

JEE MAIN 2025 SESSION-2 SHIFT-2 EVENING



SCAN ME

VIDEO SOLUTION

MEMORY BASED QUESTIONS

1. Given below are two statements. One is labelled as Assertion (A) and the other is labelled as reason (R)

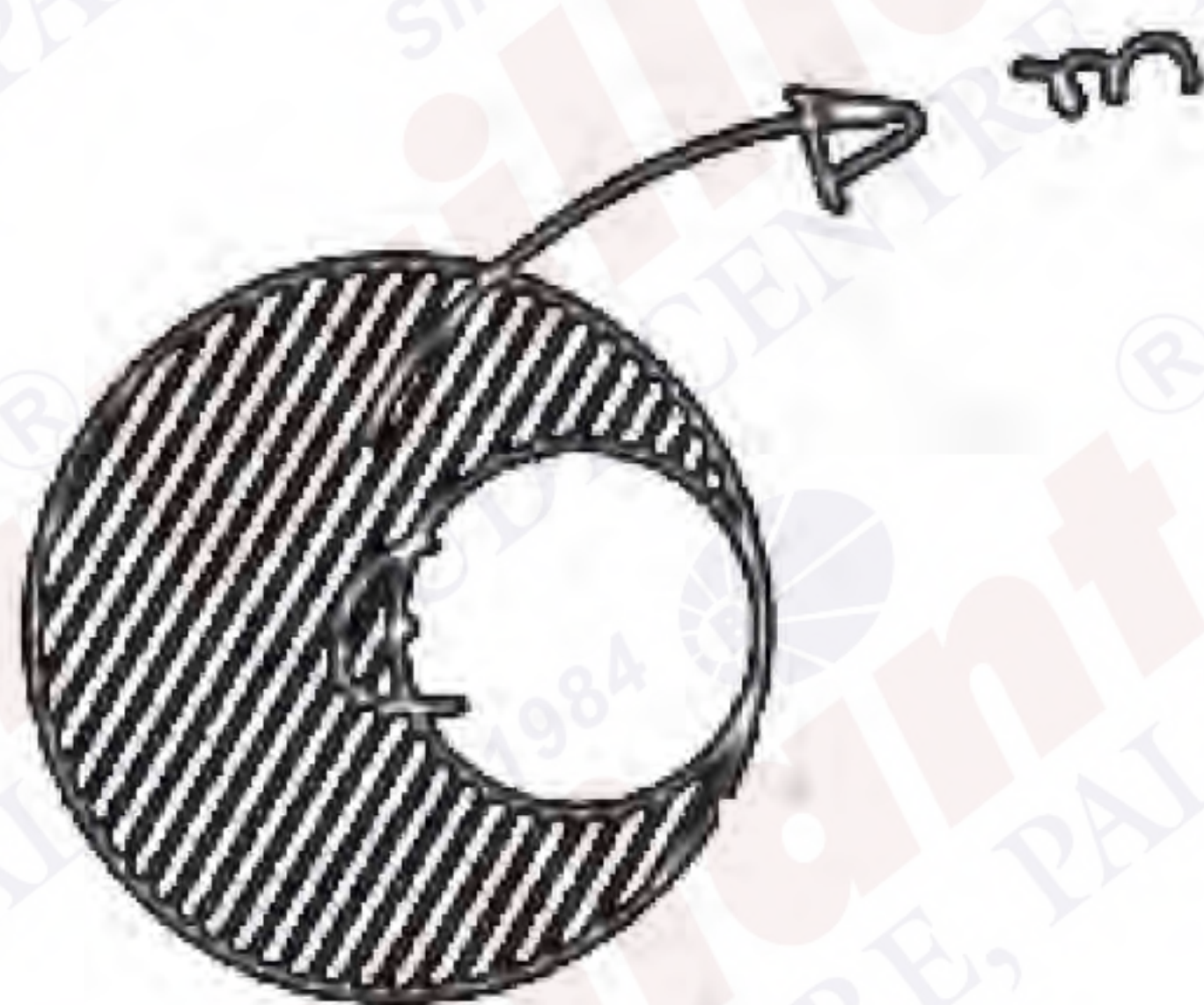
Assertion (A): Refractive index of glass is more than air

Reason (R): Optical density of a medium is directly related to its mass density

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

- 1) (A) is false but (R) is true
- 2) (A) is true but (R) is false
- 3) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)
- 4) Both (A) and (R) are true and (R) is the correct explanation of (A)

2. The figure shows a circular portion of radius $R/2$ removed from a disc of mass m and radius R . The moment of inertia about an axis passing through the centre of mass the disc and perpendicular to the plane is



- 1) $\frac{13}{32}mR^2$
- 2) $\frac{mR^2}{2}$
- 3) $\frac{mR^2}{4}$
- 4) $\frac{13}{64}mR^2$

