JEE MAINS 2026

PAPER SOLUTION

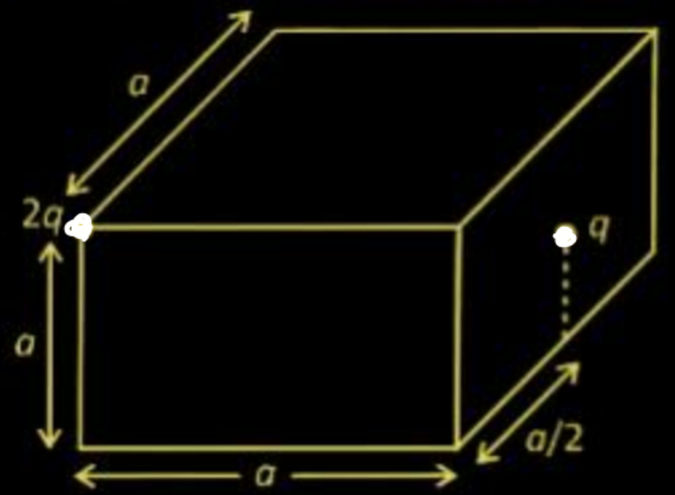
23 JAN, SHIFT 1

Physics

Q) There are two point charges, one at vertex and other at face as shown the cube. Find electric flux through the cube.

(A) q/ε_0 **(B) $3q/4\varepsilon_0$**

(C) $2q/\varepsilon_0$ **(D) $5q/\varepsilon_0$**



$$\phi_{net} = \frac{2q}{4\pi\varepsilon_0} + \frac{q}{2\varepsilon_0}$$

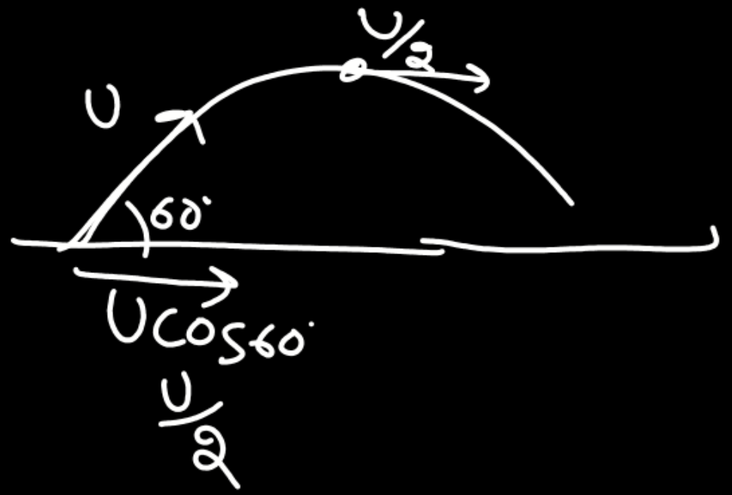
$$= \frac{q+2q}{4\varepsilon_0} = \frac{3q}{4\varepsilon_0}$$

Ans. (B)

Q) A particle is projected from the ground with an initial velocity making an angle of 60° with the horizontal. If its kinetic energy at the point of projection is k_0 and the kinetic energy at the highest point of the trajectory is k_1, then find the value of $\frac{k_0 - k_1}{k_0}$

(A) $\frac{1}{2}$ (B) $\frac{2}{3}$ (C) $\frac{3}{4}$ (D) $\frac{1}{5}$

Ans. (C)



$K_0 = \frac{1}{2}mU^2$

$K_1 = \frac{1}{2}m\left(\frac{U}{2}\right)^2$

$= \frac{1}{8}mU^2$

$$K_0 - K_1 = \frac{1}{2}mu - \frac{1}{8}mu$$

$$K_0 - K_1 = \frac{3mu^2}{8}$$

$$\frac{K_0 - K_1}{K_0} = \frac{\frac{3}{8}mu^2}{\frac{1}{2}mu^2} = \frac{3}{4}$$

Q) For the given set of measurement find relative error.
20.00, 19.75, 18.25, 17.01

(A) 0.12 **(B) 0.06** **(C) 0.17** **(D) 0.09**

Sol"

$$\bar{x} = \frac{20.00 + 19.75 + 18.25 + 17.01}{4}$$

$$\bar{x} = 18.75$$

$$\Delta\bar{x} = \frac{1.25 + 1 + 0.5 + 1.74}{4}$$

$$\Delta\bar{x} = 1.12$$

Ans. (B)

$\Delta x_1 = 1.25$

$\Delta x_2 = 1.00$

$\Delta x_3 = 0.50$

$\Delta x_4 = 1.74$

$$\frac{\Delta\bar{x}}{\text{Mean}} = \frac{1.12}{18.75} = 0.06$$

A

Q) A simple pendulum of length 30cm complete 40 revolutions in 10sec then how much length of this pendulum should be increased so that it complete 20 revolutions in 10sec.

$T \propto \frac{1}{f}$

$T_1 = T$

$T_2 = 2T$

$T = 2\pi\sqrt{\frac{l}{g}}$

$T \propto \sqrt{l}$

$T^2 \propto l$

$l' = 4l$

$\Delta l = 4l - l = 3l$

$3 \times 30\text{cm}$

$= 90\text{cm}$

Ans. (90)

Q) Find out the correct energy for the ground state or energy transition. (symbols have usual meaning & n → m gives the transition)

(A) $Be^{3+}_{2\rightarrow1}(+13.6eV)$

(B) $H(-6.8\ eV)$

(C) $He^{+}_{2\rightarrow1}(40.8eV)$

(D) $Li^{2+}(-13.6eV)$

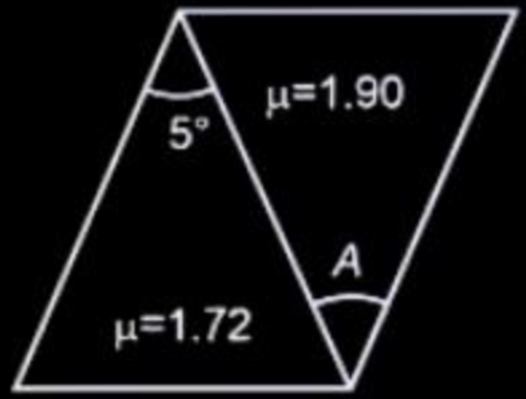
$$E = -13.6\frac{Z^2}{n^2}$$

Ans. (C)

Q) Find A for dispersion without deviation.

(A) 3 (B) 4

(C) 5 (D) 4.5



$$(\mu_1 - 1)A_1 + (\mu_2 - 1)A_2 = 0$$

($\mu_1 - 1 = 1.72$, $A_1 = 5°$)

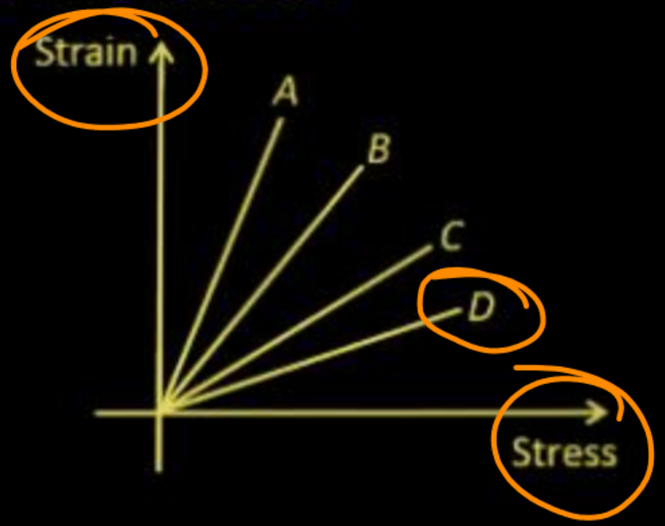
$$A_2 = -\frac{(0.72) \times 5}{0.9}$$

$$A_2 = 4°$$

Ans. (B)

Q) Which of the following material has bigger Young's modulus?

