PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET SET 40

Physics

1. In a hydrogen like atom electron make transition from an energy level with quantum number n to another with quantum number

$(n-1)$ if $n> >1$, the frequency of radiation emitted is proportional to :

A. $\frac{1}{n^3}$

B. $\frac{1}{n}$

C. $\frac{1}{n^2}$

D. $\frac{1}{n^4}$

Answer: A

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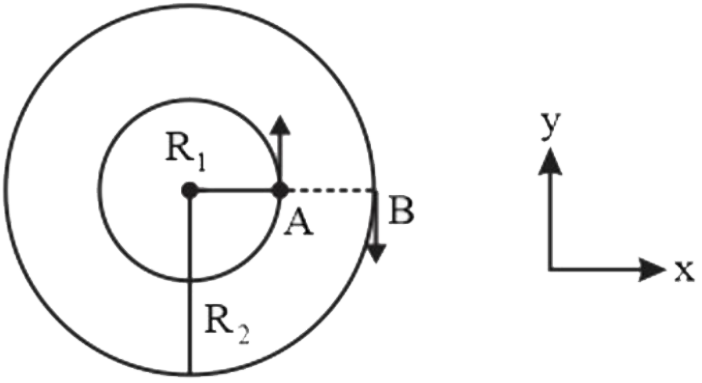
2. In the figure given , A and B are two particles having same magnitude of angular velocity in opposite sense, at t = 0 , then $\vec{V}_A - \vec{V}_B$ at $t = \frac{\pi}{2\omega}$ sec is



A. $-\omega R_1 \hat{i} + \omega R_2 \hat{i}$

B. $\omega R_1 \hat{i} - \omega R_2 \hat{j}$

C. $\omega R_1 \hat{j} - \omega R_2 \hat{i}$

D. $\omega R_1 \hat{j} + \omega R_2 \hat{j}$

Answer: A

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3. A particle of mass m_1 makes a head - on elastic collision with another particle of mass m_2 at rest. m_1 rebounds straight back with $\frac{4}{9}$ of its initial kinetic energy . Then $\frac{m_1}{m_2}$ is :

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

B. $\frac{1}{5}$

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

D. $\frac{2}{5}$

Answer: B

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4. An object , initially at rest , explodes into three fragments of equal mass . The momenta of two parts are $2p\hat{i}$ and $p\hat{j}$ where p is a

positive number . The momentum of the third part is

A. Will be of the magnitude 3p inclined at $\tan^{-1}\left(\frac{1}{2}\right)$ with x - axis

B. Will be of the magnitude $\sqrt{5}p$ inclined at $\tan^{-1}(2)$ with x - axis

C. Will be of the magnitude 3p inclined at $\pi - \tan^{-1}\left(\frac{1}{2}\right)$ with x - axis

D. Will be of the magnitude $\sqrt{5}p$ inclined at $\pi + \tan^{-1}\left(\frac{1}{2}\right)$ with x - axis

Answer: D

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5. The coercivity of a small bar magnet is $4 \times 10^3 Am^{-1}$. It is inserted inside a solenoid of 500 turns and length 1 m to demagnetize it. The amount of current to be passed through the solenoid will be

A. 2.5 A

B. $5A$

C. $8A$

D. $10A$

Answer: C

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6. To get maximum current through a resistance of 2.5Ω, one can use m rows of cells, each row having n cells. The internal resistance of each cell is 0.5Ω what are the

values of n and m, if the total number of cells is 45.