3. Give below are two statements. One is labelled as Assertion (A) and the other is labelled as Reason (R)

Assertion (A): A magnetic monopole does not exist

Reason (R): Magnetic lines are continuous and form closed loops

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

- 1) (A) is false but (R) is true
- 2) (A) is true but (R) is false
- 3) (A) and (R) are true but (R) is NOT the correct explanation of (A)
- 4) (A) and (R) are true and (R) is the correct explanation of (A)

4. Potential energy is not defined for which of the force

- 1) Gravitational force
- 2) Restoring force
- 3) Friction
- 4) Electrostatic force

5. Which of the following forces cannot be expressed in terms of potential energy?

- 1) Frictional force
- 2) Gravitational force
- 3) Restoring force
- 4) Coloumb's force

6. An object with mass 500g moves along x - axis with speed $v = 4\sqrt{x}$ m / s then force acting on the object is

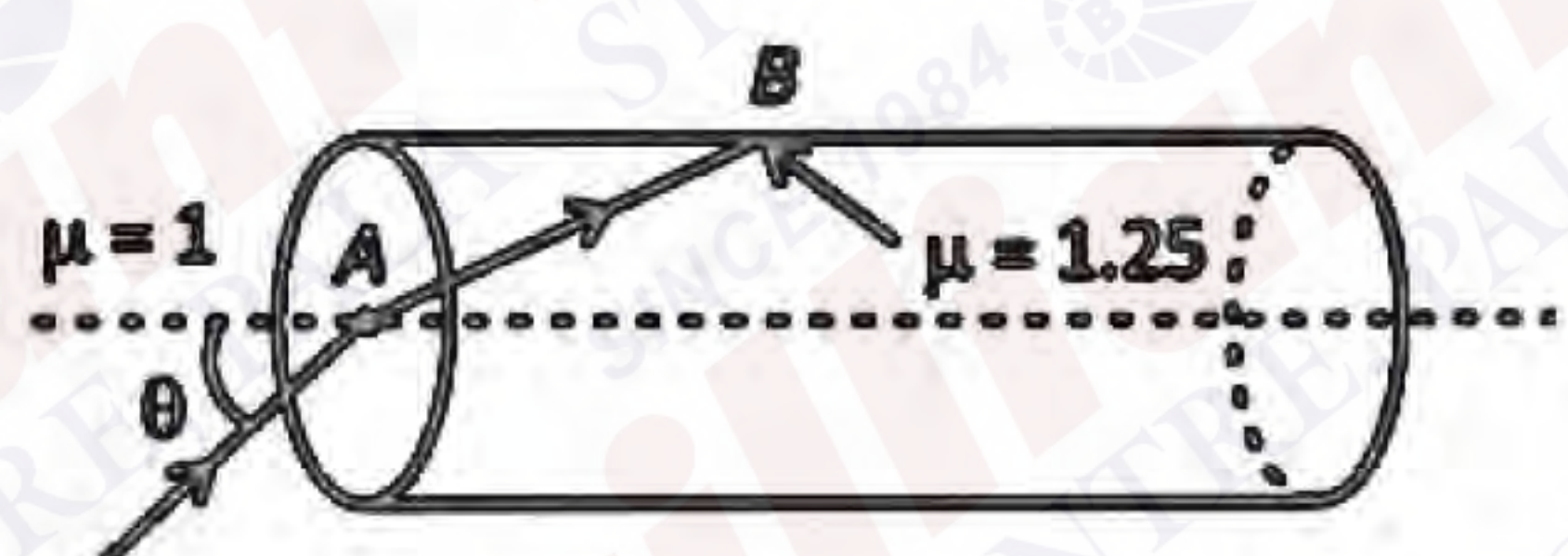
- 1) 8N
- 2) 6N
- 3) 5N
- 4) 4N

7. An inductor of reactance 50Ω , a capacitor of reactance 50Ω and a resistor of resistance 100Ω are connected in series with an AC source 10V, 50Hz. Average power dissipated by the circuit is ——W

8. The equation of a wave travelling on a string is $y = \sin 20\pi x + 10\pi t$ where x and t are distances and time in si units, the minimum distance two points having same oscillating speed is



- 1) 10cm 2) 20cm 3) 5.0cm 4) 2.5cm
9. Which of the following quantity has same dimensions as $\sqrt{\frac{\mu_0}{\epsilon_0}}$?
- 1) voltage 2) resistance 3) inductance 4) capacitance
10. An object is released from a plane moving horizontally with a speed 100m/s at a height 2km above ground. The horizontal distance travelled (in km) by the object is (take $g = 10\text{m/s}^2$)
11. The maximum value of θ (shown in figure) for which total internal reflection can happen at point B is



