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PHYSICS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 32

Physics

1. On moving a charge of 7C from a point x where potential is +5.5V to a point y where potential is -7.6 V, the work done is -

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2. A smooth sphere of mass M moving with velocity u directly collides elastically with another sphere of mass m at rest. After collision their final velocities are V and v respectively. The value of v is

A. $\frac{2uM}{m}$

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

C. $(2u)\left(1+\frac{m}{M}\right)$

D. $\frac{2u}{1+\frac{M}{m}}$

Answer: C

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3. A magnet is cut in three equal parts by cutting it perpendicular to its length. The time period of original magnet is T_0 in a uniform magnetic field B. Then, the time period of each part in the same magnetic field is

A. T_0

B. $\frac{T_0}{2}$

C. $\frac{T_0}{2}$

D. $4T_0$

Answer: A

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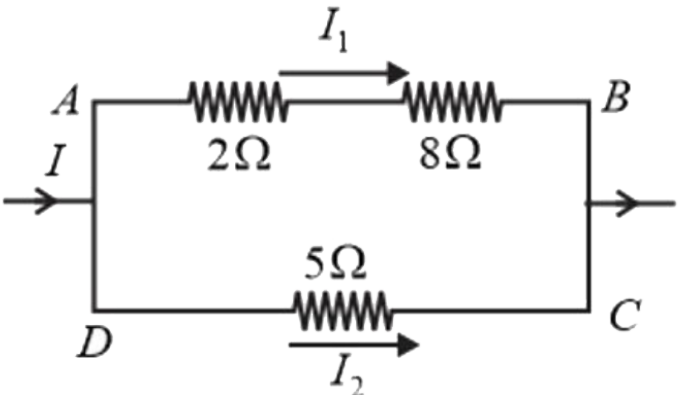
4. In the circuit shown, the heat produced in 5Ω resistnace due to current through it is $50\ \mathrm{J\ s^{-1}}$. Then, the heat generated per second

in the 2Ω resistance is



A. $5Js^{-1}$

B. $4Js^{-1}$

C. $9Js^{-1}$

D. $10Js^{-1}$

Answer: A

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5. Incandescent bulbs are designed by keeping in mind that the resistance of their filament increases with the increase in temperature. If at room temperature, $100W, 60W$ and $40W$ bulbs have filament resistances R_{100}, R_{60} and R_{40}, respectively, the relation between these resistances is

A. $\frac{1}{R_{100}} = \frac{1}{R_{40}} + \frac{1}{R_{60}}$

B. $R_{100} = R_{40} + R_{60}$

C. $R_{100} > R_{40} > R_{60}$

D. $\frac{1}{R_{100}} > \frac{1}{R_{60}} > \frac{1}{R_{40}}$

Answer: D

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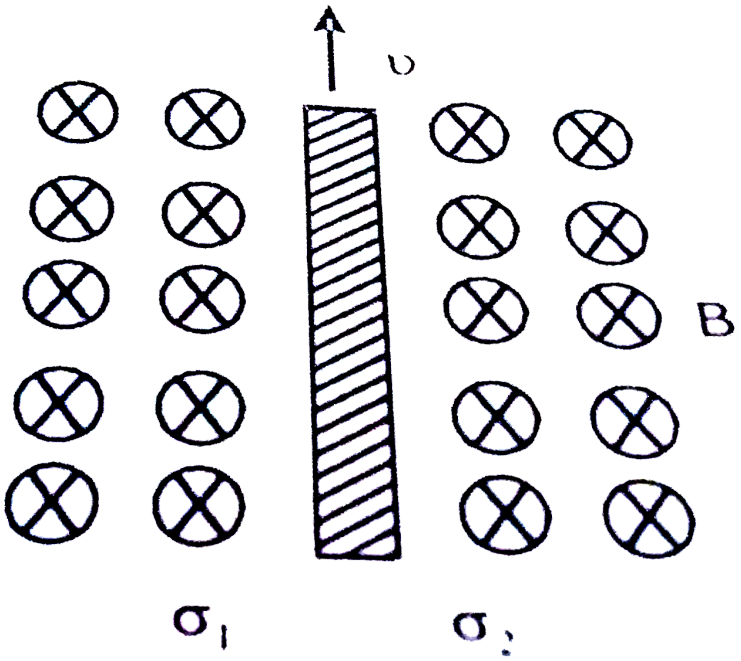
6. Consider a thin metallic sheet perpendicular to the plane of the paper moving with speed v in a uniform magnetic field B going into the plane of the paper (See figure.) If charge densities σ_1 and σ_2 are induced on the left and

