Question no. 1

What is the relationship between time of flight T and horizontal range R?

(where θ is angle of projection with the horizontal)

(1) $R = \frac{gT}{\tan\theta}$

(2) $R = \frac{gT^2}{2\tan\theta}$

(3) $R = \frac{gT^2}{\tan\theta}$

(4) $R = \frac{gT}{2\tan\theta}$

$R = \frac{u^2 \sin 2\theta}{g}$

$T = \frac{2u\sin\theta}{g}$

$T^2 = 4\frac{u^2 \sin^2\theta}{g^2}$

$R = \frac{u^2 \sin\theta \cos\theta \times \sin\theta}{g} \times \frac{g}{\sin\theta}$

$R = T^2 \frac{\cos\theta \cdot g}{2\sin\theta} = \frac{T^2 \cdot g}{2\tan\theta}$

Question no. 2

Two particles P and Q describes SHM of same amplitude A and frequency υ along the same straight line. The maximum distance between two particles is $\sqrt{2}A$. The initial phase difference between the particles is

(1) Zero

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

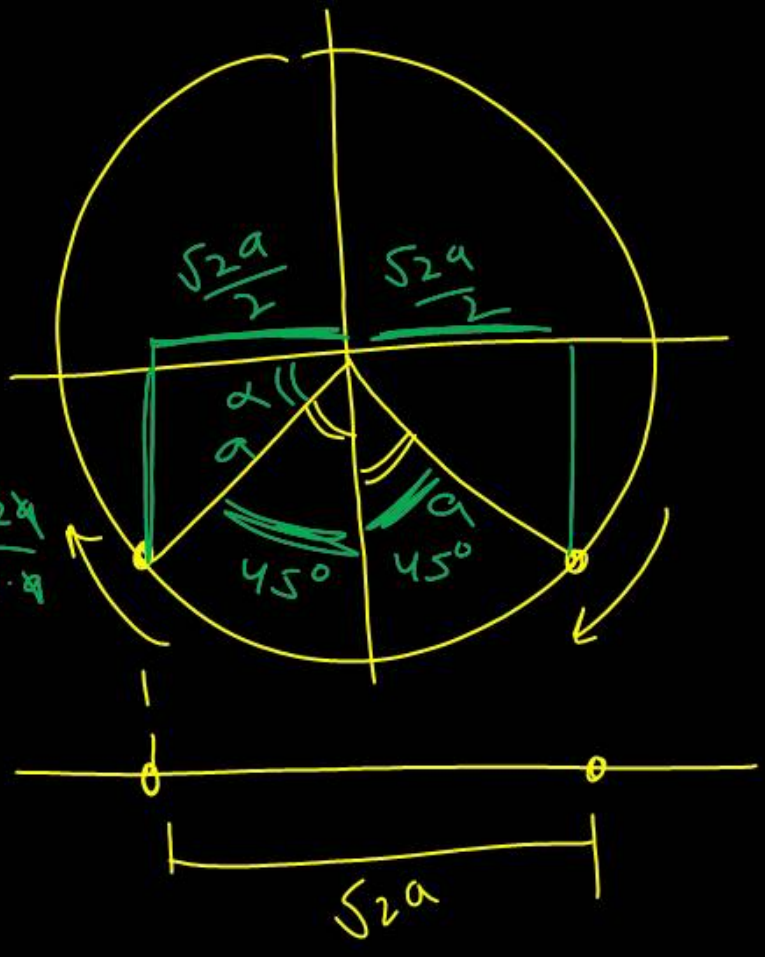
(3) $\frac{\pi}{6}$

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

$\cos\alpha = \frac{B}{H} = \frac{\sqrt{2}a}{2a}$

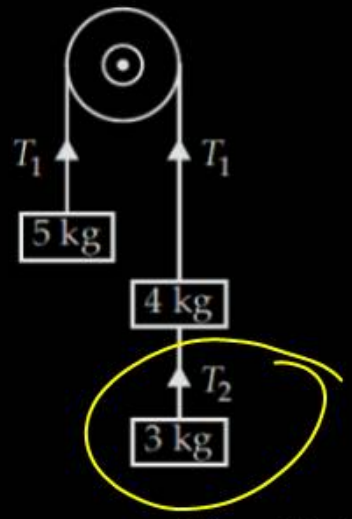
$\cos\alpha = \frac{1}{\sqrt{2}}$

45°



Question no. 3

With reference to the figure showing a light inextensible string passing over a fixed frictionless pulley, the tension T_2 is



(1) 24.5 N (2) 29.4 N

(3) 18.6 N (4) 68.6 N

$a = \frac{\text{net driving force}}{\text{total mass}} = \frac{70-50}{12} = \frac{20}{12}$

$\Sigma f_y = ma$

$30 - T_2 = 3 \cdot \frac{20}{12}$

$30 - 5 = T_2$

T_2

a

30

Question no. 4

A boy A starts from rest with an acceleration a_1. After 2 seconds, another boyd B starts from rest with an acceleration a_2. If they travel equal distances in the 5^{th} second, after the start of A, then the ratio $a_1 : a_2$ is equal to

(1) 5 : 9 (2) 5 : 7

(3) 9 : 5 (4) 9 : 7

5^{th} A

3^{rd} B

$S_5 = u + \frac{1}{2}a(2n-1)$

$= \frac{1}{2}a_1(9) = \frac{9}{2}a_1$

$S_{3^{rd}} = \frac{1}{2}a_2(5) = \frac{5}{2}a_2$

$\frac{9}{2}a_1 = \frac{5}{2}a_2$

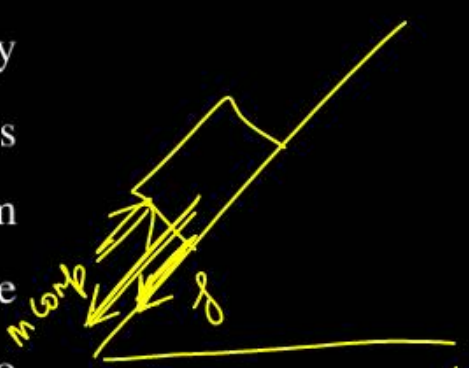
$\frac{a_1}{a_2} = \frac{5}{2} \times \frac{2}{9} = 5:9$

Question no. 5

The minimum force required to start pushing a body up a rough (frictional coefficient μ) inclined plane is F_1 while the minimum force needed to prevent it from sliding down is F_2. If the inclined plane makes an angle θ from the horizontal such that $\tan\theta = 2\mu$ then the ratio $\frac{F_1}{F_2}$ is

(1) 4 (2) 1

(3) 2 (4) 3



$f = mg\sin\theta + \mu mg\cos\theta$

$f_2 = mg\sin\theta - \mu mg\cos\theta$

$\frac{f_1}{f_2} = \frac{mg\sin\theta + \mu mg\cos\theta}{mg\sin\theta - \mu mg\cos\theta}$

$\frac{f_1}{f_2} = \frac{\tan\theta + \mu}{\tan\theta - \mu} = \frac{3\mu}{\mu} = 3:1$

Question no. 6

Two spheres A and B have diameters in the ratio 1 : 2, densities in the ratio 2 : 1 and specific heats in the ratio 1 : 3, the ratio of their thermal capacities is

(1) 1 : 6 (2) 1 : 12

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

$$\frac{H_1}{H_2} = \frac{m_1 c_1}{m_2 c_2} = \frac{\frac{4}{3}\pi r_1^3 \cdot \rho_1 c_1}{\frac{4}{3}\pi r_2^3 \cdot \rho_2 \cdot c_2} = \left(\frac{1}{2}\right)^3 \times \left(\frac{2}{1}\right)\left(\frac{1}{3}\right)$$

$$= \frac{1}{8} \cdot \frac{2}{3} = \frac{1}{12}$$

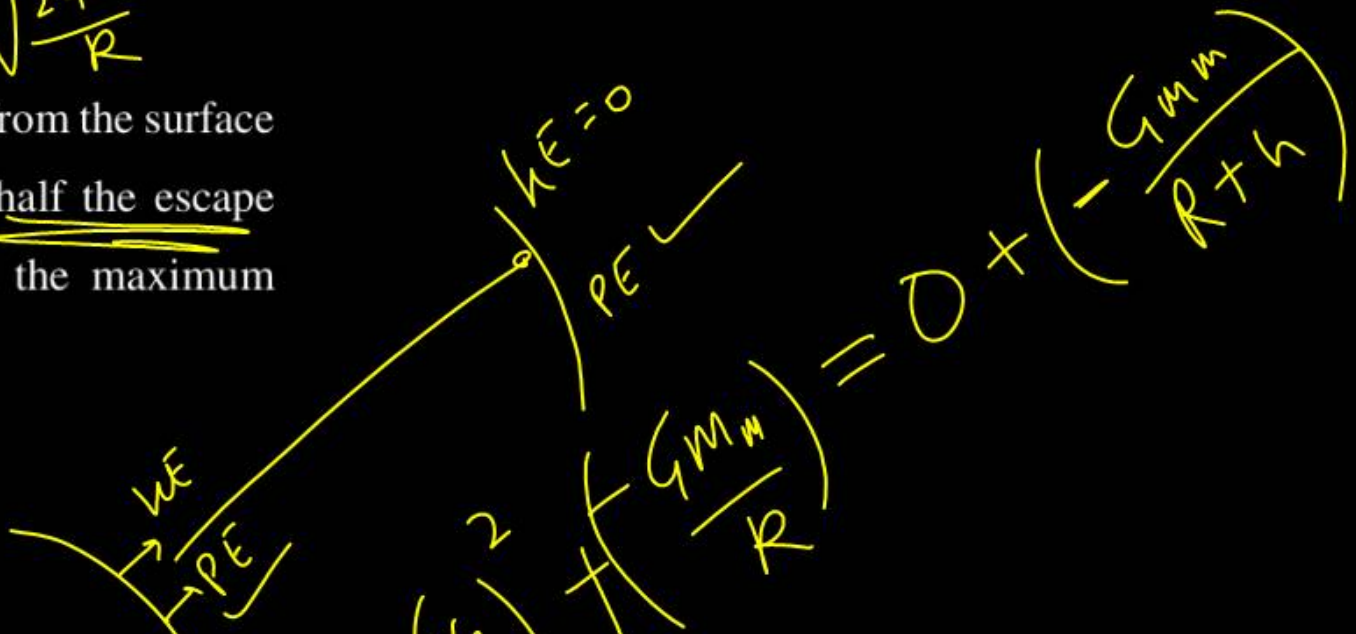
Question no. 7

A body is projected vertically upward from the surface of the earth with a velocity equal to half the escape velocity. If R is radius of the earth, the maximum height attained by the body is

(1) $\frac{R}{6}$ (2) $\frac{R}{3}$

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

$V_e = \sqrt{\frac{2GM}{R}}$



$\frac{1}{2}m\left(\frac{V_e}{2}\right)^2 + \left(\frac{-GM_m}{R}\right) = 0 + \left(\frac{-GMm}{R+h}\right)$

$\frac{1}{8}V_e^2 = \frac{Gm(h)}{R(R+h)}$

$\frac{1}{2}m\frac{V_e^2}{4} = \frac{-Gmm}{R+h} + \frac{GMm}{R}$

$\frac{1}{8}\frac{2GM}{R} = \frac{Gm(h)}{R(R+h)}$

$\frac{1}{8}V_e^2 = Gm\left(\frac{-R+R+h}{R(R+h)}\right)$

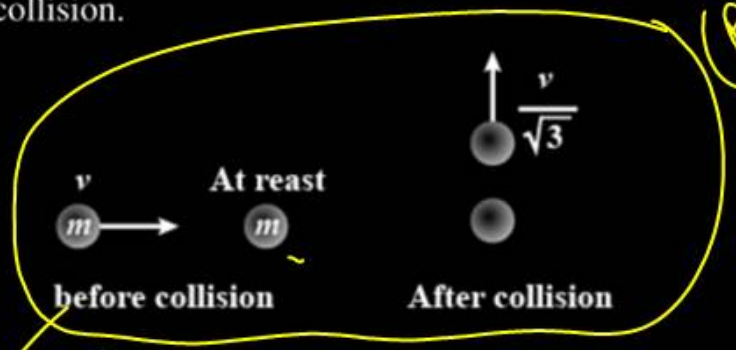
$R+h = 4h$

$R = 3h$

$h = R/3$

Question no. 8

A mass m moves with a velocity v and collides inelastically with another identical mass. After collision the first mass moves with velocity $\frac{v}{\sqrt{3}}$ in a direction perpendicular to the initial direction of motion. Find the speed of the second mass after collision.



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

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

$m(v\hat{i}) + m(0) = m\left(\frac{v}{\sqrt{3}}\right)\hat{j} + m\vec{V}_{new}$

$v\hat{i} - \left(\frac{v}{\sqrt{3}}\right)\hat{j} = \vec{V}_{new}$

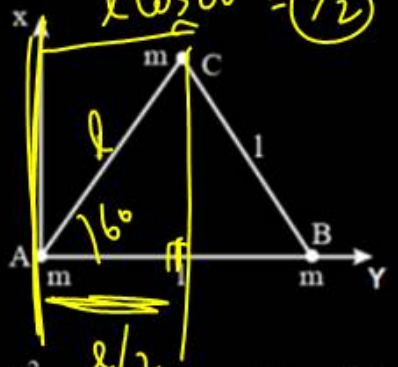
$(P_i)_S = (P_f)_S$

$\sqrt{(v)^2 + \left(\frac{v}{\sqrt{3}}\right)^2}$

$= \sqrt{\left(\frac{3v^2 + v^2}{3}\right)} = \sqrt{\frac{4v^2}{3}} = \frac{2v}{\sqrt{3}}$

Question no. 9

Three particles each of mass m gram situated at the vertices of an equilateral triangle ABC of side ℓ cm (as shown in the figure). The moment of inertia of the system about a line AX perpendicular to AB and in the plane of ABC in gcm^2 units will be



(1) $\left(\frac{3}{4}\right)m\ell^2$ (2) $2m\ell^2$

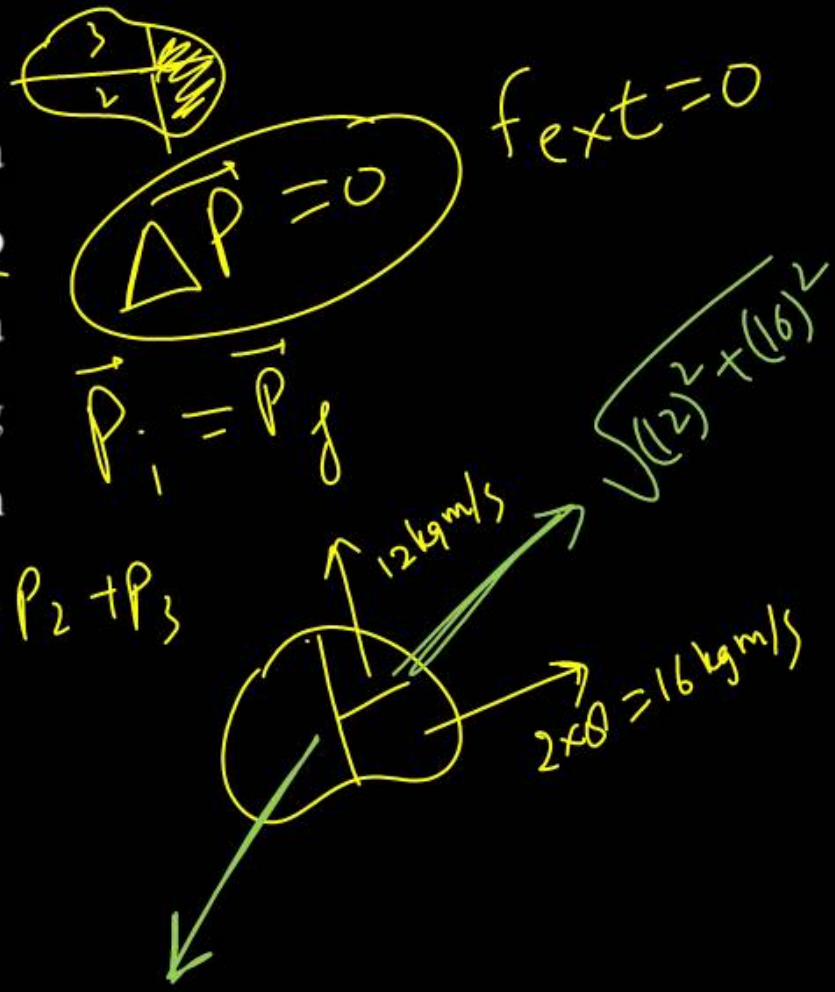
(3) $\left(\frac{5}{4}\right)m\ell^2$ (4) $\left(\frac{3}{2}\right)m\ell^2$

Question no. 10

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 1kg moves with a speed of 12 ms^{-1} and the second part of mass 2kg moves with 8 ms^{-1} speed. If the third part flies off with 4 ms^{-1} speed, then its mass is

(1) 3 kg (2) 5 kg

(3) 7 kg (4) 17 kg



Question no. 11

One mole of monoatomic gas $\left(\gamma = \frac{5}{3}\right)$ is mixed with one mole of diatomic gas $\left(\gamma = \frac{7}{5}\right)$. What will be the value of γ for the mixture?

(1) 1.5 (2) 1.54

(3) 1.4 (4) 1.45

$$C_{v(\text{mixture})} = \frac{n_1 C_{v_1} + n_2 C_{v_2}}{n_1 + n_2}$$

$$= \frac{\frac{3}{2}R + \frac{5}{2}R}{2} = \frac{8}{2}R = 2R$$

$\gamma_1 = \frac{5}{3}$ $C_{v_1} = \frac{3}{2}R$

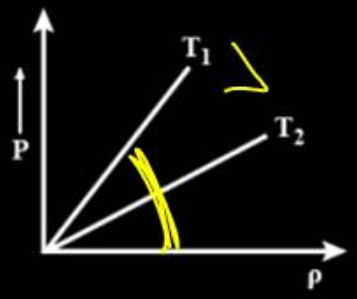
$\gamma_2 = \frac{7}{5}$ $C_{v_2} = \frac{5}{2}R$

$C_p = C_v + R = 3R$

$\gamma = \frac{C_p}{C_v} = \frac{3R}{2R} = 3/2$

Question no. 12

The figure show the graph of pressure versus density for an ideal gas at two temperature T_1 and T_2, then



(1) $T_1 > T_2$

(2) $T_1 = T_2$

(3) $T_1 < T_2$

(4) None of these

$PV = nRT$

$PV = \frac{m}{M}RT$

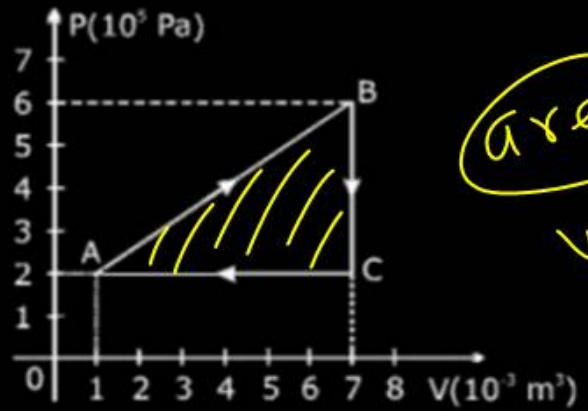
$\frac{P}{m/V} = \frac{RT}{M}$

$\frac{P}{\rho} = \frac{RT}{M}$

$\frac{P}{\rho} \propto T$

Question no. 13

A gas is taken through the cycle A → B → C → A, as shown in figure. What is net work done by the gas?



Area
$WD = \frac{1}{2} \times 6 \times 4 \times 10^5 \times 10^{-3}$
12×10^2
$= 1200\,J$

(1) 2000 J
(2) 1000 J
(3) Zero
(4) – 2000 J

1200J

Question no. 14

The following truth table with A and B as inputs is for … gate.

A	B	Output
1	0	1
1	1	0
0	1	1
0	0	0

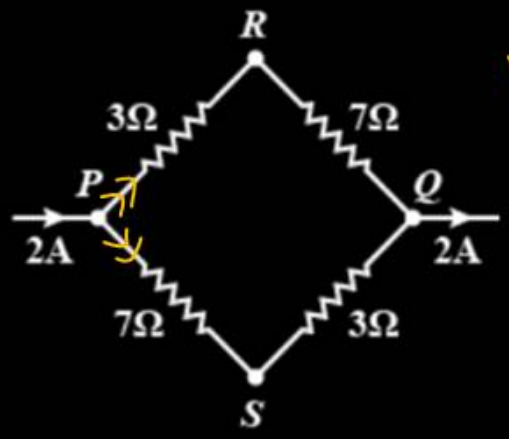
(1) AND (2) OR

(3) XOR (4) NOR

3

Question no. 15

A current of 2 A flows in an electric circuit as shown in figure. The potential difference ($V_R - V_S$), in volts (V_R and V_S are potentials at R and S respectively) is



$V_P - V_R = 3$

$V_P - V_S = 7$

$V_P - V_R - V_P + V_S = 3 - 7$

$V_S - V_R = -4$

(1) -4

(2) $+2$

(3) $+4$

(4) -2

Question no. 16

The threshold frequency for a certain photosensitive metal is υ_0. When it is illuminated by light of frequency $\upsilon = 2\upsilon_0$, the maximum velocity of photoelectrons is v_0. What will be the maximum velocity of the photoelectrons when the same metal is illuminated by light of frequency $\upsilon = 5\upsilon_0$?

(1) $\sqrt{2}v_0$ (2) $2v_0$

(3) $2\sqrt{2}v_0$ (4) $4v_0$

(2)

$$2h\nu_0 - h\nu_0 = \frac{1}{2}mv_0^2$$

$$h\nu_0 = \frac{1}{2}mv_0^2 \quad -(1)$$

$$5h\nu_0 - h\nu_0 = \frac{1}{2}mv'^2$$

$$4h\nu_0 = \frac{1}{2}mv'^2$$

$$4\frac{1}{2}mv_0^2 = \frac{1}{2}mv'^2$$

$$v' = 2v_0$$

Question no. 17

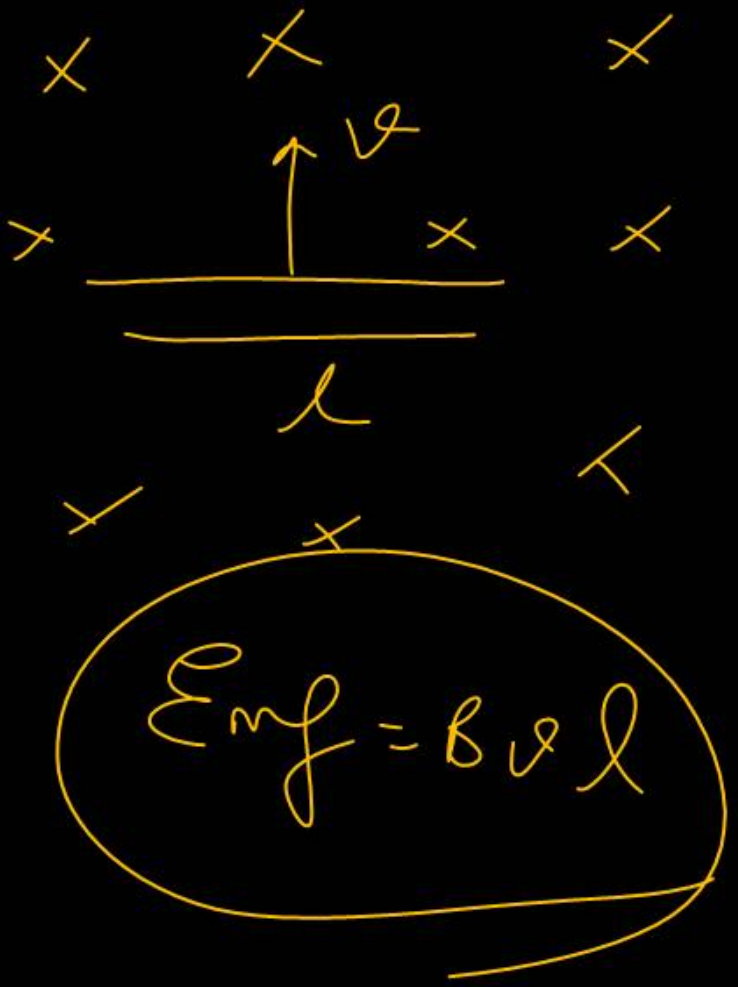
A conducting rod of length L is moving in a uniform magnetic field (B) with a velocityυ without rotation. The velocity of the rod is perpendicular to the rod, and the motion of the rod is confined to a plane perpendicular to the magnetic field. What is the induced emf developed across the rod?