- 1) $\tan^{-1}\left(\frac{4}{3}\right)$ 2) $\sin^{-1}\left(\frac{3}{4}\right)$ 3) $\cot^{-1}\left(\frac{3}{4}\right)$ 4) $\cos^{-1}\left(\frac{3}{4}\right)$
12. Distance between object and image for a convex lens is 40cm and magnification $-1/4$. Find focal length of the lens
- 1) 14.5cm 2) 15cm 3) 12.5cm 4) 6.4cm
13. Flux through a plane parallel to $x - z$ plane is 6 SI units. Find area of plane if electric field in the region is $\vec{E} = (\hat{i} + 4\hat{j} + \hat{k})10^3 \text{ N/C}$
- 1) $2 \times 10^{-3} \text{ m}^2$ 2) $2.5 \times 10^{-2} \text{ m}^2$ 3) $1.5 \times 10^{-3} \text{ m}^2$ 4) $2.5 \times 10^{-3} \text{ m}^2$
14. A mirror is used to produce an image with magnification of $1/4$. If the distance between object and its image is 40cm, the focal length of the mirror is
- 1) 10.7cm 2) 12.7cm 3) 10cm 4) 15cm
15. Match the list - I with list - II
- | List - I | | List - II | |
|----------|------------|-----------|-------------------|
| A) | Isothermal | I | $\Delta W = 0$ |
| B) | Adiabatic | II | $\Delta Q = 0$ |
| C) | Isobaric | III | $\Delta U \neq 0$ |
| D) | Isochoric | IV | $\Delta U = 0$ |

