



PHYSICS

BOOKS - NTA MOCK TESTS

JEE MOCK TEST 15

Mcqs Physics

1. Electrons in a certain energy level $n = n_1$ can emit 3 spectral lines. When they are in another energy level, $n = n_2$, they can emit 6

spectral lines. The orbital speed of the electrons in the two orbits are in the ratio

A. 4:3

B. 3:4

C. 2:1

D. 1:2

Answer: A



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2. A radioactive nucleus of mass number A , initially at rest, emits an α – particle with a speed v . What will be the recoil speed of the daughter nucleus ?

A. $\frac{2v}{(A - 4)}$

B. $\frac{2v}{(A + 4)}$

C. $\frac{4v}{(A - 4)}$

D. $\frac{4v}{(A + 4)}$

Answer: C



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3. A paramagnetic sample shows a net magnetisation of 8 A m^{-1} when placed in an external magnetic field of 0.6 T at a temperature of 4 K . When the same sample is placed in an external magnetic field of 0.2 T at a temperature of 16 K , the magnetisation will be

A. $\frac{32}{3} \text{ A m}^{-1}$

B. $\frac{2}{3} \text{ A m}^{-1}$

C. 6 A m^{-1}

D. 2.4 A m^{-1}

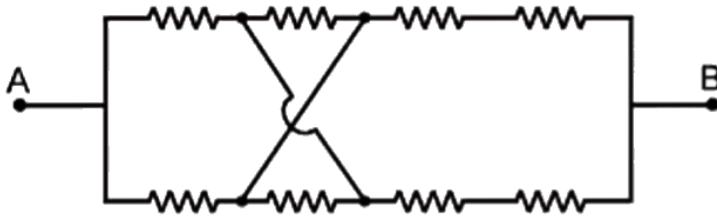
Answer: B



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4. In the circuit shown, each resistor is of resistance R . the equivalent resistance

between the terminals A and B is



A. $2R$

B. $1.3R$

C. $1.5R$

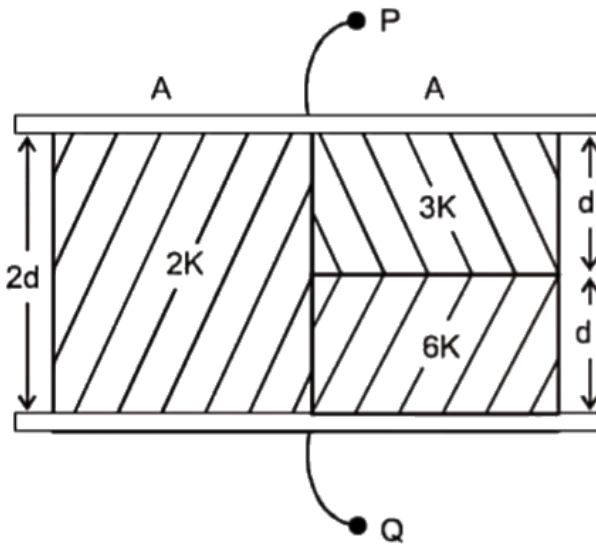
D. $15R$

Answer: C



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5. Three different types of dielectric slabs have been arranged between the plates of a parallel plate capacitor, as shown in the figure. The equivalent capacitance of the system between the points P and Q will be



A. $\frac{K\varepsilon_0 A}{d}$

B. $\frac{2K\varepsilon_0 A}{d}$

C. $\frac{3K\varepsilon_0 A}{d}$

D. $\frac{3K\varepsilon_0 A}{2d}$

Answer: C



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6. The mass and the diameter of a planet are three times the respective value for the Earth.