(1) $BL\upsilon$

(2) $B\upsilon^2L$

(3) $\frac{BL}{\upsilon}$

(4) $BL^2\upsilon$



Question no. 18

The momentum of a photon of energy 1 MeV in kg m s^{-1} will be

(1) 5.3×10^{-22}

(2) 0.33×10^{6}

(3) 7×10^{-24}

(4) 10^{-22}

$E = h\nu = \frac{hc}{\lambda}$

$\lambda = \frac{h}{p}$

$p = \frac{E}{c} = \frac{1 \times 10^{6} \times 1.6 \times 10^{-19}}{3 \times 10^{8}} = \frac{16}{3} \times 10^{-22}$

Question no. 19

A block of mass M is suspended from a wire of length L, area of cross-section A and Young's modulus Y. The elastic potential energy stored in the wire is

(1) $\frac{1}{2}\frac{M^2g^2L}{AY}$

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

(3) $\frac{1}{2}\frac{M^2g^2A}{YL}$

(4) $\frac{1}{2}\frac{MgY}{AL}$

$\frac{E}{V} = \frac{1}{2} \times \text{Stress} \times \text{strain}$

$E = \frac{1}{2} \times \text{Stress} \times \left(\frac{\text{Stress}}{Y}\right) \times V$

$= \frac{1}{2}\left(\frac{mg}{A}\right)^2 \times \frac{1}{Y} \times (A \times L)$

$= \frac{1}{2}\frac{m^2g^2}{A^2Y} A \cdot L = \frac{m^2g^2L}{2YA}$

Question no. 20

A soap bubble of radius r is blown up to form a bubble of radius 2r under isothermal conditions. If T is the surface tension of soap solution, the energy spent in the blowing is.

(1) $3\pi Tr^2$

(2) $6\pi Tr^2$

(3) $12\pi Tr^2$

(4) $24\pi Tr^2$

Energy $= T \cdot \Delta A$

$= T \cdot 24\pi r^2$

$A_1 = 4\pi r^2$

$A_2 = 4\pi(2r)^2 = 16\pi r^2$

increase $\Rightarrow \Delta A \Rightarrow 12\pi r^2$

both $= 2 \times 12\pi r^2$

$24\pi r^2$

Question no. 21

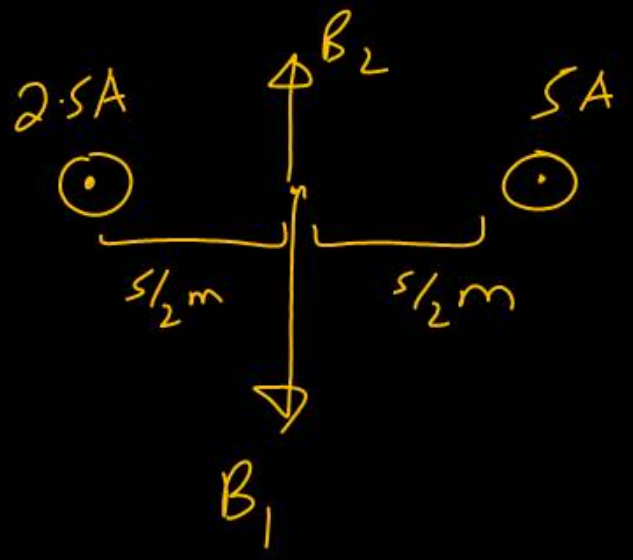
Two wire are held perpendicular to the plane of paper and are 5 m apart. They carry currents of 2.5 A and 5 A is same direction. Then, the magnetic field strength B at a point midway between the wires will be

(1) $\frac{\mu_0 T}{4\pi}$

(2) $\frac{\mu_0}{2\pi} T$

(3) $\frac{3\mu_0}{2\pi} T$

(4) $\frac{3\mu_0}{4\pi} T$



$B_{net} = B_1 - B_2$

$= \frac{\mu_0}{4\pi} \frac{2(5)}{5/2} - \frac{\mu_0}{4\pi} \frac{2(5/2)}{(5/2)}$

$= \frac{\mu_0}{4\pi} (4-2) = \frac{\mu_0}{2\pi}$

Question no. 22

For a series L-C-R circuit, the power loss at resonance is

(1) $\dfrac{V^2}{\omega L - \dfrac{1}{\omega C}}$

(2) $I^2 C\omega$

(3) $I^2 R$

(4) $\dfrac{V^2}{\omega C}$

Question no. 23

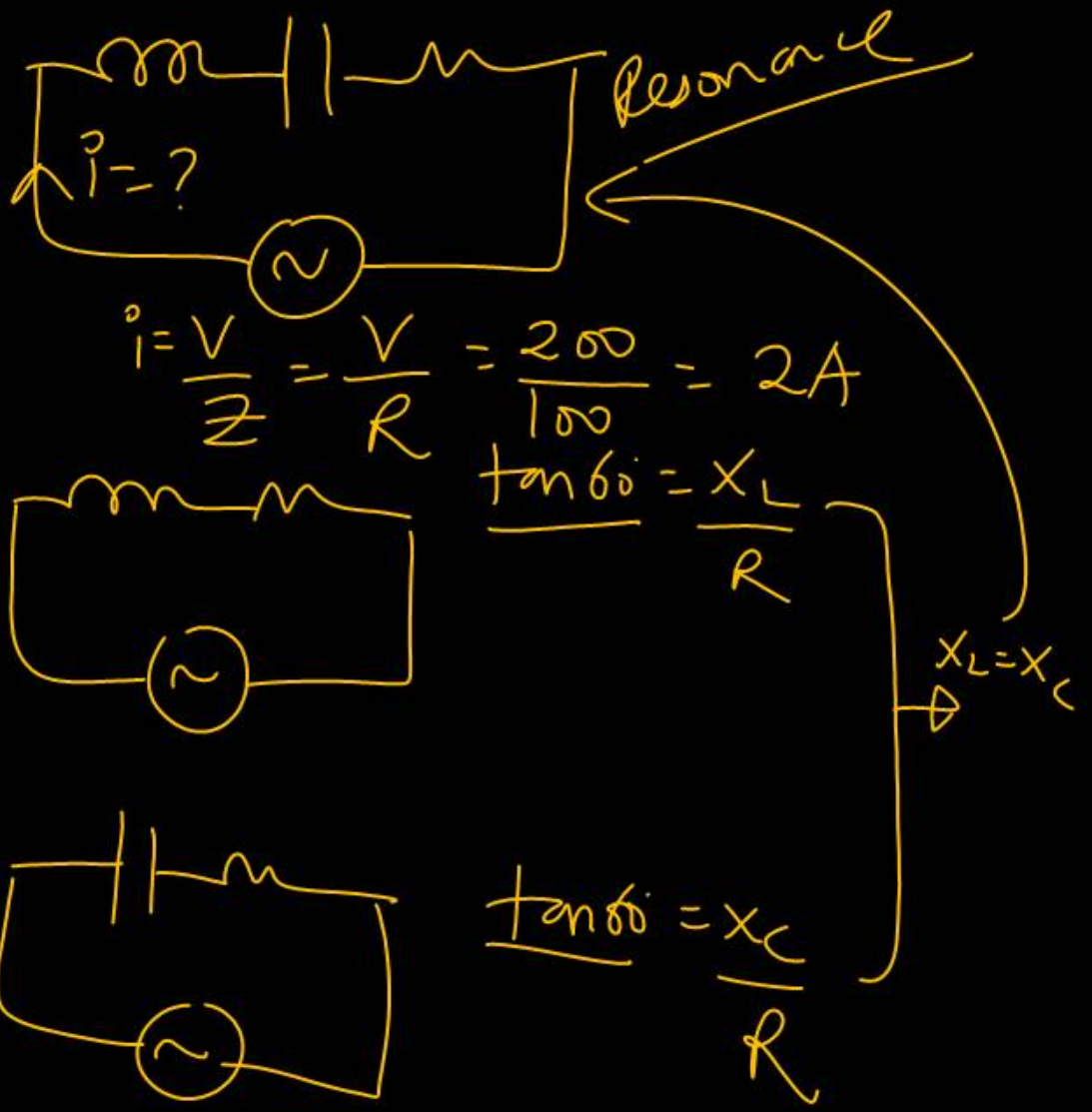
An LCR series circuit with R = 100 Ω is connected to a 200 V, 50 Hz a.c source when only the capacitance is removed, the voltage leads the current by 60°. When only the inductance is removed, the current leads the voltage by 60°. The current in the circuit is

(1) 2 A

(2) 7 A

(3) $\frac{\sqrt{3}}{2}$ A

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



Question no. 24

The de-Broglie wavelength of a neutron in thermal equilibrium with heavy water at a temperature T (kelvin) and mass m, is

(1) $\frac{h}{\sqrt{mkT}}$ (2) $\frac{h}{\sqrt{3mkT}}$

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

2

TK

$\lambda = \frac{h}{\sqrt{3mk_BT}}$

$\lambda = \frac{h}{\sqrt{2m\left(\frac{3}{2}k_BT\right)}}$

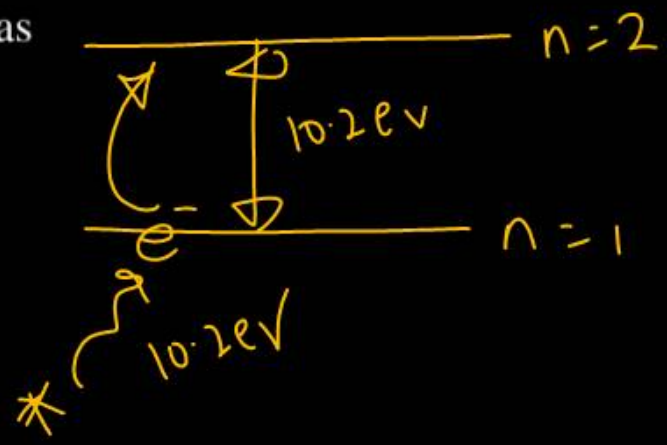
$\lambda = \frac{h}{\sqrt{3mk_BT}}$

Question no. 25

What will be the amount of energy absorbed when an electron jumps from first orbit to second orbits, if the value of energy in nth orbit of H-atom is expressed as $\left(E_n = -\frac{13.6}{n^2}\text{eV}\right)$?

(1) 3.4 eV (2) 6.6 eV

(3) 8.1 eV (4) 10.2 eV



Question no. 26

If a star can convert all the He nuclei completely into oxygen nuclei, the energy released per oxygen nucleus is [Mass of He nucleus is 4.0026 amu and mass of oxygen nucleus is 15.9994 amu]

(1) 7.6 MeV (2) 56.12 MeV

(3) 10.24 MeV (4) 23.9 MeV

3

$4\,{}_{2}He^{4} \longrightarrow {}_{8}O^{16}$

IR^n

$Q = \Delta m \times 931.5\,MeV$

$Q = (4 \times 4.0026 - 15.9994) \times 931.5\,MeV$

$Q \approx 10.24\,MeV$

Question no. 27

10^{14} fissions per second are taking place in a nuclear reactor having efficiency 40%. The energy released per fission is 250 MeV. The power output of the reactor is

(1) 2000 W (2) 4000 W

(3) 1600 W (4) 3200 W

(3)

$P = 10^{14} \times 250 \times 10^{6} \times 1.6 \times 10^{-19}$ J

$P_{out} = ?$

$\eta = \frac{P_{out}}{P_{in}} \times 100\ \%$

$P_{out} = \frac{\eta \times P_{in}}{100} = \frac{40}{100} \times 10^{14} \times 250 \times 10^{6} \times 1.6 \times 10^{-19}$

$= 4 \times 25 \times 16 \times 10^{-1}$

$= 1600$ W

Question no. 28

Two spheres of the same material, but of radii R and 3R are allowed to fall vertically downwards through a liquid of density σ. The ratio of their terminal velocities

(1) 1 : 3 (2) 1 : 6

(3) 1 : 9 (4) 1 : 1

$V_T \propto r^2$

$\frac{V_{T_1}}{V_{T_2}} = \frac{r_1^2}{(3r_1)^2} = \frac{1}{9}$

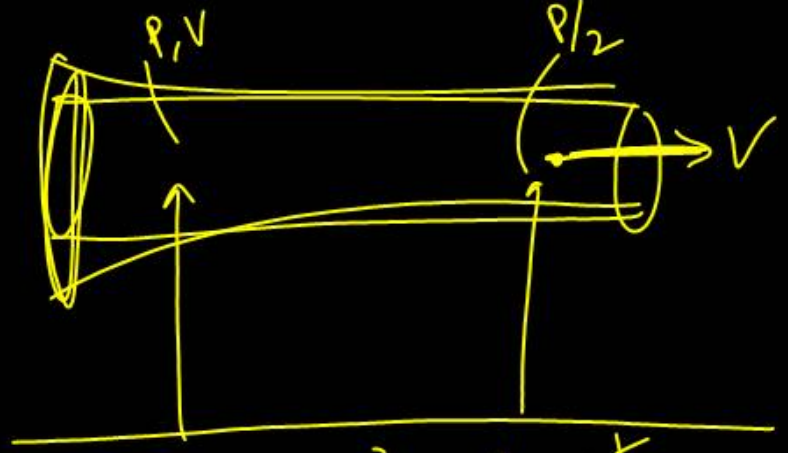
$V_T = \frac{2r^2(\rho - \sigma)g}{9\eta}$

Question no. 29

Water is flowing streamline motion through a horizontal tube. The pressure at a point in the tube is p where the velocity of flow is v. At another point. where the pressure is p/2, the velocity of flow is (density of water= ρ)

(1) $\sqrt{v^2+\frac{p}{\rho}}$ (2) $\sqrt{v^2-\frac{p}{\rho}}$

(3) $\sqrt{v^2+\frac{2p}{\rho}}$ (4) $\sqrt{v^2-\frac{2p}{\rho}}$



$$P + \frac{1}{2}\rho v^2 = \text{const}$$

$$P_1 + \frac{1}{2}\rho v_1^2 = P_2 + \frac{1}{2}\rho v_2^2$$

$$\left(P - \frac{P}{2}\right) = \frac{1}{2}\rho\left(v_2^2 - v^2\right)$$

$$\frac{2P}{\rho} + v^2 = v_2^2$$

$$V_2 = \sqrt{\frac{P}{\rho} + v^2}$$

Question no. 30

Water flows through a pipe of varying cross section. Then the ratio of speeds of water at two points 1 and 2 where the radii of the pipe are r_1 and r_2 is

(1) $\frac{r_2^2}{r_1^2}$

(2) $\frac{r_2}{r_1}$

(3) $\frac{r_1^2}{r_2^2}$

(4) $\frac{r_1}{r_2}$

$\left.\frac{dV}{dt}\right|_1 = \left.\frac{dV}{dt}\right|_2$

$A_1 v_1 = A_2 v_2$

$\frac{v_1}{v_2} = \frac{A_2}{A_1} = \frac{\pi r_2^2}{\pi r_1^2}$

Question no. 31

Two coherent monochromatic light beams of intensities I and $4I$ are superimposed. The maximum and minimum possible intensities in the resulting beam are

(1) $5I$ and I

(2) $5I$ and $3I$

(3) $9I$ and I

(4) $9I$ and $3I$

3

$$I_{max} = (\sqrt{I_1} + \sqrt{I_2})^2$$

$$= (\sqrt{I} + \sqrt{4I})^2$$

$$= (\sqrt{I} + 2\sqrt{I})^2$$

$$I_{max} = (3\sqrt{I})^2 : 9I$$

$$I_{min} = (\sqrt{I_1} - \sqrt{I_2})^2 = I$$

Question no. 32

The interference pattern is obtained with two coherent light sources of intensity ratio n. In the interference pattern, the ratio $\frac{I_{max}-I_{min}}{I_{max}+I_{min}}$ will be

(1) $\frac{\sqrt{n}}{n+1}$ (2) $\frac{2\sqrt{n}}{n+1}$

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

2

$\frac{I_1}{I_2} = n$

$I_1 = nI_2$

$\frac{I_{max}}{I_{min}} = \left(\frac{\sqrt{I_1}+\sqrt{I_2}}{\sqrt{I_1}-\sqrt{I_2}}\right)^2$

$\frac{I_{max}}{I_{min}} = \left(\frac{\sqrt{n}+1}{\sqrt{n}-1}\right)^2$

$\frac{I_{min}\left(\frac{\sqrt{n}+1}{\sqrt{n}-1}\right)^2 - I_{min}}{I_{min}\left(\frac{\sqrt{n}+1}{\sqrt{n}-1}\right)^2 - I_{min}}$

$\left(\frac{(\sqrt{n}+1)^2-(\sqrt{n}-1)^2}{(\sqrt{n}+1)^2+(\sqrt{n}-1)^2}\right)$

$\left(\frac{2\sqrt{n}-(-2\sqrt{n})}{n+1+2\sqrt{n}+n+1-2\sqrt{n}}\right)$

$\frac{4\sqrt{n}}{2(n+1)}$

$= \frac{2\sqrt{n}}{n+1}$

Question no. 33

In a Young's double slit experiment the intensity of light when the path difference is equal to λ is I. What will be the intensity at a point where path difference is $\frac{\lambda}{6}$?

(1) $\frac{I}{6}$

(2) $\frac{I}{12}$

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

(4) $\frac{I}{8}$

3

$\Delta = \lambda$

$\frac{\lambda}{2\pi\lambda} = \frac{\phi}{2\pi} \Rightarrow \phi = 2\pi$

$I = 4I_0 \cos^2\left(\frac{2\pi}{\pi}\right)$

$I = 4I_0$

$\Delta = \lambda/6$

$\frac{\lambda/6}{\lambda} = \frac{\phi}{2\pi}$

$\phi = \pi/3$

$I' = 4I_0 \cos^2\left(\frac{60}{2}\right)$

$I' = I\cos^2 30$

$I' = \frac{3I}{4}$

Question no. 34

In a Young's double slit experiment the spacing between the slits is 0.3 mm and the screen is kept at a distance of 1.5 m. The second bright fringe is found 6 mm from the central fringe. The wavelength of the light used in the experiment is

(1) 625 nm (2) 600 nm

(3) 550 nm (4) 500 nm

(2)

$d = 0.3\,mm = 3 \times 10^{-4}$ meter

$D = 1.5$ meter $= 15 \times 10^{-1}$

$\frac{2\lambda D}{d} = 6 \times 10^{-3}$

$\lambda = 3 \times 10^{-3} \times \frac{d}{D} = \frac{3 \times 10^{-3} \times 3 \times 10^{-4}}{5 \times 10^{-1}}$

$= 0.6 \times 10^{-6}$

$= 6 \times 10^{-7}$

$= 600\,nm$

Question no. 35

The angular width of the central maximum of the diffraction pattern in a single slit (of width 'a') experiment, with λ as the wavelength of light, is

(1) $\frac{3\lambda}{2a}$

(2) $\frac{\lambda}{2a}$

(3) $\frac{2\lambda}{a}$

(4) $\frac{\lambda}{a}$

3

Question no. 36

The angle of minimum deviation for a prism of refractive index $\sqrt{3}$ is equal to the angle of the prism. Then the angle of the prism is

(1) 30^o (2) 45^o

(3) 60^o (4) 90^o

3

$A = \delta_{min}$

$\frac{\sqrt{3}}{1} = \frac{\sin\left(\frac{A+A}{2}\right)}{\sin(A/2)}$

$\sqrt{3} = \frac{\sin A}{\sin A/2}$

$\sqrt{3} = \frac{2\sin(A/2)\cos(A/2)}{\sin(A/2)}$

$\frac{\sqrt{3}}{2} = \cos(A/2)$

$\frac{A}{2} = 30$

$A = 60$

Question no. 37

Focal length of a convex lens ($\mu = 3/2$) is 24 cm in air. When it is immersed in water ($\mu = 4/3$), its focal length will be

(1) 24 cm (2) 48 cm

(3) 36 cm (4) 96 cm

4

$$\frac{1}{24} = \left(\frac{3/2}{1} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

$$\frac{1}{12} = \left(\frac{1}{R_1} - \frac{1}{R_2}\right) \quad \text{(1)}$$

$$\frac{1}{f_w} = \left(\frac{3/2}{4/3} - 1\right) \times \frac{1}{12}$$

$$\frac{1}{f_w} = \left(\frac{9}{8} - 1\right) \times \frac{1}{12} = \frac{1}{8} \times \frac{1}{12} = \frac{1}{96}$$

$$f_w = 96\,\text{cm}$$

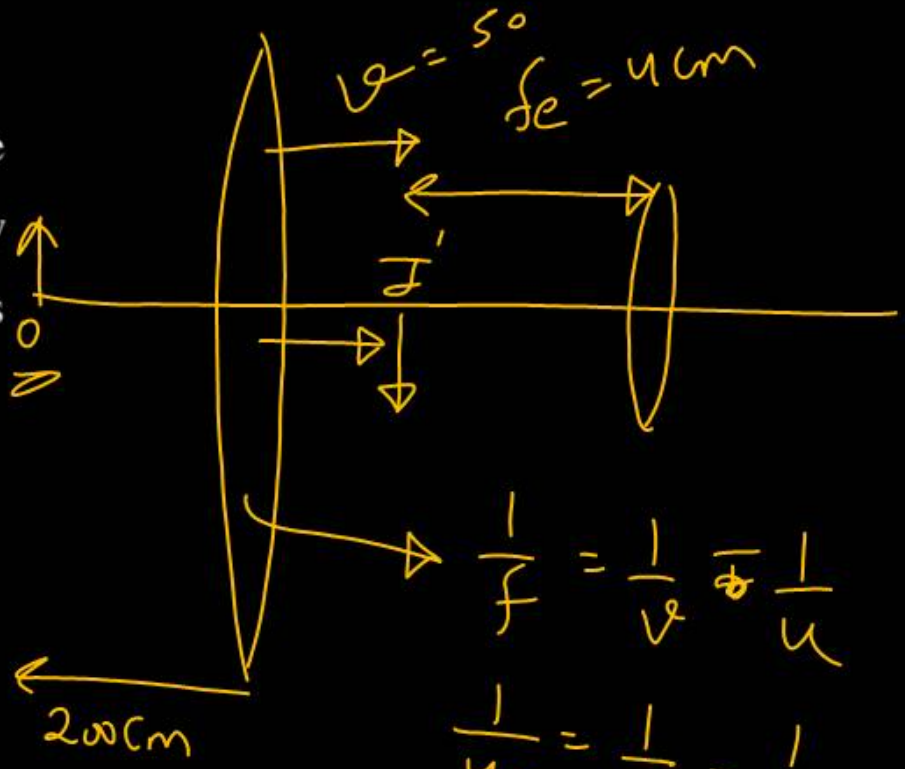
Question no. 38

An astronomical telescope has objective and eyepiece of focal lengths 40 cm and 4 cm respectively. To view an object 200 cm away from the objective, the lenses must be separated by a distance