16. Match the list - I with List - II

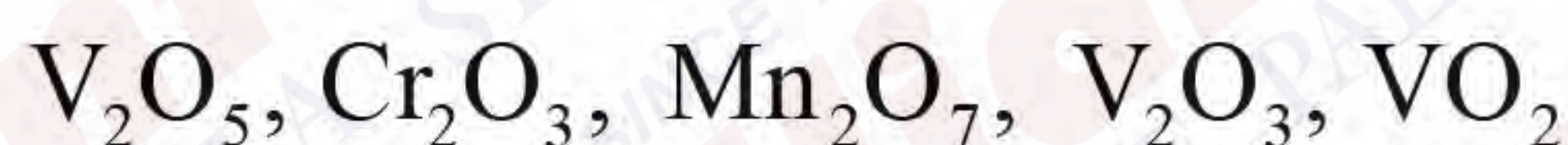
List I

List - II

- A) Mass density
- B) Impulse
- C) Power
- D) Moment of inertia

- I) $[ML^2T^{-3}]$
- II) $[ML^2T^{-1}]$
- III) $[ML^2T^0]$
- IV) $[ML^{-3}T^0]$

1. Consider the following oxides



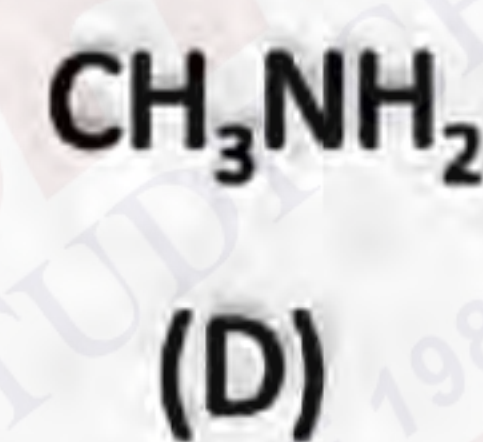
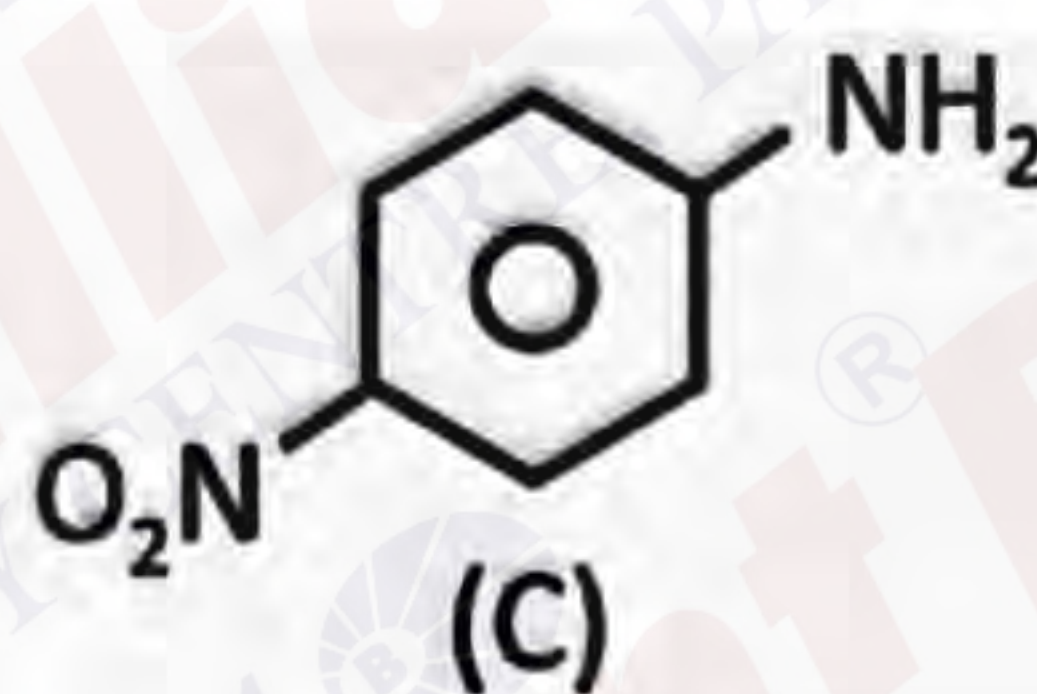
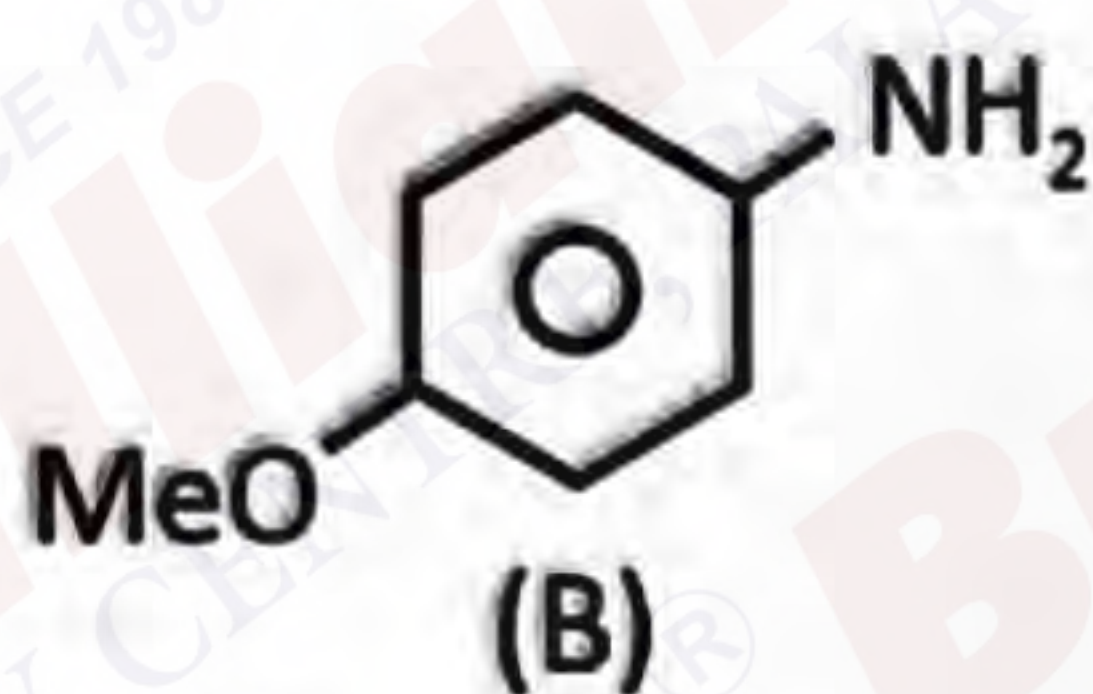
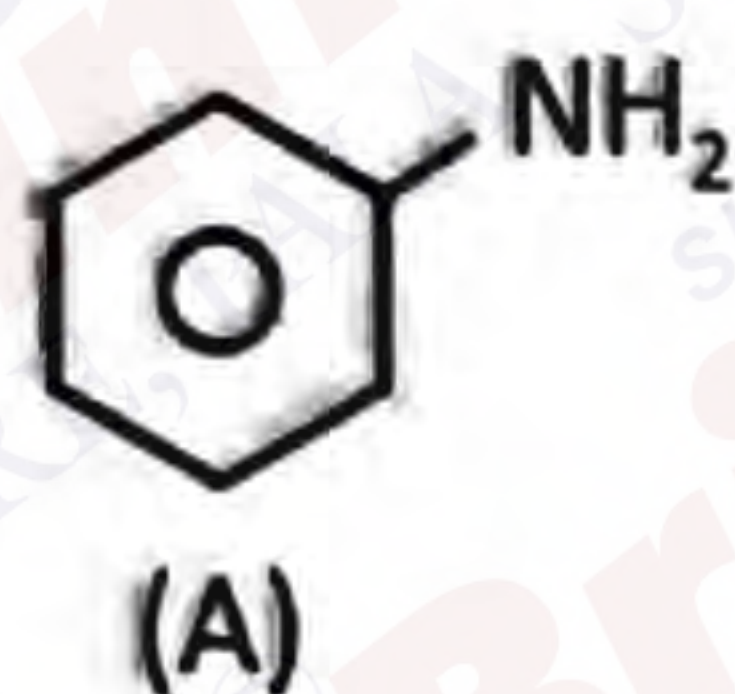
Number of oxides which are acidic is x.

