AIPMT
SAMPLE PAPERS WITH SOLUTIONS

1. In an experiment four quantities a, b, c and d are measured with percentage error 1%, 2%, 3% and 4% respectively. Quantity P is calculated as follows :

$$P = \frac{a^3b^2}{cd}$$

% error in P is

(1) 14% (2) 10%

(3) 7% (4) 4%

Answer (1)

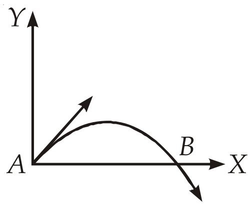
Sol. $P = \dfrac{a^3b^2}{cd}$

$$\Rightarrow \frac{\Delta P}{P}\times 100 = 3\left(\frac{\Delta a}{a}\times 100\right)+2\left(\frac{\Delta b}{b}\times 100\right)+\left(\frac{\Delta c}{c}+100\right)+\left(\frac{\Delta d}{d}\times 100\right)$$

$= 3 \times 1 + 2 \times 2 + 3 + 4$

$= 3 + 4 + 3 + 4 = 14\%$

2. The velocity of a projectile at the initial point A is $(2\hat{i}+3\hat{j})$ m/s. Its velocity (in m/s) at point B is



(1) $-2\hat{i}-3\hat{j}$ (2) $-2\hat{i}+3\hat{j}$

(3) $2\hat{i}-3\hat{j}$ (4) $2\hat{i}+3\hat{j}$

Answer (3)

Sol. X component remain unchanged and Y component reverses.

3. A stone falls freely under gravity. It covers distances h_1, h_2 and h_3 in the first 5 seconds, the next 5 seconds and the next 5 seconds respectively. The relation between h_1, h_2 and h_3 is

(1) $h_1 = 2h_2 = 3h_3$ (2) $h_1 = \dfrac{h_2}{3} = \dfrac{h_3}{5}$

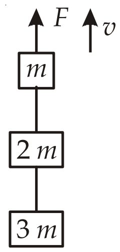
(3) $h_2 = 3h_1$ and $h_3 = 3h_2$ (4) $h_1 = h_2 = h_3$

Answer (2)

Sol. $h_1 : h_2 : h_3 = 1 : 3 : 5$

4. Three blocks with masses m, $2m$ and $3m$ are connected by strings, as shown in the figure. After an upward force F is applied on block m, the masses move upward at constant speed v. What is the net force on the block of mass 2 m?

(g is the acceleration due to gravity)



(1) Zero (2) 2 mg

(3) 3 mg (4) 6 mg

Answer (1)

Sol. All blocks are moving with constant velocity so net force on all blocks are zero.

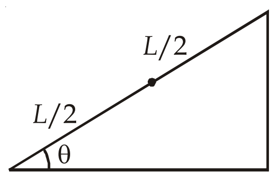
5. The upper half of an inclined plane of inclination θ is perfectly smooth while lower half is rough. A block starting from rest at the top of the plane will again come to rest at the bottom, if the coefficient of friction between the block and lower half of the plane is given by

(1) $\mu = \dfrac{1}{\tan\theta}$ (2) $\mu = \dfrac{2}{\tan\theta}$

(3) $\mu = 2\tan\theta$ (4) $\mu = \tan\theta$

Answer (3)

Sol.



$$mg\sin\theta\cdot L = \mu mg\cos\theta\times\frac{L}{2}$$

$$\mu = \frac{2\sin\theta}{\cos\theta} = 2\tan\theta$$

6. A uniform force of $\left(3\hat{i}+\hat{j}\right)$ newton acts on a particle of mass 2 kg. Hence the particle is displaced from position $\left(2\hat{i}+\hat{k}\right)$ metre to position $\left(4\hat{i}+3\hat{j}-\hat{k}\right)$ metre. The work done by the force on the particle is

(1) 9 J (2) 6 J

(3) 13 J (4) 15 J

Answer (1)

Sol. $\vec{F} = 3\hat{i} + \hat{j}$ $\quad\quad$ $\vec{S} = \vec{r}_2 - \vec{r}_1 = 2\hat{i} + 3\hat{j} - 2\hat{k}$

$$W = \vec{F}\cdot\vec{S} = 6 + 3 + 0 = 9 \text{ J}$$

7. An explosion breaks a rock into three parts in a horizontal plane. Two of them go off at right angles to each other. The first part of mass 1 kg moves with a speed of 12 ms^{-1} and the second part of mass 2 kg moves with 8 ms^{-1} speed. If the third part flies off with 4 ms^{-1} speed, then its mass is

(1) 3 kg $\quad\quad$ (2) 5 kg

(3) 7 kg $\quad\quad$ (4) 17 kg

Answer (2)

Sol. $\vec{P_1} + \vec{P_2} + \vec{P_3} = \vec{0}$

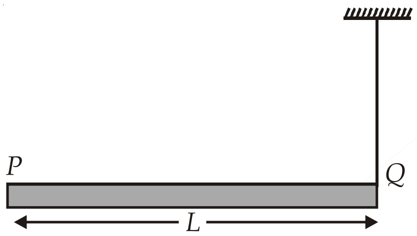
$$\Rightarrow \quad 1\times 12\hat{i} + 2\times 8\hat{j} + \vec{P_3} = 0$$

$$\vec{P_3} = -\left(12\hat{i} + 16\hat{j}\right)$$

$$P_3 = \sqrt{12^2 + 16^2} = 20 \text{ kg ms}^{-1}$$

$$m_3 = \frac{P_3}{v_3} = 5 \text{ kg}$$

8. A rod PQ of mass M and length L is hinged at end P. The rod is kept horizontal by a massless string tied to point Q as shown in figure. When string is cut, the initial angular acceleration of the rod is

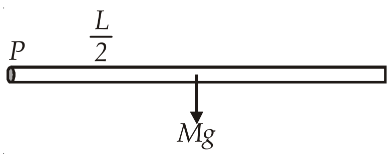


(1) $\frac{3g}{2L}$ $\quad\quad$ (2) $\frac{g}{L}$

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

Answer (1)

Sol.



$$Mg\frac{L}{2} = \frac{ML^2}{3}\alpha$$

$$\alpha = \frac{3g}{2L}$$

9. A small object of uniform density rolls up a curved surface with an initial velocity v'. It reaches up to a maximum height of $\frac{3v^2}{4g}$ with respect to the initial position. The object is

(1) Ring $\quad\quad$ (2) Solid sphere

(3) Hollow sphere $\quad\quad$ (4) Disc

Answer (4)

Sol. $v = \sqrt{\dfrac{2gh}{1+\dfrac{k^2}{r^2}}}$

$$v^2 = \frac{2g\,3v^2}{4g\left(1+\dfrac{k^2}{r^2}\right)}$$

$$\Rightarrow \quad 1 + \frac{k^2}{r^2} = \frac{3}{2}$$

$$k^2 = \frac{1}{2}r^2 \ \rightarrow \text{disc}$$

10. A body of mass 'm' taken from the earth's surface to the height equal to twice the radius (R) of the earth. The change in potential energy of body will be

(1) $mg2R$ $\quad\quad$ (2) $\frac{2}{3}mgR$

(3) $3mgR$ $\quad\quad$ (4) $\frac{1}{3}mgR$

Answer (2)

Sol. $\Delta U = \dfrac{mgRh}{R+h} = \dfrac{mgR2R}{3R} = \dfrac{2mgR}{3}$

11. Infinite number of bodies, each of mass 2 kg are situated on x-axis at distance 1 m, 2 m, 4 m, 8 m, ... respectively, from the origin. The resulting gravitational potential due to this system at the origin will be

(1) $-G$ $\quad\quad$ (2) $-\frac{8}{3}G$

(3) $-\frac{4}{3}G$ $\quad\quad$ (4) $-4G$

Answer (4)

Sol. $V = -2G\left[\dfrac{1}{1} + \dfrac{1}{2} + \dfrac{1}{4} + \dfrac{1}{8}........\right]$

$$= -2G\left[1 + \frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3}........\right]$$

$$= -2G\frac{1}{\left(1-\dfrac{1}{2}\right)} = -4G$$

12. The following four wires are made of the same material. Which of these will have the largest extension when the same tension is applied?

(1) Length = 50 cm, diameter = 0.5 mm

(2) Length = 100 cm, diameter = 1 mm

(3) Length = 200 cm, diameter = 2 mm

(4) Length = 300 cm, diameter = 3 mm

Answer (1)

Sol. $\Delta L = \frac{FL}{AY}, \frac{L}{A}$ is maximum for option (1).

13. The wettability of a surface by a liquid depends primarily on

(1) Viscosity

(2) Surface tension

(3) Density

(4) Angle of contact between the surface and the liquid

Answer (4)

14. The molar specific heats of an ideal gas at constant pressure and volume are denoted by C_p and C_v respectively. If $\gamma = \frac{C_p}{C_v}$ and R is the universal gas constant, then C_v is equal to

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

(3) $\frac{(\gamma-1)}{R}$ (4) γR

Answer (2)

Sol. $C_v = \frac{R}{\gamma - 1}$

15. A piece of iron is heated in a flame. It first becomes dull red then becomes reddish yellow and finally turns to white hot. The correct explanation for the above observation is possible by using

(1) Stefan's Law

(2) Wien's displacement Law

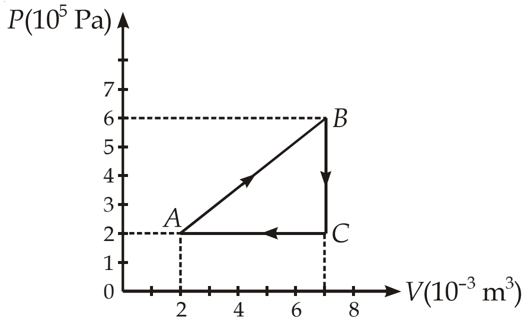
(3) Kirchoff's Law

(4) Newton's Law of cooling

Answer (2)

Sol. $\lambda_m T$ = constant

16. A gas is taken through the cycle $A \to B \to C \to A$, as shown. What is the net work done by the gas?



(1) 2000 J (2) 1000 J

(3) Zero (4) –2000 J

Answer (2)

Sol. W = Area enclosed in P-V curve

$= \frac{1}{2} \times 5 \times 10^{-3} \times 4 \times 10^{5}$

$= 10 \times 10^2$

$= 1000$ J

17. During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its temperature. The ratio of $\frac{C_p}{C_v}$ for the gas is

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

(2) 2

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

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

Answer (4)

Sol. $P \propto T^3$,

$PV = nRT$

$P \propto T^3$

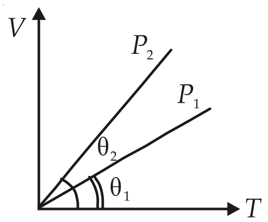
$P \propto (PV)^3$

P^2V^3 = constant

$PV^{\frac{3}{2}}$ = constant

$\gamma = \frac{3}{2}$

18. In the given (V – T) diagram, what is the relation between pressures P_1 and P_2?



(1) $P_2 = P_1$ (2) $P_2 > P_1$

(3) $P_2 < P_1$ (4) Cannot be predicted

Answer (3)

Sol. Slope of the graph $\propto \dfrac{1}{\text{Pressure}}$.

