemistry : Chemical Bonding and Molecular Structure, States of Matter: Gases and Liquids, Thermodynamics

Botany : Morphology of Flowering Plants, Anatomy of Flowering Plants

Zoology : Structural Organization in Animals, Biomolecules


Instructions :

(i) There are two sections in each subject, i.e. Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 1

(ii) Each question carries 4 marks. For every wrong response 1 mark shall be deducted from the total score. Unanswered / unattempted questions will be given marks.

(iii) Use blue/black ballpoint pen only to darken the appropriate circle.

(iv) Mark should be dark and completely fill the circle.

(v) Dark only one circle for each entry.

(vi) Dark the circle in the space provided only.

(vii) Rough work must not be done on the Answer sheet and do not use white-fluid or any other rubbing material on the Answer sheet.

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PHYSICS

Choose the correct answer :

SECTION - A

1. A block of mass m is suspended through a vertical spring of spring constant k as shown in the figure. If the block is pulled down by a distance $\frac{mg}{4k}$ from equilibrium position, and released, then the initial acceleration of the block will be
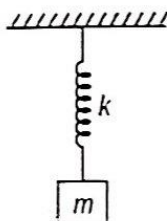

(1) $g/3$

(2) $g/4$

(3) $g/5$

(4) g

2. A bullet of mass 40 g is fired from a gun with initial velocity of 40 m/s. If the mass of the gun is 3 kg, then the recoil velocity of the gun just after fire will be

(1) 3.6 m/s

(2) 1.87 m/s

(3) 0.53 m/s

(4) 1 m/s

3. The tension in the string as shown in the figure is [$g = 10$ m/s²] (All surfaces are smooth)
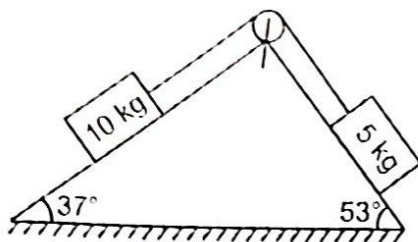
(1) 23.3 N   (2)   50 N
(3) 30 N   (4)   46.67 N

4. A block of mass 2 kg is placed on the top of a block of mass 4 kg as shown in the figure. The coefficient of friction between the blocks is 0.2, while the ground is smooth. The acceleration of 2 kg block, with respect to ground is
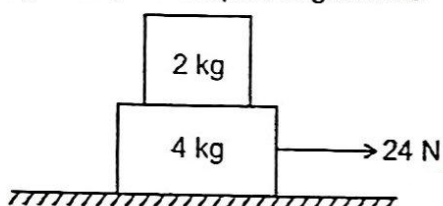

(1) 1 m/s²   (2)   8 m/s²
(3) 4 m/s²   (4)   2 m/s²

5. A force $F(t) = (6 - 8t)$ N varying with time (t) acts on a particle moving along x-axis. The magnitude of impulse imparted to the particle from $t = 0$ to $t = 10$ s is

(1) 300 N s   (2)   340 N s
(3) 210 N s   (4)   120 N s

6. Two blocks A and B of masses $2m$ and $4m$ respectively are connected to each other by an ideal spring. The whole system is suspended in equilibrium with the help of an inextensible string as shown in the figure. Acceleration of A just after cutting the string, is
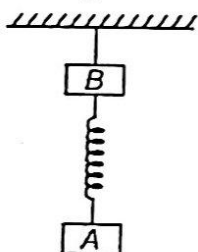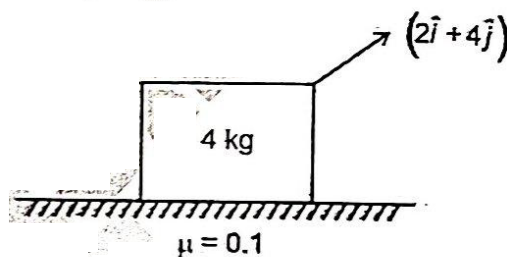

(1) $\dfrac{g}{2}$

(2) $2g$

(3) g

(4) Zero

7. The linear momentum (P) versus time (t) graph for a particle is as shown in the figure. The particle will be in equilibrium at time (t) equal to
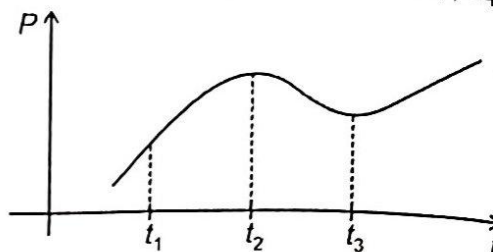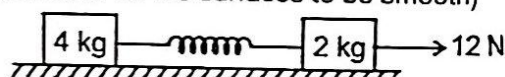

(1) t_1

(2) t_2

(3) t_3

(4) Both (2) and (3)

8. A force $(2\hat{i} + 4\hat{j})$ N acts on a block of mass 4 kg as shown in the figure. The frictional force acting on the block is ($g = 10$ m/s²)

(1) 3 N   (2) 4 N
(3) 1 N   (4) 2 N

9. Consider the system of blocks as shown in the figure. The acceleration of 4 kg block, when the 2 kg block has an acceleration 4 m/s² is (Consider all the surfaces to be smooth)

(1) 3 m/s²   (2) 4 m/s²
(3) 1 m/s²   (4) 2 m/s²

10. Two masses of 15 kg each are suspended through two strings tied to a spring balance after passing over frictionless pulleys. The reading of spring balance in this situation will be
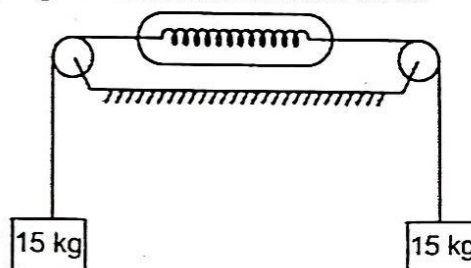
(1) 15 kg   (2) 30 kg
(3) 60 kg   (4) Zero

11. Two masses A and B are suspended vertically with help of two strings as shown in the figure. The ratio of tension in strings is α. If the whole apparatus is taken in an elevator accelerating upwards, then this ratio
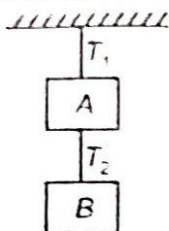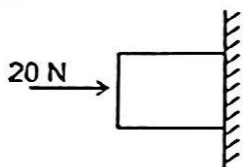

(1) Increases
(2) Decreases
(3) Remains same
(4) None of these

12. A horizontal force of 20 N is necessary to just hold a block stationary against a vertical wall as shown in the figure. The coefficient of friction between the block and the wall is 0.4. The weight of the block is

(1) 8 N
(2) 16 N
(3) 4 N
(4) 10 N

13. A particle is displaced from $(1\ m, 2\ m)$ to $(2\ m, 4\ m)$. If work done by force $\vec{F} = 2\hat{i} + \alpha\hat{j}$ is zero for the given displacement, then α is equal to

(1) -1
(2) 1
(3) 2
(4) -2

14. An engine slowly lifts 90 tonne of coal per hour from a mine whose depth is 200 m. Average power developed by the engine is $(g = 9.8\ m/s^2)$

(1) 176.4 kW
(2) 22 kW
(3) 89 kW
(4) 49 kW

15. A block of mass m is suspended by a light string from an elevator. The elevator starts accelerating downward from rest with uniform acceleration a. The work done by tension in the string on the block during first t second is $(a < g)$
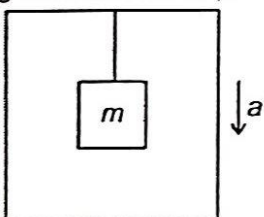
(1) $\dfrac{m}{2}(a-g)at^2$
(2) $m(a-g)at^2$
(3) $\dfrac{m}{2}(g+a)at^2$
(4) $m(g+a)at^2$

16. Consider the motion of a particle with total mechanical energy E. If U denotes potential energy, K denotes kinetic energy and E denotes mechanical energy then which of the following is not possible?

(1) $U < E$
(2) $U > E$
(3) $K > E$
(4) $K < E$

17. The approximate energy required to turn a page of an Aakash study package is 10^{-3} J. The energy in electron-volt is

(1) 1.88×10^9 eV
(2) 1.6×10^{-22} eV
(3) 3.46×10^{16} eV
(4) 6.25×10^{15} eV

18. A rigid body of mass 4 kg is under the influence of a force such that its displacement at any time t (in second) is $s = \dfrac{t^2}{2}$ metre. The work done by the force in first two seconds will be

(1) 4 J
(2) 6 J
(3) 8 J
(4) 10 J

19. A particle is dropped from a certain height. Taking g to be constant everywhere, the variation of total mechanical energy of the particle as a function of time before striking the ground is best represented by (Neglect air resistance)
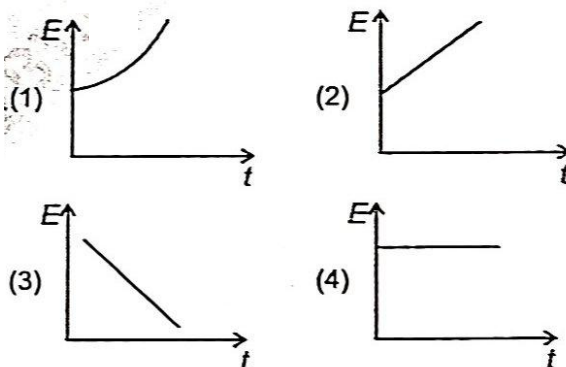
20. A particle is dropped from a height 100 m. If the coefficient of restitution of the particle with the ground is $\dfrac{1}{2}$, then the maximum height attained by the particle after three collisions with the ground is

(1) 15.625 m
(2) 31.25 m
(3) 1.5625 m
(4) 3.125 m

21. The relationship between the force F and position X of a body is as shown in figure. The work done in displacing the body from X = 0 to X = 6 m is
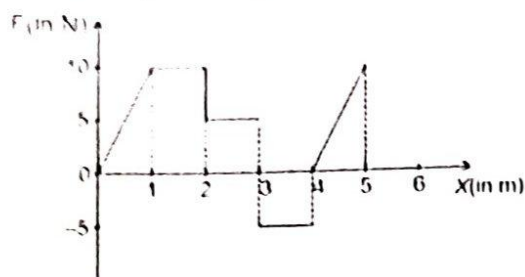
(1) 30 J   (2) 15 J

(3) 25 J   (4) 20 J

22. The principle of conservation of mechanical energy may be valid, if

(1) There is no external force on the system

(2) There is external force on the system

(3) There is internal force on the system

(4) All of these

23. Work done by internal forces on a system is

(1) Positive   (2) Negative

(3) Always zero   (4) Both (1) and (2)

24. It is observed that on applying a force the kinetic energy of a body is increasing continuously. Then it can be concluded that

(1) The resultant force is parallel to the velocity at all instants

(2) The angle between resultant force and velocity is acute

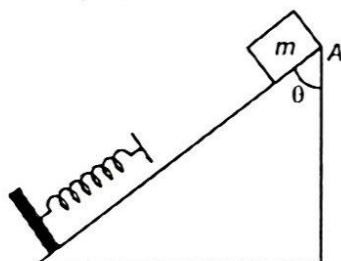(3) The resultant force is antiparallel to the velocity at all instants

(4) The angle between resultant force and velocity is obtuse

25. A block of mass m is released from rest at point A. The compression of spring when the speed of block is maximum, is

(1) $\dfrac{mg\sin(\theta)}{k}$ (2) $\dfrac{2mg\sin(\theta)}{k}$

(3) $\dfrac{mg\cos(\theta)}{k}$ (4) $\dfrac{mg}{k}$

26. A hollow sphere of radius 0.5 m and mass 10 kg, rolls on a horizontal surface. Its centre of mass has speed 60 cm/s. Magnitude of work required to stop it completely is