Consider the following complex compound $[\text{Co}(\text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2)_3]_2(\text{SO}_4)_3$

the primary valency of complex is y

The value of x + y is

2. The correct order to basic strength of the following molecules is



1) $A > B > C > D$

2) $B > C > D > A$

3) $D > B > A > C$

4) $B > A > C > D$

3. Which of the following is the correct Hybridisation of XeF_4 ?

1) sp^3d

2) sp^3

3) sp^3d^2

4) sp^3d^3

4. Which of the following is correct order of acidic character of oxides of vanadium?

1) $\text{V}_2\text{O}_5 > \text{VO}_2 > \text{V}_2\text{O}_3$

2) $\text{V}_2\text{O}_3 > \text{VO}_2 > \text{V}_2\text{O}_5$

3) $\text{V}_2\text{O}_5 > \text{V}_2\text{O}_3 > \text{VO}_3$

4) $\text{VO}_2 > \text{V}_2\text{O}_3 > \text{V}_2\text{O}_5$

5. Consider the following species

(i) SO_2

(ii) N_3^-

(iii) NO_2^-

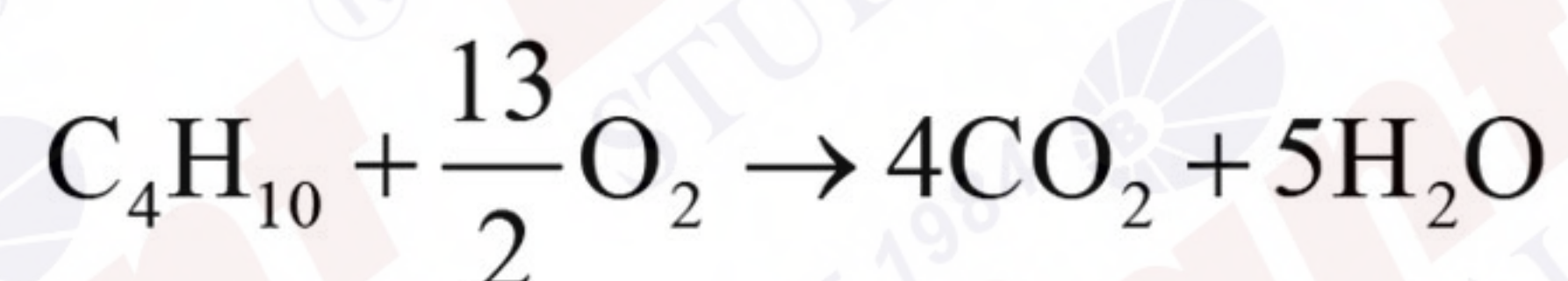
1) (i) sp^2 (ii) sp^2 (iii) sp^2

2) (i) sp^2 (ii) sp (iii) sp^2

3) (i) sp^3 (ii) sp (iii) sp^2

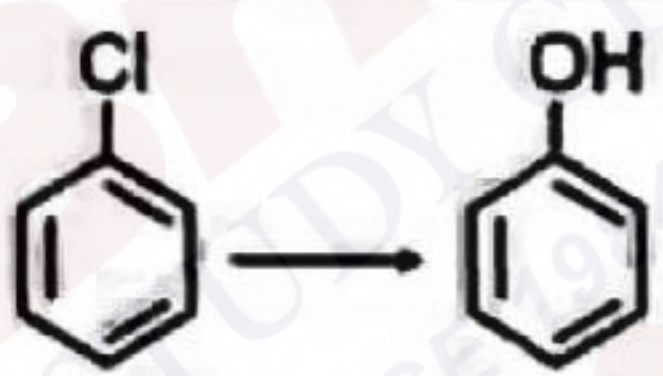
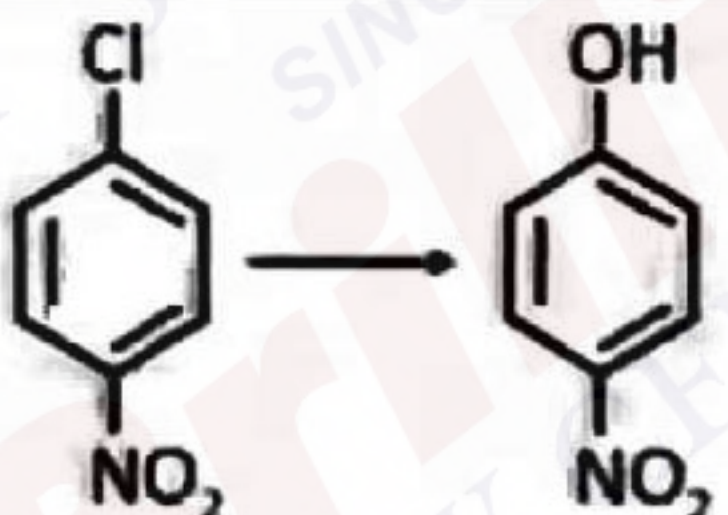
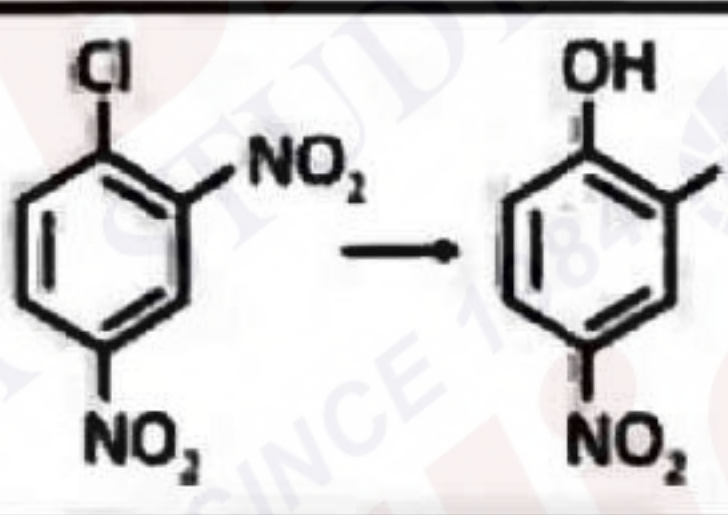
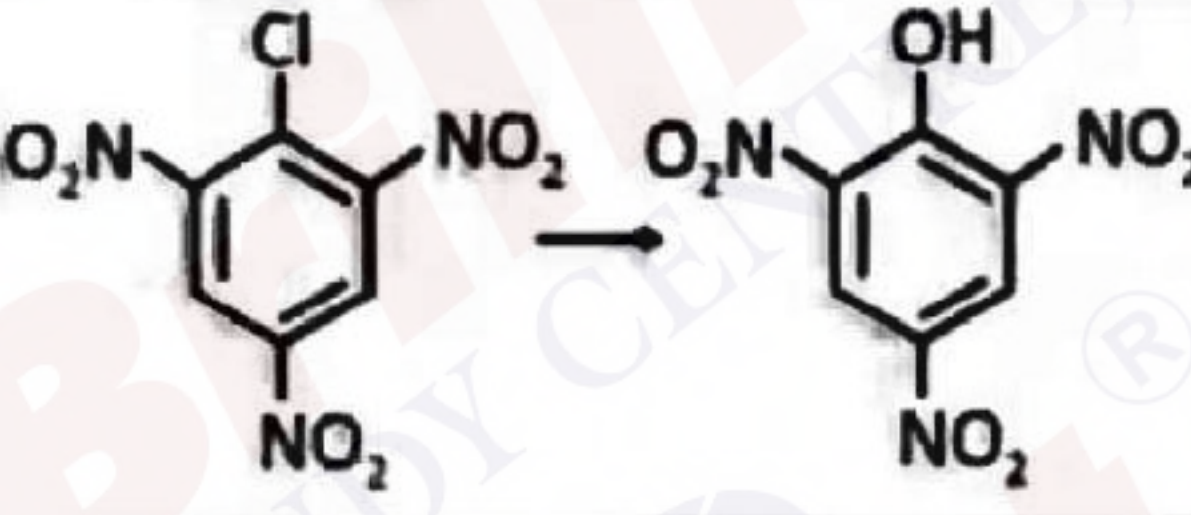
4) (i) sp (ii) sp^2 (iii) sp^3

6. Consider the reaction given below:



If 174 g of Butane reacts with 320 g of O_2 . Find the volume of H_2O formed in ml. (given density of H_2O is 1 g/ml)

7. Match the following List - I with List - II

	List-I (Reactions)		List-II (Reaction Temperature)
(A)		(I)	Slight Warming
(B)		(II)	368 K
(C)		(III)	443 K
(D)		(IV)	623 K

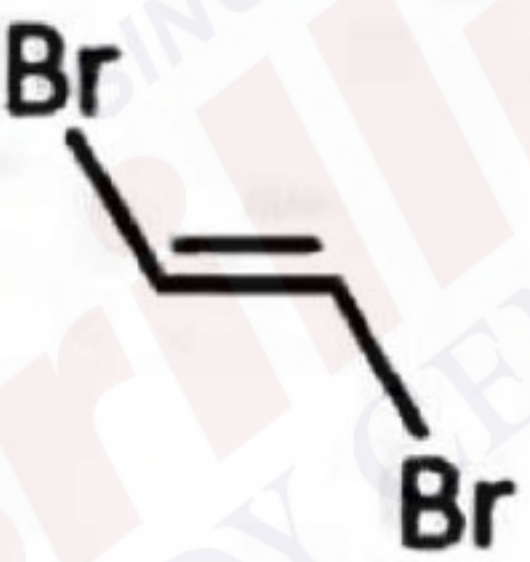
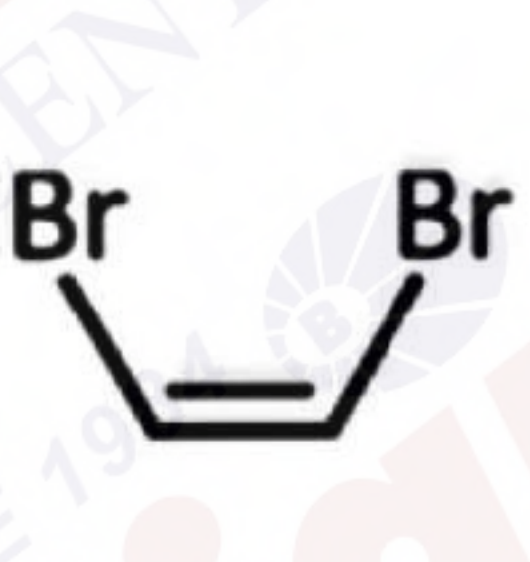
1) A - II, B - III, C-I, D-IV

