SINCE 1984

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STUDY CENTRE, PALA

JEE MAIN 2025

SESSION-2

SHIFT-2 EVENING

VIDEO SOLUTION

SCAN ME

MEMORY BASED QUESTIONS

SINCE 1984
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02-04-2025 SHIFT 2-EVENING

MEMORY BASED QUESTIONS

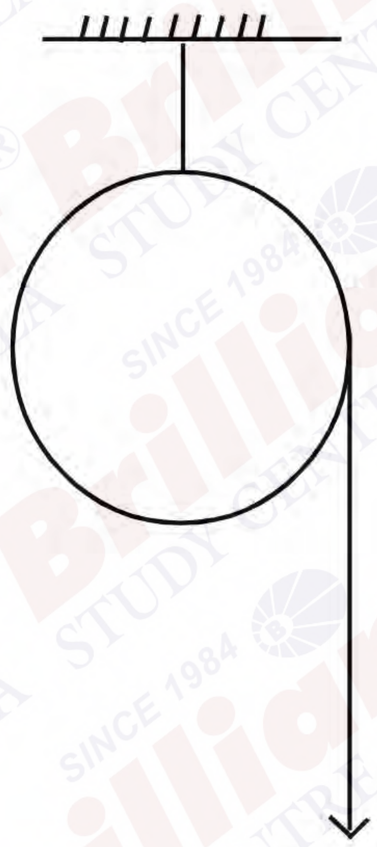
PHYSICS

1. Binding energy per nucleon in ${}_1^2H$ is x and for ${}_2^4He$ is y. Find energy released in the given reaction ${}_1^2H + {}_2^4He \rightarrow {}_2^4He$

1) 2x - 2y 2) –4x + 4y 3) 4x – 4y 4) 2y – 4x

2. A disc of mass M and radius 2m is hinged keeping axis horizontal. If angular acceleration of disc is $2rad/s^2$. Find moment of inertia

1) $10kgm^2$ 2) $5kgm^2$ 3) $6\ kg\ m^2$ D) $20kgm^2$

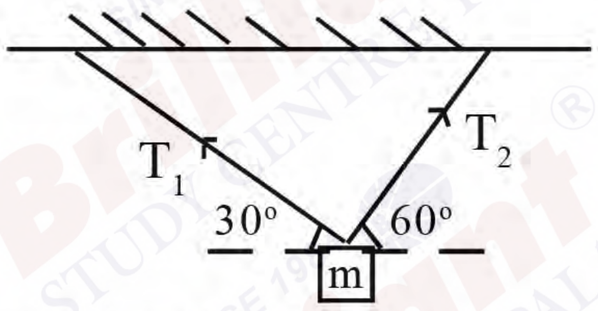


F= 10N

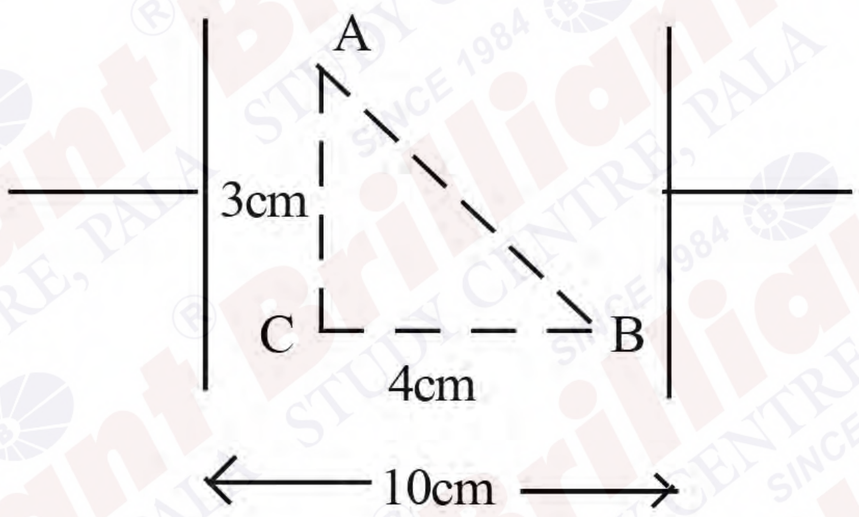
3. A block of mass m is suspended in a vertical plane with the help of two light strings as shown.

Find the ratio of tensions $\frac{T_1}{T_2}$

1) 3 2) 1/3 3) $1/\sqrt{3}$ 4) $\sqrt{3}$



4. The figure shows the plates of a parallel plate capacitor with a separation 10cm and charged to a potential difference V. Find the potential difference between B and A.