19. The amount of heat energy required to raise the temperature of 1 g of Helium at NTP, from T_1K to T_2K is

(1) $\frac{3}{8}N_a k_B(T_2 - T_1)$ (2) $\frac{3}{2}N_a k_B(T_2 - T_1)$

(3) $\frac{3}{4}N_a k_B(T_2 - T_1)$ (4) $\frac{3}{4}N_a k_B\left(\frac{T_2}{T_1}\right)$

Answer (1)

Sol. $Q = \frac{f}{2}nR\Delta T$

$\frac{3}{2} \times \frac{1}{4} \times k_B N_a \,\Delta T$

$= \frac{3}{8}N_a k_B\,(T_2 - T_1) = \frac{3}{8}N_a k_B\,(T_2 - T_1)$

20. A wave travelling in the +ve x-direction having displacement along y-direction as 1 m, wavelength 2π m and frequency of $\frac{1}{\pi}$ Hz is represented by

(1) $y = \sin(x - 2t)$ (2) $y = \sin(2\pi x - 2\pi t)$

(3) $y = \sin(10\pi x - 20\pi t)$ (4) $y = \sin(2\pi x + 2\pi t)$

Answer (1)

Sol. $y = a\sin(kx - \omega t)$

$= \sin\left[\frac{2\pi}{2\pi}x - 2\pi \times \frac{1}{\pi}t\right]$

$= \sin(x - 2t)$

21. If we study the vibration of a pipe open at both ends, then the following statement is not true

(1) Open end will be anti-node

(2) Odd harmonics of the fundamental frequency will be generated

(3) All harmonics of the fundamental frequency will be generated

(4) Pressure change will be maximum at both ends

Answer (4)

Sol. At open ends pressure change will be zero.

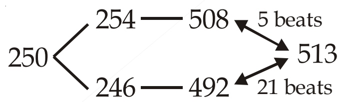
22. A source of unknown frequency gives 4 beats/s, when sounded with a source of known frequency 250 Hz. The second harmonic of the source of unknown frequency gives five beats per second, when sounded with a source of frequency 513 Hz. The unknown frequency is

(1) 254 Hz (2) 246 Hz

(3) 240 Hz (4) 260 Hz

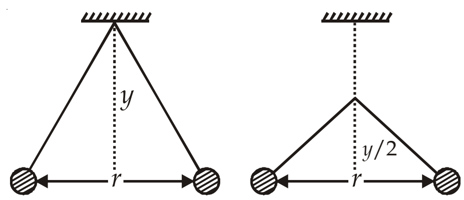
Answer (1)

Sol.



$\therefore$ Unknown frequency is 254 Hz.

23. Two pith balls carrying equal charges are suspended from a common point by strings of equal length, the equilibrium separation between them is r. Now the strings are rigidly clamped at half the height. The equilibrium separation between the balls now become



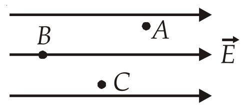
(1) $\left(\frac{1}{\sqrt{2}}\right)^2$ (2) $\left(\frac{r}{\sqrt[3]{2}}\right)$

(3) $\left(\frac{2r}{\sqrt{3}}\right)$ (4) $\left(\frac{2r}{3}\right)$

Answer (2)

Sol. $F_e = mg\tan\theta$, $\frac{F_e'}{F_e} = \frac{\tan\theta_2}{\tan\theta_1}$

24. A, B and C are three points in a uniform electric field. The electric potential is



(1) Maximum at A

(2) Maximum at B

(3) Maximum at C

(4) Same at all the three points A, B and C

Answer (2)

Sol. Electric field is directed along decreasing potential $V_B > V_C > V_A$.

25. A wire of resistance 4 Ω is stretched to twice its original length. The resistance of stretched wire would be

(1) 2 Ω (2) 4 Ω

(3) 8 Ω (4) 16 Ω

Answer (4)

Sol. $R' = 16\ \Omega$ $(R' = n^2R)$

26. The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of 10 Ω is

(1) 0.2 Ω

(2) 0.5 Ω

(3) 0.8 Ω

(4) 1.0 Ω

Answer (2)

Sol. $I = \dfrac{E}{R+r}$

$0.2 \times (10 + r) = 2.1$

$10 + r = \dfrac{2.1}{2} \times 10$

$r = 10.5 - 10 = 0.5\ \Omega$

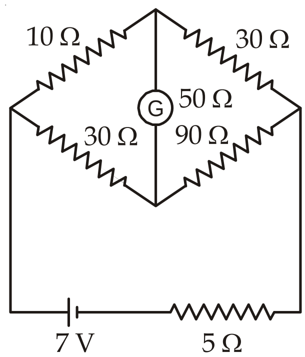
27. The resistances of the four arms P, Q, R and S in a Wheatstone's bridge are 10 ohm, 30 ohm, 30 ohm and 90 ohm, respectively. The e.m.f. and internal resistance of the cell are 7 volt and 5 ohm respectively. If the galvanometer resistance is 50 ohm, the current drawn from the cell will be

(1) 1.0 A (2) 0.2 A

(3) 0.1 A (4) 2.0 A

Answer (2)

Sol.



$$R_{\text{eff}} = \frac{40 \times 120}{120 + 40} = 30\ \Omega$$

$$I = \frac{7\text{ V}}{(30+5)\Omega} = 0.2\text{ A}$$

28. When a proton is released from rest in a room, it starts with an initial acceleration a_0 towards west. When it is projected towards north with a speed v_0 it moves with an initial acceleration $3a_0$ toward west. The electric and magnetic fields in the room are

(1) $\dfrac{ma_0}{e}$ west, $\dfrac{2ma_0}{ev_0}$ up

(2) $\dfrac{ma_0}{e}$ west, $\dfrac{2ma_0}{ev_0}$ down

(3) $\dfrac{ma_0}{e}$ east, $\dfrac{3ma_0}{ev_0}$ up

(4) $\dfrac{ma_0}{e}$ east, $\dfrac{3ma_0}{ev_0}$ down

Answer (2)

Sol. $a_0 = \dfrac{eE}{m} \Rightarrow E = \dfrac{ma_0}{e}$

$\dfrac{ev_0B + eE}{m} = 3a_0$

$ev_0B = 3ma_0 - eE$

$= 3ma_0 - ma_0$

$= 2ma_0$

$B = \dfrac{2ma_0}{ev_0}$

29. A current loop in a magnetic field

(1) Experiences a torque whether the field is uniform or non uniform in all orientations

(2) Can be in equilibrium in one orientation

(3) Can be in equilibrium in two orientations, both the equilibrium states are unstable

(4) Can be in equilibrium in two orientations, one stable while the other is unstable

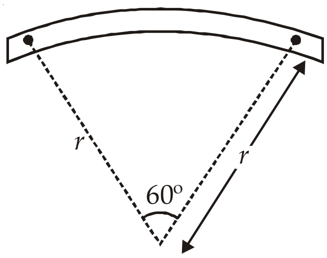
Answer (4)

Sol.

Parallel $\vec{M}$ – stable

Anti-parallel $\vec{M}$ – unstable

30. A bar magnet of length l and magnetic dipole moment M is bent in the form of an arc as shown in figure. The new magnetic dipole moment will be



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

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

Answer (2)

Sol. $M = mL$

$$L = \frac{\pi}{3}\times r \qquad r = \frac{3L}{\pi}$$

$$M' = m\times r = m\frac{3L}{\pi} = \frac{3M}{\pi}$$

31. A wire loop is rotated in a magnetic field. The frequency of change of direction of the induced e.m.f. is

(1) Once per revolution

(2) Twice per revolution

(3) Four times per revolution

(4) Six times per revolution

Answer (2)

32. A coil of self-inductance L is connected in series with a bulb B and an AC source. Brightness of the bulb decreases when

(1) Frequency of the AC source is decreased

(2) Number of turns in the coil is reduced

(3) A capacitance of reactance $X_C = X_L$ is included in the same circuit

(4) An iron rod is inserted in the coil

Answer (4)

Sol. $Z = \sqrt{R^2 + X_L^2} = \sqrt{R^2 + (2\pi f L)^2}$

$I = \frac{V}{Z}$, $P = I^2R$, $\mu\uparrow$ $L\uparrow$ $Z\uparrow$ $I\downarrow$ $P\downarrow$

33. The condition under which a microwave oven heats up a food item containing water molecules most efficiently is

(1) The frequency of the microwaves must match the resonant frequency of the water molecules

(2) The frequency of the microwaves has no relation with natural frequency of water molecules

(3) Microwaves are heat waves, so always produce heating

(4) Infra-red waves produce heating in a microwave oven

Answer (1)

Sol. Electromagnetic waves.

