JEE MAINS 2026

PAPER SOLUTION

24 JAN, SHIFT 2

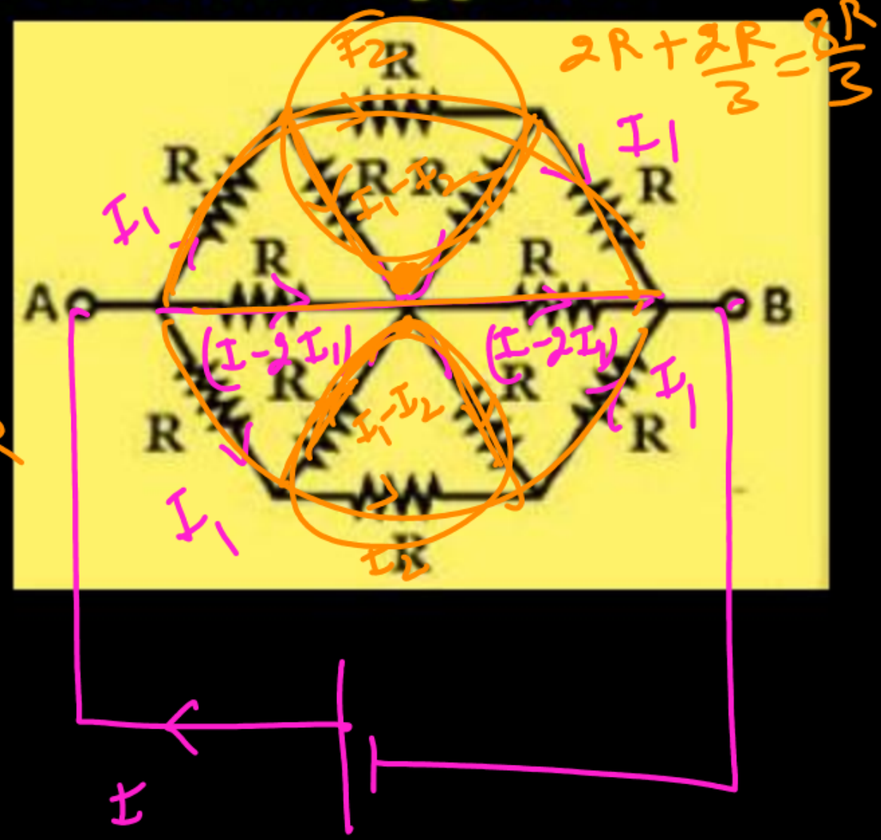
Physics

Q) A regular hexagon is formed by six identical resistors, each of resistance R. Find the equivalent resistance between two opposite vertices A and B of the hexagon.

(A) R
(B) R/2
(C) 3R/2
(D) 2R

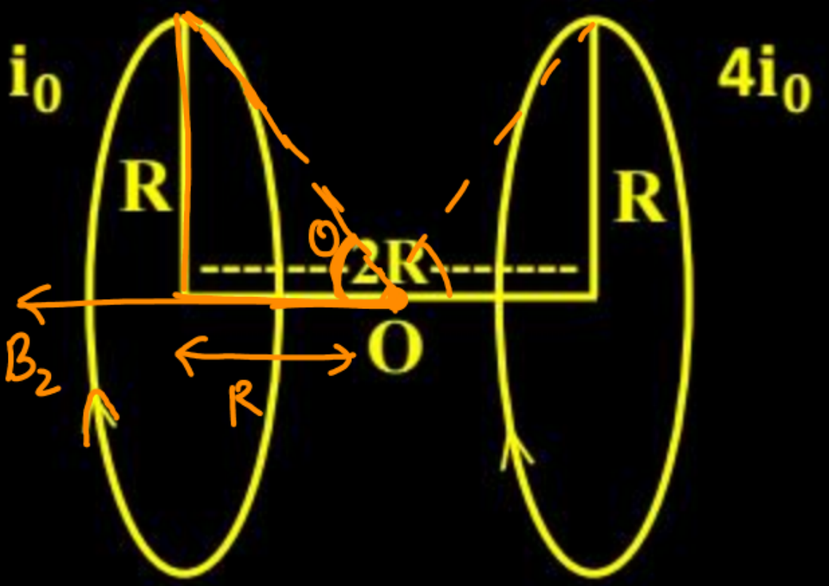
$$\frac{1}{R_{eq}} = \frac{1}{\frac{8R}{3}} + \frac{1}{\frac{8R}{3}} + \frac{1}{2R}$$

$R_{eq} =$



Ans. (C)

Q) Find magnetic field at point O.



$$B_1 = \frac{\mu_0 i}{2R}\sin^3\theta = \frac{\mu_0 i_0}{2R}\left(\frac{1}{\sqrt{2}}\right)^3$$

$$B_2 = 4B_1$$

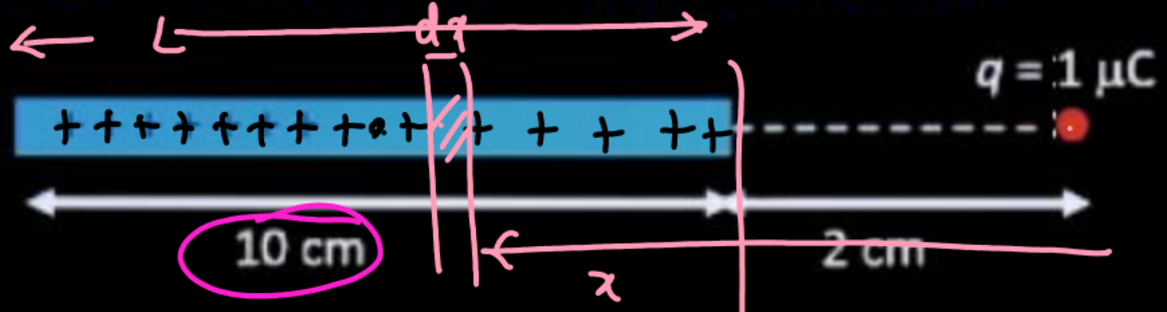
$$B_{net} = B_1 + B_2 = 5\left(\frac{\mu_0 i_0}{4\sqrt{2}R}\right)$$

$$B = \frac{\mu_0 N i_0 R^2}{R\left(x^2+R^2\right)^{3/2}}$$

Ans. ()

Q) Find force on charge q = 1μC as due to uniformly charged rod as shown in the figure.

