PHYSICS

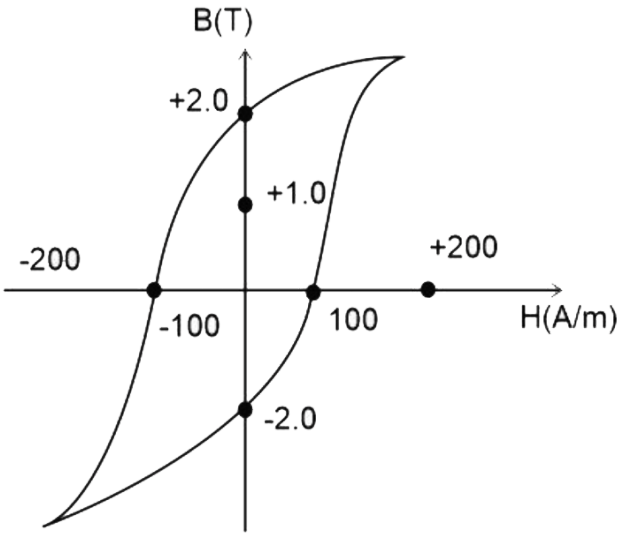
BOOKS - NTA MOCK TESTS

JEE MOCK TEST 21

Physics

1. The B-H curve for a ferromagnet is shown in the figure. The ferromagnet is placed inside a long solenoid with 1000 turns/cm. The current

that should be passed in the solenoid to demagnetise the ferromagnet completely is :



A. 2 mA

B. $20\mu A$

C. $1mA$

D. $40\mu A$

Answer: C

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2. A cell of emf E and internal resistance r supplies currents for the same time t through external resistances $R_1 = 100\Omega$ and $R_2 = 40\Omega$ separately. If the heat developed in both cases is the same, then the internal resistance of the cell is

A. 28.6Ω

B. 80Ω

C. 63.3Ω

D. 140Ω

Answer: C

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3. Two point white dots are 1mm apart on a black paper. They are viewed by eye of pupil diameter 3mm. Approximately, what is the maximum distance at which these dots can be

resolved by the eye? [Take wavelelngth of light =500nm]

A. 6 m

B. 3m

C. 1m

D. 5m

Answer: D

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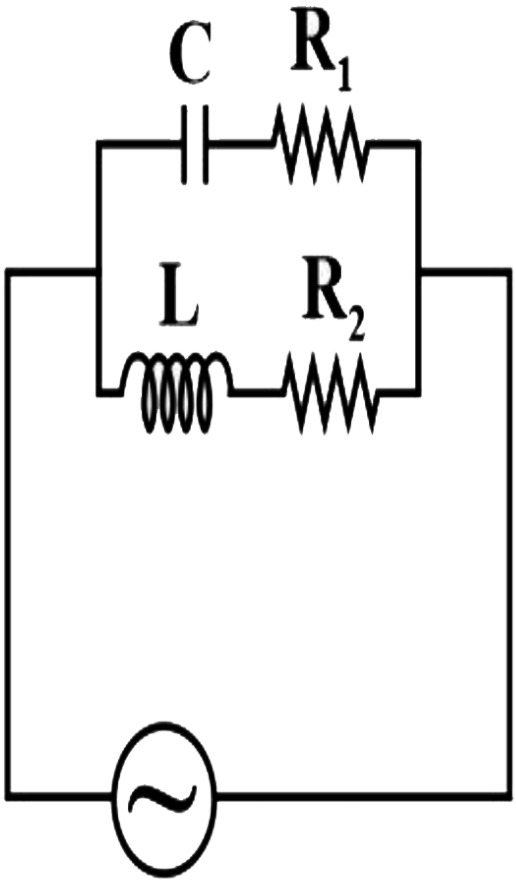
4. In the given circuit the R.M.S values of voltages across the capacitor C, inductor L and resistor R_1 are 12V, 10V and 5 V respectively.