(A) D
(B) C
(B) A
(D) A



$$Y = \frac{\text{Stress}}{\text{Strain}}$$

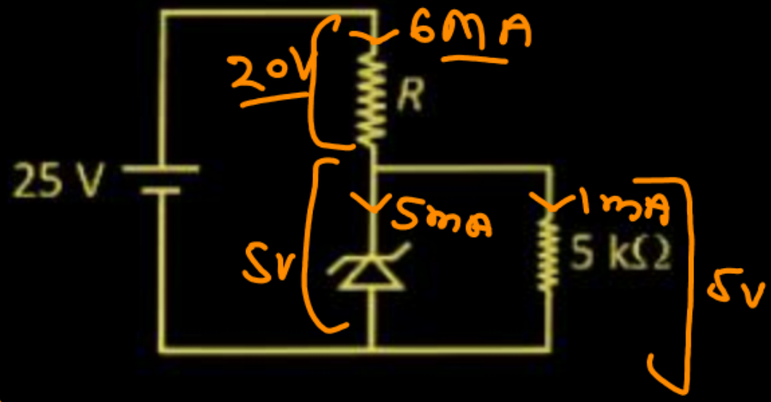
$$\frac{1}{Y} = \text{slope}$$

Ans. (A)

Q) For the given circuit the breakdown voltage of Zener diode is $V_z = 5$ volts. And it can with stand maximum circuit of $I_Z = 5$ mA. Find the value of R.

(A) 5/3 kΩ **(B) 14/3 kΩ**

(C) 8 kΩ **(D) 10/3 kΩ**

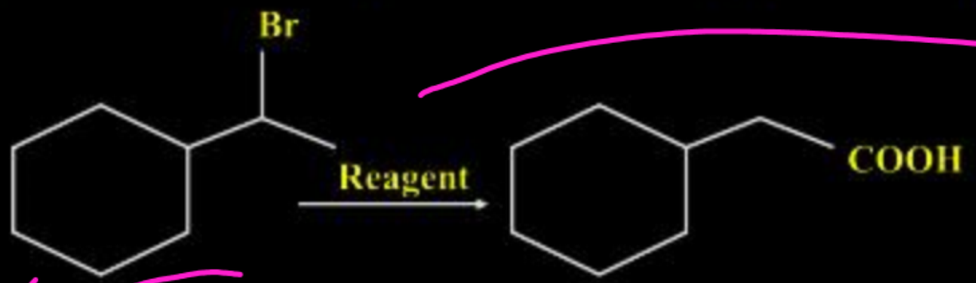


$$R = \frac{20V}{6mA} = \frac{10}{3} k\Omega$$

Ans. (D)

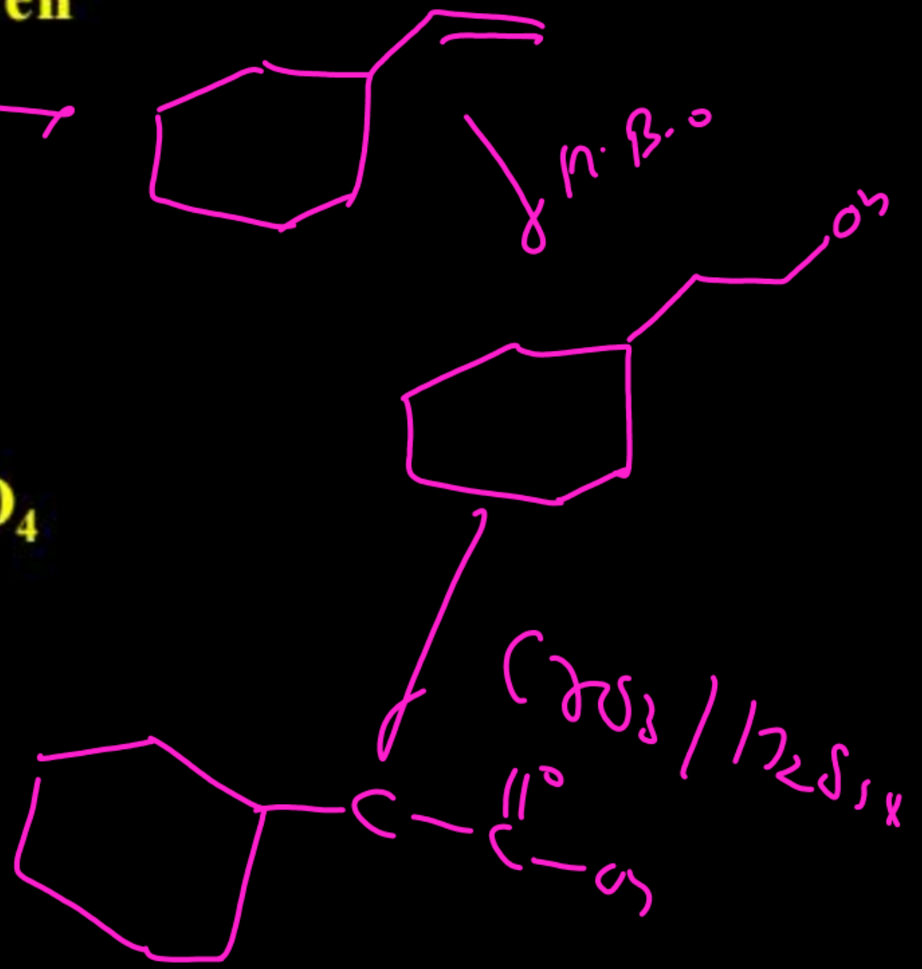
Chemistry

Q) Correct Sequence of reagent for given



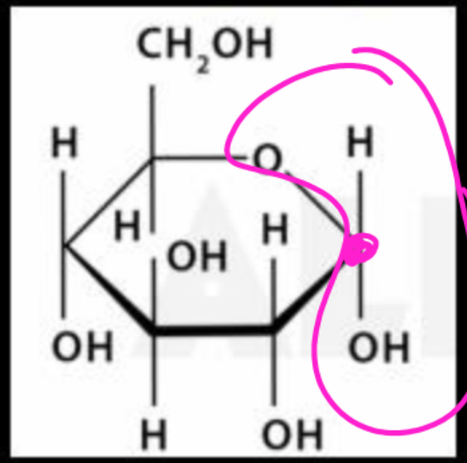
(I) $(CH_3)_3CO^-$, H.B.O, CrO_3/H_2SO_4
(II) $(CH_3)_3CO^-$, O.M.D.M, CrO_3/H_2SO_4
(III) EtO^-, H.B.O, PCC
(IV) EtO^-, H^+/H_2O, $KMnO_4$

Ans. (A)