(1) 3 J   (2) 5 J

(3) 1.8 J   (4) 1.2 J

27. From a disc of radius R and mass M, a circular hole of radius $\dfrac{R}{2}$ is removed concentric to the disc. The moment of inertia of remaining part of disc about an axis perpendicular to plane and passing through centre of original disc is

(1) $\dfrac{15}{32}MR^2$ (2) $\dfrac{16}{32}MR^2$

(3) $\dfrac{12}{37}MR^2$ (4) $\dfrac{18}{37}MR^2$

28. A point mass m moves in a circle of radius R with speed v on a smooth horizontal table, with the help of a string whose other end passes through a hole in the table. By pulling the string, the radius of circle is reduced to $\dfrac{2R}{3}$. The final angular momentum of mass is

(1) $\dfrac{3}{2}mvR$ (2) $\dfrac{2}{3}mvR$

(3) mvR (4) $\dfrac{1}{3}mvR$

29. Three identical uniform spheres, each of mass M and radius R, are placed as shown in figure. The moment of inertia of the system about the axis AB is
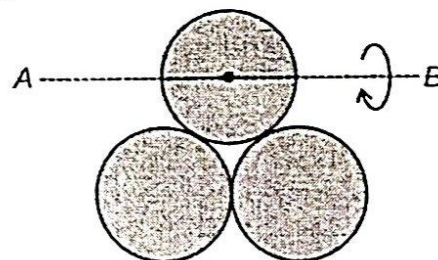
(1) $\dfrac{46}{5}MR^2$ (2) $\dfrac{36}{5}MR^2$

(3) $\dfrac{19}{5}MR^2$ (4) $\dfrac{17}{5}MR^2$

30. A solid sphere of mass 2 kg rolls down a fixed inclined plane of height 7 m. The rotational kinetic energy of sphere at bottom of plane is ($g = 10$ m/s²)

(1) 40 J   (2) 50 J

(3) 100 J   (4) 140 J

31. A constant torque of 10 N m is applied on a wheel having angular momentum 5 kg m²/s. If torque is supporting the motion of wheel, then angular momentum of the wheel after 3 second is

(1) 35 kg m²/s   (2) 30 kg m²/s

(3) 40 kg m²/s   (4) 25 kg m²/s

32. Two rings each of mass M and radius R, are placed with common centre such that their planes are mutually perpendicular. The moment of inertia of the system about an axis through the centre and perpendicular to plane of one of the ring is

(1) $\dfrac{5}{2}MR^2$ (2) MR^2

(3) $\dfrac{3}{2}MR^2$ (4) $2MR^2$

33. A particle of mass 2 kg is projected at an angle of 60° above the horizontal, with a speed 20 m/s. The magnitude of angular momentum of the particle about point of projection, when it is at maximum height will be
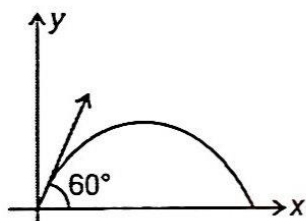
(1) 300 kg m²/s   (2) $120\sqrt{3}$ kg m²/s

(3) $40\sqrt{3}$ kg m²/s   (4) 150 kg m²/s

34. A wheel starts from rest and rotates with a constant angular acceleration of 2.0 rad/s². The number of revolutions made by wheel in 10 s is nearly

(1) 10   (2) 12

(3) 16   (4) 20

35. A uniform cylinder is released, from rest from top of an inclined plane of inclination θ and length l. If cylinder rolls without slipping, the speed of cylinder at bottom of plane is

(1) $\sqrt{\dfrac{4}{3}gl\sin\theta}$ (2) $\sqrt{\dfrac{2}{3}gl\sin\theta}$

(3) $\sqrt{gl\sin\theta}$ (4) $\sqrt{2gl\sin\theta}$

SECTION - B

36. The position-time graph of a body of mass 12 kg is given in the figure. The impulse on the body at $t = 4$ second is
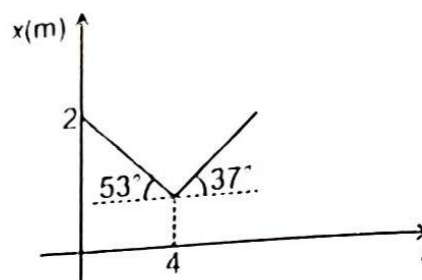
(1) 34 kg m/s   (2) 28 kg m/s

(3) 12 kg m/s   (4) 25 kg m/s

37. A uniform thick rope of length 10 m is pulled on a frictionless surface by a force of 10 N which is applied at one of its end along the surface. The tension in the rope at a distance 1 m from this end will be

(1) 1 N   (2) 5 N

(3) 9 N   (4) 10 N

38. A block of mass 4 kg falls on a spring from a height of 15 cm. If the spring constant of spring is 2000 N/m, then maximum compression in spring will be
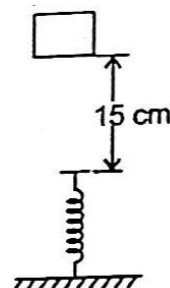
(1) 14 cm   (2) 18.2 cm

(3) 12.6 cm   (4) 10 cm

39. A small bob of mass m suspended by a massless inextensible string is rotated in a vertical circle of radius l. The minimum horizontal speed that must be imparted to the bob (when the bob is vertically suspended) such that the bob just completes circular path is

(1) $\sqrt{5gl}$ (2) $\sqrt{4gl}$

(3) $\sqrt{2gl}$ (4) $\sqrt{6gl}$

40. There are two blocks of equal masses. If the blocks are raised vertically through a height h such that one block is raised in time 10 s and other block in time 20 s, then the ratio of work done by gravity on the blocks is

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

(3) 6 : 1   (4) 4 : 1

41. Two bodies of masses $3m$ and $4m$ have their kinetic energy in the ratio 3 : 1 respectively. The ratio of their momenta is

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

    (3) $3 : 1$ (4) $4 : 3$

42. The linear mass density of a rod of length l, with lighter end at origin is given $\lambda = (2 + 3x^2)$. The distance of centre of mass of rod from origin is

    (1) $\dfrac{l(4 + 3l^2)}{(2 + l^2)}$ (2) $\dfrac{l(4 + 3l^2)}{2(2 + l^2)}$

    (3) $\dfrac{l(4 + 3l^2)}{4(2 + l^2)}$ (4) $\dfrac{l}{2}$

43. A uniform circular plate of diameter d is kept in contact with a uniform square plate of edge d as shown in figure. The thickness and density of material are same everywhere. The centre of mass of composite system will be
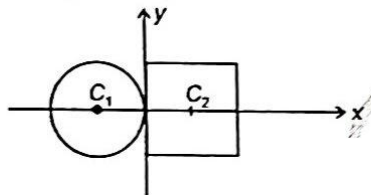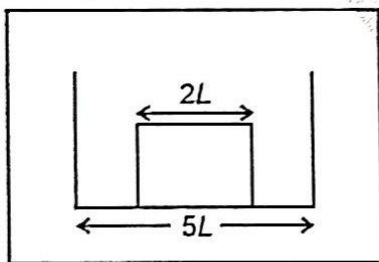

    (1) Towards left of origin
    (2) Towards right of origin
    (3) At origin
    (4) Outside the two plates

44. Consider a gravity free hall in which a tray of mass M, carrying a cubical block of ice of mass m and edge $2L$, is at rest in the middle. If ice melts by what distance does the centre of mass of the tray and ice system descend?

    (1) $\dfrac{L}{3}$ (2) $\dfrac{L}{4}$

    (3) $\dfrac{L}{2}$ (4) Zero

45. A man of mass 50 kg is at one end of 6 m long boat of mass 100 kg rests in still water. The man moves to the centre of boat and sits there. The centre of mass of the system will shift by

    (1) 0 m (2) 1 m

    (3) 5/3 m (4) 1.5 m

46. A small ball of mass 8 kg is moving with speed 6 m/s and it strikes with a vertical wall perpendicularly. If coefficient of restitution between the ball and vertical wall is $\dfrac{1}{3}$ then the ball will rebound with speed

    (1) 4 m s^{-1} (2) 18 m s^{-1}

    (3) 2 m s^{-1} (4) 12 m s^{-1}

47. A person sitting firmly over a rotating chair has his arms stretched. If he fold his arms, his kinetic energy about the axis of rotation

    (1) Increases
    (2) Decreases
    (3) Remain same
    (4) Data insufficient

48. A spring of spring constant K is attached to the ceiling. A block of mass M is attached to its lower end and is released suddenly from its natural length. Maximum extension in spring will be

    (1) $\dfrac{Mg}{K}$ (2) $\dfrac{Mg}{2K}$

    (3) $\dfrac{2Mg}{K}$ (4) $\dfrac{3Mg}{K}$

49. A van is moving with an acceleration g m/s². A man inside the van drops a coin outside the window. If mass of the coin is m then net force acting on the coin just after release will be

    (1) mg (2) $mg\sqrt{2}$

    (3) 0 (4) $2mg$

50. Consider the diagram given below, if there is no relative motion between the block M and m then the minimum co-efficient of friction between the blocks will be

Smooth

    (1) $\mu = \dfrac{g}{a}$

    (2) $\mu = \dfrac{a}{g}$
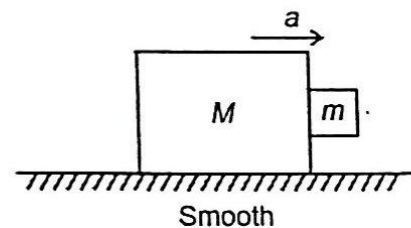
    (3) $\mu = \dfrac{29}{g}$

    (4) $\mu = \dfrac{2g}{9}$

CHEMISTRY

SECTION - A

51. Polar molecule among the following is
    (1) BF_3
    (2) CO_2
    (3) BeF_2
    (4) H_2O

52. Shape of SF_4 molecule is
    (1) See-saw
    (2) Tetrahedral
    (3) Square planar
    (4) Octahedral

53. Zero overlap takes place between which of the following, if x-axis is the inter-nuclear axis?
    (1) 1s and 2s
    (2) $2p_x$ and 2s
    (3) $2p_y$ and $2p_y$
    (4) $2p_x$ and 1s

54. In the given compound $CH_3 - CH = \overset{\bullet}{C} = CH_2$, hybridisation of the marked carbon atom is
    (1) sp
    (2) sp^2
    (3) sp^3
    (4) dsp^2

55. Number of 90° angle(s) in PCl_5 is
    (1) Zero
    (2) 3
    (3) 5
    (4) 6

56. Given below are two statements.
    Statement I: Both NF_3 and NH_3 are pyramidal in shape.
    Statement II: Dipole moment of NF_3 is greater than NH_3.
    In light of the above statements, choose the correct answer.
    (1) Both statement I and statement II are correct
    (2) Both statement I and statement II are incorrect
    (3) Statement I is incorrect but statement II is correct
    (4) Statement I is correct but statement II is incorrect

57. Which of the following molecular orbitals does not contain nodal plane?
    (1) $\sigma 1s$
    (2) $\sigma^* 1s$
    (3) $\pi^* 2p_x$
    (4) $\sigma^* 2p_z$

58. Which of the following species contains only π bond?
    (1) H_2
    (2) C_2
    (3) N_2
    (4) O_2

59. Paramagnetic species among the following is/are
    I. N_2^-
    II. N_2^-
    III. O_2

    (1) I only
    (2) II & III only
    (3) III only
    (4) I, II & III

60. Which of the following species does not exist?
    (1) He_2^+
    (2) H_2
    (3) Li_2
    (4) Be_2

61. A gaseous mixture contains equal masses of CH_4, O_2 and SO_2. If the total pressure is 10 atm, then the partial pressure of CH_4 in the mixture is
    (1) $\dfrac{60}{7}$ atm
    (2) $\dfrac{40}{7}$ atm
    (3) 5 atm
    (4) $\dfrac{30}{7}$ atm