A. $m = 3, n = 15$

B. $m = 5, n = 9$

C. $m = 9, n = 5$

D. $m = 15, n = 3$

Answer: A

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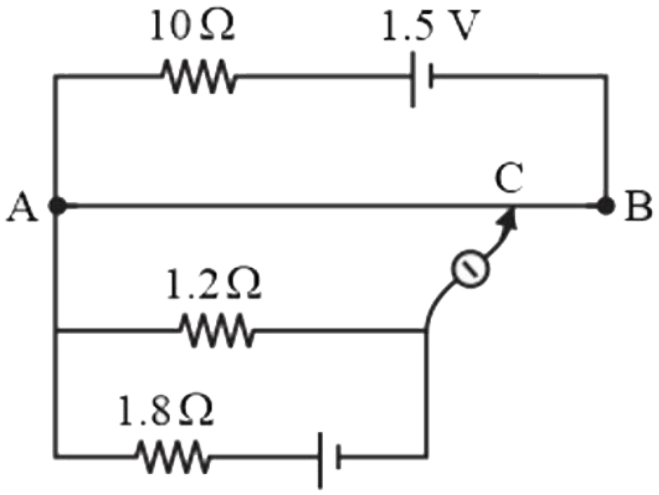
7. In the below circuit , AB is a wire of length 100 cm with 5Ω resistance . If there is no deflection in the galvanometer , the current flowing in the wire AB is



A. $0.1A$

B. $0.5A$

C. $1.0A$

D. $1.4A$

Answer: A

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8. A power transmission line feeds input power at 2300 V a step down transformer with its primary windings having 4000 turns. The output power is delivered at 230 V by the transformer. If the current in the primary of

the transformer is 5A and its efficiency is $90\ \%$, the output current would be :

A. 45 A

B. 50 A

C. 20 A

D. 25 A

Answer: A

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9. A 60 W , 120 V bulb is connected to a 240 V , 60 Hz supply with an inductance in series. Find the value of inductance so that bulb gets correct voltage.

A. $\frac{2.3}{\pi}H$

B. $2\sqrt{3}H$

C. πH

D. $\frac{2\sqrt{3}}{\pi}H$

Answer: D

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10. The two plates of a parallel plate capacitor are $4mm$ apart. A slab of dielectric constant 3 and thickness $3mm$ is introduced between the plates is so adjusted that the capacitance of the capacitor becomes $\frac{2}{3}rd$ of its original value. What is the new distance between the plates ?

A. 9 mm

B. 21 mm

C. 5 mm

D. 8 mm

Answer: D

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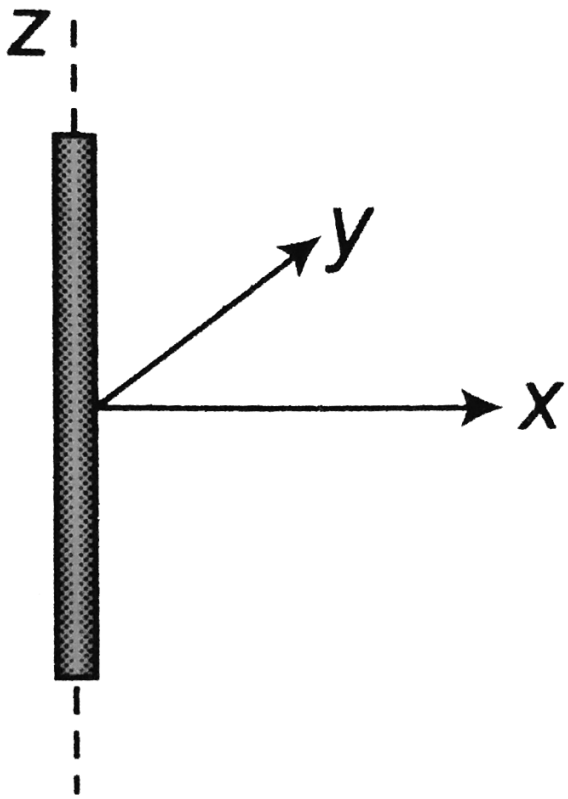
11. An infinitely long wire is kept along z-axis from $z = \infty$ to $z = \infty$, having uniform linear cahrges density $\frac{10}{9} nC/m$. The electric field

at point $(6cm, 8cm, 10cm)$ will be



A. $\left(160\hat{i} + 120\hat{j} + 200\hat{k}\right) NC^{-1}$

B. $\left(200\hat{k}\right) NC^{-1}$

C. $\left(160\hat{i} + 120\hat{j}\right) NC^{-1}$

D. $\left(120\hat{I} + 160\hat{j}\right)NC^{-1}$

Answer: D

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12. A mass of $6 \times 10^{24}kg$ is to be compressed in a sphere in such a way that the escape velocity from its surface is $3 \times 10^{8}m/s$. Find the radius of the sphere.

