

# JEE MAINS 2026

# PAPER SOLUTION



**02 APR, SHIFT 1**

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# PHYSICS

**Q) For Diatomic gas, find the ration of  $\Delta Q : \Delta U : W$  for isobaric process**

**(A) 2:5:7**

**(B) 2:3:5**

**(C) 2:7:3**

**(D) 7:5:2**

$$\Delta Q = nC_p\Delta T$$

$$\Delta U = nC_v\Delta T$$

$$W = nR\Delta T$$

$$\Delta Q : \Delta U : W = C_p : C_v : R$$

$$= \frac{7R}{2} : \frac{5R}{2} : R$$

$$= 7:5:2$$

**Ans. (D)**

Q) The dimension of  $\frac{1}{2} \epsilon_0 E^2$  is

(A)  $MLT^{-2}$

(B)  $ML^{-1} T^{-2}$

(C)  $MLT^{-1}$

(D)  $ML^{-1} T^{-1}$

$$\boxed{\frac{E}{V}} = \frac{1}{2} \epsilon_0 E^2$$
$$\Rightarrow \frac{[M^1 L^2 T^{-2}]}{[L^2]} \Rightarrow [M^1 L^{-1} T^{-2}]$$

Ans. (B)

Q) Determine the magnitude of acceleration at  $t = 1$  sec for  $\vec{r} = \frac{5t^4}{40}\hat{i} - \frac{t^3}{3}\hat{j}$

$$\vec{v} = \frac{d\vec{r}}{dt}$$

$$= \frac{5}{40}(4t^3)\hat{i} - \frac{1}{3}(3t^2)\hat{j}$$

$$\vec{v} = \frac{t^3}{2}\hat{i} - t^2\hat{j}$$

$$\vec{a} = \frac{d\vec{v}}{dt}$$

$$= \frac{3t^2}{2}\hat{i} - 2t\hat{j}$$

$$\vec{a} = \frac{3}{2}\hat{i} - 2\hat{j}$$

$$|\vec{a}| = \sqrt{\frac{9}{4} + 4}$$

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

Ans. (5/2)

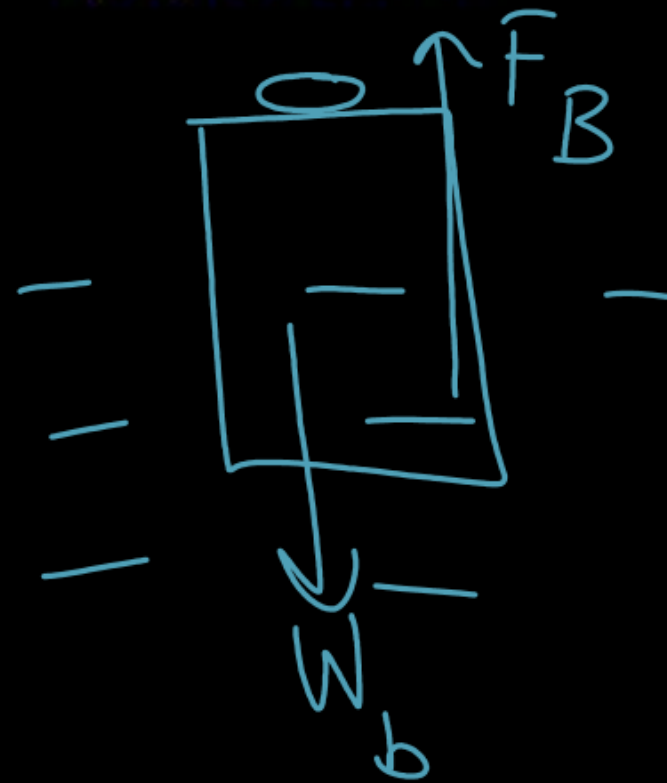
**Q) A wooden cubic block of relative density, 0.4 is floating in water. Side of cubic block is 10 cm. When a coin is placed on the block the dips 0.3 cm in equilibrium. Weight of coin is**

(A) 0.3 N

(B) 230 N

(C) 0.7 N

(D) 3 N



$$W_{\text{coin}} = \Delta F_B$$

$$= \rho_w (V_{\text{disp}}) g$$

$$= 10^3 (10 \times 10 \times 10^{-4} \times 0.3 \times 10^{-2}) \times 10$$

$$= 0.3 \text{ N}$$

**Ans. (A)**

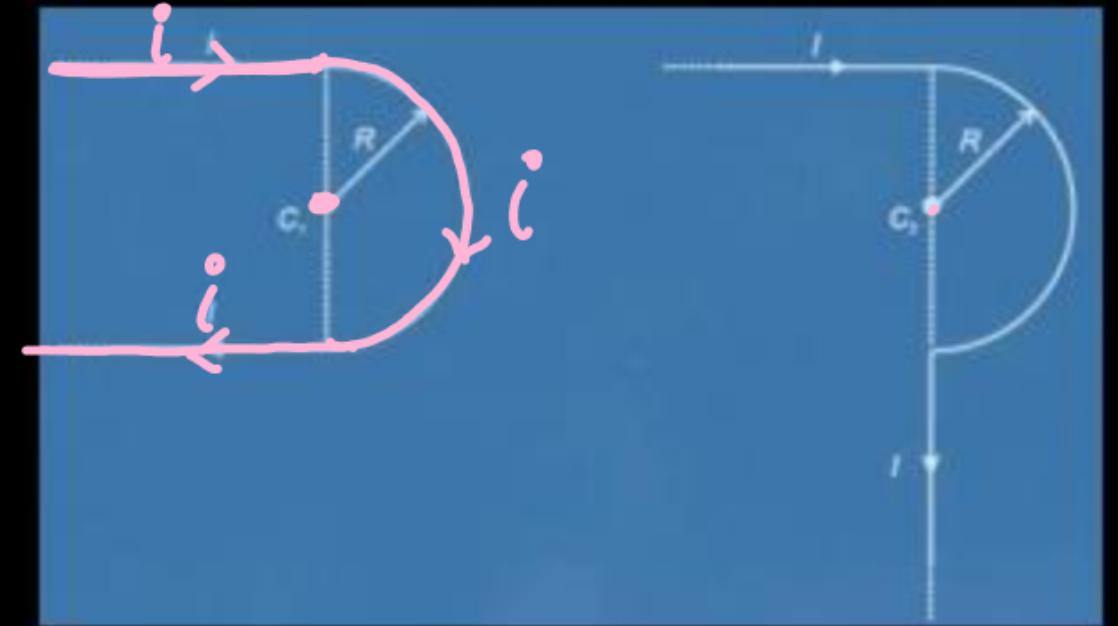
**Q) Consider two arrangements of wires, find ratio of magnetic field at centre of the semi-circular part.**