(A) 15 N
(B) 6 N
(C) 12 N
(D) 7.5 N



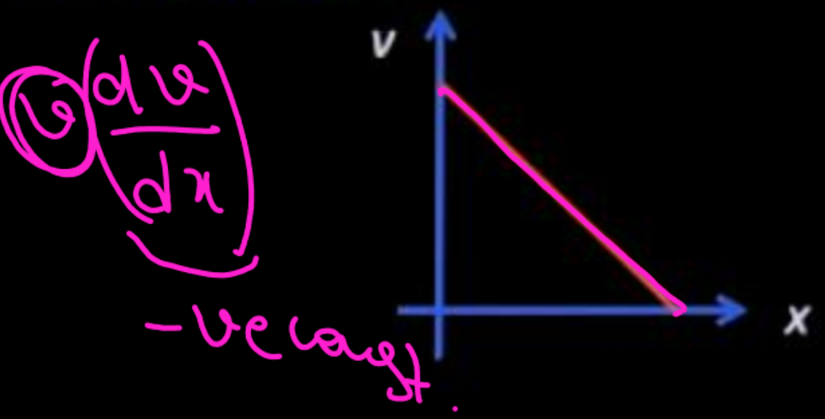
$Q = 2\mu C$

$$dq = \frac{Q}{L}dx$$

$$F = \int_{0.2\,m}^{0.12\,m} \frac{k(10^{-6})\,Q\,dx}{L \quad x^2} \qquad 2\mu C,\ L \to 0.10$$

Ans. (D)

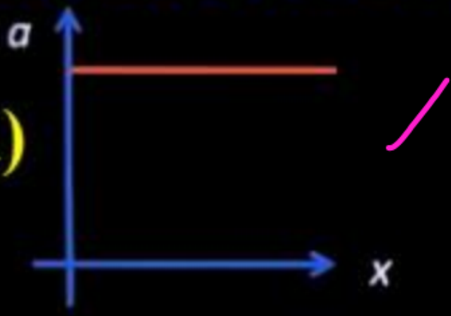
Q) Velocity of particle varies with position as shown in the below graph. Find the correct variation of acceleration with position.



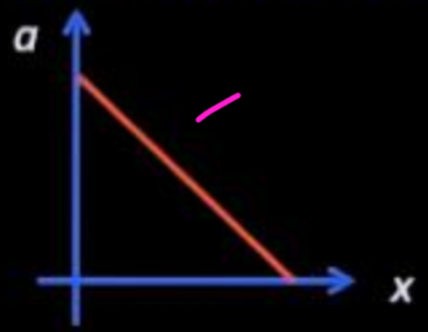
$a = v\frac{dv}{dx}$

-ve slope.

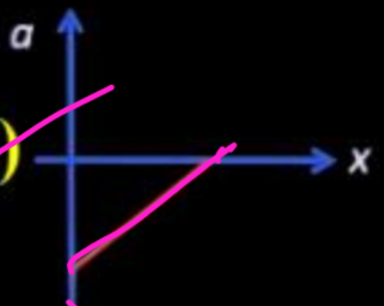
(A)



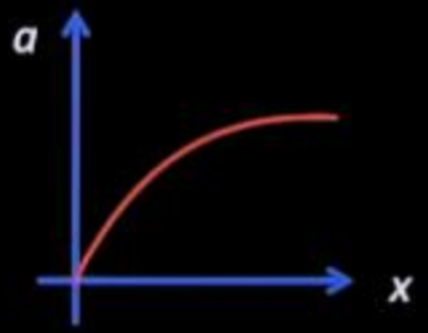
(C)



(B)



(D)



Ans. (B)

Q) The frequency of the 5th harmonic of a closed organ pipe is equal to the fundamental frequency of an open organ pipe. Find the ratio of the lengths of the closed organ pipe to the open organ pipe.

$$5\left(\frac{\lambda_1}{4}\right) = L_1$$

$$\lambda_1 = \frac{4L_1}{5}$$

$$f_1 = \frac{5v}{4L_1}$$

$$f_2 = \frac{v}{2L_2}$$

$$f_1 = f_2$$

$$\frac{5v}{4L_1} = \frac{v}{2L_2}$$

$$\frac{L_1}{L_2} = \frac{5}{2}$$

Q) When monochromatic light of wavelength λ is incident on a photoelectric emitter, the stopping potential is 3.2 V. When light of wavelength 2λ is incident on the same emitter, the stopping potential becomes 0.7 V. Determine the value of λ.

$$2.5\,eV = \frac{hc}{2\lambda}$$

$$2.5\,eV = \frac{1}{2}\left(\frac{1240}{\lambda(nm)}\right)$$

$$KE_{max} = \frac{hc}{\lambda} - \phi$$

$$3.2\,eV = \frac{hc}{\lambda} - \phi$$

$$0.7\,eV = \frac{hc}{2\lambda} - \phi$$

Ans. ()

Q) A particle attached to an ideal string is projected from position B (lowest position). At position A, tension in string becomes zero. Find speed in string at B.