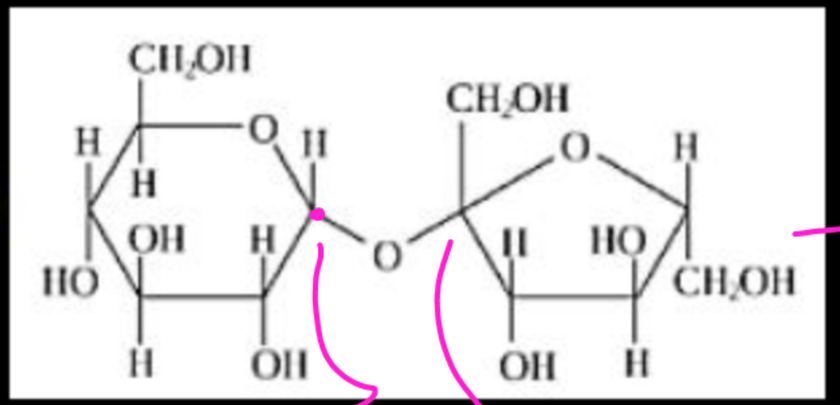


Q) Which one give positive Tollen's test.

(A)



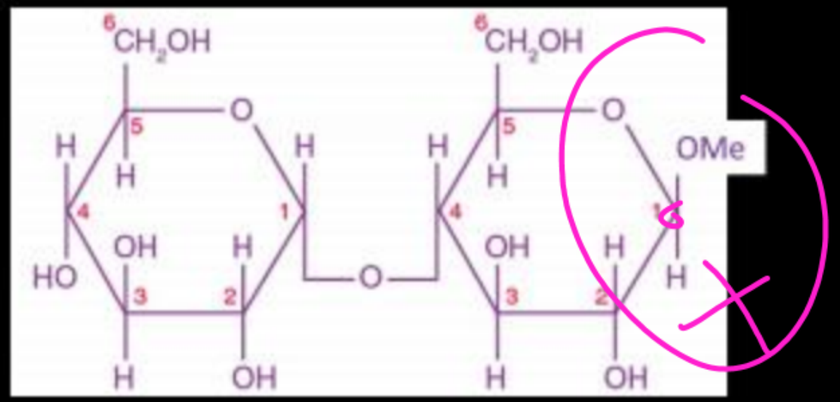
(B)



Sucrose

Acetal Ketal

(C)



(D) Cellulose

Ans. (A)