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

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

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

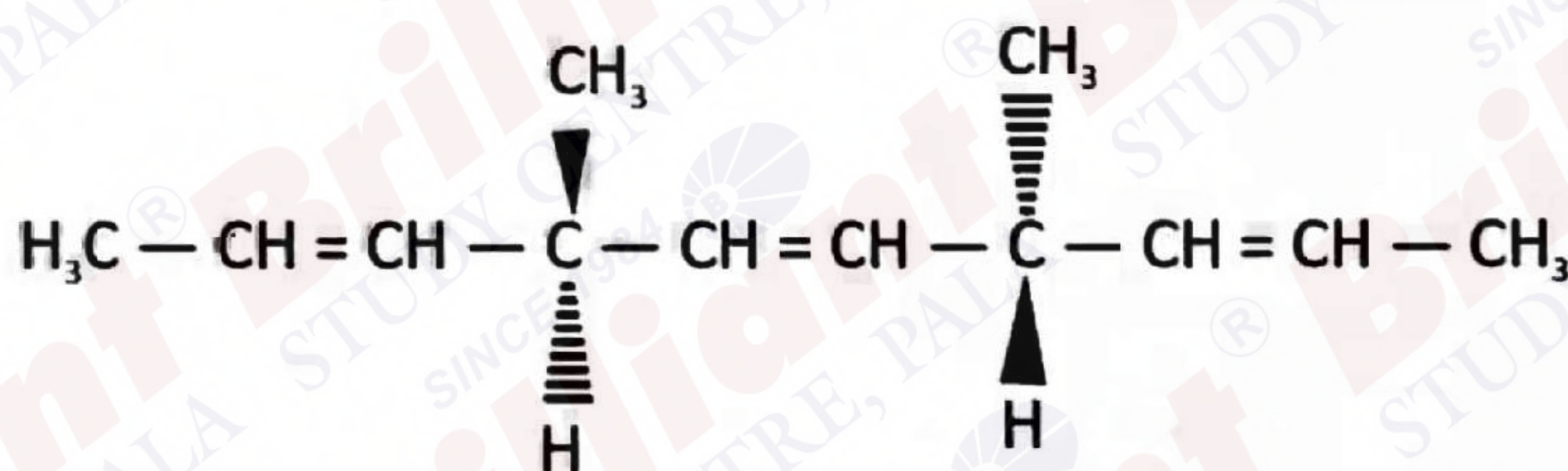
8. Assertion :  has dipole moment than 

Reason :  has more boiling point than 

Choose the correct option

- Both Assertion & Reason are correct, Reason is correct explanation of Assertion
- Both Assertion & Reason are correct, Reason is not correct explanation of Assertion
- Assertion is correct, Reason is incorrect
- Assertion is incorrect, Reason is correct

9. Consider the following molecules



Number of optically active molecule(s) formed after complete reductive ozonolysis of above compounds.

1) 2

2) 1

3) 0

4) 3

10. If $P_A^\circ = 350 \text{ torr}$ and $P_B^\circ = 750 \text{ torr}$ and the two volatile liquids (A) and (B) form an ideal solution. X_A and X_B are the respective mole fraction of (A) and (B) in solution and Y_A and Y_B are the respective mole fractions of (A) and (B) in the vapour phase. Which one of the following relation is correct?

1) $\frac{Y_A}{Y_B} = \frac{X_A}{X_B}$

2) $\frac{Y_A}{Y_B} < \frac{X_A}{X_B}$

3) $\frac{Y_A}{Y_B} > \frac{X_A}{X_B}$

4) $\frac{Y_A}{Y_B} = \frac{X_B}{X_A}$

11. Among the given order, the incorrect order of atomic radii is

1) $r_{\text{Rb}} < r_{\text{Cs}}$

2) $r_{\text{Mg}} < r_{\text{Al}}$

3) $r_{\text{Cl}} < r_{\text{Br}}$

4) $r_{\text{K}} < r_{\text{Rb}}$

12. Match the List-I with List -II and select the correct option

List-I (Solution)

(A) Benzene + Toluene

(B) Aniline + CH_3COOH

(C) Water + ethanol

(D) Acetone + CHCl_3

List-II (Properties)

(P) Show +ve deviation

(Q) $\Delta V_{\text{mix}} = 0$

(R) $\Delta H_{\text{mix}} = -\text{ve}$

(S) Form minimum boiling Azeotrope.