(A) $\sqrt{5gl}$

(B) $\sqrt{\frac{7gl}{2}}$

(C) $\sqrt{\frac{3gl}{2}}$

(D) $\sqrt{2gl}$

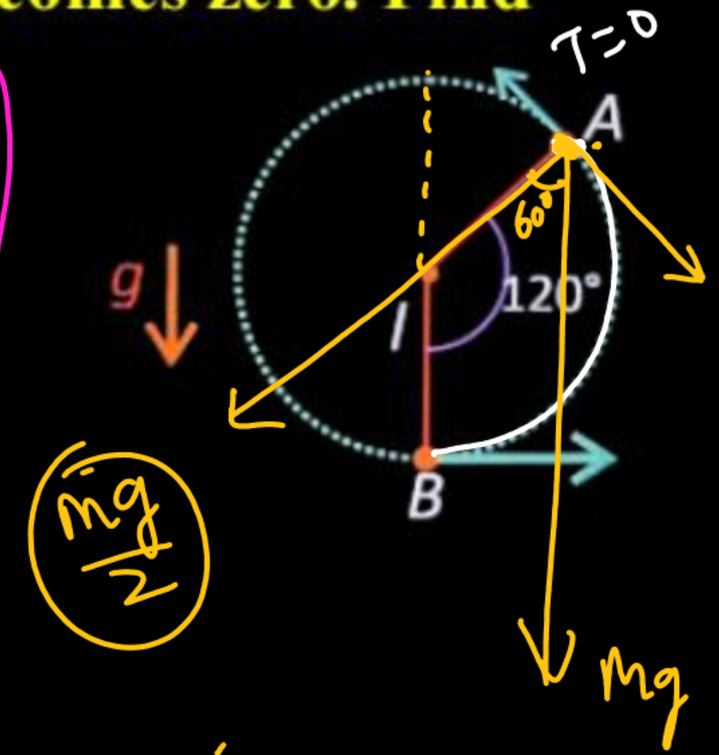
$F_R = ma_R$

$\frac{mg}{2} = m\left(\frac{v^2}{l}\right)$

$v = \sqrt{\frac{gl}{2}}$

$-mg\left[\frac{3l}{2}\right] = \frac{mv^2}{2} - \frac{m}{2}u^2$

$u = ?$

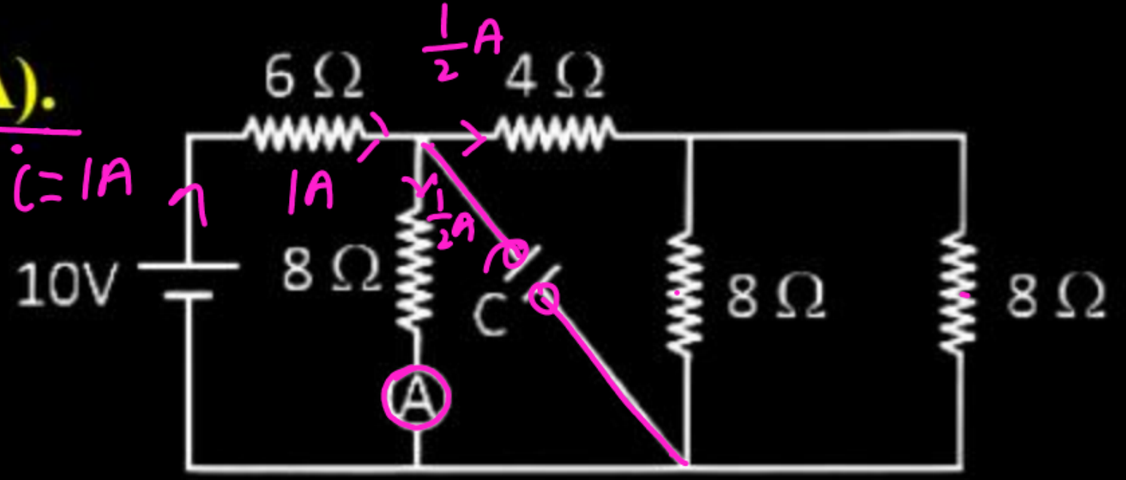


Ans. (B)

Q) Find current through ammeter (in A).

(A) 0.75 (B) 1

(C) 2 (D) 0.5



Ans. (D)

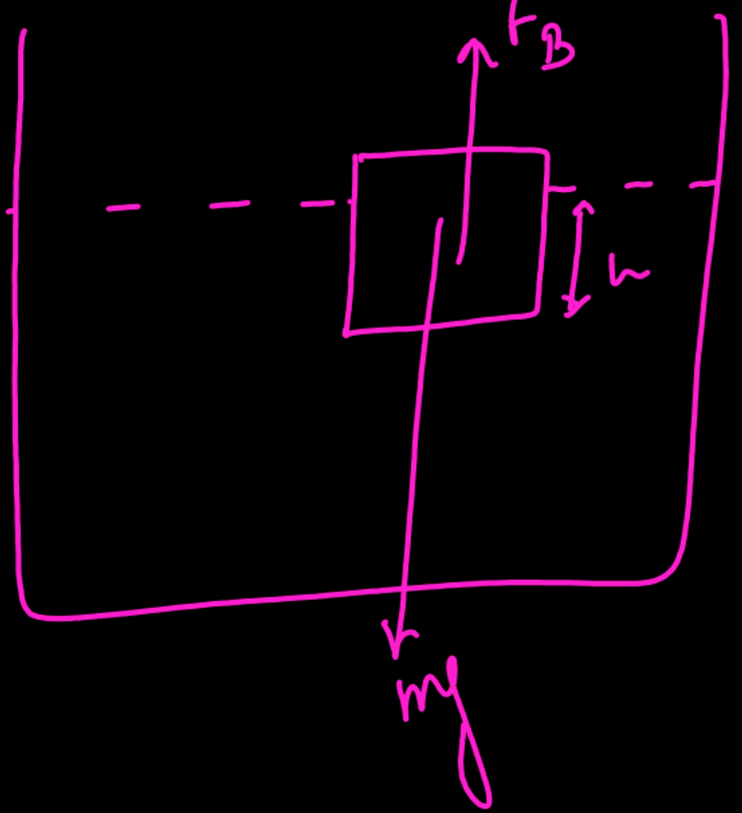
Q) A cube of side length 8 cm having density 600 kg/m³ is floating in liquid density 900 kg/m³. Find height of cube inside the liquid.

$F_B = mg$

$900 \times a^2 h \rho g = 600 \times a^3 \rho g$

$h = \frac{6a}{9} = \frac{2}{3}a$

$h = \frac{16}{3}\,cm$



Ans. ()

Chemistry

Q) An electron make transition from higher energy orbit (n_2) to lower energy orbit (n_1) in Li^{+2} ion such that $n_1 + n_2 = 4$ & $n_2 - n_1 = 2$. Determine the wavelength emitted in the dimension (in nm)

(A) 11.4nm (B) 12.9nm (C) 9.2nm (D) 16.7nm

$n_1 + n_2 = 4$

$n_2 - n_1 = 2$

$n_2 = 3 \Rightarrow n_1 = 1$

$$\Delta E = 13.6 \times Z^2 \left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

$$= 13.6 \times 3^2 \times \left(\frac{1}{1^2} - \frac{1}{3^2}\right)$$

$$= 13.6 \times 9 \times \frac{8}{9} = 13.6 \times 8 \text{ eV}$$

$$\Delta E = \frac{hc}{\lambda}$$

$$\lambda = \frac{hc}{\Delta E} = \frac{1240 \text{ eV-nm}}{13.6 \times 8 \text{ eV}}$$

$$= 11.4 \text{ nm}$$

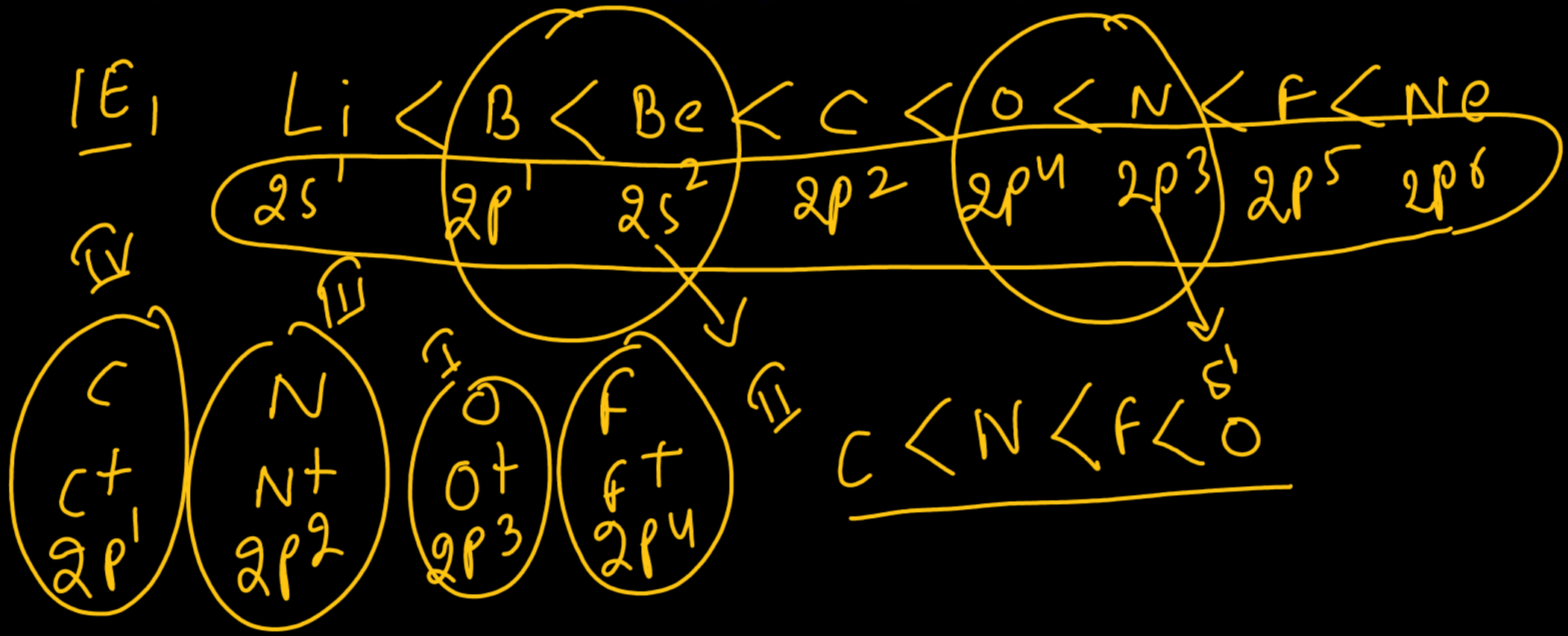
Q) Choose the correct order of second IE of O, C, N and F