34. Ratio of longest wavelengths corresponding to Lyman and Balmer series in hydrogen spectrum is

(1) $\frac{5}{27}$ (2) $\frac{3}{23}$

(3) $\frac{7}{29}$ (4) $\frac{9}{31}$

Answer (1)

Sol. $\lambda_L = \frac{1}{R\left(1-\frac{1}{4}\right)} = \frac{4}{3R}$

$$\lambda_B = \frac{1}{R\left(\frac{1}{4}-\frac{1}{9}\right)} = \frac{1}{R\left(\frac{5}{36}\right)} = \frac{36}{5R}$$

$$\frac{\lambda_L}{\lambda_B} = \frac{4}{3R}\times\frac{5R}{36}$$

$$= \frac{5}{27}$$

35. The half life of a radioactive isotope 'X' is 20 years. It decays to another element 'Y' which is stable. The two elements 'X' and 'Y' were found to be in the ratio 1 : 7 in a sample of a given rock. The age of the rock is estimated to be

(1) 40 years (2) 60 years

(3) 80 years (4) 100 years

Answer (2)

Sol.

$$\frac{N}{N_0} = \frac{1}{8} = \frac{1}{2^3}$$

3 half lives, $T = 3\times 20 = 60$ years

36. A certain mass of Hydrogen is changed to Helium by the process of fusion. The mass defect in fusion reaction is 0.02866 u. The energy liberated per u is (given 1 u = 931 MeV)

(1) 2.67 MeV (2) 26.7 MeV

(3) 6.675 MeV (4) 13.35 MeV

Answer (3)

Sol. $\frac{0.02866 \times 931}{4}$ MeV $= \frac{26.7}{4}$ MeV

$= 6.675$ MeV

37. For photoelectric emission from certain metal the cut-off frequency is ν. If radiation of frequency 2ν impinges on the metal plate, the maximum possible velocity of the emitted electron will be (m is the electron mass)

(1) $\sqrt{\frac{h\nu}{(2m)}}$ (2) $\sqrt{\frac{h\nu}{m}}$

(3) $\sqrt{\frac{2h\nu}{m}}$ (4) $2\sqrt{\frac{h\nu}{m}}$

Answer (3)

Sol. $\frac{1}{2}mv_{\max}^2 = h2\nu - h\nu$

$v_{\max} = \sqrt{\frac{2h\nu}{m}}$

38. The wavelength λ_e of an electron and λ_p of a photon of same energy E are related by

(1) $\lambda_p \propto \lambda_e^2$ (2) $\lambda_p \propto \lambda_e$

(3) $\lambda_p \propto \sqrt{\lambda_e}$ (4) $\lambda_p \propto \frac{1}{\sqrt{\lambda_e}}$

Answer (1)

Sol.

$\lambda_e = \frac{h}{\sqrt{2mE}}$ $\lambda_p = \frac{hc}{E}$

$\lambda_e^2 = \frac{h^2}{2mE}$

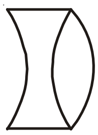
$\lambda_e^2 = \frac{h^2}{2m\frac{hc}{\lambda_p}} \Rightarrow \lambda_e^2 \propto \lambda_p$

39. A plano-convex lens fits exactly into a plano-concave lens. Their plane surfaces are parallel to each other. If lenses are made of different materials of refractive indices μ_1 and μ_2 and R is the radius of curvature of the curved surface of the lenses, then the focal length of the combination is

(1) $\frac{R}{2(\mu_1 + \mu_2)}$ (2) $\frac{R}{2(\mu_1 - \mu_2)}$

(3) $\frac{R}{(\mu_1 - \mu_2)}$ (4) $\frac{2R}{(\mu_2 - \mu_1)}$

Answer (3)

Sol. 

$f = \frac{1}{f_1} + \frac{1}{f_2}$

$f_1 = \frac{R}{(\mu_1 - 1)}$; $f_2 = \frac{-R}{(\mu_2 - 1)}$

$\frac{1}{f} = \frac{(\mu_1 - 1)}{R} - \frac{(\mu_2 - 1)}{R}$

$= \frac{[\mu_1 - 1 - \mu_2 + 1]}{R}$

$= \frac{[\mu_1 - \mu_2]}{R}$

40. For a normal eye, the cornea of eye provides a converging power of 40 D and the least converging power of the eye lens behind the cornea is 20 D. Using this information, the distance between the retina and the cornea - eye lens can be estimated to be

(1) 5 cm

(2) 2.5 cm

(3) 1.67 cm

(4) 1.5 cm

Answer (3)

Sol. $P_{\text{eff}} = 40\text{ D} + 20\text{ D} = 60\text{ D}$

$f = \frac{100}{P_{\text{eff}}}$

41. In Young's double slit experiment, the slits are 2 mm apart and are illuminated by photons of two wavelengths λ_1 = 12000 Å and λ_2 = 10000 Å. At what minimum distance from the common central bright fringe on the screen 2 m from the slit will a bright fringe from one interference pattern coincide with a bright fringe from the other?

(1) 8 mm (2) 6 mm

(3) 4 mm (4) 3 mm

Answer (2)

Sol. $\frac{\lambda_1}{\lambda_2} = \frac{n_2}{n_1} = \frac{12000}{10000} = \frac{6}{5}$

$$x = \frac{n_1 \lambda_1 D}{d} = \frac{5 \times 12000 \times 10^{-10} \times 2}{2 \times 10^{-3}}$$

= 6 mm

42. A parallel beam of fast moving electrons is incident normally on a narrow slit. A fluorescent screen is placed at a large distance from the slit. If the speed of the electrons is increased, which of the following statements is correct?

(1) Diffraction pattern is not observed on the screen in the case of electrons

(2) The angular width of the central maximum of the diffraction pattern will increase

(3) The angular width of the central maximum will decrease

(4) The angular width of the central maximum will be unaffected

Answer (3)

Sol. $v\uparrow \qquad \lambda\downarrow$

43. In a n-type semiconductor, which of the following statement is true?

(1) Electrons are majority carriers and trivalent atoms are dopants

(2) Electron are minority carriers and pentavalent atoms are dopants

(3) Holes are minority carriers and pentavalent atoms are dopants

(4) Holes are majority carriers and trivalent atoms are dopants

Answer (3)

44. In a common emitter (CE) amplifier having a voltage gain G, the transistor used has transconductance 0.03 mho and current gain 25. If the above transistor is replaced with another one with transconductance 0.02 mho and current gain 20, the voltage gain will be

(1) $\frac{2}{3}G$ (2) 1.5 G

(3) $\frac{1}{3}G$ (4) $\frac{5}{4}G$

Answer (1)

Sol. $A_v = \beta \frac{R_L}{R_i}$ $\qquad \left(g_m = \frac{\Delta I_C}{\Delta V_B} = \frac{\Delta I_C}{\Delta I_B R_i} \right)$

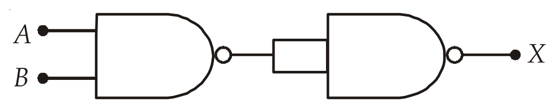
$G = \left(\frac{\beta}{R_i}\right) R_L$ $\qquad \left(g_m = \frac{\beta}{R_i} \right)$

$= g_m R_L \quad \Rightarrow \quad G \propto g_m$

$\frac{G_2}{G_1} = \frac{g_{m_2}}{g_{m_1}} \quad \Rightarrow G_2 = \frac{0.02}{0.03} \times G$

$= \frac{2}{3}G$

45. The output (X) of the logic circuit shown in figure will be



(1) $X = \overline{\overline{A}.\overline{B}}$ (2) $X = \overline{A.B}$

(3) $X = A.B$ (4) $X = \overline{A+B}$

Answer (3)

Sol. $X = \overline{\overline{AB}} = A \cdot B$

46. The value of Planck's constant is 6.63 × 10^{-34} Js. The speed of light is 3 × 10^{17} nm s^{-1}. Which value is closest to the wavelength in nanometer of a quantum of light with frequency of 6 × 10^{15} s^{-1}?

(1) 10 (2) 25

(3) 50 (4) 75

Answer (3)

Sol. $\nu = \frac{c}{\lambda}$

$\therefore \quad \lambda = \frac{3 \times 10^{17} \text{ nms}^{-1}}{6 \times 10^{15} \text{ s}^{-1}}$

= 50 nm

47. What is the maximum numbers of electrons that can be associated with the following set of quantum numbers?

$n = 3, l = 1$ and $m = -1$

(1) 10 (2) 6

(3) 4 (4) 2

Answer (4)

Sol. Fact.

48. What is the activation energy for a reaction if its rate doubles when the temperature is raised from 20°C to 35°C ? (R = 8.314 J mol^{-1} K^{-1})

(1) 342 kJ mol^{-1} (2) 269 kJ mol^{-1}

(3) 34.7 kJ mol^{-1} (4) 15.1 kJ mol^{-1}

Answer (3)

Sol. $\log\frac{K_2}{K_1} = -\frac{E_a}{2.303R}\left[\frac{T_1 - T_2}{T_1.T_2}\right]$

$$\log 2 = -\frac{E_a}{2.303 \times 8.314}\left[\frac{293 - 308}{293 \times 308}\right]$$

$$E_a = \frac{0.301 \times 2.303 \times 8.314 \times 293 \times 308}{15}$$

$= 34.67$ kJ mol^{-1} ≈ 34.7 kJ mol^{-1}

49. A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH = 10 and by passing hydrogen gas around the platinum wire at one atm pressure. The oxidation potential of electrode would be

(1) 0.059 V (2) 0.59 V

(3) 0.118 V (4) 1.18 V

Answer (2)

Sol. $E_{cell} = \frac{0.059}{1}\log\frac{1}{10^{-10}}$

$= +0.59$ V

50. A reaction having equal energies of activation for forward and reverse reactions has

(1) $\Delta S = 0$ (2) $\Delta G = 0$

(3) $\Delta H = 0$ (4) $\Delta H = \Delta G = \Delta S = 0$

Answer (3)

Sol. Fact.

51. At 25°C molar conductance of 0.1 molar aqueous solution of ammonium hydroxide is 9.54 ohm^{-1} cm^2 mol^{-1} and at infinite dilution its molar conductance is 238 ohm^{-1} cm^2 mol^{-1}. The degree of ionisation of ammonium hydroxide at the same concentration and temperature is

(1) 2.080% (2) 20.800%

(3) 4.008% (4) 40.800%

Answer (3)

Sol. Degree of ionization $= \frac{\lambda_m}{\lambda_m^{\infty}} \times 100$

$$= \frac{9.54 \times 100}{238} = 4.008\%$$

52. Based on equation $E = -2.178 \times 10^{-18}\,J\left(\frac{Z^2}{n^2}\right)$ certain conclusions are written. Which of them is **not** correct?