(1) 46.0 cm (2) 50.0 cm

(3) 54.0 cm (4) 37.3 cm

3



$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$\frac{1}{40} = \frac{1}{v} - \frac{1}{-200}$$

$$\frac{1}{v} = \frac{1}{40} - \frac{1}{200} = \frac{4}{160} = \frac{1}{50}$$

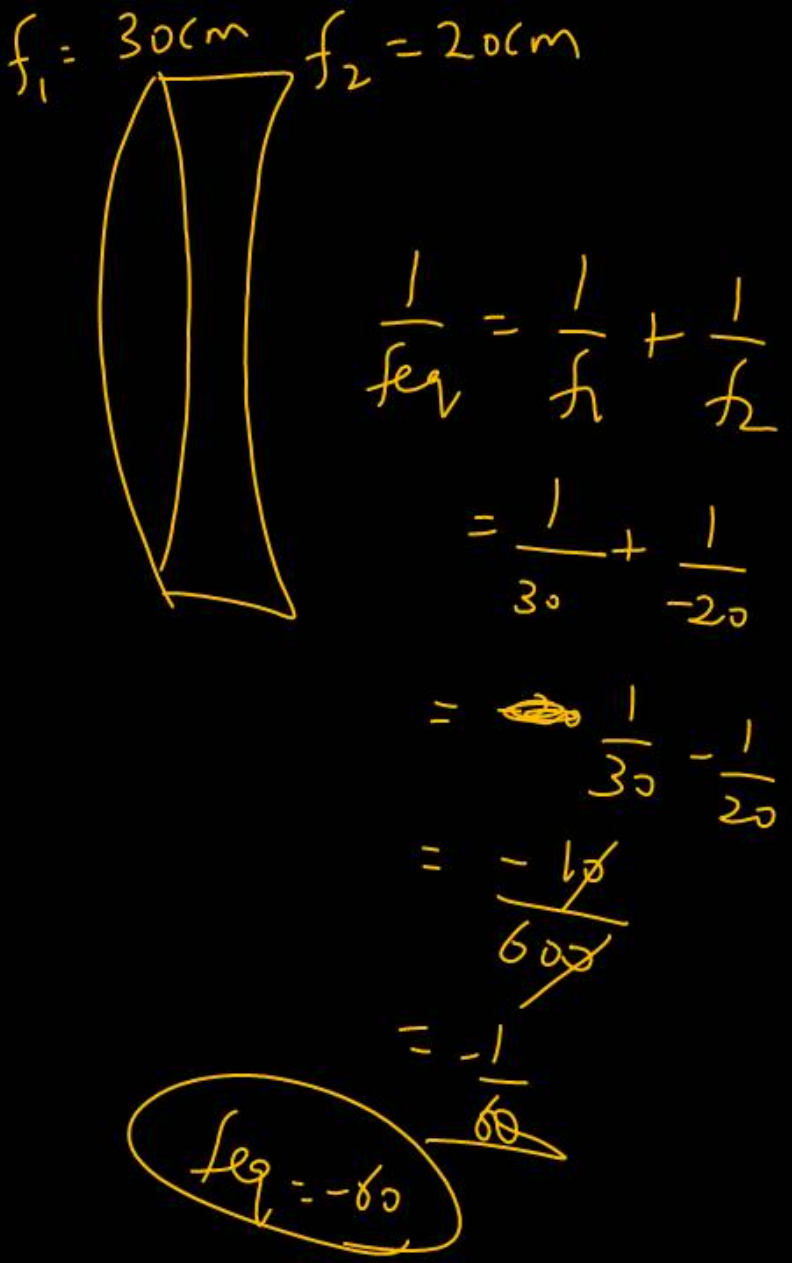
$v = 50$

Question no. 39

What is the focal length of a convex lens of focal length 30 cm in contact with a concave lens of focal length 20 cm, is the system a converging or a diverging lens? (Ignore thickness of the lenses)

(1) 60 cm, diverging (2) 40 cm, converging

(3) 50 cm, converging (4) 40 cm, diverging



Question no. 40

$f = -20\,cm$

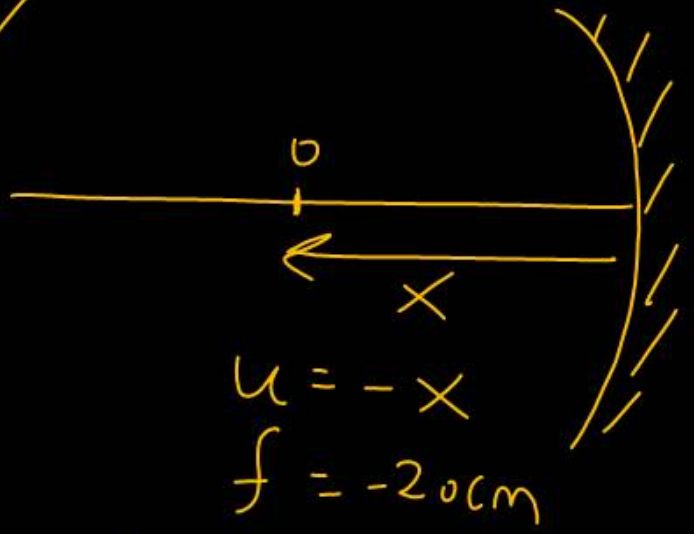
$m_I = -2$

A concave mirror of focal length 20 cm produces an image twice the size of the object. If the image is real, then the distance of the object from the mirror is

(1) 10 cm (2) 20 cm

(3) 30 cm (4) 60 cm

3



$u = -x$

$f = -20\,cm$

$$\frac{-f}{u-f} = \frac{1}{2}$$

$$\frac{-20}{-x+20} = 2$$

$-20 = -2x + 40$

$-60 = -2x$

$x = 30$

Question no. 41

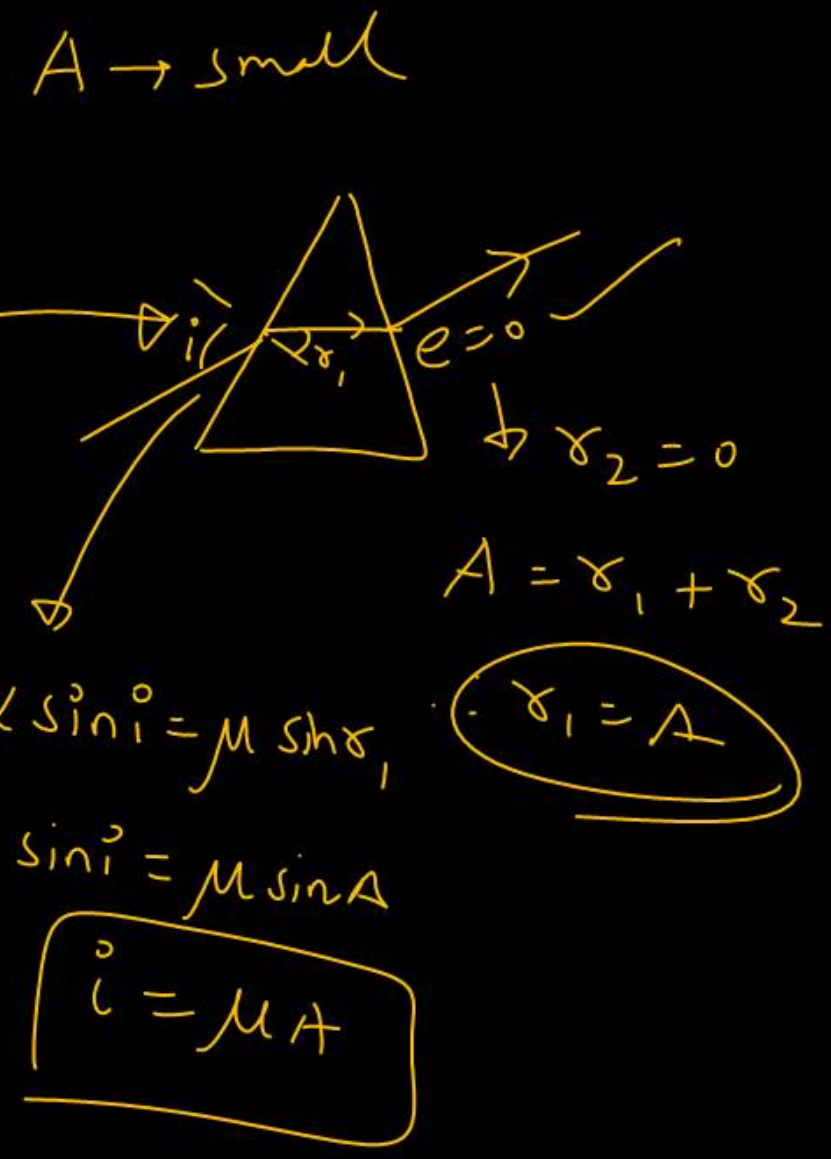
A ray of light is incident at an angle of incidence i, on one face of a prism of angle A (assumed to be small) and emerges normally from the opposite face. If the refractive index of the prism is μ, the angle of incidence i, is nearly equal to

(1) μA

(2) $\frac{\mu A}{2}$

(3) $\frac{A}{\mu}$

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



Question no. 42

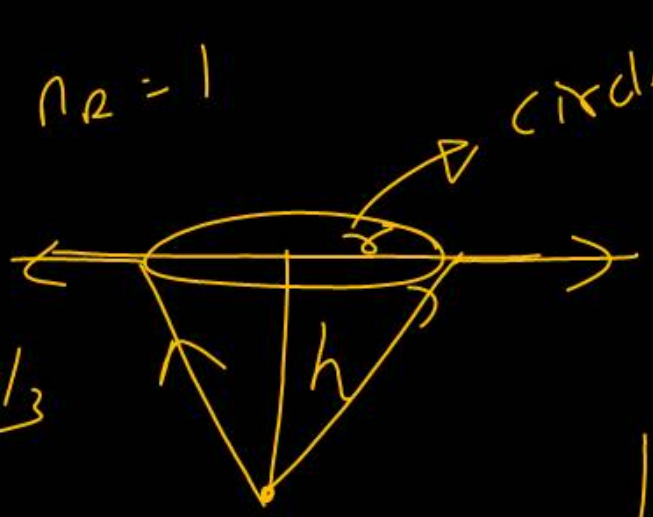
A point source of light is kept at a depth of h in water of refractive index 4/3. The radius of the circle at the surface of water through which light emits is

(1) $\frac{3}{\sqrt{7}}h$

(2) $\frac{\sqrt{7}}{3}h$

(3) $\frac{\sqrt{3}}{7}h$

(4) $\frac{7}{\sqrt{3}}h$



$$\left(\frac{n_R}{n_D}\right)^2 = \frac{r^2}{r^2+h^2}$$

$$\frac{9}{16} = \frac{r^2}{r^2+h^2}$$

$$9r^2 + 9h^2 = 16r^2$$

$$9h^2 = 7r^2$$

$$r = \frac{3h}{\sqrt{7}}$$

Question no. 43

Match the corresponding entries of column I with column 2. [Where m is the magnification produced by the mirror]

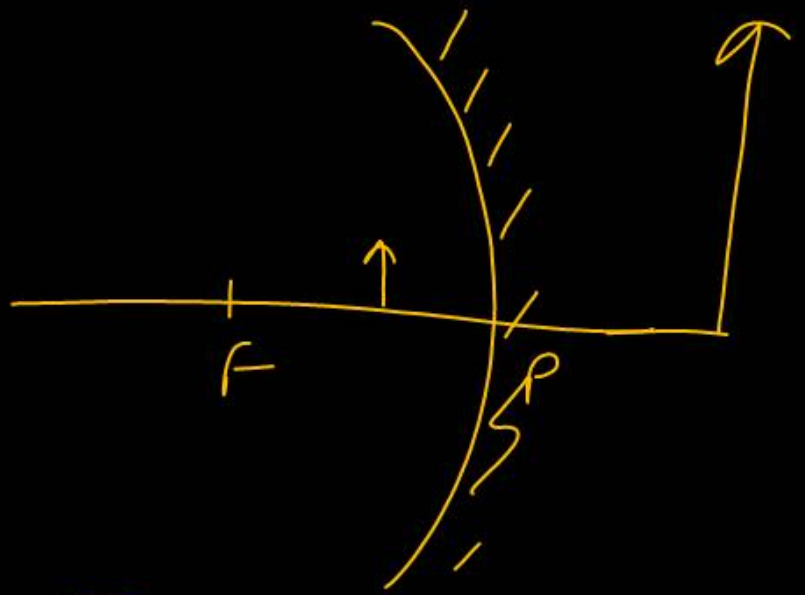
	Column I		Column II
A.	$m = -2$	p.	Convex mirror
B.	$m = -\frac{1}{2}$	q.	Concave mirror
C.	$m = +2$	r.	Real image
D.	$m = +\frac{1}{2}$	s.	Virtual image

(1) A → p and s; B → q and r; C → q and s; D → q and r

(2) A → r and s; B → q and s; C → q and r; D → p and s

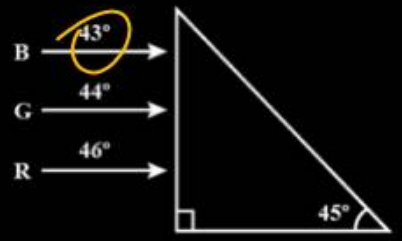
(3) A → q and r; B → q and r; C → q and s; D → p and s

(4) A → p and r; B → p and s; C → p and q; D → r and s



Question no. 44

Figure shows a mixture of blue, green and red colured rays incident normally on a right angled prism. The critical angles of the material of the prism for red, green and blue are 46°, 44° and 43° respectively. The arrangement will separate

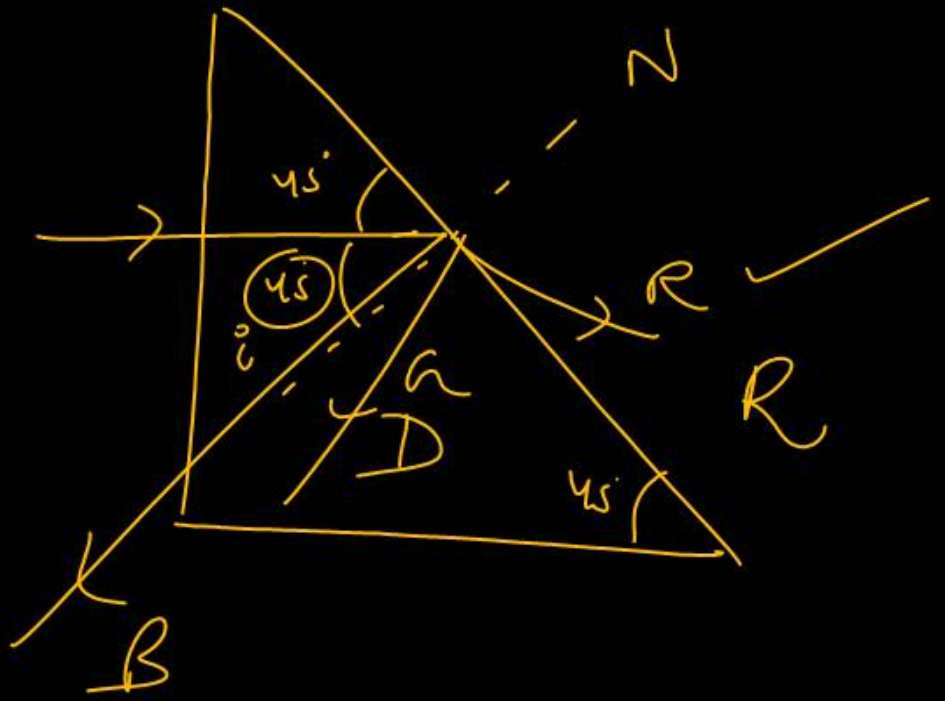


(1) green colour from red and blue

(2) all the three colours

(3) red colour from blue and green

(4) blue colour from red and green



Question no. 45

Two glass prisms P_1 and P_2 are to be combined together to produce dispersion without deviation. The angles of the prism P_1 and P_2 are selected as 4° and 3° respectively. If the refractive index of prism P_1 is 1.54 then that of P_2 will be

(1) 1.48 (2) 1.58

(3) 1.62 (4) 1.72

4

$$\frac{A'}{A} = \frac{(n_y - 1)}{(n_y' - 1)}$$

$$\frac{A_1}{A_2} = \frac{(n_2 - 1)}{(n_1 - 1)}$$

$$\frac{4}{3} = \frac{(n_2 - 1)}{(1.54 - 1)}$$

$$\frac{4}{3} \times 0.54 = n_2 - 1$$

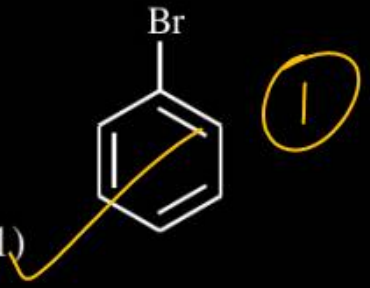
$$n_2 = 1 + \frac{4}{3} \times 0.54$$

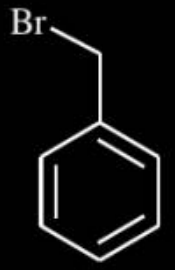
$$n_2 = 1 + 0.72$$

$$n_2 = 1.72$$

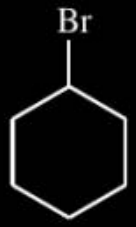
Question no. 46

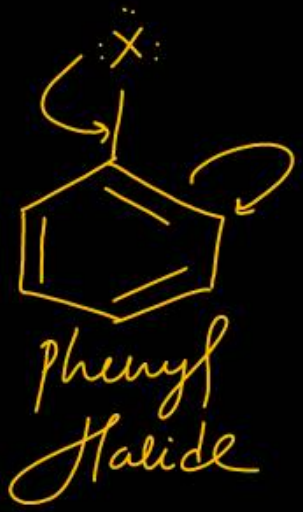
Which one will not undergo nucleophillic substitution reaction?

(1) 

(2) 

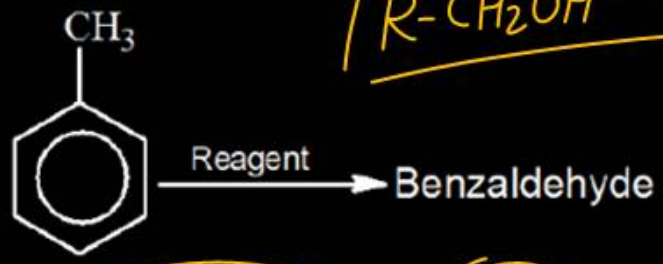
(3) 

(4) 



Question no. 47

Consider the following reaction. Which reagent is not suitable for above conversion?



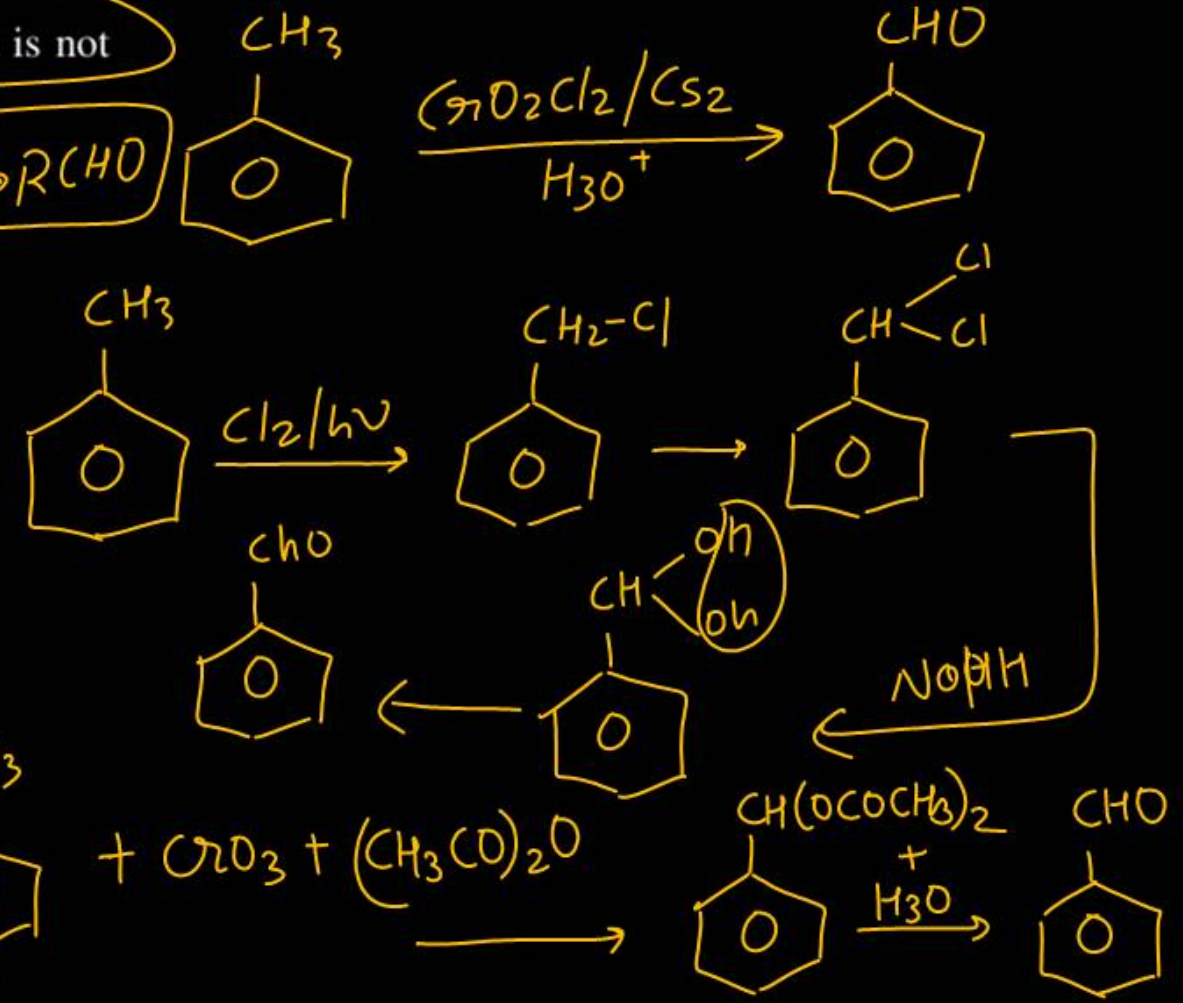
(1) CrO_2Cl_2/CCl_4, H_3O^+

(2) $Cl_2/h\nu$, H_2O 373 K

(3) CrO_3, $(CH_3CO)_2O$, H_3O^+/373 K

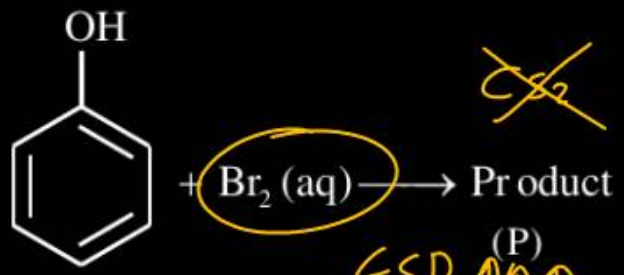
(4) PCC

R-CH2OH —PCC→ RCHO



Question no. 48

Find the product (P) of the following conversion



(1) 2–bromophenol

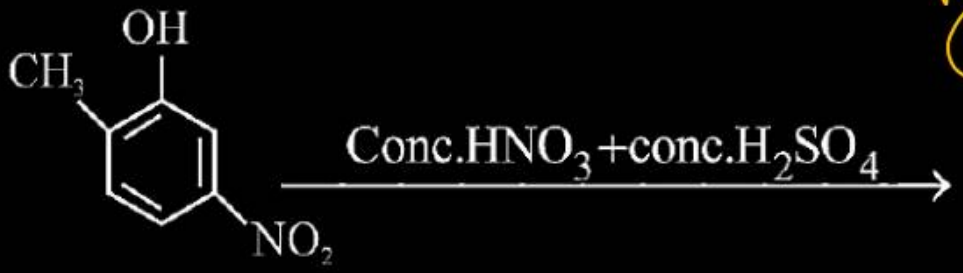
(2) 4–bromophenol

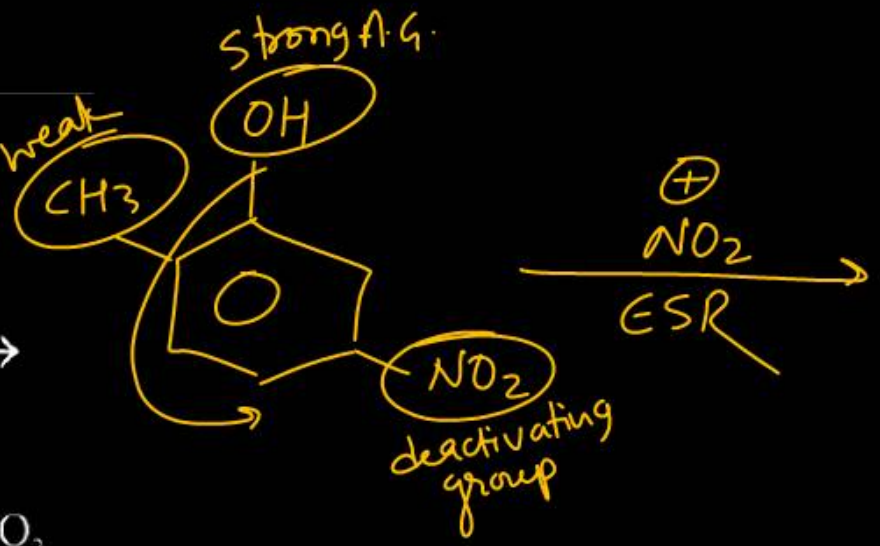
(3) 2, 4, 6 – tribromophenol

(4) 2, 4 – dibromophenol

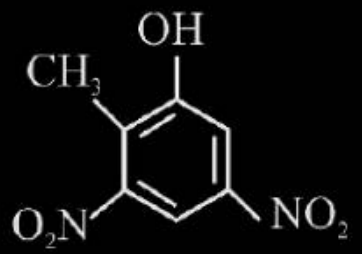
Question no. 49

The major product of the following reaction is

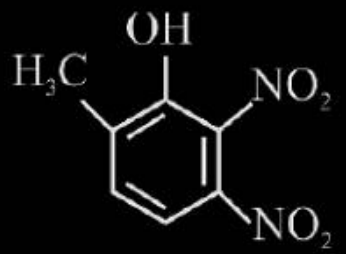




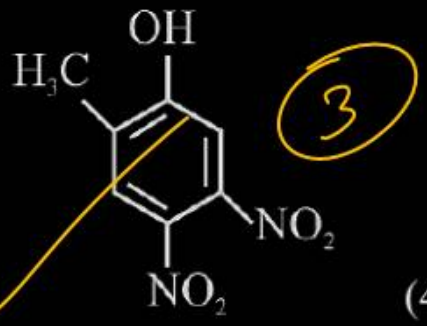
(1)



