



PHYSICS

BOOKS - NTA MOCK TESTS

JEE MOCK TEST 20

Physics

1. When the angle of incidence on a material is 60° , the reflected light is completely polarised.

The velocity of the refracted ray inside the materials is (in m / s)

A. $3 \times 10^8 m / s$

B. $\sqrt{3} \times 10^8 m / s$

C. $\frac{3}{\sqrt{2}} \times 10^8 m / s$

D. $\frac{1}{3} \times 10^8 m / s$

Answer: B



Watch Video Solution

2. A convex, rearview mirror of focal length 20cm, is fitted in a car. A second car 2 m broad and 1.6m high is 6m away from the first car and overtakes the first car at a relative speed of 15m s^{-1} , then the speed of the first car is

A. 0.016m s^{-1}

B. 0.257m s^{-1}

C. 0.162m s^{-1}

D. 0.0073m s^{-1}

Answer: A



Watch Video Solution

3. The electrical conductivity of a semiconductor increases when electromagnetic radiation of wavelength shorter than 2480nm is incident on it. The band gap in (eV) for the semiconductor is.

A. $0.5eV$

B. $0.7eV$

C. $1.1eV$

D. $2.5eV$

Answer: A



Watch Video Solution

4. A coil having inductance L and resistance R is connected to a battery of emf \mathcal{E} at $t = 0$. If t_1 and t_2 are time for 90% and 99% completion of current growth in the circuit, then $\frac{t_1}{t_2}$ will be-

A. 1 : 2

B. 2: 1

C. $\frac{\log_e 10}{2}$

D. $2\log_e 10$

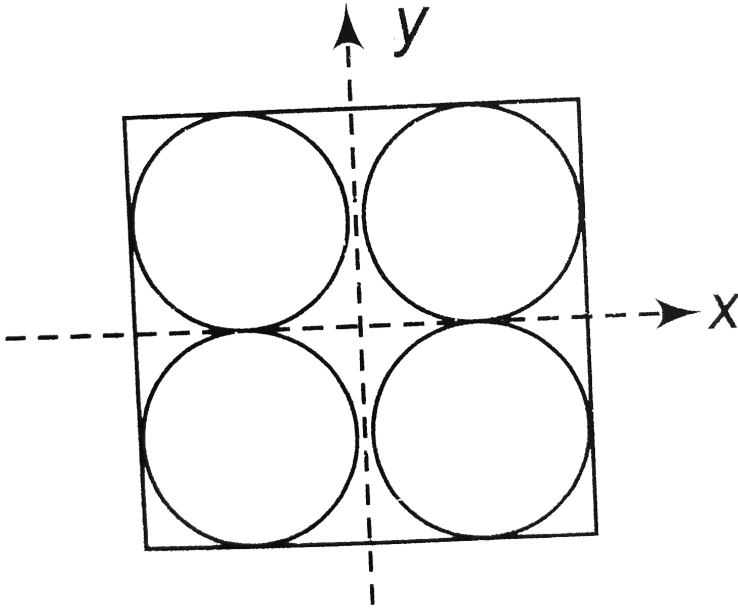
Answer: A



Watch Video Solution

5. Four holes of radius R are cut from a thin square plate of side $4R$ and mass M . The moment of inertia of the remaining portion

about z-axis is :



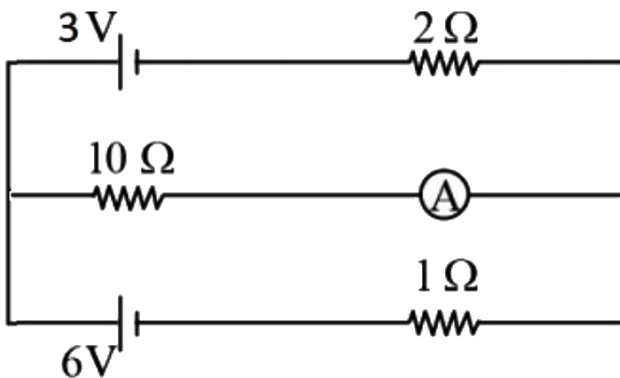
- A. $\frac{\pi}{12}MR^2$
- B. $\left(\frac{4}{3} - \frac{\pi}{4}\right)MR^2$
- C. $\left(\frac{8}{3} - \frac{10\pi}{16}\right)MR^2$
- D. $\left(\frac{4}{3} - \frac{\pi}{6}\right)MR^2$

