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SAMPLE
TEST PAPER
XI NEET

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PHYSICS

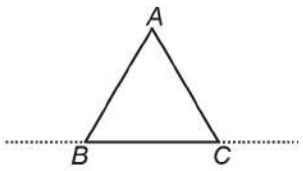
Choose the correct answer :

1. The moment of inertia of a solid sphere about an axis passing through the centre of gravity is $\frac{2}{5}MR^2$, then its radius of gyration about a parallel axis at a distance $2R$ from first axis is

(1) $5R$ (2) $\sqrt{\frac{22}{5}}R$

(3) $\frac{5}{2}R$ (4) $\sqrt{\frac{12}{5}}R$

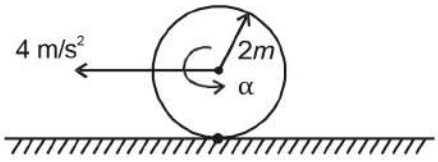
2. Three identical rods, each of mass m and length l, form an equilateral triangle. Moment of inertia about one of the sides is



(1) $\frac{ml^2}{4}$ (2) $\frac{ml^2}{2}$

(3) $\frac{3ml^2}{4}$ (4) $\frac{2}{3}ml^2$

3. A sphere of radius $2m$ rolls on a floor the acceleration of the centre of mass of sphere is 4 m/s^2. Angular acceleration α about its centre of mass is



(1) 2 rad/s^2

(2) 4 rad/s^2

(3) 3 rad/s^2

(4) 1 rad/s^2

4. A ring of radius R is first rotated with angular velocity x_0 about horizontal axis normally through its centre of mass and then carefully placed on a rough horizontal surface. The coefficient of friction between surface and ring is μ. Angular velocity about centre of mass, when it starts pure rolling is

(1) $\frac{x_0}{4}$

(2) $\frac{x_0}{4\mu}$

(3) $\frac{x_0}{2\mu}$

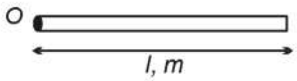
(4) $\frac{x_0}{2}$

5. A small uniform and solid ball of radius r starts rolling without slipping down from the top of a rough inclined plane of height h. Its speed at the bottom of the inclined plane is

(1) $\sqrt{\frac{2gh}{7}}$ (2) $\sqrt{\frac{5gh}{7}}$

(3) $\sqrt{\frac{14gh}{5}}$ (4) $\sqrt{\frac{10gh}{7}}$

6. A uniform thin rod of length l and mass m is hinged at one end O and released from horizontal position as shown in figure. The angular velocity of the rod as it passes the vertical position is



(1) $\sqrt{\frac{2g}{l}}$ (2) $\sqrt{\frac{3g}{l}}$

(3) $2\sqrt{\frac{g}{l}}$ (4) $\sqrt{\frac{g}{l}}$

7. A disc of mass m is rolling without slipping with angular speed x about its centre of mass. Ratio of translational kinetic energy to total kinetic energy is

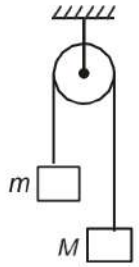
(1) $\frac{1}{2}$

(2) $\frac{5}{7}$

(3) $\frac{3}{5}$

(4) $\frac{2}{3}$

8. Pulley in figure has radius r and moment of inertia I. Find the acceleration of blocks.



(1) $\left(\frac{M-m}{M+m+\frac{I}{r^2}}\right)g$

(2) $\frac{(M-m)g}{M+m-\frac{2I}{r^2}}$

(3) $\frac{(M-m)g}{M+m+\frac{I}{r^2}}$

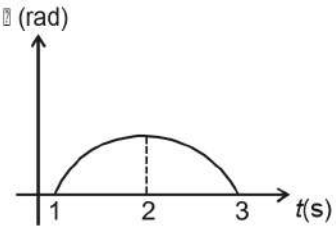
(4) $\frac{(M-m)g}{M+m-\frac{I}{r^2}}$

9. A body of radius R is rolling without slipping on a floor such that velocity of its centre of mass is v. Velocity of the top most point of the body is

(1) v (2) $2v$

(3) $\frac{v}{2}$ (4) $\frac{3v}{2}$

10. Graph of angular position vs time is plotted. What is the sign of angular velocity at $t = 3$ sec?



(1) Zero (2) Positive

(3) Negative (4) Non-zero

11. Flywheel is important part of engine because

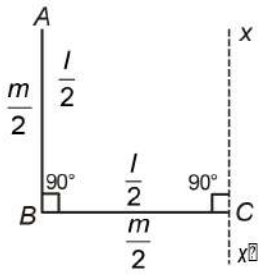
(1) It gives strength to engine

(2) It accelerates the speed of wheel

(3) It reduces the moment of inertia

(4) It helps engine in keeping speed uniform

12. Find the moment of inertia of given L shape wire ABC about axis xx' which is parallel to AB.



(1) $\frac{ml^2}{6}$ (2) $\frac{ml^2}{3}$

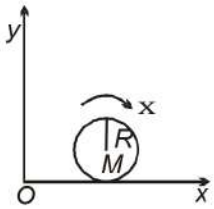
(3) $\frac{ml^2}{2}$ (4) $\frac{ml^2}{4}$

13. Four spheres each of mass M and radius r with their centres at four corners of a square of side l, then moment of inertia of system about an axis along one of the sides of square is

(1) $M\left(\frac{4}{5}r^2+2l^2\right)$ (2) $M\left(\frac{8}{5}r^2+2l^2\right)$

(3) $\frac{8}{5}Mr^2$ (4) $M\left(\frac{4}{5}r^2+4l^2\right)$

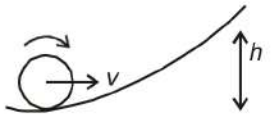
14. A disc of mass M and radius R is rolling without slipping with angular velocity x on a horizontal plane as shown in figure. The magnitude of angular momentum of disc about origin O is



(1) $\frac{1}{2}MR^2x$ (2) MR^2x

(3) $\frac{3}{2}MR^2x$ (4) $2MR^2x$

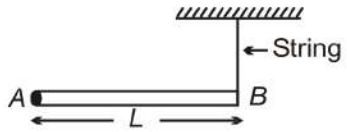
15. Solid sphere is rolling on a frictionless surface, shown in figure with a translational velocity v m/s. If sphere climbs upto height h of a smooth inclined plane, then the value of v is