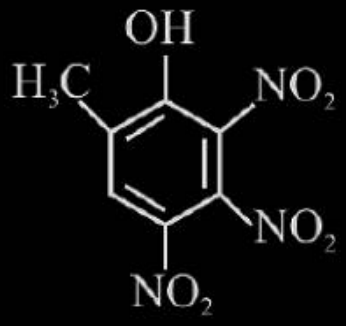
(2)



(3)

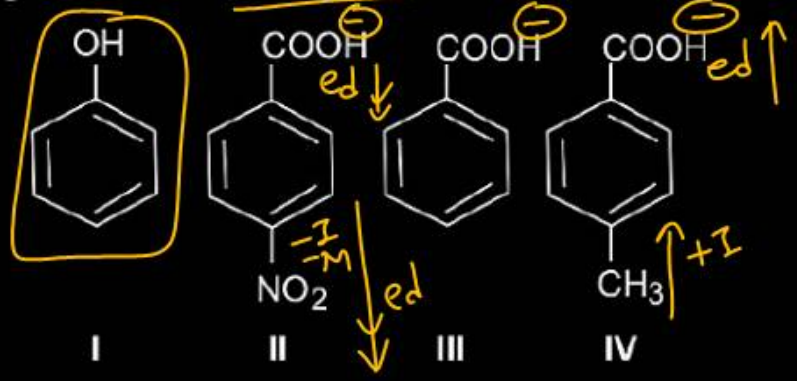


(4)



Question no. 50

The correct order of acidic character of the following compounds is



(1) I > II > III > IV

(2) III > II > I > IV

(3) II > III > IV > I

(4) IV > III > II > I

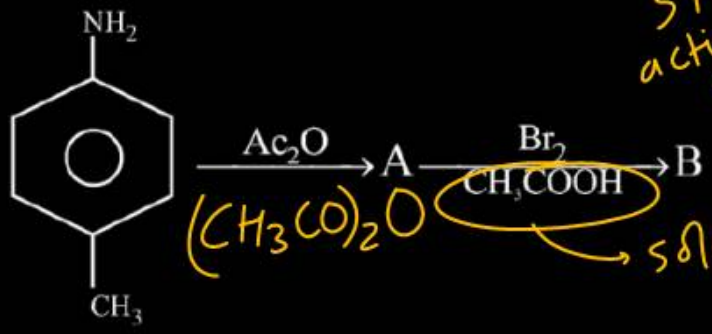
3

Phenol < Benzoic acid

II > III > IV > I

Question no. 51

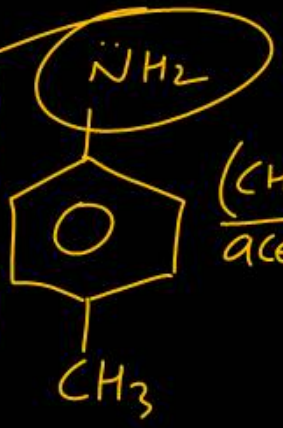
In the following reaction sequence,



(CH3CO)2O

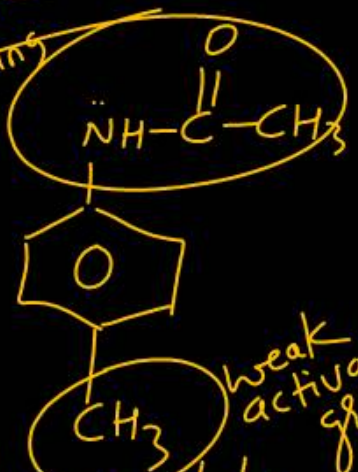
solvent

strong activating group



(CH3CO)2O
acetylation

moderate activating

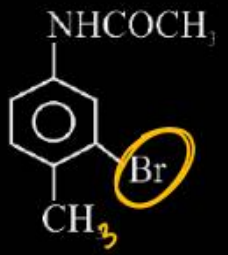


weak activating group.

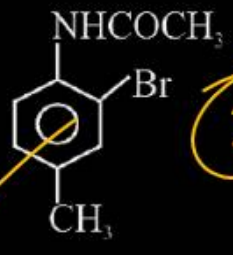
p-methylacetanilide

The major product B is:

(1)

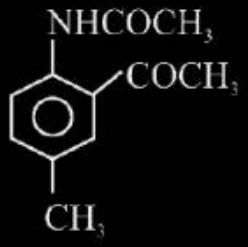


(2)



2

(3)



(4)

FRSR

Question no. 52

If the E^{o}_{cell} for a given reaction has a negative value, which of the following gives correct relationship for the values of ΔG^{o} and K_{eq}?

(1) $\Delta G^{o} > 0; K_{eq} < 1$ (2) $\Delta G^{o} > 0; K_{eq} > 1$

(3) $\Delta G^{o} < 0; K_{eq} > 1$ (4) $\Delta G^{o} < 0; K_{eq} < 1$

$\Delta G^{\circ} = -nFE^{\circ}_{cell}$ $\Delta G^{\circ} > 0$ +ve

$E^{\circ}_{cell} = -2.303RT \log K_{eq}$ $K_{eq} > 1$

Question no. 53

The most common oxidation state of lanthanoid elements is +3. Which of the following is likely to deviate easily from +3 oxidation state?

(1) Ce (58) (2) La (57) $= 6s^2\ 5d^1\ 4f^0$ +3

(3) Lu (71) (4) Gd (64) $= 6s^2\ 5d^1\ 4f^7$ +3

$6s^2\ 5d^1\ 4f^1$

$Ce_{58} = 6s^2\ 5d^1\ 4f^1$ (+3)

Question no. 54

The specific conductance of a 0.1 N KCl solution at 23°C is 0.012 ohm^{-1} cm^{-1}. The resistance of cell containing the solution at the same temperature was found to be 55 ohm. The cell constant will be

(1) 0.918 cm^{-1} (2) 0.66 cm^{-1}

(3) 1.142 cm^{-1} (4) 1.12 cm^{-1}

$k = \frac{1}{R} \times \frac{l}{A}$

$k = 0.012$

$R = 55\ \Omega$

$k \times R = \frac{l}{A}$

0.012×55

Question no. 55

What will be the pH of a solution formed by mixing 40 cm^3 of 0.1 M HCl with 10 cm^3 of 0.45 M NaOH?

(1) 10 (2) 8

(3) 5 (4) 12

$HCl + NaOH$

40 ml × 0.1 10 ml × 0.45

4 mmole 4.5 mmole

$\frac{0.5 \text{ mmole NaOH}}{50 \text{ ml}} = 10^{-2} = [OH^-]$

$pOH = 2$

$pH = 14 - 2 = 12$

Question no. 56

The Correct order of the increasing ionic character is

(1) $BeCl_2 < MgCl_2 < CaCl_2 < BaCl_2$

(2) $BeCl_2 < BaCl_2 < MgCl_2 < CaCl_2$

(3) $BeCl_2 < MgCl_2 < BaCl_2 < CaCl_2$

(4) $BaCl_2 < CaCl_2 < MgCl_2 < BeCl_2$

(1)

→ Cation size ↑ Polarization ∝ C.C. / ionic ch2.

Pb CCl

Ionic ch2 ↑

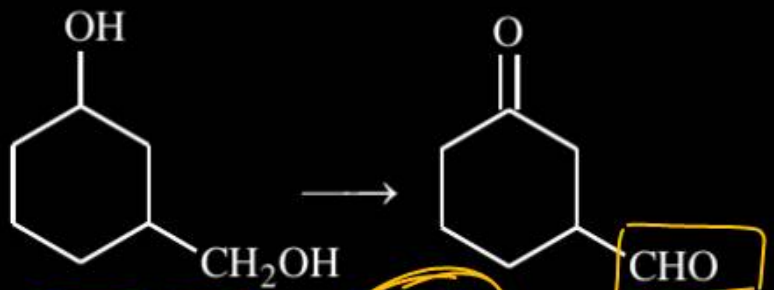
Fajans Rule

Smaller Cation = Larger anion = More charge = more Polarization

= more covalent ch2

Question no. 57

The correct reagent for the following oxidation is



(1) $KMnO_4 / OH^-$

(2) $K_2Cr_2O_7 / H_2SO_4$

(3) pyridinium dichromate

(4) any of the above three

S.O.A.

S.O.A.

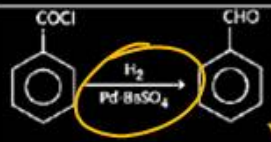
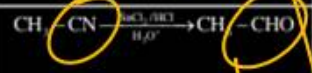
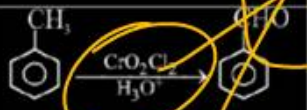
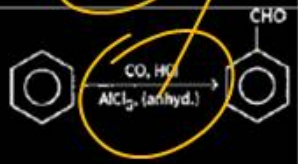
$RCH_2OH \longrightarrow RCOOH$

$PCC \longrightarrow RCH_2OH \longrightarrow RCHO$

3

Question no. 58

Match List–I with List–II.

	List–I		List–II
A.		i.	Gattermann Koch reaction
B.		ii.	Etard reaction
C.		iii.	Stephen reaction
D.		iv.	Rosenmund reaction

Choose the correct answer from the options given below.

(1) (A) → (IV), (B) → (III), (C) → (II), (D) → (I)

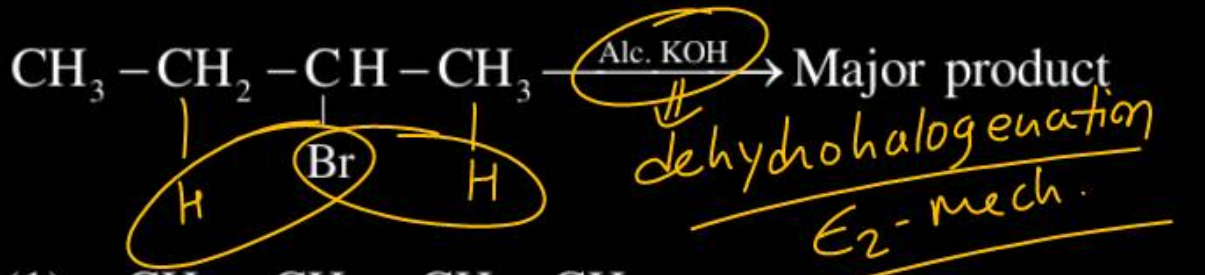
(2) (A) → (I), (B) → (II), (C) → (III), (D) → (IV)

(3) (A) → (II), (B) → (III), (C) → (IV), (D) → (I)

(4) (A) → (III), (B) → (II), (C) → (I), (D) → (IV)

Question no. 59

Product of the following reaction,



dehydrohalogenation
E2 - mech.

(1) $CH_3 - CH_2 - CH = CH_2$

(2) $CH_3 - CH = CH - CH_3$

(3) $CH_3 - \underset{\displaystyle CH_3}{\overset{|}{C}} = CH_2$

2

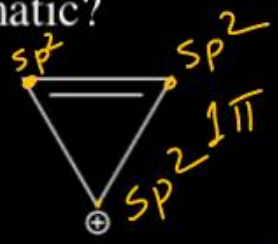
(4) Not predictable

$CH_3 - CH_2 - CH = CH_2$ 2αH

$CH_3 - CH = CH - CH_3$ 6αH Major

Question no. 60

Which compound (s) out of the following is/are not aromatic?

A. 

B. 

C. 

D. 

Cyclic/CR
Planar/sp²
(4n+2) π e⁻ / odd no. of π Bonds

(1) B, C and D

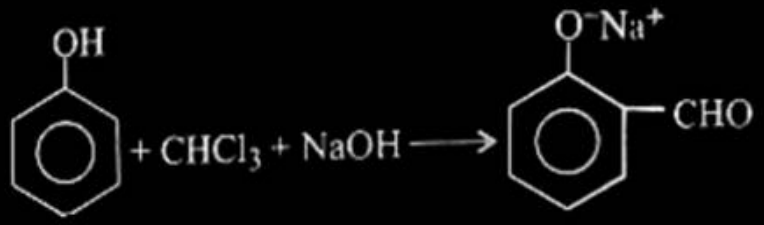
(2) C and D

(3) B only

(4) A and C

Question no. 61

The electrophile involved in the below reaction is



(1) dichloromethyl cation $(\overset{\oplus}{C}HCl_2)$

(2) dichlorocarbene ($:CCl_2$)

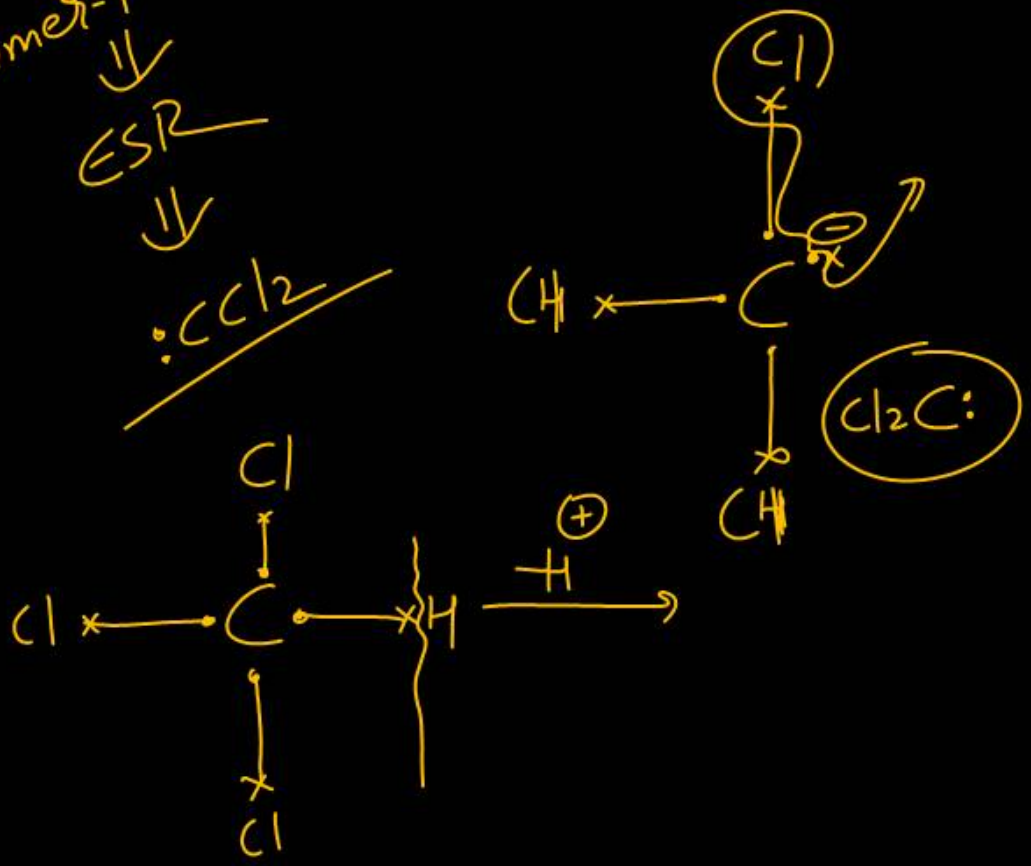
(3) trichloromethyl anion $(\overset{\ominus}{C}Cl_3)$

(4) formyl cation $(\overset{\oplus}{C}HO)$

Reimer-tiemann Rxn

ESR

$:CCl_2$



Question no. 62

Given below are two statements :

Assertion (A) Gabriel phthalimide synthesis cannot be used to prepare aromatic primary amines.

Reason (R) Aryl halides do not undergo nucleophilic substitution reaction.

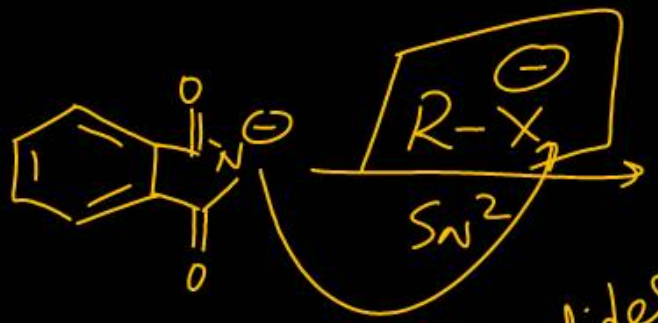
In the light of the above statements, choose the correct answer from the options given below.

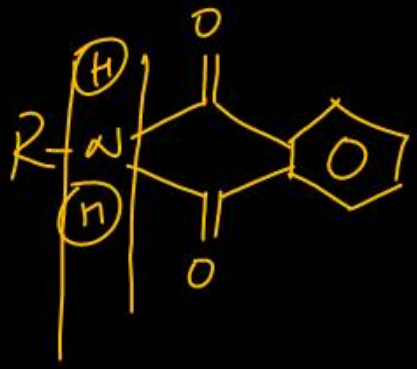
(1) Both (A) and (R) true but (R) is not the correct explanation of (A).

(2) (A) is false but (R) is true.

(3) Both (A) and (R) true and (R) is correct explanation of (A).

(4) (A) is true but (R) is false.





aryl halides or phenyl halides

R-NH2
1° aliphatic amine

R-NH2

Question no. 63

In which one of the following gaseous equilibria, K_P is less than K_C?

$K_p = K_c (RT)^{\Delta n_g}$

$K_p < K_c$

Δn_g = -ve

(1) $N_2O_4(g) \rightleftharpoons 2NO_2(g)$ $\quad 2 - 1 = +1$

(2) $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$ $\quad 2 - 3 = -1$

(3) $2HI(g) \rightleftharpoons H_2(g) + I_2(g)$ $\quad 0$

(4) $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ $\quad 0$

Question no. 64

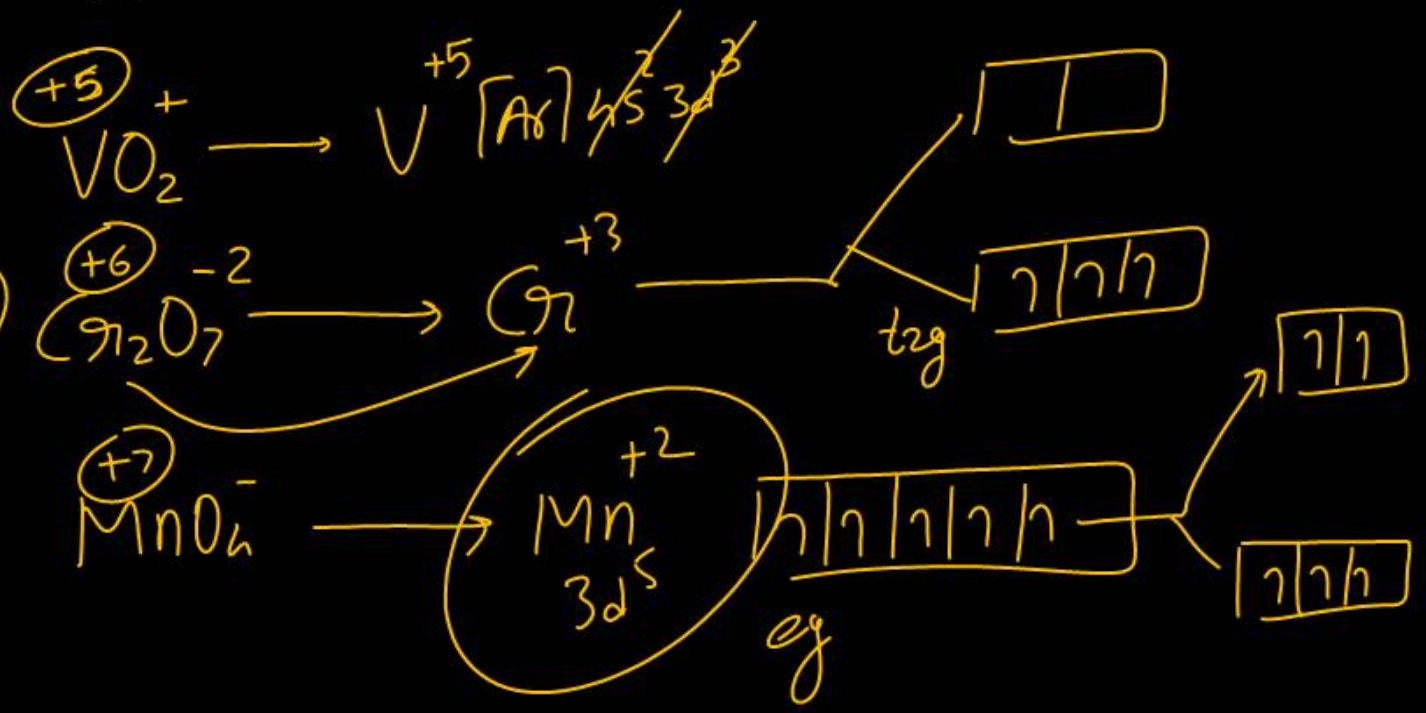
The correct order of increasing oxidising power of VO_2^+, MnO_4^- and $Cr_2O_7^{2-}$ is

(1) $MnO_4^- < Cr_2O_7^{2-} < VO_2^+$

(2) $VO_2^+ < Cr_2O_7^{2-} < MnO_4^-$

(3) $Cr_2O_7^{2-} < MnO_4^- < VO_2^+$

(4) $MnO_4^- < VO_2^+ < Cr_2O_7^{2-}$



Question no. 65

If K_{sp} for $HgSO_4$ is 6.4×10^{-5}, then solubility of the salt is (in mol/liter)

(1) 6.4×10^{-5}

(2) 8×10^{-3}

(3) 6.4×10^{-3}

(4) 8×10^{-6}

$HgSO_4 \longrightarrow Hg^{+2} + SO_4^{-2}$

$S \qquad\quad S \qquad\quad S$

$K_{sp} = S^2$

$6.4 \times 10^{-5} = S^2$

$64 \times 10^{-6} = S^2$

8×10^{-3}

Question no. 66

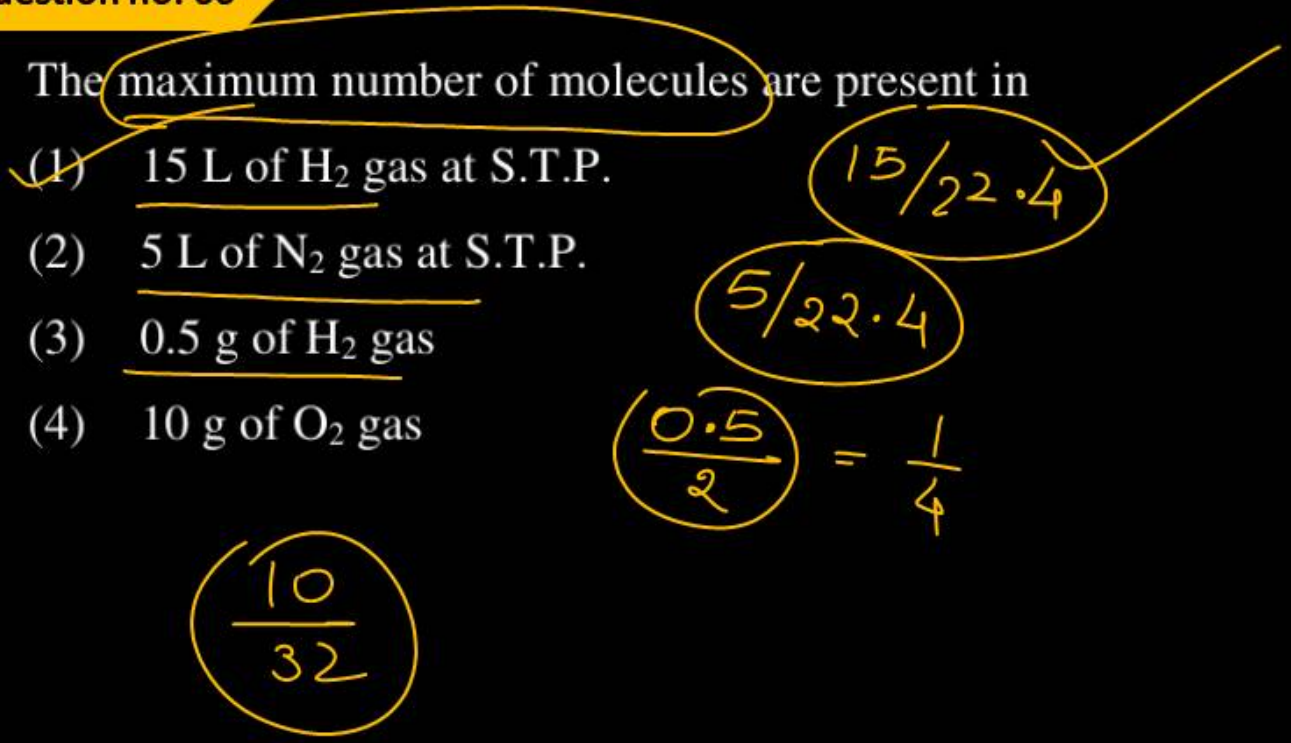
The maximum number of molecules are present in

(1) 15 L of H_2 gas at S.T.P.