Q) But-2-yne react with H_2,Pd,$BaSO_4$ form X and react with Na, NH3 form Y

Select corrects statements

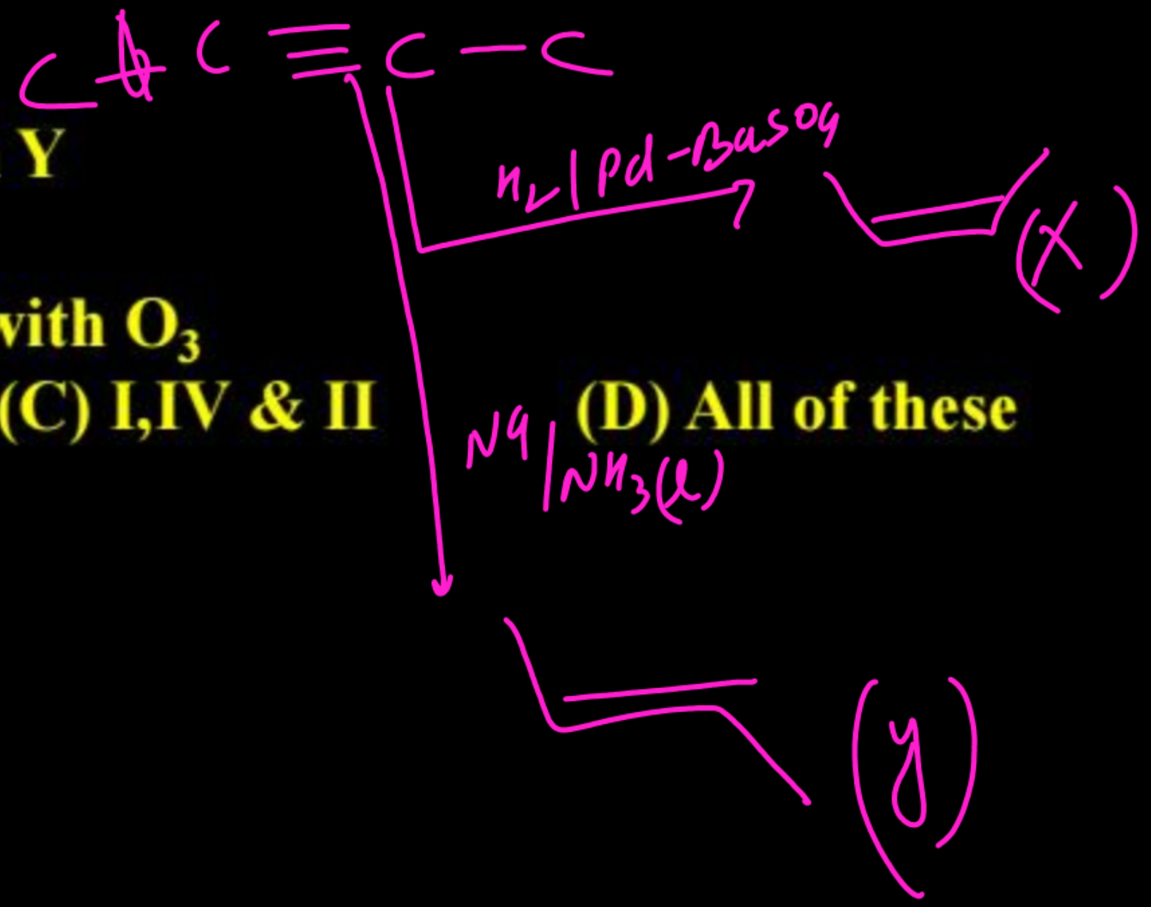
(I) X & Y are stereoisomers

(II) X has more dipole momentum than Y

(III) X has more B.P. than Y

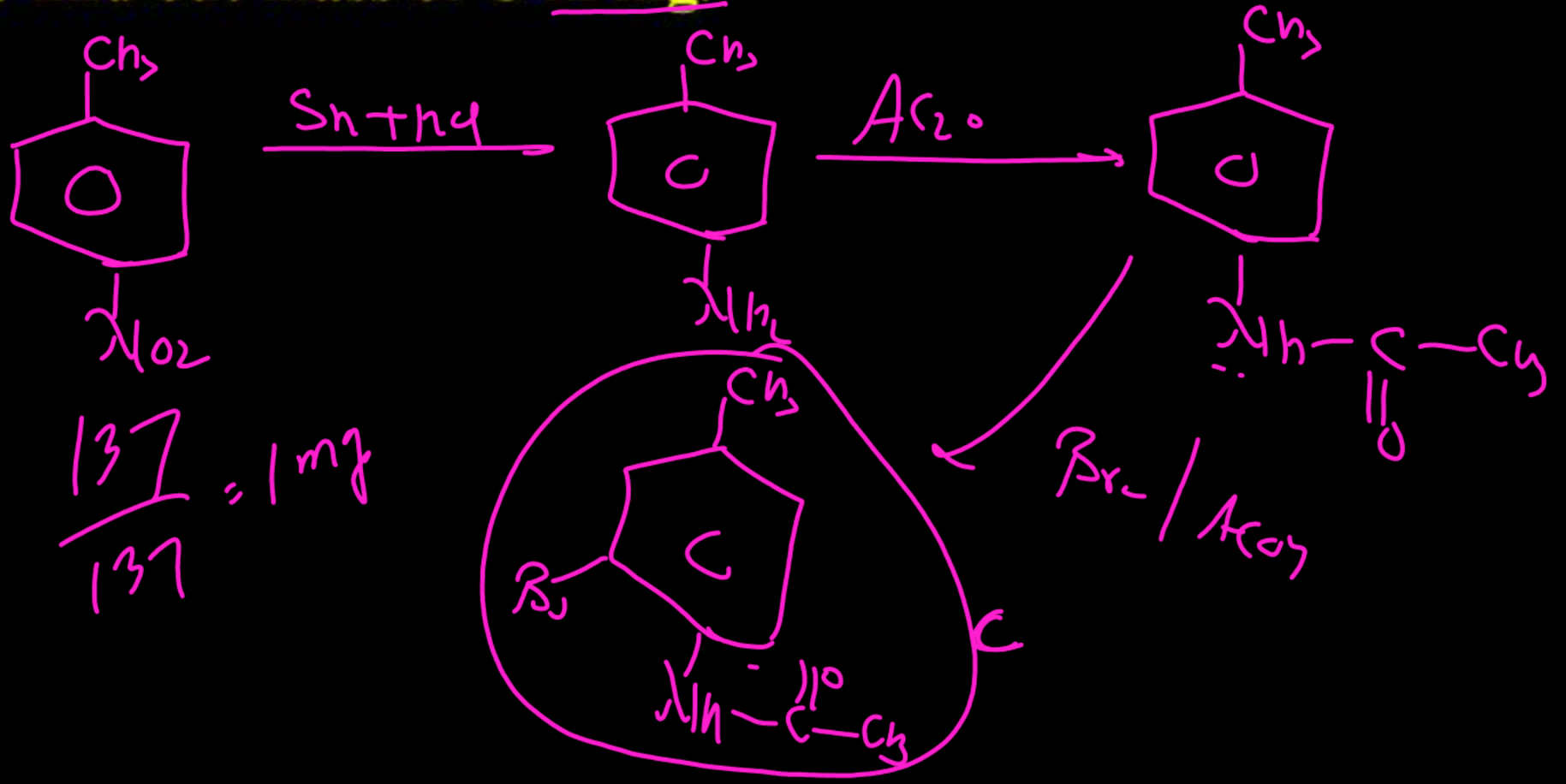
(IV) X & Y will give different product with O_3

(A) I,II & III **(B) II,IV & III** **(C) I,IV & II** **(D) All of these**

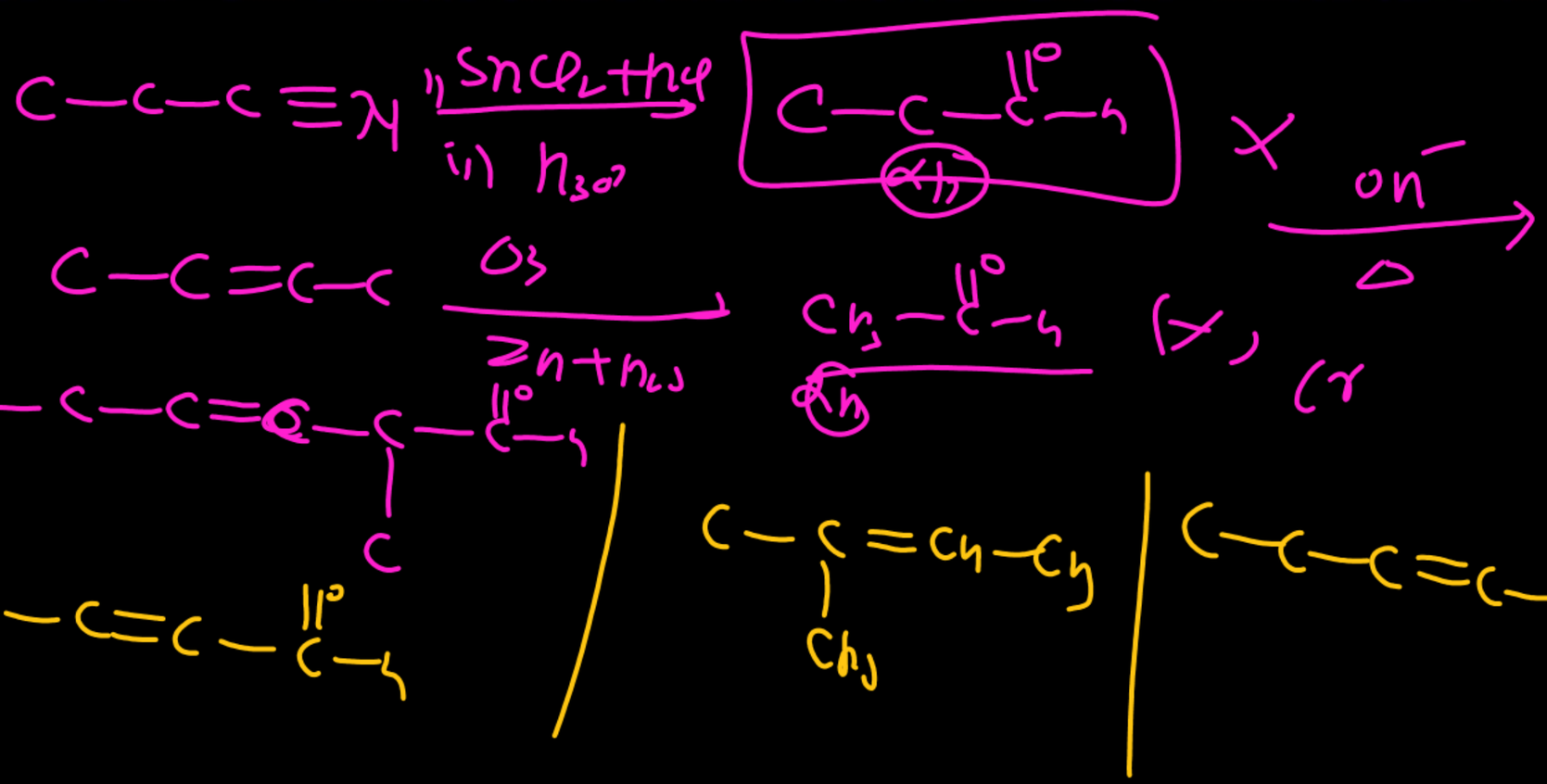


Ans. (A)

Q) 137 mg of paranitro toluene react with Sn + HCl form A which react with AcO_2 form B and B react with Bromine in presence of acetic acid form C. find out mass of C in mg.



Q) Propane nitrile react with $SnCl_2$ + HCL, followed by hydrolysis form X
But-2-ene react with O_3, Zn form Y
X & Y react with OH^-/ heat form different products which product can not form.