(1) $\sqrt{\frac{10}{7}gh}$ (2) $\sqrt{2gh}$

(3) $2gh$ (4) $\sqrt{\frac{7}{10}}gh$

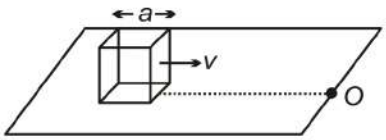
16. A uniform rod AB of length L is hinged at one end A. The rod is kept in horizontal position by a massless string tied to point B as shown in figure. If string is cut, initial angular acceleration of rod is



(1) $\frac{g}{L}$ (2) $\frac{2g}{L}$

(3) $\frac{2g}{3L}$ (4) $\frac{3g}{2L}$

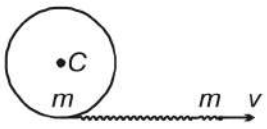
17. A cubical block of side a moving with velocity v on a horizontal smooth the plane as shown in figure. It hits a ridge at point O and starts rotating about the edge in contact with O. The angular speed of the block after it hits O is



(1) $\frac{3v}{4a}$ (2) $\frac{3v}{2a}$

(3) $\sqrt{\frac{3}{2}}\frac{v}{a}$ (4) Zero

18. A particle of mass m is attached to a disc of equal mass m by means of a slack string as shown. The disc is hinged about its centre C on a horizontal smooth table. The particle is thrown on the horizontal table with initial velocity v. Find its velocity, when the string becomes taut.



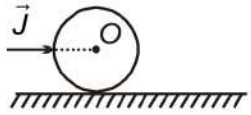
(1) v

(2) $\frac{v}{3}$

(3) $\frac{2v}{3}$

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

19. An impulse J is applied on a ring of mass m along a line passing through its centre O. The ring is placed on a rough horizontal surface. The linear velocity of centre of ring once it starts rolling without slipping is



(1) $\frac{J}{m}$ (2) $\frac{J}{2m}$

(3) $\frac{J}{4m}$ (4) $\frac{J}{3m}$

20. A particle undergoes uniform circular motion. About which point on plane of circle, will angular momentum of the particle remain conserved?

(1) Centre of circle

(2) On the circumference of the circle

(3) Inside the circle

(4) Outside the circle

21. A particle of mass 2 kg located at the position $(i + j)$m has a velocity $2(i - j)$. Find its angular momentum about z-axis.

(1) Zero (2) $+ 8\hat{k}$

(3) $12\hat{k}$ (4) $- 8\hat{k}$

22. A force $\vec{F} = a\hat{i} + 3\hat{j} + 6\hat{k}$ is acting at a point $\vec{r} = 2\hat{i} - 6\hat{j} - 12\hat{k}$. Find the value of a for which angular momentum about origin is conserved.

(1) 0

(2) 1

(3) $- 1$

(4) 2

23. Two loops P and Q are made from a uniform wire. The radii of P and Q are R_1 and R_2 respectively and their moment of inertia about axes normally through centre are I_1 and I_2 respectively. If $\frac{I_2}{I_1} = 4$ then find $\frac{R_2}{R_1}$.

(1) $4^{\frac{2}{3}}$ (2) $4^{\frac{1}{3}}$

(3) $4^{-\frac{2}{3}}$ (4) $4^{-\frac{1}{3}}$

24. A ring is rolling down a rough inclined plane (coefficient of friction μ) without slipping. Maximum angle of inclination of the inclined plane is

(1) $\tan^{-1}(2\mu)$ (2) $\tan^{-1}(2.5\mu)$

(3) $\tan^{-1}(3\mu)$ (4) $\tan^{-1}(3.5\mu)$

25. If radius of earth suddenly contracts to $\frac{1}{n^{th}}$ of its present radius without any change in its mass, the duration of day will approximately become

(1) $\frac{24}{n}$ hour (2) $\frac{24}{n^2}$ hour

(3) 24 n hour (4) $24n^2$ hour

26. The radio of two planets are R_1 and R_2 respectively with density p_1 and p_2. Then find ratio of acceleration due to gravity at their surfaces?

(1) $\frac{\frac{p_1}{R_1^2}}{\frac{p_2}{R_2^2}}$ (2) $\frac{R_1R_2}{p_1p_2}$

(3) $\frac{R_1p_2}{R_2p_1}$ (4) $\frac{R_1p_1}{R_2p_2}$

27. If the distance between centres of earth and moon is D and mass of earth is 81 times the mass of moon then at what distance from centre of earth gravitational field is zero?

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

(3) $\frac{4D}{3}$ (4) $\frac{9D}{10}$

28. Infinite number of point masses each equal to m are placed at x =1, x = 2, x = 4, x = 8....., what is the total gravitational potential at x = 0?

(1) $-Gm$ (2) $-2Gm$

(3) $-4Gm$ (4) $-8Gm$

29. Gravitational potential in a region is given by $v = (3x + 4y + 12z)$ J/kg. The modulus of gravitational field at (x = 1, y = 0, z = 3) is

(1) 20 N/kg (2) 13 N/kg

(3) 12 N/kg (4) 5 N/kg

30. Consider earth as a uniform solid sphere. Gravitational potential at its surface is v. Gravitational potential at its cente is

(1) v (2) Zero

(3) $\frac{v}{2}$ (4) $\frac{3}{2}v$

31. A body of mass m kg starts falling from a point at height $2R$ above earth's surface. Find its kinetic energy when it has fallen to a point at height R above earth's surface. (R = Radius of earth)

(1) $\frac{1}{2}\frac{GMm}{R}$ (2) $\frac{1}{6}\frac{GMm}{R}$

(3) $\frac{2}{3}\frac{GMm}{R}$ (4) $\frac{1}{3}\frac{GMm}{R}$

32. Acceleration due to gravity on the surface of earth is g. Acceleration due to gravity at a height equal to radius of earth from surface of earth is

(1) g (2) $\frac{g}{4}$

(3) $\frac{g}{8}$ (4) $\frac{g}{6}$

33. If radius of earth reduces by 4% and density remains same, then find escape velocity change.

(1) Reduce by 2% (2) Increase by 2%

(3) Reduce by 4% (4) Increase by 4%

34. A "double star" is a composite system of two stars rotating about their centre of mass under their mutual gravitational attraction. Let us consider such a double star which has two stars of masses m each at separation l. If T is the time period of rotation about their centre of mass then find T.

