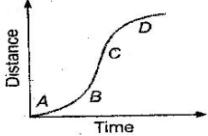
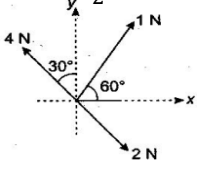
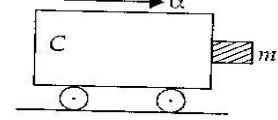


PHYSICS

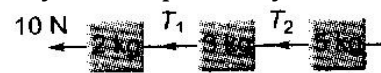
- Q.1 The distance travelled by a particle starting from rest and moving with an acceleration $\frac{4}{3} \text{ ms}^{-2}$, in the third – second is
 (a) $\frac{10}{3} \text{ m}$ (b) $\frac{19}{3} \text{ m}$ (c) 6 m (d) 4 m
- Q.2 A particle moves in a straight line with a constant acceleration. It changes its velocity from 10 ms^{-1} to 20 ms^{-1} while passing through a distance 135 m in t second. The value of t is
 (a) 12 (b) 9 (c) 10 (d) 1.8
- Q.3 A particle of mass m is projected with velocity v making an angle of 45° with the horizontal. When the particle lands on the level ground the magnitude of change in its momentum will be:
 (a) $mv\sqrt{2}$ (b) zero (c) $2mv$ (d) $\frac{mv}{\sqrt{2}}$
- Q.4 A particle shows distance – time curve as given in the figure. The maximum instantaneous velocity of the particle is around the point
 (a) D (b) A
 (c) B (d) C
- 
- Q.5 Sand is being dropped on a conveyor belt at the rate of $M \text{ kg/s}$. The force necessary to keep the belt moving with a constant velocity of $v \text{ m/s}$ will be
 (a) $\frac{Mv}{2}$ newton (b) Zero (c) Mv newton (d) $2Mv$ newton
- Q.6 Three forces acting on a body are shown in the figure. To have the resultant force only along the y – direction, the magnitude of the minimum additional force needed is
 (a) $\frac{\sqrt{3}}{5} \text{ N}$ (b) $\sqrt{3} \text{ N}$ (c) 0.5 N (d) 1.5 N
- 
- Q.7 A roller coaster is designed such that riders experience “weightlessness” as they go round the top of a hill whose radius of curvature is 20 m. The speed of the car at the top of the hill is between
 (a) 16 m/s and 17 m/s (b) 13 m/s and 14 m/s
 (c) 14 m/s and 15 m/s (d) 15 m/s and 16 m/s
- Q.8 A bus is moving with a speed of 10 ms^{-1} on a straight road. A scooterist wishes to overtake the bus in 100s. If the bus is at a distance of 1 km from the scooterist, with what speed should the scooterist chase the bus?
 (a) 40 ms^{-1} (b) 25 ms^{-1} (c) 10 ms^{-1} (d) 20 ms^{-1}
- Q.9 A particle starts its motion from rest under the action of a constant force. If the distance covered in first 10 s is S_1 and that covered in the first 20 s is S_2 , then
 (a) $S_2 = 3S_1$ (b) $S_2 = 4S_1$ (c) $S_2 = S_1$ (d) $S_2 = 2S_1$
- Q.10 A body, under the action of a force $\vec{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$, acquires an acceleration of 1 ms^{-2} . The mass of this body must be
 (a) 10 kg (b) 20 kg (c) $10\sqrt{2} \text{ kg}$ (d) $2\sqrt{10} \text{ kg}$
- Q.11 The mass of a lift is 2000 kg. When the tension in the supporting cable is 28000 N, then its acceleration is
 (a) 4 ms^{-2} upwards (b) 4 ms^{-2} downwards (c) 14 ms^{-2} upwards (d) 30 ms^{-2} downwards
- Q.12 A particle moves of distance x in time t according to equation $x = (t + 5)^{-1}$. The acceleration of particle is proportional to
 (a) (velocity) $^{3/2}$ (b) (distance) 2 (c) (distance) $^{-2}$ (d) (velocity) $^{2/3}$
- Q.13 A ball is dropped from a high rise platform at $t = 0$ starting from rest. After 6 seconds another ball is thrown downwards from the same platform with a speed v . The two balls meet at $t = 18$ s. What is the value of v ?
 (a) 75 m/s (b) 55 m/s (c) 40 m/s (d) 60 m/s

- Q.14 A block of mass m is in contact with the cart C as shown in the figure. The coefficient of static friction between the block and the cart is μ . The acceleration α of the cart that will prevent the block from falling satisfies



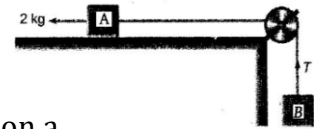
- (a) $\alpha > \frac{mg}{\mu}$ (b) $\alpha > \frac{g}{\mu m}$ (c) $\alpha \geq \frac{g}{\mu}$ (d) $\alpha < \frac{g}{\mu}$
- Q.15 The speed of a projectile at its maximum height is half of its initial speed. The angle of projection is
 (a) 60° (b) 15° (c) 30° (d) 45°
- Q.16 A particle moves in $x - y$ plane according to rule $x = a \sin \omega t$ and $y = a \cos \omega t$. The particle follows
 (a) an elliptical path (b) a circular path
 (c) a parabolic path (d) a straight line path inclined equally to x and $y - axes$
- Q.17 The dimensions of $(\mu_0 \epsilon_0)^{-1/2}$ are
 (a) $[L^{1/2} T^{-1/2}]$ (b) $[L^{-1} T]$ (c) $[L T^{-1}]$ (d) $[L^{-1/2} T^{1/2}]$
- Q.18 A boy standing at the top of a tower of 20 m height drops a stone. Assuming $g = 10 \text{ m s}^{-2}$, the velocity with which it hits the ground is
 (a) 10.0 m/s (b) 20.0 m/s (c) 40.0 m/s (d) 5.0 m/s
- Q.19 A particle moves in a circle of radius 5 cm with constant speed and time period 0.2π s. The acceleration of the particle is
 (a) 15 m/s^2 (b) 25 m/s^2 (c) 36 m/s^2 (d) 5 m/s^2
- Q.20 A missile is fired for maximum range with an initial velocity of 20 m/s. If $g = 10 \text{ m/s}^2$, the range of the missile is
 (a) 40 m (b) 50 m (c) 60 m (d) 20 m
- Q.21 A body is moving with velocity 30 m/s towards east. After 10 seconds its velocity becomes 40 m/s towards north. The average acceleration of the body is
 (a) 1 m/s^2 (b) 7 m/s^2 (c) $\sqrt{7} \text{ m/s}^2$ (d) 5 m/s^2
- Q.22 A person of mass 60 kg is inside a lift of mass 940 kg and presses the button on control panel. The lift starts moving upwards with an acceleration 1.0 m/s^2 . If $g = 10 \text{ m s}^{-2}$, the tension in the supporting cable is
 (a) 8600 N (b) 9680 N (c) 11000 N (d) 1200 N
- Q.23 A body of mass M hits normally a rigid wall with velocity V and bounces back with the same velocity. The impulse experienced by the body is
 (a) MV (b) $1.5 MV$ (c) $2 MV$ (d) zero
- Q.24 The density of a material of CGS system of units is 4 g cm^{-3} . In a system of units in which unit of length is 10 cm and unit of mass is 100 g, the value of density of material will be
 (a) 0.04 (b) 0.4 (c) 40 (d) 400
- Q.25 A particle covers half of its total distance with speed v_1 and the rest half distance with speed v_2 . Its average speed during the complete journey is
 (a) $\frac{v_1 + v_2}{2}$ (b) $\frac{v_1 v_2}{v_1 + v_2}$ (c) $\frac{2v_1 v_2}{v_1 + v_2}$ (d) $\frac{v_1^2 v_2^2}{v_1^2 + v_2^2}$
- Q.26 A projectile is fired at an angle of 45° with the horizontal. Elevation angle of the projectile at its highest point as seen from the point of projection, is
 (a) 45° (b) 60° (c) $\tan^{-1} \frac{1}{2}$ (d) $\tan^{-1} \left(\frac{\sqrt{3}}{2} \right)$
- Q.27 A conveyor belt is moving at a constant speed of 2 m s^{-1} . A box is gently dropped on it. The coefficient of friction between them is $\mu = 0.5$. The distance that the box will move relative to belt before coming to rest on it, taking $g = 10 \text{ m s}^{-2}$, is
 (a) 0.4 m (b) 1.2 m (c) 0.6 m (d) zero
- Q.28 A particle is moving with a constant speed v in a circle. What is the magnitude of average velocity after half rotation?
 (a) $2v$ (b) $2 \frac{v}{\pi}$ (c) $\frac{v}{2}$ (d) $\frac{v}{2\pi}$