(A) C < N < O < F

(B) C < N < F < O

(C) C < O < F < N

(D) C < F < O < N



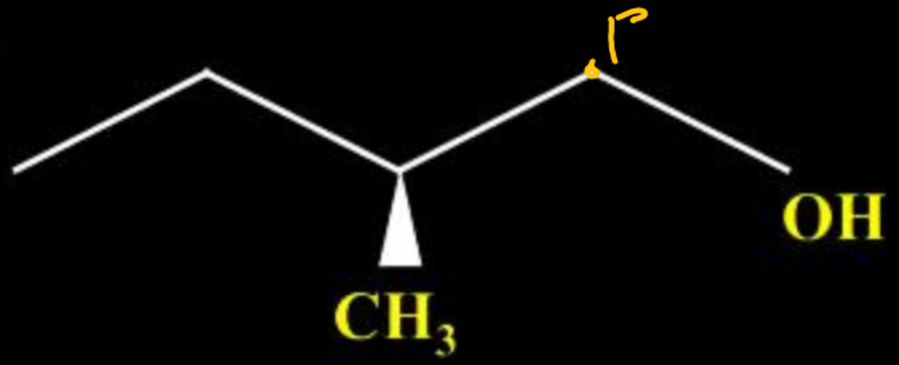
Q) Using three different amino acid alanine, glycine & therenine total possible tripeptide.

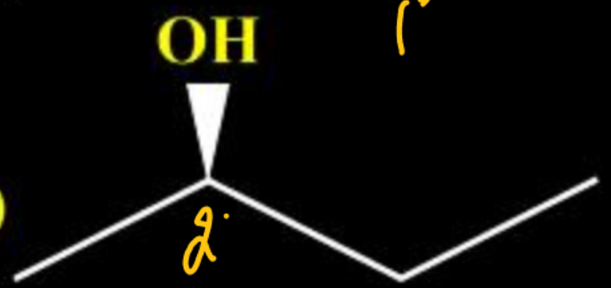
$(3)^3 = 27$

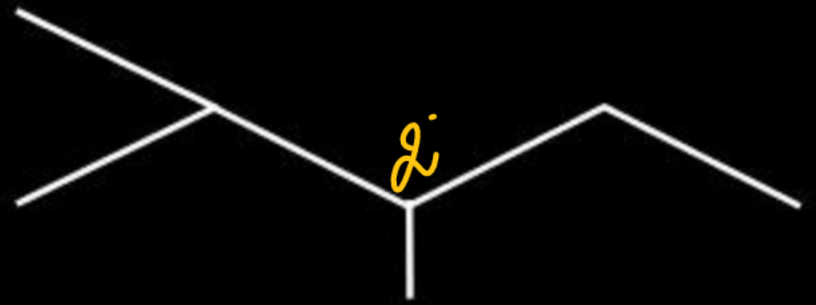
Ans. (27)

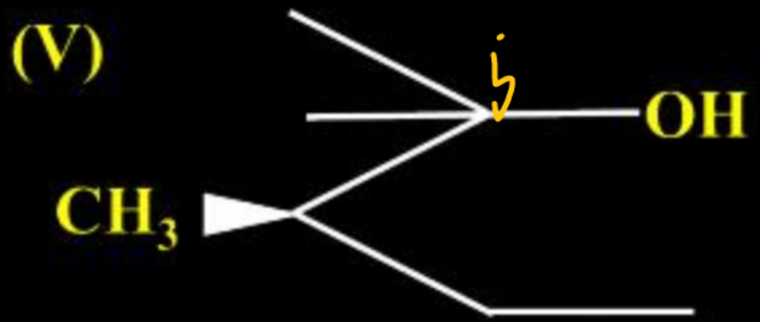
Q) How many compound is 2° alcohol

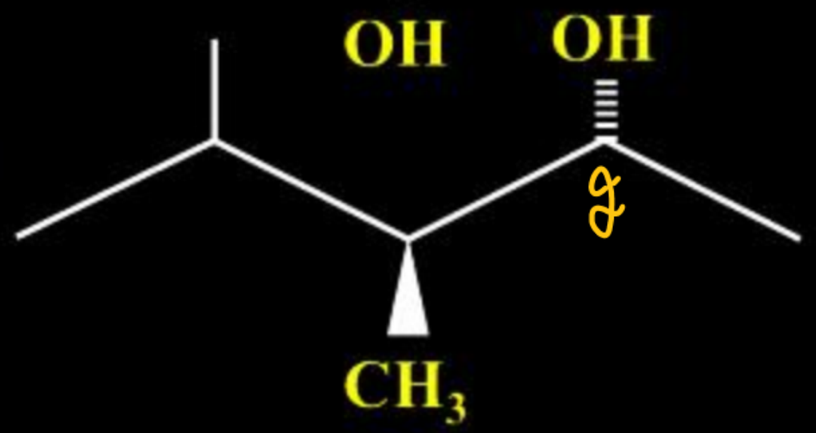
(I) 

(II) 

(III) 

(IV) 

(V) 

(VI) 

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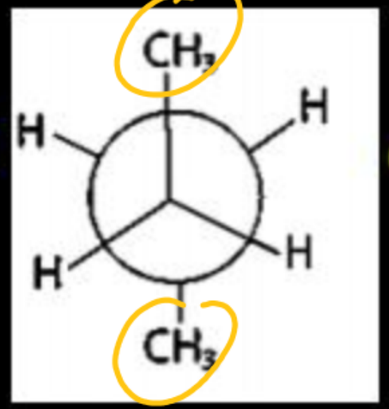
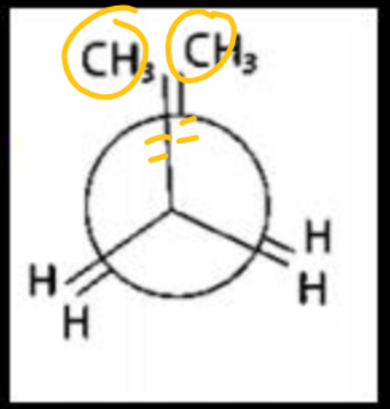
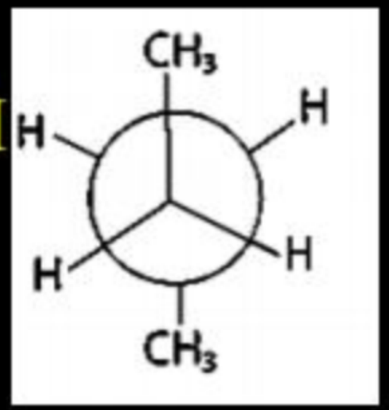
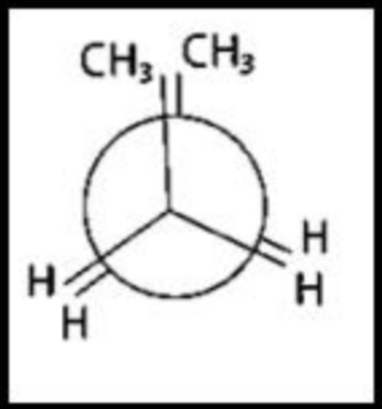
Q) Statement I 

