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JEE (MAIN) 2025

MEMORY BASED QUESTIONS & TEXT SOLUTION

SHIFT-2

DATE & DAY: 29th January 2025 & Wednesday

PAPER-1

Duration: 3 Hrs.

Time: 03:00 PM – 06:00 PM

SUBJECT: PHYSICS

Selections in JEE (Advanced)/
IIT-JEE Since 2002

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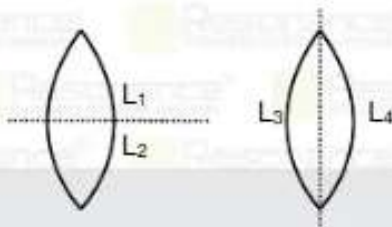
Selections in JEE (Main)/
AIEEE Since 2009

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Selections in NEET (UG)/
AIPMT/AIIMS Since 2012

22494

1. An equiconvex lens is cut in two ways as shown. The ratio of focal length of the parts L_1 and L_3 as mentioned in the diagram is



- (1) 2 (2) 4 (3) $\frac{1}{2}$ (4) $\frac{1}{4}$

Ans. (3)

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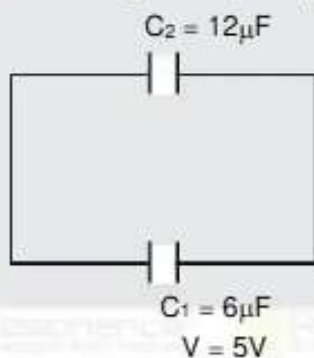
2. A solenoid of radius 1 cm carrying current 0.29 A. and having total number of turns 200 If magnetic field inside solenoid is 2.9×10^{-4} T. Find the length of solenoid.

- (1) 6π cm (2) 8π cm (3) 4.5π cm (4) 16 cm

Ans. (2)

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3. A capacitor of $6\mu\text{F}$ is charged to 5V and after charging it is connected to another uncharged capacitor of capacitance of $12\mu\text{F}$. Then find the final charge on $12\mu\text{F}$ capacitor?



- (1) $20 \mu\text{C}$ (2) $80 \mu\text{C}$ (3) $75 \mu\text{C}$ (4) $90 \mu\text{C}$

Ans. (1)

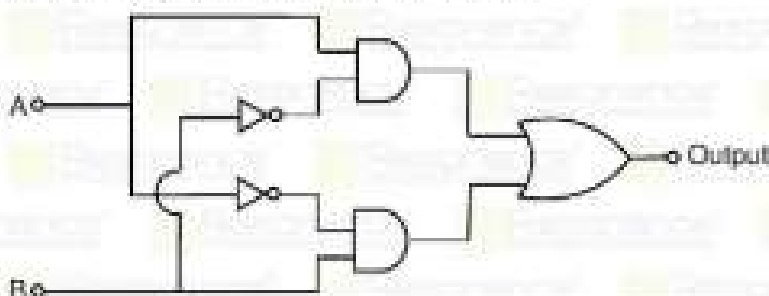
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4. Two particles of same mass are performing SHM vertically with two different spring of spring constant k_1 and k_2 . If amplitude of both is same. Find ratio of the maximum speed of two particles.

- (1) $\sqrt{\frac{k_1}{k_2}}$ (2) $\sqrt{k_1 k_2}$ (3) $\sqrt{\frac{k_2}{k_1}}$ (4) $\sqrt{\frac{k_1 + k_2}{k_1 - k_2}}$

Ans. (1)

5. In the system of logic gates, the truth table of output will be:



(1)

A	B	Output
0	0	0
0	1	1
1	0	1
1	1	1

(3)

A	B	Output
0	0	1
0	1	0
1	0	1
1	1	0

(2)

A	B	Output
0	0	0
0	1	1
1	0	1
1	1	0

(4)

A	B	Output
0	0	0
0	1	0
1	0	1
1	1	1

Ans. (2)