Answer: C



Watch Video Solution

6. The ammeter reading in the given circuit is



A. $\frac{14}{33} A$

B. $\frac{15}{32} A$

C. $\frac{17}{33} A$

D. $\frac{15}{31} A$

Answer: B



Watch Video Solution

7. A long thin magnet of moment M is bent into a semi circle. The decrease in the magnetic moment is

A. $\frac{2M}{\pi}$

B. $\frac{\pi M}{2}$

C. $\frac{M(\pi - 2)}{\pi}$

D. $\frac{M(2 - \pi)}{2}$

Answer: C



Watch Video Solution

8. The current gain in the common emitter mode of a transistor is 10. The input impedance is $20k\Omega$ and load of resistance is $100k\Omega$. The power gain is

A. 300

B. 500

C. 200

D. 100

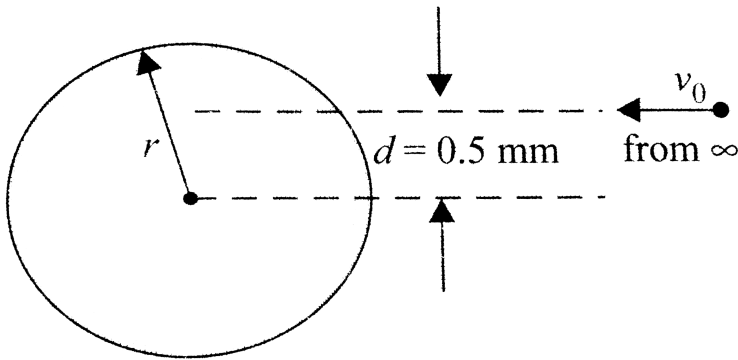
Answer: B



Watch Video Solution

9. A particle of mass 1kg and charge $1/3\mu\text{C}$ is projected toward a nonconducting fixed spherical shell of radius $r = 1\text{mm}$ having the

same charge uniformly distributed on its surface. Find the minimum initial velocity of projection requires if the particle just grazes the shell.



A. $\sqrt{\frac{2}{3}} \text{ms}^{-1}$

B. $2\sqrt{\frac{2}{3}} \text{ms}^{-1}$

C. $\frac{2}{3} \text{ms}^{-1}$

D. 1ms^{-1}

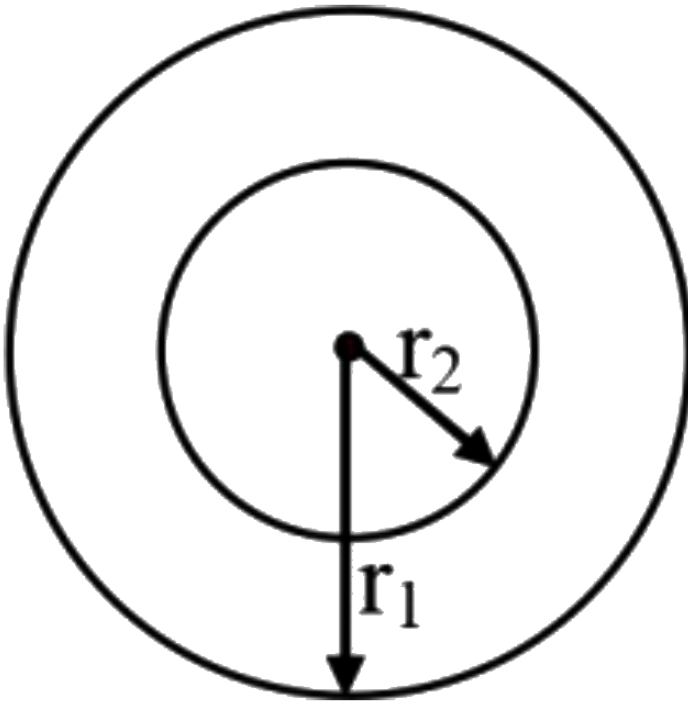
Answer: B



Watch Video Solution

10. A charge is uniformly distributed inside a spherical body of radius $r_1 = 2r_0$ having a concentric cavity of radius $r_2 = r_0$ (ρ is charge density inside the sphere). The potential of a

point P at a distance $\frac{3r_0}{2}$ from the centre is



- A. $\frac{7\rho r_0^2}{6\epsilon_0}$
- B. $\frac{101\rho r_0^2}{72\epsilon_0}$
- C. $\frac{17\rho r_0^2}{72\epsilon_0}$