A. 9 km

B. 9 m

C. 9 cm

D. 9 mm

Answer: D

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13. A rocket is fired with a speed $u = 3\sqrt{gR}$ from the earth surface . What will be its speed at interstellar space ?

A. zero

B. $\sqrt{2gR}$

C. $\sqrt{7gR}$

D. $\sqrt{3gR}$

Answer: C

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14. The ratio of energies of emitted radiation by a black body at 600 K and 900 K , when the surrounding temperature is 300 K , is

A. $\frac{5}{16}$

B. $\frac{7}{16}$

C. $\frac{3}{16}$

D. $\frac{9}{16}$

Answer: C

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15. A perfect gas goes from state A to another state B by absorbing 8 x 10^5 J of heat and doing 6.5 x 10^5 J of external work. It is now

transferred between the same two states in another process in which it absorbs 10^5 J of heat. Then in the second process,

A. Work done on gas is $10^5 J$

B. Work done on gas is $0.5 \times 10^5 J$

C. Work done by gas is $10^5 J$

D. Work done by gas is $0.5 \times 10^5 J$

Answer: B

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16. An amount Q of heat is added to a monoatomic ideal gas in a process in which the gas performs work $\frac{Q}{2}$ on its surrounding. Find the molar heat capacity for the process.

A. 2 R

B. 1.5 R

C. 3 R

D. 2.5 R

Answer: C

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17. A very long metallic hollow pipe of length l and radius $r(<< l)$ is carrying charge Q , uniformly distributed upon it . The pipe is rotated about its axis with constant angular speed ω . The energy stored in the pipe of length $\frac{l}{100}$ is

A. $\frac{\mu_0 Q^2 \omega^2 r^2}{100\pi l}$

B. $\frac{\mu_0 Q^2 \omega^2 r^2}{200\pi l}$

C. $\frac{\mu_0 Q^2 \omega^2 r^2}{800\pi l}$

D. $\frac{\mu_0 Q^2 \omega^2 r^2}{400\pi l}$

Answer: C

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18. A current of $1A$ is flowing through a straight conductor of length $16cm$. The magnetic induction (in tesla) at a point $10cm$ from the either end the wire is :

A. $\frac{8}{3} \times 10^{-6}$

B. $\frac{1}{6\sqrt{2}} \times 10^{-5}$

C. $\frac{1}{6\sqrt{3}} \times 10^{-5}$

D. $\frac{\sqrt{3}}{6} \times 10^{-6}$

Answer: A

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19. A and B participate in a race with acceleration a_1 and a_2 , respectively . A reaches t times earlier than B at finish line and their velocities at finish line are v_1 and v_2 , respectively. If difference between their velocities is v , then find the value of v

A. $\frac{a_1 + a_2}{2}t$

B. $\sqrt{a_1 a_2}t$

C. $\frac{a_1 a_2}{a_1 + a_2}t$

D. $\frac{2a_1 a_2}{a_1 + a_2}t$

Answer: B

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20. A particle is projected with velocity $20ms^{-1}$ at angle 60° with horizontal . The radius of curvature of trajectory , at the

instant when velocity of projectile become perpendicular to velocity of projection is , $(g = 10ms^{-1})$