(A)  $\frac{\pi+3}{\pi-1}$

~~(C)  $\frac{\pi+2}{\pi+1}$~~

(B)  $\frac{\pi+4}{\pi+2}$

(D)  $\frac{\pi-1}{\pi+1}$



$$\frac{\mu_0 i}{4\pi R} \times 2 + \frac{1}{2} \left( \frac{\mu_0 i}{2R} \right) = B_1$$

$$B_2 = \frac{\mu_0 i}{4\pi R} + \frac{1}{2} \left( \frac{\mu_0 i}{2R} \right)$$

**Ans. (C)**

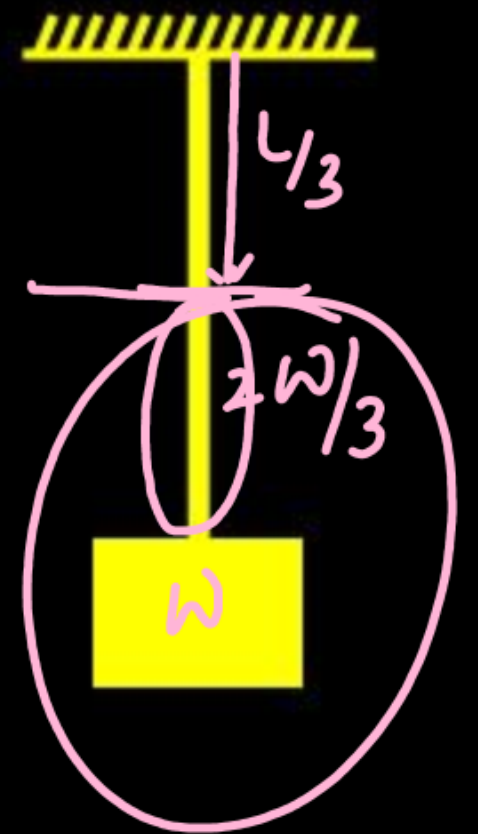
**Q) Weight of string =  $w$  and weight of block =  $w$  and cross sectional area of string is  $A$  if stress at distance  $L/3$  from top and is given by**

$$\frac{w}{A} + \frac{2W}{\gamma A} \text{ determine } \gamma ?$$

$$\sigma = \frac{\frac{2w}{3} + w}{A} = \frac{2w}{3A} + \frac{w}{A}$$

$$\frac{5w/3}{A} = \text{Stress}$$

$$\gamma = 3$$



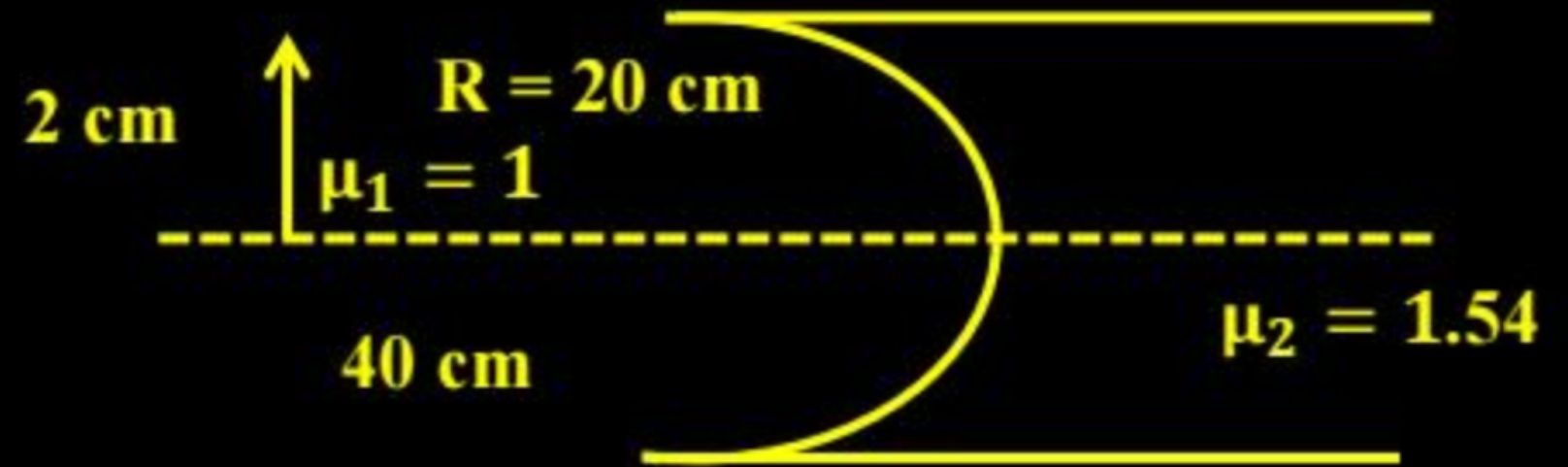
**Ans. ( )**

**Q) Determine height of image after refraction.**

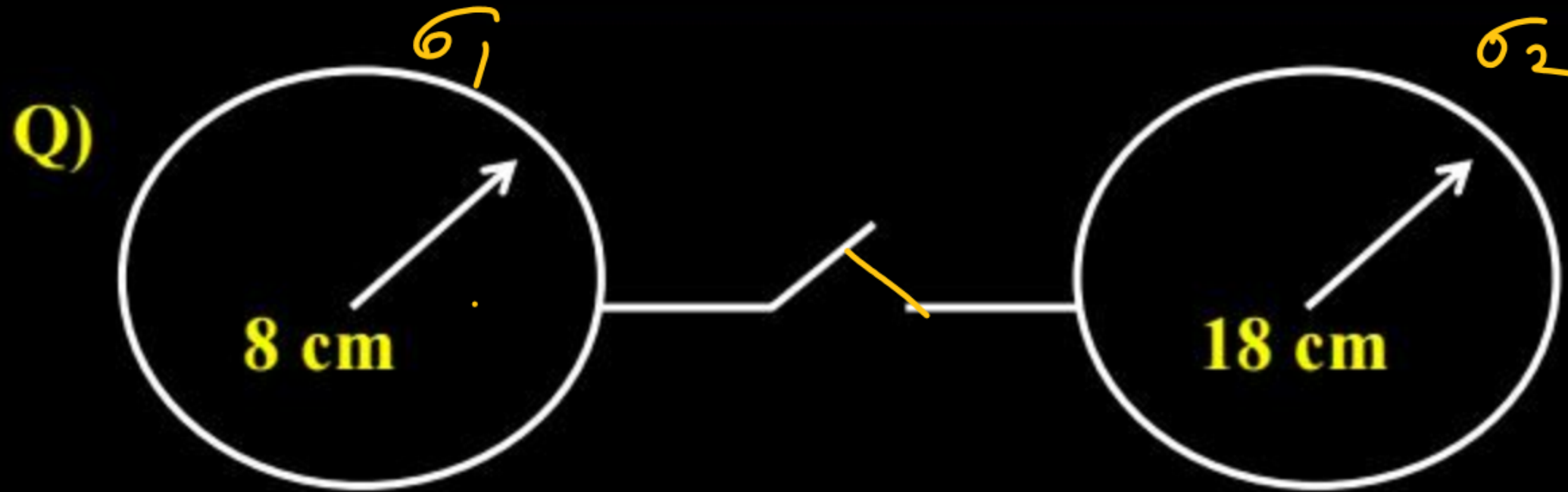
$$m = \left( \frac{\mu_1}{\mu_2} \right) \left( \frac{v}{u} \right) = \frac{h_I}{20 \text{ cm}}$$

$$u = -40 \text{ cm}$$

$$\frac{1.54}{v} - \frac{1}{-40} = \frac{1.54 - 1}{-20}$$



**Ans. ()**



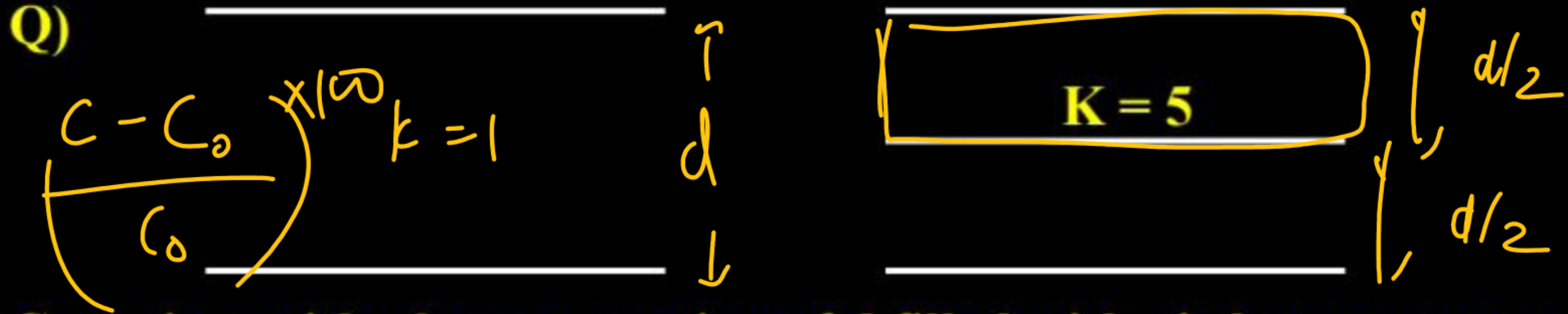
**Ratio of Electric field intensity on surface of sphere radius 18cm to that on the surface of sphere of radius 8 cm after closing of switch till equilibrium established**