(1) $T = 2\pi\sqrt{\frac{l^3}{mG}}$ (2) $T = 2\pi\sqrt{\frac{l^3}{2mG}}$

(3) $T = 2\pi\sqrt{\frac{l^3}{3mG}}$ (4) $T = 2\pi\sqrt{\frac{l^3}{4mG}}$

35. A point $P\left(R\sqrt{3},0,0\right)$ lies on the axis of a ring of mass M and radius R. The ring is located in y - z plane with centre at origin O. A small particle of mass m starts from P and reaches at O under gravitational attraction. Find its speed at O.

(1) $\sqrt{\frac{GM}{R}}$ (2) $\sqrt{\frac{Gm}{R}}$

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

36. A satellite is revolving round the earth in an orbit of radius r with time period T. If the satellite is revolving round the earth in an orbit of radius $r + \Delta r$ ($\Delta r << r$) with time period $T + \Delta T$($\Delta T << T$) then find $\frac{\Delta T}{T}$.

(1) $\frac{3\Delta r}{2r}$ (2) $\frac{2\Delta r}{3r}$

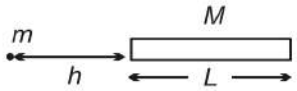
(3) $\frac{\Delta r}{r}$ (4) $\frac{2\Delta r}{r}$

37. If g is acceleration due to gravity on surface of earth then value of acceleration due to gravity at depth equal to $\frac{R}{2}$ from the surface of earth is how much?

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

(3) $\frac{4g}{9}$ (4) $\frac{5g}{9}$

38. A homogeneous bar of length L and mass M is at a distance h from a point mass m a shown. The force on m is F, then find F.



(1) $\frac{GMm}{(h+L)^2}$ (2) $\frac{GMm}{h^2}$

(3) $\frac{GMm}{h(h+L)}$ (4) $\frac{GMm}{L^2}$

39. Dimensional formula of radius of gyration is same that of

(1) Moment of inertia (2) Angular momentum

(3) Radius (4) Torque

40. A projectile is projected with velocity kv_e in vertically upward direction from ground into space (v_e is escape velocity and $k < 1$). If air resistance is considered negligible then find the maximum height from centre of earth to which it can go.

(1) $\frac{R}{k^2+1}$ (2) $\frac{R}{k^2-1}$

(3) $\frac{R}{1-k^2}$ (4) $\frac{R}{k+1}$

41. An artificial satellite moving in circular orbit around earth has a total (kinetic + potential) energy E_0. Find its potential energy and kinetic energy respectively.

(1) $2E_0$ and $-2E_0$

(2) $-2E_0$ and $3E_0$

(3) $2E_0$ and $-E_0$

(4) $-2E_0$ and $-E_0$

42. The magnitudes of gravitational field at distance r_1 and r_2 from centre of uniform solid sphere of radius R and mass M are F_1 and F_2 respectively, then find ratio of F_1 and F_2.

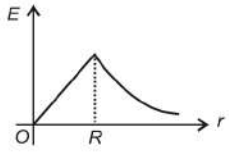
(1) $\frac{F_1}{F_2} = \frac{r_1}{r_2}$ if $r_1 < R$ and $r_2 < R$

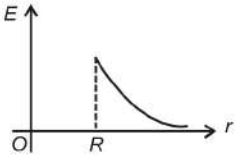
(2) $\frac{F_1}{F_2} = \frac{r_2^2}{r_1^2}$ if $r_1 > R$ and $r_2 < R$

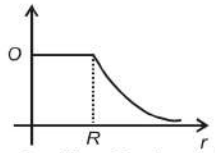
(3) $\frac{F_1}{F_2} = \frac{r_1}{r_2}$ if $r_1 > R$ and $r_2 > R$

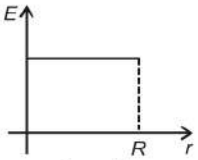
(4) $\frac{F_1}{F_2} = \frac{r_1^2}{r_2^2}$ if $r_1 < R$ and $r_2 < R$

43. Which of the following represents the variation of gravitational field (E) versus distance (r) from the centre of a spherical shell of radius R?

(1) 

(2) 

(3) 

(4) 

44. A projectile, fired vertically upwards with escape speed (v) from earth. If it is fired at 45° to the horizontal, what should be its speed so that it escapes from earth?

(1) v (2) $\frac{v}{\sqrt{2}}$

(3) $\sqrt{2}\,v$ (4) $2v$

45. Orbital speed of Jupiter is

(1) Greater than orbital speed of earth

(2) Less than orbital speed of earth

(3) Equal to the orbital speed of earth

(4) Zero

CHEMISTRY

46. The difference in heat of reaction at constant volume and at constant pressure for given reaction is

$$CH_4(g) + O_2(g) \xrightarrow{Mn^{2+}} HCOOH(l) + H_2(g)$$

(1) $-RT$ (2) RT

(3) $-2RT$ (4) $-3RT$

47. Which of the following gas has y-value equal to 1.4?

(1) He

(2) SO_2

(3) O_3

(4) CO_2

48. $HF_{(aq)} + NaOH \rightarrow NaF_{(aq)} + H_2O_{(l)}$ $\Delta H = -68.6$ kJ mol^{-1}.
The high negative value of heat of reaction is due to

(1) In aqueous solution HF is strong acid

(2) High hydration of $F^{(-)}$ due to its high charge density

(3) Heat of neutralisation of any strong acid with NaOH is –68.6 kJ mol^{-1}

(4) HF is associated liquid

49. Choose the incorrect combination

	ΔH	ΔS	Temp.	Spontaneity
I.	+ve	–ve	Any temp.	Non-spontaneous
II.	–ve	–ve	Low temp.	Non-spontaneous
III.	+ve	+ve	Low temp.	Spontaneous
IV.	– ve	+ ve	Any temp.	Spontaneous

(1) I, II

(2) II, III

(3) III, IV

(4) I, IV

50. When a real gas expands adiabatically against a finite pressure, its

(1) Internal energy increases

(2) Internal energy decreases

(3) Temperature always increases

(4) Entropy remains constant

51. In thermodynamics, a process is called reversible when

(1) Surrounding and system change into each other

(2) There is no boundary between system and surrounding

(3) The system and surroundings are in equilibrium at each stage

(4) The system changes into surrounding spontaneously

52. The heat of neutralisation of four acids, A, B, C, D are –13.7, –9.4, –11.2 and –12.4 kcal respectively, when they are neutralised by a common base. The acidic character obeys the order