A. $60\sqrt{3}m$

B. $\frac{80}{\sqrt{3}}m$

C. $40\sqrt{3}m$

D. $\frac{80}{3\sqrt{3}}m$

Answer: D

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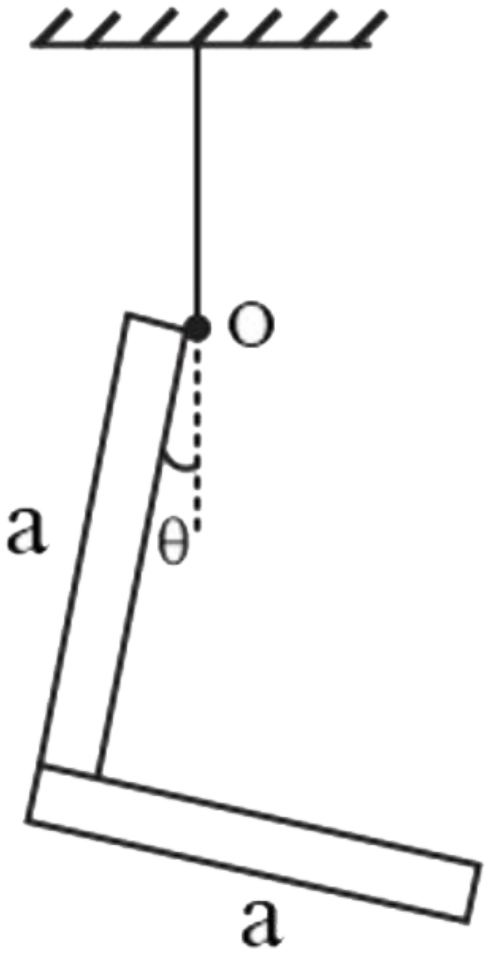
21. A uniform L shaped rod each of side a is held ,as shown in the figure. The angle θ such that rod remains stable. Will be.



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

B. $\tan^{-1}\left(\frac{1}{3}\right)$

C. $\tan^{-1} 2$

D. $\tan^{-1} 3$

Answer: B

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22. A rope of length $10m$ and linear density $0.5kg/m$ is lying length wise on a smooth horizontal floor It is pulled by a force of $25N$.

The tension in the rope at a point $6m$ away from the point of application is .

A. 20 N

B. 15 N

C. 10 N

D. 5 N

Answer: C

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23. The half-life period of a radioactive element x is same as the mean life time of another radioactive element y. Initially, both of them have the same number of atoms. Then,

(a) x and y have the same decay rate initially

(b) x and y decay at the same rate always

(c) y will decay at a faster rate than x

(d) x will decay at a faster rate than y

A. x and y have the same decay rate initially

B. x and y decay at the same rate always

C. y will decay at a faster rate than x

D. x will decay at a faster rate than y

Answer: C

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24. What is the binding energy per nucleon of

$._6C^{12}$nucleus?

Given , mass of C^{12} $(m_c)_m$ = 12.000 u

Mass of proton m_p = 1.0078 u

Mass of neutron m_n = 1.0087 u

and 1 amu = 931.4 MeV

A. 5.26 MeV

B. 10.11 MeV

C. 15.65 MeV

D. 7.68 MeV

Answer: D

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25. The bob of a simple pendulum executes simple harmonic motion in water with a period t, while the period of oscillation of the

bob is t_0 in air. Neglecting frictional force of water and given that the density of the bob is $(4/3) \times 1000 kg/m^3$.

What relationship between t and t_0 is true.