- Q.29 A ball of mass 0.12 kg is being whirled in a horizontal circle at the end of string 2.5 m long. It is capable of making 231 revolutions in one minute. The breaking tension of the string is
 (a) 3 N (b) 15.1 N (c) 31.5 N (d) 35.1 N
- Q.30 The centre of a wheel rolling on a plane surface moves with a speed v_0 . A particle on the rim of the wheel at the same level as the centre will be moving at speed
 (a) zero (b) v_0 (c) $\sqrt{2} v_0$ (d) $2 v_0$
- Q.31 The motor of an angle is rotating about its axis with an angular velocity of 100 rev/m. It comes to rest in 15 s, after being switched off. Assuming constant angular deceleration. What are the numbers of revolutions made by it before coming to rest?
 (a) 12.5 (b) 40 (c) 32.6 (d) 15.6
- Q.32 A stone of mass m is tied to a string and is moved in a vertical circle of radius r making n rev/min. The total tension in the string when the stone is at the lowest point is
 (a) mg (b) $m(g + \pi nr^2)$ (c) $m(g + nr)$ (d) $m\{g + \frac{\pi^2 n^2 r}{900}\}$
- Q.33 A string is wound round the rim of a mounted flywheel of mass 20 kg and radius 20 cm. A steady pull of 25 N is applied on the cord. Neglecting friction and mass of the string, the angular acceleration of the wheel is:
 (a) 50 s^{-2} (b) 25 s^{-2} (c) 12.5 s^{-2} (d) 6.25 s^{-2}
- Q.34 A wheel is rotating at 900 rpm about its axis. When the power is cut off it comes to rest in 1 min. The angular retardation in rad/s^2 is
 (a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{8}$
- Q.35 A car is moving in a circular horizontal track of radius 10.0 m with a constant speed of 10.0 ms^{-1} . A plumb bob is suspended from the roof of the car by a light rigid rod of length 1.00 m. The angle made by the rod with the track is ($g = 10 \text{ ms}^{-2}$)
 (a) Zero (b) 30° (c) 45° (d) 60°
- Q.36 A body of mass M starts sliding down on the inclined plane where the critical angle is $\angle ACB = 30^\circ$ as shown in figure.. The coefficient of kinetic friction will be
 (a) $Mg/\sqrt{3}$ (b) $\sqrt{3} Mg$
 (c) $\sqrt{3}$ (d) none of these
- Q.37 A block of mass 2 kg is placed on the surface of a trolley of mass 20 kg which is on a smooth surface. The coefficient of friction between the block and the surface of the trolley is 0.25. If a horizontal force of 2 N acts on the block, the acceleration of the system in ms^{-2} is ($g = 10 \text{ ms}^{-2}$)
 (a) 1.8 (b) 1.0 (c) 0.9 (d) 0.09
- Q.38 A marble block of mass 2 kg lying on ice when given a velocity of 6 ms^{-1} is stopped by friction in 10 s. Then the coefficient of friction is
 (a) 0.02 (b) 0.03 (c) 0.06 (d) 0.01
- Q.39 Three blocks of masses 2 kg, 3 kg and 5 kg are connected to each other with light string and are then placed on a frictionless surface as shown in the figure. The system is pulled by a force $F = 10 \text{ N}$, then tension T_1 is equal to
 (a) 1 N (b) 5 N (c) 8 N (d) 10 N
- Q.40 A block B is pushed momentarily along a horizontal surface with an initial velocity v . If μ is the coefficient of sliding friction between B and the surface, block B will come to rest after a time
 (a) $\frac{v}{g\mu}$ (b) $\frac{g\mu}{v}$
 (c) $\frac{g}{v}$ (d) $\frac{v}{g}$
- Q.41 The limiting friction is
 (a) always greater than the dynamic friction (b) always less than the dynamic friction
 (c) equal to the dynamic friction
 (d) sometimes greater and sometimes less than the dynamic friction



Q.42 The coefficient of static friction, μ_s , between block A of mass 2 kg and the table as shown in the figure, is 0.2. What would be the maximum mass value of block B, so that the two blocks do not move? The string and the pulley are assumed to be smooth and massless ($g = 10 \text{ m/s}^2$)

- (a) 2.0 kg (b) 4.0 kg (c) 0.2 kg (d) 0.4 kg



Q.43 A force of 49 N is just able to move a block of wood weighing 10 kg on a rough horizontal surface. Its coefficient of friction is

- (a) 1 (b) 0.7 (c) 0.5 (d) zero

Q.44 If the coefficient of static friction between the tyres and road is 0.5, what is the shortest distance in which an automobile can be stopped when travelling at 72 kmh^{-1} ?