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6. Match the physical quantities with their corresponding dimensions

Column - I

- (A) Young's modulus
- (B) Magnetic moment
- (C) Magnetic flux
- (D) Magnetic intensity

Column - II

- (i) $[AL^2]$
- (ii) $[ML^2T^{-2}A^{-1}]$
- (iii) $[AL^{-1}]$
- (iv) $[ML^{-1}T^{-2}]$

- (1) A \rightarrow (iii), B \rightarrow (i), C \rightarrow (ii), D \rightarrow (iv)
- (2) A \rightarrow (iv), B \rightarrow (i), C \rightarrow (ii), D \rightarrow (iii)
- (3) A \rightarrow (ii), B \rightarrow (i), C \rightarrow (iii), D \rightarrow (iv)
- (4) A \rightarrow (iii), B \rightarrow (ii), C \rightarrow (i), D \rightarrow (iv)

Ans. (2)

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7. Focal length of lens is 24 cm in air, is completely immersed in water of refractive index 1.33. Focal length of lens is chosen to (refractive index of lens is = 1.5)

- (1) 24 cm
- (2) 48 cm
- (3) 72 cm
- (4) 96 cm

Ans. (4)

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8. An electromagnetic wave is propagating along + x direction. The direction of electric field (E) and magnetic field (B) should be along :-

- (1) E \rightarrow in y direction, B \rightarrow z direction
- (2) E \rightarrow in x direction, B \rightarrow y direction
- (3) E \rightarrow x direction, B \rightarrow in y direction
- (4) E \rightarrow y direction, B \rightarrow x direction

Ans. (1)

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9. Which of the following is true about stopping potential (where I is intensity of light, V stopping potential and λ is wavelength incident light)
- (1) If λ increases then V increases
 - (2) If λ increases then V decreases
 - (3) If I increases then V decreases
 - (4) If I increases then V decreases

Ans. (2)

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10. Two planets A & B revolve around same star in circular paths of radius R_A & R_B such that $R_B = 2R_A$, planet B is $4\sqrt{2}$ times massive than planet A. Find the ratio of angular momentum of planet A to planet B. i.e.

$$\left(\frac{L_A}{L_B}\right) = ?$$

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

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

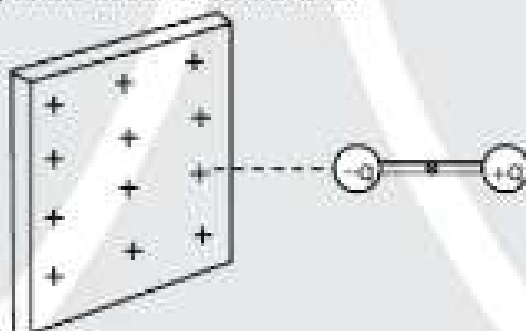
(3) $\frac{1}{2}$

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

Ans. (3)

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11. A small electric dipole is placed near an infinitely large charged non-conducting sheet, as shown in the figure. The dipole can only rotate about its central axis.



Choose the correct alternative :

- (1) Potential energy of the system is minimum and net torque on the dipole is zero.
- (2) Potential energy of the system is minimum and net torque on the dipole is non-zero.
- (3) Potential energy of the system is maximum and the dipole will experience a resultant force towards the sheet.
- (4) Potential energy of the system is maximum and the dipole will experience a resultant force away from the sheet.

Ans. (1)

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12. **Assertion :** On increasing the pressure, the volume decrease is more in isothermal process than in an adiabatic process.

Reason : Adiabatic process is given by relation $PV^\gamma = \text{constant}$ and for isothermal process it is $PV = \text{constant}$

- (1) Assertion is correct and Reason is false.
- (2) Assertion is correct and Reason is correct.
- (3) Assertion is false and Reason is correct.
- (4) Assertion is false and Reason is false.