(2) 5 L of N_2 gas at S.T.P.

(3) 0.5 g of H_2 gas

(4) 10 g of O_2 gas



Question no. 67

The mixture which shows positive deviation from Raoult's law is

(1) benzene + toluene — ideal

(2) acetone + chloroform — −ve

(3) chloroethane + bromoethane — ideal

(4) ethanol + acetone — +ve

Question no. 68

Choose the correct option for the following complexes:

(1) $[Cr(en)_3]^{3+}$: high spin : 2 unpaired electrons ✗

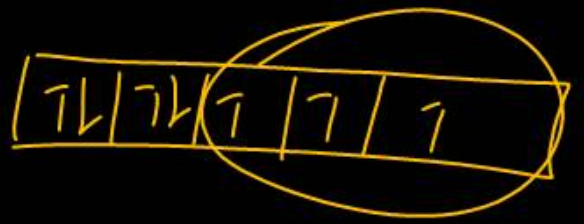
(2) $[Mn(CN)_6]^{3-}$: low spin : 3 unpaired electrons ✗

(3) $[Co(H_2O)_6]^{2+}$: high spin : 3 unpaired electrons ✓

(4) None of these

$Mn^{+3} = 3d^4\ 4s^0$

$Co^{+3} = 3d^7\ 4s^0$



Question no. 69

Which of the following are not correctly related with an S_N1 reaction?

I. Rearrangement is possible.

II. Rate is affected by solvent polarity.

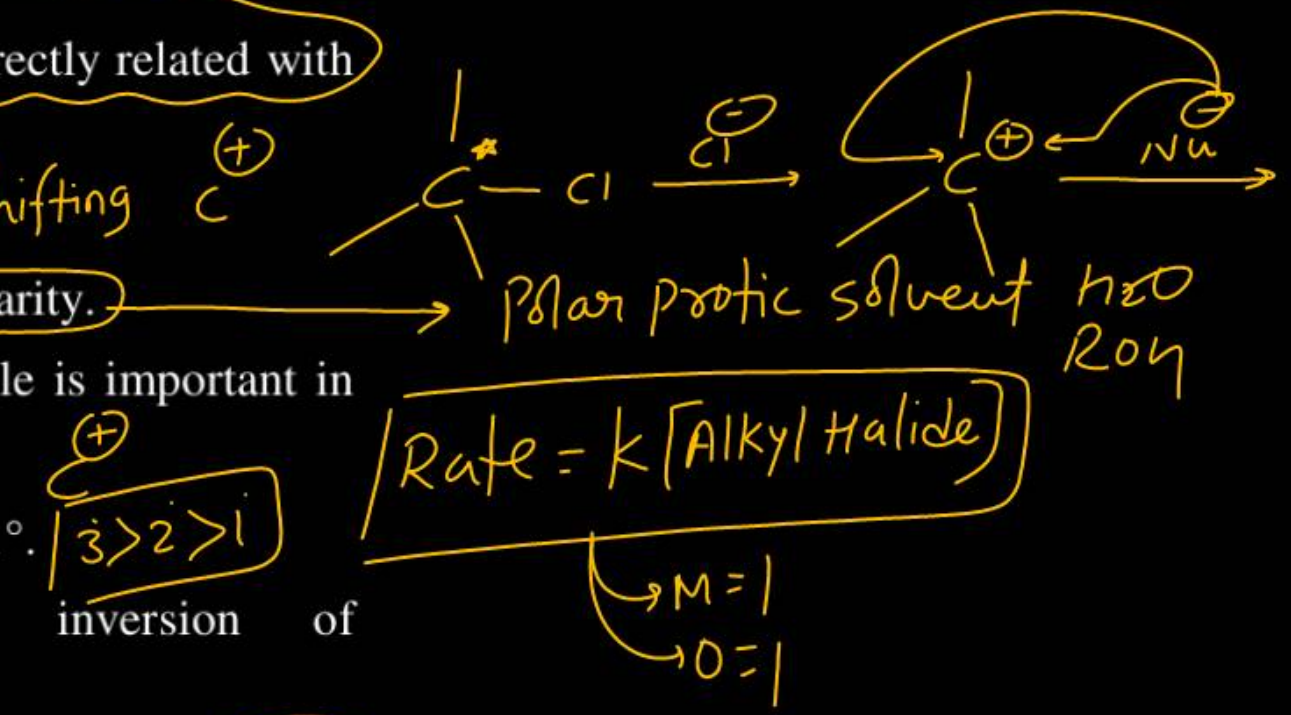
III. The strength of the nucleophile is important in determining rate.

IV. Reactivity order is: 3° > 2° > 1°.

V. Proceeds with complete inversion of configuration.

(1) III and V (2) Only V

(3) II, III and V (4) Only III



Question no. 70

Complete the following equation.

I. $CH_3-CH=CH-CH_2-CH_2-CN \xrightarrow[(ii)\,H_2O]{(i)\,AlH(i-Bu)_2} ?$

Hex-4-en-1-al

DiBAL-H

$CH_3-CH=CH-CH_2-CH_2-\underset{\underset{O}{\|}}{C}-H$ (=NH)

II. $CH_3(CH_2)_9-\underset{\underset{O}{\|}}{C}(H)(H)-OC_2H_5 \xrightarrow[H_2O]{(i)\,DIBAL-H} ?$

$R-\underset{\underset{O}{\|}}{C}(H)-O-R'$

$CN \longrightarrow CHO$

$R-\underset{\underset{O}{\|}}{C}-OR' \longrightarrow R-\underset{\underset{O}{\|}}{C}-H$

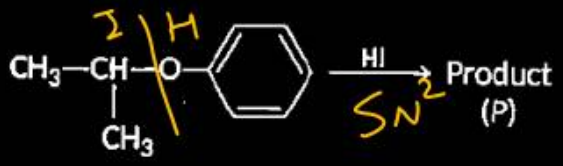
Choose the correct option.

	I	II
(1)	4–hexenal	Nonanone
(2)	2–hexenal	Nonanal
(3)	4–hexenal	Undecanal
(4)	2–hexenal	Nonanone

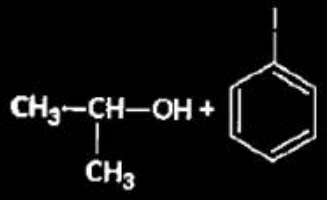
3

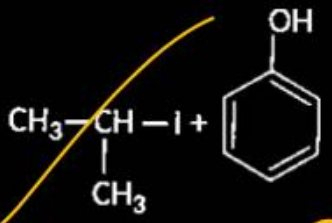
Question no. 71

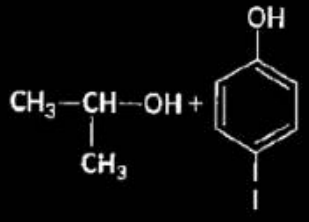
In this reaction,



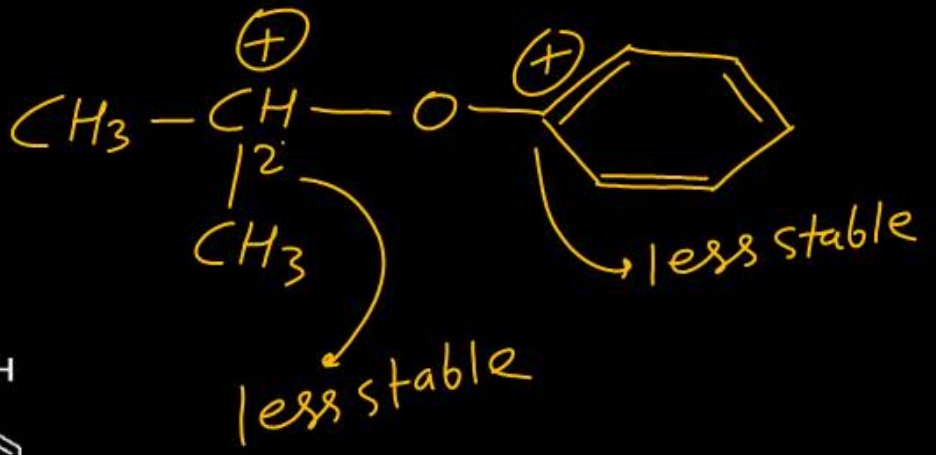
Then product P is?

(1) 

(2) 

(3) 

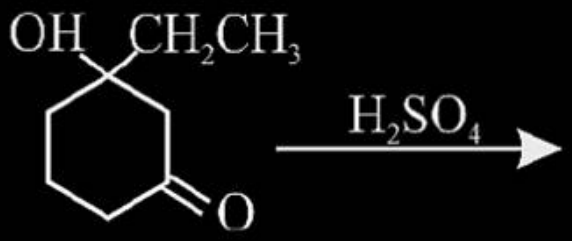
(4) None of these

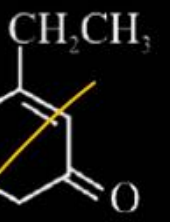


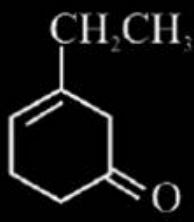
2 (2)

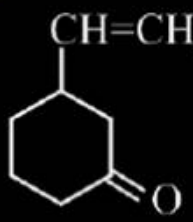
Question no. 72

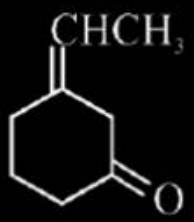
The major product of the following reaction is

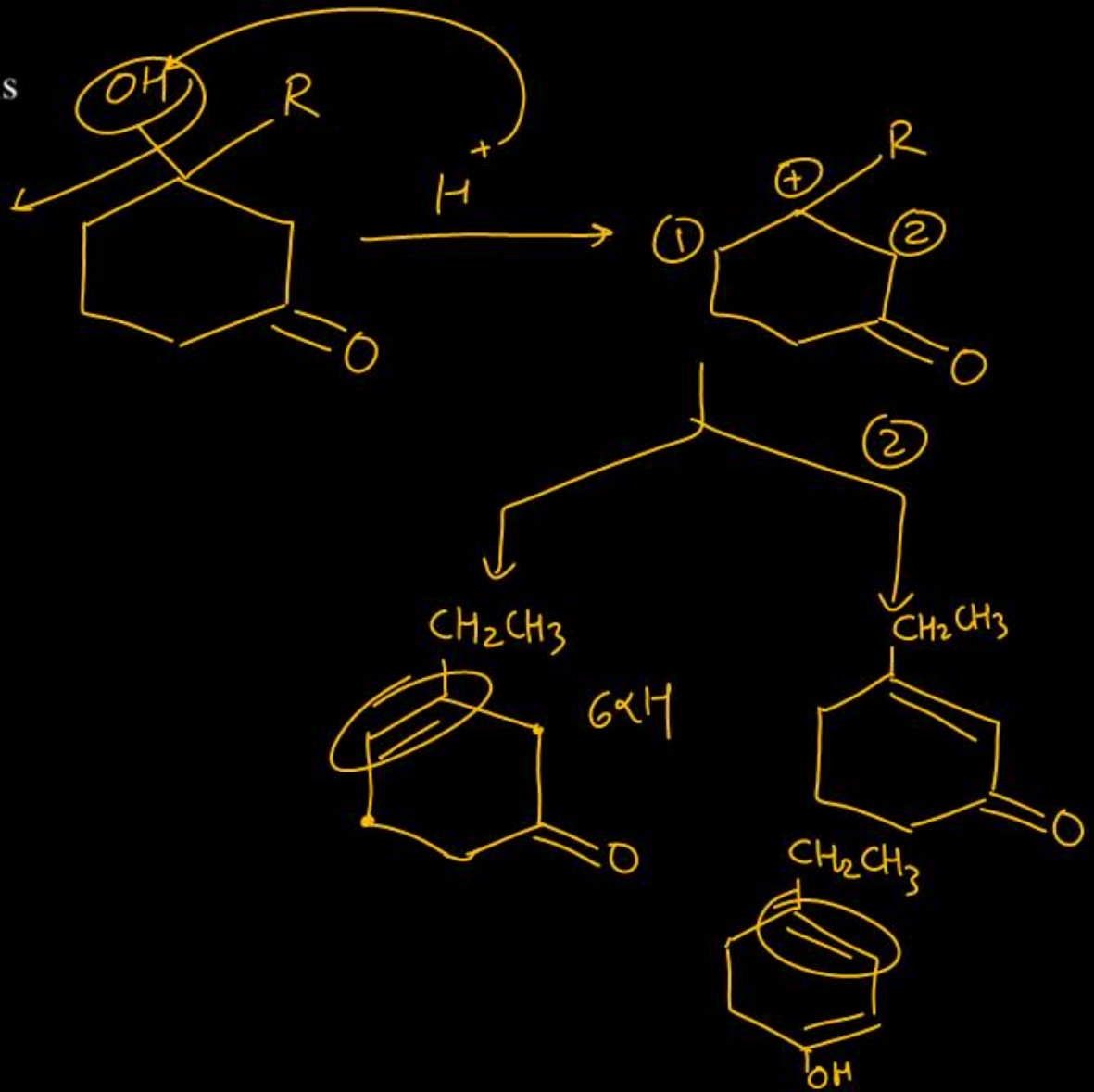


(1) 

(2) 

(3) 

(4) 



Question no. 73

In the following sequence of reaction,

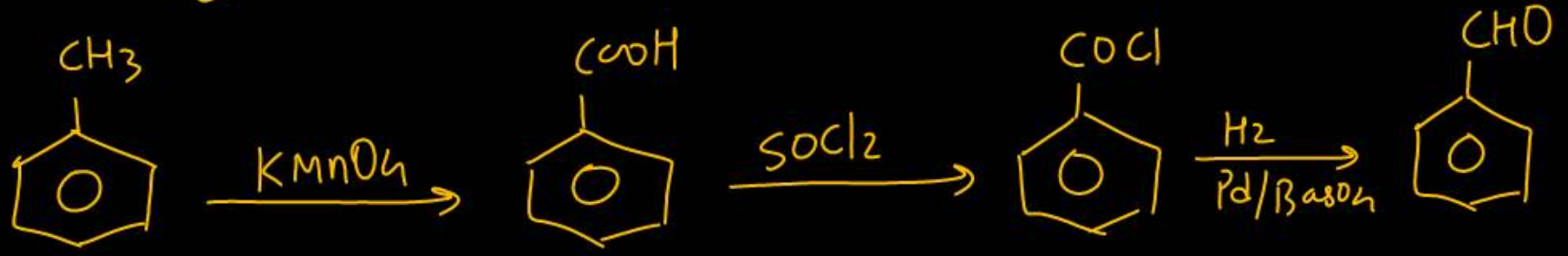
$$\text{Toluene} \xrightarrow{KMnO_4} A \xrightarrow{SOCl_2} B \xrightarrow[BaSO_4]{H_2/Pd} C$$

The product C is

(1) C_6H_5COOH (2) $C_6H_5CH_3$

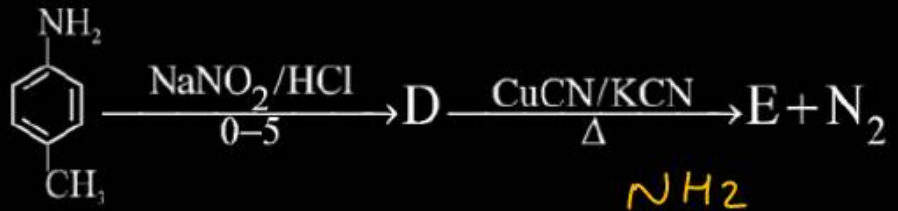
(3) $C_6H_5CH_2OH$ (4) C_6H_5CHO

4



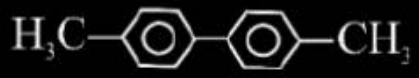
Question no. 74

In the reaction,



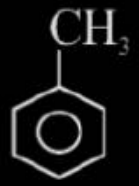
The product E is

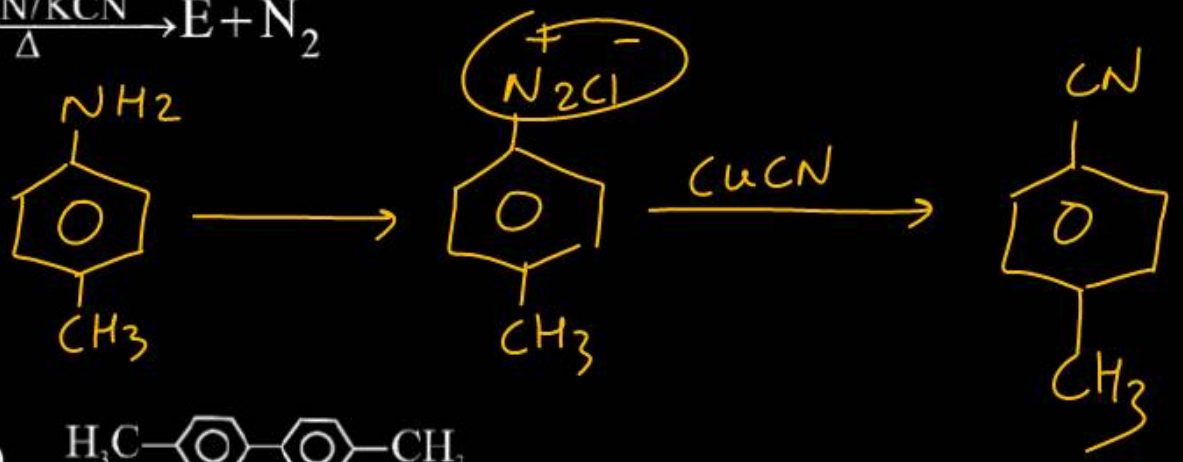
(1) 

(2) 

(3) 

3

(4) 



Question no. 75

Mechanism of a hypothetical reaction,

$X_2 + Y_2 \rightarrow 2XY$ is given below

(i) $X_2 \rightleftharpoons X + X$ (fast)

(ii) $X + Y_2 \longrightarrow XY + Y$ (slow)

(iii) $X + Y \longrightarrow XY$ (fast)

The overall order of the reaction will be

(1) 1 (2) 2

(3) 0 (4) 1.5

$R = k[X_2]^{1/2}[Y_2]^1$

Rate law $1 + \frac{1}{2} = 1.5$

$R = k[X][Y_2]$

Question no. 76

Select the complex which has magnetic moment $\mu = 3.873$ BM.

$\mu = 3.873$

$n = 3$

(1) $[Ni(Cl)_4]^{2-}$ (2) $[Cr(NH_3)_6]^{3+}$

(3) $[Fe(CN)_6]^{3-}$ (4) $[Fe(H_2O)_6]^{2+}$

$Ni^{+2} = 3d^8 4s^0 \quad n = 2$

$Cr^{+3} = 3d^3 4s^0 \quad n = 3$

$Fe^{+3} = 3d^5 4s^0 \quad n = 1$

$Fe^{+2} = 3d^6 4s^0 \quad n = 4$

Question no. 77

The data for the reaction A + B → C, is

Exp.	$[A]_0$	$[B]_0$	Initial rate
1	0.012	0.035	0.10
2	0.024	0.070	0.80
3	0.024	0.035	0.10
4	0.012	0.070	0.80

The rate law corresponds to the above data is

(1) Rate = $k[A][B]^3$ (2) Rate = $k[A]^2[B]^3$

(3) Rate = $k[B]^3$ (4) Rate = $k[B]^4$

$R = k[A_0]^x[B_0]^y$

$2^0 = 2^x$

$x = 0$

$2^3 = 8 = 2^y$

$y = 3$

Question no. 78

In a system $A(s) \rightleftharpoons 2B(g) + 3C(g)$. If the concentration of C at equilibrium is increased by a factor of 2, it will cause the equilibrium concentration of B to change to

(1) two times of its original value

(2) one–half of its original value

(3) $2\sqrt{2}$ times of its original value

(4) $\frac{1}{2\sqrt{2}}$ times of its original value

$$K_C = \frac{[B]^2[C]^3}{[A]}$$

$$[B]^2 \times 2^3$$

$$\sqrt{\frac{1}{8}}$$

$$\frac{1}{2\sqrt{2}}$$

Question no. 79

In which set of molecules all the species are paramagnetic?

(1) B_2, O_2, N_2

(2) B_2, O_2, NO

(3) B_2, F_2, O_2

(4) B_2, O_2, Li_2

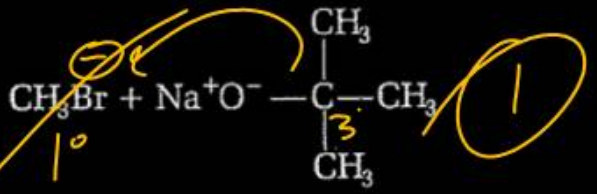
$B_2 = 10\bar{e}$ / P
$O_2 = 16\bar{e}$ / P
$NO = 15\bar{e}$ / P

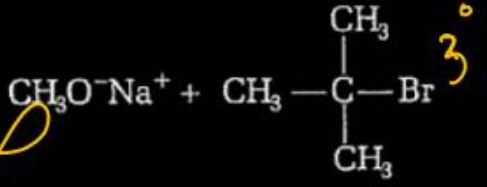
(2)

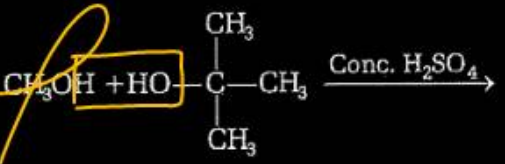
no. of $\bar{e}$ = even = Dia
no. of $\bar{e}$ = odd + $10\bar{e}$ + $16\bar{e}$ = Para

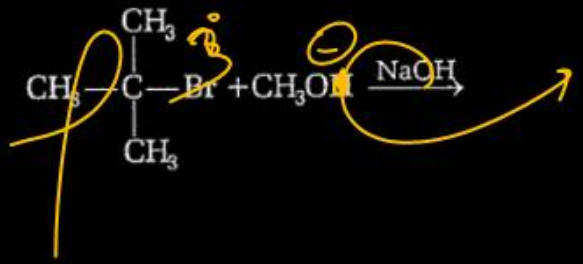
Question no. 80

For the preparation of t–butyl methyl ether which one of the following methods should be recommended?