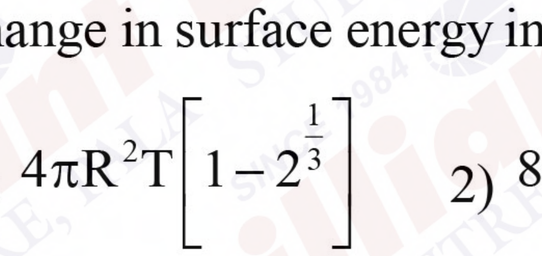


5. The figure shows the plates of a parallel plate capacitor with 10cm and charges to a potential difference V. Find the difference between B and A.

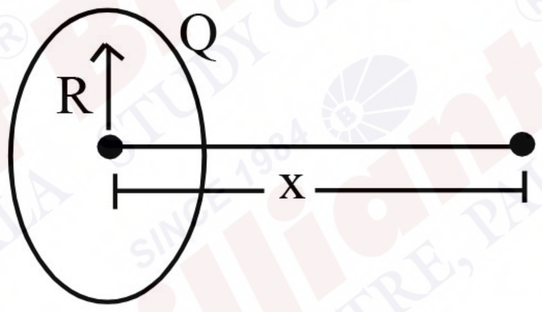
1) $\frac{2V}{5}$ 2) V/2 3) $\frac{3V}{5}$ 3) V/S

6. Figure shows a uniformly charged ring having charge Q and radius R. the distance from the centre on the axis of the ring where electric field maximum

1) $R\sqrt{2}$ 2) $R\sqrt{2}$ 3) 2R 4) R



7. Figure shows a uniformly charged ring having charge Q and radius R. Find distance from the centre on the axis of the ring where electric field is



8. Two identical drops of radius R and surface tension 'T' coalesce to form a bigger drop. The change in surface energy in this process is

1) $4\pi R^2T\left[1-2^{\frac{1}{3}}\right]$ 2) $8\pi R^2T\left[1+2^{\frac{1}{3}}\right]$ 3) $4\pi R^2T\left[1+2^{\frac{1}{3}}\right]$ 4) $8\pi R^2T\left[2^{\frac{1}{3}}-1\right]$

9. Two galvanometers G_1 and G_2 are having resistors $R_1 = 5\Omega$ and $R_2 = 7\Omega$, number of turns $N_1 = 21$, $N_2 = 15$, magnetic field $B_1 = 0.25T$, $B_2 = 0.50T$ and area of coil $A_1 = 3.6\times10^{-3}cm^2$ and $A_2 = 1.8\times10^{-3}cm^2$. Find the ratio of their voltage sensitivity same spring in both

1) 49/25 2) 7/5 3) 5/7 4) 59/20

10. Match the List- I with the List II

i) Heat capacity	a) $Jkg^{-1}k^{-1}$
ii) Specific heat capacity	b) JK^{-1}
iii) Latent heat	c) $Wm^{-1}K^{-1}$
iv) Thermal conductivity	d) JKg^{-1}

1) (i) - (b), (ii) - (d), (iii) - (c), (iv) - (a)
2) (i) - (b), (ii) - (a), (iii) - (c), (iv) - (a)
3) (i) - (b), (ii) - (c), (iii) - (d), (iv) - (a)
4) (i) - (b), (ii)- (a), (iii) - (d), (iv) - (c)

11. What is the dimensional formula of $\frac{1}{m_o\varepsilon_o}$ (where μ_o is permeability and ε_o is permittivity of free space)

1) LT^{-1} 2) L^2T^{-1} 3) MLT^{-1} 4) ML^2T^{-2}

12. An equilateral prism is made of a material of refractive index $\sqrt{2}$. Find angle of incidence for minimum deviation of the light ray

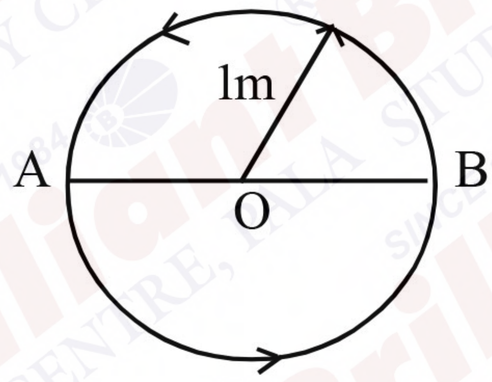
1) 60^o 2) 30^o 3) 37^0 4) 45^0

13. The moment of inertia of a ring of mass M and radius R about an axis passing through tangential point in the plane of ring is

