



PHYSICS

BOOKS - NTA MOCK TESTS

JEE MOCK TEST 24

Physics

1. Which of these materials requires the least value of magnetic field strength to magnetize it ?

A. Nickel

B. Silver

C. Tungsten

D. Sodium Chloride

Answer: A



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2. A current of 2A flows through a 2Ω resistor when connected across a battery. The same battery supplies a current of 0.5A when

connected across a 9Ω resistor The internal resistance of the battery is

A. $\frac{1}{3}\Omega$

B. $\frac{1}{4}\Omega$

C. 5Ω

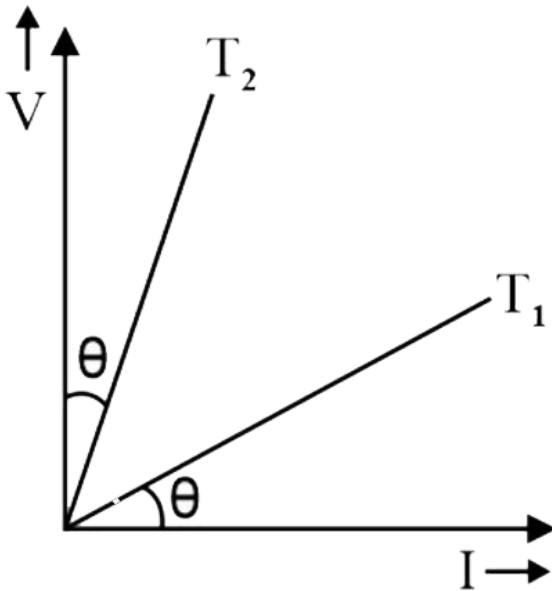
D. 0.5Ω

Answer: A



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3. The $V - I$ graphs for a conductor at temperature T_1 and T_2 are shown in the figure ($T_2 - T_1$) is proportional to



A. $\tan \theta$

B. $\sin \theta$

C. $\cot 2\theta$

D. $\cos 2\theta$

Answer: C



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4. A superconducting loop of radius R has self inductance L , A uniform & constant magnetic field B is applied perpendicular to the plane of the loop. Initially current in this loop is zero. The loop is rotated about its diameter by

180° . Find the current in the loop after rotation.

A. zero

B. $\frac{B\pi R^2}{L}$

C. $\frac{2B\pi R^2}{L}$

D. $\frac{B\pi R^2}{2L}$

Answer: C



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5. A solid sphere of radius R has a charge Q distributed in its volume with a charge density $\rho = kr^a$, where k and a are constants and r is the distance from its centre. If the electric field at $r = \frac{R}{2}$ is $\frac{1}{8}$ times that at $r = R$, find the value of a .

A. 2

B. 3

C. 2.5

D. 0.2

Answer: A



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6. Two balls with equal charge are in a vessel with ice at $-10^{\circ}C$ at a distance of 25 cm from each other. On forming water at $0^{\circ}C$, the balls are brought nearer to 5 cm for the interaction between them to be same. If the dielectric constant of water at $0^{\circ}C$ is 80, the dielectric constant of ice at $-10^{\circ}C$ is

A. 40

B. 3.2

C. 20

D. 6.4

Answer: B



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7. A circular coil of radius R carries a current i .

The magnetic field at its centre is B . The

distance from the centre on the axis of the coil
where the magnetic field will be $B/8$ is

A. $R\sqrt{2}$

B. $R\sqrt{3}$

C. $2R$

D. $3R$

Answer: B



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8. A Carnot engine, having an efficiency of $\eta = \frac{1}{10}$ as heat engine, is used as a refrigerator. If the work done on the system is 10 J, the amount of energy absorbed from the reservoir at lower temperature is

A. 99 J

B. 90 J

C. 1 J

D. 100 J

Answer: B



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9. Two bodies of specific heats s_1 and s_2 having same heat capacities are combined to form a single composite body. Find the specific heat of the composite body.