(1) 

(2) 

(3) 

(4) 

Question no. 81

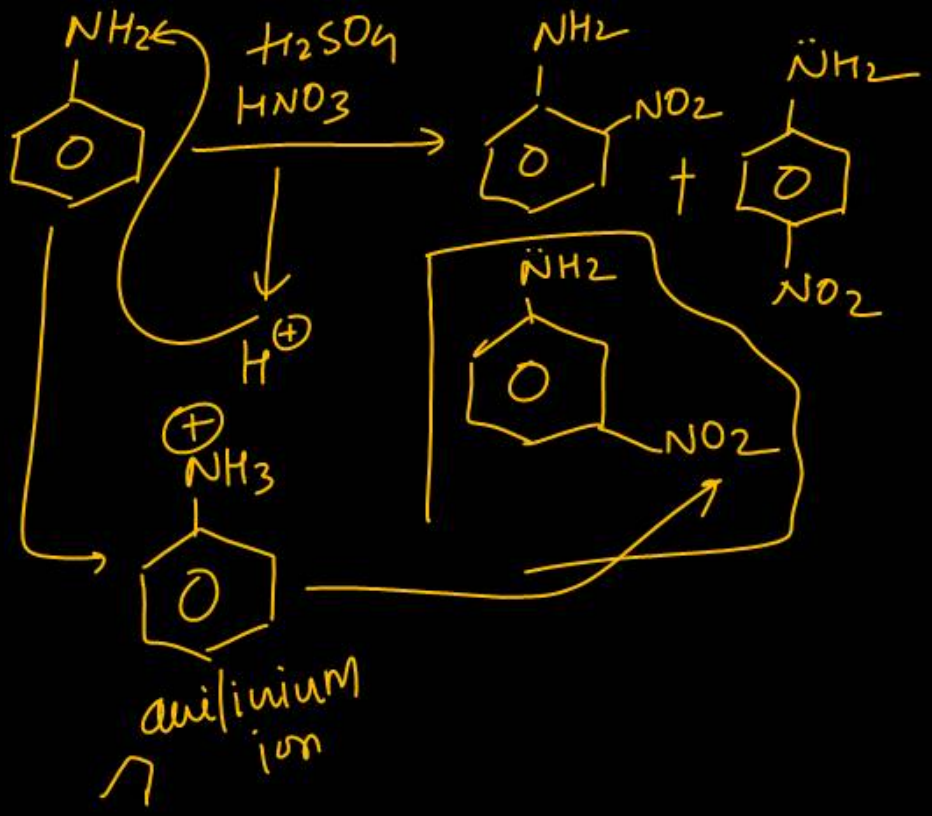
Nitration of aniline also give m–nitroaniline in strong acidic medium because

(1) in electrophilic, substitution reaction amino group is meta–directive.

(2) inspite of substitutents, nitro group always goes to meta–position.

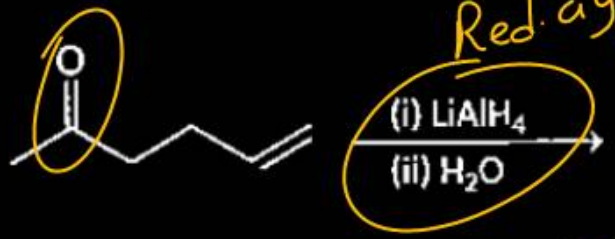
(3) in acidic (strong) medium aniline is present as anilinium cation.

(4) None of the above



Question no. 82

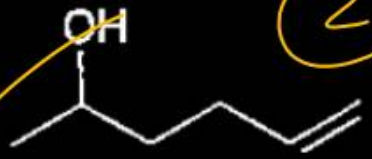
Which of the following product is obtained in the given reaction?



Red. agent → does not Reduce C=C, C≡C

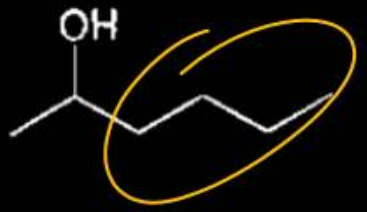
(1)

(2)



2

(3)



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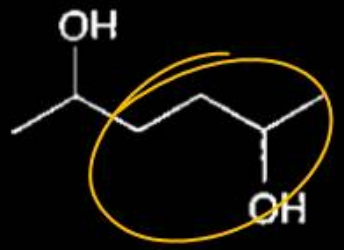


Question no. 83

IUPAC name of $[Pt(NH_3)_3(Br)(NO_2)Cl]Cl$ is

(1) Triamminebromochloronitroplatinum

(IV) chloride

(2) Triamminebromonitrochloroplatinum

(IV) chloride

(3) Triamminechlorobromonitroplatinum

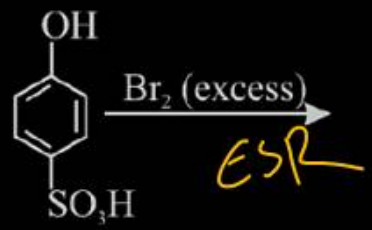
(IV) chloride

(4) Triamminenitrochlorobromoplatinum

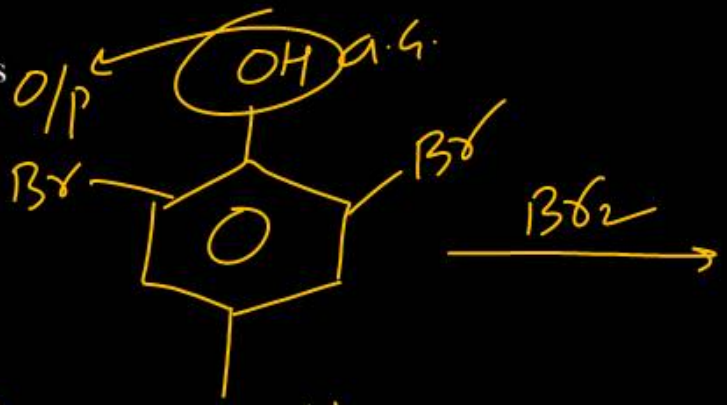
(IV) chloride

Question no. 84

The major product of the following reaction is

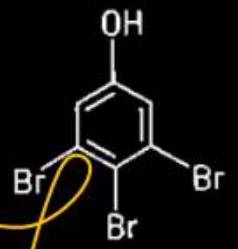


ESR

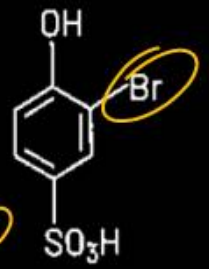


BrO_2

(1)

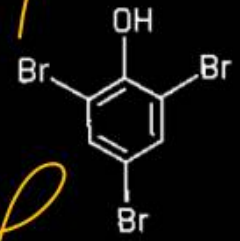


(2)

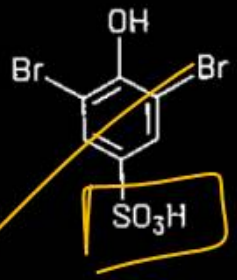


4

(3)



(4)



Question no. 85

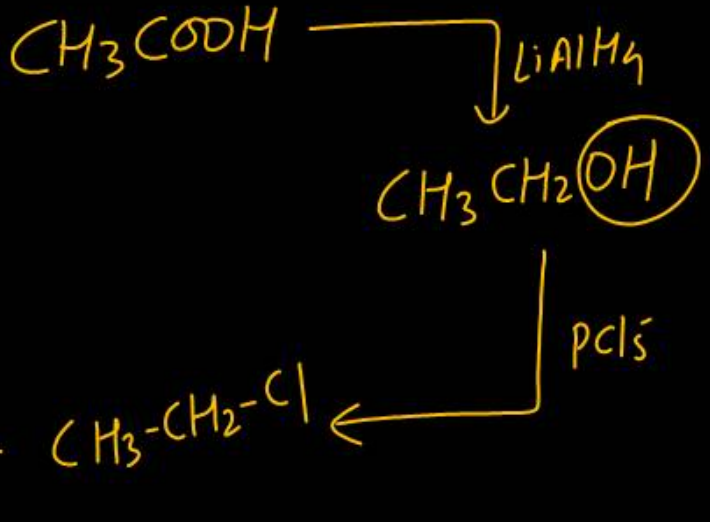
In the reaction,

$$CH_3COOH \xrightarrow{LiAlH_4} A \xrightarrow{PCl_5} B \xrightarrow{alc.KOH} C$$

Then the C is

(1) acetaldehyde (2) acetylene

(3) ethylene (4) acetylchloride



Question no. 86

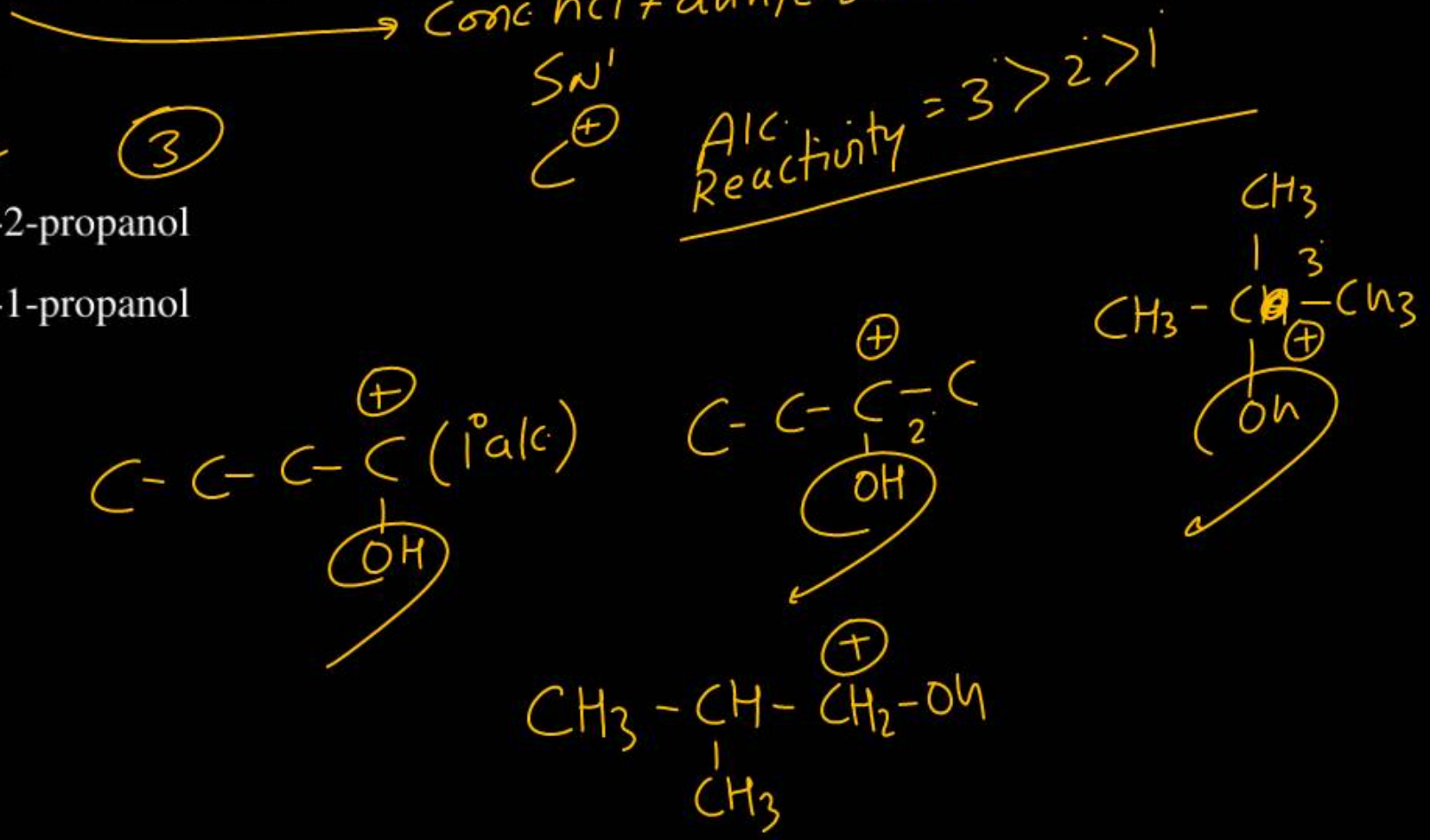
Lucas reagent reacts fastest with

(1) 1-butanol

(2) 2-butanol

(3) 2-methyl-2-propanol

(4) 2-methyl-1-propanol



Question no. 87

Four successive members of the first row transition elements are listed below with their atomic numbers. Which one of them is expected to have the highest third ionisation enthalpy?

(1) Vanadium (Z = 23)

(2) Chromium (Z = 24)

(3) Iron (Z = 26)

(4) Manganese (Z = 25)

$V_{23}^{+2} = 3d^3\ 4s^0$

$Cr_{24}^{+2} = 3d^4\ 4s^0$

$Fe_{26}^{+2} = 3d^6\ 4s^0$

$Mn^{+2} = 3d^5\ 4s^0$

Question no. 88

An oxide of a metal (M) contains 40% by mass of oxygen. Metal (M) has atomic mass of 24. The empirical formula of the oxide is

(1) M_2O (2) MO

(3) M_2O_3 (4) M_3O_4

$$40\% = \frac{8}{E+8} \times 100$$

$$5E + 40 = 100$$

$$5E = 60 \qquad E = 12$$

$$M = E \times x$$

$$24 = 12 \times x$$

$$x = 2$$

MO

Question no. 89

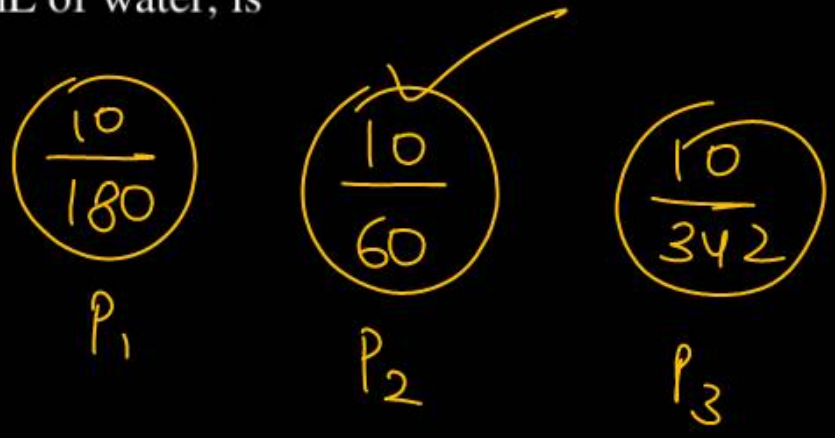
The relationship between osmotic pressure at 273 K when 10g glucose (P_1), 10g urea (P_2) and 10g sucrose (P_3) are dissolved in 250 mL of water, is

(1) $P_1 > P_2 > P_3$

(2) $P_3 > P_1 > P_2$

(3) $P_2 > P_1 > P_3$

(4) $P_2 > P_3 > P_1$



$P_2 > P_1 > P_3$

Question no. 90

Which of the following sets of quantum number is not allowed?

$n > \ell \geq m$

(1) $n = 3, l = 2, m_l = 0, s = +\frac{1}{2}$

(2) $n = 3, l = 2, m_l = -2, s = +\frac{1}{2}$

(3) $n = 3, l = 3, m_l = -3, s = -\frac{1}{2}$

(4) $n = 3, l = 0, m_l = 0, s = -\frac{1}{2}$

Question no. 92

The plant hormone used to destroy weeds in a field is

(1) IAA

(2) NAA

(3) 2, 4–D

(4) IBA

Herbicide
weedicide

3

Question no. 93

Which one of the following is represented by Calvin cycle?

(1) Reductive carboxylation

(2) Oxidative carboxylation

(3) Photophosphorylation

(4) Oxidative phosphorylation

Question no. 94

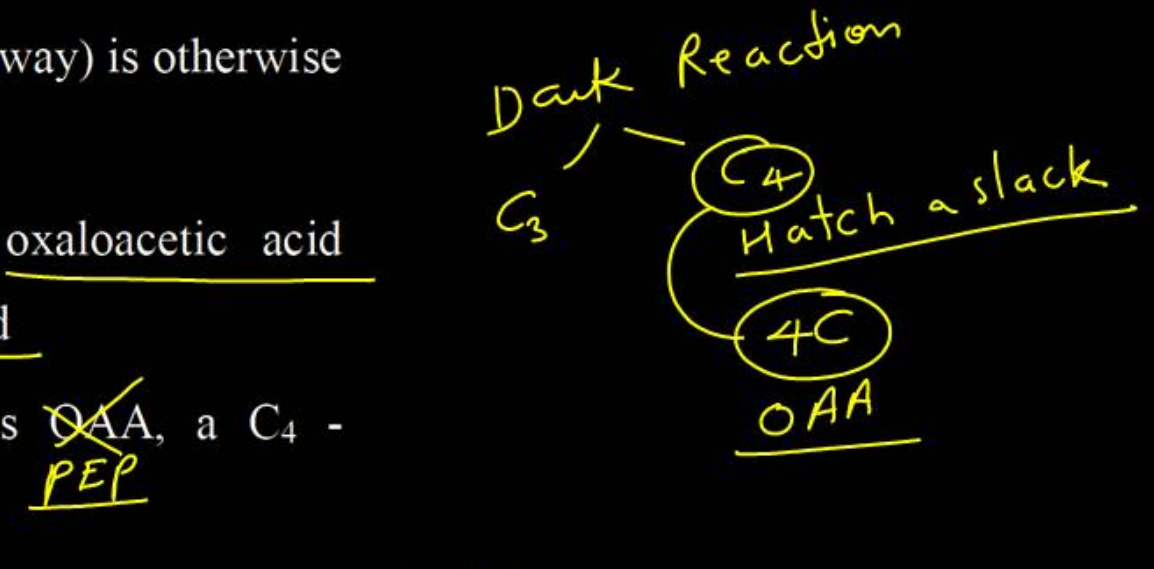
Hatch and Slack pathway (HSK pathway) is otherwise known as C_4-cycle because

(1) The first stable product is oxaloacetic acid /OAA which is a C_4-compound

(2) The primary CO_2 acceptor is OAA, a C_4 - compound

(3) All intermediate metabolites are C_4-compound

(4) At one time 4 CO_2 molecules take part in carboxylation pathway.



PEP

1

Question no. 95

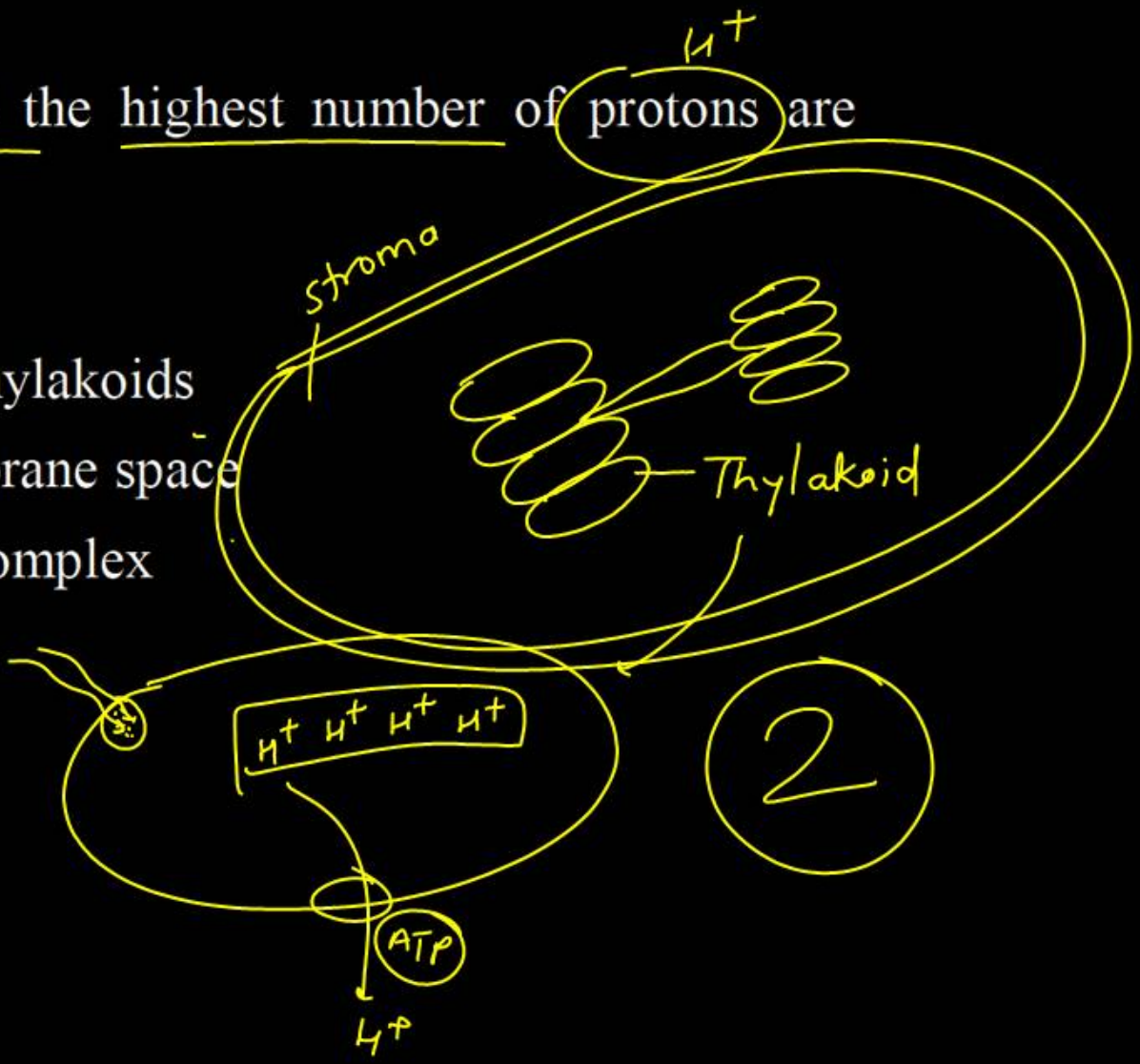
In a chloroplast the highest number of protons are found in

(1) stroma

(2) lumen of thylakoids

(3) inter membrane space

(4) antennae complex



Question no. 96

Single turn of citric acid cycle yields

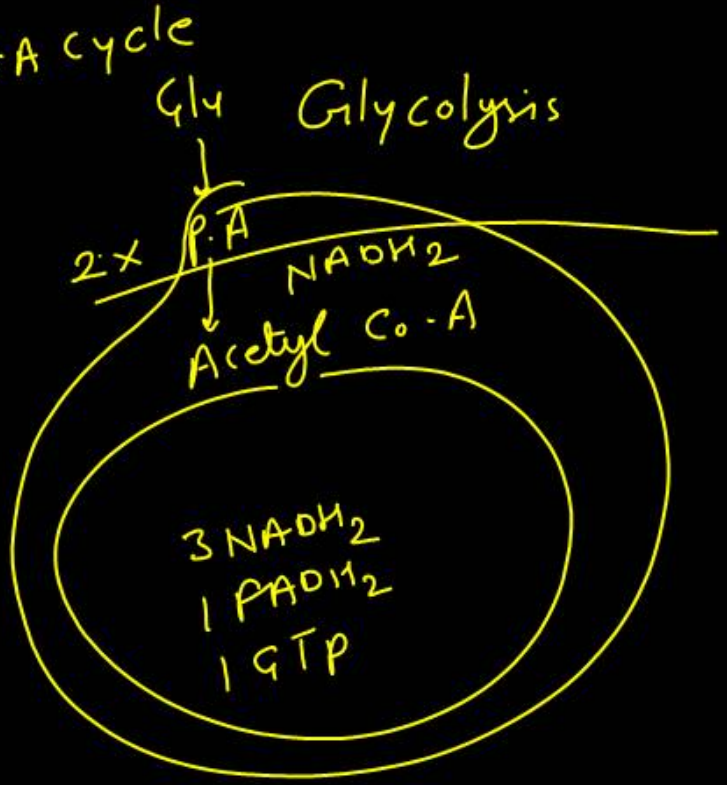
(1) $2FADH_2$, $2NADH_2$, 2 GTP

(2) 1 $FADH_2$, $2NADH_2$, 1 GTP

(3) 1 $FADH_2$, $3NADH_2$, 1 GTP

(4) 1 $FADH_2$, 4 $NADH_2$, 1 GTP

4



Question no. 97

Choose the correct combination between respiratory substrates and their respective RQs.

	Carbohydrate	Fat	Protein
(1)	2	1	1
(2)	0	1	1
(3)	1	0.7	0.9
(4)	0.5	0.5	0.5

3

$R.Q. = \frac{CO_2}{O_2}$

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + E$

$R.Q = \frac{6}{6}$ -- (1)

$C_{51}H_{98}O_6$

Question no. 98

In the given columns, column-I contain complexes and column-II contain their alternative names. Select the correct match from the option given below.

	Column –I		Column –II
A.	Complex I	I.	Cytochrome bc_1 complex
B.	Complex II	II.	NADH dehydrogenase
C.	Complex III	III.	ATP synthetase
D	Complex IV	IV.	Succinate Dehydrogenase
		V.	Cytochromec oxidase

(1) A-III; B-V, C-I; D-IV

(2) A-II; B-V, C-I; D-IV

(3) A-II; B-IV, C-I; D-V

(4) A-IV; B-I, C-II; D-V

ETS — oxysome

I – $NADH_2$ dehy

II – Succinate dehy

III – Cyt bc_1

IV – Cytochrome oxidase
Cyt a, a_3 ~ 2 Cu^{2+}

V – ATP Synthase

3

Question no. 99

Identify the hormone/s which promote/s all these events in plants and choose the correct option?