- (a) 50 m (b) 60 m (c) 40.8 m (d) 80.16 m

Q.45 Three blocks of masses m_1 , m_2 and m_3 are connected by massless string as shown on a frictionless table. They are pulled with a force of 40 N. If $m_1 = 10 \text{ kg}$, $m_2 = 6 \text{ kg}$ and $m_3 = 4 \text{ kg}$, then tension T_2 will be

- (a) 10 N (b) 20 N (c) 32 N (d) 40 N



Q.46 A ball is projected from the ground at angle θ with the horizontal. After 1 s it is moving at angle 45° with the horizontal and after 2 s it is moving horizontal. What is the velocity of projection of the ball?

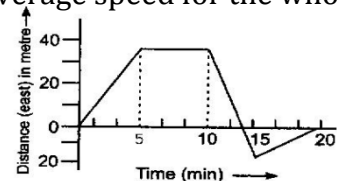
- (a) $10\sqrt{3} \text{ ms}^{-1}$ (b) $20\sqrt{3} \text{ ms}^{-1}$ (c) $10\sqrt{5} \text{ ms}^{-1}$ (d) $20\sqrt{2} \text{ ms}^{-1}$

Q.47 A boy playing on the roof of a 10 m high building throws a ball with a speed of 10 ms^{-1} at an angle of 30° with the horizontal. How far from the throwing point will the ball be at the height of 10 m from the ground? ($g = 10 \text{ ms}^{-2}$, $\sin 30^\circ = \frac{1}{2}$, $\cos 30^\circ = \frac{\sqrt{3}}{2}$)

- (a) 5.20 m (b) 4.33 m (c) 2.60 m (d) 8.66 m

Q.48 A boy begins to walk eastward along a street in front of his house and the graph of his displacement from home is shown in the following figure. His average speed for the whole time interval is equal to

- (a) 8 m min^{-1} (b) 6 m min^{-1}
 (c) $\frac{8}{3} \text{ m min}^{-1}$ (d) 2 m min^{-1}

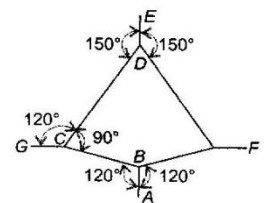


Q.49 A wire has a mass $(0.3 \pm 0.003) \text{ g}$, radius $(0.5 \pm 0.005) \text{ mm}$ and length $(6 \pm 0.006) \text{ cm}$. The maximum percentage error in the measurement of its density

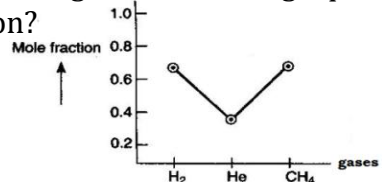
- (a) 1 (b) 2 (c) 3 (d) 4

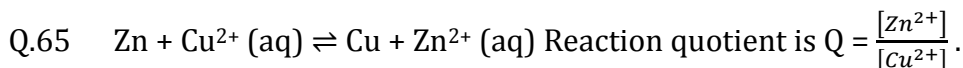
Q.50 The adjacent figure is the part of a horizontally stretched net. Section AB is stretched with a force of 10 N. The tension in the sections BC and BF are

- (a) 10 N, 11 N (b) 10 N, 6 N
 (c) 10 N, 10 N (d) can't be calculated due to insufficient data



CHEMISTRY

- Q.51 In a glass – tube, there are 18 g of glucose ($C_6H_{12}O_6$). 0.08 mole of glucose is taken. Glucose left in the glass – tube is
 (a) 0.10 g (b) 0.02 g (c) 0.10 mol (d) 3.60 g
- Q.52 Compute the value of x $x = 9.4$ g of phenol (C_6H_5OH) + 6.02×10^{23} molecules of phenol – 0.2 mole of phenol
 (a) 0.9 mol (b) 9.2 g (c) 0.1 mol (d) 6.02×10^{23}
- Q.53 Following is the graphical representation of mole fraction of different gases containing equal amount (in grams) of them. Which is not placed at correct position?
 (a) H_2 (b) He
 (c) CH_4 (d) All of these
- 
- Q.54 Sulphuryl chloride, SO_2Cl_2 , reacts with H_2O to give mixture of H_2SO_4 and HCl . Aqueous solution of 1 mol SO_2Cl_2 will be neutralised by
 (a) 3 mol of $NaOH$ (b) 2 mol of $Ca(OH)_2$ (c) Both (a) and (b) (d) None of these
- Q.55 H_3PO_4 (98 g mol^{-1}) is 98% by mass of solution. If density is 1.8 g mL^{-1} , then analytical molarity is
 (a) 18 M (b) 36 M (c) 54 M (d) 0.18 M
- Q.56 In balancing the half – reaction, $CN^- \rightarrow CNO^-$ (skeletal) the number of electrons that must be added is
 (a) 0 (b) 1 on the right (c) 1 on the left (d) 2 on the right
- Q.57 In the following reaction(unbalanced), equivalent weight of As_2S_3 is related to molecular weight M by $As_2S_3 + H^+ + NO_3^- \rightarrow NO + H_2O + AsO_4^{3-} + SO_4^{2-}$
 (a) $\frac{M}{2}$ (b) $\frac{M}{4}$ (c) $\frac{M}{28}$ (d) $\frac{M}{24}$
- Q.58 Out of the following redox reactions
 I: $NH_4NO_3 \xrightarrow{\Delta} N_2O + 2H_2O$ II: $NH_4NO_2 \xrightarrow{\Delta} N_2 + 2H_2O$ III: $PCl_5 \xrightarrow{\Delta} PCl_3 + Cl_2$
 disproportionation is not shown in
 (a) I, II (b) II, III (c) I, III (d) I, II and III
- Q.59 The complex $[Fe(H_2O)_5NO]^{2+}$ is formed in the ring – test fro nitrate when freshly prepared $FeSO_4$ solution is added to aqueous solution of NO_3^- following by addition of conc. H_2SO_4 . This complex is formed by charge transfer in which
 (a) Fe^{2+} changes to Fe^{3+} and NO^+ changes to NO (b) Fe^{2+} changes to Fe^{3+} and NO changes to NO^+
 (c) Fe^{2+} changes to Fe^+ and NO changes to NO^+ (d) no charge transfer takes place
- Q.60 In the following unbalanced redox reaction, $H_2S(g) + SO_2(g) \rightarrow S(S) + H_2O$ total number of equivalent of SO_2 is
 (a) 4 (b) 3 (c) 2 (d) 1
- Q.61 The set of elements which could form stable, covalent hydrogen bonded hydrides are
 (a) nitrogen, oxygen and fluorine (b) lithium, sodium and potassium
 (c) sulphur, selenium and tellurium (d) chlorine, bromine and iodine
- Q.62 H_2O_2 is “5.6 volume”, then
 (a) it is 1.7% weight by volume (b) it is 1N
 (c) Both (a) and (b) are true (d) None of the above is true
- Q.63 Assertion (a) $NaCl$ is less soluble in heavy water than n ordinary water
 Reason(R) Dielectric constant of ordinary water is more than that of heavy water.
 (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
 (b) Both Assertion and Reason are true and Reason is not the correct explanation of Assertion
 (c) Assertion is true but Reason is false. (d) Both Assertion and Reason are false.
- Q.64 Which one of the following reactions represents the oxidising property of H_2O_2 ?
 (a) $2KMnO_4 + 3H_2SO_4 + 5H_2O_2 \rightarrow K_2SO_4 + 2MnSO_4 + 8H_2O + 5O_2$
 (b) $2K_3[Fe(CN)_6] + 2KOH + H_2O_2 \rightarrow 2K_4[Fe(CN)_6] + 2H_2O + O_2$
 (c) $PbO_2 + H_2O_2 \rightarrow PbO + H_2O + O_2$ (d) $2KI + H_2SO_4 + H_2O_2 \rightarrow K_2SO_4 + I_2 + 2H_2O$