conformer is more stable than 

Statement II 

has less steric strain than 

$R-C\equiv N \xrightarrow{H_3O} R-\underset{O}{\overset{\|}{C}}-OH \xrightarrow{NH_3/\Delta} R-\underset{O}{\overset{\|}{C}}-NH_2 \xrightarrow{KOBr} R-NH_2$

Q) Statement I: By using two different aldehyde four different product are formed by self and cross aldol condensation

Statement II: alkyl cyanide after hydrolysis produced product react with ammonia after heating formed product react with KOBr produced product P which on further reaction with chloroform in presence of KOH produce product RNC.

S.I

R_1-CH_2-CHO $\xrightarrow{OH^-/\Delta}$

R_2-CH_2-CHO

$R_1-CH_2-CH=\underset{R_1}{C}-CHO$

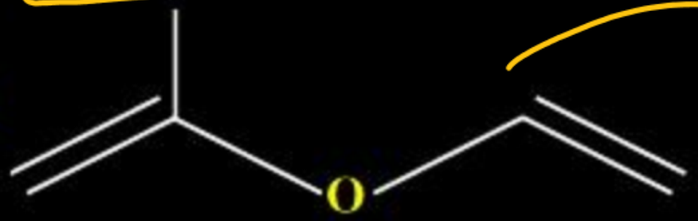
$R_2-CH_2-CH=\underset{R_2}{C}-CHO$

$R_1-CH_2-CH=\underset{R_2}{C}-CHO$

$R_2-CH_2-CH=\underset{R_1}{C}-CHO$

Q) Given $R–O–R' \xrightarrow{H_3O^+} R-OH + R-OH$

State



$\xrightarrow{H_3O^+} R-OH + R-OH$

P,Q are can be differentiate by

(A) 2,4-DNP

(B) Lucas

(C) $NaHSO_3$

(D) Fehling Reagent

Q) Order of wavelength of absorbed radiation for the below given complexes is,

(a) $[Co(NH_3)_6]^{3+}$ (2)

(b) $[Co(NH_3)_5\ H_2O]^{3+}$ (3)

(c) $[CoF_6]^{3-}$ Δ min → (4)

(d) $[Co(CN)_6]^{3-}$ (1)

(A) d > a > c > b

(B) d > a > b > c

(C) d < a < b < c ✓

(D) d < a < c < b

λ ?

Ligand strength ↑ Δ ↑ λ ↓

$\Delta = \frac{hc}{\lambda}$ λ ↑ (Δ ↓)

Δ c < b < a < d

λ c > b > a > d

$F^- < NH_3 < CN^-$ e.g. Strength

Q) Given:

$\Delta H_{atom}\,(CH_4) = x\ kJ\ mole^{-1}$

$\Delta H_{atom}\,(C_2H_6) = y\ kJ\ mole^{-1}$

Find out bond energy (C – C) (kJ/mole)

(A) $y = x$ **(B)** $y - 4x$ **(C)** $y - \frac{3x}{2}$ **(D)** $y - 2x$

$CH_4 \rightarrow C(g) + 4H(g)$

$\Delta H = 4 \times E_{C-H} = x$

$E_{C-H} = \frac{x}{4}$

Ans. (C)

$$C_2H_6(g) \longrightarrow 2C(g) + 6H(g)$$

$$\Delta_r H = y = \epsilon_{C-C} + 6x\,\epsilon_{C-H}$$

$$\epsilon_{C-C} = y - 6x\,\epsilon_{C-H}$$

$$= y - 6x\,\frac{x}{4}$$

$$= y - \frac{3x}{2}$$

Q) Two compounds A & B form ideal solution. If mole fraction of A in vapour is 0.8 Calculate mol fraction of A in liquid ($P_A^0 = 55$ torr, $P_B^0 = 15$ torr)

(A) 0.4 (B) 0.52 (C) 0.6 (D) 0.7

$y_A = 0.8$, $x_A = ?$

$P_A = P_A^0 x_A = y_A \times P_T$

$P_B = P_B^0 x_B = y_B \times P_T$

$$\frac{P_A^0}{P_B^0} \times \frac{x_A}{1-x_A} = \frac{y_A}{1-y_A}$$

$$\frac{55}{15} \times \frac{x_A}{1-x_A} = \frac{0.8}{0.2}$$

$$x_A = 0.52$$

Q) Identify pair having same Bond order having both paramagnetic species

(A) N_2^+, O_2^- (B) N_2^+, O_2^+ (C) N_2^-, O_2^+ (D) N_2^-, O_2^-

(A): $13e^-$, $17e^-$ (B): $13e^-$, $15e^-$ (C): $15e^-$ ≡ $15e^-$ (D): $15e^-$, $17e^-$

MOT

(C): odd

upto 14

≥14

upto 14: $\sigma_{1s} < \sigma_{1s}^* < \sigma_{2s} < \sigma_{2s}^* < \pi_{2p} \equiv \pi_{2p_y} < \sigma_{2p_z}$