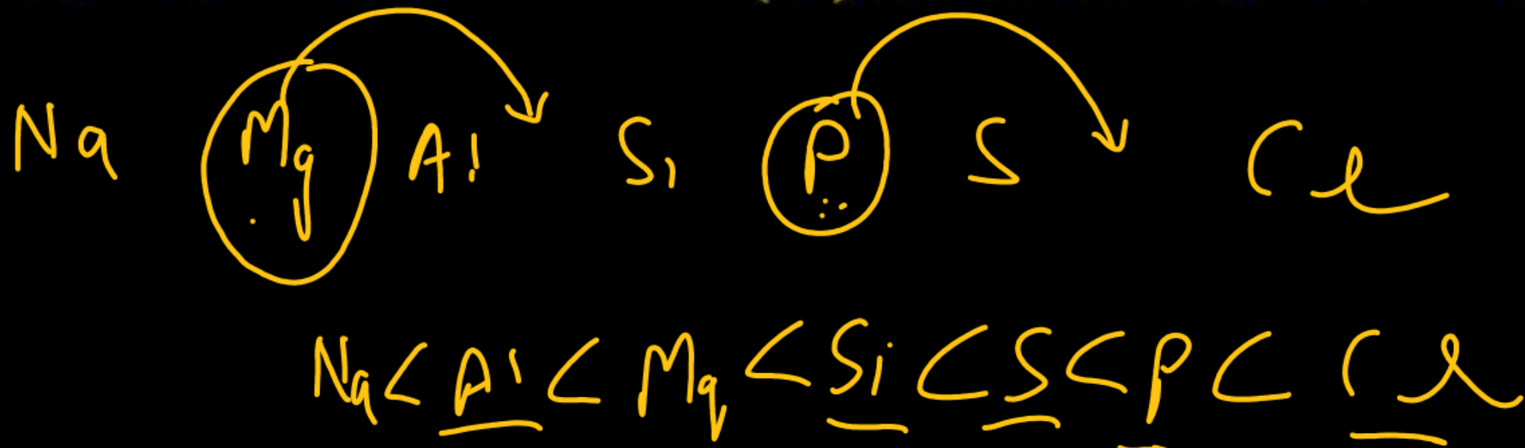
Q) Which of the following is the correct order of first ionization enthalpy for Ai, Si, P, S, Cl.

(A) Ai < Si < P < S < Cl

(B) Cl < S < P < Si < Ai

(C) Al < Si < S < P < Cl

(D) Si < Ai < S < P < Cl



Q) Correct order of +3 ionic radices among B, Ai, Ga, In, Tl.

(A) $B^{3+} < Al^{3+} < Ga^{3+} < In^{3+} < Tl^{3+}$

(B) $B^{3+} < Al^{3+} < Ga^{3+} < Tl^{3+} < In^{3+}$

(C) $B^{3+} < Ga^{3+} < Ai^{3+} < Tl^{3+} < In^{3+}$

(D) $Ai^{3+} < B^{3+} < Ga^{3+} < In^{3+} < Tl^{3+}$

Q) Given below are two statements

Statement -I: $[CoBr_4]^{2-}$ absorbs lesser energy than $[CoCl_4]^{2-}$

Statement -II: $[CoCl_4]^{2-}$ has higher crystal field splitting energy then $[CoBr]^{2-}$

(A) Both Statement-I and Statement -II are correct

(B) Both Statement-I and Statement-II are incorrect

(C) Statement-I is correct and Statement-II are incorrect

(D) Statement-I is incorrect and Statement-II are correct

Δ ligand sh $Br^- < Cl^-$

Q) Which of the following undergo nitration at fastest rate?

(A) $C_6H_5NO_2$ (B) $C_6H_5CH_3$

(C) C_6H_5COOH (D) C_6H_5Br

Ans. (B)

Q) Among the following compounds

HNO_3, H_2SO_4, O_3, NF_3

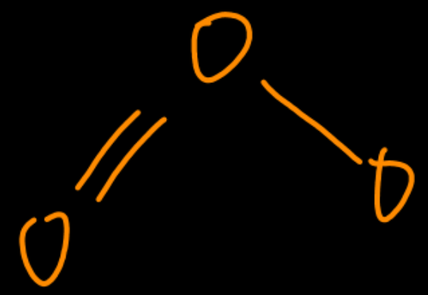
Bond angle for the compound which has highest number of lone pairs.

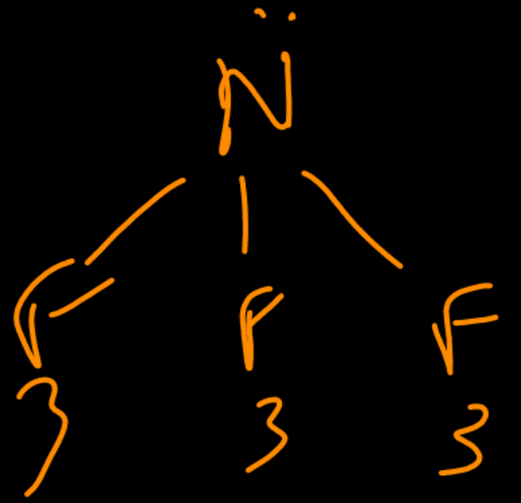
(A) 116°

(B) 107°

(C) 120°

(D) 102°





Q) For the following change,

$$\underset{5^\circ C}{H_2O(\ell)} \rightarrow \underset{100^\circ C}{H_2O(g)}$$

Select the correct answer:

(A) $q = +ve, w = +ve, \Delta H = +ve$

(B) $q = -ve, w = -ve, \Delta H = +ve$

(C) $q = +ve, w = -ve, \Delta H = +ve$

(D) $q = -ve, w = -ve, \Delta H = -ve$

Ans. (C)

Q) Given below are two statements.

Statement I: Sublimation is a purification technique that is used to separate those solid substances which changes from solid to vapour state without passing through liquid state.

Statement II: If external atmospheric pressure is reduced, then boiling point of substance is decreased.

In the light of the above statements, choose the correct option.

(A) Both statement I and statement II are correct

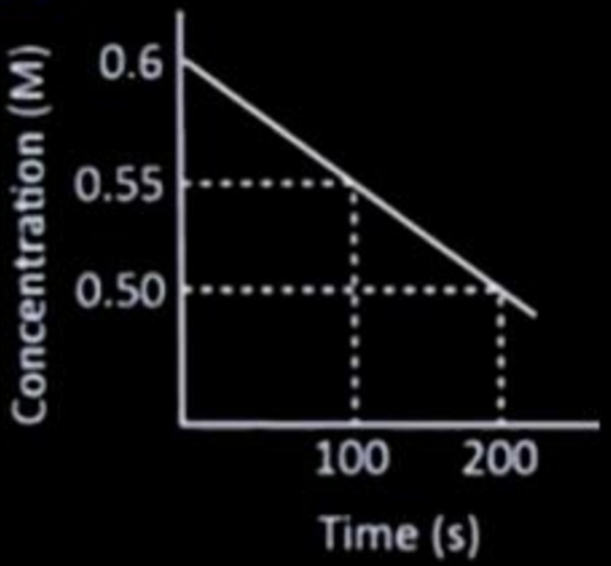
(B) Both statement I and statement II are incorrect

(C) Statement I is correct but statement II is incorrect

(D) Statement I is incorrect but statement II is correct

Q) Consider the following graph of concentration vs time.
Find half-life of reaction.