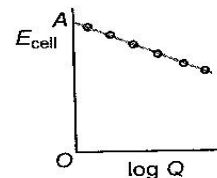


Variation of E_{cell} with $\log Q$ is of the type with $A_0 = 1.10 \text{ V}$.

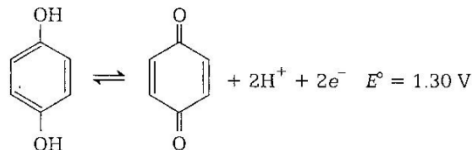
E_{cell} will be 1.1591 V when

(a) $\frac{[\text{Cu}^{2+}]}{[\text{Zn}^{2+}]} = 0.01$ (b) $\frac{[\text{Zn}^{2+}]}{[\text{Cu}^{2+}]} = 0.01$

(c) $\frac{[\text{Zn}^{2+}]}{[\text{Cu}^{2+}]} = 0.1$ (d) $\frac{[\text{Zn}^{2+}]}{[\text{Cu}^{2+}]} = 1$



Q.66 For the half-cell



At $\text{pH} = 2$, electrodes potential is

(a) 1.36V (b) 1.30 V (c) 1.42 V (d) 1.20 V

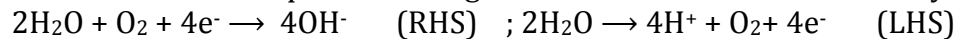
Q.67 1 mole of electrons passes through each of the solution of AgNO_3 , CuSO_4 and AlCl_3 when Ag, Cu and Al are deposited. Their molar ratio will be

(a) 1:1:1 (b) 6:3:2 (c) 6:3:1 (d) 1:3:6

Q.68 A quantity of electrical charge that brings about the deposition of 4.5 g Al from Al^{3+} at the cathode will also produce the following volume (STP) of $\text{H}_2(\text{g})$ from H^+ at the cathode

(a) 44.8 L (b) 22.4 L (c) 11.2 L (d) 5.6 L

Q.69 100 mL of a buffer of 1 M $\text{NH}_3(\text{aq})$ and 1 M $\text{NH}_4^+(\text{aq})$ are placed in two voltaic cells separately. A current of 1.5 A is passed through both cells for 20 min. If electrolysis of water only takes place



Then pH of the

(a) LHS half-cell will increase (b) RHS half-cell will increase

(c) Both half-cell will increase (d) Both half-cell will decrease

Q.70 A 0.200 M KOH solution is electrolysed for 1.5 h using a current of 8.00 A. how many moles of O_2 were produced at the anode?

(a) 0.48 (b) 0.224 (c) 0.112 (d) 2.24×10^{-2}

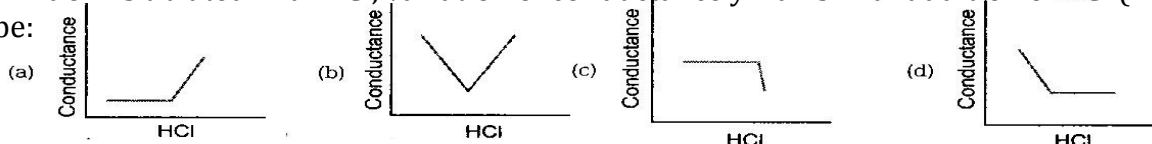
Q.71 Specific conductance of 0.01 N KCl solution is $x\Omega^{-1} \text{ cm}^{-1}$ having conductance $y\Omega^{-1}$, Specific conductance of 0.01 N NaCl having conductance $z\Omega^{-1}$, is

(a) $\frac{yx}{z}$ (b) $\frac{zx}{y}$ (c) $\frac{z}{yx}$ (d) None of these

Q.72 Equivalent conductance at infinite dilution of BaCl_2 , H_2SO_4 and HCl aq solutions are x_1 , x_2 and x_3 respectively. Equivalent conductance of BaSO_4 solution is

(a) $x_1 + x_2 - x_3$ (b) $x_1 - x_2 - x_3$ (c) $x_1 + x_2 - 2x_3$ (d) $x_1 - 2x_2 + x_3$

Q.73 If NaOH is titrated with HCl, variation of conductance y-axis with addition of HCl (x-axis) will be:



Q.74 For the cell $\text{Mg}|\text{Mg}^{2+}(0.01 \text{ M})||\text{pH} = 1, \text{H}^+|\text{Pt}(\text{H}_2). E_{\text{cell}}^{\circ} = + 2.37 \text{ V}$, hence

(a) $E_{\text{cell}} = 2.37 + \frac{0.0591}{2} \text{ V}$ (b) $E_{\text{cell}} = 2.37 + 0.0591 \text{ V}$

(c) $E_{\text{cell}} = 2.37 \text{ V}$ (d) None of these

Q.75 $2\text{Ce}^{4+} + \text{Co} \rightarrow 2\text{Ce}^{3+} + \text{Co}^{2+}$ $E_{\text{cell}}^{\circ} = 1.89 \text{ V}$, $E_{\text{Co}^{2+}|\text{Co}}^{\circ} = -0.28 \text{ V}$, hence, $E_{\text{Ce}^{4+}|\text{Ce}^{3+}}^{\circ}$ is