D. none of these

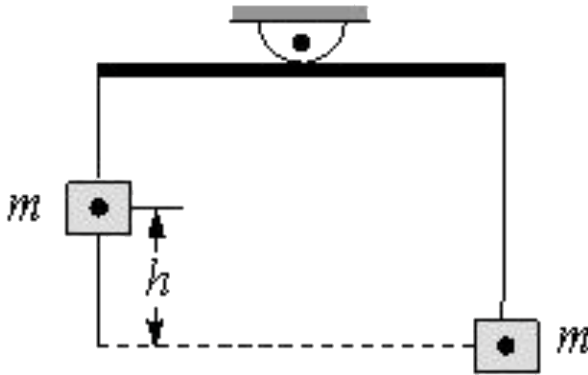
Answer: B



Watch Video Solution

11. Two identical blocks of mass m are suspended from a beam balance whose scale pans differ in vertical height by h ($h \ll R$), if R and ρ are the radius and density of the

earth, then the error in weighing is



A. $\frac{2}{3}\pi\rho R^3 Gm$

B. $\frac{8}{3}\pi\rho Gmh$

C. $\frac{8}{3}\pi\rho R^3 Gm$

D. $\frac{4}{3}\pi\rho Gm^2 h$

Answer: B



12. Two objects P and Q, travelling in the same direction start from rest. While the object P starts at time $t = 0$ and object Q starts later at $t = 30$ min. The object P has an acceleration of $40\text{km} / \text{h}^2$. To catch P at a distance of 20 km, the acceleration of Q should be

A. $40\text{km} / \text{h}^2$

B. $80\text{km} / \text{h}^2$

C. $100\text{km} / \text{h}^2$

D. $160 \text{ km} / \text{h}^2$

Answer: D



Watch Video Solution

13. When a liquid in a glass vessel is heated, its apparent expansion coefficient is $10.30 \times 10^{-4} . ^\circ C^{-1}$. When the same liquid is heated in a metal vessel, its apparent expansion coefficient is $10.06 \times 10^{-4} . ^\circ C^{-1}$. If the coefficient of linear expansion of glass =

$9 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$, what is the coefficient of linear expansion of metal?

A. $51 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$

B. $17 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$

C. $25 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$

D. $43 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$

Answer: B



Watch Video Solution

14. A Carnot engine efficiency is equal to $\frac{1}{7}$. If the temperature of the sink is reduced by 65 K, the efficiency becomes $\frac{1}{4}$. The temperature of the source and the sink in the first case are respectively

A. 620 K , 520 K

B. 520 K , 606.67 K

C. 606.67 K, 520 K

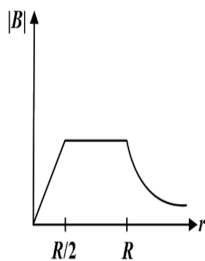
D. 520 K, 610 K

Answer: C

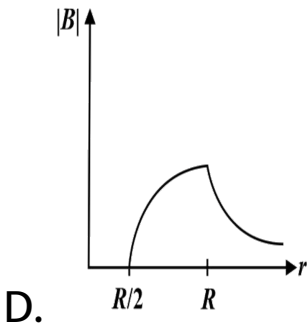
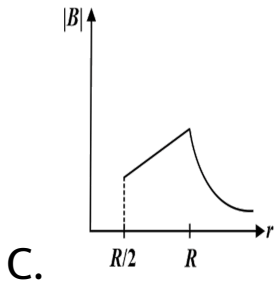
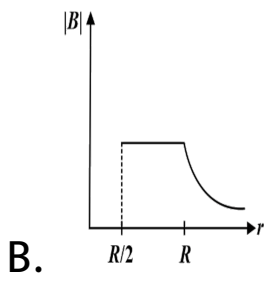


Watch Video Solution

15. An infinitely long hollow conducting cylinder with inner radius $\frac{R}{2}$ and outer radius R carries a uniform current density along its length. The magnitude of the magnetic field $|B|$ as a function of the radial distance r from the axis is best represented by



A.