Then the peak voltage across R_2 is



A. $7\sqrt{2}V$

B. $\sqrt{69}V$

C. $\sqrt{138}V$

D. none of these

Answer: C

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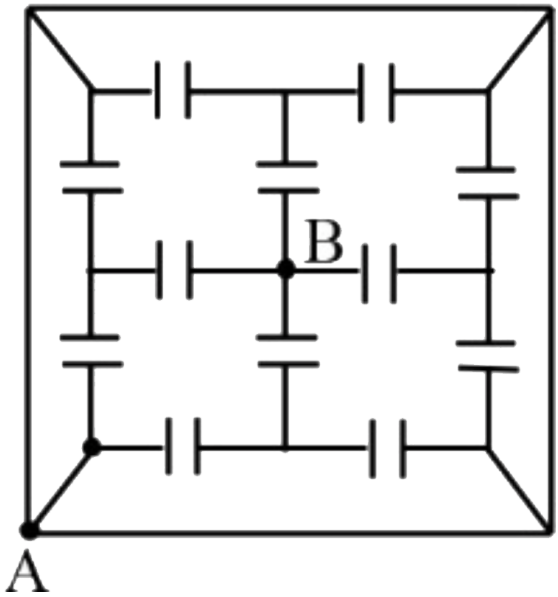
5. If each capacitor has capacitance C, then equivalent capacitance between A and B is



A. $\frac{4C}{3}$

B. $\frac{8C}{3}$

C. $12C$

D. $\frac{5C}{12}$

Answer: B

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6. A $10\mu F$ capacitor is charged to a potential difference of $50V$ and is connected to another uncharged capacitor in parallel. Now the common potential difference becomes 20 volt. The capacitance of second capacitor is

A. $15\mu F$

B. $30\mu F$

C. $20\mu F$

D. $10\mu F$

Answer: A

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7. A particle of mass $2 \times 10^{-5} kg$ moves horizontally between two horizontal plates of a charged parallel plate capacitor between which there is an electric field of $200NC^{-1}$ acting upward. A magnetic induction of 2.0 T is applied at right angles to the electric field in a

direction normal to both $\overrightarrow{B}$ and $\overrightarrow{v}$. If g is $9.8ms^{-2}$ and the charge on the particle is $10^{-6}C$, then find the velocity of charge particle so that it continues to move horizontally

A. $2ms^{-1}$

B. $20ms^{-1}$

C. $0.2ms^{-1}$

D. $100ms^{-1}$

Answer: A

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8. Two identical vessels contain two different ideal gases at the same temperature. If the average speed of gas molecules in the first vessel is euqal to the most probable speed of molecules in the second vessel, then the ratio of the mass of gas molecules in the first vessel to that in the second vessel is

A. $\frac{4}{\pi}$

B. $\frac{8}{\pi}$

C. $\frac{2}{\pi}$

D. $\frac{\pi}{2}$

Answer: A

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9. The K_α line obtained for molybdenum $(Z = 42)$ is 0.71 Å. Then, the wavelength of the K_α line of copper (Z = 29) is

A. 2.14 Å

B. 1.52 Å

C. 1.04 Å

D. 1.71 Å

Answer: B

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10. Wire having tension 225 N produces six beats per second when it is tuned with a fork. When tension changes to 256 N, it is tuned with the same fork, the number of beats

remain unchanged. The frequency of the fork will be

A. 186 Hz

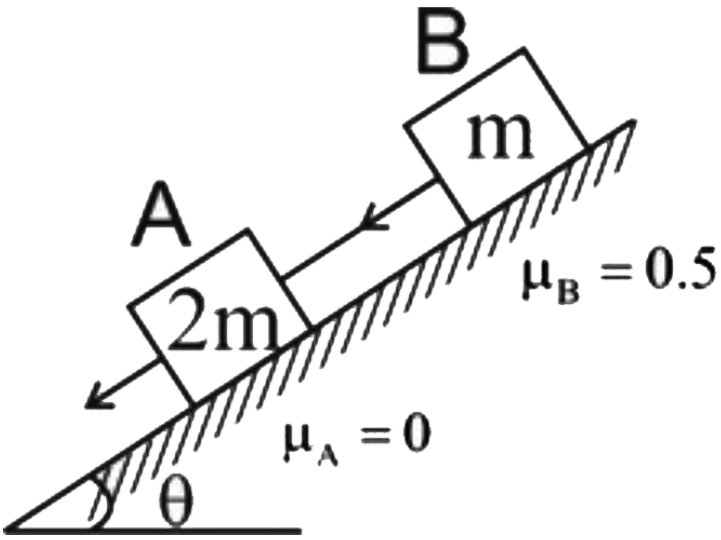
B. 225 Hz

C. 256 Hz

D. 280 Hz

Answer: A

11. The arrangement is released from rest. The minimum angle θ at which block A starts sliding downwards is



A. $\tan\theta = 0$

B. $\tan\theta = 0.5$

C. $\tan\theta = \frac{1}{6}$

D. $\tan\theta = \frac{1}{3}$

Answer: C

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12. The length and breadth of a metal sheet are 3.124m and 3.002m respectively. The area of this sheet upto correct significant figure is