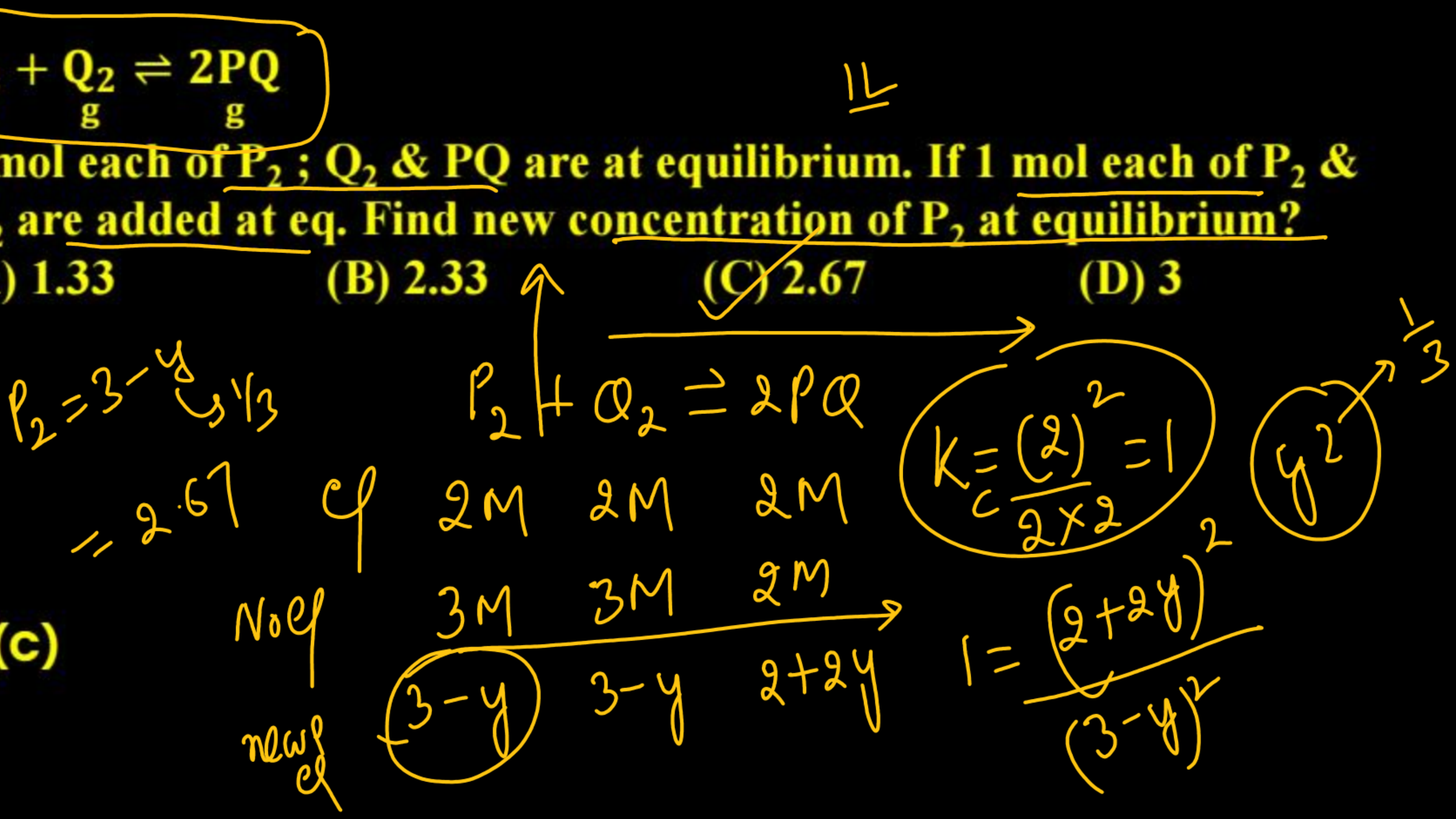
>14: $\sigma_{1s} < \sigma_{1s}^* < \sigma_{2s} < \sigma_{2s}^* < \sigma_{2p_z} < \pi_{2p_x} \equiv \pi_{2p_y}$

Q) $\underset{g}{P_2} + \underset{g}{Q_2} \rightleftharpoons \underset{g}{2PQ}$

2 mol each of P_2 ; Q_2 & PQ are at equilibrium. If 1 mol each of P_2 & Q_2 are added at eq. Find new concentration of P_2 at equilibrium?

(A) 1.33 (B) 2.33 (C) 2.67 (D) 3

Ans. (C)



Math

Q) If words are arranged in a dictionary alphabetically, then rank of UDAYPUR is?

ADPRUUY

A ——— $= \frac{6!}{2!} = 360$

D ——— 360

P ——— 360

R ——— 360

1440

UA ——— $5! = 120$

UDAP — $3! = 6$

UDAR — $3! = 6$

UDAU — $3! = 6$

UDAYPR — $= 1 = 1$

UDAYPUR $= 1 = 1$

140

1580

Ans. (1580)

Q) The value of sum $S = \left(\frac{1}{3}+\frac{4}{7}\right) + \left(\left(\frac{1}{3}\right)^2 + \left(\frac{4}{7}\right)^2 + \left(\frac{1}{3}\right)\left(\frac{4}{7}\right)\right) + \left(\left(\frac{1}{3}\right)^3 + \left(\frac{1}{3}\right)^2\left(\frac{4}{7}\right) + \left(\frac{1}{3}\right)\left(\frac{4}{7}\right)^2 + \left(\frac{4}{7}\right)^3\right) + \ldots$, then S is equal to

(A) $\frac{5}{2}$ (B) $\frac{3}{2}$ (C) $\frac{1}{2}$ (D) 2

Ans. (A)

$x = \frac{1}{3}$, $y = \frac{4}{7}$

$S = (x+y) + (x^2+y^2+xy) + \ldots$

$(x-y)S = (x^2-y^2) + (x^3-y^3) + (x^4-y^4) + \ldots$

$\left(\frac{1}{3}-\frac{4}{7}\right)S = \frac{x^2}{1-x} - \frac{y^2}{1-y}$

$S = 5/2$

Q) let $z = (1 + i)(1 + 2i)(1 + 3i)$ and $(1 + ni)$, where $i = \sqrt{-1}$ if If $|z|^2 = 44200$, then n is equal to:

$|z| = |1+i|\,|1+2i|\,|1+3i| \cdots |1+ni|$

$|z| = \sqrt{2}\,\sqrt{5}\,\sqrt{10}\,\sqrt{17}\,\sqrt{1+n^2}$

$|z|^2 = 2 \cdot 5 \cdot 10 \cdot 17 (1+n^2) = 44200 = 2 \times 5 \times 10 \times 17 \times 26$

$1+n^2 = 26$

$n^2 = 25 \Rightarrow n = 5$

22100
4420 (442) 26
442/17
(26)

Ans. (5)

Q) Let f be a function such that $3f(x) + 2f\left(\frac{m}{19x}\right) = 5x, x \neq 0$ where $m = \sum_{i=1}^{9} (i)^2$, then f(5) – f(2) is equal to

$m = 1^2 + 2^2 + \dots + 9^2$

$= \frac{9 \times 10 \times 19}{6}$

$= 15 \times 19$

$x \to \frac{15}{x}$

$3f(x) + 2f\left(\frac{15}{x}\right) = 5x$

$3f\left(\frac{15}{x}\right) + 2f(x) = \frac{75}{x}$

$\frac{3}{2}\left[5x - 3f(x)\right] + 2f(x) = \frac{75}{x}$

$\frac{15}{2}x - \frac{5}{2}f(x) = \frac{75}{x} \Rightarrow \frac{3x}{2} - \frac{15}{x} = \frac{f(x)}{2}$

$f(x) = 3x - \frac{30}{x}$

$f(15) = 15 - 6 = 9$

$6 - 15 = -9$

$9 - (-9)$

Ans. (18)