(1) A > B > C > D (2) A > D > C > B

(3) D > C > B > A (4) D > B > C > A

53. The temperature of 5 ml of a strong acid increases by 5°C when 5 ml of a strong base is added to it. If 10 ml of each is mixed, temperature should increase by

(1) 5°C (2) 10°C

(3) 15°C (4) Cannot be predicted

54. The gas absorbs 100 J heat and simultaneously compressed by a constant external pressure of 1.50 atm from 8 L to 2 L. Hence, ΔU will be

(1) 109 J (2) 812 J

(3) 1011 J (4) 911 J

55. $H_2 + Cl_2 \longrightarrow 2HCl$; $\Delta H = -44$ kcal
Heat of formation of HCl is

(1) +44 kcal/mole (2) –44 kcal/mole

(3) +22 kcal/mole (4) –22 kcal/mole

56. $X_2O_{4(l)} \longrightarrow 2XO_{2(g)}$, $\Delta U = 2.1$ kcal, $\Delta S = 20$ cal K^{-1} at 300 K. Then ΔG is

(1) 2.7 kcal (2) –2.7 kcal

(3) 9.3 kcal (4) –9.3 kcal

57. Heat of hydrogenation of cyclohexene is x_1 and that of benzene is x_2. Hence, resonance energy is

(1) $x_1 - x_2$ (2) $x_1 + x_3$

(3) $3x_1 - x_2$ (4) $x_1 - 3x_2$

58. In which of the given process entropy decreases?

(1) $3O_2(g) \rightarrow 2O_3(g)$

(2) Sugar + Water → Solution

(3) $2SO_3(g) \rightarrow 2SO_2(g) + O_2(g)$

(4) $2HCl(g) \rightarrow H_2(g) + Cl_2(g)$

59. What is the change in the energy of system if 500 cal of heat energy is added to a system and system does 350 cal of work on surroundings?

(1) –150 cal (2) +150 cal

(3) +850 cal (4) –850 cal

60. The volume of gas is reduced to half from its original volume. The specific heat will

(1) Reduce to half

(2) Be doubled

(3) Remain constant

(4) Increase four times

61. $NaCl_{(s)} \longrightarrow Na^{+}_{(g)} + Cl^{-}_{(g)}$

The enthalpy of above reaction is known as

(1) Enthalpy of hydration

(2) Lattice enthalpy

(3) Enthalpy of solution

(4) Enthalpy of dissociation

62. **Assertion :** The dissolution of NH_4Cl in water is endothermic still it dissolves in H_2O.

Reason : On dissolution of NH_4Cl, entropy increases and $T\Delta S > \Delta H$, so the process is spontaneous.

(1) Both assertion and reason are correct; Reason is the correct explanation of assertion.

(2) Both are correct; but reason is not the correct explanation of assertion.

(3) Assertion is correct; Reason is incorrect.

(4) Assertion is incorrect; Reason is correct.

63. Find the correct relationship

(1) $\Delta G^\circ = \Delta G + RT \ln K$

(2) $\Delta G^\circ = -2.303\ RT \log K$

(3) Melting point = $\Delta H_{fusion} \times \Delta S_{fusion}$

(4) $\Delta U = \Delta H + \Delta n_g RT$

64. In an isochoric process, ΔH for a system equals to

(1) $P\Delta V$ (2) PV

(3) $E + P\Delta V$ (4) ΔE

65. For the reaction, $CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$ at a given temperature the equilibrium amount of can be increased by

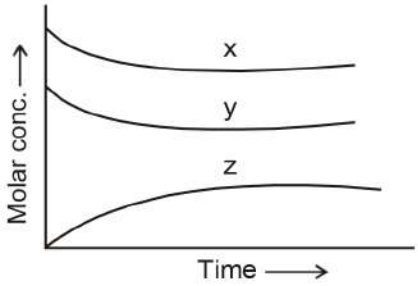
(1) Adding a suitable catalyst

(2) Adding an inert gas

(3) Decreasing the volume of the container

(4) Increasing the amount of CO

66. The preparation of ammonia can be represented graphically as



Identify (x), (y) and (z) respectively

(1) N_2, NH_3, H_2

(2) H_2, N_2, NH_3

(3) NH_3, N_2, H_2

(4) NH_3, H_2, N_2

67. Which of the following is not a physical equilibrium?

(1) Ice $\rightleftharpoons$ Water

(2) $I_{2(s)} \rightleftharpoons I_{2(g)}$

(3) $S_{(l)} \rightleftharpoons S_{(gas)}$

(4) $3O_{2(g)} \rightleftharpoons 2O_{3(g)}$

68. $2HX_{(g)} \rightleftharpoons H_{2(g)} + X_{2(g)}$; $K_C = 1.0 \times 10^{-5}$

What is the concentration of HX if the equilibrium concentration of H_2 and X_2 is 1.2×10^{-3} M and 1.2×10^{-4} M respectively?

(1) 1.2×10^{-4} M (2) 1.2×10^{-3} M

(3) 1.2×10^{-2} M (4) 1.2×10^{-1} M

69. At 500 K, the equilibrium constant for cis-$C_2H_2Cl_2$ $\rightleftharpoons$ trans-$C_2H_2Cl_2$ is 0.6. At the same temperature, the equilibrium constant for the given reaction, trans-$C_2H_2Cl_2$ $\rightleftharpoons$ cis $C_2H_2Cl_2$ will be

(1) 0.66 (2) 1.67

(3) 0.76 (4) 2.6

70. 'a' moles of PCl_5 are heated in a closed container till equilibrium is established

$PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$

at a pressure of P atm. If 'b' moles of PCl_5 dissociate at equilibrium, then

(1) $\frac{a}{b} = \frac{K_P}{K_P + P}$ (2) $\frac{a}{b} = \left(\frac{K_P + P}{K_P}\right)^{1/2}$

(3) $\frac{a}{b} = \left(\frac{K_P}{K_P + P}\right)^{1/2}$ (4) $\frac{a}{b} = \left(\frac{K_P}{P}\right)$

71. Which of the following reactions shows heterogeneous equilibria?

(1) $N_2 + 3H_2 \rightleftharpoons 2NH_3$

(2) $H_2O_{(l)} \rightleftharpoons H_2O_{(s)}$

(3) $CH_3COOH + C_2H_5OH \rightleftharpoons CH_3COOC_2H_5 + H_2O$

(4) $N_2 + O_2 \rightleftharpoons 2NO$

72. $A_{2(g)} + B_{2(g)} \rightleftharpoons 2AB_{(g)}$; $K_C = 56$ at 700 K. The molar concentration of $[A_2] = 0.10$ M, $[B_2] = 0.20$ M and $[AB] = 0.40$ M, the reaction quotient, Q_C is