Ans. (2)

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13. A conveyor belt is moving with constant speed v . sand is falling on the belt with the rate given by $\frac{dm}{dt} \propto \sqrt{v}$. Then the power supplied to the belt to move with constant speed will be proportional to

- (1) $p \propto \sqrt{v}$ (2) $p^2 \propto v^2$ (3) $p \propto v$ (4) $p^2 \propto v^2$

Ans. (2)

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14. A cup of hot coffee is placed in environment of 20°C . Its temperature falls from 90°C to 80°C in time T . The time taken in which the temperature falls from 80°C to 60°C will be.

- (1) $\frac{13}{3}T$ (2) $\frac{13}{5}T$ (3) $\frac{12}{7}T$ (4) $\frac{17}{4}T$

Ans. (2)

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15. The electric flux linked with a closed surface is $2 \times 10^8 \text{ V-m}$. Calculate net charge enclosed within the surface

- (1) 1.77 mC (2) 2.78 mC (3) 1.97 mC (4) 1.57 mC

Ans. (1)

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16. Two particles A and B starts moving from a same point at $t = 0$. Acceleration of particle A increases linearly with time as $a = kt$ and the acceleration of particle B is non-zero constant. How many times will they meet (including at $t = 0$)

- (1) 1 (2) 2 (3) 3 (4) 4

Ans. (2)

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17. Three particles of same mass are moving as show. (all collisions are elastic)



Assertion: After all collision, velocities of A, B & C are 4m/s, 2m/sec 5m/sec respectively

Reason: Velocity get interchanged in elastic head-on collision for same mass.

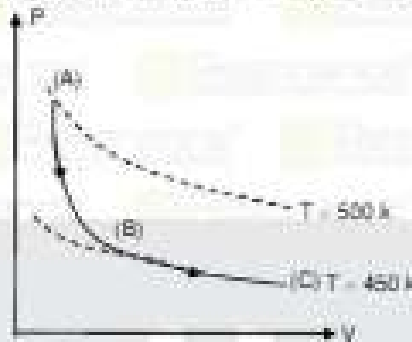
- (1) Assertion \rightarrow True, Reason \rightarrow True
 (2) Assertion \rightarrow False, Reason \rightarrow True
 (3) Assertion \rightarrow True, Reason \rightarrow False
 (4) Assertion \rightarrow False, Reason \rightarrow False

Ans. (2)

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18. Figure shows two isotherms for $T = 500\text{K}$ and 450K . An ideal polyatomic gas is undergone through a process $A \rightarrow B \rightarrow C$, in which process $A \rightarrow B$ is an adiabatic. The heat given to the gas for the process $A \rightarrow B \rightarrow C$ will be :

(Given that $P_A = 5 \times 10^4 \text{ Pa}$, $V_A = 6 \times 10^{-3} \text{ m}^3$ and $P_C = 3.75 \times 10^4 \text{ Pa}$, $V_C = 8 \times 10^{-3} \text{ m}^3$)



- (1) $200 \ln \left(\frac{3}{2} \right) \text{ J}$ (2) $200 \ln \left(\frac{4}{3} \right) \text{ J}$ (3) $300 \ln \left(\frac{4}{3} \right) \text{ J}$ (4) $300 \ln \left(\frac{5}{3} \right) \text{ J}$

Ans. (3)

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19. Figure shows two spherical surfaces of radius R each and having common centre C . If an object is placed at O , Find distance between the first images formed by both the surfaces individually.



- (1) $\frac{4R}{35}$ (2) $\frac{4R}{27}$ (3) $\frac{8R}{70}$ (4) $\frac{2R}{35}$

Ans. (1)

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20. A circular plate capacitor has constant current 0.15 A flowing through it. Potential difference across capacitor varies as $7 \times 10^8 \text{ V/s}$. Find distance between the two circular plates of capacitor. (Radius of circular plate = 10 cm , $\pi = \frac{22}{7}$)

- (1) 1.29 cm (2) 1.29 mm (3) 2.58 mm (4) 2.58 cm

Ans. (2)

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