A. $9.378m^2$

B. $9.37m^2$

C. $9.378248m^2$

D. $9.3782m^2$

Answer: A

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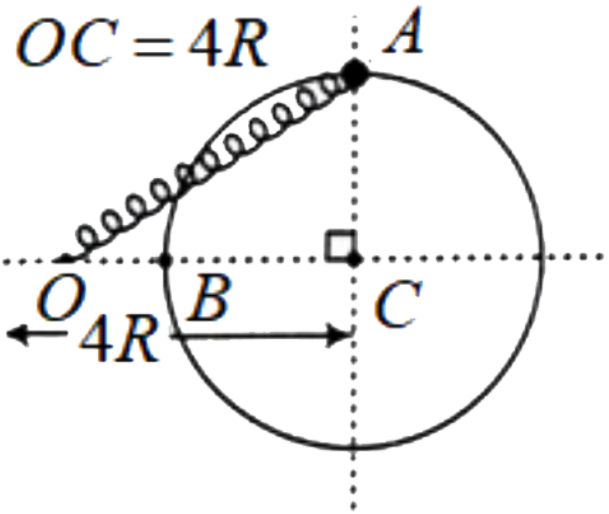
13. A bead of mass m can slide without friction on a fixed circular horizontal ring of radius 3R having a centre at the point C. The bead is attached to one of the ends of spring of

spring constant k. Natural length of spring is R and the other end of the spring is R and the other end of the spring is fixed at point O as shown in the figure. If the bead is released from position A, then the kinetic energy of the bead when it reaches point B is



A. $\frac{25}{2}kR^2$

B. $\frac{9}{2}kR^2$

C. $8kR^2$

D. $12KR^2$

Answer: C

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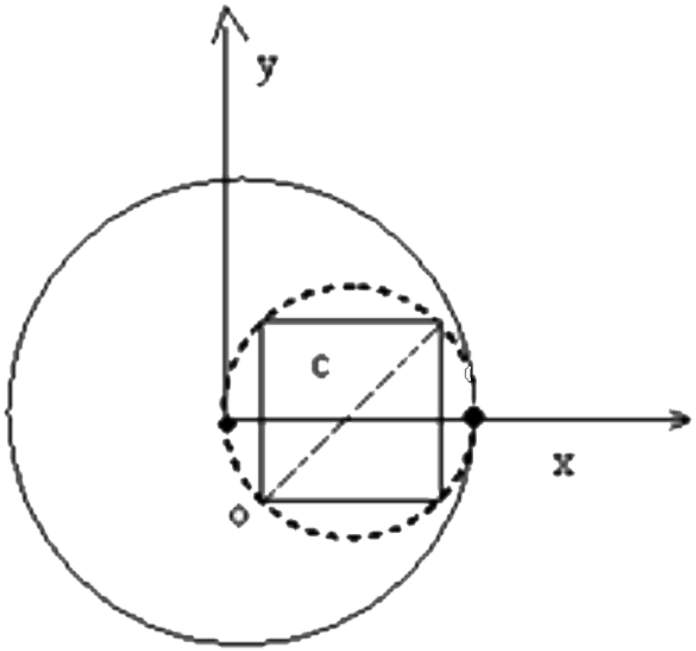
14. There is a thin uniform disc of radius R and mass per unit area σ in which a hole of radius $R/2$ has been cut out as shown in the figure. Inside the hole, a square plate of same mass

per unit area σ is inserted so that its corners touch the periphery of the hole. The distance of the centre of mass of the system from the origin is