right surfaces, respectively, of the sheet then

(ignore fringe effects.)



A. $\sigma_1 = \frac{-\varepsilon_0 vB}{2}, \sigma_2 = \frac{\varepsilon_0 vB}{2}$

B. $\sigma = \varepsilon_0 vB, \sigma_0 = -\varepsilon_0 vB$

C. $\sigma_1 = \frac{\varepsilon_0 vB}{2}, \sigma = \frac{-\varepsilon_0 vB}{2}$

D. $\sigma_1 = \sigma_2 = \varepsilon_0 vB$

Answer: B

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7. The electric potential at a space point P (X, Y, Z) is given as $V = x^2 + y^2 + z^2$. The modulus of the electric field at that point is proportional to

A. $V^{\frac{1}{2}}$

B. V

C. $V^{\frac{3}{2}}$

D. V^2

Answer: A

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8. g_e and g_p denote the acceleration due to gravity on the surface of the earth and another planet whose mass and radius are twice as that of earth. Then

A. $g_p = \frac{g_e}{2}$

B. $g_p = g_e$

C. $g_p = 2g_e$

D. $g_p = \frac{g_e}{\sqrt{2}}$

Answer: A

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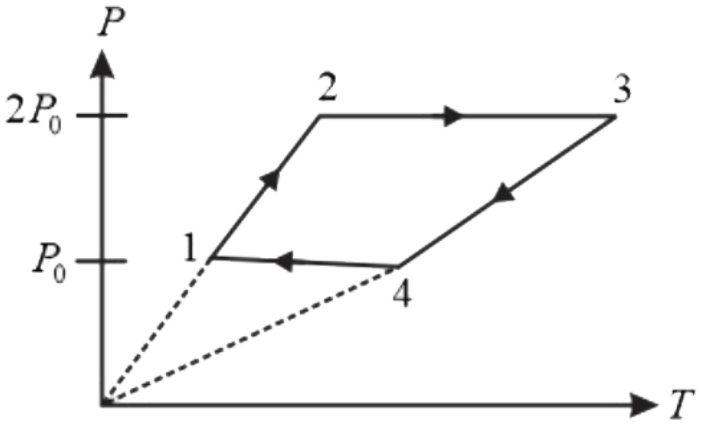
9. One mole of an ideal monoatomic gas undergoes a cyclic process, as shown in the figure. If the temperature of the gas at state 1

is 300 K and at state 4 is 500 K, then heat exchanged during process $2 \rightarrow 3$, is



A. 1000 R

B. 600 R

C. 750 R

D. 800 R

Answer: A

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10. The strength of the magnetic field at a point r near a long straight current carrying wire is B. The field at a distance $\frac{r}{2}$ will be

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

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

C. 2B

D. 4B

Answer: C

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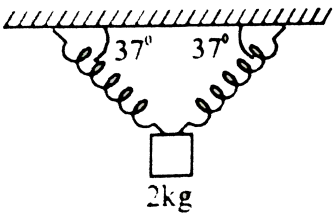
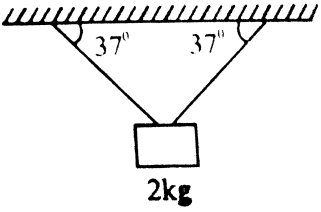
11. The block are of mass 2 kg shown is in equlibrium. At t=0 right spring in figure (i) and right string in figure (ii) breaks. Find the ratio of instantaneous acceleration of blocks ?