Q) The maximum value of n for which 40^n divides 60! Is equal to

(A) 11 (B) 13 (C) 14 (D) 12

$$\varepsilon_2(60!) = \left[\frac{60}{2}\right] + \left[\frac{60}{4}\right] + \left[\frac{60}{8}\right] + \left[\frac{60}{16}\right] + \left[\frac{60}{32}\right] + 0$$

$$= 30 + 15 + 7 + 3 + 1 = 56$$

$$\varepsilon_5(60!) = \left[\frac{60}{5}\right] + \left[\frac{60}{25}\right] + 0 = 12 + 2 = 14$$

$$60! = 2^{56} \cdot 3^{x} \cdot 5^{14} \cdots$$

$$= 2^2 \cdot (2^3)^{18} \cdot 3^{x_2} \cdot 5^{14}$$

$\varepsilon_p(n)$

$40 = 8 \times 5 = 2^3 \cdot 5^1$

$(40)^{14}$

Ans. (C)

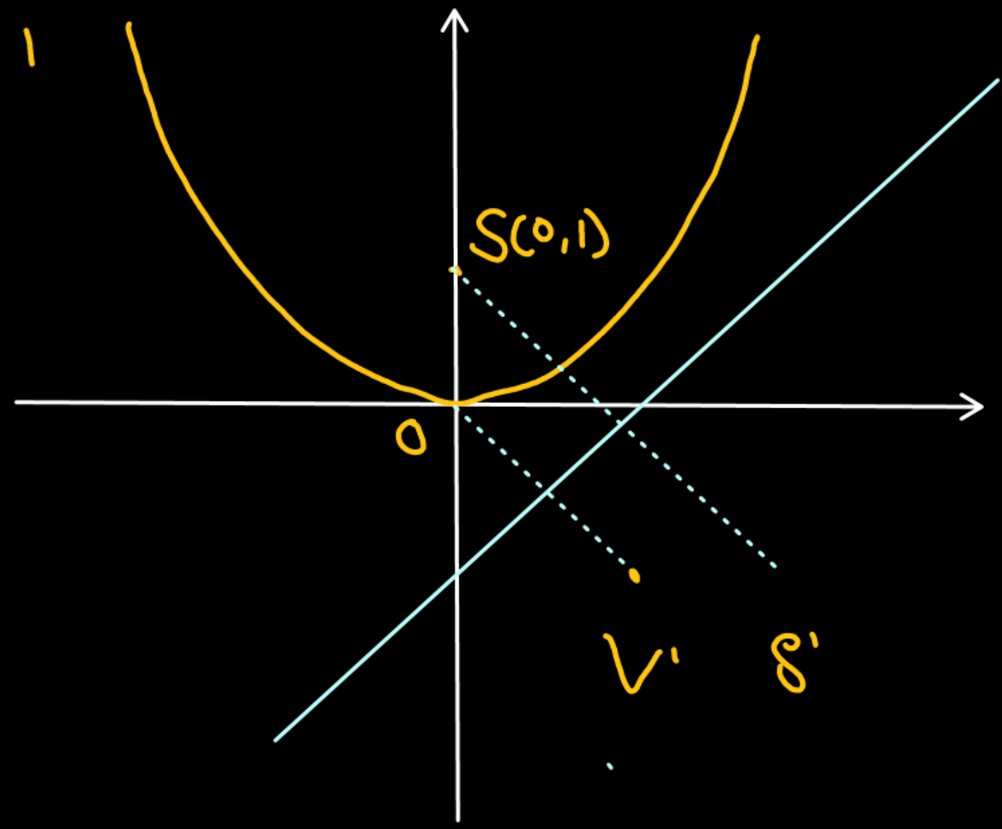
Q) The image of the parabola $x^2 = 4y$ in the line $x - y = 1$ is

(A) $(y-1)^2 = 4(x+1)$ **(B)** $(y+1)^2 = 4(x+1)$

(C) $(y+1)^2 = 4(x-1)$ **(D)** $(y-1)^2 = 4(x-1)$

$$\frac{x-0}{1} = \frac{y-0}{-1} = -2\left(\frac{0-0-1}{2}\right) = 1$$

$x = 1, y = -1 \Rightarrow V'(1,-1)$



Ans. (C)

Q) Let the equation $x^4 - ax^2 + 9 = 0$ have four real and distinct roots. Then the least integral value of a is

(A) 5 **(B) 7** **(C) 6** **(D) 8**

$f(t) = t^2 - at + 9$

Let $t = x^2 \Rightarrow x = \pm\sqrt{t}$, $t > 0$

$t^2 - at + 9 = 0$

$f(0) > 0$ and $D > 0$ and $-\frac{b}{2a} > 0$

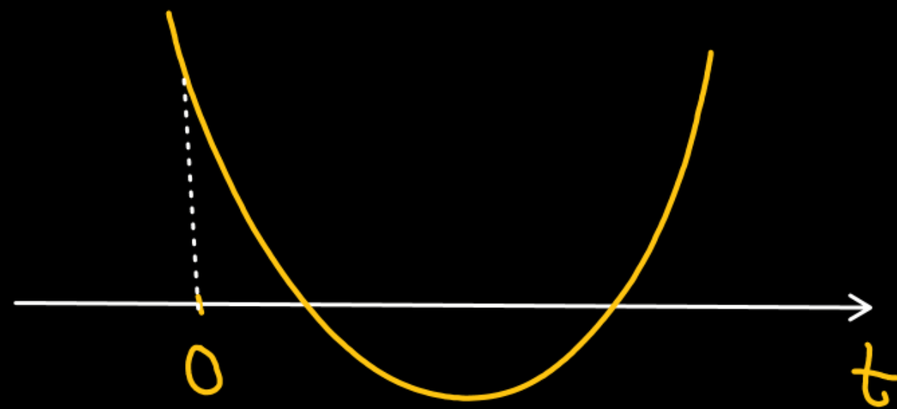
$9 > 0$ and $a^2 - 36 > 0$ and $\frac{a}{2} > 0$

$(a+6)(a-6) > 0$

$a > 0$

$a < -6 \cup a > 6$

$\Rightarrow \boxed{a > 6}$



Ans. (B)

Q) Let p(x) be a differentiable function such that p(1) = 2.

If $\lim_{t\to x}\left(\frac{t^2p(x)-x^2p(t)}{x-t}\right)=3$, then the value of 2p(2).

$$\lim_{t\to x}\frac{2t\cdot p(x)-x^2p'(t)}{-1}=3$$

$$x^2p'(x)-2xp(x)=3$$

$$p'(x)-\frac{2}{x}p(x)=3/x^2$$

$$\text{I.F.}=e^{-2\int\frac{1}{x}dx}=1/x^2$$

$$\frac{p(x)}{x^2}=\int\frac{3}{x^2}\cdot\frac{1}{x^2}dx+C$$

$$\frac{p(x)}{x^2}=3\frac{1}{-3x^3}+C$$

$$p(x)=-\frac{1}{x}+Cx^2$$

$$p(1)=2$$

$$2=-1+C$$

$$\boxed{C=3}$$

$$p(x)=-\frac{1}{x}+3x^2$$

$$p(2)=-\frac{1}{2}+12$$

$$2p(2)=-1+24=23$$

Ans. (23)

Q) let h, k lie on the circle $x^2 + y^2 = 4$ and the point $2h + 1, 3k + 2$ lie on the ellipse with eccentricity e, then the value of $\frac{5}{e^2}$.