A. Antagonist to GA.

B. Promoted bud dormancy

C. Promoted stomatal closure

D. Promoted abscission layer

ABA

3

(1) Cytokinin

(2) Auxin

(3) Abscisic acid

(4) C_2H_4

Question no. 100

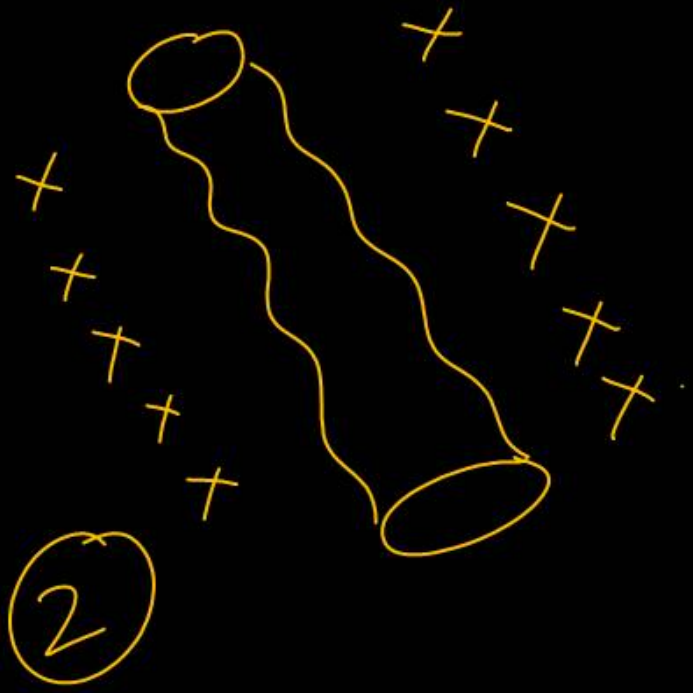
(A) large proportion of oxygen is left unused in the human blood even after its uptake by the body tissues. This O_2

(1) Helps in releasing more O_2 to the epithelium tissues

(2) Acts as a reserve during muscular exercise

(3) Raises the pCO_2 of blood to 75 mm of Hg

(4) Is enough to keep oxyhaemoglobin saturation at 96%



Question no. 101

. Match List–I with List–II and select the correct option.

	List–I Plasma protein		List–II Functions
I.	Fibrinogen	A.	Defence mechanism
II.	Globulins	B.	Osmotic balance
III.	Albumins	C.	Coagulation of blood

(1) I–C, II–A, III–B (2) I–A, II–C, III–B

(3) I–C, II–B, III–A (4) I–B, II–A, III–C

Question no. 102

P–wave represents –

(1) Depolarization of ventricles

(2) Repolarization of ventricle

(3) Repolarization of atria

(4) Depolarization of atria

ECG

∴ P : Depolarization

∴ QRS

∴ T wave

4

Question no. 103

Which blood cells can engulf bacteria by phagocytosis?

(1) Eosinophil and Basophil

(2) Basophil and Lymphocyte

(3) Neutrophil and Monocyte

(4) Neutrophil and Lymphocyte

3

Question no. 104

Given below are four statements (A-D) regarding human blood circulatory system

(A) Arteries are thick-walled and have narrow lumen as compared to veins

(B) Angina is acute chest pain when the blood circulation to the brain is reduced

(C) Persons with blood group AB can donate blood to any person with any blood group under ABO system

(D) Calcium ions play a very important role in blood clotting

Which two of the above statements are correct?

(1) A & D

(2) A & B

(3) B & C

(4) C & D

Question no. 105

Pulmonary vein, carrying oxygenated blood, opens into

(1) Left auricle

(2) Right auricle

(3) Left ventricle

(4) Right ventricle

Question no. 106

Functional residual capacity can be represented as

(1) TV+ERV

(2) ERV+RV

(3) RV+ IRV

(4) ERV+TV+IRV

2

F.R.C

Volume of Air that remains in Lungs after normal expiration.

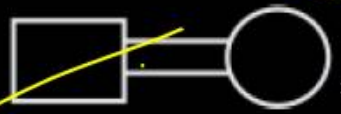
Question no. 107

Which one of the following symbols and is representation, used in human pedigree analysis is correct?

(1)  =unaffected male

(2)  =unaffected female

(3)  =male affected

(4)  =mating between relatives

Question no. 108

Listed below are four respiratory capacities (A-D) in column I and four jumbled respiratory volume of a normal human adult in column II.

	Column – I (Respiratory capacities)		Column – I (Respiratory volumes)
A.	Residual volume	I.	Additional volume of air, a person can inspire by a forcible inspiration.
B.	Vital capacity	II.	Total volume of air a person can inspire after a normal expiration
C.	Inspiratory reserve volume	III.	Volume of air remaining in the lungs even after a forcible expiration.
D.	Inspiratory capacity	IV.	The maximum volume of air a person can breath in after forced expiration

Which one of the following is the correct matching of two capacities and volume?

(1) A-I; B-II, C-III; D-IV

(2) A-IV; B-III, C-I; D-II

(3) A-II; B-III, C-IV; D-I

(4) A-III; B-IV, C-I; D-II

Question no. 109

Coca alkaloid or cocaine is obtained from

(1) Papaver somniferum

(2) Atropha belladona

(3) Erythroxylum coca

(4) Datura

Stimulant
S. A

3

Question no. 110

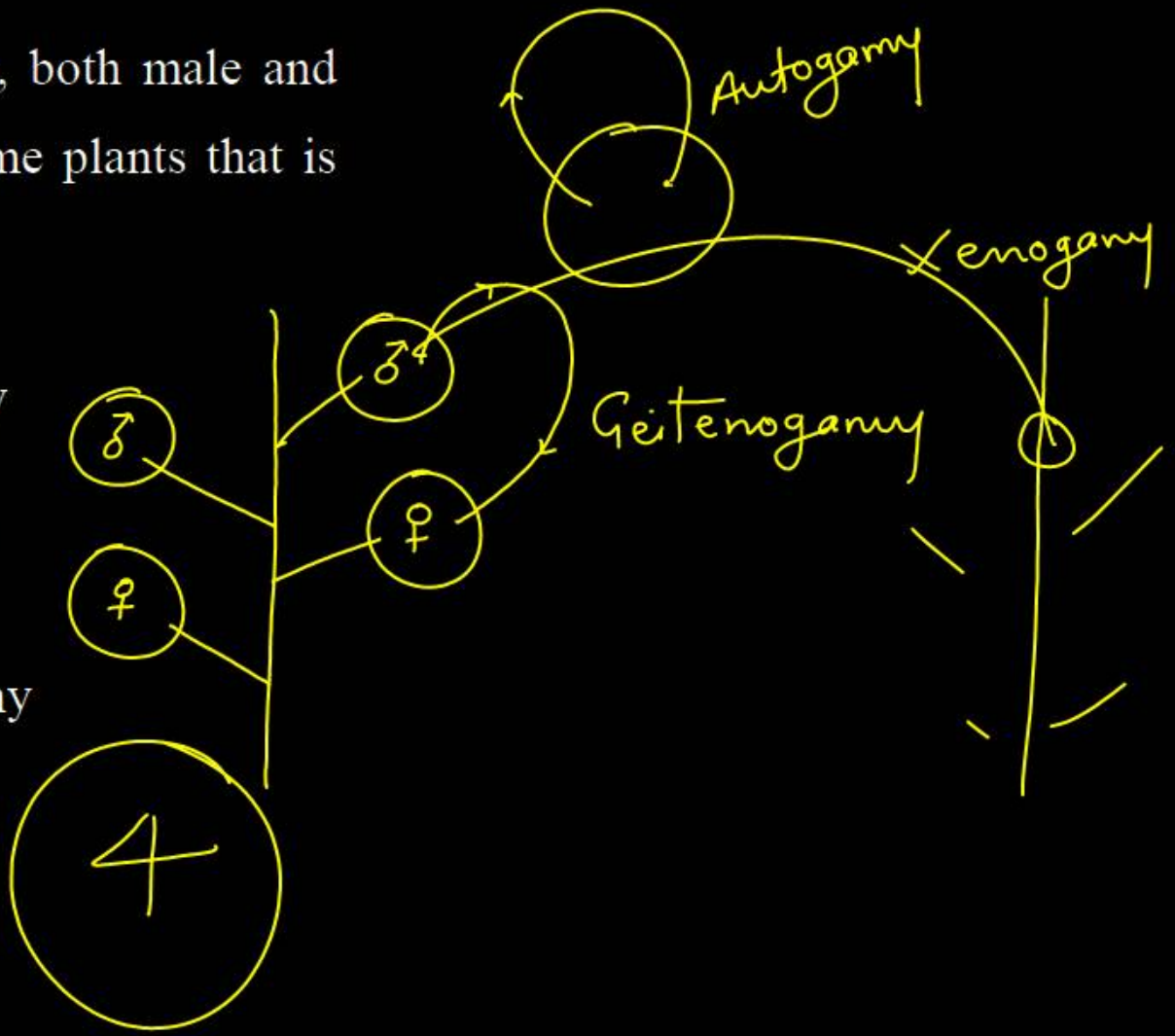
In some plants like castor and maize, both male and female flowers are present on the same plants that is called monoecious which prevents

(1) Both autogamy and geitonogamy

(2) Geitonogamy but not autogamy

(3) Both geitonogamy and Xenogamy

(4) Autogamy but not geitonogamy



Question no. 111

Secretory phase of human menstrual cycle is also called.

(1) Luteal phase and lasts for 6 days

(2) Luteal phase and lasts for 13 days

(3) Follicular phase and lasts for 13 days

(4) Follicular phase and lasts for 6 days

Question no. 112

Which of the following is most appropriate regarding kidney function regulation?

(1) Renin- Angiotensin mechanism decreases the glomerular filtration rate (GFR) while atrial natriuretic factor increases GFR

(2) Renin- Angiotensin mechanism increases GFR while atrial natriuretic factor decreases GFR

(3) Renin- Angiotensin mechanism and Atrial natriuretic factor both increase GFR

(4) Renin- Angiotensin mechanism and Atrial natriuretic factor both decrease GFR

R.A.A.S.

A.N.F.

2

Question no. 113

The proboscis gland is the excretory organ in:

(1) Taenia

(2) Blood worm

(3) Balanoglossus

(4) Ascidia

3

Hemichordata.
- Balanoglossus
- Saccoglossus

Question no. 114

The exponential growth can be mathematically expressed as

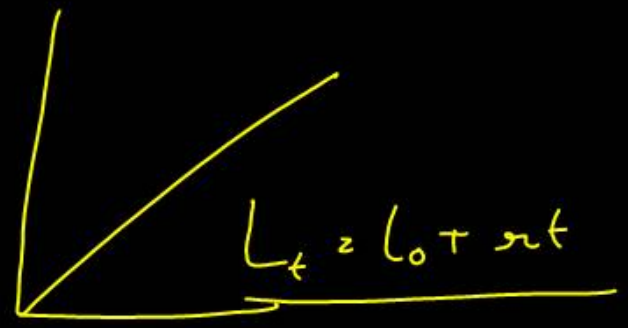
(1) $L_t = L_0 + rt$

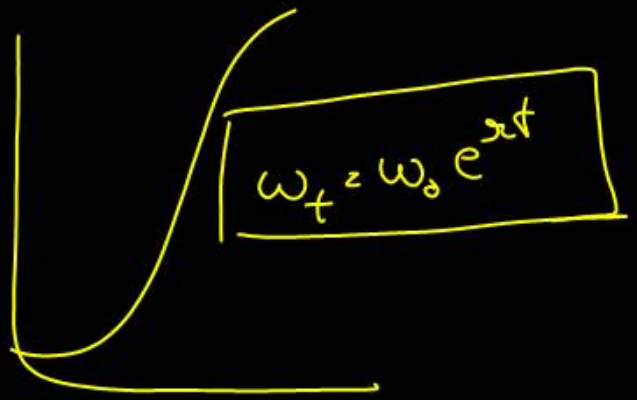
(2) $W_1 = W_0 + e^{rt}$

(3) $W_t = W_0 e^{rt}$

(4) $L_t = L_0 - rt$

3





Question no. 115

Match the following concerning the activity/function and the phytohormone involed.

	Column I		Column II
A.	Fruit ripener	(i)	Abscisic acid
B.	Herbicide	(ii)	GA_3
C.	Bolting agent	(iii)	2, 4–D
D.	Stress hormone	(iv)	Ethephone

Select the correct option.

	A	B	C	D
(1)	(ii),	(iii),	(iv),	(i)
(2)	(iii),	(iv),	(ii),	(i)
(3)	(iv),	(iii),	(ii),	(i)
(4)	(ii),	(ii),	(i),	(iii)

A – IV
B – III
C – ii
D – i

3

Question no. 116

Fixation of one CO_2 molecule through Calvin cycle requires

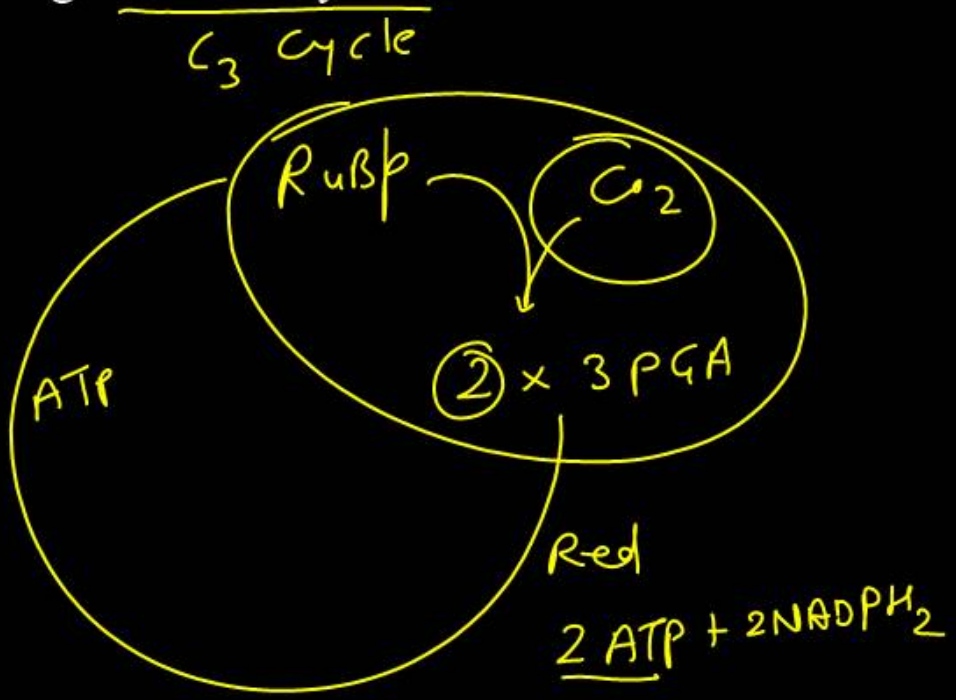
(1) 1 ATP and 2$NADPH_2$

(2) 2ATP and 2$NADPH_2$

(3) ~~3ATP~~ and 2$NADPH_2$

(4) 2ATP and 1$NADPH_2$

3



Question no. 117

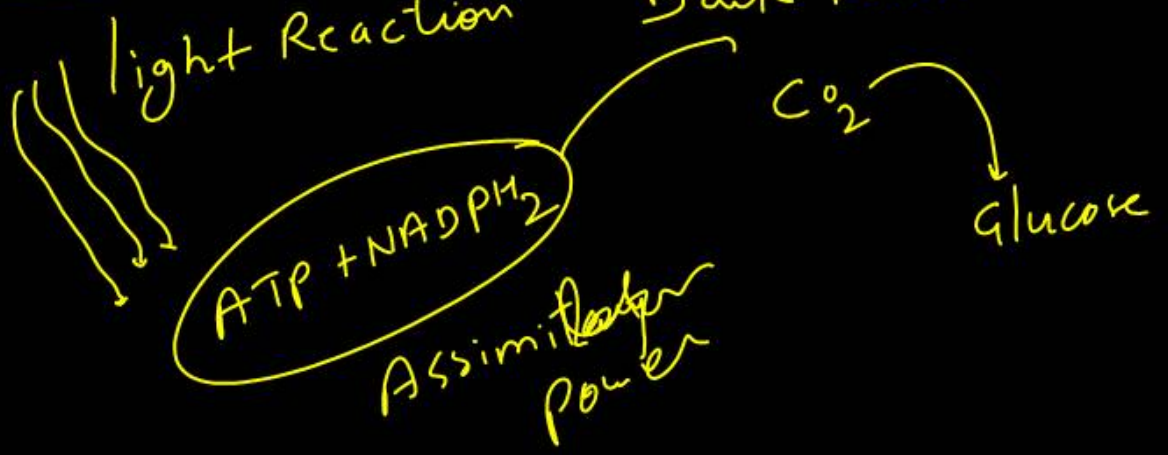
Assimilatory power in photosynthesis refers to

(1) ATP+NADPH$_2$+CO_2

(2) ATP+NADPH$_2$

(3) ATP

(4) NADPH$_2$



2

Question no. 118

A. Initial CO_2 acceptor.

B. Extent of photorespiration.

C. Enzyme catalyzing reaction that fixes CO_2.

D. Presence of Calvin cycle.

E. Leaf anatomy.

Which one does not differ in C_3 and C_4-plants?

(1) A and E

(2) Only D

(3) B and C

(4) Only B

C3
RuBP
RuBisCO
Calvin cycle
(meso)

C4
PEP
PEPcase
Calvin
(Bundle sheath)
Kranz Anatomy

Question no. 119

Which one of the following is complex V of the ETS of inner mitochondrial membrane?

ATP Synthase

(1) NADH dehydrogenase I

(2) Cytochrome c oxidase IV

(3) Ubiquinone

(4) ATP synthetase V

4

Question no. 120

Final electron acceptor in oxidative phosphorylation is

(1) hydrogen

(2) dehydrogenases

(3) cytochromes

(4) oxygen

Question no. 121

Match the number of carbon atoms given in column –I with that of the compounds given in column –II and select the correct option.

	Column –I		Column –II
A.	4C compound	I.	Acetyl CoA 2C
B.	2C compound	II.	Pyruvate 3C
C.	5C compound	III.	Citric acid ~~4C~~ 6C
D	3C compound	IV.	α -ketoglutaric acid 5C
		V.	Malic acid 4C

(1) A-II; B-V, C-III; D-I

(2) A-V; B-I, C-IV; D-II

(3) A-III; B-I, C-IV; D-II

(4) A-V; B-III, C-I; D-II

A-V
B-I
C-IV
D-II

2

Question no. 122

Which of the following growth regulators is an adenine derivative?

(1) Abscisic acid
(2) Auxin
(3) Cytokinin
(4) Ethylene

Question no. 123

Sites of gaseous exchange in lungs are–

(1) Alveoli

(2) Tracheoles

(3) Bronchioles

(4) Pleura

Question no. 124

Match List I with List– II correctly –

	List–I Types of leucocytes/WBCs		**List–II** Their % (of total WBC)
I.	Neutrophils	A.	20–25
II.	Basophils	B.	2–3
III.	Monocytes	C.	6–8
IV	Eosinophils	D.	0.5–1
V.	Lymphocytes	E.	60–65

(1) I–E, II–D, III–C, IV–A, V–B

(2) I–A, II–B, III–C, IV–E, V–D

(3) I–E, II–D, III–C, IV–B, V–A

(4) I–B, II–D, III–A, IV–C, V–A

3

Question no. 125

'Lubb' sound produced during heart beat is caused by

(1) ventricular diastole

(2) ventricular systole

(3) atrial diastole

(4) atrial systole

2

1st Heart Sound.

∴ Closure of Valves

∴ Ventricular systole

Question no. 126

Which chamber of the heart shows the greatest pressure changes during one cardiac cycle?

(1) Left atrium
(2) Left Ventricle
(3) Right atrium
(4) Right ventricle

2

Question no. 127

Which is the correct route through which pulse making impulse travels in the heart?

(1) SA node → AV node → Bundle of His → Purkinje fibres

(2) AV node → Bundle of His → SA node → Purkinje fibres → heart muscles

(3) AV node → SA node → Purkinje fibres → Bundle of His → heart muscles

(4) SA node → Purkinje fibres → Bundle of His → AV node → heart muscles

Question no. 128

The chemosensory area for respiration, in the brain, is most sensitive to:

(1) Low oxygen content

(2) High oxygen content

(3) Low carbon-di-oxide content

(4) High hydrogen ions content

(4)

High CO_2.

High Hydrogen.

Question no. 129

Which one of the followings statements is not correct?

(i) Total volume of air a person can expire after a normal inspiration is called expiratory capacity.

(ii) Binding of oxygen with haemoglobin is primarily related to partial pressure of CO_2

(iii) Every 100 ml of deoxygenated blood delivers approximately 4 ml of CO_2 to the alveoli.

(iv) Every 100 ml of oxygenated blood can deliver around 5 ml of O_2 to the tissues under normal physiological conditions

(1) (ii)
(2) (i) and (ii)
(3) (iii) and (iv)
(4) All of these

Question no. 130

Which of the following set of conditions promotes the dissociation of oxygen from haemoglobin?

(1) Low pO_2, high pCO_2, high H^+

(2) High pO_2, high pCO_2, low H^+

(3) High pO_2, low pCO_2, low H^+

(4) Low pO_2, low pCO_2, low H^+

Question no. 131

Select the correct option.

	Direction of RNA synthesis	Direction of reading of the template DNA strand
(1)	3' → 5'	3' → 5'
(2)	5' → 3'	3' → 5'
(3)	3' → 5'	5' → 3'
(4)	5' → 3'	5' → 3'

2

Question no. 132

Which of the following is a commercial blood cholesterol lowering agent?

(1) Statin

(2) Streptokinase

(3) Lispases

(4) Cyclosporin A

1

Question no. 133

Megasporangium is equivalent to

(1) Fruit

(2) Nucellus

(3) Ovule

(4) Embryo sac

3

Megasporophyll → Carpel

Megasporangium – ovule

♀ gametophyte – Embryosac

♀ gamete : Egg

Question no. 134

Which of the following approaches does not give the defined action of contraceptive?

(1) Hormonal contraceptives – prevent / retard entry of sperms, prevent ovulation and fertilization.

(2) Vasectomy – prevents spermatogenesis

(3) Bather methods – prevent fertilization

(4) Intra uterine devices – increase phagocytosis of sperms, suppres sperm motility and fertilizing capacity of sperms.

Question no. 135

Name the character of phylum Aschelminthes which differentiates it from all other phyla of kingdom Animalia

(1) Parasitic mode
(2) Round in shape
(3) Pseudocoelomate
(4) Bilateral symmetry

3

Question no. 136

In aquatic plant Ranunculus flabellaris (buttercup), submerged leaves are highly dissected whereas the emerged leaves are broad and lobed. This is an example of

(1) heterophylly

(2) environmental plasticity

(3) phenology

(4) both (1) and (2)

Question no. 137

Column I lists the parts of the human brain and column II lists the functions. Match the two columns and identify the correct option.

	Column -I		Column –II
A.	Cerebrum	I.	Body temperature
B.	Cerebellum	II.	Controls vision and hearing
C.	Hypothalamus	III.	Controls the rate of heart beat
D.	Medulla oblongata	IV.	Maintains body posture

(1) A-II, B-IV, C-I, D-III

(2) A-IV, B-II, C-III, D-I

(3) A-I, B-IV, C-III, D-II

(4) A-III, B-IV, C-I, D-II

Question no. 138

Which one of the following pairs, is not correctly matched?