62. 200 mL of SO_2 diffuse in 100 seconds, then the volume of CH_4 which diffuses in 100 seconds under identical conditions is
    (1) 50 mL
    (2) 100 mL
    (3) 200 mL
    (4) 400 mL

63. Unit of van der Waals constant b is
    (1) L mol
    (2) mol L^{-1}
    (3) L mol^{-1}
    (4) mol L^{-2}

64. In which of the following processes, entropy increases?
    (1) Boiling of egg
    (2) Stretching of rubber
    (3) Freezing of water
    (4) Condensation of water vapour

65. Which of the following is an extensive property?
    (1) Temperature
    (2) Volume
    (3) Density
    (4) Pressure

66. Heat capacity for adiabatic process is
    (1) Zero
    (2) 1
    (3) Infinite
    (4) R

67. Work done in a reversible isothermal expansion is given by
    (1) $-2.303 \, nRT \log \dfrac{V_f}{V_i}$
    (2) $2.303 \, nRT \log \dfrac{P_i}{P_f}$
    (3) $2.303 \, nR \log \dfrac{V_f}{V_i}$
   (4) $2.303 \, nR \log \dfrac{P_i}{P}$

68. The amount of heat required to raise the temperature of 21 g of aluminium from 250 K to 350 K is (Specific heat of aluminium is $0.9 \text{ J } (^\circ\text{C})^{-1} \text{ g}^{-1}$)
    (1) 1590 J   (2) 2010 J
    (3) 1890 J   (4) 2400 J

69. The thermodynamic process for which volume remains constant is
    (1) Isothermal process   (2) Isobaric process
    (3) Adiabatic process   (4) Isochoric process

70. Which among the following is a correct relation for the given process?
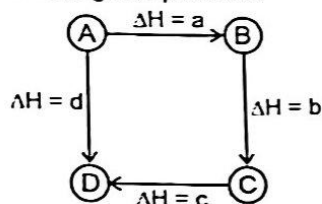
    (1) $a - b = d - c$ (2) $a + b = d - c$
    (3) $b + c = a + d$ (4) $a - d = b + c$

71. Which of the following has $\Delta_f H^\circ = 0$?
    (1) $Br_2(l)$ (2) $H_2O(l)$
    (3) $C_6H_6(l)$ (4) $C_{(diamond)}$

72. The third law of thermodynamics deals with
    (1) Absolute entropy   (2) Enthalpy
    (3) Free energy   (4) Internal energy

73. Which of the relation is incorrect for irreversible free expansion of an ideal gas under isothermal condition?
    (1) $\Delta H = 0$ (2) $q = 0$
    (3) $w = 0$ (4) $\Delta S_{total} = 0$

74. For a sample of perfect gas when its volume is changed isothermally from V_1 to V_2, the entropy change is
    (1) $\Delta S = nRT \ln \dfrac{V_1}{V_2}$ (2) $\Delta S = nR \ln \dfrac{V_2}{V_1}$
    (3) $\Delta S = nRT \ln \dfrac{V_2}{V_1}$ (4) $\Delta S = nR \ln \dfrac{V_1}{V_2}$

75. The path function among the following is
    (1) Internal energy   (2) Enthalpy
    (3) Entropy   (4) Work

76. ΔH_f for C_2H_4 = 12.5 kcal mol^{-1}
    Heat of atomisation of C = 171 kcal mol^{-1}
    Bond energy of H_2 = 104.3 kcal mol^{-1}
    Bond energy C – H = 99.3 kcal mol^{-1}
    What is C = C bond energy?
    (1) 140.9 kcal mol^{-1} (2) 76 kcal mol^{-1}
    (3) 65 kcal mol^{-1} (4) 41 kcal mol^{-1}

77. If calorific value of CH_4 is x kJ/g then the heat of combustion of CH_4 (in kJ/mol) is
    (1) $\dfrac{x}{16}$ (2) 16x
    (3) x   (4) $\dfrac{16}{x}$

78. The value of ΔH and ΔS for the reaction, C(graphite) + CO_2(g) → 2CO(g) are 170 kJ mol^{-1} and 170 J K^{-1} mol^{-1} respectively. This reaction will be spontaneous at
    (1) 950 K   (2) 900 K
    (3) 750 K   (4) 1200 K

79. Consider the following P vs V plot, and choose the correct relation between T_1, T_2, T_3.
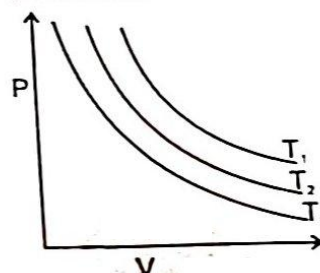
    (1) $T_1 < T_3 < T_2$ (2) $T_3 < T_2 < T_1$
    (3) $T_3 < T_1 < T_2$ (4) $T_1 < T_2 < T_3$

80. If pressure of a gas increases upto four times keeping temperature constant, then its most probable speed will
    (1) Become two times
    (2) Remains unchanged
    (3) Become four times
    (4) Become half

81. The correct relation for critical temperature of a gas with van der Waals constant is
    (1) $T_c = \dfrac{a}{8Rb}$ (2) $T_c = \dfrac{8a}{27Rb}$
    (3) $T_c = \dfrac{a^2}{27Rb}$ (4) $T_c = 3b$

82. The temperature at which the root mean square velocity of CH_4 molecules is same as that O_2 at 27° C is
    (1) 350 K   (2) 300 K
    (3) 200 K   (4) 150 K

83. Which among the following gas show maximum deviation from ideal gas behaviour?
    (1) He   (2) NH_3
    (3) O_2 (4) CH_4

84. Which among the following mixture of gases does not obey Dalton's law of partial pressure at room temperature?
    (1) NO_2 & O_2 (2) SO_2 and SO_3
    (3) CO_2 and He   (4) NH_3 and HCl

85. Match the molecules given in list I with their shapes given in list II

	List I		List II
a.	SF₆	(i)	Tetrahedral
b.	CCl₄	(ii)	Trigonal Planar
c.	XeF₄	(iii)	Octahedral
d.	SO₃	(iv)	Square planar

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

SECTION - B

86. The hybridisation of Cl in ClF_3 is
   (1) sp^3d
   (2) sp^3d^2
   (3) sp^3
   (4) dsp^2

87. Formal charge on N in $\overset{..}{O}{=}N{-}\overset{..}{\underset{..}{O}}{:}$ is
   (1) Zero
   (2) −1
   (3) +1
   (4) +3

88. Which among the given molecules does not contain central atom with expanded octet?
   (1) PF_5
   (2) SF_6
   (3) H_2SO_4
   (4) NH_3

89. Given below are two statements.
   Statement I: Acetone is soluble in water.
   Statement II: Acetone forms intermolecular hydrogen bond with water.
   In light of the above statements, choose the correct answer.
   (1) Statement I is correct but statement II is incorrect
   (2) Statement I is incorrect but statement II is correct
   (3) Both statement I and statement II are incorrect
   (4) Both statement I and statement II are correct

90. Which among the given pairs does not have identical bond order?
   (1) O_2^{2-} and F_2
   (2) N_2^{2-} and C_2^{2-}
   (3) N_2 and O_2^{2-}
   (4) C_2 and O_2

91. Vapour pressure of liquid depends on
   I. Temperature
   II. Interparticle attraction
   III. Surface area
   (1) I & III only
   (2) II & III only
   (3) I, II & III
   (4) I & II only

92. Density of an ideal gas is maximum at
   (1) High pressure and low temperature
   (2) Low pressure and high temperature

(3) High pressure and high temperature
(4) Low pressure and low temperature

93. S.I. unit of surface tension is
   (1) Nm^{-1}
   (2) Nm
   (3) $N^{-1}m$
   (4) N^2m

94. The normal boiling point of water is
   (1) 100°C
   (2) 99.6°C
   (3) 100.4°C
   (4) 99.1°C

95. Statement I: Particles of a gas move in all directions in straight line.
   Statement II: Collision of gas molecules are perfectly elastic.
   In the light of above statements, the correct option is
   (1) Both statement I & II are correct
   (2) Both statement I & II are incorrect
   (3) Statement I is correct but statement II is incorrect
   (4) Statement I is incorrect but statement II is correct

96. For one mole of a gas, γ is equal to 1.66, the gas will be
   (1) Monoatomic
   (2) Diatomic
   (3) Triatomic
   (4) Tetraatomic

97. Necessary condition for spontaneity is
   (1) $\Delta S_{system} = 0$
   (2) $\Delta H_{system} < 0$
   (3) $\Delta G = 0$
   (4) $\Delta S_{total} > 0$

98. Consider the following reactions
   (i) $C\text{ (graphite, s)} + 2H_2O(l) \to CO_2(g) + 2H_2(g)$;
   $\Delta H° = -a$ kJ/mol
   (ii) $C\text{ (graphite, s)} + O_2(g) \to CO_2(g)$;
   $\Delta H° = -b$ kJ/mol
   (iii) $CH_4(g) + 2O_2(g) \to CO_2(g) + 2H_2O(l)$;
   $\Delta H° = -c$ kJ/mol
   (iv) $CO(g) + \dfrac{1}{2}O_2(g) \to CO_2(g)$;
   $\Delta H° = -d$ kJ/mol
   $\Delta H°$ of $CO_2(g)$ will be
   (1) $-a$ kJ/mol
   (2) $-b$ kJ/mol
   (3) $-c$ kJ/mol
   (4) $-d$ kJ/mol

99. If enthalpies of formation of $CH_4(g)$, $CO_2(g)$ and $H_2O(l)$ at 25°C and 1 atm pressure are −x, −y and −z kJ/mol respectively, then enthalpy of combustion of $CH_4(g)$ will be
   (1) $x - y - z$ kJ/mol
   (2) $x - y - 2z$ kJ/mol
   (3) $z + x - y$ kJ/mol
   (4) $z - 2x - y$ kJ/mol

100. The change in internal energy if 50 J of heat is given to the system at constant pressure and 20 J of work is done by the system will be
   (1) −30 J
   (2) 30 J
   (3) −70 J
   (4) 70 J

BOTANY

SECTION - A

101. Radial and bilateral symmetry is found respectively in flowers of
    (1) Pea and tomato
    (2) Sem and chilli
    (3) Chilli and pea
    (4) Bean and pea

102. Find the **mismatched** pair.
    (1) Root cap — Protects the tender apex of the root
    (2) Region of elongation — Increased vacuolation
    (3) Region of maturation — New cell wall deposition
    (4) Region of meristematic activity — Covers the root cap and protect it

103. When the ovules are borne on central axis and septa are absent, the placentation is
    (1) Axile
    (2) Free central
    (3) Basal
    (4) Marginal

104. Prop roots found in banyan trees
    (1) Are responsible for photosynthesis
    (2) Provide mechanical support
    (3) Enter the soil obliquely for storage of food
    (4) Are modified for respiration

105. In vexillary aestivation, the largest petal that overlaps the two smaller lateral petals is called
    (1) Keel
    (2) Wings
    (3) Standard
    (4) Pedicel

106. The stamens may be united into one bunch or one bundle termed as
    (1) Epipetalous
    (2) Staminode
    (3) Monoadelphous
    (4) Epiphyllous

107. Stem tendrils
    (a) Are long, thin thread-like structures
    (b) Provide support to weak and tender stem
    (c) Are found in *Pistia* and *Eichhornia*
    Correct statements are
    (1) All (a), (b) and (c)
    (2) Only (a) and (c)
    (3) Only (a) and (b)
    (4) Only (b) and (c)