(a) 0.805 V (b) 1.61 V (c) - 0.805 V (d) - 1.61 V

Q.76 The equivalent conductance of Ba^{2+} and Cl^- are respectively 127 and $76\Omega^{-1} \text{ cm}^2 \text{ equiv}^{-1}$ at infinite dilution. The equivalent conductance (in $\Omega^{-1} \text{ cm}^2 \text{ equiv}^{-1}$) of BaCl_2 at infinite dilution will be :

(a) 139.5 (b) 203 (c) 279 (d) 101.5

Q.77 Potential at the equivalence point in the titration of Fe^{2+} with MnO_4^- is



(a) $E = \frac{E_1^{\circ} + E_2^{\circ}}{6} - 0.08 \text{ pH}$ (b) $E = \frac{5E_1^{\circ} + E_2^{\circ}}{6} + 0.08 \text{ pH}$

(c) $E = \frac{E_1^{\circ} + E_2^{\circ}}{6} + 0.08 \text{ pH}$ (d) $E = \frac{5E_1^{\circ} + E_2^{\circ}}{6} + 0.08 \text{ pH}$

Q.78 Due to lanthanide contraction

(a) Fe, Co, Ni have equal size (b) Zr and Hf have equal size

(c) all f-block ions have equal size (d) all isoelectronic ions have equal size

Q.79 For Ni and Pt different IP in MJ mol⁻¹ are given below.

	$\frac{(IP)_3 + (IP)_2}{Ni}$	$\frac{(IP)_3 + (IP)_4}{Pt}$
	2.49	8.80
	2.60	6.70

Hence

(a) nickel (II) compounds tend to be thermodynamically more stable than platinum (II)

(b) platinum (IV) compounds tend to be more stable than nickel (IV)

(c) both (a) and (b) are correct

(d) None of the above is correct

Q.80 paramagnetism is given by the relation $\mu = 2\sqrt{s(s+1)}$ magnetons where 's' is the total spin. On this basis, the paramagnetism of Cu⁺

(a) 3.88 magnetons

(b) 2.83 magnetons

(c) 1.41 magnetons

(d) zero

Q.81 Ti²⁺ is purple while Ti⁴⁺ is colourless, because

(a) there is no crystal field effect in Ti⁴⁺

(b) Ti²⁺ has 3d² configuration

(c) Ti⁴⁺ has 3d² configuration

(d) Ti⁴⁺ is a very small cation when compared to Ti²⁺ and hence, does not absorb any radiation

Q.82 Which is not the true statement about KMnO₄?

(a) Its solution is unstable in acidic medium

(b) Its small quantity added to conc. H₂SO₄, a green coloured solution containing MnO₃⁺ ions is formed

(c) MnO₄⁻ changes to Mn²⁺ in basic solution (d) It is self-indicator in Fe²⁺ or C₂O₄²⁻ titration

Q.83 Which is not the true statement?

(a) Ions of d-block elements are coloured due to d-d transition

(b) Ions of f-block elements are coloured due to f-f transition

(c) [Sc(H₂O)₆]³⁺, [Ti(H₂O)₆]⁴⁺ are coloured complexes

(d) Cu⁺ is colourless ion

Q.84 FeCr₂O₄ (chromite) is converted to Cr by the following steps:

Chromite \xrightarrow{I} Na₂CrO₄ \xrightarrow{II} Cr₂O₃ \xrightarrow{III} Cr I, II and III are

I
(a) Na₂CO₃/air, Δ

II
C

III
C

(b) NaOH/air, Δ

C, Δ

Al, Δ

(c) NaOH/air, Δ

C, Δ

Mg, Δ

(d) conc. H₂SO₄, Δ

NH₄Cl, Δ

C, Δ

Q.85 [Fe^{II}(O₂)(CN)₄Cl]⁴⁻ is named as

(a) chlorotetracyanodioxoferrate (II) ion

(b) chlorotetracyanoperoxoferrate (II) ion

(c) chlorotetracyanosuperoxoferrate (II) ion

(d) None of the above is correct

Q.86 Which of the following compounds show optical isomerism?

1. cis - [Co(NH₃)₄Cl₂]⁺

2. Trans - [Co(en)₂Cl₂]⁺

3. cis - [Co(en)₂Cl₂]⁺

4. [Co(en)₃]³⁺

Select the correct answer using the codes given below.

(a) 1 and 2

(b) 2 and 3

(c) 3 and 4

(d) 1, 3 and 4

Q.87 Of the following complex ions, the one that probably has the largest overall formation constant, K_f is:

(a) [Co(NH₃)₆]³⁺

(b) [Co(H₂O)₆]³⁺

(c) [Co(H₂O)₄(NH₃)₂]³⁺

(d) [Co(en)₃]³⁺

Q.88 The complex ion which has no 'd' - electrons in the central metal atom is

(a) [MnO₄]⁻

(b) [Co(NH₃)₆]³⁺

(c) [Fe(CN)₆]³⁻

(d) [Cr(H₂O)₆]³⁺

Q.89 Consider following facts about chelating ligands:

I: They have more than one donor atom.

II. They are non-linear, and they must form bonds with reasonable angles at the metal atom.

III. Ethylenediamine is a bidentate chelating ligand.

Select the correct facts.

(a) I only

(b) I and II

(c) II and III

(d) I, II and III

Q.90 Following equilibrium $[K\{CH_3O(CH_2CH_2O)_5CH_3\}]^+ + cyclo - (CH_2CH_2O)_6 \rightleftharpoons K[(CH_2CH_2O)_6]^+ + CH_3O(CH_2CH_2O)_5CH_3$

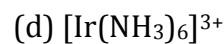
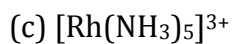
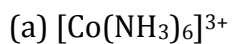
(a) Is known as macrocyclic effect

(b) chelate effect

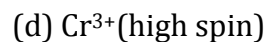
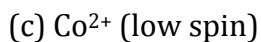
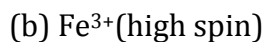
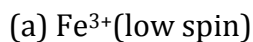
(c) Both (a) and (b)

(d) None of the above

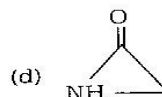
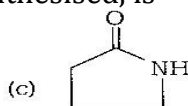
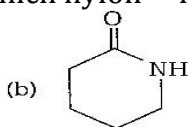
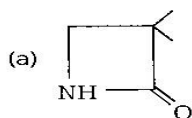
Q.91 Which one of the following complexes is expected to have lowest Δ_o value?



Q.92 Which one of the following ions has zero CFSE in octahedral field?



Q.93 Lactam from which nylon - 4 is synthesised, is



Q.94 Consider the following polymer.