(1) 10.0 (2) 7.0

(3) 8.0 (4) 12.0

73. $\underset{\text{acid}}{H_2O_{(l)}} + \underset{(X)}{H_2O_{(l)}} \rightleftharpoons \underset{(aq)}{H_3O^+} + \underset{(aq)}{OH^-}$

Here, (X) and (Y) refer to

(1) Base and conjugate acid

(2) Acid and conjugate base

(3) Base and conjugate base

(4) Acid and conjugate acid

74. The pH of solution obtained by mixing equal volume of solution of pH = 3 and pH = 4.

(1) 4.38 (2) 3.67

(3) 3.26 (4) 4.12

75. pH of solution containing 0.01 M NH_4Cl and 0.1 M NH_4OH solution (pK_b is 5) is

(1) 9 (2) 10

(3) 6 (4) 7

76. The correct relationship between solubility and K_{sp} of Ag_2CO_3 is

(1) $K_{sp} = s^2$ (2) $K_{sp} = 4s^3$

(3) $K_{sp} = 27s^4$ (4) $K_{sp} = s$

77. The acid dissociation constant of H_2S and HS^- are 10^{-7} and 10^{-13} respectively. The pH of 0.1 M aqueous solution of H_2S will be

(1) 2 (2) 3

(3) 4 (4) 5

78. Acidity of BF_3 can be explained on the basis of
(1) Arrhenius concept

(2) Bronsted concept
(3) Lewis concept

(4) Bronsted as well as Lewis concept

79. How much water must be added to 300 mL of 0.2 M solution of CH_3COOH for the degree of dissociation of the acid to be double? [K_a for the acetic acid is 1.8×10^{-5}].

(1) 900 mL (2) 1000 mL

(3) 500 mL (4) 300 mL

80. The correct order of increasing acidic nature

(1) $H_3O^+ < NH_4^+ < HF < OH^- < H_2O$

(2) $NH_4^+ < HF < H_3O^+ < H_2O < OH^-$

(3) $OH^- < H_2O < NH_4^+ < HF < H_3O^+$

(4) $H_3O^+ < HF < H_2O < NH_4^+ < OH^-$

81. In which of the given solution AgBr will have maximum solubility?

(1) Pure water

(2) 10^{-3} M NaBr

(3) 10^{-3} M NH_4OH

(4) 10^{-3} M HBr

82. The indicator used for the titration of a weak base and strong acid is

(1) Methyl orange [$pK_{in} = 1.7$]

(2) Phenophthalein [$pK_{in} = 9.4$]

(3) Phenol red [$pK_{in} = 7.9$]

(4) Thymol blue [$pK_{in} = 9.00$]

83. What is the correct expression of K_C for given reaction?

$P_{4(s)} + 5O_{2(g)} \rightleftharpoons P_4O_{10(s)}$

(1) $K_C = [O_2]^5$

(2) $K_C = [P_4O_{10}]/[P_4][O_2]^5$

(3) $K_C = \dfrac{[P_4O_{10}/5]}{[P_4][O_2]^5}$

(4) $K_C = \dfrac{1}{[O_2]^5}$

84. Three reactions involving H_3PO_4 are given below

(i) $H_3PO_4 + H_2O \rightleftharpoons H_3O^+ + H_2PO_4^-$

(ii) $H_2PO_4^- + H_2O \rightleftharpoons HPO_4^{2-} + H_3O^+$

(iii) $H_2PO_4^- + OH^- \rightarrow H_3PO_2 + O^{2-}$

In which of the above does $H_2PO_4^-$ act as an acid?

(1) (ii) only (2) (i) & (ii)

(3) (iii) only (4) (i) only

85. When $HCl_{(g)}$ is passed through a saturated solution of common salt, pure NaCl is precipitated because

(1) HCl is highly soluble in water

(2) The ionic product $[Na^+]$ $[Cl^-]$ exceeds its solubility product

(3) The K_{sp} of NaCl is lowered by presence of Cl^- ions

(4) HCl causes precipitation

86. A cylinder of gas contains 14 kg of butane. If a normal family requires 20,000 kJ of energy per day for cooking, butane gas in the cylinder lasts for ____days (ΔH_{comb} of $C_4H_{10} = -2568$ kJ mol^{-1})

(1) 15

(2) 30.9

(3) 50

(4) 40

87. 8.56 L of an ideal gas at STP requires 24 cal to raise the temperature by 15°C at constant volume. The C_p of the gas is

(1) 3 cal

(2) 4 cal

(3) 7 cal

(4) 6 cal

88. For an ideal gas expanding adiabatically in vacuum,

(1) $\Delta H < 0$

(2) $\Delta H = 0$

(3) $\Delta H > 0$

(4) $\Delta G = 0$

89. Which of given relationship is incorrect?

(1) $\Delta G° - \Delta H° = -T\Delta S$

(2) $\Delta S_{Total} = \Delta S_{sys} + \Delta_{surr.}$

(3) $\Delta G = \Delta G° + RT \log Q$

(4) $\Delta U = q \Delta w$

90. Choose the correct option for free expansion of an ideal gas under adiabatic condition from the following:

(1) $q = 0, \Delta T \leq 0, w = 0$

(2) $q \leq 0, \Delta T = 0, w = 0$

(3) $q = 0, \Delta T = 0, w = 0$

(4) $q = 0, \Delta T < 0, w \leq 0$

BOTANY

91. The tap root system in angiosperms

(1) Includes primary roots derived directly from the elongation of radicle

(2) Bear branches of several orders of exogenous origin

(3) Does not consist secondary and tertiary roots

(4) Originate from the base of stem and may become fibrous also

92. Which one is not correct for adventitious roots?

(1) Do not arise from radicle

(2) Found in monocots only

(3) May provide a proper anchorage to the plants or plant parts

(4) May help in photosynthesis in certain plants

93. The region of root few millimetres above the root cap possessing very small cells with thin walls and dense protoplasm is