$$\frac{E_1}{E_2} = \frac{18}{8}$$

$$\sigma \propto \frac{1}{R}$$

$$E = \frac{\sigma}{\epsilon_0}$$

$$\frac{E_1}{E_2} = \frac{R_2}{R_1}$$



Capacitor with plate separation of  $d$  filled with air has some capacitance now dielectric slab of  $K = 5$  of thickness  $d/2$  is inserted determine % increasing in capacitance.

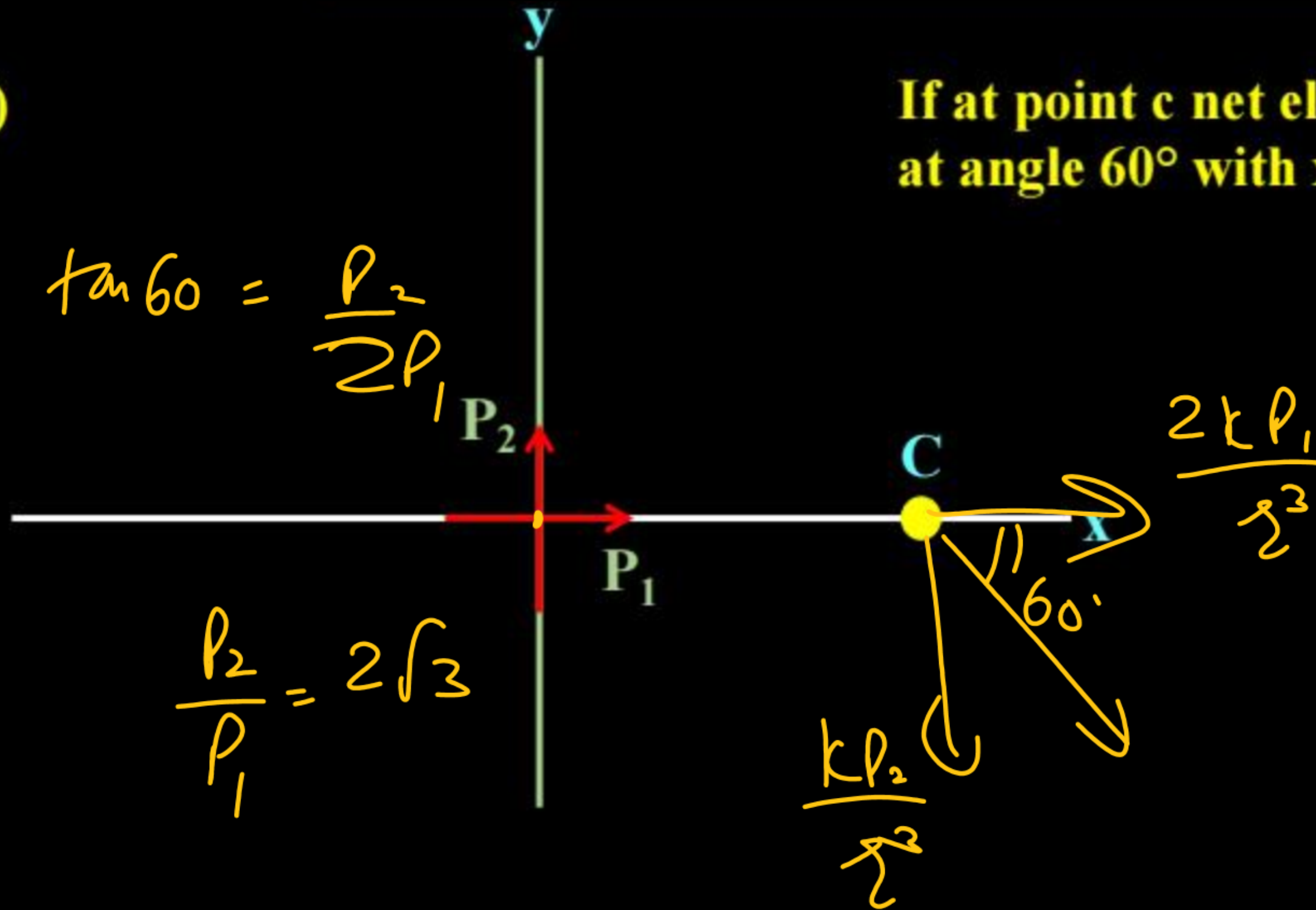
$$C_0 = \frac{\epsilon_0 A}{d}$$

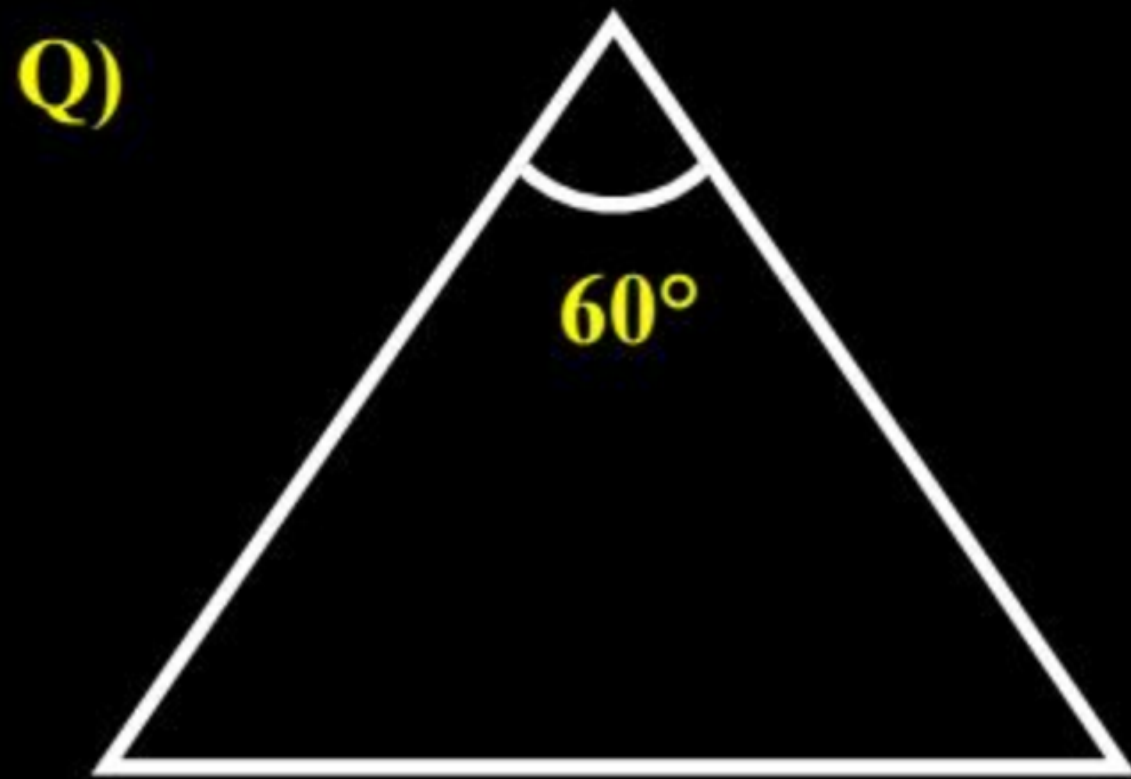
$$C = \frac{\epsilon_0 A}{\frac{d}{2 \times 5} + \frac{d}{2}}$$

$$\frac{\epsilon_0 A}{\frac{t_1}{K_1} + \frac{t_2}{K_2}}$$

Q)

If at point c net electric field intensity is at angle  $60^\circ$  with x axis. Determine  $P_2/P_1$ .