I: Polystyrene; II Dacron; III: Orlon

They are classified as

I

II

III

(a) chain - growth; step - growth; step - growth

(b) chain - growth; chain - growth; step - growth

(c) chain - growth ; step - growth; chain - growth

(d) step - growth; step - growth; chain - growth

Q.95 IUPAC name for polystyrene is

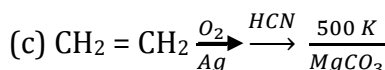
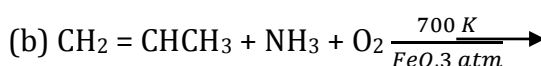
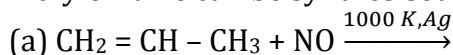
(a) poly (1 - ethenyl benzene)

(b) poly (2 - ethynyl benzene)

(c) poly (1 - phenylethylene)

(d) poly (2 - phenylethylene)

Q.96 Acrylonitrile can be synthesised via



(d) All of the above

Q.97 Select the incorrect statement.

(a) 0.2 per cent solution of phenol is an antiseptic while 1.0 per cent solution is a disinfectant.

(b) Equanil is used in controlling depression and hypertension.

(c) Mifepristone is a synthetic steroid used as " morning after pill".

(d) A drug which kills the organism in the body is called bacteriostatic.

Q.98 Which set has different class of compound?

(a) Analgesics: naproxen, morphine, aspirin

(b) Tranquilisers: equanil, heroin, valium

(c) Antiseptics: Bithional, Dettol, boric acid

(d) Bactericidal: penicillin, aminoglycosiders, ofloxacin

Q.99 Select the correct statement (s)

(a) p - chlorometaxyleneol and dichlorometaxyleneol are antibacterials and deodorants

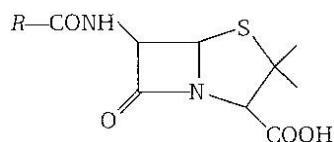
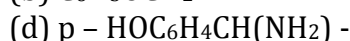
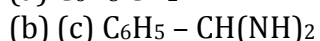
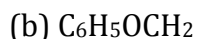
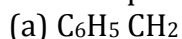
(b) BHT and BHA are food antioxidants

(c) SO_2 and SO_3^{2-} are antioxidants for wine and beers

(d) All of the above are correct statements

Q.100 Following structure

Is called penicillin G if R is



BIOLOGY

- Q.101 Which is called 'sexual system' of classification?
(a) Bentham and Hooker (b) Tippos (c) Linnaeus (d) Takhtajan
- Q.102 Father of botany is
(a) Aristotle (b) Robert Hooke (c) Darwin (d) Theophrastus
- Q. 103 Family placed between
(a) genus and species (b) order and class (c) class and genus (d) order and genus
- Q. 104 The term 'Taxonomy' was introduced by
(a) de Candolle (b) Bentham and Hooker (c) Linnaeus (d) Huxley
- Q. 105 Select the wrong statements.
I. Lower the taxon, more are the characteristics that the members within the taxon share.
II. Order is the assemblage of genera which exhibit a few similar characters.
III. Cat and dog are included in the same family-Felidae.
IV. Binomial nomenclature was introduced by Carolus Linnaeus.
(a) I, II and III (b) II, III and IV (c) I and IV (d) III and IV (e) II and III
- Q. 106 Phylogenetic system of classification is based on
(a) evolutionary relationships (b) morphological features
(c) chemical constituents (d) floral characters
- Q. 107 Which of the following statements regarding universal rules of nomenclature is wrong?
(a) The first word in a biological name represents the genus
(b) The first word denoting the genus starts with a capital letter
(c) Both the words in a biological name, when handwritten are separately underlined
(d) Biological names are generally in Greek and written in italics
(e) The second component in a biological name denotes the specific epithet
- Q.108 Binomial nomenclature was first issued in
(a) Systema Naturae (b) genera Plantarum (c) Genera Animalium (d) Species Plantarum
- Q.109 ICBN stands for
(a) Indian Congress of Biological Name (b) International Code for Botanical Nomenclature
(c) International Congress of Biological Name (d) Indian Code of Botanical Nomenclature
- Q.110 Correct name is
(a) *Brassica indica* (b) *Mangifera Indica*
(c) SOLANUM MELONGINA (d) *mimosa Pudica*
- Q.111 Binomial nomenclature means that every organism has
(a) two names one scientific and other popular
(b) one scientific name consisting of a generic and a specific epithet
(c) one name given by two scientists (d) two names, one Latinize and other of the person
- Q.112 Five kingdom classification was given by
(a) Huxley (b) Hooker (c) Whittaker (d) Linnaeus
- Q.113 In which kingdom, would you classify the archaea and nitrogen-fixing organisms, if the five kingdom system of classification is used
(a) Protista (b) Monera (c) Plantae (d) Fungi
- Q.114 The main difference between Gram positive and Gram negative bacteria is
(a) cell membrane (b) cell wall (c) ribosome (d) mitochondria
- Q.115 Which one is the free-living, anaerobic nitrogen-fixer?
(a) *Beijernickia* (b) *Rhodospirillum* (c) *Rhizobium* (d) *Azotobacter*
- Q.116 Which of the following is not matched correctly?
(a) *Anabaena* - Cyanobacteria
(b) *Amoeba* - Protozoa
(c) *Gonyaulax* - Dinoflagellated
(d) *Thermacidophiles* - Archaeobacteria
(e) *Albugo* - Chrysophytes
- Q.117 Which of the following is not a character of Protista?
(a) Protists are prokaryotic (b) Some protists have cell walls
(c) Mode of nutrition is both autotrophic and heterotrophic
(d) Body organization is cellular (e) Membrane bound organelles are present in cells