(1) Root hair zone (2) Region of elongation

(3) Region of meristems (4) Region of maturation

94. Adventitious root get swollen to store food is found in

(1) Carrot (2) Radish

(3) Turnip (4) *Ipomoea*

95. Find out correct match

(1) Root pocket – Screw pine

(2) Multiple root cap – Water hyacinth

(3) Brace root – Maize

(4) Nodulated root – Turmeric

96. Choose incorrect statement w.r.t. stem

(1) Ascending part of the axis arising from plumule

(2) Can help in vegetative propagation and perennation

(3) Bears immature underdeveloped shoot called buds in the axils of leaves only

(4) May protect the plant from grazing animals

97. Lateral branches originate from the basal and underground portion of the main stem, grows horizontally beneath the soil and then come out obliquely upward forming the leafy shoots, is known as

(1) Runner (2) Sucker

(3) Root stock (4) Stolon

98. Plants well adapted to dry arid regions of habitat

(1) Modify their stems into woody, straight and pointed thorns

(2) Modify their stems into fleshy cylindrical structures as in *Euphorbia*

(3) Have much branched stems with sunken stomata in endoderms

(4) Essentially have low osmotic pressure in roots and leaves as well

99. Stolon and runners resemble each other in

(1) Possessing node and internodes

(2) Helping to find new niches

(3) Possessing tuft of roots and rosette of leaves at nodes

(4) More than one option is correct

100. Choose incorrect statement w.r.t. bulbs.

(1) Presence of reduced disc-shaped stem

(2) Absence of terminal buds

(3) It may be covered by a sheath of membranous tunic

(4) Fleshy scales are arranged in a more or less concentric fashion

101. The part of leaf which allow leaf blade to flutter in wind, thereby cooling the leaf and bringing fresh air to the leaf surface is

(1) Mesopodium (2) Hypopodium

(3) Pulvinus (4) Epipodium

102. Mark correct option (w.r.t. dicot leaf with parallel venation)

(1) *Smilax* (2) *Calophyllum*

(3) *Ricinus* (4) *Ficus*

103. Which of the following is not a modification of leaf?

(1) Fleshy leaves of onion

(2) Tendrils in pea

(3) Spines of cacti

(4) Thorns in *Bougainvillea*

104. In a pinnately compound leaf

(1) Leaflets are attached at the tip of petiole

(2) Rachis represents midrib of the leaf

(3) The incision in lamina do not touch the midrib

(4) A bud is present in the axil of leaflets

105. Select odd one w.r.t. phyllode

(1) Bud is present in its axil

(2) Flattened petiole or rachis of a leaf

(3) Absence of nodes and internodes

(4) Shows unlimited growth

106. In racemose type of inflorescence

(1) Younger flowers are present at the base of peduncle

(2) Main axis continue to grow

(3) Flowers are borne in a basipetal order

(4) Main axis terminates in a flower

107. Mark the correct option (w.r.t. cymose inflorescence)

(1) *Solanum* (2) *Morus*

(3) *Musa* (4) *Iberis*

108. In a hypogynous flower

(1) Stamens and carpels both occupy highest position

(2) Gynoecium is situated in the centre and other parts are located on the rim of the thalamus

(3) The ovary is superior and exemplified by china rose

(4) The ovary is completely enclosed by thalamus margins

109. How many of the given flowers are actinomorphic?

China rose, Bean, *Cassia*, *Datura*, Pea, onion, mustard, chilly, canna

(1) Five (2) Six
(3) Four (4) Three

110. If the margins of sepals or petals overlap each other but not in any particular direction, the aestivation is referred as
(1) Valvate (2) Imbricate
(3) Twisted (4) Vexillary

111. Axile placentation is characterised by
(1) The placenta forms a ridge along the ventral suture of the ovary
(2) Number of placenta corresponds to the number of carpels
(3) Presence of multilocular ovary with ovules on central axis
(4) Ovules are present at inner wall of multicarpellary apocarpous ovary

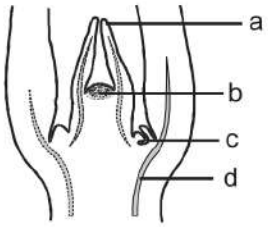
112. Which of the following is matched correctly?
(1) Etaerio of achenes – Mango
(2) Simple dry indehiscent fruit – *Ficus*
(3) Composite fruit – Wheat
(4) Simple dry dehiscent fruit – Pea

113. Diagnostic feature of angiospermic family that includes muliathi is
(1) Pulvinate leaf base with alternate phyllotaxy
(2) Presence of root nodules
(3) Diadelphous stamens and marginal placentation
(4) All are correct

114. Meristems are characterised by all, except
(1) Vacuoles are absent or very small
(2) Presence of proplastids
(3) Isodiametric cells with broad intercellular spaces
(4) Ergastic substances are absent

115. Meristems which develop from primary permanent tissue upon dedifferentiation
(1) Are exemplified by cork cambium only
(2) Can add new cells on its both sides
(3) Do not develop in dicot roots
(4) May have thick wall of pectocellulose

116. Examine the figure given below and select the right option in which structures are identified correctly.



(1) a - leaf primordium, d - shoot apical meristem
(2) c - radical bud, d - differentiating vascular tissue
(3) b - root apical meristem, c - axillary bud
(4) b - meristematic zone, c - lateral bud

117. 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

118. Distinct endodermis with deposition of suberin can be observed in
(1) Dicot roots
(2) Monocot stems
(3) Dicot stems
(4) Dicot leaves

119. Collenchyma differs from sclerenchyma in
(1) Retaining protoplasm at maturity
(2) Having thick cell wall
(3) Possessing a wide lumen
(4) Providing mechanical support to the organ

120. Find odd one (w.r.t. drupe fruit)
(1) Mango
(2) Almond
(3) Coconut
(4) Maize

121. Choose incorrect option w.r.t. lateral meristems.
(1) They are cylindrical meristems
(2) Occur in mature regions of roots and shoots
(3) They are responsible for producing the secondary tissues
(4) Do not occur in extrastelar region of dicot stem

122. Find **correct** statement w.r.t. common features of tracheids and vessels.

(1) Being dead and without protoplasm

(2) Septa between adjacent cells get dissolved to produce vessel or tracheid

(3) Occur in all vascular plants

(4) Transport of water, minerals and sugars

123. Select odd one w.r.t. protoxylem

(1) First formed primary xylem elements

(2) Lies towards periphery in exarch condition

(3) Presence of annular and spiral thickening

(4) It is formed of broader and larger elements

124. 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) Stores food materials and substances like resins and latex