$= a \quad = b \quad (a, b)$

Parametric form

$h = 2\cos\theta$

$k = 2\sin\theta$

$a = 2(2\cos\theta) + 1$

$a = 4\cos\theta + 1$

$b = 3(2\sin\theta) + 2$

$b = 6\sin\theta + 2$

$\cos^2\theta + \sin^2\theta = 1$

$$\left(\frac{a-1}{4}\right)^2 + \left(\frac{b-2}{6}\right)^2 = 1$$

$e^2 = 1 - \frac{16}{36} = \frac{20}{36} = \frac{5}{9}$

$\frac{5}{e^2} = 9$

Ans. (9)

Q) The domain of $\text{Sin}^{-1}\left(\frac{1}{x^2-2x-1}\right)$ is $(-\infty, \alpha] \cup [\beta, \gamma] \cup [\delta, \infty)$.

The value of $\alpha + \beta + \gamma + \delta$ is equal to:

$$\left|\frac{1}{x^2-2x-1}\right| \leq 1$$

$$|1| \leq |x^2-2x-1|$$

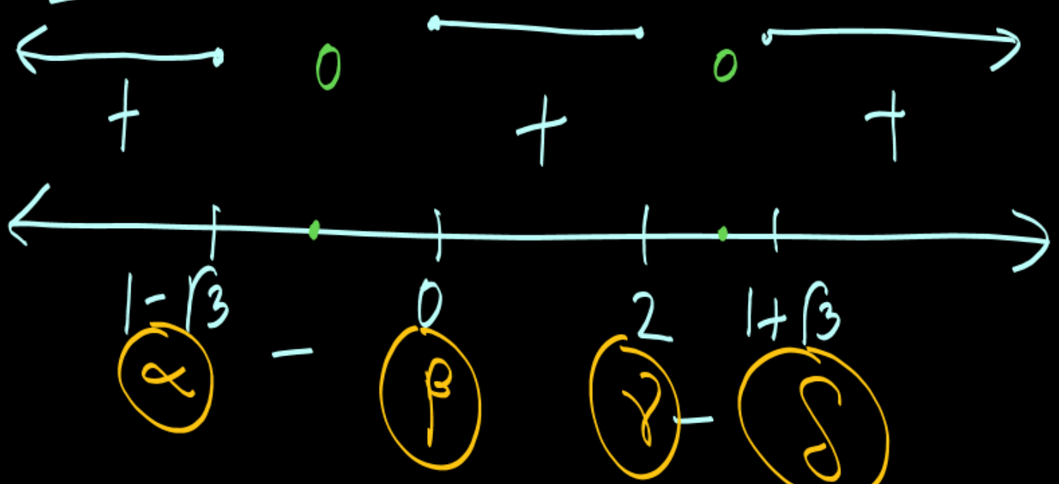
Sq.

$$|1|^2 \leq |x^2-2x-1|^2$$

$$|x^2-2x-1|^2 - |1|^2 \geq 0$$

$$(x^2-2x)(x^2-2x-2) \geq 0$$

$$x(x-2)\left(x-(1+\sqrt{3})\right)\left(x-(1-\sqrt{3})\right) \geq 0$$



$$x^2-2x-1 \neq 0$$

$$\frac{2 \pm \sqrt{4+4}}{2} = 1 \pm \sqrt{2}$$

$$\frac{2 \pm \sqrt{4+8}}{2}$$

$$1 \pm \sqrt{3}$$

4

4

Ans. ()

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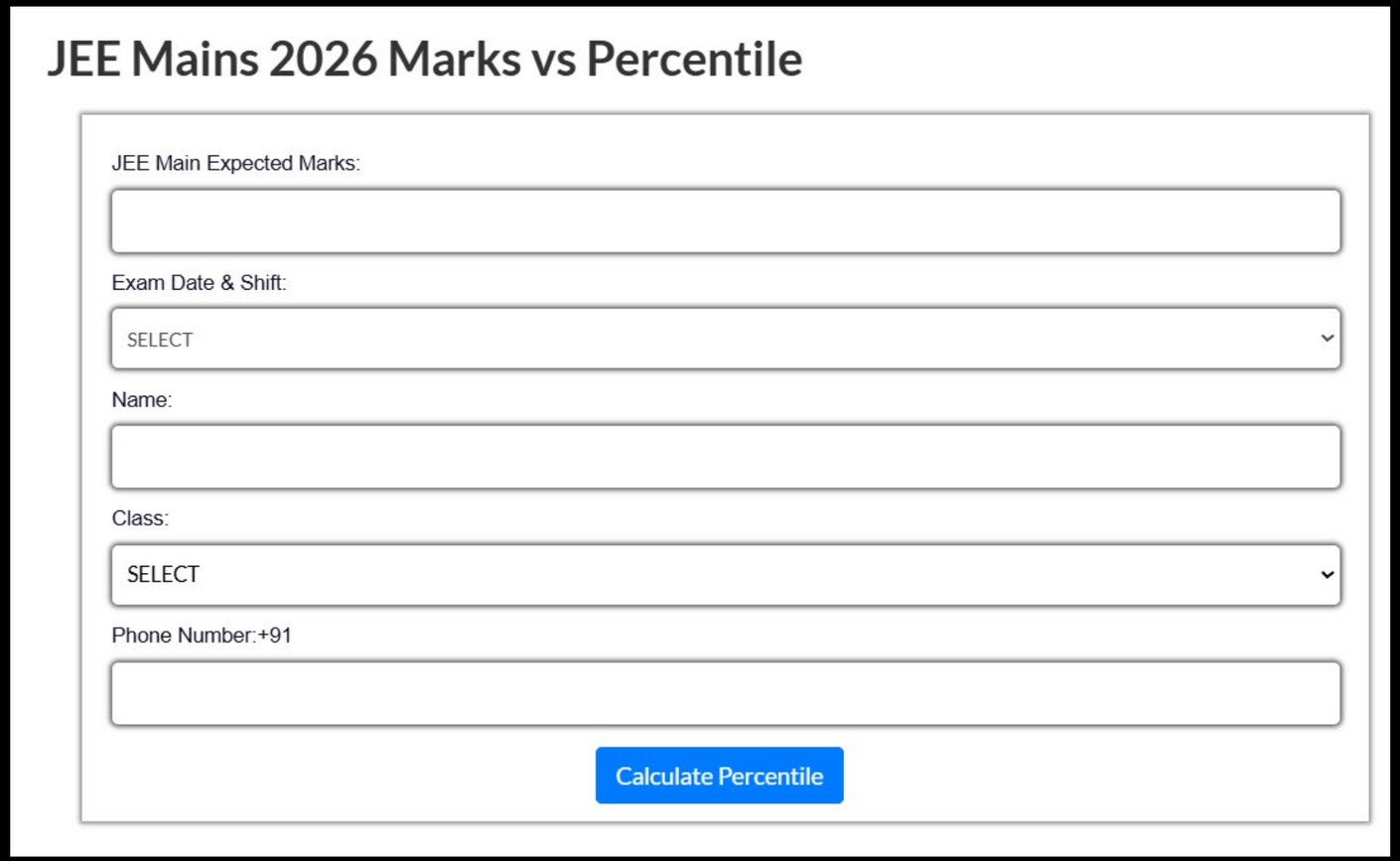

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