108. Find the **correctly** matched option.
    (1) Racemose — Acropetal succession — Mustard
    (2) Racemose — Basipetal succession — Radish
    (3) Cymose — Acropetal succession — Teak
    (4) Cymose — Basipetal succession — Lupin

109. Perigynous flowers are seen in
    (1) Guava
    (2) Mustard
    (3) China rose
    (4) Plum

110. In insectivorous plant such as *Nepenthes*
    (1) Leaves are modified for storage of food
    (2) Lamina of leaves is modified into pitcher
    (3) Stem is modified to trap insects
    (4) Petiole of leaves is modified into pitcher

111. Inner layer of seed coat is called
    (1) Testa
    (2) Hilum
    (3) Tegmen
    (4) Micropyle

112. In some flowers like lily, calyx and corolla not distinct and are termed as
    (1) Thalamus
    (2) Receptacle
    (3) Perianth
    (4) Bract

113. Pneumatophores in *Rhizophora* are
    (1) Modified stems and helpful in respiration
    (2) Modified roots and helpful in photosynthesis
    (3) Modified roots and helpful to get oxygen respiration
    (4) Modified leaves and perform as organs for perennation

114. Mature seeds of orchid, are
    (1) Non-endospermic
    (2) Endospermic and without cotyledons
    (3) Perispermic with two cotyledons
    (4) Endospermic with two cotyledons

115. All of the following statements are correct w.r.t. racemose inflorescence, **except**
    (1) The main axis continues to grow
    (2) The floral axis does not terminate into a flower
    (3) The floral axis is limited in growth
    (4) The younger flowers are present towards the apex

116. Aleurone layer in monocotyledonous seeds is
    (1) Triploid and is part of scutellum
    (2) Diploid and is part of endosperm
    (3) Diploid and is part of perisperm
    (4) Triploid and is outer covering of endosperm

117. Collenchyma
    (1) May perform photosynthesis
    (2) Is mainly found in roots
    (3) Has cell wall composed of pectin and lignin
    (4) Is a non living mechanical tissue

118. Match the following columns and select the correct option

	Column I		Column II
a.	Variation in the length of filaments within a flower	(i)	Pea
b.	Epiphyllous condition	(ii)	Brinjal
c.	Diadelphous condition	(iii)	Lily
d.	Stamens attached to the petals	(iv)	Mustard

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

119. Find the **incorrect** match

(1) Runner — Grass
(2) Food storing fleshy leaves — Onion
(3) Stolon — Water hyacinth
(4) Tuber — Potato

120. Companion cells
(1) Are specialised sclerenchymatous cells
(2) Are closely associated with sieve tube elements
(3) Lack nucleus at maturity
(4) Are found in gymnosperms

121. The innermost layer of cortex is called
(1) Epiblema
(2) Endodermis
(3) Hypodermis
(4) Epidermis

122. Find the **odd** one out w.r.t. intercalary meristem.
(1) It is intercalated between meristematic tissues
(2) These are separated from the apex of organ by mature tissues
(3) They add to the length of plants or its organs
(4) They are also found in grasses to regenerate the parts removed by grazing herbivores

123. Periderm includes
(1) Phellogen and phellem only
(2) Phellogen, phellem and phelloderm
(3) Phellem and phelloderm only
(4) Primary cortex and pericycle only

124. Ring arrangement of vascular bundles is found in
(1) Dicot stem   (2) Dicot root
(3) Monocot stem   (4) Monocot root

125. Which of the following is **wrong** statement?
(1) Pericycle of dicot stem is in the form of semi-lunar patches of sclerenchyma
(2) General cortex is parenchymatous in both stem and roots
(3) Endodermis of monocot stem has casparian strip
(4) Endodermis is located around the pericycle and composed of compactly arranged cells

126. Read the statements and select the **correct** option.
(A) Thick walled pericycle gives mechanical support to plants.
(B) Pericycle gives rise to the lateral roots.
(1) Both (A) and (B) are correct
(2) Only (A) is correct
(3) Only (B) is correct
(4) Both (A) and (B) are incorrect

127. Which one of the following features is the common between monocot and dicot leaves?
(1) Presence of more stomata on abaxial surface
(2) Presence of mesophyll cells
(3) Presence of palisade parenchyma
(4) Presence of reticulate venation

128. When protoxylem is formed towards centre and metaxylem towards the periphery, then this condition is called
(1) Endarch or centripetal
(2) Exarch or centrifugal
(3) Exarch or centripetal
(4) Endarch or centrifugal

129. Balloon like swelling of xylem parenchyma into the lumen of xylem vessels is called
(1) Duramen   (2) Sapwood
(3) Tracheal plug (4) Alburnum

130. Select the **incorrect** statement w.r.t. hypodermis.
(1) It is outermost layer of cortex
(2) It is absent in monocot stems
(3) It is not present in roots
(4) It is collenchymatous in dicot stems

131. Dicot leaf
(1) Contains bulliform cells
(2) Usually has parallel venation
(3) Has middle prominent vein called midrib
(4) Has conjoint and open vascular bundle

132. In which of the following plant parts, ground tissue is not well differentiated into layers?
    (1) Dicot stem
    (2) Monocot stem
    (3) Dicot root
    (4) Monocot root

133. A, B and C are the tissues that participate in secondary growth of dicots.

    A, B and C should be
    (1) A = Intrafascicular cambium
        B = Interfascicular cambium
        C = Intercalary meristem
    (2) A = Apical meristem
        B = Lateral meristem
        C = Cork cambium
    (3) A = Primary phloem
        B = Primary xylem
        C = Secondary xylem
    (4) A = Intrafascicular cambium
        B = Interfascicular cambium
        C = Cork cambium

134. Monocot stem is characterised by the presence of
    (1) Open, conjoint vascular bundles
    (2) Starchy endodermis
    (3) Sclerenchymatous general cortex
    (4) Water containing cavities in the vascular bundles

135. All given features are of early wood, **except**
    (1) Lighter in colour
    (2) Lower density
    (3) Fewer xylary elements
    (4) Formed in spring season

SECTION - B

136. Which of the following is a redifferentiated tissue?
    (1) Cork
    (2) Primary xylem
    (3) Phellogen
    (4) Fascicular cambium

137. During secondary growth, vascular cambium in dicot stem is
    (1) More active on the inner side forming more amount of secondary xylem
    (2) More active on outer side forming more primary phloem
    (3) More active on inner side forming more primary xylem
    (4) More active on outer side forming secondary xylem

138. The gritty texture of fruit as in guava is due to the presence of
    (1) Sclereids
    (2) Xylem fibres
    (3) Phloem fibres
    (4) Collenchyma

139. Cork cambium is
    (1) A meristematic tissue arises as a result of division of pith cells
    (2) Formed from pericycle cells in dicot roots and gives rise to periderm
    (3) More active in monocot stem than dicot stem
    (4) Collenchymatous tissue responsible for protection

140. Which of the following is absent in monocotyledonous plants?
    (1) Parenchyma
    (2) Sclerenchyma
    (3) Fibres
    (4) Collenchyma

141. Vascular cambium of dicot roots
    (1) Is primary in origin and circular in outline
    (2) Is partly primary and partly secondary
    (3) Is form due to redifferentiation
    (4) Is completely secondary in origin and form a wavy ring initially

142. Products obtained after redifferentiation of cells cut off by cork cambium on the outer and the inner sides are respectively
    (1) Cork cells and phellogen
    (2) Secondary xylem and secondary cortex
    (3) Cork cells and secondary cortex
    (4) Secondary xylem and secondary phloem

143. Read the following statements and select the correct option.

    Assertion (A): During secondary growth, the amount of secondary xylem produced is more than secondary phloem.

    Reason (R): The primary and secondary phloem get gradually crushed during secondary growth.

    (1) (A) is true but (R) is false
    (2) (A) is false but (R) is true
    (3) Both (A) and (R) are true and (R) is the correct explanation of (A)
    (4) Both (A) and (R) are true but (R) is not the correct explanation of (A)

144. Which of the following plants has modified storage root?
    (1) Potato
    (2) Ginger
    (3) Onion
    (4) Sweet potato

145. Select the **incorrectly** matched pair w.r.t. phyllotaxy.

(1) Sunflower – Alternate

(2) Nerium – Whorled

(3) Calotropis – Alternate

(4) Alstonia – Whorled

146. Match the following columns and select the correct option.

	Column I		Column II
a.	Sterile stamen	(i)	Chrysanthemum
b.	Phylloclade	(ii)	Staminode
c.	Phyllode	(iii)	Opuntia
d.	Sucker	(iv)	Australian Acacia

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

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

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

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

147. In palmately compound leaf, leaflets are present on the

(1) Base of rachis

(2) Tip of midrib

(3) Tip of petiole

(4) Axil of branch

148. Thorns differ from spines as the former

(1) Protect the plants from browsing animals

(2) Are modification of axillary buds

(3) Are pointed, prickly structures

(4) Prevent water loss by transpiration

149. Find the **correctly** matched option w.r.t. plant families and their characteristics.

	Family	Flower	Gynoecium
(1)	Solanaceae	Trimerous	Bicarpellary
(2)	Liliaceae	Trimerous	Tricarpellary
(3)	Brassicaceae	Pentamerous	Monocarpellary
(4)	Fabaceae	Pentamerous	Bicarpellary

150. When the members of calyx are fused in a flower, it is called

(1) Gamopetalous

(2) Polysepalous

(3) Gamosepalous

(4) Polytepalous

ZOOLOGY

151. If the 'R' group in an amino acid is a methyl group, then this amino acid is

(1) Glycine

(2) Serine

(3) Alanine

(4) Valine

152. The cells of areolar tissue that secrete fibres and matrix are

(1) Fibroblasts

(2) Osteocytes

(3) Chondroblasts

(4) Mast cells

153. Match the following column A with column B w.r.t. an adult cockroach.

	Column A		Column B
a.	13	(i)	Eggs in ootheca
b.	6	(ii)	Number of moultings to reach adult form
c.	14-16	(iii)	Number of oothecae produced by a female
d.	9-10	(iv)	Abdominal ganglia

Select the **correct** option.

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

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

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

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

154. Among the given elements, which one makes up maximum percentage of weight of human body?

(1) Oxygen

(2) Hydrogen

(3) Carbon

(4) Nitrogen

155. Cells of ciliated epithelium can be

a. Cuboidal

b. Squamous

c. Columnar

Select the **correct** option.

(1) a and b

(2) b and c

(3) a and c

(4) a, b and c

156. Consider the following statements and select the correct option.

Statement A: Most of the cartilages in vertebrate embryos are replaced by bones in adults.

Statement B: Cartilages are present between adjacent bones of vertebral column, limbs and hands in adults.

(1) A and B both are correct

(2) A and B both are incorrect

(3) Only A is correct

(4) Only B is correct

157. The most abundant protein in the whole biosphere is

(1) Collagen

(2) RuBisCO

(3) Keratin

(4) Thrombin

158. Epithelium consisting of single thin layer of flattened cells with irregular boundaries can be found in

(1) Inner lining of pharynx

(2) Inner surface of bronchi

(3) Air sacs of human lungs

(4) Inner lining of pancreatic ducts

159. The wall of internal organs such as blood vessels and intestine contain which type of muscle fibres?

(1) Cylindrical shaped fibres

(2) Skeletal muscle fibres

(3) Involuntary muscle fibres

(4) Striated muscle fibres

160. Identify the below given structure and select the **correct** option w.r.t. it.
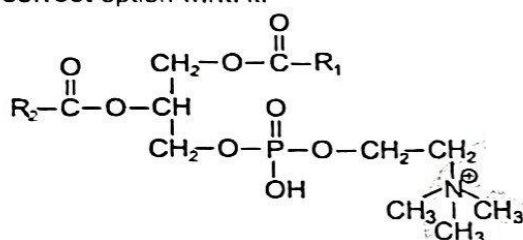
(1) Generally it is water soluble

(2) It is found in cell walls of plants.