A. $S_1 + S_2$

B. $\frac{S_1 + S_2}{2}$

C. $\frac{2S_1S_2}{S_1 + S_2}$

D. $\frac{1}{S_1} + \frac{1}{S_2}$

Answer: C



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10. The phase difference between two points separated by 0.8 m in a wave of frequency 120 Hz is 0.5π . The wave velocity is

A. $144ms^{-1}$

B. $384ms^{-1}$

C. $256ms^{-1}$

D. $720ms^{-1}$

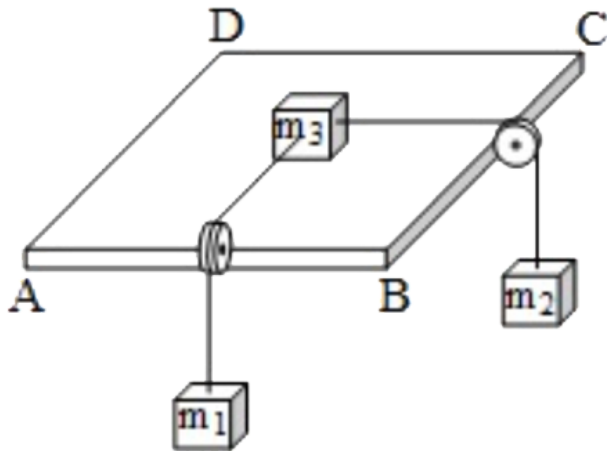
Answer: B



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11. Three blocks are arranged on a horizontal table ABCD as shown in the figure . The strings and pulleys are massless and both the pulleys stand vertical . The strings connecting blocks m_1 and m_2 are also vertical and are perpendicular to faces AB and BC which are mutually perpendicular to each other . If m_1 and m_2 are 3 kg and 4 kg respectively.

Coefficient of friction between the block $m_3 = 10\text{kg}$ and the surface is $\mu = 0.6$ then, frictional force on m_3 is



- A. 30 N
- B. 40 N
- C. 50 N

D. 60 N

Answer: C



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12. Two gold pieces, each of mass 0.035 g are placed in a box of mass 2.3 g. The total mass of the box with gold pieces is

A. 2.3 g

B. 2.4 g

C. 2.37 g

D. 2.370 g

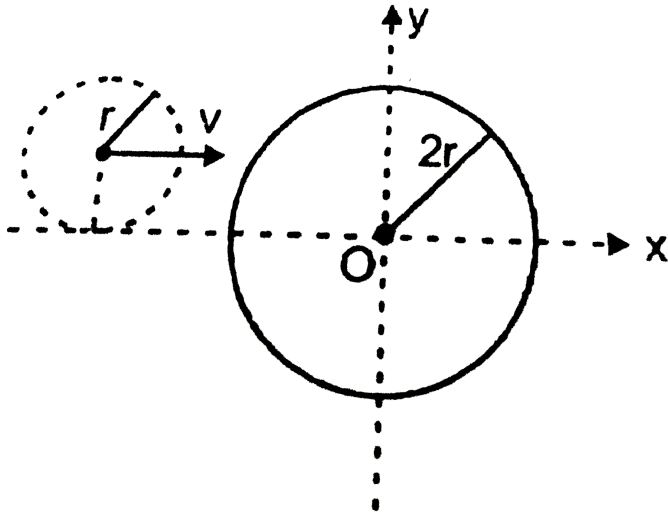
Answer: B



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13. A small smooth disc of mass m and radius moving with an initial velocity ' v ' along the positive $x -$ axis collided with a big disc of mass $2m$ and radius $2r$ which was initially at rest with its centre at origin as shown in

figure.



If the coefficient of restitution is 0 then
velocity of larger disc after collision is