A. 0

B. 1

C. $\frac{25}{24}$

D. None of these

Answer: C

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12. The circuit shown in the figure determine the current through zener diode. (Given :

zener diode break down voltage $Vz = 5.8V$)

(A) $7mA$ (B) $17mA$ (C) $10mA$ (D) $15mA$

A. 5 mA

B. 17 mA

C. 10 mA

D. 7 mA

Answer: C

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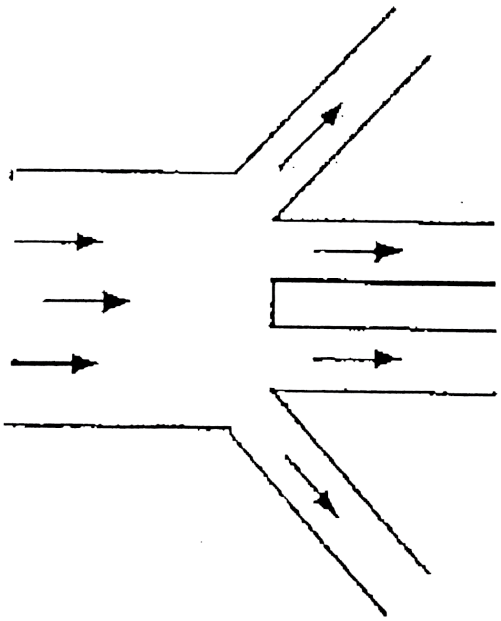

13.

Water is flowing through a channel that is 12 m wide with a speed of 0.75m/s. the water then flows into four identical channels that have a width of 4.0 m the depth of the water does not change as it flows into the four

channels. What is the speed of the water in one of the smaller channels?

A. $0.56ms^{-1}$

B. $2.3ms^{-1}$

C. $0.25ms^{-1}$

D. $0.75ms^{-1}$

Answer: A

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14. There is no change in the volume of a wire due to the change in its length on stretching. The Poisson's ratio of the material of the wire is

A. $+\frac{1}{2}$

B. $-\frac{1}{2}$

C. $+\frac{1}{4}$

D. $-\frac{1}{4}$

Answer: B

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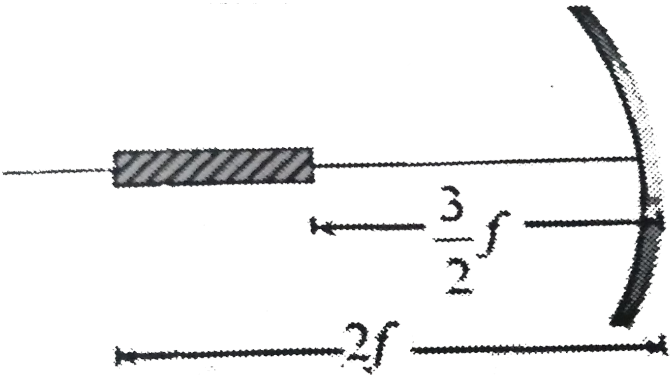
15. A linear object is placed along the axis of a mirror as shown in figure. If 'f' is the focal length of the mirror then the length of image is-



A. $\frac{(2f)}{3}$

B. f

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

D. none

Answer: B

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16. Radar waves are sent towards a moving aeroplane and the reflected waves are recived by radar . When aero

A. sound waves

B. light waves

C. radio waves

D. microwaves

Answer: D

17. In a p- n junction diode not connected to any circuit,

A. the potential is the same everywhere

B. the p - type side is at a higher potential than the n - type side

C. there is an electric field at the junction directed from the n - side to the p - side

D. there is an electric field at the junction directed from the p - type side to the n - type side

Answer: C

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18. If masses of all molecules of a gas are halved and the speed doubled. Then the ratio of initial and final pressure is :