(1) The negative sign in equation simply means that the energy of electron bound to the nucleus is lower than it would be if the electrons were at the infinite distance from the nucleus

(2) Larger the value of n, the larger is the orbit radius

(3) Equation can be used to calculate the change in energy when the electron changes orbit

(4) For n = 1, the electron has a more negative energy than it does for n = 6 which means that the electron is more loosely bound in the smallest allowed orbit

Answer (4)

Sol. Fact.

53. A button cell used in watches functions as following

$$Zn(s) + Ag_2O(s) + H_2O(l) \rightleftharpoons 2Ag(s) +$$

Zn^{2+} (aq) + $2OH^-$ (aq)

If half cell potentials are

Zn^{2+} (aq) + $2e^- \rightarrow Zn(s)$; E° = –0.76 V

$Ag_2O(s) + H_2O(l) + 2e^- \rightarrow 2Ag(s) + 2OH^-$ (aq),

E° = 0.34 V

The cell potential will be

(1) 1.10 V (2) 0.42 V

(3) 0.84 V (4) 1.34 V

Answer (1)

Sol. $E^{\circ}_{cell} = E^{o}_{cathode} - E^{o}_{anode}$

$= 0.34 - (-0.76) = 1.1$ V

54. How many grams of concentrated nitric acid solution should be used to prepare 250 mL of 2.0 M HNO_3? The concentrated acid is 70% HNO_3.

(1) 45.0 g conc. HNO_3 (2) 90.0 g conc. HNO_3

(3) 70.0 g conc. HNO_3 (4) 54.0 g conc. HNO_3

Answer (1)

Sol. M × V = Moles of HNO_3 = $\frac{250 \times 2}{1000} = 0.5$

$\therefore$ HNO_3 required = $0.5 \times 63 \times \frac{100}{70} = 45$ g

55. The number of carbon atoms per unit cell of diamond unit cell is

(1) 4 (2) 8

(3) 6 (4) 1

Answer (2)

Sol. Fact.

56. Maximum deviation from ideal gas is expected from

(1) $H_2(g)$ (2) $N_2(g)$

(3) $CH_4(g)$ (4) $NH_3(g)$

Answer (4)

Sol. Fact.

57. A metal has a fcc lattice. The edge length of the unit cell is 404 pm. The density of the metal is 2.72 g cm^{-3}. The molar mass of the metal is

(N_A Avogadro's constant = 6.02×10^{23} mol^{-1})

(1) 40 g mol^{-1} (2) 30 g mol^{-1}

(3) 27 g mol^{-1} (4) 20 g mol^{-1}

Answer (3)

Sol. $d = \frac{Z \times M}{V \times N_A}$

$$2.72 = \frac{4 \times M}{(4.04 \times 10^{-8})^3 \times 6.02 \times 10^{23}}$$

$$M = \frac{2.72 \times (4.04)^3 \times 6.02 \times 10^{-1}}{4}$$

= 27 g/mol.

58. Dipole-induced dipole interactions are present in which of the following pairs?

(1) H_2O and alcohol (2) Cl_2 and CCl_4

(3) HCl and He atoms (4) SiF_4 and He atoms

Answer (3)

Sol. $\overset{\delta+}{H}-\overset{\delta-}{Cl}$ .... 

He

59. A magnetic moment of 1.73 BM will be shown by one among the following

(1) $[Cu(NH_3)_4]^{2+}$ (2) $[Ni(CN)_4]^{2-}$

(3) $TiCl_4$ (4) $[CoCl_6]^{4-}$

Answer (1)

Sol. Magnetic moment (μ) = $\sqrt{n(n+2)}$

$1.73 = \sqrt{n(n+2)}$

n = 1

So, compound must contain one unpaired electron. The compound is $[Cu(NH_3)_4]^{2+}$.

60. Roasting of sulphides gives the gas X as a by-product. This is a colorless gas with choking smell of burnt sulphur and causes great damage to respiratory organs as a result of acid rain. Its aqueous solution is acidic acts as a reducing agent and its acid has never been isolated. The gas X is

(1) H_2S (2) SO_2

(3) CO_2 (4) SO_3

Answer (2)

Sol. Fact.

61. Which is the strongest acid in the following?

(1) H_2SO_4 (2) $HClO_3$

(3) $HClO_4$ (4) H_2SO_3

Answer (3)

Sol. Fact.

62. Which of the following is paramagnetic?

(1) CO (2) O_2^-

(3) CN^- (4) NO^+

Answer (2)

Sol. $O_2^- \Rightarrow$ It has one unpaired electron.

63. Which of the following structure is similar to graphite?

(1) BN (2) B

(3) B_4C (4) B_2H_6

Answer (1)

Sol. Fact.

64. The basic structural unit of silicates is

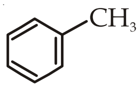
(1) SiO^- (2) SiO_4^{4-}

(3) SiO_3^{2-} (4) SiO_4^{2-}

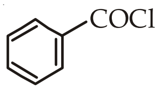
Answer (2)

Sol. Fact.

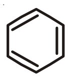
65. Reaction by which Benzaldehyde cannot be prepared?

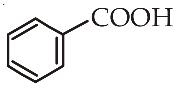
(1) 

+ CrO_2Cl_2 in CS_2 followed by H_3O^+

(2) 

+ H_2 in presence of Pd-$BaSO_4$

(3)  + CO + HCl in presence of anhydrous $AlCl_3$

(4) 

+ Zn/Hg and conc. HCl

Answer (4)

Sol. Fact.

66. Which of the following does not give oxygen on heating?

(1) $KClO_3$ (2) $Zn(ClO_3)_2$

(3) $K_2Cr_2O_7$ (4) $(NH_4)_2Cr_2O_7$

Answer (4)

Sol. $(NH_4)_2Cr_2O_7 \xrightarrow{\Delta} N_2(\uparrow) + Cr_2O_3 + 4H_2O$

67. Which of the following lanthanoid ions is diamagnetic?

(At. nos. Ce = 58, Sm = 62, Eu = 63, Yb = 70)

(1) Ce^{2+} (2) Sm^{2+}

(3) Eu^{2+} (4) Yb^{2+}

Answer (4)

Sol. Yb^{2+} has an electronic configuration of $4f^{14}$.

68. Identify the correct order of solubility in aqueous medium

(1) CuS > ZnS > Na_2S

(2) ZnS > Na_2S > CuS

(3) Na_2S > CuS > ZnS

(4) Na_2S > ZnS > CuS

Answer (4)

Sol. Fact.

69. XeF_2 is isostructural with

(1) TeF_2 (2) ICl_2^-

(3) $SbCl_3$ (4) $BaCl_2$

Answer (2)

Sol. ICl_2^- (Same number of lp and bp on "I")

70. An excess of $AgNO_3$ is added to 100 mL of a 0.01 M solution of dichlorotetraaquachromium(III) chloride. The number of moles of AgCl precipitated would be

(1) 0.001 (2) 0.002

(3) 0.003 (4) 0.01

Answer (1)

Sol. $[Cr(H_2O)_4Cl_2]Cl$, one ionizable Cl^-.

71. Which of these is least likely to act as a Lewis base?

(1) CO (2) F^-

(3) BF_3 (4) PF_3

Answer (3)

Sol. BF_3, it is a Lewis acid.

72. $KMnO_4$ can be prepared from K_2MnO_4 as per the reaction:

$$3MnO_4^{2-} + 2H_2O \rightleftharpoons 2MnO_4^- + MnO_2 + 4OH^-$$

The reaction can go to completion by removing OH^- ions by adding

(1) HCl (2) KOH

(3) CO_2 (4) SO_2

Answer (3)

Sol. Fact.

73. Which of the following is electron-deficient?

(1) $(CH_3)_2$

(2) $(SiH_3)_2$

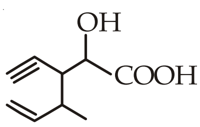
(3) $(BH_3)_2$

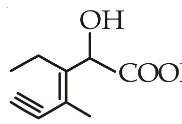
(4) PH_3

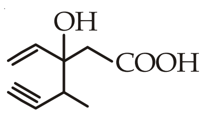
Answer (3)

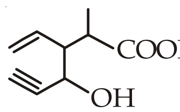
Sol. $(BH_3)_2$, Diborane is electron deficient.

74. Structure of the compound whose IUPAC name is 3-Ethyl-2-hydroxy-4-methylhex-3-en-5-ynoic acid is

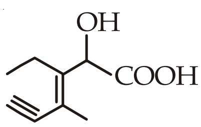
(1) 

(2) 

(3) 

(4) 

Answer (2)

Sol. 

75. Which of these is **not** a monomer for a high molecular mass silicone polymer?

(1) $MeSiCl_3$ (2) Me_2SiCl_2

(3) Me_3SiCl (4) $PhSiCl_3$

Answer (3)

Sol. Fact.

76. Which of the following statements about the interstitial compounds is incorrect?

(1) They retain metallic conductivity

(2) They are chemically reactive

(3) They are much harder than the pure metal

(4) They have higher melting points than the pure metal

Answer (2)

Sol. Fact.

77. Which one of the following molecules contains no π bond?

(1) CO_2 (2) H_2O

(3) SO_2 (4) NO_2

Answer (2)

Sol. Fact.

78. Antiseptics and disinfectants either kill or prevent growth of microorganisms. Identify which of the following statements is **not true**

(1) A 0.2% solution of phenol is an antiseptic while 1% solution acts as a disinfectant

(2) Chlorine and Iodine are used as strong disinfectants

(3) Dilute solutions of Boric acid and Hydrogen, Peroxide are strong antiseptics

(4) Disinfectants harm the living tissues

Answer (3)

Sol. Dilute solutions of boric acid and H_2O_2 are mild antiseptics.