A. $\frac{R(2-\pi)}{2(3\pi+2)}$

B. $\frac{R(1-\pi)}{2(2\pi+1)}$

C. $\frac{2R\pi}{2(3\pi+2)}$

D. $\frac{3R\pi}{2(2\pi+1)}$

Answer: A

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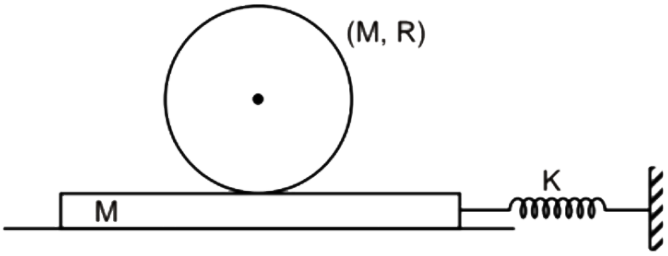
15. A cylinder of mass M and radius R lies on a plank of mass M as shown. The surface between plank and ground is smooth, and between cylinder and plank is rough.

Assuming no slipping between cylinder and plank, the time period of oscillation (When displaced from equilibrium) of the system is



A. $2\pi\sqrt{\frac{m}{3k}}$

B. $4\pi\sqrt{\frac{2m}{3k}}$

C. $4\pi\sqrt{\frac{M}{3k}}$

D. $4\pi\sqrt{\frac{3M}{2k}}$

Answer: C

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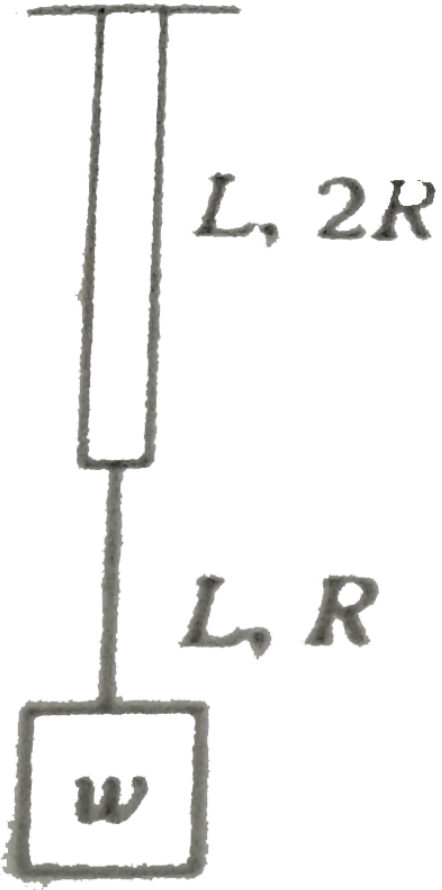
16. Two wires of the same material (Young's modulus=Y) and same length L but radii R and 2R respectively are joined end to end and a weight w is suspended from the combination as shown in the figure. The elastic potential

energy in the system is



A. $\dfrac{3w^2L}{4\pi R^2Y}$

B. $\dfrac{3w^2L}{8\pi R^2Y}$

C. $\frac{5w^2L}{8\pi R^2Y}$

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

Answer: C

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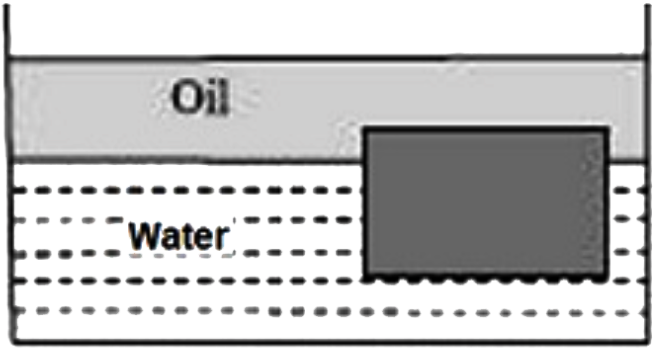
17. A layer of oil with density 724 kg m^{-3} floats on water of density $1000kgm^{-3}$. A block floats on the oil-water interface with $1/6$ of its volume in oil and $5/6$ of its volume in water, as shown in the figure. What is the density of

the block?



A. $1024kgm^{-3}$

B. $1276kgm^{-3}$

C. $776kgm^{-3}$

D. $954kgm^{-3}$

Answer: D

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18. A uniform ball of radius r rolls without slipping down from the top of a sphere of radius R Find the angular velocity of the ball at the moment it breaks off the sphere. The initial velocity of the ball is negligible.