125. The **correct** floral formula of *Allium cepa* is

(1) Br ♀ $P_{(3+3)}$ A_{3+3} $\underline{G}_{(3)}$

(2) Br ♀ $P_{(3+3)}$ A_{3+3} $\underline{G}_{(3)}$

(3) Br ♀ P_6 A_{3+3} $\underline{G}_{(3)}$

(4) Br ♀ $P_{(3+3)}$ $A_{(3+3)}$ $\underline{G}_{(3)}$

126. The trichomes in the shoot system are

(1) Usually multicellular

(2) Are branched or unbranched but not stiff

(3) Cannot be secretory in function

(4) Cannot help in preventing water loss due to transpiration

127. Ground tissue system

(1) Is composed of simple permanent tissues

(2) Forms the outermost covering of the whole plant body

(3) Include general cortex, endodermis, pericycle but not the medullary rays in dicot stems

(4) More than one option is correct

128. Biological check-post in roots of angiosperm is

(1) Pericycle

(2) Endodermis

(3) Bulliform cells

(4) Starch sheath

129. Vascular bundles in leaves are

(1) Conjoint and closed

(2) Radial and closed

(3) Nearly of similar sizes in dicots

(4) Surrounded by a layer of sclerenchymatous cells called bundle sheath

130. The transverse section of a typical young dicot stem shows

(1) Few layered sclerenchymatous hypodermis providing mechanical strength

(2) Few layered parenchymatous pericycle above the phloem in the form of semi-lunar patches

(3) Conjoint, open vascular bundles with endarch xylem

(4) Large number of elongated collenchymatous cells with intercellular spaces that constitute the central pith

131. Large, empty, colourless cells that occur on_____surface of leaves in_____help in rolling are called_____cells (respectively)

(1) Adaxial, monocots, motor

(2) Abaxial, dicots, bulliform

(3) Abaxial, monocots, motor

(4) Adaxial, dicots, bulliform

132. Which one contributes in formation of cambium ring in a dicot root?

(1) Conjunctive tissue and cells of pericycle

(2) Cells of pericycle lying opposite to patches of phloem

(3) Cells of endodermis and conjunctive tissue

(4) Cells of conjunctive tissue only

133. Select **incorrect** statement w.r.t. secondary growth in dicot stem

(1) Cambium is generally more active on the inner side than on the outer

(2) Addition of secondary xylem in the centre causes primary phloem and primary xylem to be obliterated

(3) Secondary medullary rays passes through secondary xylem and secondary phloem in the radial direction

(4) Activity of cambium ring is not uniform in trees of temperate region

134. Youngest layer of secondary xylem is

(1) Laid just inner to the cambium ring

(2) Involved in conduction of water and mineral

(3) Light in colour and occupies in periphery

(4) More than one option is correct

135. Which one is not true for bark?

(1) All tissues lying outside the vascular cambium is referred as bark

(2) It refers to a number of tissue types, viz, periderm and secondary phloem

(3) Bark formed towards the end of the season is called soft bark

(4) Include suberised cells called cork and lens shaped openings known as lenticels

ZOOLOGY

136. Which of the following statements is **'incorrect'** for epithelia?

(1) They are derived from any of the embryonic germ layers

(2) They are vascularized

(3) The cells have a rapid rate of cell division

(4) Cemented to one another to form a single layer

137. Non-keratinised stratified squamous epithelium occurs in

(1) Buccal cavity, nail, skin

(2) Nail, skin, cornea

(3) Buccal cavity, pharynx, sweat gland duct

(4) Buccal cavity, pharynx, oesophagus, cervix, vagina

138. Read the statements is/are

(A) The cells of germinal epithelium are cuboidal
(B) The main function of stratified squamous epithelium is protection

(C) The ciliated epithelium is found in trachea and fallopian tubes

(D) The transitional epithelium is found in kidney and ureters

The **correct** statement is

(1) All are correct

(2) Only A & B are correct

(3) Only A, B & C are correct

(4) Only B, C & D are correct

139. Mark the cell junctions which facilitate the cells to communicate with each other by connecting the cytoplasm of adjoining cells for rapid transfer of ions, small molecules and sometimes big molecules

(1) Tight junctions (2) Adhering junction

(3) Gap junctions (4) Desmosomes

140. Which of the following is considered a transparent tissue?

(1) Ligaments (2) Tendons

(3) Hyaline cartilage (4) White fibrocartilage

141. Hyaline cartilage is present in

(1) Tip of nose, epiglottis, trachea, larynx

(2) Ear pinna, trachea, larynx

(3) Larynx, trachea, nasal septum

(4) Epiglottis, trachea, larynx

142. Which of the bone will be considered investing or dermal bone?

(1) Thoracic vertebrae (2) Femur

(3) Frontal (4) Ribs

143. Find out **'incorrect'** statement about nerve fibres

(1) The dendrite carries impulse towards the cyton

(2) Collateral fibres are given out by cyton

(3) Nissl granules are absent in axon

(4) Myelin sheath is discontinuous at the node of Ranvier

144. Choose the odd pair from the following

(1) Muscle fibre – Myosin

(2) Areolar – Adipocytes

(3) Epithelium – Keratin

(4) Neuron – Melanin

145. Tendon is made up of
(1) Mainly collagen fibres
(2) Elastic connective tissue fibres only
(3) Without fibres
(4) Few collagen fibres and more elastic fibres

146. Which of the following is 'true' regarding adipose tissue?
(1) Brown fat cells are monolocular
(2) White fat cells are multilocular
(3) Adipocytes have the shape of signet rings
(4) Brown fat is poorly vascularized

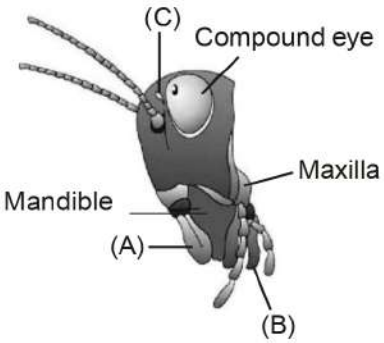
147. Haversian systems are found in the bones of
(1) Scoliodon
(2) Scolidon, Pigeon
(3) Rabbit, Panther
(4) Scoliodon, Pigeon, Panther, Python

148. Non-excitable cells found in nervous tissue
(1) Dendrites
(2) Glial cells
(3) Axons
(4) Macrophages and Kupffer cells