**Refractive index of equilateral prism material is equals to 1.5. determine the ratio of angle of minimum deviation to the angle of incident at which minimum deviation occur.**

**Q) For an ideal gas having  $C_p = 3R$  and  $C_v = 2R$ . Find work done by one mole of the gas in adiabatic expansion when pressure reduces from 8 bar to 1 bar. (Initial temperature =  $140^\circ\text{C}$ )**

(A) 1140 R

(B) 270 R

(C) 826 R

(D) 413 R

$$\frac{T_1}{T_2} = \frac{P_1}{P_2} = 2$$

$$T_2 = \frac{T_1}{2}$$

**Ans. (D)**

$$\gamma = \frac{C_p}{C_v}$$

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

$$Q = 0$$

$$W + \Delta U = 0$$

$$|W| = |\Delta U|$$

$$|W| = nC_v\Delta T$$

$$P^{1-\gamma} T^\gamma = C$$

$$P^{1-\frac{3}{2}} T^{\frac{3}{2}} = C$$

$$P^{-\frac{1}{2}} T^{\frac{3}{2}} = C$$

$$\frac{T^3}{P} = C$$

$$\frac{T^3}{P} = C P$$

$$\left(\frac{T_1}{T_2}\right)^3 = \frac{P_1}{P_2} = \frac{8}{1}$$

*Dy/2adha*

Q) in YDSE experiment wavelength of light used is 620 nm and separation between slits is 0.2 mm. Find angular ~~fringe~~ width.

(A)  $3 \times 10^{-4}$

(C)  $3.1 \times 10^{-3}$

(B)  $6.2 \times 10^{-4}$

(D)  $1.2 \times 10^{-3}$

*central  
maxima*



$\frac{2\lambda}{d}$  in radians

$d \sin \theta = \lambda$

Ans. (C)

Q) Photons of wavelength  $\lambda$  &  $3\lambda$  incident on a metal surface if stopping potential for the ejected photoelectrons are  $4v_0$  &  $v_0$  respectively. Find threshold wavelength.

(A)  $6\lambda$ (B)  $8\lambda$  (C)  $9\lambda$ (D)  $2\lambda$ 

$$K.E._{max} = E - \phi$$

$$4eV_0 = \frac{hc}{\lambda} - \phi$$

$$eV_0 = \frac{hc}{3\lambda} - \phi$$

$$4eV_0 = \frac{hc}{3\lambda} - 4\phi$$

$$4eV_0 = \frac{hc}{\lambda} - \phi$$

$$\phi = \frac{hc}{9\lambda}$$

Ans. (C)

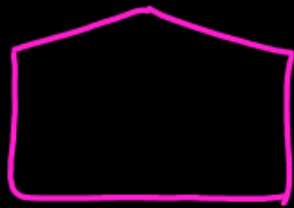
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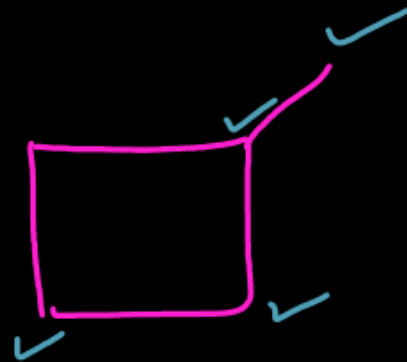
**CHEMISTRY**

Q) Compound of molecular formula  $C_5H_{10}$  can not decolorize Baeyer's reagent, how many monohalo products (Structural) are obtained by all isomers of  $C_5H_{10}$  .



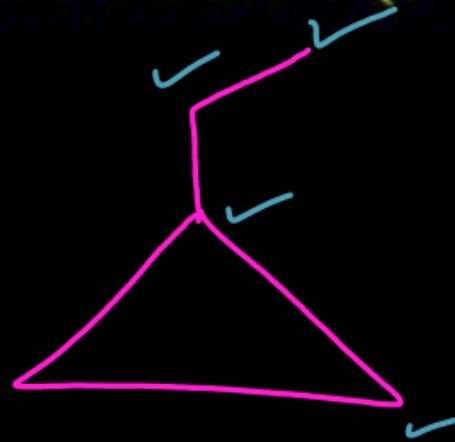
↓  $Cl_2/h\nu$

①



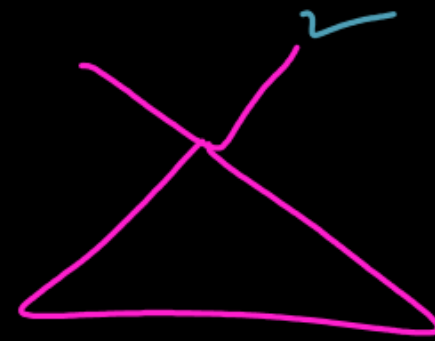
↓

④



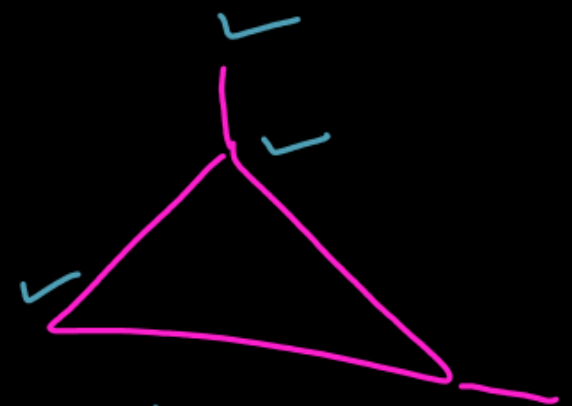
↓

④



↓

②



↓

③

Ans. (14)

**Q) An alkane on complete combustion required 8 moles of  $O_2$  find out some of carbon and Hydrogen in the alkane.**

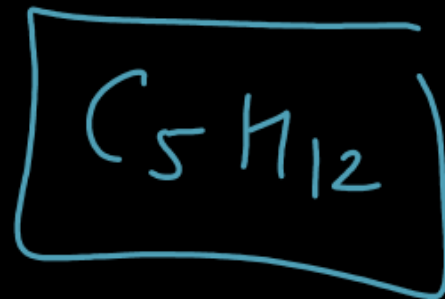


$$\frac{3n+1}{2} = 8$$

$$3n+1 = 16$$

$$3n = 15$$

$$n = 5$$



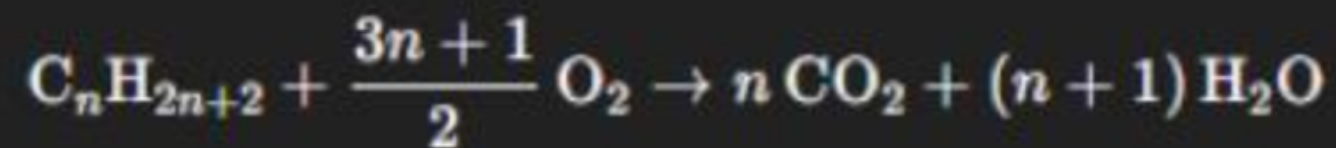
$$5 + 12$$

$$= 17$$

**Ans. (17)**

For an alkane, the general formula is  $C_nH_{2n+2}$ .