The period of oscillation of a simple pendulum

on the Earth is 2 s. The period of oscillation of the same pendulum on the planet would be:

A. $\frac{3}{2}S$

B. $\frac{2}{\sqrt{3}}S$

C. $\frac{\sqrt{3}}{2}S$

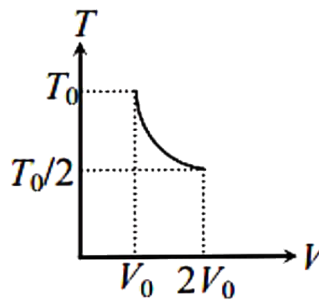
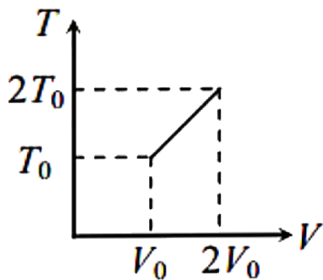
D. $2\sqrt{3}S$

Answer: D



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7. Temperature and volume curves are drawn for two thermodynamic processes. For the first process, it is a straight line and for the second, it is a rectangular hyperbola. The ratio of work done in the first process to the work done in the second process is



A. 2 : 1

B. 3 : 1

C. 4:1

D. 3:2`

Answer: A



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8. A proton, a deuteron and an α - particle having the same kinetic energy are moving in circular trajectory in a constant magnetic field. If r_p , r_d and r_α denote respectively the radii of the trajectories of these particles then

A. $r_e > r_p = r_{He}$

B. $r_e > r_p > r_{He}$

C. $r_e < r_p < r_{He}$

D. $r_e < r_p = r_{He}$

Answer: D



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9. An object is placed on the surface of a smooth inclined plane of inclination θ . It takes time t to reach the bottom of the inclined

plane. If the same object is allowed to slide down rough inclined plane of same inclination θ , it takes time nt to reach the bottom where n is a number greater than 1. The coefficient of friction μ is given by -

A. $\mu = \left(1 - \frac{1}{n^2}\right) \tan \theta$

B. $\mu = \left(1 - \frac{1}{n^2}\right) \coth \eta$

C. $\mu = \left(1 - \frac{1}{n^2}\right)^{1/2} \tan \theta$

D. $\mu = \left(1 - \frac{1}{n^2}\right)^{1/2} \cot \theta$

Answer: A





10. A 27 mW laser beam has a cross-sectional maximum electric field in this electromagnetic wave is given by :

[Given permittivity of space $\epsilon_0 = 9 \times 10^{12}$ SI units, Speed of light $c = 3 \times 10^8$ m/s]

- A. 1kV/m
- B. 1.4kV/m
- C. 0.7kV/m
- D. 2kV/m

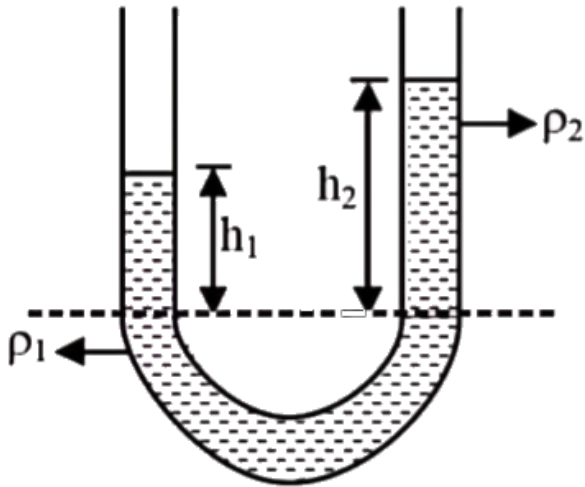
Answer: B



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11. Two chemically non-reactive liquids are placed in a U-shaped tube as shown in the figure. The height of any liquid above a

common reference line is



- A. directly proportional proportional to their densities
- B. inversely proportional to their densities
- C. directly proportional to square of their densities