(3) Carboxyl group is present in its structure.

(4) It is a phospholipid.

161. In an electrical synapse the type of junctions that facilitate adjacent neurons to communicate with each other, are

(1) Tight junctions   (2) Adhering junctions

(3) Gap junctions   (4) Desmosomes

162. The given reaction can be catalysed by

$$\underset{C-C}{\overset{X \quad Y}{|\quad|}} \longrightarrow X - Y + C = C$$

(1) Hydrolases   (2) Lyases

(3) Ligases   (4) Isomerases

163. The matrix of all of the following connective tissues is fibrous, **except**

(1) Blood   (2) Cartilage

(3) Adipose tissue   (4) Areolar tissue

164. Polymer of fructose is

(1) Chitin   (2) Inulin

(3) Insulin   (4) Glycogen

165. Which among the following is closely attached to the bones?

(1) Skeletal muscle tissue

(2) Non-striated muscle tissue

(3) Involuntary muscle tissue

(4) Muscle tissue with branched muscle fibres

166. The most abundant and widely distributed tissue in the human body is

(1) Connective tissue

(2) Epithelial tissue

(3) Nervous tissue

(4) Muscular tissue

167. Choose the **odd** one w.r.t. nitrogenous bases.

(1) Uracil   (2) Cytosine

(3) Thymine   (4) Uridylic acid

168. The junctions that perform cementing to keep neighbouring cells together are

(1) Tight junctions

(2) Adhering junctions

(3) Gap junctions

(4) Cytoplasmic connections

169. Read the features given in the box.

Branched, striated, involuntary, fusiform, cylindrical, uninucleated, intercalated disc, multinucleated.

How many of the above are the characteristics of cardiac muscle fibres?

(1) 3   (2) 5

(3) 6   (4) 7

170. What is the function of antennae in cockroach?

(1) Clean up the body

(2) Shed the cuticle

(3) Monitoring environment around it

(4) Protecting eyes

171. Which of the following is **not** a mouth part of cockroach?

(1) Labrum   (2) Antennae

(3) Labium   (4) Hypopharynx

172. Comprehend the following statements w.r.t. tendons.

Statement A: Orientation of fibres is irregular.

Statement B: Fibres and fibroblasts are loosely packed.

Choose the **correct** option.

(1) Only statement A is correct

(2) Both statements are correct

(3) Only statement A is incorrect

(4) Both statements are incorrect

173. Select the odd one w.r.t. secondary metabolites.

(1) Morphine   (2) Glucose

(3) Concanavalin A   (4) Ricin

174. In cockroach, Malpighian tubules absorb nitrogenous waste and convert them into
   (1) Uric acid
   (2) Urea
   (3) Ammonia
   (4) Glycogen

175. Which of the following is **not** an aromatic amino acid?
   (1) Tyrosine
   (2) Alanine
   (3) Phenylalanine
   (4) Tryptophan

176. Which of the following will **not** be present in acid insoluble fraction?
   (1) Fructose
   (2) Collagen
   (3) RNA
   (4) Starch

177. Select the **correct** option for palmitic acid.
   (1) $CH_3 - (CH_2)_{14} - COOH$
   (2) $CH_2 - (CH_3)_{14} - COOH$
   (3) $CH_3 - (CH_3)_{14} - COOH$
   (4) $CH_3 - (CH_2)_{16} - COOH$

178. The presence of collagen and elastin fibres in a tissue provide all the following, **except**
   (1) Fluidity
   (2) Strength
   (3) Elasticity
   (4) Flexibility

179. Select the **incorrect** option.
   (1) Peroxidase and catalase are enzymes
   (2) Co-enzymes are organic compounds but their association with apoenzyme is only transient.
   (3) NAD contains vitamin niacin
   (4) Haem is the example of apoenzyme

180. Choose the **incorrect** option w.r.t. amino acids.
   (1) They are organic compounds
   (2) They contain an amino group and an acidic group on α-carbon
   (3) They are substituted methanes
   (4) Four substituent groups are hydrogen, nitrogen, carbon and an acid group

181. Match column A with column B and choose the correct option.

Column A		Column B	
a.	Insulin	(i)	Sensory reception
b.	GLUT-4	(ii)	Glucose transport
c.	Receptor	(iii)	Enzyme
d.	Trypsin	(iv)	Hormone

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

182. Exchange of gases takes place at which level in cockroach?
   (1) Trachea
   (2) Spiracles
   (3) Tracheoles
   (4) Lymph

183. Formation of cholesterol from acetic acid in humans is an example of
   (1) Anabolism
   (2) Catabolism
   (3) Uncatalyzed reaction
   (4) Exothermic reaction

184. Complete the **correct** sequence with appropriate option w.r.t. digestive system of cockroach.
   Mouth → X → oesophagus → Y → proventriculus
   (1) X is gizzard; Y is oesophagus
   (2) X is pharynx; Y is crop
   (3) X is larynx; Y is hepatic caeca
   (4) X is mesenteron; Y is hepatic caeca

185. Select the **correct** option to complete the analogy w.r.t. average % of the total cellular mass
   Water : 70-90% : : Carbohydrates : _____
   (1) 10-15%
   (2) 3%
   (3) 2%
   (4) 5-7%

SECTION - B

186. Which structure is present at the junction of midgut and hindgut in cockroach?
   (1) Malpighian tubules
   (2) Hepatic caeca
   (3) Ileocaecal valve
   (4) Gizzard

187. Heart of cockroach consists of elongated muscular tube lying along _____ of _____. Fill in the blanks respectively with **correct** option.
   (1) Ventral line; Thorax and abdomen
   (2) Dorsal line; Thorax only
   (3) Ventral line; Abdomen only
   (4) Dorsal line; Thorax and abdomen

188. Biological catalysts generally work by
   (1) Reducing the activation energy
   (2) Decreasing pH value
   (3) Increasing the K_m value
   (4) Increasing the temperature

189. Match the following and choose the **correct** option.

a.	Acidic amino acid	(i)	Valine
b.	Basic amino acid	(ii)	Glutamic acid
c.	Neutral amino acid	(iii)	Lysine

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

190. Starch can hold I_2 molecules and gives blue colour because it
   (1) Is highly branched
   (2) Is osmotically inactive
   (3) Is chemically non-reactive
   (4) Has complex helices

191. How many terms are related to female reproductive system of cockroach?

> Spermathecal pore, long tubules, collaterial glands, vestibulum, ovarioles, anal style

(1) 6   (2) 4
(3) 5   (4) 2

192. A protein is imagined as a line, the left end represented by **X** and the right end is represented by **Y**.

Select the **correct** option for **X** and **Y** respectively.

(1) N-terminal and C-terminal
(2) C-terminal and N-terminal
(3) C-terminal and C-terminal
(4) N-terminal and N-terminal

193. Match the following and choose the **correct** option.

	Column A		Column B
a.	Peptide bond	(i)	Between mono saccharides
b.	Glycosidic bond	(ii)	Between phosphate and hydroxyl group
c.	Ester bond	(iii)	Between amino acids
d.	Hydrogen bond	(iv)	Between purines and pyrimidines

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

194. In a chain of glycogen, the right end is (A) end and the left end is called (B) end.

Select the **correct** option for (A) and (B) respectively

(1) Reducing and non-reducing
(2) Reducing and reducing
(3) Non-reducing and reducing
(4) Non-reducing and non-reducing

195. Select the **correct** statement.

(1) Inhibition of succinic dehydrogenase by succinate occurs because the latter resembles the substrate malonate

(2) Competitive inhibitors are often used in the control of bacterial pathogens

(3) Addition of lot of succinate does not reverse the inhibition of succinic dehydrogenase by malonate

(4) In non-competitive inhibition, the inhibitor inhibits the activity of enzyme by binding at the active site

196. **Assertion (A):** Bones are hard and non-pliable in nature.

Reason (R): Their matrix is rich in calcium salts and collagen fibres.

In the light of above statements, choose the **correct** option.

(1) Both (A) and (R) are correct and (R) is the correct explanation of (A)

(2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(3) (A) is correct but (R) is incorrect

(4) Both (A) and (R) are incorrect

197. Compound epithelium is multilayered, thus it can

(1) Play a major role in absorption
(2) Carry out more secretion than simple epithelium
(3) Be suitable for diffusion of gases
(4) Provide protection against mechanical and chemical stresses

198. A zwitterion among the following is

(1) $\overset{R}{\underset{|}{H_3N^+ - CH - COOH}}$ (2) $\overset{R}{\underset{|}{H_3N^+ - CH - COO^-}}$

(3) $\overset{R}{\underset{|}{H_2N - CH - COO^-}}$ (4) $\overset{R}{\underset{|}{H_3N - CH - COO^-}}$
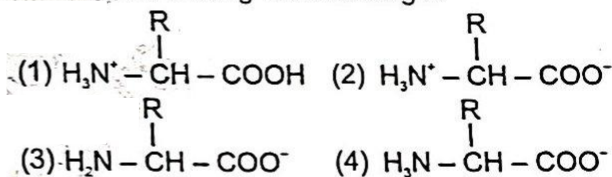
199. External genitalia in male cockroach are represented by

(1) Phallomeres
(2) Brood pouch
(3) Vas deferens
(4) Chitinous symmetrical structures

200. All of the following are components of a nucleotide **except**

(1) Homocyclic compound
(2) Monosaccharide
(3) Phosphate group
(4) Heterocyclic compound

□ □ □

FINAL TEST SERIES for NEET-2023

MM : 720   **Test - 2**   **Time : 3 Hrs. 20 Mins.**

Answers

1. (2)	41. (2)	81. (2)	121. (2)	161. (3)
2. (3)	42. (3)	82. (4)	122. (1)	162. (2)
3. (4)	43. (2)	83. (2)	123. (2)	163. (1)
4. (4)	44. (4)	84. (4)	124. (1)	164. (2)
5. (2)	45. (1)	85. (2)	125. (3)	165. (1)
6. (4)	46. (3)	86. (1)	126. (1)	166. (1)
7. (4)	47. (1)	87. (3)	127. (2)	167. (4)
8. (4)	48. (3)	88. (4)	128. (4)	168. (2)
9. (3)	49. (1)	89. (4)	129. (3)	169. (3)
10. (1)	50. (1)	90. (2)	130. (2)	170. (3)
11. (3)	51. (4)	91. (4)	131. (3)	171. (2)
12. (1)	52. (1)	92. (1)	132. (2)	172. (4)
13. (1)	53. (3)	93. (1)	133. (4)	173. (2)
14. (4)	54. (1)	94. (1)	134. (4)	174. (1)
15. (1)	55. (4)	95. (1)	135. (3)	175. (2)
16. (2)	56. (4)	96. (1)	136. (1)	176. (1)
17. (4)	57. (1)	97. (4)	137. (1)	177. (1)
18. (3)	58. (2)	98. (2)	138. (1)	178. (1)
19. (4)	59. (4)	99. (2)	139. (2)	179. (4)
20. (3)	60. (4)	100. (2)	140. (4)	180. (4)
21. (4)	61. (2)	101. (3)	141. (4)	181. (3)
22. (4)	62. (4)	102. (4)	142. (3)	182. (3)
23. (4)	63. (3)	103. (2)	143. (4)	183. (1)
24. (2)	64. (1)	104. (2)	144. (4)	184. (2)
25. (3)	65. (2)	105. (3)	145. (3)	185. (2)
26. (1)	66. (1)	106. (3)	146. (3)	186. (1)
27. (1)	67. (1)	107. (3)	147. (3)	187. (4)
28. (3)	68. (3)	108. (1)	148. (2)	188. (1)
29. (2)	69. (4)	109. (4)	149. (2)	189. (2)
30. (1)	70. (2)	110. (2)	150. (3)	190. (4)
31. (1)	71. (1)	111. (3)	151. (3)	191. (2)
32. (3)	72. (1)	112. (3)	152. (1)	192. (1)
33. (1)	73. (4)	113. (3)	153. (2)	193. (2)
34. (3)	74. (2)	114. (1)	154. (1)	194. (1)
35. (1)	75. (4)	115. (3)	155. (3)	195. (2)
36. (4)	76. (1)	116. (4)	156. (1)	196. (1)
37. (3)	77. (2)	117. (1)	157. (2)	197. (4)
38. (4)	78. (4)	118. (2)	158. (3)	198. (2)
39. (1)	79. (2)	119. (3)	159. (3)	199. (1)
40. (1)	80. (2)	120. (2)	160. (4)	200. (1)

FINAL TEST SERIES for NEET-2023

MM : 720   **Test - 2**   Time : 3 Hrs. 20 Mins.