### Step 1: Write the combustion reaction



### Step 2: Use given information

Given: 8 moles of  $O_2$  are required

$$\frac{3n+1}{2} = 8$$

### Step 3: Solve for $n$

$$3n + 1 = 16$$

$$3n = 15$$

$$n = 5$$

### Step 4: Find carbon and hydrogen

- Carbon atoms =  $n = 5$
- Hydrogen atoms =  $2n + 2 = 2(5) + 2 = 12$

### Final Answer

The alkane is  $C_5H_{12}$

- Carbon = 5 atoms
- Hydrogen = 12 atoms

**Q) Which is decreasing priority order of given functional group**

- ✓ (A) amide > aldehyde > ketone > amine > alkyne  
 (B) aldehyde > amide > ketone > amine > alkyne  
 (C) aldehyde > amide > amine > alkyne > ketone  
 (D) alkyne > aldehyde > amide > amine > ketone

According  
to IUPAC

Acid > Sul > Anhydride > Ester > Acid halide > Amide > -CN > -NC  
 > -CHO >  $\text{C}=\text{O}$  > -OH > -SH > -NH<sub>2</sub>

**Ans. (A)**

**Q) Match the list-I (Vitamins) with list-II (Name)**

**List-I (Vitamins)**

**(A) Vitamin B<sub>1</sub>**

**(B) Vitamin B<sub>2</sub>**

**(C) Vitamin B<sub>12</sub>**

**(D) Vitamin C**

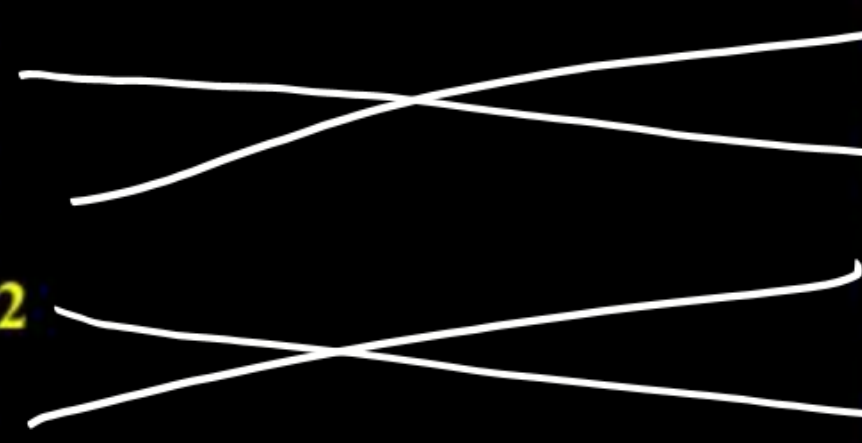
**List-II (Name)**

**(P) Riboflavin**

**(Q) Thiamine**

**(R) Ascorbic Acid**

**(S) Cobalamin**



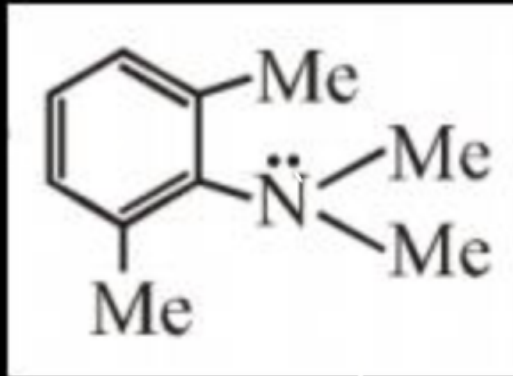
**Q) Consider the electrophilic attack on given compound**



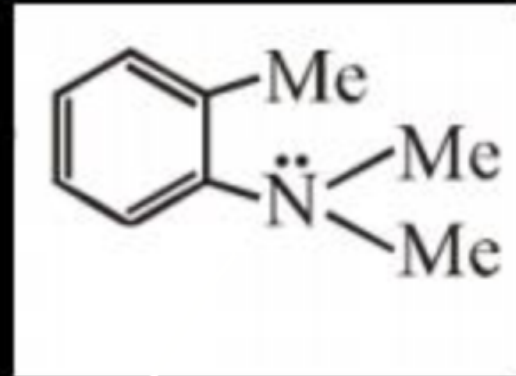
- (A) Predominately at U position**
- (B) Predominately at R position** ✓
- (C) Predominately at P position**
- (D) Predominately at S position**

**Ans. (B)**

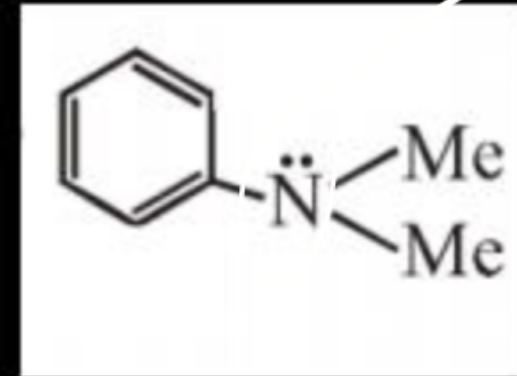
**Q) Arrange the following compound in decreasing order of coupling reaction with benzene diazonium chloride**