- 1) $A \rightarrow Q, B \rightarrow R, C \rightarrow P, S, D \rightarrow R$
 2) $A \rightarrow S, B \rightarrow Q, R, C \rightarrow P, S, D \rightarrow R$
 3) $A \rightarrow Q, B \rightarrow P, S, C \rightarrow R, D \rightarrow R$
 4) $A \rightarrow P, S, B \rightarrow S, C \rightarrow P, D \rightarrow R$

13. Which of the following compounds having molecular formula $\text{C}_6\text{H}_{12}\text{O}_6$ and gives positive result to 2,4-DNP test and Tollen's reagent test



- Let $f(x) = \frac{x-5}{x^2-3x+2}$ if range of $f(x)$ is $(-\infty, \alpha) \cup (\beta, \infty)$. Then $\alpha^2 + \beta^2$ equals to
- If two vectors $\vec{a}$ and $\vec{b}$ satisfies $\frac{|\vec{a} + \vec{b}| + |\vec{a} - \vec{b}|}{|\vec{a} + \vec{b}| - |\vec{a} - \vec{b}|} = \sqrt{2} + 1$, then the value of $\frac{|\vec{a} + \vec{b}|^2}{|\vec{a} - \vec{b}|^2}$ is
 1) $1 + \sqrt{2}$ 2) $2 + 4\sqrt{2}$ 3) $1 + 2\sqrt{2}$ 4) $3 + 2\sqrt{2}$
- $\operatorname{Re}\left(\frac{2z+i}{z+i}\right) + \operatorname{Re}\left(\frac{2\bar{z}-i}{\bar{z}-i}\right) = 2$ is circle of radius r and centre (a, b) , then $\frac{15ab}{r^2}$ is equal to
- If $x|x-3| + 3|x-2| + 1 = 0$, then the number of real solution is
 1) 2 2) 4 3) 1 4) 6
- If $f(\theta) = \frac{\tan(\tan \theta) - \tan(\sin \theta)}{\tan \theta - \sin \theta}$ is continuous at $\theta = 0$, then the value of $f(\theta)$ at $\theta = 0$ is equal to
- If a box contains 19 unbiased coins and 1 biased coin with both faces head, if a coin is randomly chosen out of this box and tossed. If the head appears, then the probability that the unbiased coin was selected
 1) $\frac{19}{21}$ 2) $\frac{1}{3}$ 3) $\frac{1}{5}$ 4) $\frac{1}{6}$
- Let a_n be the n^{th} term of an A.P
 If $S_n = a_1 + a_2 + a_3 + \dots + a_n = 700$, $a_6 = 7$ and $S_7 = 7$, then a_n is equal to
- Let a random variable x take values 0, 1, 2, 3 with $P(x=0) = P(x=1) = P$, $P(x=2) = P(x=3)$ and $E(X^2) = 2E(x)$. Then the value of $8p - 1$ is
- Let $y = y(x)$ and $(1+x^2)y' - 2xy = (x^4 + 2x^2 + 1)\cos x$. If $y(0) = 1$, then $\int_{-3}^3 y(x)dx$ equals to
 1) 20 2) 15 3) 24 4) 10
- The sum of series ${}^2C_1 \cdot (1 \times 2) + {}^3C_2 \cdot (2 \times 3) + {}^4C_3 \cdot (3 \times 4) + \dots + {}^{19}C_{18} \cdot (18 \times 19)$ is S , then $\frac{S}{295}$ is equal to
 1) 104 2) 107 3) 103 4) 114
- Let the length of latus rectum of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ be 10. If its eccentricity is the minimum value of the function $f(t) = t^2 + t + \frac{11}{12}$, $t \in \mathbb{R}$, then $a^2 + b^2$ is equal to

12. Let the foot of perpendicular from $P(5, 1 - 3)$ on the line $L_1 : x - 1 = y = 2 = z$ and $L_2; x - 2 = y = z - 1$ is Q and R , respectively. The area of triangle PQR is equal to (in square units)
13. If a triangle is formed using lines $y = x + 1$, $y = 4x - 8$, $y = mx + c$, if the orthocentre of this triangle is $(3, -1)$ then $m - c$ is equal to
14. Let α and β be roots of the equation

$$\left[(t+2)^{\frac{1}{7}} - 1 \right] x^2 + \left[(t+2)^{\frac{1}{6}} - 1 \right] x + \left((t+2)^{\frac{1}{21}} - 1 \right) = 0 \quad \text{If } \lim_{t \rightarrow 1} \beta = b, \text{ then } 72 (a + b)^2 \text{ is equal to}$$

15. If the range of the function $f(x) = \frac{5-x}{x^2-3x+2}$, $x \neq 1, 2$ is $(-\infty, \alpha] \cup [\beta, \infty)$, then $\alpha^2 + \beta^2$ is equal to

16. If the equation of the line passing through the point $\left(0, -\frac{1}{2}, 0\right)$ and perpendicular to the lines

$$\vec{r} = \lambda(\hat{i} + \hat{a}\hat{j} + b\hat{k}) \text{ and } \vec{r} = (\hat{i} - \hat{j} - 6\hat{k}) + \mu(-b\hat{i} + \hat{a}\hat{j} + 5\hat{k}) \text{ is } \frac{x-1}{-a} = \frac{y+4}{d} = \frac{z-c}{-4} \text{ then } a + b + c + d \text{ is equal to}$$

- 1) 12 2) 10 3) 13 4) 14