Answers and Solutions

PHYSICS

SECTION - A

1. Answer (2)

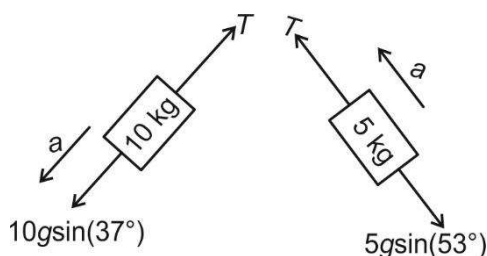$$a = \frac{k\left(\dfrac{mg}{k} + \dfrac{mg}{4k}\right) - mg}{m} = \frac{g}{4}$$

2. Answer (3)

$m_1 v_1 = m_2 v_2$

$(40 \times 10^{-3}) \times 40 = 3 \times v_2$

$v_2 = \dfrac{1600 \times 10^{-3}}{3} = \dfrac{1.6}{3} = 0.53 \text{ m/s}$

3. Answer (4)

$10g \sin(37°) - T = 10a$ … (i)

$T - 5g \sin(53°) = 5a$ … (ii)

Eq. (i) – 2 × Eq. (ii)

$\Rightarrow 10g \sin(37°) - T - 2T + 10g\sin(53°) = 0$

$\Rightarrow 3T = 10g \sin(37°) + 10g\sin(53°)$

$3T = 100 \times \dfrac{3}{5} + 100 \times \dfrac{4}{5}$

$T = \dfrac{700}{15} = 46.67 \text{ N}$

4. Answer (4)

Let us assume that they are moving with common acceleration.

$\Rightarrow a_c = \dfrac{24}{2+4} = 4 \text{ m/s}^2$

Friction required to provide 4 m/s^2 acceleration to 2 kg block = 2 × 4 = 8 N

Limiting value of friction

$= \mu (2g) = 0.2 \times 2 \times 10 = 4 \text{ N}$

∴ Slipping would occur

Friction acting on 2 kg block = 4 N

Acceleration = $\dfrac{4}{2} = 2 \text{ m/s}^2$

5. Answer (2)

$i = \left|\int_0^{10} F dt\right| = \left|\int_0^{10} (6 - 8t) dt\right|$

$\left|6t - 4t^2\right|_0^{10} = \left|60 - 400\right| = 340 \text{ N s}$

6. Answer (4)

Spring force on block *A* remains unchanged just after cutting the string. Thus acceleration of block *A* immediately after cutting the string would be zero.

7. Answer (4)

Particle is in equilibrium when force acting on it, is zero.

Slope of momentum-time graph gives force

Hence, force on the particle is zero, when slope of momentum-time graph is zero.

8. Answer (4)

Normal reaction on block

$4g - 4 = N$

$\Rightarrow N = 36\,N$

$F_{ext} = 2\,N$

$f_{limiting} = \mu N = 0.1 \times 36 = 3.6\,N$

Since $f_{limiting} > F_{ext}$

$f = 2\,N$

9. Answer (3)

Let spring force be F

$12 - F = 2 \times 4$

$\Rightarrow F = 4\,N$

For 4 kg block

$F = 4a \Rightarrow a = 1\,m/s^2$

10. Answer (1)

$kx = mg = 15\,g\ \ N \Rightarrow 15\,kg$

11. Answer (3)

$\dfrac{T_1}{T_2} = \dfrac{(m_A + m_B)g}{m_B(g)} = \dfrac{(m_A + m_B)(g + a_0)}{m_B(g + a_0)}$

= constant

12. Answer (1)

$\mu \times 20 = mg \Rightarrow mg = 0.4 \times 20 = 8\,N$

13. Answer (1)

$\vec{F} \cdot \vec{d} = 0 \Rightarrow (2\hat{i} + \alpha\hat{j}) \cdot (\hat{i} + 2\hat{j}) = 0$

$2 + 2\alpha = 0$

$\alpha = -1$

14. Answer (4)

$m = 90 \times 10^3\,kg$

$P_{avg} = \dfrac{mgh}{t} = \dfrac{90 \times 10^3 \times 9.8 \times 200}{60 \times 60} = 49\,kW$

15. Answer (1)

$T = m(g - a)$

$W = T.d\cos180° = -m(g-a)\left\{\dfrac{1}{2}at^2\right\}$

$= \dfrac{m}{2}(a - g)(a)t^2$

16. Answer (2)

As $K \geq 0$

And $U + K = E$

$\therefore\ U \leq E$

17. Answer (4)

$E_{(eV)} = \dfrac{10^{-3}}{1.6 \times 10^{-19}} = 6.25 \times 10^{15}\,eV$

18. Answer (3)

$W = \Delta KE$

$KE = \dfrac{1}{2}mv^2 = \dfrac{1}{2} \times 4 \times \left(\dfrac{d(t^2/2)}{dt}\right)^2$

$KE = 2 \times t^2$

At $t = 2$, KE $= 2 \times 2^2 = 8\,J$

$W = 8\,J$

19. Answer (4)

Mechanical energy would remain constant.

20. Answer (3)

$H' = e^6 \times H = \dfrac{100}{2^6} = 1.5625\,m$

21. Answer (4)

Area under the F-X graph is 20

therefore, work done = 20 J (taking area below the X axis as negative)

22. Answer (4)

If $W_{F,ext} = 0$ and

$W_{int,\ nc} = 0$ then principle of conservation of mechanical energy will be valid.

23. Answer (4)

Work done by internal forces may be positive, negative or zero.

24. Answer (2)

The power delivered must be positive and hence $\vec{F} \cdot \vec{v} > 0$

25. Answer (3)

Speed is maximum when acceleration of block is zero.

$mg\cos\theta = kx \Rightarrow x = \dfrac{mg\cos\theta}{k}$

26. Answer (1)

Work required = Change in K.E

$= \dfrac{1}{2}mv^2 + \dfrac{1}{2}I\omega^2$

$W = \dfrac{1}{2}mv^2 + \dfrac{1}{2} \times \dfrac{2}{3}mR^2 \cdot \dfrac{v^2}{R^2}$

$= \dfrac{5}{6}mv^2$

$= \dfrac{5}{6} \times 10 \times 0.6 \times 0.6 = 3\,J$

27. Answer (1)

$I_{remaining} = I_{main} - I_{cut}$

$= \dfrac{mR^2}{2} - \dfrac{1}{2} \times \dfrac{M}{4} \times \dfrac{R^2}{4}$

$$= \frac{mR^2}{2} - \frac{MR^2}{32}$$

$$= \frac{15MR^2}{32}$$

28. Answer (3)

As external torque is zero; so angular momentum remain constant.

29. Answer (2)

$$I_{AB} = \frac{2}{5}MR^2 + \left[\frac{2}{5}MR^2 + 3MR^2\right] \times 2 = \frac{36}{5}MR^2$$

30. Answer (1)

$$\frac{1}{2}mv^2 + \frac{1}{2}I\omega^2 = mgh$$

$$\frac{7}{10}mv^2 = mgh = 2 \times 10 \times 7$$

$$mv^2 = 200$$

Rotational kinetic energy.

$$K_R = \frac{1}{5}mv^2 = 40 \text{ J}$$

31. Answer (1)

$$\vec{\tau} = \frac{d\vec{L}}{dt}$$

$$d\vec{L} = \vec{\tau}dt$$

$$\vec{L_2} - \vec{L_1} = 10 \times 3$$

$$L_2 = 30 + 5 = 35 \text{ kg m}^2/\text{s}$$

32. Answer (3)

$$I = I_1 + I_2$$

$$= MR^2 + \frac{1}{2}MR^2 = \frac{3}{2}MR^2$$

33. Answer (1)

$$L = mvr$$

$$L = m \times u_x \times \frac{(u_y)^2}{2g}$$

$$L = 2 \times 20\cos 60° \times \frac{(20\sin 60°)^2}{20}$$

$$\Rightarrow L = 300 \text{ kg m}^2 \text{ s}^{-1}$$

34. Answer (3)

$$\theta = \omega_0 t + \frac{1}{2}\alpha t^2$$

$$\theta = \frac{1}{2} \times 2 \times 100 = 100 \text{ rad}$$

Number of revolutions

$$n = \frac{\theta}{2\pi} = \frac{100}{6.28} = 15.93 \simeq 16$$

35. Answer (1)

$$mgh = \frac{1}{2}mv^2 + \frac{1}{2}I\omega^2$$

$$mgh = \frac{1}{2}mv^2 + \frac{1}{4}mR^2 \times \frac{v^2}{R^2}$$

$$mgl\sin\theta = \frac{3}{4}mv^2$$

$$v = \sqrt{\frac{4}{3}gl\sin\theta}$$

SECTION - B

36. Answer (4)

$$v_f = \tan 37° = \frac{3}{4}$$

$$v_i = -\tan 53° = -\frac{4}{3}$$

$$\Delta v = \frac{3}{4} - \left(-\frac{4}{3}\right) \Rightarrow \frac{9+16}{12} = \frac{25}{12}$$

Impulse on the body

$$\Delta p = m\Delta v = 12 \times \frac{25}{12} = 25 \text{ kg m/s}$$

37. Answer (3)

Let mass per unit length be λ,

$$T = \frac{F}{\lambda l} \times \lambda(l - x) = \frac{10}{10}(10 - 1) = 9 \text{ N}$$

38. Answer (4)

Using conservation of energy.

$$mg(h + x) = \frac{1}{2}Kx^2$$

On solving $x = 10$ cm

39. Answer (1)

For a bob suspended by a massless inextensible string.

$v_{min} = \sqrt{5gl}$, to just complete the circular path of radius l.

40. Answer (1)

$w = mgh$ (independent of time)

41. Answer (2)

$$p = \sqrt{2mk}$$

$$\frac{p_1}{p_2} = \frac{\sqrt{2m_1 k_1}}{\sqrt{2m_2 k_2}}$$

$$\frac{p_1}{p_2} = \frac{3}{2}$$

42. Answer (3)

$$x_{cm} = \frac{\int x\, dm}{\int dm} = \frac{\int x(2+3x^2)dx}{\int(2+3x^2)dx}$$

$$= \frac{2\int_0^l x\, dx + 3\int_0^l x^3\, dx}{2\int_0^l dx + 3\int_0^l x^2\, dx}$$

$$= \frac{l^2 + \frac{3}{4}l^4}{2l + l^3}$$

$$= \frac{l(4 + 3l^2)}{4(2 + l^2)}$$

43. Answer (2)

Centre of mass lies towards heavier object. For same edge of square and diameter of circle and material being same, square will be heavier hence COM shifts towards square.