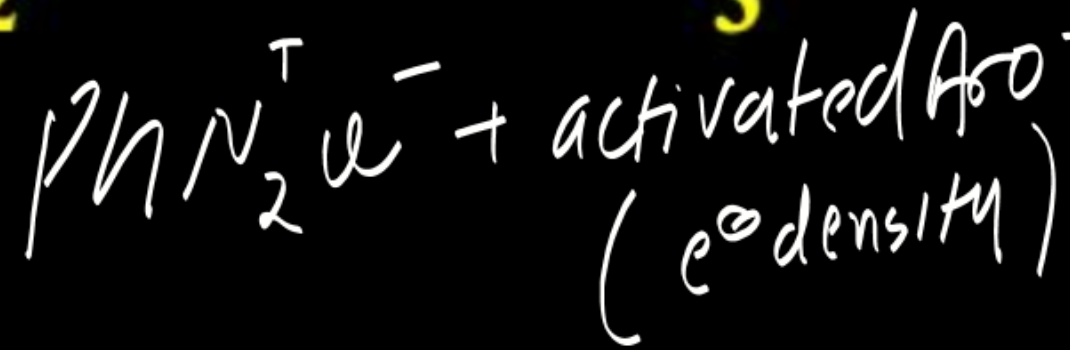
**1**



**2**



**3**



**Ans. (3 > 2 > 1)**

**Q) Distinguish the compounds given in list-I to list-II (Reagent)**

**List-I**

(A) Acetophenone & acetaldehyde

(B) Phenol & Ethanol

(C) Diethyl amine & ethyl amine

(D) Propane & Cyclobutene

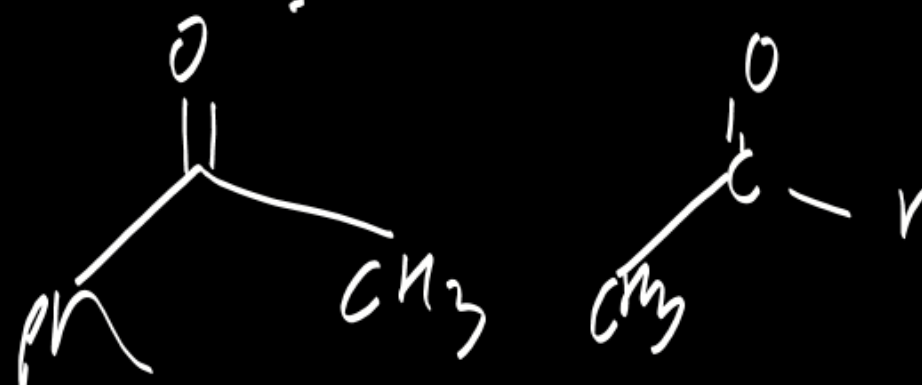
**List-II**

(P) Neutral  $\text{FeCl}_3$

(Q) Ammoniacal  $\text{AgNO}_3$

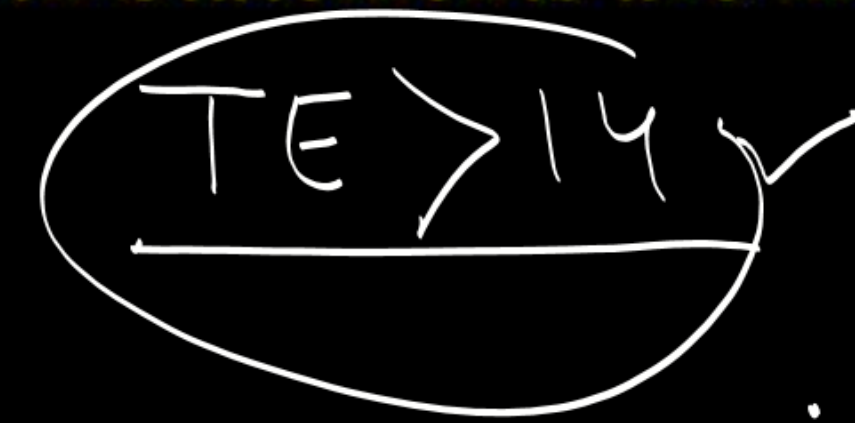
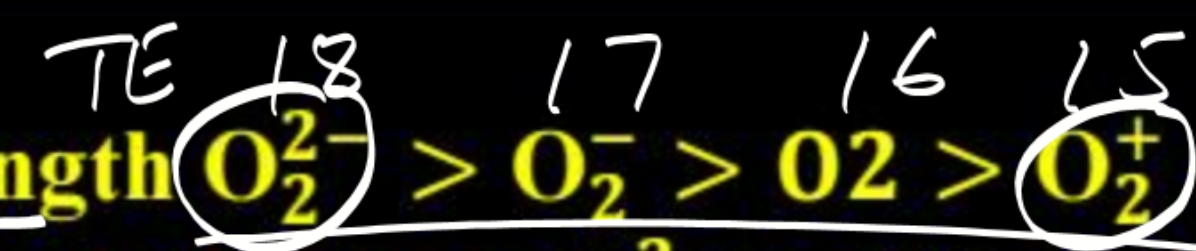
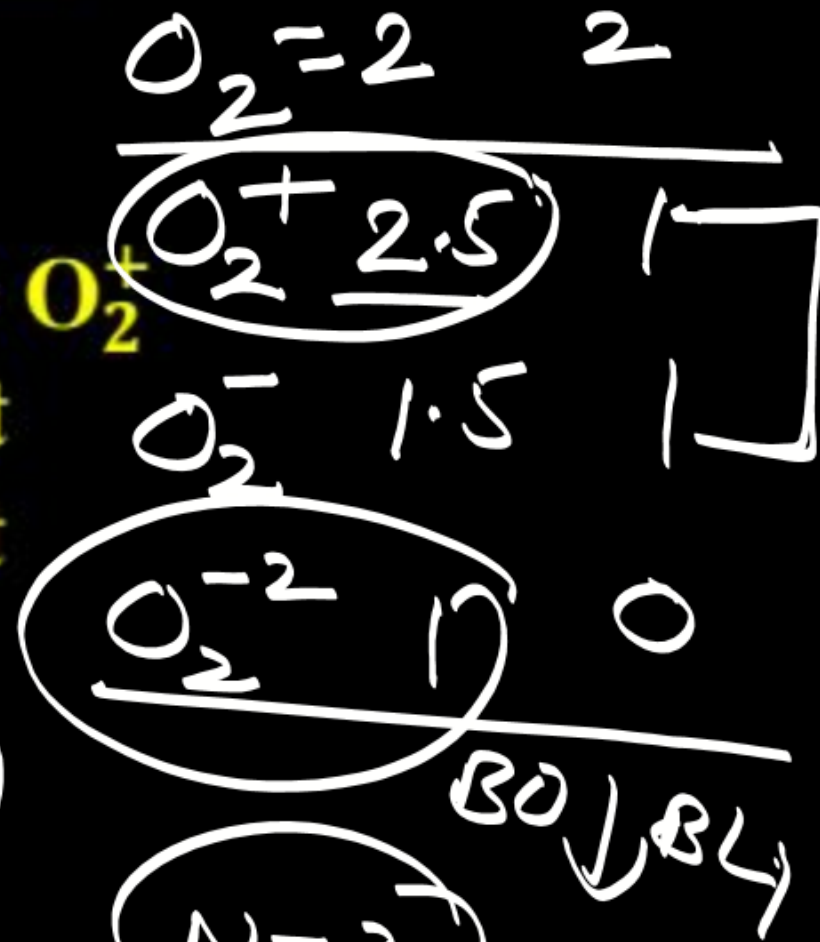
(R) Alcoholic  $\text{KOH}/\text{CHCl}_3$

(S)  $\text{Br}_2 / \text{H}_2\text{O}$



T.R

- Q) Statement I Bond length  $O_2^{2-} > O_2^- > O_2 > O_2^+$  ✓  
 Statement II unpaired electron  $O_2^{2-} > O_2^- > O_2 > O_2^+$  ✗
- ✓ (A) Statement I is correct & Statement II is incorrect  
 (B) Statement I is incorrect & Statement II is correct  
 (C) Both Statements are correct  
 (D) Both Statements are incorrect



$$BO = \frac{1}{2} [N_b - N_a]$$

$$= \frac{1}{2} [10 - 6] = 2$$

MO diagram showing orbitals for  $O_2$  with bond order 2.

Ans. (A)

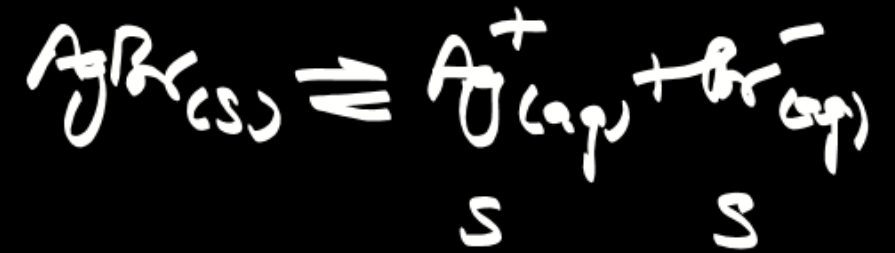
**Q) Solubility product of  $\text{Ag}_2\text{CrO}_4$  &  $\text{AgBr}$  are  $32x$  &  $4y$  respectively. What is ratio of solubility of  $\text{Ag}_2\text{CrO}_4$  &  $\text{AgBr}$ .**