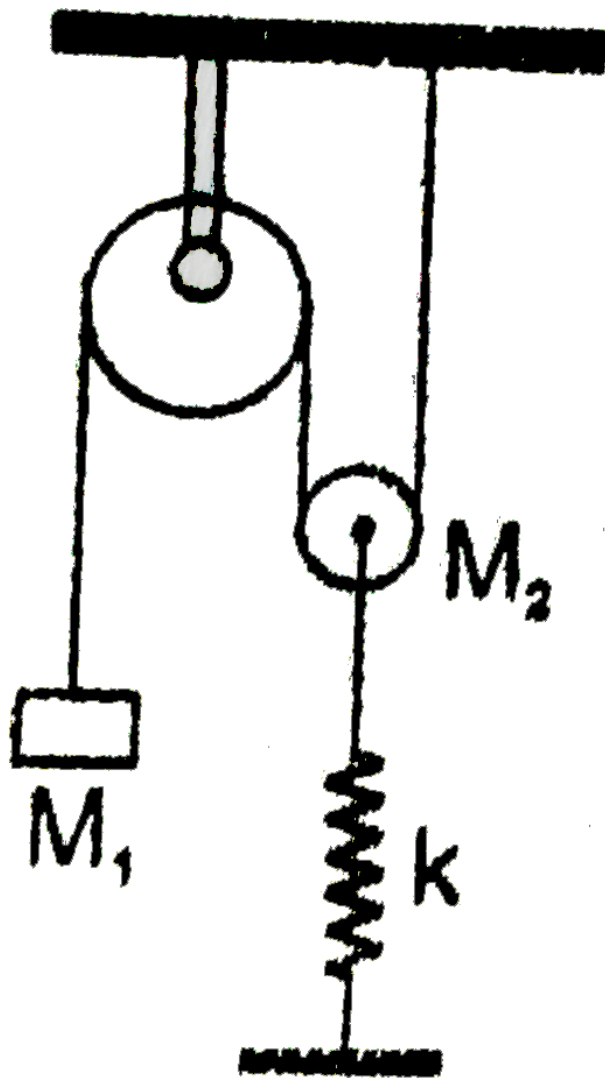
Answer: D



Watch Video Solution

16. What would be the period of the free oscillations of the system shown here if mass M_1 is pulled down a little force constant of the spring is k , mass of fixed pulley is

negligible and movable pulley is smooth



$$A. 2\pi \sqrt{\frac{4M_1 + M_2}{k}}$$

B. $2\pi \sqrt{\frac{4M_2 + M_1}{k}}$

C. $4\pi \sqrt{\frac{4M_1 + M_2}{k}}$

D. $\pi \sqrt{\frac{4M_1 + M_2}{k}}$

Answer: A



Watch Video Solution

17. A parallel beam of light is incident normally on a plane surface absorbing 40% of the light and reflecting the rest. If the incident beam

carries 60 W of power, the force exerted by it on the surface is

A. $3.2 \times 10^{-8} N$

B. $3.2 \times 10^{-7} N$

C. $5.12 \times 10^{-7} N$

D. $5.12 \times 10^{-8} N$

Answer: B



Watch Video Solution

18. One of the square faces of a metal slab of side 50 cm and thickness 20 cm is rigidly fixed on a horizontal surface. If a tangential force of 30 N is applied to the top face and it is known that the shear modulus of the material is $4 \times 10^{10} \text{ N/m}^2$, then the displacement (in m) of the top face is