(1) Abscisic acid – Stomatal closure

(2) Gibberellic acid – Leaf fall

(3) Cytokinin – Cell division

(4) IAA – Cell wall elongation

2

Question no. 139

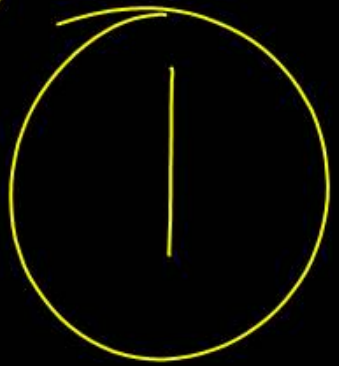
In C_4 plants, Calvin cycle operates in

(1) stroma of bundle sheath chloroplasts

(2) grana of bundle sheath chloroplasts

(3) grana of mesophyll chloroplasts

(4) stroma of mesophyll chloroplasts



Question no. 140

The enzyme responsible for primary carboxylation in C_3 plants is

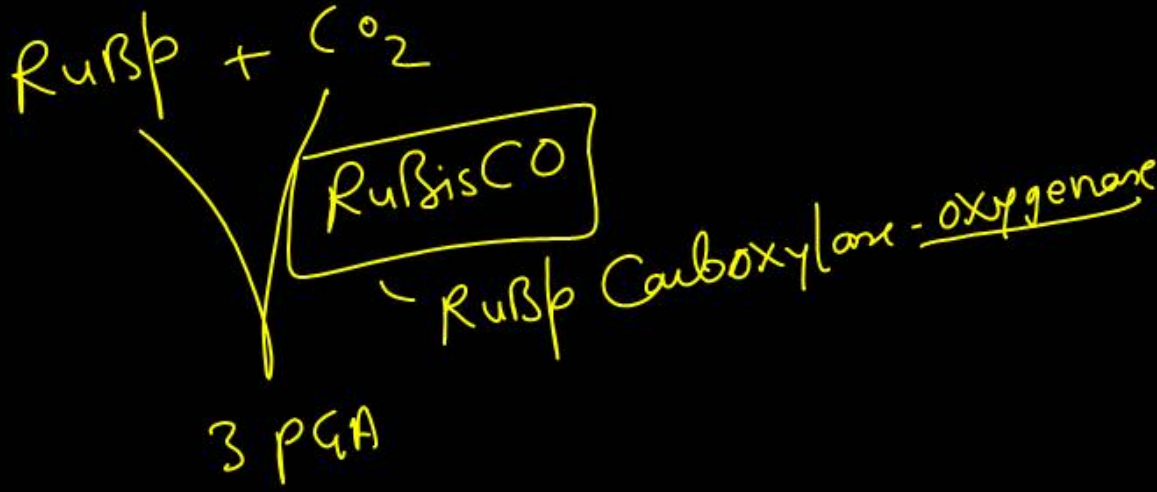
(1) Succinic dehydrogenase

(2) Rubp carboxylase oxygenase

(3) Hexokinase

(4) Pyruvate carboxylase

2



Question no. 141

Which of the following statement best support the fact that photorespiration commonly occurs on C_3 plant?

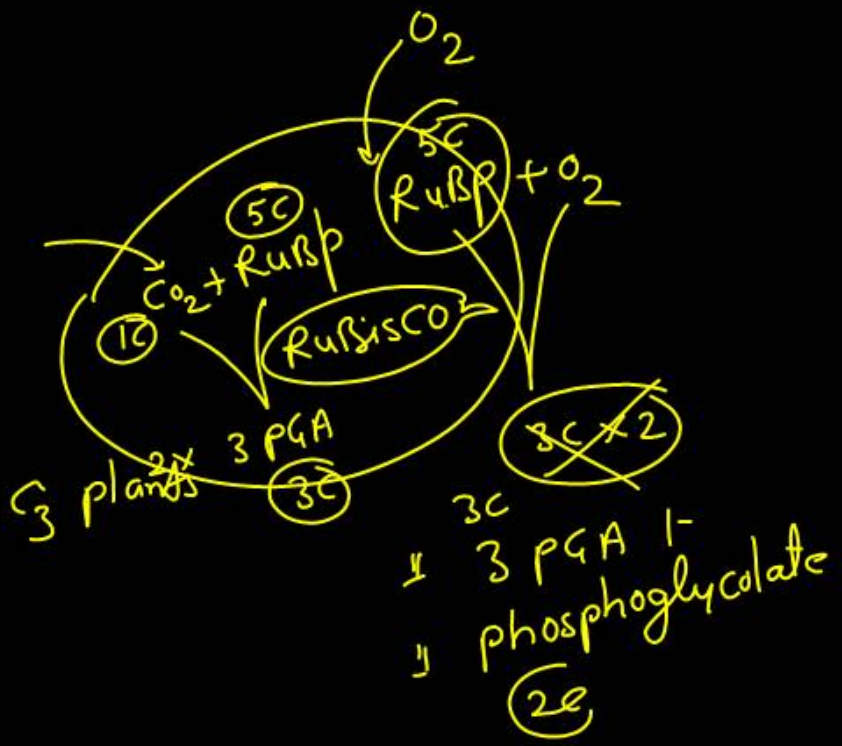
(1) C_3 plants don't possess Kranz anatomy.

(2) C_3 plants usually have high CO_2 compensation species.

(3) C_3 plants are less efficient in photosynthesis

(4) C_3 plants are characterized by RuBP oxygenase activity under high oxygen supply

4



Question no. 142

Identify the correct sequence of events in Krebs cycle.

(1) Acetyle CoA → Citrate → Pyruvate →

α -ketoglutarate → Succinate → Malate →

Fumarate → OAA

(2) Acetyl CoA → Citric acid → α -ketoglutaric acid → Succinic acid → Fumaric acid → Malic acid → OAA

(3) Acetyl CoA → Citric acid → Malic acid →

α -ketoglutaric acid → Succinic acid → OAA

(4) None of the above

2

Question no. 143

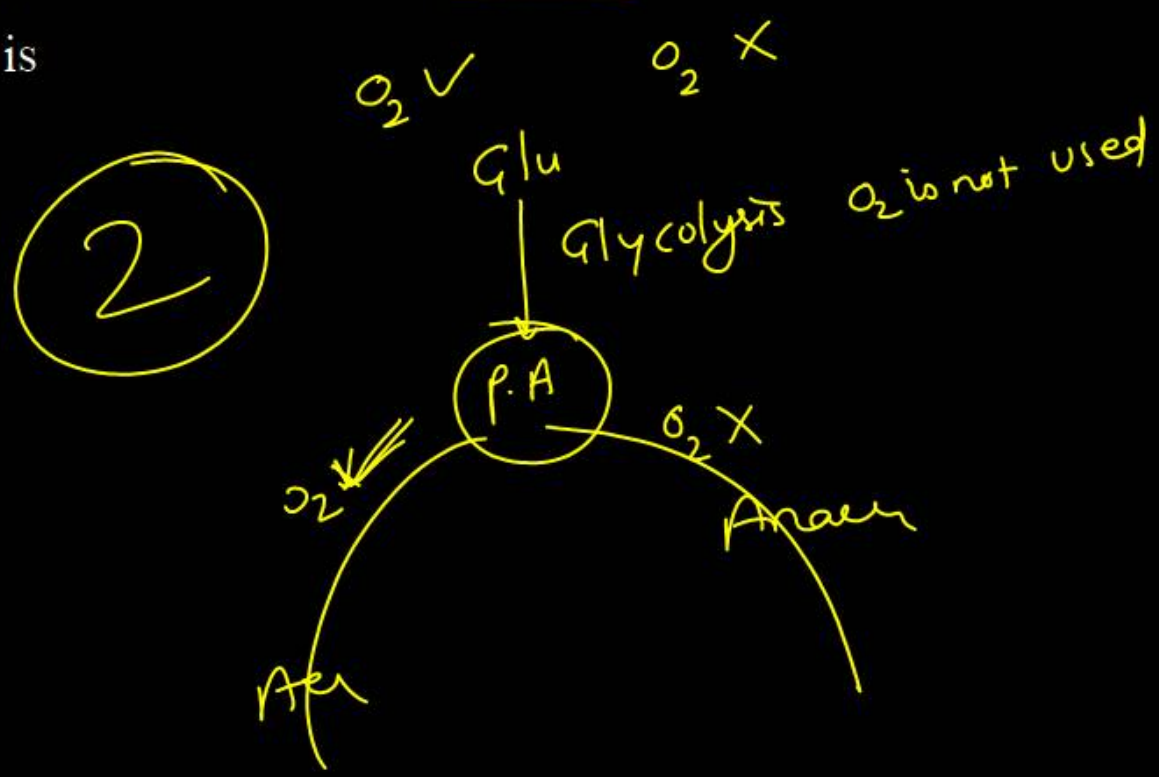
The intermediate compound common for aerobic and anaerobic respiration is

(1) citric acid

(2) pyruvic acid

(3) acetyl CoA

(4) succinic acid



Question no. 144

The ability of plant to follow different pathways and produce different structures in response to environment and phases of life is termed as

(1) elasticity

(2) growth efficiency

(3) plasticity

(4) heterophylly

Question no. 145

Closed circulatory system is found in–

(1) Arthopod and chordates

(2) Molluscs and chordates

(3) Amphibians and molluscs

(4) Annelids and chordates

4

Question no. 146

Match the plant hormones listed in column-I with their major role listed in column-II. Select the correct option from the codes given below.

	Column –I		Column –II
A.	Auxin	I.	Fruit ripening
B.	Cytokinins	II.	Apical dominance
C.	Abscisic acid	III.	Antagonistic to GAs
D.	Ethylene	IV.	Stomatal opening and closing
		V.	Growth of lateral buds

(1) A-IV; B-V, C-III; D-I

(2) A-II; B-IV, C-III; D-I

(3) A-II; B-V, C-III; D-I

(4) A-IV; B-V, C-II; D-I

A - II
B - V
C - III
D - I

3

Question no. 147

Match the following correctly

	Animals		**Respiratory Organs**
A.	Earthworms	I.	Lungs
B.	Most aquatic arthropods	II.	Trachea
C.	Fishes	III.	Gills
D.	Birds/Reptiles	IV	Moist cuticle
E.	Insects		

(1) A–IV, B and C–III, D–I, E–II

(2) A–IV, B–III, C and D–I, E–III

(3) A–II, B and C–III, D–I, E–IV

(4) A–III, B and C–I, D–II, E–IV

Question no. 148

What would be the cardiac output of a person having 72 heart beats per minute and a stoke volume of 50 ml?

(1) 360 mL

(2) 3600 mL

(3) 7200 mL

(4) 5000 mL

Question no. 149

The opening between the right atrium and the right ventricle is guarded by which valve?

(1) Bicuspid valve

(2) Tricuspid valve

(3) Mitral valve

(4) Semilunar valve

Question no. 150

Persons with 'AB' blood group are called as "Universal recipients". This is due to:

AB — Antigen A & B

a ~~a~~ b

(1) Absence of antibodies, anti –A and anti-B, in plasma

(2) Absence of antigens A and B on the surface of RBCs

(3) Absence of antigens A and B in plasma

(4) Presence of antibodies, anti-A and anti-B, on RBCs

Question no. 151

Arrange the followings in the order of increasing volume

A. Tidal volume

B. Residual volume

C. Expiratory reserve volume

D. Vital capacity

(1) A < B < C < D

(2) A < C < B < D

(3) A < D < C < B

(4) A < D < B < C

Question no. 152

Name the chronic respiratory disorder caused mainly by cigarette smoking :

(1) Respiratory alkalosis

(2) Emphysema

(3) Asthma

(4) Respiratory acidosis

Question no. 153

"When two pairs of traits are combined in a hybrid, segregation one pair of characters is independents of the other pair of characters". This explains

(1) Law of dominance

(2) Law of segregation

(3) Law of independent assortment

(4) Postulate of paired factors

2

Question no. 154

Match the following columns.

	Column I		Column II
A.	Homo habilis	I.	First human like hominid being
B.	Homo erectus	II.	Buried their dead with flowers
C.	Neanderthal man	III.	Brain size around 900cc
D.	Cro-Magnon man	IV.	Excellent cave painting/art

	A	B	C	D
(1)	IV	III	II	I
(2)	III	I	II	IV
(3)	I	II	III	IV
(4)	I	III	II	IV

Question no. 155

Identify the palindromic sequence in the following

(1) $\frac{GAATTC}{CTTUUG}$

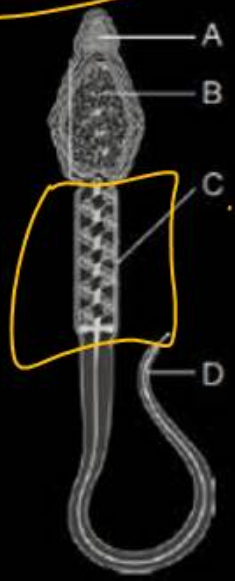
(2) $\frac{GGATCC}{CCTAGG}$

(3) $\frac{CCTGG}{GGACC}$

(4) $\frac{CGATA}{GCTAA}$

Question no. 156

Which of the following labelled parts parts produces energy for the movement of the tail that facilitate sperm motility essential for fertilisation?



(1) A

(2) B

(3) C

(4) D

Question no. 157

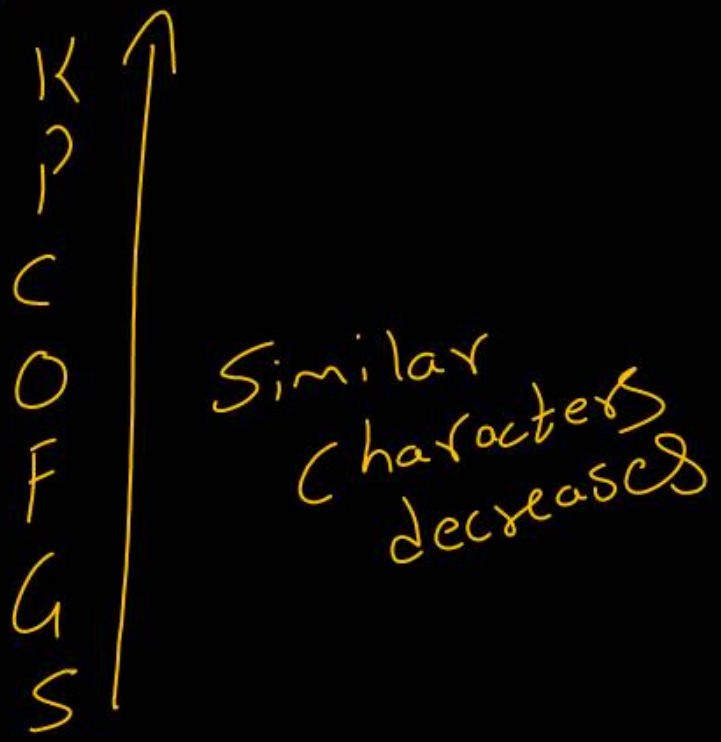
As we go from species to kingdom in a taxonomic hierarchy, the number of common characteristics:

(1) will decrease

(2) will increase

(3) remain same

(4) may increase or decrease



Question no. 158

Assertion (A): FSH which interacts with membrane bound receptors does not enter the target cell.

Reason (R) : Binding of FSH to its receptors generates second messenger (cyclic AMP) for its biochemical and physiological responses.

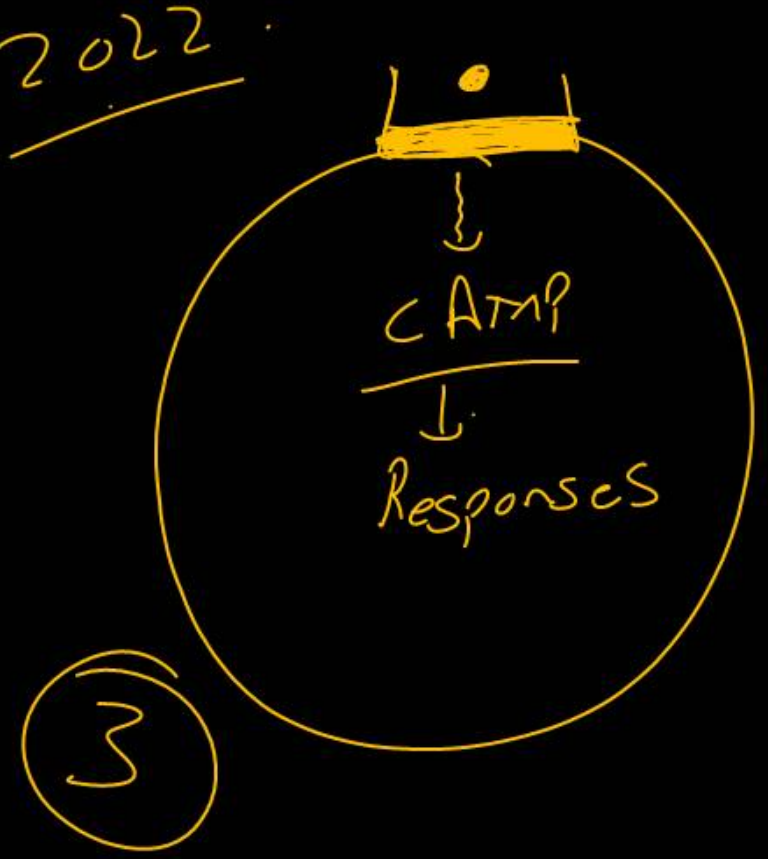
In the light of the above statements, choose the most appropriate answer from the options given below:

(1) (A) is not correct but (R) is correct

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

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

(4) (A) is correct but (R) is not correct



Question no. 159

Spraying sugarcane crop with which of the following plant growth regulators, increase the length of stem, thus increasing the yield?

(1) Auxin
(2) Gibberellin
(3) Cytokinin
(4) Abscisic acid

2

Question no. 160

The specific characteristic of C_4-plants is

(1) Bulliform cells

(2) Isobilateral leaf

(3) Kranz anatomy

(4) Parallel veins configuration

3

Question no. 161

Which chemical compound /molecule supplies electrons continuously to PS-II?

(1) CO_2

(2) O_2

(3) H_2O

(4) NADPH

photolysis of water

3

Question no. 162

Read the following four statements a, b, c and d and select the right option having both correct statements

A. Z scheme of light reaction takes place in presence of PSI only

B. Only PSI is functional in cyclic photophosphorylation.

C. Cyclic photophosphorylation results into synthesis of ATP and $NADPH_2$

D. Stromal lamellae lack PSII as well as NADP.

(1) B and D

(2) A and B

(3) B and C

(4) C and B

Question no. 163

In glycolylsis the end product is

(1) phosphoglyceric acid

(2) citric acid

(3) pyruvic acid

(4) glucose

Question no. 164

Which of the following processes make direct use of oxygen?

(1) Glycolysis

(2) Fermentation

(3) Electron transport

(4) Krebs cycle

Question no. 165

Each molecule of NADH release how many number of ATP molecules?

3 ATP

$FADH_2$: 2 ATP

(1) 3

(2) 2

(3) 4

(4) 5

Question no. 166

Which of the following is the correct sequence of the developmental process in a plant cell?

(1) Plasmatic growth, Differentiation, Senescence and Maturation respectively.

(2) Plasmatic growth, Differentiation, Maturation and Senescence respectively

(3) Maturation, Plasmatic growth, Differentiation and Senescence respectively.

(4) Differentiation, Plasmatic growth, Maturation and Senescence respectively.

2

Question no. 167

The majority of CO_2 is transported as–

(1) Carbonates

(2) Bicarbonates ✓

(3) Carbaminohaemoglobin

(4) Dissolved state in blood

20-25% : Carbaminohaemoglobin.

7% : Dissolved in Plasma.

70% : Bicarbonate.

(2)

Question no. 168

The part starting with the external nostrils upto the terminal bronchioles constitute the –

(1) Respiratory or exchange part or respiratory system

(2) Inspiratory part

(3) Conducting part

(4) Expiratory part

Question no. 169

A doctor suggested to a couple not to have more than one child because of –

(1) Rh^+ male and Rh^- female

(2) Rh^- male and Rh^+ female

(3) Rh^- male and Rh^- female

(4) Rh^+ male and Rh^+ female

Question no. 170

ECG depicts the depolarization and repolarization processes during the cardiac cycle. In the ECG of a normal healthy individual one of the following waves is not represented.

(1) Depolarisation of atria — P

(2) Repolarisation of atria

(3) Depolarisation of ventricles — QRS

(4) Repolarisation of ventricles — T

2

Question no. 171

Arteries are best defined as the vessels which

(1) Carry blood from one visceral organ to another visceral organ

(2) Supply oxygenated blood to the different organs

(3) Carry blood away from heart to different organs

(4) Break up into capillaries which reunite to form a vein

3

Question no. 172

Which one of the following is correct?

(1) Serum = Blood +Fibrinogen

(2) Lymph = Plasma +RBC+WBC

(3) Blood = Plasma +RBC +WBC

(4) Plasma = Blood - Lymphocytes

Question no. 173

Partial pressures of oxygen and carbon dioxide in healthy human lung alveoli are, respectively, nearest to:

(1) 104 and 40 mm of Hg

(2) 90 and 20 mm of Hg

(3) 40 and 45 mm of Hg

(4) 159 and 0.3 mm of Hg

Question no. 174

Name the pulmonary disease in which alveolar surface area involved in gas exchange is drastically reduced due to damage in the alveolar walls:

(1) Emphysema

(2) Pneumonia

(3) Erythrocytes

(4) Pleurisy

Question no. 175

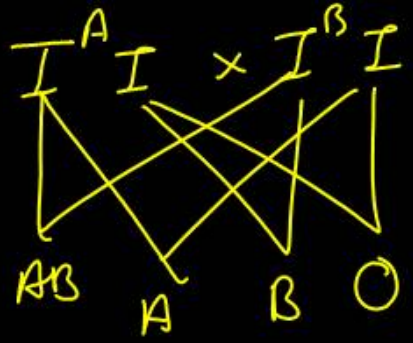
Three children in a family have blood types O, AB and B respectively. What are the genotypes of their parents?

(1) I^Ai and I^Bi

(2) I^AI^B and ii

(3) I^BI^B and I^AI^A

(4) I^AI^A and I^Bi



Question no. 176

A population is in Hardy-Weinberg equilibrium for a gene with only two alleles. If the gene frequency of an allele A is 0.7 the genotype frequency of heterozygous is

(1) 0.21 (2) 0.42

(3) 0.36 (4) 0.7

2

A

$p = 0.7$

$p + q = 1$

$0.7 + q = 1$

$q = 1 - 0.7$

$q = 0.3$

$AA = p^2$

$Aa = 2pq$

$aa = q^2$

$2pq = 2 \times 0.7 \times 0.3$

$= 0.42$

Question no. 177

What will be the effect if pBR322, a cloning vector does not carry "Ori" site?

(1) Sticky ends will not produce

(2) More replication will occur

(3) The cell will transform into a tumour cell

(4) Replication will not take place

Origin of Replication is Absent

4

Question no. 178

Seminal plasma of humans is rich in

(1) Fructose and certain enzymes, poor in Ca^{2+}.

(2) Fructose, Ca^{2+} and certain enzymes.

(3) Fructose, Ca^{2+} but no enzymes.

(4) Glucose, certain enzymes but no Ca^{2+}.

Question no. 179

Match List –I with List-II;

	List –I		List –II
A.	Imbricate	I.	Calotropis
B.	Valvate	II.	Cassia
C.	Vexillary	III.	Cotton
D.	Twisted	IV.	Bean

Choose correct answer from the options given below

(1) A-I, B-III, C-IV, D-II

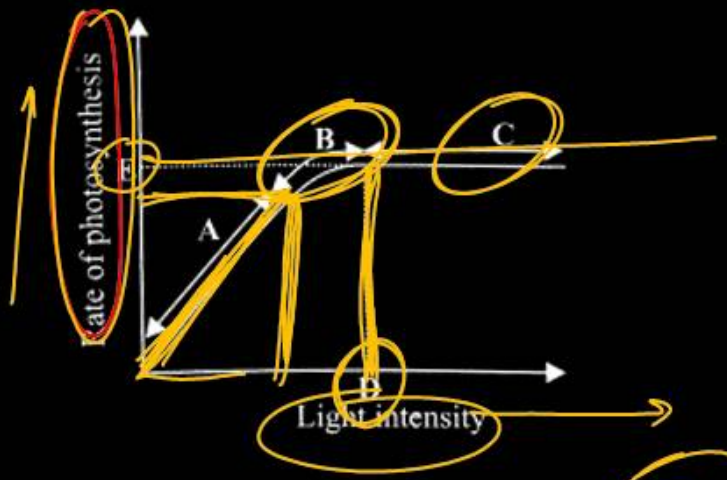
(2) A-II, B-I, C-III, D-IV

(3) A-II, B-I, C-IV, D-III

(4) A-II, B-IV, C-III, D-I

Question no. 180

Study the figure showing graph of light intensity on the rate of photosynthesis. Choose the correct option by matching the column I with column II.



	Column -I		Column –II
A.	Limiting factor in region A	I.	Some factor other than light intensity is becoming the limiting factor
B.	B represents to	II.	Light is no longer limiting factor
C.	C represents to	III.	Light intensity
D.	D represents to	IV.	Maximum rate of photosynthesis
E.	E represents to	V.	Saturation point for light intensity

A-III
B-I
C-II
D-V
E-IV

(1) A-I, B-II, C-III, D-IV, E-V

(2) A-III, B-I, C-II, D-V, E-IV

(3) A-IV, B-II, C-V, D-III, E-I

(4) A-V, B-IV, C-III, D-II, E-I