A. $\frac{8}{27}v\hat{i} - \frac{2\sqrt{2}}{27}v\hat{j}$

B. $\frac{8}{27}v\hat{i} - \frac{\sqrt{2}}{27}v\hat{j}$

C. $\frac{v}{3}\hat{i}$

$$D. \frac{2\sqrt{2}}{27}v\hat{i} - \frac{8}{27}v\hat{j}$$

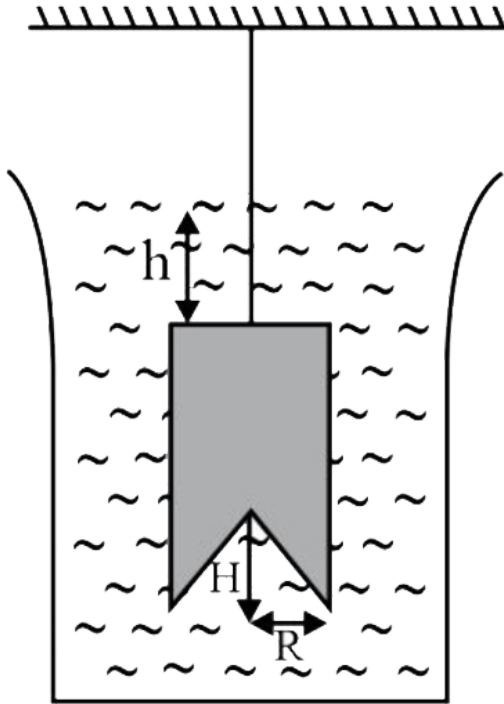
Answer: A



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14. A conical portion of radius R and height H is removed from the bottom of a cylinder of radius R . The volume of the remaining cylinder is V and its mass is M . It is suspended by a string in a liquid of density ρ where it stays vertical. The upper surface of the cylinder is at

depth h below the liquid surface . The force on the bottom of the cylinder by the liquid is



A. Mg

B. $Mg - V\rho g$

$$C. Mg + \pi R^2 h \rho g$$

$$D. \rho g(V + \pi R^2 h)$$

Answer: D



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15. A spherical ball of density ρ and radius 0.003m is dropped into a tube containing a viscous fluid , filled up to the 0 cm mark as shown in the figure . Viscosity of the fluid $= 1.260Nm^{-2}s^{-1}$ and its density

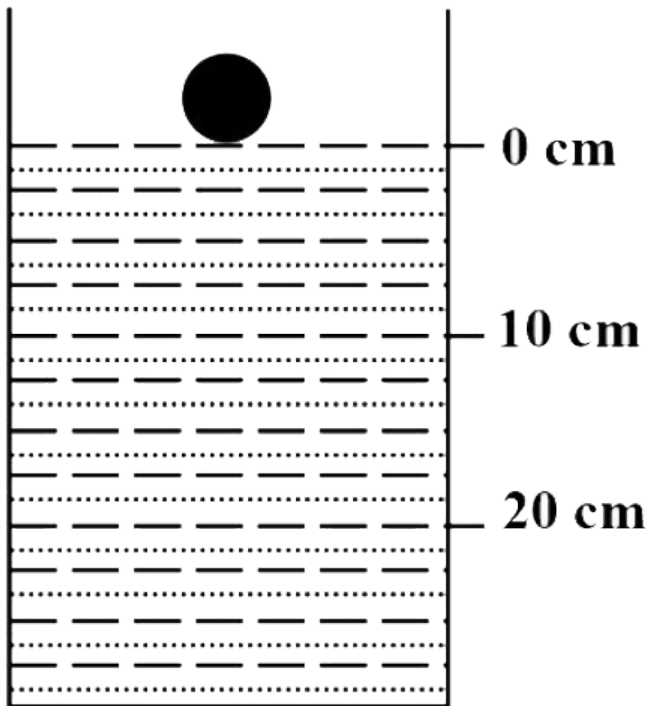
$\rho_L = \rho / 2 = 1260 \text{ kg m}^{-3}$. Assume the ball

reaches a terminal speed by the 10 cm mark.

Find the time taken by the ball to traverse the

distance between the 10 cm and 20 cm mark .

[$g = \text{acceleration due to gravity} = 10 \text{ m s}^{-2}$]



A. 2s

B. 3s

C. 5s

D. 1.5 s

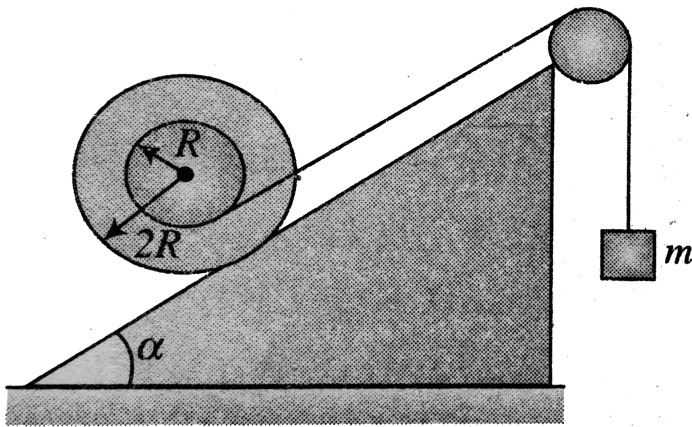
Answer: C



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16. A spool of mass M and radius $2R$ lies on an inclined plane as shown in the figure. A light thread is wound around the connecting

tube of the spool and its free end carries a weight of mass m . The value of m so that system is in equilibrium is