A. $1:2$

B. $2:1$

C. $4:1$

D. $1:4$

Answer: A

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19. A screw gauge with a pitch of $0.5mm$ and a circular scale with 50 divisions is used to measure the thicknes of a thin sheet of Aluminium. Before starting the measurement, it is found that when the jaws of the screw gauge are brought in contact, the 45^{th} division coincide with the main scale line and the zero of the main scale is barely visible. what is the thickness of the sheet if the main scale readind is $0.5mm$ and the $25th$ division coincide with the main scale line?

A. 0.70 mm

B. 0.50 mm

C. 0.75 mm

D. 0.80 mm

Answer: D

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20. If a man of ,mass M jumps to the ground from a height h and his centre of mass moves a distance x in the time taken by him to 'hit'

the ground the average force acting on him (assuming his retardation to be constant during his impact with the ground) is :

A. $\frac{Mgh}{x}$

B. $\frac{Mgx}{h}$

C. $Mg\left(\frac{h}{x}\right)^2$

D. $Mg\left(\frac{x}{h}\right)^2$

Answer: A

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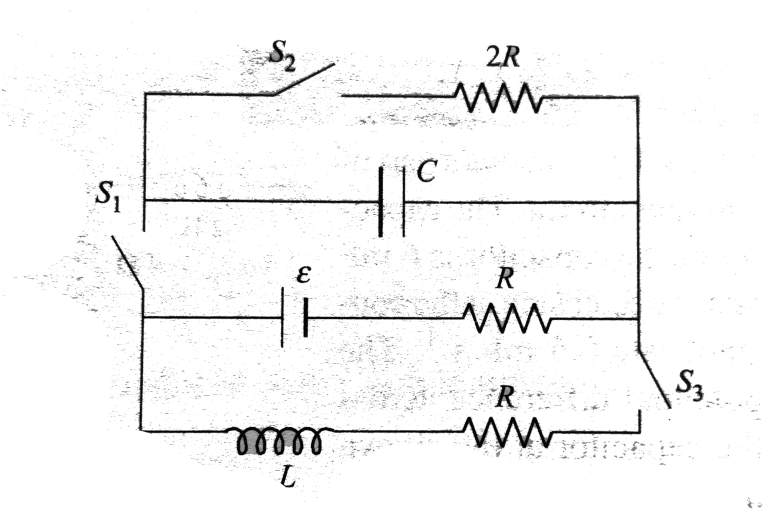
21. In the given circuit, initially switch S_1 is closed, and S_2 and S_3 are open. After charging of capacitor, at $t = 0$, S_1 is opened and S_2 and S_3 are closed. If the relation between inductance, capacitance and resistance is $L = 4CR^2$, then find the time (in s) after which current passing through capacitor and inductor will be same (given

$R = In2m\Omega, L = 2mH)$



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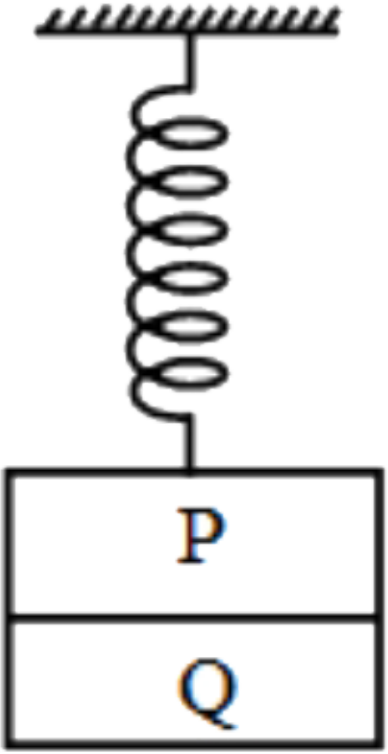
22. Two blocks P and Q of masses 0.3 kg and 0.4 kg respectively are stuck to each other by some weak glue as shown in the figure. They hand together at the end of a spring with a

spring constant $k = 200\ N\ m^{-1}$. The block Q suddenly falls free due to failure of glue, then find the maximum kinetic energy of the block P during subsequent motion (in mJ).