- Q.118 Which of the following organisms completely lack cell wall, they are the smallest living cells known and can survive with oxygen
 (a) Mycoplasma (b) Euglenoids (c) Slime moulds (d) All of these
- Q.119 Where will you look for the sporozoites of the malarial parasite?
 (a) Red blood corpuscles of human suffering from malaria (b) Spleen of infected humans
 (c) Salivary glands of freshly moulted female *Anopheles* mosquito
 (d) Saliva of infected female *Anopheles*
- Q.120 The disease caused by *Trypanosoma* is
 (a) yellow fever (b) sleeping sickness (c) kala azar (d) hey fever
- Q.121 The infective stage of *Plasmodium* to man, is
 (a) trophozoite (b) sporozoite (c) merozoite (d) None of these
- Q.122 *Amoeba* differs from *Entamoeba* in having
 (a) contractile vacuole (b) pseudopodia (c) ectoplasm (d) cytostome
- Q.123 Which of the following helps in absorption of phosphorus from soil by plants?
 (a) *Rhizobium* (b) *Frankia* (c) *Anabaena* (d) *Glomus*
- Q.124 Which of the following is wrongly matched?
 (a) *Puccinia* - Smut
 (b) Root - Exarch protoxylem
 (c) *Cassia* - Imbricate aestivation
 (d) Root pressure - Guttation
- Q.125 Red rot of sugarcane is caused by
 (a) *Colletotrichum falcatum* (b) *Phytophthora infestans*
 (c) *Ustilago nuda* (d) *Alternaria solani*
- Q.126 Edible part of mushroom is
 (a) basidiocarp (b) primary mycelium (c) fungal hyphae (d) basidiospores
- Q.127 Baker's yeast is
 (a) *Saccharomyces cerevisiae* (b) *Saccharomyces ludwigii*
 (c) *Saccharomyces octosporus* (d) Schizosaccharomyces
- Q.128 Infectious proteins are present in
 (a) Gemini viruses (b) prions (c) viroids (d) satellite viruses
- Q.129 Virus envelope is known as
 (a) capsid (b) virion (c) nucleoprotein (d) core
- Q.130 Which of the following is correctly matched?
 (a) National Institute of Virology - Pune
 (b) National Institute of Communication Diseases - Lucknow
 (c) Central drug research Institute - Kasauli
 (d) National Institute of Nutrition - Mumbai
- Q.131 Virus multiplies in
 (a) soil (b) dead tissue (c) living tissue (d) culture medium (e) All of the above
- Q.132 Vessels and companion cells are present in:
 (a) Gymnosperms (b) Angiosperms (c) Pteridophytes (d) All of these
- Q.133 The number of cotyledons in embryo of sun flower is:
 (a) Only one (b) Two (c) Three (d) Many
- Q.134 Vascular plants are divided into:
 (a) One group (b) Two groups (c) Three groups (d) Four groups
- Q.135 Double fertilization is characteristic of only:
 (a) Bryophytes (b) Pteridophytes (c) Gymnosperms (d) Angiosperms
- Q.136 Select out one of the important features from following pairs distinguishing Gnetum from Cycas and Pinus showing affinity with angiosperms:
 (a) Perianth and two integuments (b) Embryo development and apical meristem
 (c) Absence of resin duct and leaf venation (d) Presence of vessels and absence of archegonia
- Q.137 The Pinus male cones bear a large number of:
 (a) Ligules (b) Anthers (c) Microsporophylls (d) Megasporophylls
- Q.138 Which of the following is/are grouped under Phanerogams?
 (a) Angiosperms (b) Gymnosperms (c) Both (a) and (b) (d) pteridophytes

- Q.139 Nektons are:
 (a) Floating plants (b) Swimming organisms
 (c) Suspended plants (d) Animals associated with plants.
- Q.140 Which of the following is a fresh water sponge?
 (a) Euplectella (b) Spongilla (c) Euspongia (d) Sycon
- Q.141 Earthworms are:
 (a) uricotelic under conditions of water scarcity
 (b) Ammonotelic when plenty of water is available
 (c) Uricotelic when plenty of water is available
 (d) Ureotelic when plenty of water is available
- Q.142 Two common characters found in centipede, cockroach and crab are:
 (a) Green gland and tracheas (b) Book lungs and antennae
 (c) Compound eyes and anal cerci (d) Jointed legs and chitinous exoskeleton.
- Q.143 Which one of the following pairs is mismatched?
 (a) *Apis indica* - honey (b) *Kenia lacca* - lac
 (c) *Bombyx mori* - silk (d) *Pila globosa* - pearl
- Q.144 The Jellyfish is classified under the phylum:
 (a) Porifera (b) Cnidaria (c) Mollusca (d) Echinodermata
- Q.145 Caterpillar and maggot are:
 (a) pupa (b) larvae (c) adults (d) nymphs.
- Q.146 Green gland is the excretory organ of:
 (a) prawn (b) butterfly (c) snail (d) earthworm.
- Q.147 The parasite which completes its life cycle in a single host is:
 (a) *Fasciola hepatica* (b) *Plasmodium vivax* (c) *Taenia solium* (d) *Ascaris lumbricoides*.
- Q.148 *Ascaris* is characterized by:
 (a) presence of true Coelom and metamerism (metamerisation)
 (b) presence of neither true coelom nor metamerism
 (c) absence of true coelom but presence of metamerism
 (d) absence of true coelom but absence of metamerism.
- Q.149 In which of the following haemocyanin pigment is found:
 (a) Annelida (b) Echinodermata (c) Insecta (d) Lower chordate.
- Q.150 In which of these following phyla, while the adults shows radial symmetry, the larva shows bilateral symmetry?
 (a) annelids (b) arthropods (c) molluscs (d) echinoderms (e) Porifera.
- Q.151 Besides bats, echo location also occurs in:
 (a) Primates (b) Wild Cat (c) Whales and Dolphins (d) Beavers.
- Q.152 Choose the cat fish from the following:
 (a) *Labeo rohita* (b) *Catla catla* (c) *Cirrhina mrigala* (d) *Wallago attu*.
- Q.153 Mule is a product of:
 (a) Breeding (b) Mutation (c) Hybridization (d) Interspecific hybridisation
- Q.154 Cartilaginous fishes do not have:
 (a) Pelvic fins (b) Gill slits (c) Scales (d) Operculum
- Q.155 Which of the following have notochord throughout life?
 (a) Snake (b) Birds (c) Amphioxus (d) Fish
- Q.156 Which one of the following animals is correctly, matched with its one characteristic and the taxon?

Animal	Characteristic	Taxon
(a) millipede	ventral nerve cord	arachnida
(b) duckbill platypus	oviparous	mammalia
(c) silverfish	pectoral and pelvic fins	chordate
(d) sea anemone	triploblastic	cnidaria

- Q.157 A poisonous lizard is
 (a) *Varanus* (b) *Chamaeolon* (c) *Ancistrodon* (d) *Heloderma*

- Q.158 What is common to whale, seal and shark?