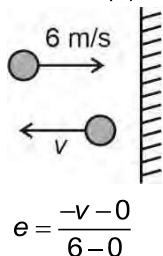**44.** Answer (4)

In gravity free space F_{ext} is zero.

Hence, there is no shift in centre of mass of the system.

45. Answer (1)

$$\therefore \ \vec{F}_{ext} = 0$$

$$\overrightarrow{\Delta X}_{cm} = 0$$

46. Answer (3)

$$e = \frac{-v - 0}{6 - 0}$$

$$\Rightarrow v = -\frac{1}{3} \times 6$$

$$= -2$$

$$|v| = 2 \text{ m/s}$$

47. Answer (1)

$I\omega = $ constant and $K = \frac{L^2}{2I}$.

As the person folds his arm MOI decreases, hence its kinetic energy increases.

48. Answer (3)

Using work – energy theorem,
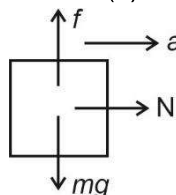
$$W_g + W_{spring} = \Delta K \cdot E$$

$$\Rightarrow Mg x_M - \frac{1}{2}K(x_M)^2 = 0 \ \Rightarrow Mg = \frac{K \cdot x_M}{2}$$

$$\Rightarrow x_M = \frac{2Mg}{K}$$

49. Answer (1)

After release only gravity will act on the coin therefore force on the coin will be mg.

50. Answer (1)
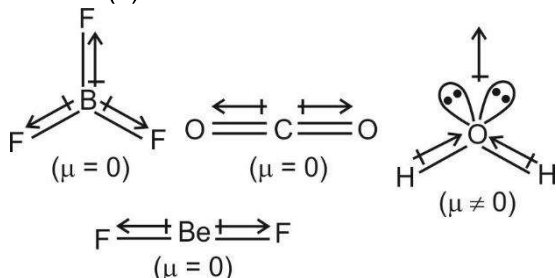

$N = ma$ and $f = mg$

$$\Rightarrow mg \le \mu N$$

$$\Rightarrow \frac{g}{a} \le \mu$$

$$\Rightarrow \mu_{min} = g/a$$

CHEMISTRY

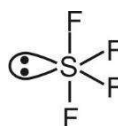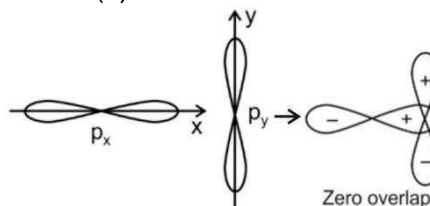**SECTION - A**

51. Answer (4)

52. Answer (1)

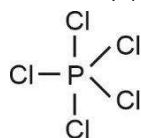SF_4 has four bond pairs and one lone pair. The shape is see-saw.

53. Answer (3)

54. Answer (1)

Carbon atom is sp hybridised as it is forming 2σ and 2π bonds.

55. Answer (4)

Shape of PCl_5 is trigonal bipyramidal which contains six 90° Cl – P – Cl bonds.

56. Answer (4)

Compound	Dipole moment (μ)
NH_3	1.47 D
NF_3	0.23 D

57. Answer (1)

$\sigma 1s$ does not contain nodal plane.

58. Answer (2)

In C_2 molecule both the bonds are π bonds.

$$C_2 : (\sigma 1s)^2\ (\sigma^* 1s)^2\ (\sigma 2s)^2\ (\sigma^* 2s)^2 \begin{Bmatrix} (\pi 2p_x)^2 \\ (\pi 2p_y)^2 \end{Bmatrix}$$
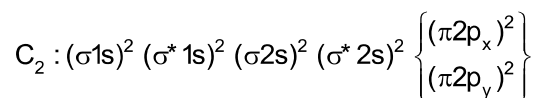
59. Answer (4)

- N_2^+ and N_2^- contain odd electrons hence paramagnetic.
- O_2 contains two unpaired electrons hence paramagnetic.

60. Answer (4)

Bond order $= \dfrac{N_b - N_a}{2}$

Bond order of Be_2 is zero, therefore it does not exist

$BO(Be_2) = \dfrac{4-4}{2} = 0$

61. Answer (2)

$n_{CH_4} = \dfrac{w}{16},\ n_{O_2} = \dfrac{w}{32}, n_{SO_2} = \dfrac{w}{64}$

$x_{CH_4} = \dfrac{n_{CH_4}}{n_{CH_4} + n_{O_2} + n_{SO_2}}$

$= \dfrac{\dfrac{w}{16}}{\dfrac{w}{16} + \dfrac{w}{32} + \dfrac{w}{64}} = \dfrac{4}{7}$

$p_{CH_4} = P_{Total}\ x_{CH_4} = 10 \times \dfrac{4}{7} = \dfrac{40}{7}$ atm

62. Answer (4)

$\dfrac{r_{SO_2}}{r_{CH_4}} = \sqrt{\dfrac{M_{CH_4}}{M_{SO_2}}} = \dfrac{V_1/t_1}{V_2/t_2} = \dfrac{200/100}{V_2/100}$

$\dfrac{200}{V_2} = \sqrt{\dfrac{16}{64}}$

$V_2 = 400$ mL

63. Answer (3)

For unit, nb = V

$b = \dfrac{V}{n} =$ L mol^{-1}

64. Answer (1)

Entropy increases with increase in disorder.

65. Answer (2)

The properties which depends upon the quantity or size of matter present in the system is called as extensive property.

Temperature, pressure and density are intensive properties

66. Answer (1)

$\because$ For adiabatic process, q = 0

Also, total heat capacity $= \dfrac{dq}{dT} = 0$

67. Answer (1)

(Work done)$_{Rev} = -2.303nRT \log \dfrac{V_f}{V_i}$

$= -2.303nRT \log \dfrac{P_i}{P_f}$

68. Answer (3)

q = Cm ΔT

$= 0.9 \times 21 \times (T_2 - T_1)$

$= 0.9 \times 21 \times 100$

$= 1890$ J

69. Answer (4)

For isochoric process, $\Delta V = 0$

For adiabatic process, q = 0

For isothermal process, $\Delta T = 0$

For isobaric process, $\Delta p = 0$

70. Answer (2)

According to Hess's law,

a + b + c = d

$\therefore$ a + b = d – c

71. Answer (1)

Species present in their standard state has $\Delta_f H° = 0$.

72. Answer (1)

Third law of thermodynamics: The entropy of a perfectly crystalline solid at absolute zero is zero.

73. **Answer (4)**

$\Delta S \neq 0$ for free expansion of an ideal gas under isothermal condition.
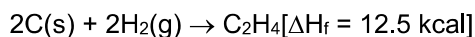
74. **Answer (2)**

For isothermal expansion of gas,

$$\Delta S = nR \ln \frac{V_2}{V_1}$$

75. **Answer (4)**

Work is a path function as it depends upon the path followed by a process along with the initial and final state.

76. **Answer (1)**

$2C(s) + 2H_2(g) \rightarrow C_2H_4 [\Delta H_f = 12.5 \text{ kcal}]$

$[2\Delta H_a C + 2BE_{H_2}] - [BE_{C=C} + 4BE_{C-H}] = \Delta H_f(C_2H_4)$

$2(171) + 2(104.3) - BE_{C=C} - 4(99.3) = 12.3$

$BE_{C=C} = 140.9 \text{ kcal}.$

77. **Answer (2)**

Heat of combustion = calorific value × Molar mass

$\Delta H_C(CH_4) \rightarrow 16x \text{ kJ mol}^{-1}$

78. **Answer (4)**

$\Delta G = \Delta H - T\Delta S$

For spontaneous reaction, $\Delta G < 0$

$\Delta H - T\Delta S < 0$

$\Delta H < T\Delta S$

$\dfrac{\Delta H}{\Delta S} < T$

$\dfrac{170,000}{170} < T$

$1000 \text{ K} < T$

i.e. T should be greater than 1000 K.

79. **Answer (2)**

In P vs V graph, higher curve are obtained at high temperature.

80. **Answer (2)**

The most probable speed depends upon temperature only, $u_{mp} = \sqrt{\dfrac{2RT}{M}}$

81. **Answer (2)**

$T_c = \dfrac{8a}{27Rb}$

82. **Answer (4)**

$u_{rms} = \sqrt{\dfrac{3RT}{M}}$

$u_{rms}(CH_4) = u_{rms}(O_2)$

$$\sqrt{\frac{3RT_1}{M_{CH_4}}} = \sqrt{\frac{3RT_2}{M_{O_2}}}$$

$$T_1 = \frac{300 \times 16}{32} \Rightarrow 150 \text{ K}$$

83. **Answer (2)**

Stronger the intermolecular interactions, more will be the deviation from ideal gas behaviour.

84. **Answer (4)**

NH_3 & HCl will react with each other hence, does not obey Dalton's law of partial pressure.

85. **Answer (2)**

SF_6 : Octahedral

CCl_4 : Tetrahedral

XeF_4 : Square planar

SO_3 : Trigonal planar

SECTION - B

86. **Answer (1)**
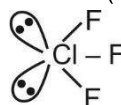
Chlorine has 3 bond pairs and 2 lone pairs of electrons.

∴ Hybridisation of Cl = sp^3d

87. **Answer (3)**

Formal charge of N = $5 - 1 - 3 = +1$

88. **Answer (4)**
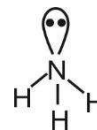
- NH_3 has exact 8 electrons in its octet.

PF_5, SF_6 and H_2SO_4 has more than 8 electrons around central atom.

89. **Answer (4)**

Intermolecular hydrogen bond

90. **Answer (2)**

Molecule	Bond order
O_2^{2-}	1
F_2	1
C_2^{2-}	3
	3
O_2^{2+}	3
N_2	2
N_2^{2+}	

91. Answer (4)

Vapour pressure does not depend on surface area

92. Answer (1)

$$d = \frac{PM}{RT}$$

- Density of an ideal gas is maximum at high pressure and low temperature

93. Answer (1)

Surface tension is force per unit length.

94. Answer (1)

In normal boiling point atmospheric pressure is 1 atm.

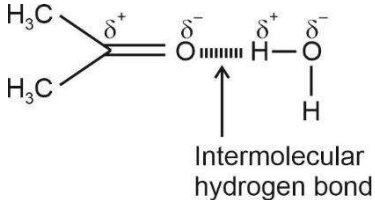95. Answer (1)

Collision of gas molecules are perfectly elastic, therefore total energy before and after the collision remains same.

96. Answer (1)

For one mole of monoatomic gas γ = 1.66

97. Answer (4)

For a process to be spontaneous,

$\Delta S_{sys} + \Delta S_{uninverse} = \Delta S_{total} > 0$.

98. Answer (2)

Standard enthalpy change for the formation of 1 mole of a compound from its elements in their most stable states of aggregation is known as standard molar enthalpy of formation.

99. Answer (2)

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

$\Delta_{comb}H = \sum \Delta_f H_{(Products)} - \sum \Delta_f H_{(reactants)}$

$= \Delta_f H_{CO_2} + 2x \Delta_f H_{H_2O} - \Delta_f H_{CH_4}$

$= -y - 2z - (-x)$

$= x - y - 2z$ kJ/mol

100. Answer (2)

$\Delta U = q + w$

$= + 50\ J - 20\ J$

$= 30\ J$

BOTANY

SECTION - A

101. Answer (3)

Radial symmetry is found in flowers of chilli and bilateral symmetry is found in flowers of bean.

102. Answer (4)

Root cap covers the meristematic zone and protects it.

103. Answer (2)

When the ovules are borne on central axis and septa are absent, it is free central placentation, as is *Dianthus* and *Primrose*

104. Answer (2)

In banyan tree, prop roots arise from the branches of stem and provide mechanical support.