A. $4 \times 10^{-12} \text{ m}$

B. $4 \times 10^{-10} \text{ m}$

C. $6 \times 10^{-10} \text{ m}$

D. $8 \times 10^{-10} \text{m}$

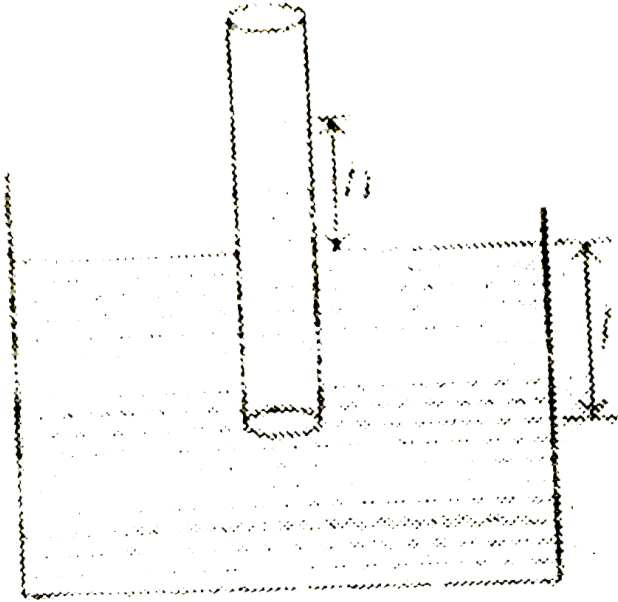
Answer: C



Watch Video Solution

19. A capillary tube is dipped in water to a depth and the water rises to a height $h (< l)$ in the capillary tube. The lower end of the tube is closed in water by putting a thumb over it. The tube is now taken out and the thumb is removed from the lower end and it kept open.

The length of liquid column in the tube will be



A. 1

B. $1 + h$

C. h

D. $2h$

Answer: D



Watch Video Solution

20. A ray of light is incident normally on one of the faces of a prism of apex angle 30 degree and refractive index $\sqrt{2}$. The angle of deviation of the ray in degrees is

A. 30°

B. 45°

C. 15°

D. none of these

Answer: C



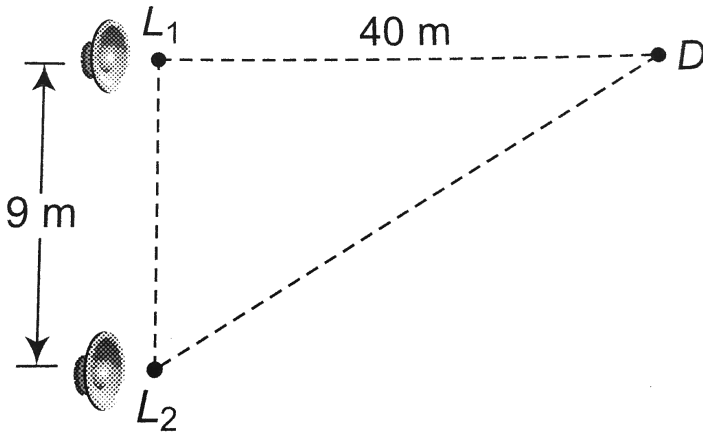
Watch Video Solution

21. An installation consists of an electric motor which drives a water pump to lift 75 L of water per second to a height of 5m, where water is disbursed at neglible speed. If the motor consumes a power of 5 kW, then what is the

efficiency (%) of the installation?

$$[g = 10ms^{-2}]$$

 **Watch Video Solution**



22.

Two loudspeakers L_1 and L_2 driven by a common oscillator and amplifier, are arranged as shown. The frequency of the oscillator is

gradually increased from zero and the detector at D records a series of maxima and minima. If the speed of sound is 330ms^{-1} then the frequency at which the first maximum is observed is



[Watch Video Solution](#)

23. In the Coolidge tube experiment, if the applied voltage is increased to three times, the short wavelength limit of continuous X-

ray spectrum shift by 20 pm. What is the initial voltage (in kV) applied to the tube?



[Watch Video Solution](#)

24. A sphere of mass m moving with velocity v collides head-on with another sphere of the same mass at rest. If the coefficient of restitution $e = 1/2$, then what is the ratio of final velocity of the second sphere to the initial velocity of the first sphere ?



[Watch Video Solution](#)

25. Two unknown resistances are connected in two gaps of a meter-bridge. The null point is obtained at 40 cm from left end. A 30Ω resistance is connected in series with the smaller of the two resistances, the null point shifts by 20 cm to the right end. The value of smaller resistance in Ω is



[Watch Video Solution](#)