D. equal

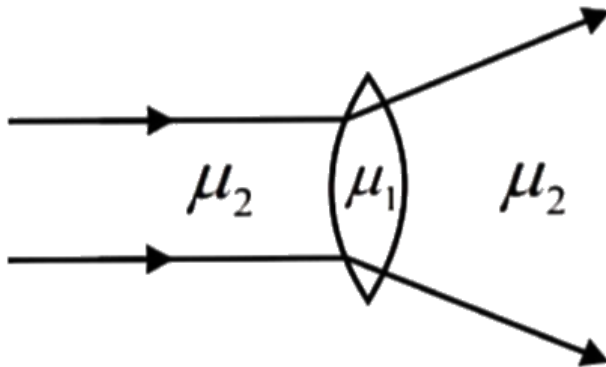
Answer: B



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12. A thin bi-convex lens made out of a material of refractive index μ_1 is placed in a medium of refractive index μ_2 . A paraxial beam of light, parallel to the principal axis of the lens, is shown in the figure. Based on the ray

diagram, we can conclude that



A. $\mu_1 > \mu_2$

B. $\mu_1 < \mu_2$

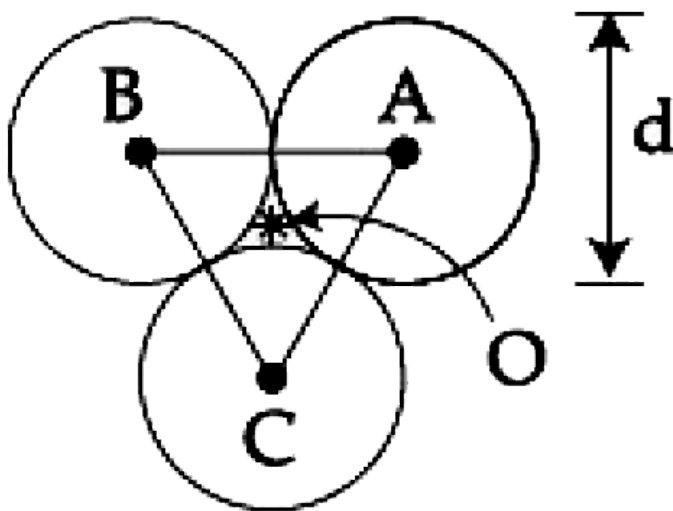
C. $\mu_1 = \mu_2$

D. $\mu_1 < \mu_2$

Answer: D



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13.

Three solids sphere each of mass m and diameter d are stuck together such that the lines connecting the centers form an equilateral triangle of side of length d . The

ratio $\frac{I_0}{I_A}$ of moment of inertia I_0 of the

system about an axis passing the centroid and about center of any of the spheres I_A and perpendicular to the plane of the triangle is

A. $\frac{23}{13}$

B. $\frac{13}{15}$

C. $\frac{13}{23}$

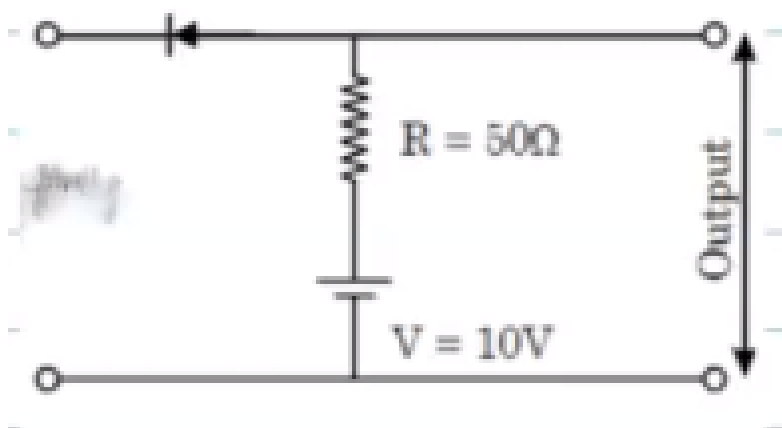
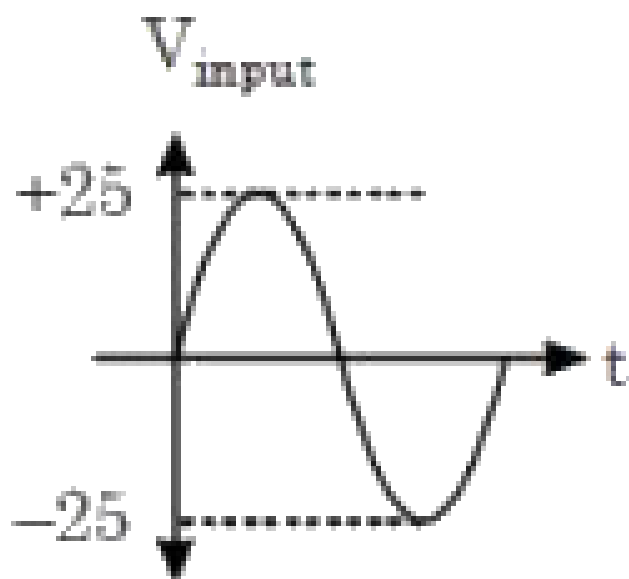
D. $\frac{15}{13}$