1) $\frac{5MR^2}{2}$ 2) $\frac{3MR^2}{2}$ 3) $\frac{4MR^2}{3}$ 4) $\frac{2MR^2}{3}$

14. A particle moves on a circular path of radius 1m. Find its displacement when it moves from $A \to B \to A \to B$. Also its distance are it moves from $A \to B \to A \to B$

1) Distance = 2m, Displacement = 4πm
2) Distance = 2m, Displacement = 5πm
3) Distance = 4πm, Displacement = 2m
4) Distance = 2m, Displacement = 2m



QN 0.5 organic compound is heated with CuO in a CO_2 atmosphere at 300K. The volume of N_2 gas collected over H_2O is 60mL, if aqueous tension is 15mmHg at 300K and pressure recorded is 715 mmHg then calculate percentage of nitrogen in organic compound.

QN Statement - I: Melting point of neopentane is greater than that of n - pentane
Statement - II : Neopentane give only one mono - substituted product
1) Both S - I and S - II are correct
2) Both S – I and S – II are incorrect
3) S – I is incorrect but S – II is correct
4) S – I correct but S – Ii is incorrect

QN Correct order of electronegativity in below elements
(a) $1s^22s^22p^3$ (b) $1s^22s^22p^4$ (c) $1s^22s^22p^5$ (d) $1s^22s^22p^6$
1) a > b > c > d 2) c > b > a > d 3C) d > c > b > a 4) c > b > d > a

QN Binding energy per nucleon in ^2_1H is x and for ^4_2He is y. Find energy released in the given

$$^2_1H + \frac{4}{2}He \rightarrow ^4_2He$$

1) 2x – 2y B) –4x + 4y C) 4x – 4y D) 2y –

QN Sodium nitroprusside test is used for detection of which of the following species in organic compounds
1) SO_4^{2-} 2) S^{2-} 3) Na^+ 4) PO_4^{3-}

QN Im 3, 3 – dimethylhex – 1 – en – 4 yne, the number of sp, sp^2 and sp^3 carbon atoms, respectively are
1) 2, 2, 4 2) 2, 2, 2 3) 4, 2, 2 4) 2, 4, 2

QN Nature of compounds TeO_2 and TeH_2 is ———— and —— respectively
1) Oxidising and Reducing respectively
2) Highly acidic and highly basic respectively
3) Reducing and basic respectively
4) Basic and oxidising

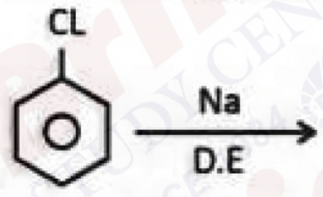
QN Which of the following is the correct order of enthalpy of atomisation of 3d – series?
A) Ni > Cu > Mn> Zn B) Zn > Cu>Mn>Ni
C) Cu > Mn > Ni>Zn D) Mn > Ni > Cu> Zn

QN The four different amine acids are given A, B, C and D. Calculate the number of tetrapeptides formed including all the four amino acids.
1) 8 2) 16 3) 24 4) 32

QN In adiabatic process, the magnitude of work done in case of one step & ∞ follows order:-
1) $|W_{rev}|_{expansion} > |W_{irr}|_{expansion}$
2) $|W_{rev}|_{expansion} < |W_{irrev}|_{expansion}$
3) $|W_{rev}|_{expansion} = |W_{irrev}|_{expansion}$
4) Can't be predicted

QN

Q. Match the reactions given in List-I with the name of the reaction given in List-II and select the correct option.

	List-I		List-I
A	$RX + Na \xrightarrow[ether]{Dry}$	I	Fittig reaction
B	$RCOOH \xrightarrow[\Delta]{NaOH + CaO}$	II	Lucas method
C	$ROH \xrightarrow[+H_4]{anhy.\ Zncl_2}$	III	Wurtz reaction
D		IV	Soda lime Decarboxylation reaction

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

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

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

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

QN Two identical drops of radius R and surface tension'T' coalesce to form a bigger drop. The change in surface energy in this process is

1) $4\pi R^2 T\left[1-2^{\frac{1}{3}}\right]$

2) $8\pi R^2 T\left[1+2^{\frac{1}{3}}\right]$

3) $4\pi R^2 T\left[1+2^{\frac{1}{3}}\right]$

4) $8\pi R^2 T\left[2^{\frac{1}{3}}-1\right]$

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MEMORY BASED QUESTIONS

MATHEMATICS

QN If the curve $x^2 = 4y$ intersects the line $y = 2(x + 6)$ at (a, b) in 2nd quadrant, then $\int_a^b \frac{x^{-4}}{1+5^x}\,dx$ is