79. Among the following ethers, which one will produce methyl alcohol on treatment with hot concentrated HI?

(1) $CH_3-CH_2-CH_2-CH_2-O-CH_3$

(2) $CH_3-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-O-CH_3$

(3) $CH_3-\overset{\displaystyle CH_3}{\overset{|}{\underset{\displaystyle CH_3}{\underset{|}{C}}}}-O-CH_3$

(4) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-O-CH_3$

Answer (3)

Sol. $CH_3-\overset{\displaystyle CH_3}{\overset{|}{\underset{\displaystyle CH_3}{\underset{|}{C}}}}-O-CH_3+HI\longrightarrow$

$\underset{\text{Methanol}}{CH_3OH}+CH_3-\overset{\displaystyle CH_3}{\overset{|}{\underset{\displaystyle CH_3}{\underset{|}{C}}}}-I$

80. Nylon is an example of

(1) Polyester (2) Polysaccharide

(3) Polyamide (4) Polythene

Answer (3)

Sol. Fact.

81. The structure of isobutyl group in an organic compound is

(1) $\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>CH-CH_2-$

(2) $CH_3-\underset{|}{CH}-CH_2-CH_3$

(3) $CH_3-CH_2-CH_2-CH_2-$

(4) $CH_3-\overset{\displaystyle CH_3}{\overset{|}{\underset{\displaystyle CH_3}{\underset{|}{C}}}}-$

Answer (1)

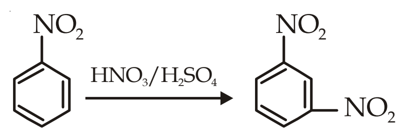
Sol. Fact.

82. Nitrobenzene on reaction with conc. HNO_3/H_2SO_4 at 80-100°C forms which one of the following products?

(1) 1, 2-Dinitrobenzene (2) 1, 3-Dinitrobenzene

(3) 1, 4-Dinitrobenzene (4) 1, 2, 4-Trinitrobenzene

Answer (2)

Sol. 

83. Some meta-directing substituents in aromatic substitution are given. Which one is most deactivating?

(1) $-C\equiv N$ (2) $-SO_3H$

(3) $-COOH$ (4) $-NO_2$

Answer (4)

Sol. Fact.

84. 6.02×10^{20} molecules of urea are present in 100 mL of its solution. The concentration of solution is

(1) 0.02 M (2) 0.01 M

(3) 0.001 M (4) 0.1 M

Answer (2)

Sol. $M = \dfrac{\dfrac{6.02\times10^{20}}{6.02\times10^{23}}}{\dfrac{100}{1000}} = 0.01\,M$

85. Which of the following is a polar molecule?

(1) BF_3 (2) SF_4

(3) SiF_4 (4) XeF_4

Answer (2)

Sol. SF_4 (Due to presence of a lone pair of electron on "S" it has distorted geometry).

86. Which is the monomer of Neoprene in the following?

(1) $CH_2 = CH - C \equiv CH$

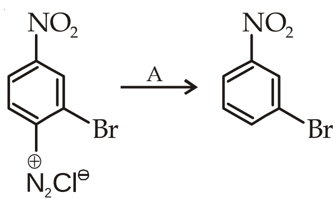
(2) $CH_2 = \underset{\underset{CH_3}{|}}{C} - CH = CH_2$

(3) $CH_2 = \underset{\underset{Cl}{|}}{C} - CH = CH_2$

(4) $CH_2 = CH - CH = CH_2$

Answer (3)

Sol. Chloroprene $(CH_2 = \underset{\underset{Cl}{|}}{C} - CH = CH_2)$

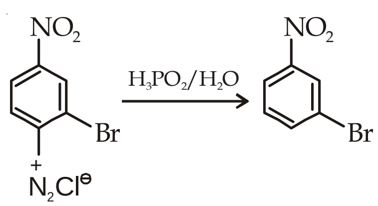
87. In the reaction 

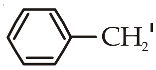
A is

(1) $HgSO_4/H_2SO_4$ (2) Cu_2Cl_2

(3) H_3PO_2 and H_2O (4) H^+/H_2O

Answer (3)

Sol. 

88. The radical  is aromatic because it has

(1) 6 p-orbitals and 6 unpaired electrons

(2) 7 p-orbitals and 6 unpaired electrons

(3) 7 p-orbitals and 7 unpaired electrons

(4) 6 p-orbitals and 7 unpaired electrons

Answer (1)

Sol. 6p orbitals and 6 unpaired electrons contributes to aromaticity.

89. The order of stability of the following tautomeric compounds is

$$CH_2 = \overset{\overset{OH}{|}}{C} - CH_2 - \overset{\overset{O}{||}}{C} - CH_3 \rightleftharpoons$$
I

$$CH_3 - \overset{\overset{O}{||}}{C} - CH_2 - \overset{\overset{O}{||}}{C} - CH_3 \rightleftharpoons$$
II

$$CH_3 - \overset{\overset{OH}{|}}{C} = CH - \overset{\overset{O}{||}}{C} - CH_3$$
III

(1) I > II > III (2) III > II > I

(3) II > I > III (4) II > III > I

Answer (2)

Sol. Fact.

90. Which of the following compounds will not undergo Friedal-Craft's reaction easily?

(1) Cumene (2) Xylene

(3) Nitrobenzene (4) Toluene

Answer (3)

Sol. Nitrobenzene ($-NO_2$ is deactivating group)

91. Select the **wrong** statement:

(1) Isogametes are similar in structure, function and behaviour

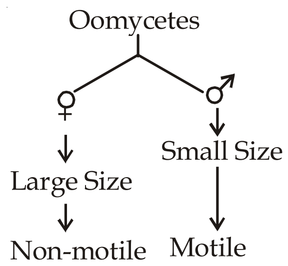
(2) Anisogametes differ either in structure, function or behaviour

(3) In Oomycetes female gemete is smaller and motile, while male gamete is larger and non-motile

(4) *Chlamydomomas* Exhibits both isogamy and anisogamy and *Fucus* shows oogamy

Answer (3)

Sol.



92. Which one of the following is **not** a correct statement?
    (1) Herbarium houses dried, pressed and preserved plant specimens
    (2) Botanical gardens have collection of living plants for reference.
    (3) A museum has collection of photographs of plants and animals.
    (4) Key is a taxonomic aid for identification of specimens.

Answer (3)

Sol. A museum has collection of dead remains of plants and animals in preserved form.

93. Isogamous condition with non-flagellated gametes is found in
    (1) *Chlamydomonas*
    (2) *Spirogyra*
    (3) *Volvox*
    (4) *Fucus*

Answer (2)

Sol.

Organism	**Reproduction**	**Gametes**
Spirogyra	Isogamous	Non-motile
Volvox	Oogamous	♂ -Motile ♀ -Non-motile
Fucus	Oogamous	♂ -Motile ♀ -Non-motile
Chlamydomonas	All three	Motile/Non-motile

94. Besides paddy fields, cyanobacteria are also found inside vegetative part of
    (1) *Pinus* (2) *Cycas*
    (3) *Equisetum* (4) *Psilotum*

Answer (2)

Sol. BGA → *Anabaena cycadae* → Coralloid roots of *Cycas*

Fungi → *Boletus (B)* → Roots of *Pinus*
→ Mycorrhizal roots

95. Megasporangium is equivalent to
    (1) Embryo sac (2) Fruit
    (3) Nucellus (4) Ovule

Answer (4)

Sol. Megasporangium
Ovule → MMC → Megaspore

96. Read the following statements (A-E) and answer the question which follows them
    (A) In liverworts, mosses, and ferns gametophytes are free-living
    (B) Gymnosperms and some ferns are heterosporous
    (C) Sexual reproduction in *Fucus, Volvox* and *Albugo* is oogamous
    (D) The sporophyte in liverworts is more elaborate than that in mosses
    (E) Both, *Pinus* and *Marchantia* are dioecious
    How many of the above statements are correct ?
    (1) One (2) Two
    (3) Three (4) Four

Answer (3)

Sol. In statement 'D', the sporophyte of moss is more elaborate than liverworts.
Statement 'E' → *Pinus* is monoecious plant.

97. Among bitter gourd, mustard, brinjal, pumpkin, china rose, lupin, cucumber, sunnhemp, gram, guava, bean, chilli, plum, petunia, tomato, rose, withania, potato, onion, aloe and tulip how many plants have hypogynous flower?
    (1) Six (2) Ten
    (3) Fifteen (4) Eighteen

Answer (3)

Sol. Hypogynous flower – mustard, brinjal, china rose, lupin, sunhemp, gram, bean, chilli, petunia, tomato, withania, potato, onion, aloe and tulip.

98. Interfascicular cambium develops from the cells of
    (1) Medullary rays (2) Xylem parenchyma
    (3) Endodermis (4) Pericycle

Answer (1)

Sol. Interfascicular cambium develops from the cells of medullary rays.

99. In China rose the flowers are
    (1) Actinomorphic, hypogynous with twisted aestivation
    (2) Actinomorphic, epigynous with valvate aestivation
    (3) Zygomorphic, hypogynous with imbricate aestivation
    (4) Zygomorphic, epigynous with twisted aestivation

Answer (1)

100. Lenticels are involved in

(1) Transpiration (2) Gaseous exchange

(3) Food transport (4) Photosynthesis

Answer (2)

Sol. Lenticels are lense like opening in periderm developed during secondary growth.

101. Age of a tree can be estimated by

(1) Its height and girth

(2) Biomass

(3) Number of annual rings

(4) Diameter of its heartwood

Answer (3)

Sol. Number of annual rings = Number of Years

102. Seed coat is **not** thin, membranous in

(1) Maize (2) Coconut

(3) Groundnut (4) Gram

Answer (2)

Sol. Coconut–Thick

Groundnut, gram, Maize–thin, membranous

103. Transition state structure of the substrate formed during an enzymatic reaction is

(1) Transient but stable

(2) Permanent but unstable

(3) Transient and unstable

(4) Permanent and stable

Answer (3)

Sol. Transition state structure of the substrate formed during an enzymatic reaction is transient and unstable.

104. A phosphoglyceride is always made up of

(1) Only a saturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached

(2) Only an unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached

(3) A saturated or unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached

(4) A saturated or unsaturated fatty acid esterified to a phosphate group which is also attached to a glycerol molecule

Answer (3)

105. Pigment-containing membranous extensions in some cyanobacteria are

(1) Heterocysts (2) Basal bodies

(3) Pneumatophores (4) Chromatophores

Answer (4)

106. A major site for synthesis of lipids is

(1) RER

(2) SER

(3) Symplast

(4) Nucleoplasm

Answer (2)

Sol. SER is the site for synthesis of lipids.