Answer: C



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14. An ideal diode is connected in a circuit with resistance $R = 50\Omega$ and $V = 10V$. If an AC input signal shown in the figure is given to the circuit, then the maximum and minimum value of output voltage (without load) is



A. 10V, -15V

B. 10V, -25V

C. 25V, -25V

D. 25V, -15V

Answer: B



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15. A thermally insulated vessel contains 150g of water at $0^{\circ}C$. Then the air from the vessel is pumped out adiabatically. A fraction of

water turns into ice and the rest evaporates at $0^{\circ}C$ itself. The mass of evaporated water will be closest to :

(Latent heat of vaporization of water $= 2.10 \times 10^6 \text{ J kg}^{-1}$ and Latent heat of Fusion of water $= 3.36 \times 10^5 \text{ J kg}^{-1}$)

A. 20g

B. 130g

C. 35g

D. 150g

Answer: A



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16. Suppose a quantity x can be dimensionally represented in terms of M, L and T, that is $[x], M^a L^b T^c$. The quantity mass

A. maybe represented in terms of L, T and y

if $a=0$

B. maybe represented in terms of L, T and y

if $a \neq 0$

C. can always be dimensionally represented

in terms of L, T and y

D. Can never be dimensionally represented

in terms of L, T and y

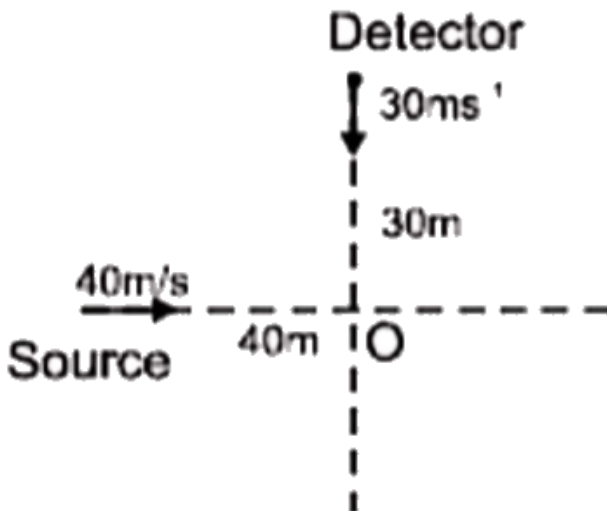
Answer: B



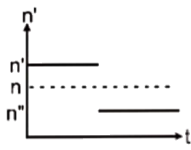
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17. A source and detector both start moving simultaneously from the position shown in the figure, one along x-axis and the other along y-

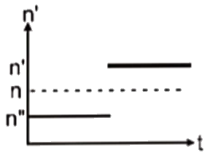
axis with speeds 40 m s^{-1} and 30 m s^{-1} respectively. If n is the frequency of the source then the graph between the apparent frequency n' observed by detector and time t would be [assume that source and detector do not collide]



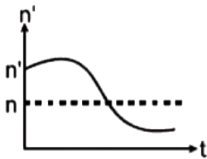
A.