(A)  $\frac{x^3}{y^2}$

(B)  $\frac{x^3}{y^{1/2}}$

✓ (C)  $\frac{x^{1/3}}{y^{1/2}}$

(B)  $\frac{y^3}{x^{1/2}}$

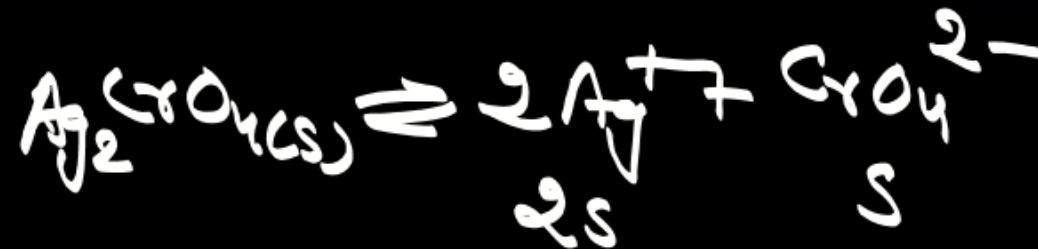


$$K_{sp} = s^2$$

$$s^2 = 4y$$

$$s = 2\sqrt{y}$$

$$\frac{s_1}{s_2} = \frac{2\sqrt{x}}{2\sqrt{y}}$$



$$K_{sp} = (\text{Ag}^+)^2 (\text{CrO}_4^{2-})$$

$$32x = (2s)^2 \cdot s = 4s^3$$

$$s = \sqrt[3]{8x}$$

$$\frac{s_1}{s_2} = \frac{\sqrt[3]{8x}}{2\sqrt{y}}$$

**Ans. (C)**

Q) For first order reaction, rate constant at 27°C and t°C is  $1.5 \times 10^3$  and  $4.5 \times 10^3$  respectively. If the activation Energy of reaction is 60 kJ then find temperature t.

$$0.4771 = \frac{60 \times 10^3}{2.303 \times 8.314} \left( \frac{1}{300} - \frac{1}{T_2} \right)$$

$$T_1 = 300 \text{ K} \quad T_2 = ?$$

$$k_1 = 1.5 \times 10^3 \quad k_2 = 4.5 \times 10^3$$

$$T_2 = 314.35 \text{ K}$$

$$T_2 = 314.35 - 273 = 41.35^\circ \text{C}$$

$$\log \frac{k_2}{k_1} = \frac{E_a}{2.303R} \left( \frac{1}{T_1} - \frac{1}{T_2} \right)$$

Ans. (41)

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**MATH**

**Q) If  $y = f(x)$  is the solution of the differential equation**

$$(1 + \sin x) \frac{dy}{dx} + (y + 1) \cos x = 0, \text{ such that } f(0) = 0, \text{ then } f\left(\frac{\pi}{2}\right)$$

can be:

(A)  $\frac{1}{2}$

(B) 1

~~(C)  $\frac{-3}{2}$~~

(D) -2

$\frac{-1}{2}$ ,  $\frac{-3}{2}$

**Ans. (C)**

$$(1 + \sin x) \frac{dy}{dx} = -(y + 1) \cos x$$

$$\left( \frac{dy}{y+1} = - \int \frac{\cos u \, du}{1 + \sin u} \right)$$

$$\ln|y+1| = -\ln|1 + \sin u| + c$$

$$|y+1| = \frac{1}{1 + \sin u}$$

$$|y+1| = \frac{1}{2} \begin{cases} y+1 = 1/2 \\ y+1 = -1/2 \end{cases}$$

$c=0$

Q) If eccentricity of an ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ , which passes

$$2b^2/a = \frac{2 \times 20}{3\sqrt{5}}$$

through point  $(3, 4)$  is  $\frac{\sqrt{5}}{3}$ , then length of latus rectum of ellipse is:

(A)  $\frac{4\sqrt{5}}{3}$

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

~~(C)  $\frac{8\sqrt{5}}{3}$~~

(D)  $\frac{8\sqrt{7}}{3}$

Ans. (C)

$$e^2 = \frac{b^2}{a^2} = 1 - \frac{b^2}{a^2} \implies \frac{b^2}{a^2} = \frac{4}{9} \implies a^2 = \frac{9}{4}b^2$$

$$\frac{9}{a^2} + \frac{16}{b^2} = 1$$

$$\frac{9 \times 4}{9b^2} + \frac{16}{b^2} = 1$$

$$\left. \begin{aligned} b^2 &= 20 \\ a^2 &= 45 \end{aligned} \right\} \implies$$

$$a = 3\sqrt{5} \implies$$

**Q) If  $x(x+2) + (x+1)(x+3) + \dots + (x+n-1)(x+n+1) = 4n$  has even consecutive integral roots  $\alpha, \alpha+2$ , then find  $|2\alpha + n|$**

$$\sum_{r=1}^n (x+r-1)(x+r+1) = 4n$$

$$\sum_{r=1}^n (x+r)^2 - (1)^2 = 4n \Rightarrow \sum_{r=1}^n (x+r)^2 - n = 4n$$

$$\sum_{r=1}^n x^2 + 2x(r+r^2) = 5n$$

$$\begin{cases} \alpha = -5 \\ n = 7 \end{cases}$$

$$nx^2 + 2x \frac{n(n+1)}{2} + \frac{n(n+1)(2n+1)}{6} - 5n = 0$$

$$\frac{|\Delta|}{4a} = 2$$

$$n = 7$$

$$x^2 + 8x + 15 = 0$$

$$x = -5, -3$$

**Ans. (7)**

$$|2\alpha + n| = 3$$

Q) Let  $x \in [-\pi, \pi]$ .

$$S = \{x: \sin x(\sin x + \cos x) = a, a \in \mathbb{I}\}$$

Then number of elements in set S is equal to

$$\begin{aligned} \sin^2 x + \sin x \cos x &= a \\ 2 \sin^2 x + 2 \sin x \cos x &= 2a \\ 1 - \cos 2x + \sin 2x &= 2a \\ \sin 2x - \cos 2x &= 2a - 1 \end{aligned}$$

$[-\sqrt{2}, \sqrt{2}]$

Ans. (9)

$$\begin{aligned} -\sqrt{2} &\leq 2a - 1 \leq \sqrt{2} \\ \frac{1 - \sqrt{2}}{2} &\leq a \leq \frac{1 + \sqrt{2}}{2} \end{aligned}$$

$$a \in \mathbb{I} \Rightarrow a = 0, 1$$

$$\begin{aligned} \sin 2x - \cos 2x &= -1, 1 \\ \frac{1}{\sqrt{2}} \sin 2x - \frac{1}{\sqrt{2}} \cos 2x &= -\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}} \end{aligned}$$

$$\sin\left(2x - \frac{\pi}{4}\right) = \pm \frac{1}{\sqrt{2}}$$

$$2x - \frac{\pi}{4} = n\pi \pm \frac{\pi}{4}$$

$$2x = n\pi, n\pi + \frac{\pi}{2}$$

$$x = \frac{n\pi}{2}, \frac{n\pi}{2} + \frac{\pi}{4}$$

$$n = 0, 1, 2, -1, -2$$

$$\boxed{Ans = 9}$$

**Q) Find the number of 7-digit numbers formed using the digits 1, 2, 3, 5, and 7 such that each digit is used at least once.**

1, 2, 3, 5, 7, ~~α~~, α

OR

1, 2, 3, 5, 7, α, β

1, 2, 3, 5, 7, 2, 3

$${}^5C_1 \cdot \frac{7!}{3!} + {}^5C_2 \cdot \frac{7!}{2! \cdot 2!}$$

$$= 5 \cdot 7 \times 120 + 10 \times \frac{5040}{4}$$

**Ans. (16800)** ←

Q) Let  $|\vec{a}| = 2$ ,  $|\vec{b}| = 3$ , then maximum value of  $3|3\vec{a} + 2\vec{b}| + 4|3\vec{a} - 2\vec{b}|$  is