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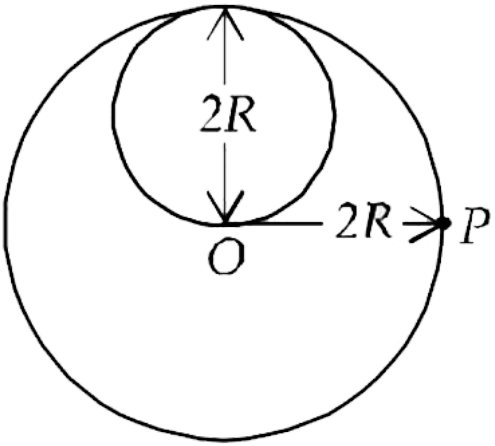
23. A lamina is made by removing a small disc of diameter 2R from a bigger disc of uniform mass density and radius 2R, as shown in the figure. The moment of inertia of this lamina about axes passing though O and P is I_O and I_P respectively. Both these axes are perpendiucalr to the plane of the lamina. The

ratio $\frac{I_P}{I_O}$ ot the nearest integer is



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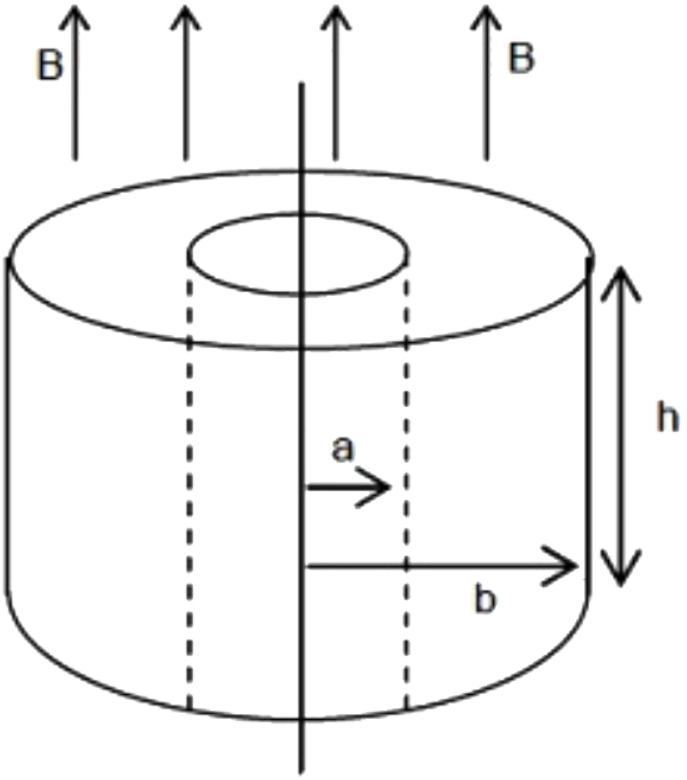
24. A conducting ring of circular cross - section with inner and outer radii a and b is made out of a material of resistivity ρ. The thickness of the ring is h. It is placed coaxially in a vertical

cylindrical region of a magnetic field $B = krt$. Where k is a positive constant, r is the distance from the axis and t is the time. If the current through the ring is $I = \left(\frac{kh}{\alpha p}\right)\left[b^3 - a^3\right]$, then what is the value

of α?



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25. Earth is moving towards a fixed star with a velocity of $30 kms^{-1}$. An observer on earth observes a shift of $0.58 Å$ in wavelength of light coming from star. What is the actual wavelength of light emitted by star ?

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