107. The complex formed by a pair of synapsed homologous chromosomes is called

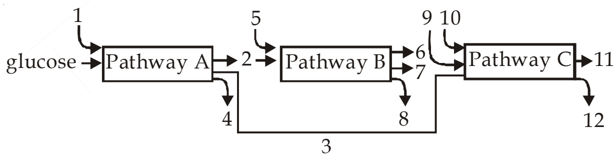
(1) Equatorial plate (2) Kinetochore

(3) Bivalent (4) Axoneme

Answer (3)

Sol. Bivalent is paired homologous chromosome in zygotene stage.

108. The three boxes in this diagram represent the three major biosynthetic pathways in aerobic respiration. Arrows represent net reactants or products



Arrows numbered 4, 8, and 12 can all be

(1) NADH (2) ATP

(3) H_2O (4) FAD^+ or $FADH_2$

Answer (2)

Sol. ATP is generated at substrate level in glycolysis (A) and Kreb's cycle (B) but through oxidative phosphorylation in ETS (C).

109. The most abundant intracellular cation is

(1) Na^+ (2) Ca^{++}

(3) H^+ (4) K^+

Answer (4)

Sol. K^+ is most abundant intracellular cation.

110. During seed germination its stored food is mobilized by

(1) Ethylene (2) Cytokinin

(3) ABA (4) Gibberellin

Answer (4)

Sol. Gibberellin induces aleurone cells to secrete enzyme to break stored food in seed.

111. Which of the following criteria **does not** pertain to facilitated transport ?

(1) Requirement of special membrane proteins

(2) High selectivity

(3) Transport saturation

(4) Uphill transport

Answer (4)

Sol. Downhill movement

Net transport of molecules is from high conc. to low conc.

112. The first stable product of fixation of atmospheric nitrogen in leguminous plants is

(1) NO_2^- (2) Ammonia

(3) NO_3^- (4) Glutamate

Answer (2)

Sol. $\underset{\text{Nitrogen}}{N_2} \longrightarrow \underset{\text{Dimide}}{N_2H_2} \longrightarrow \underset{\text{Hydrazine}}{N_2H_4} \longrightarrow \underset{\text{Ammonia}}{2NH_3}$

113. Which of the metabolites is common to respiration mediated breakdown of fats, carbohydrates and proteins?

(1) Glucose-6-phosphate

(2) Fructose 1,6-bisphosphate

(3) Pyruvic acid

(4) Acetyl CoA

Answer (4)

Sol. Acetyl CoA (2C compound) is common to respiration mediated breakdown of fats, carbohydrates and proteins.

114. Which one of the following statements is correct?

(1) Hard outer layer of pollen is called intine

(2) Sporogenous tissue is haploid

(3) Endothecium produces the microspores

(4) Tapetum nourishes the developing pollen

Answer (4)

Sol. Tapetum is innermost nutritive structure of anther wall.

115. Product of sexual reproduction generally generates

(1) Longer viability of seeds

(2) Prolonged dormancy

(3) New genetic combination leading to variation

(4) Large biomass

Answer (3)

Sol. Sexual reproduction generally generates new genetic combination leading to variation.

116. Meiosis takes place in

(1) Meiocyte (2) Conidia

(3) Gemmule (4) Megaspore

Answer (1)

Sol. The cells in which meiosis takes place are called meiocyte.

117. Advantage of cleistogamy is

(1) Higher genetic variability

(2) More vigorous offspring

(3) No dependence on pollinators

(4) Vivipary

Answer (3)

Sol. Cleistogamous/ closed flowers ensure cent percent seed setting even in the absence of pollinators.

118. Monoecious plant of *Chara* shows occurrence of

(1) Antheridiophore and archegoniophore on the same plant

(2) Stamen and carpel on the same plant

(3) Upper antheridium and lower oogonium on the same plant

(4) Upper oogonium and lower antheridium on the same plant

Answer (4)

Sol. *Chara* is monoecious green algae.

119. Perisperm differs from endosperm in

(1) Being a haploid tissue

(2) Having no reserve food

(3) Being a diploid tissue

(4) Its formation by fusion of secondary nucleus with several sperms

Answer (3)

Sol.

Preisperm	**Endosperm**
Remains of nucellus	Triple fusion
Reserve food	Reserve food
2n	3n

120. Which of the following statements is **not** true of two genes that show 50% recombination frequency ?

(1) The genes may be on different chromosomes

(2) The genes are tightly linked

(3) The genes show independent assortment

(4) If the genes are present on the same chromosome, they undergo more than one crossovers in every meiosis

Answer (2)

Sol. The tightly linked genes show 100% parental types and 0% recombinants.

121. Variation in gene frequencies within populations can occur by chance rather than by natural selection. This is referred to as

(1) Genetic flow (2) Genetic drift

(3) Random mating (4) Genetic load

Answer (2)

Sol. Variation in gene frequencies within populations can occur by chance is called as genetic drift.

122. If two persons with 'AB' blood group marry and have sufficiently large number of children, these children could be classified as 'A' blood group : 'AB' blood group : 'B' blood group in 1 : 2 : 1 ratio. Modern technique of protein electrophoresis reveals presence of both 'A' and 'B' type proteins in 'AB' blood group individuals. This is an example of

(1) Codominance

(2) Incomplete dominance

(3) Partial dominance

(4) Complete dominance

Answer (1)

Sol. Phenotype **AB**

$\downarrow$

Genotype I^AI^B

$\downarrow$

Antigen A+Antigen B

$\downarrow$

Co-dominance

123. The process by which organisms with different evolutionary history evolve similar phenotypic adaptations in response to a common environmental challenge, is called

(1) Natural selection

(2) Convergent evolution

(3) Non-random evolution

(4) Adaptive radiation

Answer (2)

Sol. Convergent evolution occurs in unrelated group of organisms. It is the development of similar functional structures but in unrelated groups.

124. The tendency of population to remain in genetic equilibrium may be disturbed by

(1) Random mating

(2) Lack of migration

(3) Lack of mutations

(4) Lack of random mating

Answer (4)

Sol. According to Hardy-Weinberg principle, allele frequencies in a population are stable and is constant from generation to generation.

125. Which of the following Bt crops is being grown in India by the farmers?

(1) Maize (2) Cotton

(3) Brinjal (4) Soybean

Answer (2)

Sol. Bt cotton is being grown in India by the farmers.

126. A good producer of citric acid is

(1) *Aspergillus* (2) *Pseudomonas*

(3) *Clostridium* (4) *Saccharomyces*

Answer (1)

127. DNA fragments generated by the restriction endonucleases in a chemical reaction can be separated by

(1) Centrifugation

(2) Polymerase chain reaction

(3) Electrophoresis

(4) Restriction mapping

Answer (3)

Sol. DNA fragments generated by restriction endonucleases in a chemical reaction can be separated by gel electrophoresis.

128. Which of the following is not correctly matched for the organism and its cell wall degrading enzyme?

(1) Bacteria - Lysozyme

(2) Plant cells - Cellulase

(3) Algae - Methylase

(4) Fungi - Chitinase

Answer (3)

Sol. In algae, cell wall is made up of cellulose degrades by cellulase.

129. The colonies of recombinant bacteria appear white in contrast to blue colonies of non-recombinant bacteria because of

(1) Non-recombinant bacteria containing beta-galactosidase

(2) Insertional inactivation of alpha-galactosidase in non-recombinant bacteria

(3) Insertional inactivation of alpha-galactosidase in recombinant bacteria

(4) Inactivation of glycosidase enzyme in recombinant bacteria

Answer (3)

Sol. The colonies of recombinant bacteria appear white in contrast to blue colonies of non-recombinant bacteria because of insertional inactivation of alpha-galactosidase in recombinant bacteria.

130. Which of the following are likely to be present in deep sea water?

(1) Archaebacteria (2) Eubacteria

(3) Blue-green algae (4) Saprophytic fungi

Answer (1)

Sol. Archaebacteria flourish in hot springs and deep sea hydrothermal vents.

131. Natural reservoir of phosphorus is

(1) Sea water

(2) Animal bones

(3) Rock

(4) Fossils

Answer (3)

Sol. Phosphorous – Sedimentary cycle

Reservoir – Rocks

132. Secondary productivity is rate of formation of new organic matter by

(1) Producer (2) Parasite

(3) Consumer (4) Decomposer

Answer (3)

Sol. Secondary productivity is rate of formation of new organic matter by consumer.

133. Which one of the following is not used for *ex situ* plant conservation?

(1) Field gene banks (2) Seed banks

(3) Shifting cultivation (4) Botanical Gardens

Answer (3)

Sol. Shifting cultivation results into deforestation.

134. Kyoto Protocol was endorsed at

(1) CoP-3 (2) CoP-5

(3) CoP-6 (4) CoP-4

Answer (1)

135. Which of the following represent maximum number of species among global biodiversity?

(1) Algae (2) Lichens

(3) Fungi (4) Mosses and Ferns

Answer (3)

136. Match the name of the animal (Column I) with one characteristics (Column II) and the phylum/class (column III) to which it belongs.

	Column I	**Column II**	**Column III**
(1)	*Petromyzon*	Ectoparasite	Cyclostomata
(2)	*Ichthyophis*	Terrestrial	Reptilia
(3)	*Limulus*	Body covered by chitinous exoskeleton	Pisces
(4)	*Adamsia*	Radially symmetrical	Porifera

Answer (1)

Sol. *Petromyzon* (Lamprey) is ectoparasite on fishes belongs to cyclostomata.

137. Which of the following are correctly matched with respect to their taxonomic classification?

(1) Flying fish, cuttlefish, silverfish, – Pisces

(2) Centipede, millipede, spider, scorpion – Insecta

(3) House fly, butterfly, tsetsefly, silverfish – Insecta

(4) Spiny anteater, sea urchin, sea cucumber – Echinodermata

Answer (3)

Sol. Housefly, butterfly, tsetse fly, silverfish belong to class insecta of phylum arthropoda.

138. Which group of animals belong to the same phylum?

(1) Malarial parasite, *Amoeba,* Mosquito

(2) Earthworm, Pinworm, Tapeworm

(3) Prawn, Scorpion, *Locusta*

(4) Sponge, Sea anemone, Starfish

Answer (3)

Sol. *Prawn, Scorpion, Locusta* belong to phylum arthropoda.