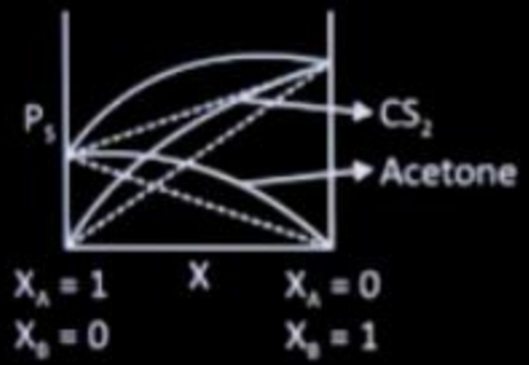
(A) 600 s
(B) 200 s
(C) 300 s
(D) 100 s



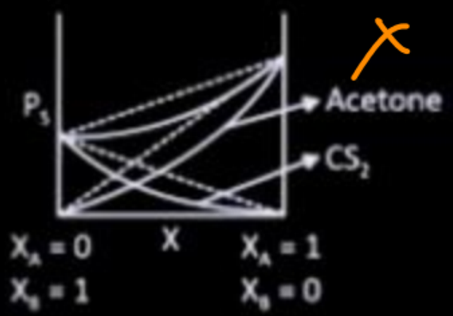
Ans. (A)

Q) A binary solution is formed by mixing Acetone (A) and CS_2(B). The variation of vapour pressure v/s mole fraction will be

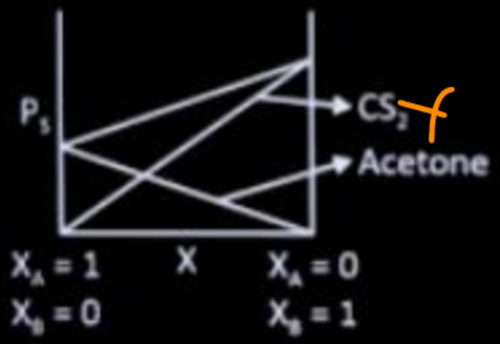
(A)



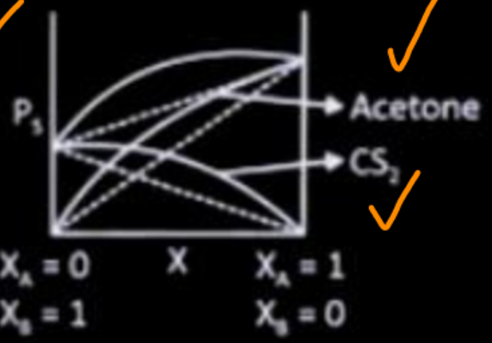
(B)



(C)



(D)



Math

Q) A rectangle is formed by lines $x = 0$, $y = 0$, $x = 3$, $y = 4$. A line perpendicular to $3x + 4y + 6 = 0$ divides the rectangle into two equal parts, then the distance of the line from $\left(-1, \frac{3}{2}\right)$ is

(A) 2 (B) $\frac{8}{5}$ (C) $\frac{6}{5}$ (D) $\frac{17}{10}$

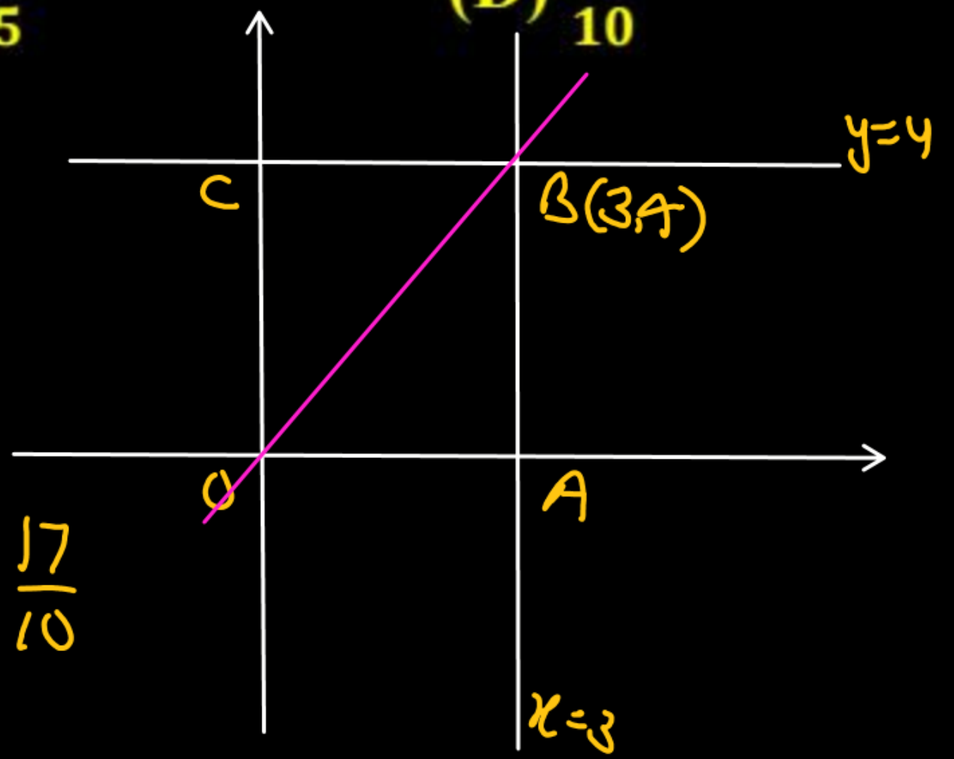
Ans. (D)

$m_{\perp} = 4/3$

$y = \frac{4}{3}x$

$4x - 3y = 0$

$d = \left|\frac{-4 - 3(3/2)}{5}\right| = \frac{17}{10}$



Q) Number of 4 letters words with or without meaning formed from the letters of the word PQRSSSTTUVV is

(A) 1232 (B) 1422 (C) 1400 (D) 1162

P, Q, R, SSS, TT, VV, U

Case 1: When all four letters are identical = 0

Case 2: When 3 identical and one is diff. $= {}^{1}C_{1} \cdot {}^{6}C_{1} \cdot \frac{4!}{3!} = 24$

Case 3: SSTT, VVTT, VVSS $= {}^{3}C_{2} \frac{4!}{2!2!} = 18$

42

Case 4: ${}^{3}C_{1} \cdot {}^{6}C_{2} \cdot \frac{4!}{2!} = 3 \times 15 \times 12 = 540$

Case 5: ${}^{7}C_{4} \cdot 4! = 35 \cdot 24 = 840$

Total $= 1380 + 42 = 1422$

Ans. (B)

(17)

Q) Let $A = \{-2, -1, 0, 1, 2, 3, 4\}$ and R be a relation R, such that $R = \{(x, y): (2x + y) \leq -2, x \in A, y \in A\}$.

$y \leq -2-2x$

Let l = number of elements in R

m = minimum number of elements to be added in R to make it reflexive.

n = minimum number of elements to be added in R to make it symmetric, then (1 + m + n) is

(A) 17 (B) 10 (C) 11 (D) 14

$x=0 \Rightarrow y \leq -2 \Rightarrow y=-2$

$(0,-2)$ $l=9$

$x=-2 \Rightarrow y \leq 2 \Rightarrow y=2,1,0,-1,-2$

$(-2,2),(-2,1),(-2,0),(-2,-1),(-2,-2)$

Ans. (A)

Ref: $(0,0),(1,1),(2,2),(3,3),(4,4)$ $m=5$

$x=-1 \Rightarrow y \leq 0 \Rightarrow y=0,-1,-2$

Sym: $(2,-2),(1,-2),(0,-1)$ $n=3$

$(-1,0),(-1,-1),(-1,-2)$

$(1+x^4+2x^2)(1+x^2+2x)$

Q) In the expansion of $(1+x^2)^2(1+x)^n$, coefficients of x, x^2 and x^3 are in A.P, then find sum of all possible values of $n \in N$.