- (a) Thick subcutaneous fat (b) Convergent evolution
(c) Homoiothermy (d) Seasonal migration
- Q.159 Which of the following pairs are correctly matched?
Animals Morphological features
(1) Crocodile - 4-Chambered heart
(2) Sea Urchin - Parapodia
(3) Obelia - Metagenesis
(4) Lemur - Thecodont
(a) 2, 3 and 4 (b) Only 1 and 4 (c) Only 1 and 2 (d) 1, 3 and 4.
- Q.160 Statement(1): All metatherians are placental mammals.
Statement (2): All placental mammals have menstrual cycle.
(a) Statement (1) is true and statement (2) is false
(b) Statement (2) is true and statement (1) is false
(c) Both the statements (1) and (2) are true (d) Both the statement (1) and (2) are false.
- Q.161 Which of the following has capulatory organ?
(a) Parrot (b) Toad (c) Snake (d) Squirrel
- Q.162 Which one of the following is birds, indicates their reptilian ancestry?
(a) Two special chambers crop and gizzard in their digestive tract
(b) Eggs with a calcareous shell (c) Scales on their hind limbs (d) Four chambered heart
- Q.163 Which one of the following groups of animals is correctly matched with its one characteristic feature without even a single exception?
(a) Reptilia: possess 3 - chambered heart with one incompletely divided ventricle.
(b) Chordata: possess a mouth provided with an upper and a lower jaw
(c) Chondrichthyes: possess cartilaginous endoskeleton
(d) Mammalia: give birth to young ones.
- Q.164 Cockroaches are:
(a) Ureotelic (b) Ureotelic or Ammonotelic (c) Uricotelic (d) Ammonotelic
- Q.165 Respiration without a distinct respiratory organ occurs in:
(a) cockroach (b) frog (c) earthworm (d) fish
- Q.166 Ommatidia serve the purpose of photoperception in:
(a) cockroach (b) frog (c) humans (d) sunflower.
- Q.167 Compared to those of human the erythrocytes in frog are:
(a) nucleated and with haemoglobin (b) very much smaller and fewer
(c) nucleated and without haemoglobin (d) without nucleus but with haemoglobin.
- Q.168 Algae were grouped into _____ kingdoms according to Whittaker.
(a) Two (b) Three (c) One (d) Four
- Q.169 Red snow is caused by
(a) Zoospores of *Chlamydomonas nivalis* (b) Hypnospores of *C. brauni*
(c) Aplanospores of *C. media* (d) Hypnospores of *C. nivalis*
- Q.170 Thallus is flattened, leaf like and anchors to the rocks with the help of holdfast in
(a) *Laminaria* (b) *Polysiphonia* (c) *Batrachospermum* (d) *Ectocarpus*
- Q.171 Which of the following is a red alga that is not red?
(a) *Nemalion* (b) *Polysiphonia* (c) *Gelidium* (d) *Batrachospermum*
- Q.172 The colour of brown algae is due to
(a) Carotene (b) Fucoxanthin (c) Phycoerythrin (d) Phycocyanin
- Q.173 Stems and leaves of bryophytes are
(a) Analogous to vascular plants (b) homologous to vascular plants
(c) Analogous to algae thallus (d) None of these
- Q.174 Pteridophytes are divided into _____ classes.
(a) Two (b) Three (c) Four (d) Six
- Q.175 Living fossils of gymnosperms are
(a) *Cycas* (b) *Metasequoia* (c) *Ginkgo biloba* (d) All of these
- Q.176 In gymnosperms, pollination takes place through
(a) Insects (b) Wind (c) Bats (d) Birds
- Q.177 Maiden hair tree is

- (a) *Ginkgo biloba* (b) *Gnetum* (c) *Ephedra* (d) *Adiantum*
- Q.178 Carpels are equivalent to the
 (a) Microsporophylls (b) Megasporophylls (c) Megasporangia (d) Embryo sac
- Q.179 Father of taxonomy described _____ plants in his book_____.
 (a) 480, *Historia Plantarum* (b) 340, *Historia Naturalis*
 (c) 18000, *Historia Generalis Plantarum* (d) 5900, *Species Plantarum*
- Q.180 Most dominant plants of present day vegetation are
 (a) Thallophytes (b) Bryophytes (c) Flowering plants (d) Pteridophytes
- Q.181 The origin of root hairs and lateral roots is
 (a) Exogenous and endogenous respectively (b) Endogenous and exogenous respectively
 (c) Both endogenously (d) Both exogenously
- Q.182 Root shows negative geotropism in
 (a) *Pothos* (b) *Ficus* (c) *Acanthorhiza* (d) *Sonneratia*
- Q.183 underground modification of stem occurs for which one of the following functions?
 (a) Perenation (b) Storage of food (c) Vegetative propagation (d) All of these
- Q.184 Stem modified into green, flattened branches of unlimited growth for assimilatory function is
 (a) Phyllode (b) Phylloclade (c) Cladode (d) Bulbil
- Q.185 Reticulate venation is the feature of dicots but some monocot also exhibit this venation, like
 (a) *Calophyllum* (b) *Smilax* (c) *Eryngium* (d) *Corymbium*
- Q.186 The inflorescence of coriander is
 (a) Umbel (b) Corymb (c) Typical raceme (d) Umbel of umbels
- Q.187 Three types of flowers occur in the _____ inflorescence
 (a) Capitulum (b) Hypanthodium (c) Cyathium (d) Umbel
- Q.188 Inferior ovary is present in
 (a) Hypogynous flower (b) Perigynous flower (c) Dichogamous flower (d) Epigynous flower
- Q.189 Vexillum is
 (a) Posterior largest petal (b) Anterior largest petal (c) Found in pea family (d) Both (a) & (c)
- Q.190 The symbol $C_{(5)} A_5$ represents which one of the following family?
 (a) Solanaceae (b) Asteraceae (c) Cucurbitaceae (d) Labiatae
- Q.191 Father of plant anatomy who also coined the term tissue is
 (a) Marcello Malpighi (b) N. Grew (c) Schleiden (d) Hanstein
- Q.192 Meristem is characterised by
 (a) Isodiametric cells with cellulosic thin wall (b) Absence of intercellular space and vacuole
 (c) Absence of reserve food material, plastids and ER (d) All of these
- Q.193 The plane of division in tunica is
 (a) Anticlinal (b) Periclinal (c) Both anticlinal and periclinal (d) Peripheral division
- Q.194 Which one of the following is not a fundamental tissue?
 (a) Parenchyma (b) Collenchyma (c) Chlorenchyma (d) Aerenchyma
- Q.195 Cell wall in dead mechanical tissue shows
 (a) Lignified nature (b) cutinized nature (c) Pectose deposition (d) Hemicellulose deposition
- Q.196 Vesseless angiosperms are
 (a) Tetracentraceae (b) Trochodendraceae (c) Winteraceae (d) All of these
- Q.197 Root differs from stem in having
 (a) Parenchymatous cortex (b) Pith (c) Exarch xylem (d) Pericycle
- Q.198 balloon like swellings formed by xylem parenchyma inside the xylem vessels through pits are called
 (a) Tracheal plugs (b) Tyloses (c) Callose plugs (d) Both (a) & (b)
- Q.199 Heart wood or Duramen
 (a) Is oldest secondary xylem ring (b) Lies near pith
 (c) Is not active for conduction (d) All of these
- Q.200 The plant part which consists of two generations one within the other is:
 (a) Germinated pollens (b) Embryo (c) unfertilized ovule (d) Seeds