139. One of the representatives of Phylum Arthropoda is

(1) Cuttlefish (2) Silverfish

(3) Pufferfish (4) Flying fish

Answer (2)

Sol. Silverfish belongs to phylum arthropoda.

140. The H-zone in the skeletal muscle fibre is due to

(1) The absence of myofibrils in the central portion of A-band

(2) The central gap between myosin filaments in the A-band

(3) The central gap between actin filaments extending through myosin filaments in the A-band

(4) Extension of myosin filaments in the central portion of the A-band

Answer (3)

Sol. H-zone in skeletal muscle is the central gap between actin filaments extending through myosin filaments in the A band.

141. What external changes are visible after the last moult of a cockroach nymph?

(1) Mandibles become harder

(2) Anal cerci develop

(3) Both fore wings and hind wings develop

(4) Labium develops

Answer (3)

Sol. In cockroach, development is paurometabolous. The nymph grows by moulting about 13 times to reach the adult form. The next to last nymphal stage has wing pads but only adult cockroaches have wings.

142. The Golgi complex plays a major role

(1) In trapping the light and transforming it into chemical energy

(2) In digesting proteins and carbohydrates

(3) As energy transferring organelles

(4) In post translational modification of proteins and glycosidation of lipids

Answer (4)

Sol. Protein + Carbohydrate $\longrightarrow$ Glycosylation

Lipid + Carbohydrate $\longrightarrow$ Glycosidation

143. Which one of the following organelle in the figure correctly matches with its function ?

(1) Rough endoplasmic reticulum, formation of glycoproteins

(2) Golgi apparatus, protein synthesis

(3) Golgi apparatus, formation of glycolipids

(4) Rough endoplasmic reticulum, protein synthesis

Answer (4)

Sol.

ER

RER → Ribosomes → Protein synthesis

SER → Ribosome -absent → Lipid synthesise

144. Macro molecule chitin is

(1) Nitrogen containing polysaccharide

(2) Phosphorus containing polysaccharide

(3) Sulphur containing polysaccharide

(4) Simple polysaccharide

Answer (1)

Sol. Macromolecule chitin is a complex polysaccharide containing amino sugars and chemically modified sugars (*e.g.* glucosamine, N-acetyl galactosamine, etc.)

145. The essential chemical components of many coenzymes are

(1) Proteins

(2) Nucleic acids

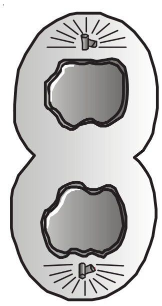
(3) Carbohydrates

(4) Vitamins

Answer (4)

Sol. Essential chemical components of many coenzymes are vitamins, *e.g.*, coenzyme nicotinamide adenine dinucleotide (NAD) and NADP contain the vitamin niacin.

146. A stage in cell division is shown in the figure. Select the answer which gives correct identification of the stage with its characteristics.



(1)	Telophase	Nuclear envelop reforms, golgi complex reforms.
(2)	Late Anaphase	Chromosomes move away from equatorial plate, golgi complex not present.
(3)	Cytokinesis	Cell plate formed, mitochondria distributed between two daughter cells.
(4)	Telophase	Endoplasmic reticulum and nucleolus not reformed yet.

Answer (1)

Sol. Telophase is reverse of prophase.

147. Select the **correct** match of the digested products in humans given in **column I** with their absorption site and mechanism in **column II**

	Column I	**Column II**
(1)	Glycine, glucose	Small intestine, active absorption
(2)	Fructose, Na^+	Small intestine passive absorption
(3)	Glycerol, fatty acids	Duodenum, move as chilomicrons
(4)	Cholesterol, maltose	Large intestine, active absorption

Answer (1)

Sol. Amino acids, monosaccharides like glucose, electrolytes like Na^+ are absorbed into the blood by active transport.

148. A pregnant female delivers a baby who suffers from stunted growth, mental retardation low intelligence quotient and abnormal skin. This is the result of

(1) Deficiency of iodine in diet

(2) Low secretion of growth hormone

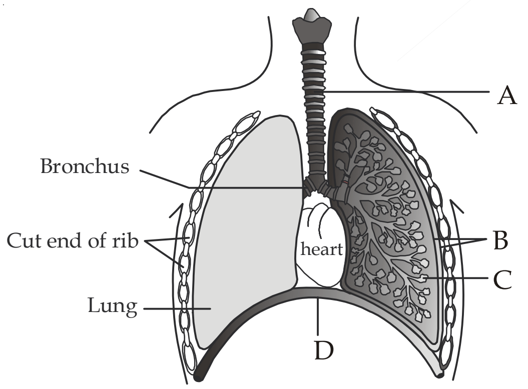
(3) Cancer of the thyroid gland

(4) Over secretion of pars distalis

Answer (1)

Sol. Hypothyroidism during pregnancy causes defective development and maturation of the growing foetus leading to stunted growth.

149. The figure shows a diagrammatic view of human respiratory system with labels A, B, C and D. Select the option which gives correct identification and main function and/or characteristic.



(1) A - trachea - long tube supported by complete cartilaginous rings for conducting inspired air

(2) B-pleural membrane - surround ribs on both sides to provide cushion against rubbing

(3) C-Alveoli - thin walled vascular bag like structures for exchange of gases

(4) D-Lower end of lungs - diaphragm pulls it down during inspiration

Answer (3)

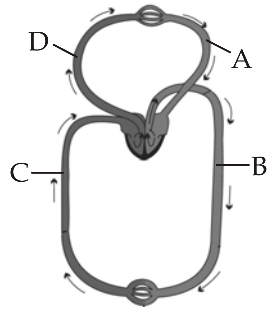
Sol. A – Trachea

B – Pleural membrane

C – Alveoli

D – Diaphragm

150. Figure shows schematic plan of blood circulation in humans with labels A to D. Identify the label and give its function/s.



(1) A – Pulmonary vein – takes impure blood from body parts, PO_2 = 60 mm Hg

(2) B – Pulmonary artery – takes blood from heart to lungs, PO_2 = 90 mm Hg

(3) C – Vena Cava – takes blood from body parts to right auricle, PCO_2 = 45 mm Hg

(4) D – Dorsal aorta – takes blood from heart to body parts, PO_2 = 95 mm Hg

Answer (3)

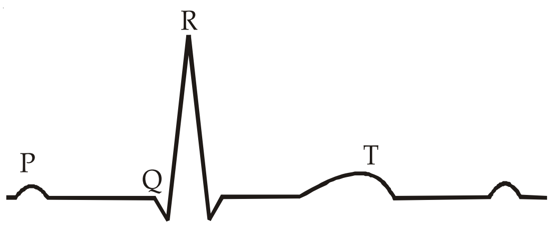
Sol. A – Pulmonary vein takes pure blood from lungs to left atria.

B – Dorsal Aorta – takes blood from heart to body parts.

C – Vena cava – takes blood from body parts to right auricle.

D – Pulmonary artery – takes impure blood from heart to lungs.

151. The diagram given here is the standard ECG of a normal person. The P-wave represents the



(1) Contraction of both the atria

(2) Initiation of the ventricular contraction

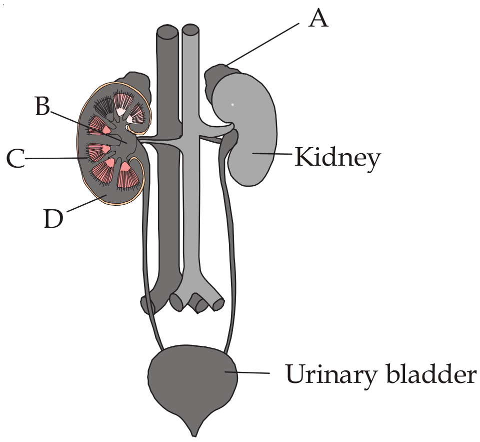
(3) Beginning of the systole

(4) End of systole

Answer (1)

Sol. In ECG, P wave represents the depolarisation of atria which leads to the contraction of both atria.

152. Figure shows human urinary system with structures labelled A to D. Select option which correctly identifies them and gives their characteristics and/ or functions



(1) A-Adrenal gland-located at the anterior part of kidney. Secrete Catecholamines which stimulate glycogen breakdown

(2) B-Pelvis-broad funnel shaped space inner to hilum, directly connected to loops of Henle

(3) C-Medulla - inner zone of kidney and contains complete nephrons

(4) D-Cortex - outer part of kidney and do not contain any part of nephrons

Answer (1)

Sol. A – Adrenal gland

B – Renal pelvis

C – Medulla

D – Cortex

153. Select the correct statement with respect to locomotion in humans

(1) A decreased level of progesterone causes osteoporosis in old people.

(2) Accumulation of uric acid crystals in joints causes their inflammation.

(3) The vertebral column has 10 thoracic vertebrae.

(4) The joint between adjacent vertebrae is a fibrous joint.

Answer (2)

Sol. Inflammation of joints due to accumulation of uric acid crystals is gout.

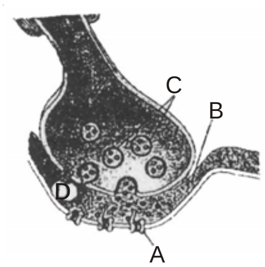
154. The characteristics and an example of a synovial joint in humans is

	Characteristics	Examples
(1)	Fluid cartilage between two bones, limited movements	Knee joints
(2)	Fluid filled between two joints, provides cushion	Skull bones
(3)	Fluid filled synovial cavity between two bones	Joint between atlas and axis
(4)	Lymph filled between two bones, limited movement	Gliding joint between carpals

Answer (3)

Sol. Joint between atlas and axis is pivot joint which is an example of synovial joint characterised by the presence of a fluid filled synovial cavity between the articulating surface of the two bones.