2, 3, 4

(9)

$(1+x^4+2x^2)(1+x)^n$ $\quad {}^nC_r x^r$

Coeff of $x = {}^nC_1$

$x^2 = {}^nC_2 + 2$

$x^3 = {}^nC_3 + 2{}^nC_1$

$2{}^nC_2 + 4 = {}^nC_1 + {}^nC_3 + 2\cdot{}^nC_1$

$\frac{2n(n-1)}{2} + 4 = 3n + \frac{n(n-1)(n-2)}{6}$

$6[n^2-n+4] = 18n + n(n^2-3n+2)$

$6n^2-6n+24 = 18n + n^3 - 3n^2 + 2n$

$n^3 - 9n^2 + 26n - 24 = 0$

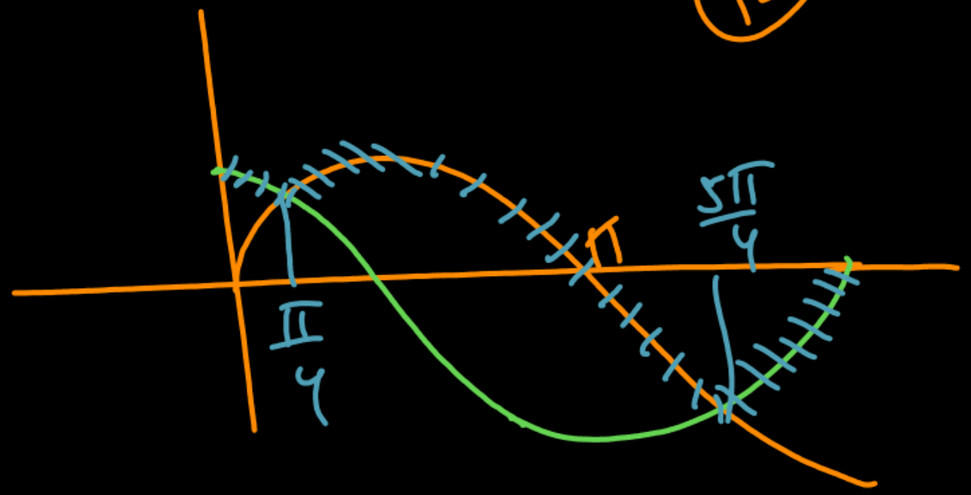
$(n-2)(n-3)(n-4)=0$

$n = 2, 3, 4$

Ans. (9)

Q) Let the area bounded by the curve $f(x) = \max\{\sin x, \cos x\}$ and x-axis is A where $x \in \left[0, \frac{3\pi}{2}\right]$. Find $A + A^2$

(12)



$\sin x = \cos x \Rightarrow \tan x = 1$

$$A = \int_0^{\pi/4} \cos x\,dx + \int_{\pi/4}^{\pi} \sin x\,dx + \int_{\pi}^{5\pi/4} -\sin x\,dx + \int_{5\pi/4}^{3\pi/2} -\cos x\,dx$$

$A = 3$

Ans. (12)

Q) For given vectors $\vec{a} = -\hat{i} + \hat{j} + 2\hat{k}$ and $\vec{b} = 2\hat{i} - \hat{j} + \hat{k}$ where $\vec{c} = \vec{a} \times \vec{b}$ and $\vec{d} = \vec{c} \times \vec{b}$. Then the value of $(\vec{a} - \vec{b}) \cdot \vec{d}$ is:

(A) 35 **(B) -35** **(C) 30** **(D) -30**

$(\vec{a}-\vec{b}) \cdot \vec{d}$

$(\vec{a}-\vec{b}) \cdot (\vec{c} \times \vec{b}) = \vec{a} \cdot (\vec{c} \times \vec{b}) - \vec{b} \cdot (\vec{c} \times \vec{b})$

$= [\vec{a}\ \vec{c}\ \vec{b}] - [\vec{b}\ \vec{c}\ \vec{b}]$

$= -[\vec{a}\ \vec{b}\ \vec{c}] = -((\vec{a} \times \vec{b}) \cdot \vec{c})$

$= -((\vec{a} \times \vec{b}) \cdot (\vec{a} \times \vec{b}))$

$= -|\vec{a} \times \vec{b}|^2 = -35$

$\vec{a} \times \vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -1 & 1 & 2 \\ 2 & -1 & 1 \end{vmatrix}$

$= 3\hat{i} + 5\hat{j} - \hat{k}$

$|\vec{a} \times \vec{b}| = \sqrt{35}$

Ans. (B)

Q) The line $y = x + 1$ intersects the ellipse $\frac{x^2}{2} + \frac{y^2}{1} = 1$ at A and B. Find the angle sub-stained by segment AB and centre of ellipse is

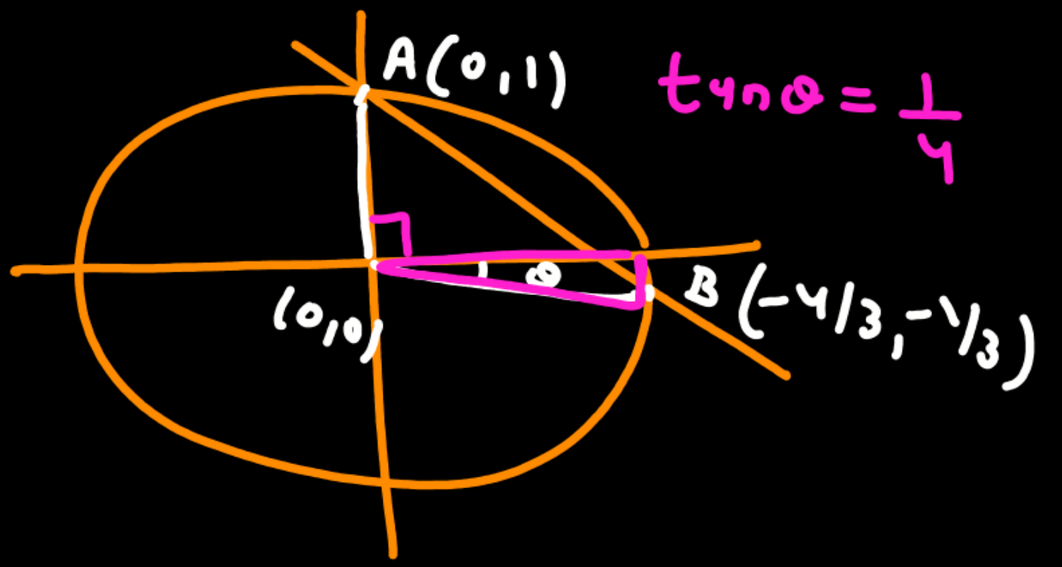
(A) $\frac{\pi}{2} + \tan^{-1}\left(\frac{1}{2}\right)$