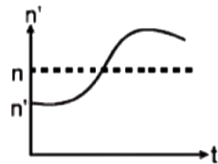
B.



C.



D.



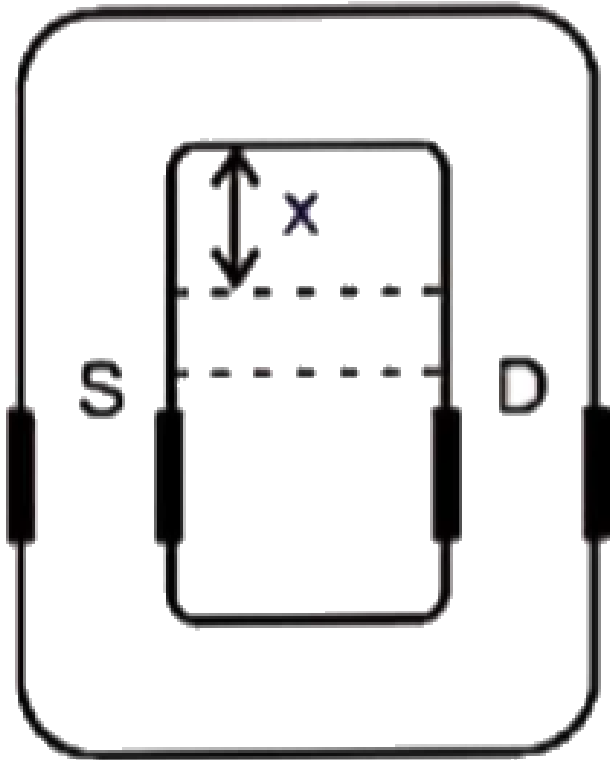
Answer: A



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18. In a closed tube whose length can be altered by sliding one of the halves relative to other is shown in the figure. In the initial condition the detector detects minimum intensity. One of the tubes is then displaced by 5 cm, during this displacement detector detects maximum intensity for 10 times and then a minimum intensity when the displacement is complete. what is the

wavelength of sound?



A. $\frac{10}{9}$ cm

B. 1 cm

C. $\frac{1}{2}$ cm

D. $\frac{5}{9}$ cm

Answer: B



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19. An organ pipe of length L is open at one end and closed at other end. The wavelengths of the three lowest resonating frequencies that can be produced by this pipe are

A. $4L, 2L, L$

B. $2L, L, L/2$

C. $2L, L, 2L/3$

D. $4L, 4L/3, 4L/5$

Answer: D



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20. 10^{22} particles each of mass 10^{-26} Kg are striking perpendicular on a wall of area 1 m^2 with speed 10^4 m/s in 1 sec. The pressure on the wall if collision are perfectly elastic is :

A. $2Nm^{-2}$

B. $4Nm^{-2}$

C. $8Nm^{-2}$

D. $16Nm^{-2}$

Answer: A



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21. A metal wire of circular cross-section has a resistance R_1 . The wire is now stretched without breaking, so that its length is doubled

and the density is assumed to remain the same. If the resistance of the wire now becomes R_2 , then $R_2 : R_1$ is



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22. A power transmission line feeds input power at 2400V to a step-down transformer and which delivers power at 240V with its primary windings having 5000 turns . If the current in the primary coil of the transformer

is 5A and its efficiency is 80%, then what is the output current (in A)?



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23. The largest magnitude the electric field on the axis of a uniformly charged ring of radius 3m is at a distance h from its centre. What is the value of h ? (Take $\frac{1}{\sqrt{2}} = 0.7$)



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24. If the displacement (x) and velocity (v) of a particle executing SHM are related through the expression $3v^2 = 30 - x^2$. If the time period of the particle is $T = \pi\sqrt{n}$, then what is the value of n ?



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25. A body hanging from a spring stretches it by 1 cm at the earth's surface. How much will the same body stretch the spring at a place

1600 km above the earth surface ? Radius of the earth=6400 km.



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