155. A diagram showing axon terminal and synapse is given. Identify correctly at least two of A-D



(1) A - Receptor
C - Synaptic vesicles

(2) B - Synaptic connection
D - K^+

(3) A - Neurotransmitter
B - Synaptic cleft

(4) C - Neurotransmitter
D - Ca^{++}

Answer (1)

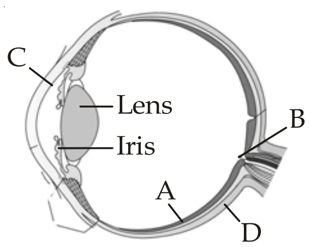
Sol. A – Receptor

B – Synaptic cleft

C – Synaptic vesicles

D – Ca^{++}

156. Parts A, B, C and D of the human eye are shown in the diagram. Select the option which gives correct identification along with its functions/ characteristics



(1) A – Retina – contains photo receptors – rods and cones.

(2) B – Blind spot – has only a few rods and cones.

(3) C – Aqueous chamber – reflects the light which does not pass through the lens.

(4) D – Choroid – its anterior part forms ciliary body.

Answer (1)

Sol. A – Retina

B – Blind spot

C – Aqueous chamber

D – Sclera

157. Which of the following statement is **correct** in relation to the endocrine system?

(1) Adenohypophysis is under direct neural regulation of the hypothalamus.

(2) Organs in the body like gastrointestinal tract, heart, kidney and liver do not produce any hormones.

(3) Non - nutrient chemicals produced by the body in trace amount that act as intercellular messenger are known as hormones.

(4) Releasing and inhibitory hormones are produced by the pituitary gland.

Answer (3)

Sol. Endocrine cells are present in different parts of the gastro-intestinal tract, e.g., gastrin, secretin, GIP.

Atrial wall of our heart secretes a peptide hormone called ANF (Atrial Natriuretic Factor). RH/IH are produced by hypothalamus. Adenohypophysis is not directly under neural control, it is under the control of hypothalamic hormones, brought by portal system.

158. Select the answer which correctly matches the endocrine gland with the hormone it secretes and its function/ deficiency symptom

	Endocrine gland	**Hormone**	**Function/ deficiency symptoms**
(1)	Anterior pituitary	Oxytocin	Stimulates uterus contraction during child birth
(2)	Posterior pituitary	Growth Hormone (GH)	Oversecretion stimulates abnormal growth
(3)	Thyroid gland	Thyroxine	Lack of iodine in diet results in goitre
(4)	Corpus luteum	Testosterone	Stimulates spermatogenesis

Answer (3)

Sol. Lack of iodine in diet results in goitre.

159. What is the correct sequence of sperm formation?

(1) Spermatid, Spermatocyte, Spermatogonia, Spermatozoa

(2) Spermatogonia, Spermatocyte, Spermatozoa, Spermatid

(3) Spermatogonia, Spermatozoa, Spermatocyte, Spermatid

(4) Spermatogonia, Spermatocyte, Spermatid, Spermatozoa

Answer (4)

160. Menstrual flow occurs due to lack of

(1) Progesterone

(2) FSH

(3) Oxytocin

(4) Vasopressin

Answer (1)

Sol. In menstrual cycle, menstrual flow occurs due to lack of progesterone because progesterone maintains endometrium for pregnancy.

161. Which one of the following is not the function of placenta? It

(1) Facilitates supply of oxygen and nutrients to embryo.

(2) Secretes estrogen.

(3) Facilitates removal of carbon dioxide and waste material from embryo.

(4) Secretes oxytocin during parturition.

Answer (4)

162. One of the legal methods of birth control is

(1) Abortion by taking an appropriate medicine

(2) By abstaining from coitus from day 10 to 17 of the menstrual cycle

(3) By having coitus at the time of day break

(4) By a premature ejaculation during coitus

Answer (1)

Sol. One of the legal methods of birth control is abortion by taking an appropriate medicine.

163. Which of the following **cannot** be detected in a developing foetus by amniocentesis ?

(1) Klinefelter syndrome

(2) Sex of the foetus

(3) Down syndrome

(4) Jaundice

Answer (4)

Sol. Amniocentesis is a foetal sex determination test based on the chromosomal pattern in the amniotic fluid surrounding the developing embryo.

164. Artificial insemination means

(1) Transfer of sperms of a healthy donor to a test tube containing ova

(2) Transfer of sperms of husband to a test tube containing ova

(3) Artificial introduction of sperms of a healthy donor into the vagina

(4) Introduction of sperms of healthy donor directly into the ovary

Answer (3)

165. Which Mendelian idea is depicted by a cross in which the F_1 generation resembles both the parents ?

(1) Incomplete dominance

(2) Law of dominance

(3) Inheritance of one gene

(4) Co-dominance

Answer (4)

Sol. Co-dominance

166. The incorrect statement with regard to Haemophilia is

(1) It is a sex-linked disease

(2) It is a recessive disease

(3) It is a dominant disease

(4) A single protein involved in the clotting of blood is affected

Answer (3)

167. If both parents are carriers for thalassemia, which is an autosomal recessive disorder, what are the chances of pregnancy resulting in an affected child?

(1) No chance (2) 50%

(3) 25% (4) 100%

Answer (3)

Sol. Thalassemia–autosomal-linked recessive

AA-Normal

Aa-Carrier

aa-Disease

$$\begin{array}{c} \text{Aa x Aa} \\ \downarrow \\ \begin{array}{ccc} \text{AA :} & \text{Aa :} & \text{aa} \\ 1 & 2 & 1 \\ \text{N} & \text{C} & \text{D} \end{array} \end{array}$$

$$\text{Affected} = \frac{1}{4} = 25\%$$

168. The diagram shows an important concept in the genetic implication of DNA. Fill in the blanks A to C

$$\text{DNA} \xrightarrow{A} \text{mRNA} \xrightarrow{B} \text{Protein} \xrightarrow[\text{C}]{\text{Proposed by}}$$

(1) A-transcription, B-replication, C-James Watson

(2) A-translation, B-transcription, C-Erevin Chargaff

(3) A-transcription, B-translation, C-Francis Crick

(4) A-translation, B-extension, C-Rosalind Franklin

Answer (3)

Sol. Central Dogma.

$$\text{DNA} \xrightarrow[\text{A}]{\text{Transcription}} \text{mRNA} \xrightarrow[\text{B}]{\text{Translation}} \text{protein} \xrightarrow[\text{C}]{\text{Francis Crick}}$$

169. Which enzyme/s will be produced in a cell in which there is a nonsense mutation in the *lac Y* gene?

(1) β-galactosidase

(2) Lactose permease

(3) Transacetylase

(4) Lactose permease and transacetylase

Answer (1)

170. According to Darwin, the organic evolution is due to

(1) Intraspecific competition.

(2) Interspecific competition.

(3) Competition within closely related species.

(4) Reduced feeding efficiency in one species due to the presence of interfering species.

Answer (2)

Sol. According to Darwin, the organic evolution is due to interspecific competition.

171. The eye of octopus and eye of cat show different patterns of structure, yet they perform similar function. This is an example of

(1) Homologous organs that have evolved due to convergent evolution.

(2) Homologous organs that have evolved due to divergent evolution.

(3) Analogous organs that have evolved due to convergent evolution.

(4) Analogous organs that have evolved due to divergent evolution.

Answer (3)

Sol. The eye of octopus and the eye of cat (mammal) are example of analogous organs because they differ in the position of retina. In the eye of mammal, retina is inverted in position.

172. Infection of *Ascaris* usually occurs by

(1) Drinking water containing eggs of *Ascaris*

(2) Eating imperfectly cooked port

(3) Tse-tse fly

(4) Mosquito bite

Answer (1)

Sol. Infection of *Ascaris* occurs by contamination of food and water containing eggs of *Ascaris*.

173. The cell-mediated immunity inside the human body is carried out by

(1) T-lymphocytes (2) B-lymphocytes

(3) Thrombocytes (4) Erythrocytes

Answer (1)

174. In plant breeding programmes, the entire collection (of plants/seeds) having all the diverse alleles for all genes in a given crop is called

(1) Selection of superior recombinants

(2) Cross-hybridisation among the selected parents

(3) Evaluation and selection of parents.

(4) Germplasm collection

Answer (4)

Sol. Germplasm collection/collection of variability

175. During sewage treatment, biogases are produced which include

(1) Methane, hydrogensulphide, carbon dioxide

(2) Methane, oxygen, hydrogensulphide

(3) Hydrogensulphide, methane, sulphur dioxide

(4) Hydrogensulphide, nitrogen, methane

Answer (1)

Sol. Methane, CO_2, H_2S, H_2.

176. A biologist studied the population of rats in a barn. He found that the average natality was 250, average mortality 240, immigration 20 and emigration 30. The net increase in population is

(1) 10 (2) 15

(3) 05 (4) Zero

Answer (4)

Sol. Net increase in population

$(B + I) - (D + E)$

177. Which one of the following processes during decomposition is **correctly** described?

(1) Fragmentation - Carried out by organisms such as earthworm

(2) Humification - Leads to the accumulation of a dark coloured substance humus which undergoes microbial action at a very fast rate

(3) Catabolism - Last step in the decomposition under fully anaerobic condition

(4) Leaching - Water soluble inorganic nutrients rise to the top layers of soil

Answer (1)

Sol. Fragmentation is one of the steps during decomposition, in which detritus is converted into small fragments.

178. A sedentary sea anemone gets attached to the shell lining of hermit crab. The association is

(1) Ectoparasitism (2) Symbiosis

(3) Commensalism (4) Amensalism

Answer (2)

Sol. Facultative mutualism can be illustrated with the example of sea anemone, which gets attached to the shell of hermit crab. The sea anemone grows on the back of the crab, providing camouflage & protection and, in turn, the sea anemone is transported about reaching new food sources. This type of mutualism is also called protocooperation.

179. Global warming can be controlled by

(1) Reducing deforestation, cutting down use of fossil fuel

(2) Reducing reforestation, increasing the use of fossil fuel

(3) Increasing deforestation, slowing down the growth of human population

(4) Increasing deforestation, reducing efficiency of energy usage

Answer (1)

Sol. Reducing deforestation, cutting down use of fossil fuel results into reduction into one of the green house gas, *i.e.*, CO_2.

180. The Air Prevention and Control of Pollution Act came into force in

(1) 1975

(2) 1981

(3) 1985

(4) 1990

Answer (2)

Sol.
- Air prevention and Control of Pollution protection act – 1981
- Environmental protection act– 1986
- Water (Prevention and Control of Pollution) act – 1974

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