(B) $\frac{\pi}{2} + 2\tan^{-1}\left(\frac{1}{4}\right)$

(C) $\frac{\pi}{2} + \tan^{-1}\left(\frac{1}{4}\right)$

(D) $\frac{\pi}{2} - \tan^{-1}\left(\frac{1}{4}\right)$

$$\frac{x^2}{2} + \frac{(x+1)^2}{1} = 1 \Rightarrow x = 0, -4/3$$



Ans. (C)

$$\frac{\pi}{2} + \theta = \frac{\pi}{2} + \tan^{-1}(1/4)$$

Q) The value of $\frac{^{100}C_{50}}{51}+\frac{^{100}C_{51}}{52}+\ldots\ldots\frac{^{100}C_{100}}{101}$ **is** $\sum_{r=50}^{100}\frac{^{100}C_r}{r+1}$

(A) $\frac{2^{100}}{100}$ **(B)** $\frac{2^{101}}{101}$ **(C)** $\frac{2^{100}}{101}$ **(D)** $\frac{2^{101}}{100}$

$= \sum_{r=50}^{100}\frac{^{101}C_{r+1}}{101} = \frac{1}{101}\left(^{101}C_{51}+{}^{101}C_{52}-\ldots+{}^{101}C_{101}\right)$

$^{n+1}C_{r+1} = \frac{n+1}{r+1}\,{}^{n}C_r$

$= \frac{1}{101}\left(2^{n-1}\right) = \frac{2^{100}}{101}$ //

Ans. (C)

(unitary)

Q) If person A and person B can finish together whole work in 22.5 days. If B alone takes 24 days more to complete the work than A alone, find the number of days taken by A alone to finish the given work.

(A) 18 (B) 36 (C) 60 (D) 24

$A + B = 22.5$; $B = 24 + A$

1 day work

$$\frac{1}{A} + \frac{1}{B} = \frac{1}{22.5}$$

$$\frac{1}{A} + \frac{1}{24+A} = \frac{2}{45}$$

$$\frac{2A+24}{A(24+A)} = \frac{2}{45}$$

$$\Rightarrow A^2 - 21A - 540 = 0 \quad (36, -15)$$

$$(A-36)(A+15) = 0$$

$A = 36$ | -15 ✗

$B = 36 + 24$

$B = 60$

Ans. (B)

Q) Find $\int_{\frac{\pi}{24}}^{\frac{5\pi}{24}} \frac{dx}{1+(\tan 2x)^{1/3}}$

$\frac{\pi}{4} \times$

(A) $\frac{\pi}{24}$ **(B)** $\frac{\pi}{6}$ **(C)** $\frac{\pi}{12}$ **(D)** $\frac{\pi}{48}$

Let $2x = t$

$2dx = dt$

$$I = \frac{1}{2}\int_{\frac{\pi}{12}}^{\frac{5\pi}{12}} \frac{dt}{1+(\tan t)^{1/3}} = \frac{1}{2}\int_{\pi/12}^{5\pi/12} \frac{c^{1/3}}{c^{1/3}+s^{1/3}}$$

Apply King

$\frac{\pi}{2}$

$\int dt$

AA

$$2I = \frac{1}{2}\int_{\frac{\pi}{12}}^{\frac{5\pi}{12}} \frac{s^{1/3}}{c^{1/3}+s^{1/3}}$$

$$2I = \frac{1}{2}\left[\frac{5\pi}{12} - \frac{\pi}{12}\right]$$

$$I = \frac{\pi}{12}$$

Ans. (C)

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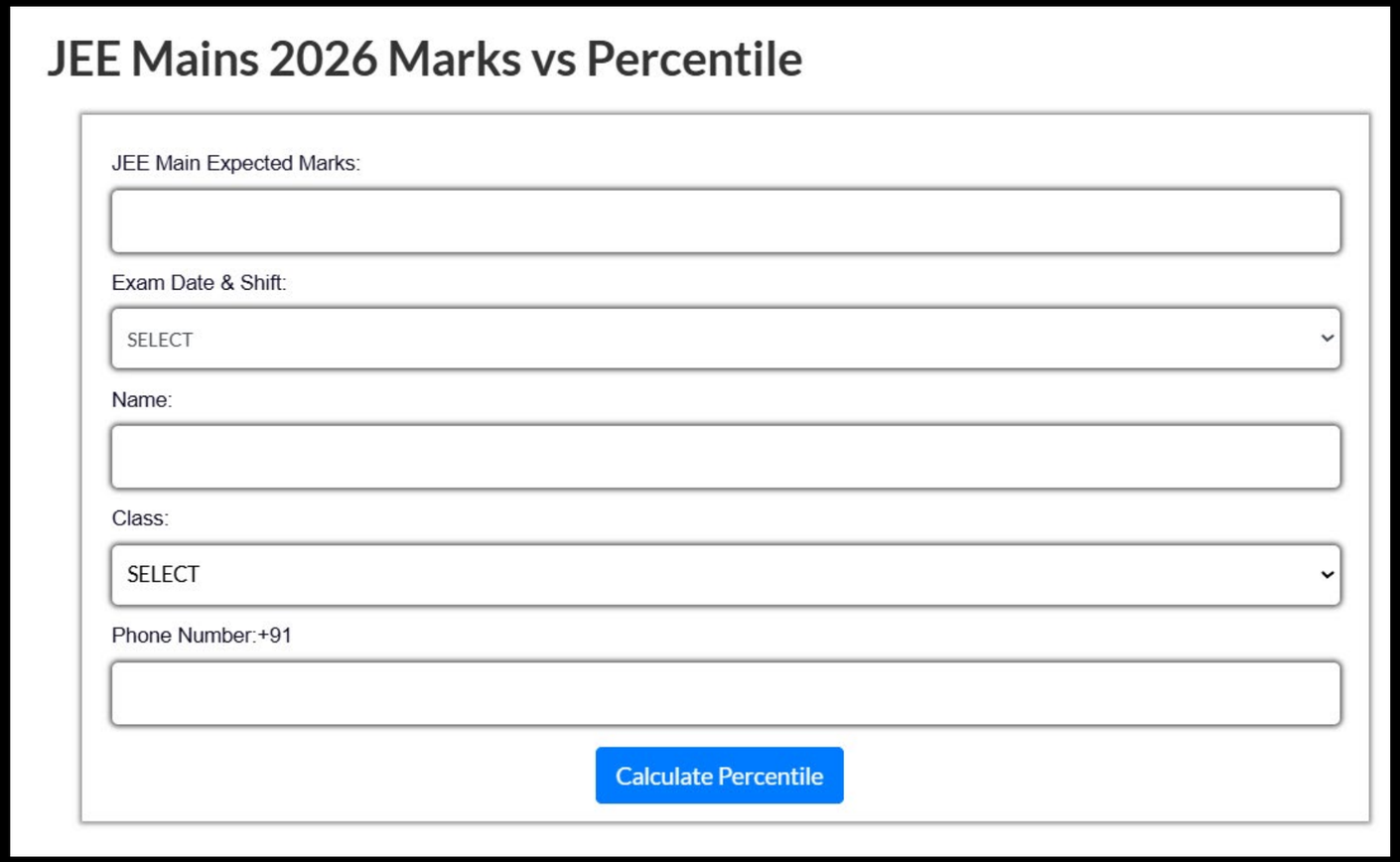

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