- A. $2M \sin \alpha$
- B. $M \sin \alpha$
- C. $2M \tan \alpha$
- D. $M \cos \alpha$

Answer: A



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17. A carrier wave of peak voltage 12 V is used to transmit a message signal . The peak voltage of the modulating signal in order to have a modulation index of 75 % is

A. 8 V

B. 6 V

C. 7 V

D. 9 V

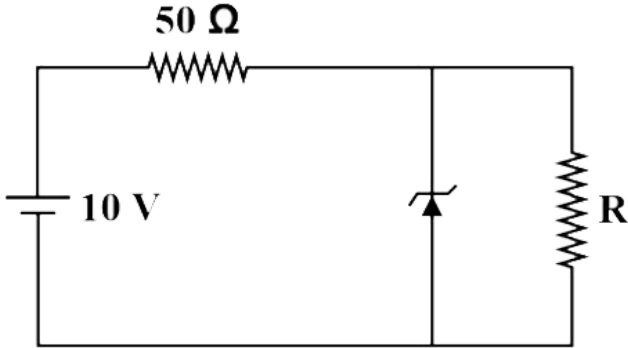
Answer: D



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18. The 6 V Zener diode shown in the figure has negligible resistance and a knee current of 5 mA. The minimum value of R (in Ω) so that the

voltage across it does not fall below 6 V is



A. 40

B. 60

C. 72

D. 80

Answer: D



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19. For a material medium, the values of refractive index for violet and red colours are given as $n_v = 1.56$ and $n_r = 1.44$. The dispersive power of a prism made out of this material is

A. 0.06

B. 0.24

C. 0.03

D. none of these

Answer: B



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20. A ray of light is incident from a denser to a rarer medium. The critical angle for total internal reflection is θ_{ic} and Brewster's angle of incidence is θ_{iB} such that $\frac{\sin \theta_{ic}}{\sin \theta_{iB}} = \eta = 1.28$. The relative refractive index of the two media is

A. 0.4

B. 0.2

C. 0.9

D. 0.8

Answer: D



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21. Power supplied to a mass $2kg$ varies with time as $P = \frac{3t^2}{2}$ watt. Here t is in second . If velocity of particle at $t = 0$ is $v = 0$, the velocity of particle at time $t = 2s$ will be:



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22. A spring of force constant $200Nm^{-1}$ has a block of mass 10 kg hanging at its one end and the other end of the spring is attached to the ceiling of an elevator. The elevator is rising upwards with an acceleration of $\frac{g}{4}$ and the block is in equilibrium with respect to the elevator . when the acceleration of the elevator suddenly ceases , the block starts oscillating . What is the amplitude (in m) of these oscillations ?



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23. If the first excitation energy of a hydrogen - like atom is 27.3 eV , then ionization energy of this atom will be



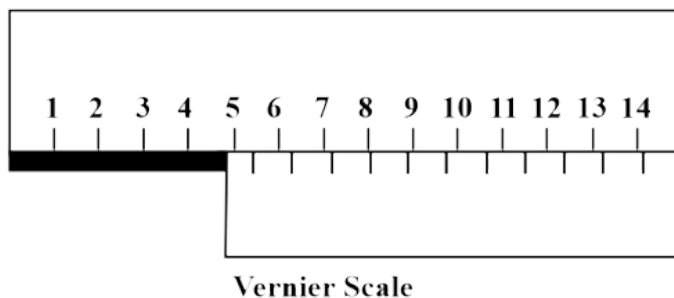
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24. Consider the vernier callipers shown below.

The instrument has no zero error.

If 1 m.s. d = 1 mm and 7 m.s.d = 8 v.s.d, of the

rod shown in the figure ? [Given , the 4th v.s.d coincides with m.s d]



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25. The electric field associated with a light wave is given by

$$E = E_0 \sin \left[(1.57 \times 10^7 \text{ m}^{-1} (x - ct)) \right]. \quad \text{Find}$$

the stopping potential when this light is used

in an experiment on photoelectric effect with a metal having work - function 1.9 eV.



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