A. $\sqrt{\frac{10g(R+r)}{17r^2}}$

B. $\sqrt{\frac{10g(R-r)}{17r^2}}$

C. $\sqrt{\frac{10g(R+r)}{17}}$

D. $\sqrt{\frac{10(R+r)}{17}}$

Answer: A

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19. A vessel contains two non-reactive gases neon (monoatomic) and oxygen (diatomic). The ratio of their partial pressures is 3:2. Estimate the ratio of

(i) number of molecules, and

(ii) mass density of neon and oxygen in the

vessel.

Atomic mass of neon = 20.2 u, and molecular mass of oxygen = 32.0 u.

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

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

C. $\frac{1}{3}$

D. $\frac{1}{2}$

Answer: A

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20. In a transistor, the collector current varies by 0.49 mA and emitter current varies by 0.50 mA. Then current gain β is

A. 49

B. 150

C. 99

D. 100

Answer: A

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21. If in nuclear fission, a piece of uranium of mass 6.0 g is lost, the energy obtained (in kWh) is $n \times 10^7$. Find the value of n.

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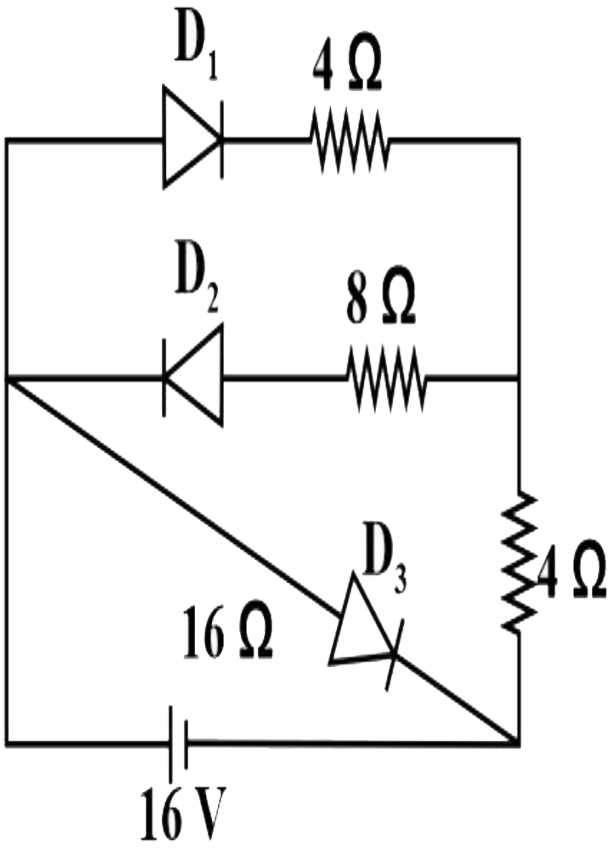
22. In the given circuit, what is the current (in A) through the battery?



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23. A galvanometer coil has a resistance 90Ω and full scale deflection current $10mA$. A 910Ω resistance is connected in series with the galvanometer to make a voltmeter. If the least count of the voltmeter is $0.1V$ the number of divisions on its scale is

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24. At what distance from a convex mirror of focal length 2.5 m should a body stand so that

his image has a height equal to half the original height ? The principal axis is perpendicular to the height.

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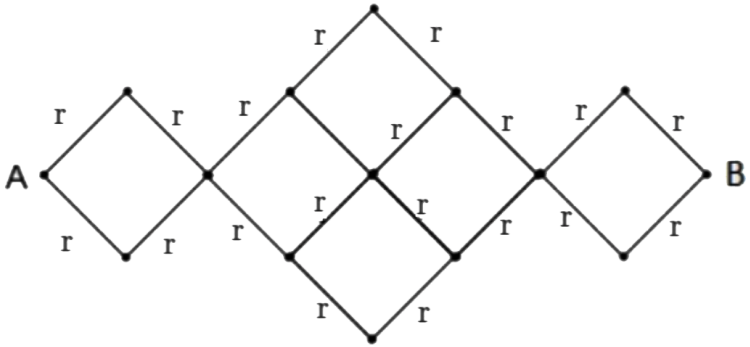
25. The resistance of each straight section $r = 2\Omega$. Find the equivalent resistance (in

ohms) between A and B.



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