149. The upper most part of head of cockroach is called
(1) Vertex (2) Clypeus
(3) Frons (4) Tergum

150. The number of abdominal segments in male and female cockroach is
(1) 9, 10 (2) 10, 10
(3) 9, 9 (4) 10, 9

151. In the given figure *i.e.* head region of cockroach mark the **correct** label A, B & C



	(A)	(B)	(C)
(1)	Labium	Labrum	Ocellus
(2)	Labrum	Labium	Ocellus
(3)	Clypeus	Vertex	Ocellus
(4)	Notum	Maxillary palp	Antennae socket

152. Read the statements
(A) 10 pairs of spiracles are present in cockroach
(B) The stage in the development of an insect between two moults is called instar
(C) Stomodaeal value is present in-between gizzard and mesenteron
(D) The cockroach is diurnal and omnivorous

The 'correct' options are
(1) A, B & C (2) A & C
(3) B, C & D (4) B & C

153. Which external changes are visible after the last moult of a cockroach nymph?
(1) Labrum and hypopharynx develop
(2) Anal cerci develop
(3) Forewings and hindwings develop
(4) Maxilla and mandible develop

154. Efferent salivary ducts in *Periplaneta* open into
(1) Base of oesophagus
(2) Base of pharynx
(3) In buccal cavity
(4) Base of hypophyarynx

155. Find out **'incorrect'** statement regarding cockroach
(1) Titillator is associated with left phallomere
(2) Number of ovarioles in each ovary is sixteen
(3) Development is paurometabolous
(4) Conglobate gland is found in male cockroach only

156. Hormone produced by corpora allata in cockroach is
(1) Inhibiting hormone (2) Juvenile hormone
(3) Ecdysone (4) Cardiac hormone

157. Number of thoracic and abdominal ganglia in cockroach respectively is
(1) 3, 3 (2) 3, 6
(3) 6, 3 (4) 6, 6

158. In cockroach, which of the following is a correct sequence of segments in each walking legs?
(1) Coxa, trochanter, femur, tibia, tarsus
(2) Coxa, femur, trochanter, tibia, tarsus
(3) Trochanter, coxa, femur, tibia, tarsus
(4) Femur, coxa, tibia, tarsus, trochanter

159. In *Periplaneta americana,* the oothecal case is secreted by
(1) Conglobate gland
(2) Collaterial gland
(3) Mushroom gland
(4) Phallic gland

160. Find out 'incorrect' statement

(1) Inulin a polysaccharide is obtained from the roots of *Dahalia*

(2) GLUT-4 protein enables glucose transport into cells

(3) Ribose sugar is present in RNA and ATP

(4) Sucrose is a dipeptide commonly known as Aspartame

161. Which of the following statements is **'not** correct' w.r.t. starch?

(1) Starch is a stored food of plants

(2) Starch is a polymer of α-glucose units

(3) Amylose and amylopectin are two types of components of starch

(4) Amylose is linear structure consisting of glucose units joined by α (1, 4) glycosidic and α (1, 6) glycosidic linkages

162. Amino acid alanine is

(1) Mono amino dicarboxylic amino acid

(2) Mono amino monocarboxylic amino acid

(3) Mono carboxylic diamino amino acid

(4) Acidic amino acid

163. Which one is the most abundant protein in the animal world?

(1) Insulin

(2) Collagen

(3) Haemoglobin

(4) Myosin

164. Mark the **wrong** statement

(1) Zinc is a cofactor for proteolytic enzyme carboxypeptidase

(2) K_m (Michaelis Constant) is numerically equivalent to ½ Vmax

(3) Each strand of DNA appears like a helical staircase. Each step of ascent, strand turns 36°

(4) Tyrosine, Phenylalanine and Tryptophan are aromatic amino acids

165. Which of the following is not an essential fatty acid?

(1) Stearic acid

(2) Arachidonic acid

(3) Linolenic acid

(4) Linoleic acid

166. Mark the **incorrect** statement

(1) Lipids are not strictly macromolecules

(2) Starch-Iodine gives blue colour, as it can hold iodine molecules in the helical portion

(3) Living state is a non-equilibrium steady state to be able to perform work

(4) The blood concentration of glucose in normal healthy individual is 4.5 to 5.0 mg/100 ml

167. Following are the examples of primary metabolites, **except**

(1) Lecithin (2) Cholesterol

(3) Triglyceride (4) Cellulose

168. Inhibition of succinic dehydrogenase by malonate which closely resembles the substrate succinate in structure 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

169. α-Keratin protein assumes secondary structure through the formation of

(1) Intrachain hydrogen bond

(2) Interchain hydrogen bond

(3) Peptide bond

(4) Interchain disulphide bond

170. Cholesterol is

(1) Wax (2) Triglyceride

(3) Steroid (4) Phospholipid

171. Select the **wrong** statement

(1) Proteins are heteropolymer made up of amino acids

(2) Ribozymes are nucleic acids with catalytic power

(3) Mannitol is a sugar alcohol

(4) Cerebroside is a steroid

172. Which of the following glycosidic bond is found in sucrose?

(1) α 1, 4 (2) β 1, 4

(3) α 1, 6 (4) α - 1, β - 2

173. Mark the odd one

(1) Adenylic acid

(2) Guanylic acid

(3) Cytidine monophosphate

(4) Ascorbic acid

174. Protein part of conjugated enzyme is known as

(1) Holoenzyme (2) Coenzyme

(3) Apoenzyme (4) Prosthetic group

175. The inhibitors which block the active sites of enzyme are

(1) Allosteric modulators

(2) Competitive inhibitors

(3) Non-competitive inhibitors

(4) Feedback inhibitors

176. Increased efficiency of enzymes depends upon

(1) Number of active sites

(2) Decrease in temperature

(3) Increase in pH

(4) More than one option is correct

177. Which statement regarding coenzyme is **'incorrect'**?

(1) Most of the coenzymes are nucleotides and are composed of vitamins

(2) Coenzymes are the active constituents 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

178. Allosteric modulation is due to the inhibitory action faced by enzyme by

(1) Competitive reversible inhibition

(2) Non-competitive irreversible inhibition

(3) Accumulation of products

(4) Accumulation of substrate

179. Select the type of enzyme involved in the following reaction

$S - G + S' \rightarrow S + S' - G$

(1) Lyase

(2) Isomerase

(3) Transferase

(4) Hydrolase

180. Which of the following bond is not present in a single nucleotide?

(1) Hydrogen bond

(2) Glycosidic bond

(3) Phosphodiester

(4) Both (1) & (3)

❑ ❑ ❑