105. Answer (3)

In vexillary aestivation, the largest petal that overlaps the two smaller lateral petals is called standard.

106. Answer (3)

When the stamens may be united into one bunch or one bundle, it is termed as monoadelphous, *e.g.*, china rose.

107. Answer (3)

Stem tendrils are long, thin thread-like structures which provide support to weak and tender stem and are found in gourds.

108. Answer (1)

Racemose inflorescence is characterised by acropetal succession as is seen in mustard.

109. Answer (4)

Perigynous flowers are seen in rose, plum, peach etc.

110. Answer (2)

In *Nepenthes*, lamina of leaves are modified into pitcher to trap the insects and obtain nutrients by digesting them.

111. Answer (3)

Outer layer of seed coat is testa and inner layer is called tegmen.

112. Answer (3)

In some flowers like lily, calyx and corolla are not distinct and are termed as perianth.

113. Answer (3)

Pneumatophores in *Rhizophora* are modified roots which help to get oxygen for respiration.

114. Answer (1)

Seeds of orchids have single cotyledon and are non-endospermic.

115. Answer (3)

The floral axis is limited in growth in cymose inflorescence.

116. Answer (4)

Endosperm in angiosperm is triploid and aleurone layer is the part of it.

117. Answer (1)

Collenchyma is living mechanical tissue, may perform photosynthesis when contain chloroplasts.

118. Answer (2)

Variation in the length of filaments within a flower is seen in mustard. Stamens attached to the petals and epipetalous condition are seen in brinjal. The stamens united in two bundles is diadelphous condition as in pea. Epiphyllous condition is seen in lily.

119. Answer (3)

Water hyacinth has offset, helps in vegetative propagation.

120. Answer (2)

Companion cells are closely associated with sieve tube elements and they control the activities of sieve tube elements.

121. Answer (2)

The innermost layer of cortex is called endodermis.

122. Answer (1)

Intercalary meristem is intercalated between mature tissues.

123. Answer (2)

Periderm includes phellem, phellogen and phelloderm.

124. Answer (1)

Ring arrangement of vascular bundles is a characteristic of dicot stem.

125. Answer (3)

Endodermis of monocot stem is not distinct.

126. Answer (1)

Pericycle give rise to lateral roots.

127. Answer (2)

Mesophyll cells are present in both dicot leaf as well as monocot leaf.

128. Answer (4)

When protoxylem is formed towards centre and metaxylem towards the periphery, then this condition is called endarch or centrifugal.

129. Answer (3)

Tracheal plugs are balloon like swellings of xylem parenchyma into the lumen of xylem vessels, also called tyloses.

130. Answer (2)

Hypodermis is present in monocot stem where it is sclerenchymatous.

131. Answer (3)

Dicot leaf shows reticulate venation.

132. Answer (2)

Ground tissue in monocot stems is not well differentiated into layers.

133. Answer (4)

Intrafascicular cambium, interfascicular cambium and cork cambium are lateral meristems that perform secondary growth.

134. Answer (4)

Water containing cavities in the vascular bundles is a characteristic feature of monocot stem.

135. Answer (3)

Early wood contains larger number of xylary elements.

SECTION - B

136. Answer (1)

Cork is a redifferentiated tissue.

137. Answer (1)

During secondary growth in dicot stems, vascular cambium is more active on the inner side forming large amount of secondary xylem elements.

138. Answer (1)

The gritty texture of fruits like guava, sapota and pear etc. is due to the presence of sclereids in their pulp.

139. Answer (2)

Cork cambium is a lateral meristem. In dicot roots it arises from pericycle cells and gives rise to periderm.

140. Answer (4)

Collenchyma is absent in monocotyledonous plants.

141. Answer (4)

Vascular cambium of dicot roots is completely secondary in origin and wavy initially.

142. Answer (3)

Cork cambium cuts off cells on both the sides which are redifferentiated to form cork cells on the outer side and secondary cortex towards the inner side.

143. Answer (4)

The amount of secondary xylem produced is more than secondary phloem because the vascular cambium is generally more active on the inner side than on the outer side.

144. Answer (4)

Sweet potato plant has modified adventitious roots for storing food.

145. Answer (3)

Calotropis shows opposite phyllotaxy.

146. Answer (3)

Sterile stamen is known as staminode.

Phylloclade is found in *Opuntia*.

Phyllode is found in Australian *Acacia*

Sucker is found in *Chrysanthemum*.

147. Answer (3)

In palmately compound leaf, as in silk cotton, leaflets are present on the tip of petiole.

148. Answer (2)

Thorns differ from spines as the former are modified axillary buds.

149. Answer (2)

Liliaceae family has trimerous flowers and tricarpellary syncarpous gynoecium.

150. Answer (3)

When the sepals are fused it is called gamosepalous condition

ZOOLOGY

SECTION - A

151. Answer (3)

Serine contains hydroxy methyl group. Valine is a neutral amino acid.

152. Answer (1)

Fibroblasts secrete fibres made up of either collagen or elastin protein.

153. Answer (2)

13 – Times nymph moults

6 – Abdominal ganglia

14 – 16 eggs in each ootheca

9 – 10 oothecae produced by female.

154. Answer (1)

Oxygen makes up about 65% weight of human body whereas carbon, hydrogen and nitrogen make up 18.5%, 0.5% and 3.3 % respectively.

155. Answer (3)

The function of cilia is to move particles or mucus in a specific direction over the epithelium.

156. Answer (1)

Most of the cartilages in vertebrates are replaced by bones.

Cartilages are present between adjacent bones of vertebral column in adults.

157. Answer (2)

The most abundant protein in animal world is collagen whereas that of biosphere is Ribulose Bisphosphate Carboxylase - Oxygenase

158. Answer (3)

Simple squamous epithelium is involved in functions like forming a diffusion boundary for respiratory gases.

159. Answer (3)

Involuntary or smooth or non-striated muscles are found in visceral organs.

160. Answer (4)

Phospholipids are found in cell membranes. They are generally water insoluble.

161. Answer (3)

Gap junctions facilitate the cells to communicate with each other by connecting cytoplasm of adjoining cells.

162. Answer (2)

Lyases are the enzymes that catalyse the removal of groups from substrates by mechanisms other than hydrolysis leaving double bonds.

163. Answer (1)

In all connective tissues except blood, the cells secrete fibres of structural proteins called collagen or elastin.

164. Answer (2)

Inulin is a polymer of fructose.

165. Answer (1)

Skeletal muscle tissue is closely attached to skeletal bones. In a typical muscle such as the biceps, striated [striped] skeletal muscle fibre are bundle together in a parallel fashion.

166. Answer (1)

Connective tissues are most abundant and widely distributed in the body of complex animals.

167. Answer (4)

Uridylic acid is a nucleotide.

168. Answer (2)

Gap junctions facilitate cell to cell communication and tight junctions help to stop leakage across the tissue.

169. Answer (3)

Cardiac muscle fibres are exclusively present in heart and are branched, striated, involuntary, uninucleated and cylindrical in shape. They possess intercalated discs which function as booster of contraction wave. Smooth muscle fibres are fusiform in their appearance and skeletal muscle fibres are syncytium in nature.

170. Answer (3)

Sensing environment around cockroach is major function of antennae.

171. Answer (2)

Antennae is the part of head. Which helps in monitoring environment around it.

172. Answer (4)

Tendons and ligaments consist of dense regular connective tissue. Tendons connect muscles to bones and ligaments connect bone to bone.

173. Answer (2)

Pigments	Carotenoids, Anthocyanins, etc.
Alkaloids	Morphine, Codeine, etc.
Terpenoides	Monoterpenes, Diterpenes etc.
Essential oils	Lemon grass oil, etc.
Toxins	Abrin, Ricin
Lectins	Concanavalin A
Drugs	Vinblastin, curcumin, etc.
Polymeric substances	Rubber, gums, cellulose

174. Answer (1)

Uric acid is formed in Malpighian tubules.

175. Answer (2)

Alanine is a simple amino acid with methyl substitution

176. Answer (1)

Micromolecules like amino acids, simple sugars and nucleotides are present in acid soluble fraction.

177. Answer (1)

$CH_3 - (CH_2)_{14} - COOH$. Palmitic acid contains 16 carbons including the carboxyl group.

178. Answer (1)

Fluidity is a characteristic feature of matrix of blood which lacks fibres.

179. Answer (4)

Haem is the example of prosthetic group.

180. Answer (4)

Four substituents are hydrogen, amino group, carboxy group and a variable group (R).

181. Answer (3)

Insulin – Hormone

GLUT-4 – Glucose transport

Receptor – Sensory reception smell, taste

Trypsin – Enzyme

182. Answer (3)

Exchange of gases takes place at the level of tracheoles.

183. Answer (1)

Formation of more complex structure from simpler structure is an example of anabolic pathway or biosynthetic pathway.

184. Answer (2)

Mouth opens into tubular pharynx, while oesophagus opens into crop.

185. Answer (2)

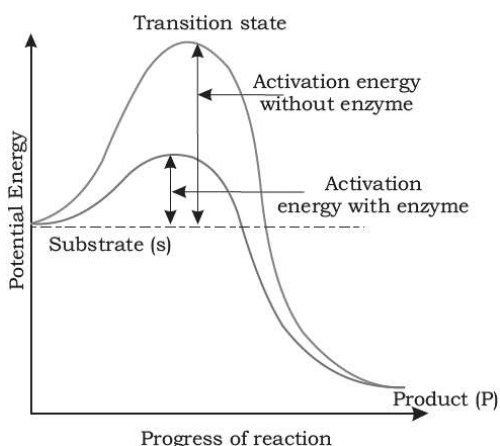| Component	% of the total cellular mass
Water	70-90
Proteins	10-15
Carbohydrates	3
Lipids	2
Nucleic acids	5-7
Ions	1

186. Answer (1)

Malpighian tubules are present at the junction of midgut and hindgut.

187. Answer (4)

Heart lies on mid-dorsal line of thorax and abdomen.

188. Answer (1)

Enzymes are biological catalyst, acts by reducing the activation energy of the reaction.

189. Answer (2)

Acidic – Glutamic acid

Basic – Lysine

Neutral – Valine

190. Answer (4)

Starch forms helical secondary structures and can hold I_2 molecules in the helical portion.

191. Answer (2)

Long tubules and anal style are associated with male cockroach.

192. Answer (1)

A protein is imagined as a line, the left end represented by the first amino acid is also called N-terminal of amino acid. The right end represented by the last amino acid is called C-terminal amino acid.

193. Answer (2)

Peptide bonds – Between amino acids

Glycosidic bonds – Between monosaccharides

Ester bonds – Between PO_4 and OH group

Hydrogen bonds – Between Purines and pyrimidine

194. Answer (1)

In glycogen, the right end is called the reducing end and the left end is called the non-reducing end.

195. Answer (2)

Succinate is the substrate of succinic dehydrogenase. The enzyme molecules get saturated with substrate.

In non-competitive inhibition, the inhibitor binds to a site, other than the active site.
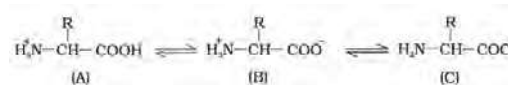
196. Answer (1)

Calcium salts and collagen fibres give bones its strength.

197. Answer (4)

Secretion and absorption is mainly the function of columnar epithelium. Squamous epithelium permits diffusion of gases.

198. Answer (2)

199. Answer (1)

External genitalia is represented by phallomere. (Chitinous asymmetrical structures)

200. Answer (1)

Nucleotide consists of heterocyclic compound along with phosphate and monosaccharide.

❑ ❑ ❑