- (A) 36     $\downarrow |\vec{a}|^2 = 4$      $\downarrow |\vec{b}|^2 = 9$     (B) 60     $\theta \in [0, \pi]$     (C) 48    (D) 72

$$3\sqrt{9\vec{a}^2 + 4\vec{b}^2 + 12\vec{a}\cdot\vec{b}} + 4\sqrt{9\vec{a}^2 + 4\vec{b}^2 - 12\vec{a}\cdot\vec{b}}$$

$$= 3\sqrt{72 + 72\cos\theta} + 4\sqrt{72 - 72\cos\theta}$$

$$= 3\sqrt{72 \cdot 2\cos^2\frac{\theta}{2}} + 4\sqrt{72 \cdot 2\sin^2\frac{\theta}{2}}$$

$$= 12 \left( 3\cos\frac{\theta}{2} + 4\sin\frac{\theta}{2} \right) \quad \checkmark, \theta \in [0, \frac{\pi}{2}]$$

max<sup>m</sup> value =  $12\sqrt{9+16}$   
 $= 60$

Ans. (B)

Q) The value of  $\int_0^3 \frac{e^x + e^{-x}}{([x])!} dx$  equals (.[ ] denotes the G.I.F)

(A)  $e^2 - e^3 + e^{-2} - e^{-3}$

(B)  $\frac{1}{2}(e^2 + e^3 - e^{-2} - e^{-3})$

(C)  $\frac{1}{2}(e^2 + e - e^{-1} - e^{-2})$

(D)  $\frac{1}{4}(e^2 + e^3 - e^{-2} - e^{-3})$

$$\begin{aligned} & \int_0^1 (e^x + e^{-x}) dx + \int_1^2 (e^x + e^{-x}) dx + \frac{1}{2} \int_2^3 (e^x + e^{-x}) dx \\ &= \int_0^2 (e^x + e^{-x}) dx + \frac{1}{2} \int_2^3 (e^x + e^{-x}) dx \\ &= (e^x - e^{-x})_0^2 + \frac{1}{2} (e^x - e^{-x})_2^3 \\ &= \frac{1}{2} (e^3 + e^2 - e^{-2} - e^{-3}) \end{aligned}$$

Ans. (B)

Q) The value of  $\sin \frac{\pi}{18} \cdot \sin \frac{5\pi}{18} \cdot \sin \frac{7\pi}{18}$  is equal to:

(A)  $\frac{1}{16}$

(B)  $\frac{1}{8}$

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

(D)  $\frac{1}{32}$

$$\sin \theta \cdot \sin \left( \frac{\pi}{3} - \theta \right) \cdot \sin \left( \frac{\pi}{2} + \theta \right) = \frac{1}{4} \sin 3\theta$$

$$= \frac{1}{4} \sin 3\theta$$

$$= \frac{1}{8}$$

Ans. (B)

Q) Find the Range of  $f(x) = \sin^{-1} \left( \frac{1}{x^2 - 2x + 2} \right)$

(A)  $\left(0, \frac{\pi}{2}\right)$

(B)  $\left[0, \frac{\pi}{2}\right]$

(C)  $\left[0, \frac{\pi}{2}\right)$

(D)  $\left(0, \frac{\pi}{2}\right]$

$$1 \leq (x-1)^2 + 1 < \infty$$

$$0 < \frac{1}{(x-1)^2 + 1} \leq 1$$

$$0 < \sin^{-1} \left( \frac{1}{(x-1)^2 + 1} \right) \leq \frac{\pi}{2}$$

Ans. (D)

Q) Let  $f(x) = \begin{cases} \left| \frac{\sin x}{x} \right| & , x \neq 0 \\ 1 & , x = 0 \end{cases}$ . Then total number of critical point(s) in  $x \in (-2\pi, 2\pi)$  is:

(A) 1

(B) 3

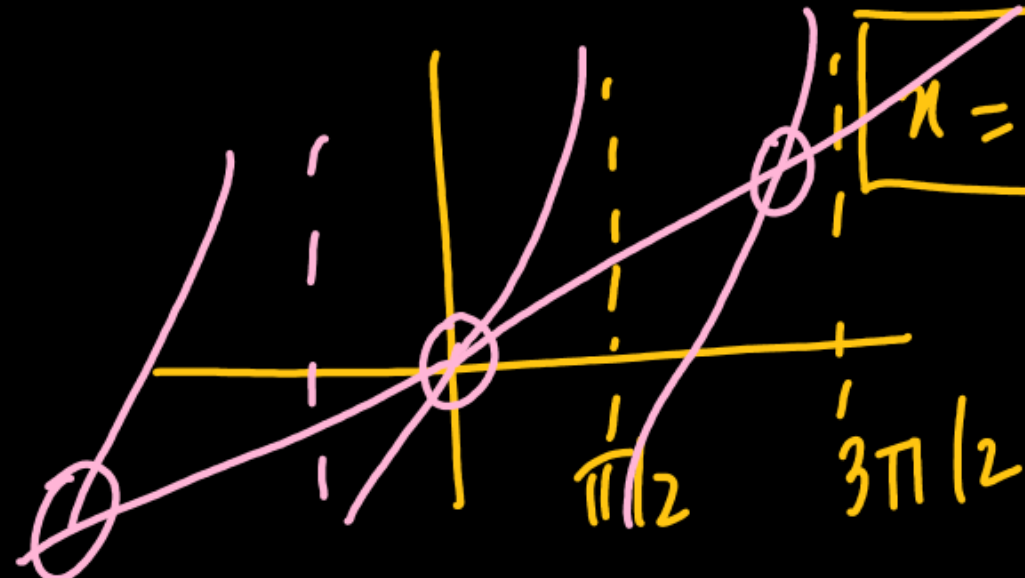
(C) 5

(D) 9

$f'(x) = 0$  or ND

$$d \left( \frac{\sin x}{x} \right) = \frac{\cos x \cdot x - \sin x}{x^2} = 0$$

$x = \tan x$



3 soln

$\sin x = -\pi$  ~~is not a solution~~  
 $\sin x = \pi$  ~~is not a solution~~  
 2 soln

Ans. (C)

Q) Consider two A.P.s such that A.P.<sub>1</sub> has 1<sup>st</sup> term 1, common difference 5 and total terms 101 and A.P.<sub>2</sub> has 1<sup>st</sup> term 9, common difference 7 and total terms 71 then the number of common terms which appear in both these A.P.s and are divisible by 3 also.

(A) 14

(B) 8

~~(C) 5~~

(D) 3

$$AP_1: \{1, 6, 11, 16, \dots, 501\}$$

$$AP_2: \{9, 16, 23, 30, \dots, 497\}$$

$$\{16, 51, 86, \dots\}$$

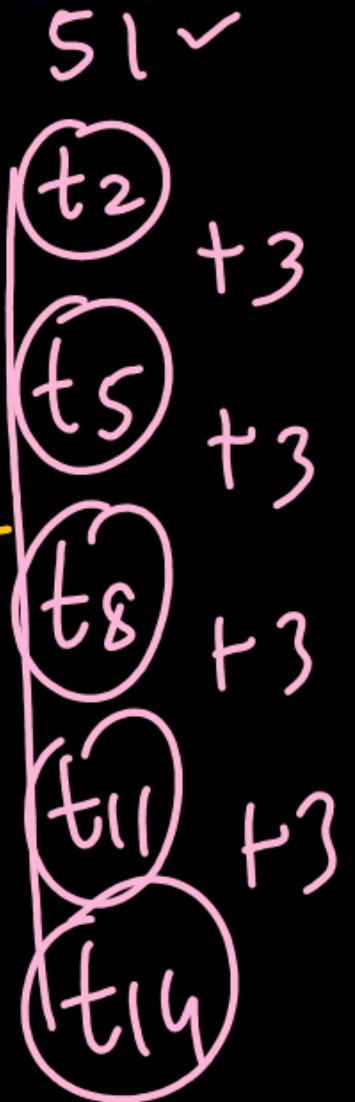
$d = 35$

$$t_n \leq 497$$

$$16 + 35(n-1) \leq 497$$

$$n \leq 14.8$$

$$n = 14$$



Ans. (C)

~~7~~

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