1) $\frac{512}{5}$ 2) $\frac{1024}{5}$ 3) $\frac{32}{5}$ 4) $\frac{16}{5}$

QN The image of the point (1, 0, 3) about the line passing through $\vec{a} = 3\hat{i} + 2\hat{j} - \hat{k}$ and whose direction ratio are $\vec{r} = 4\hat{i} + 2j66 - \hat{k}$ is

1) $\left(\frac{-23}{21}, \frac{-1}{21}, \frac{-31}{21}\right)$ 2) $\left(\frac{1}{21}, \frac{-23}{21}, \frac{-31}{21}\right)$

3) $\left(\frac{1}{21}, \frac{21}{23}, \frac{-30}{21}\right)$ 4) $\left(\frac{3}{21}, \frac{7}{21}, \frac{-5}{21}\right)$

QN $4\int_0^1 \frac{1}{\sqrt{3+x^2}+\sqrt{1+x^2}}dx - 3\,\text{In}\sqrt{3}$ is equal to

1) $3-\sqrt{2}+\text{In}\left(\sqrt{2}+1\right)$ 2) $2+\sqrt{2}-\text{In}\left(\sqrt{3}+1\right)$

3) $2-\sqrt{2}-\text{In}\left(\sqrt{2}+1\right)$ 4) $2-\sqrt{3}-\text{In}\left(\sqrt{3}+1\right)$

QN If $y = \cos\left(\frac{\pi}{3} + \cos^{-1}\left(\frac{x}{2}\right)\right)$, then which of the following is true

1) $x^2 - 2xy + 8y^2 = 2$ 2) $x^2 - 2xy + 4y^2 = 3$
3) $x^2 - 3xy + 4y^2 = 3$ 4) $x^2 - 5xy + 4y^2 = 8$

QN If two vectors $\vec{a}$ and $\vec{b}$ is given by $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}$ and $\vec{b} = \hat{i} + 4\hat{j} + 8\hat{k}$ and the vectors $\vec{c}$ and $\vec{d}$ are related as $(\vec{a} - \vec{c}) \times \vec{b} = 5\hat{i} - 2\hat{j} + 3\hat{k}$ and $\vec{b} \times \vec{c} = \vec{d}$. Then $|\vec{a}.\vec{d}|$ is equal to

1) 12 2) 8 3) 10 4) 7

QN **If the mean and variance of eight observations *a*, *b*, 8, 12, 10, 6, 4, 15, is 9 and 9.25 respectively. Then *a* + *b* + *ab* is equal to**

QN **If $\frac{dy}{dx} + 2y\sec^2 x = 2\sec^2 x + 3\tan x \cdot \sec^2 x$ and $f(0) = \frac{5}{4}$. Then the value of $12\left(y\left(\frac{\pi}{4}\right) - \frac{1}{e^2}\right)$ equals to**

QN **Total number of terms in an A.P are even. Sum of odd terms is 24 and sum of even terms is 30. Last term exceeds the first term by $\frac{21}{2}$. Find the total number of terms.**

QN **Evaluate $\int_{-2}^{2} \frac{9x^2}{1+5^x}dx$**

QN Find the eccentricity of ellipse in which length of minor axis is equal to one-fourth of the distance between foci

QN The image of the point (1, 0, 3) about the line passing through $\vec{a} = 3\hat{\imath} + 2\hat{\jmath} - \hat{k}$ and whose direction ratio are $\vec{r} = 4\hat{\imath} + 2\hat{\jmath} - \hat{k}$ is

QN If the domain of the function $f(x) = \frac{1}{\sqrt{3x+10-x^2}} + \frac{1}{\sqrt{x+|x|}}$ is (a, b), then $(1+a)^2 + b^2$ is equal to

QN In the mean and variance of eight observations a, b, 8, 12, 10, 6, 4, 15, is 9 and 9.25 respectively Then a + b + ab is equal to

1) 76 2) 83 3) 79 4) 93

QN If $\frac{dy}{dx} + 2y\sec^2 x = 2\sec^2 x + 3\tan x - \sec^2 x$ and $f(0) = \frac{5}{4}$, Then the value of $12\left(y\left(\frac{\pi}{4}\right) - \frac{1}{e^2}\right)$ equals to

QN Total number of terms in an A.P are even. Sum of odd terms is 24 amd sum of even terms is 30. Last ter, exceeds the first ter, by $\frac{21}{2}$. Find the total number of terms