A. $t = t_0$

B. $t = t_0/2$

C. $t = 2t_0$

D. $t = 4t_0$

Answer: C

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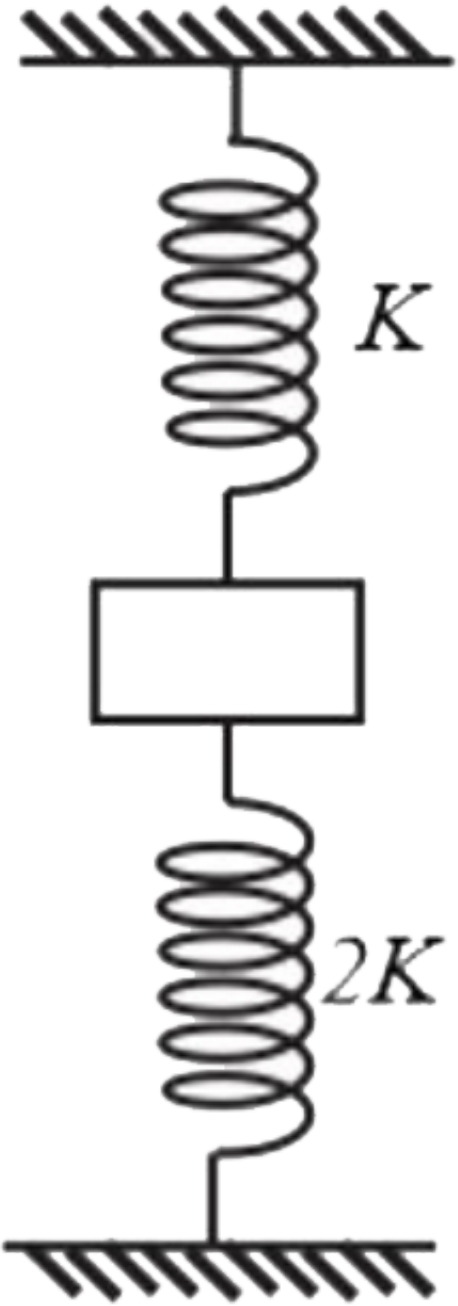
26. A block of mass m is connected two springs of spring constant 2k annd k , respectively , as shown in the vertical plane. At equilibrium , both springs are compressed by same length. If suddenly lower spring is cut, then

acceleration of block, just after spring cut , is


K
2K

A. 2g downward

B. g downward

C. g upward

D. None of these

Answer: A

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27. Which one of the following statement is $WRONG$ in the context of X- rays generated from X- rays tube ?

A. Wavelength of characteristic X - rays decreases when the atomic number of the target increases

B. Cut - off wavelength of the continuous X - rays depends on the atomic number of the target

C. Intensity on the electrical power given to the X - ray tube

D. Cut - off wavelength of the continuous X - rays depends on the energy of the

electrons in X - ray tube

Answer: B

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28. To decrease the cut-off wavelength of continuous $X-ray$ by $25\,\%$, the potential difference across the $X-ray$ tube

A. must be increased by $\frac{100}{3}\,\%$

B. must be decreased by 20%

C. must be increased by 25%

D. must be decreased by 25 %

Answer: A

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29. The excess pressure inside a spherical drop of water is four times that of another drop. Then, their respective mass ratio is

A. $1:16$

B. $8:1$

C. $1:4$

D. $1:64$

Answer: D

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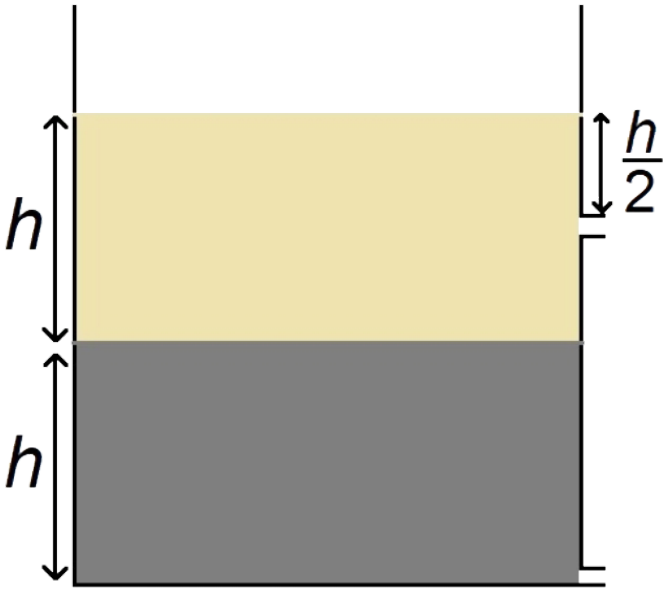
30. Equal volumes of two immiscible liquids of density 2ρ and 4ρ , respectively , are filled in the vessel as shown in the figure. Two small holes are punched at depth $\frac{h}{2}$ and $2h$,

respectively , from the surface of the lighter liquid. If v_1 and v_2 are the velocities of efflux at these holes, then the ratio of $\frac{v_1}{v_2}$ is



A. $1/3$

B. $1/\sqrt{3}$

C. $1/2$

D. $1/\sqrt{2}$

Answer: B

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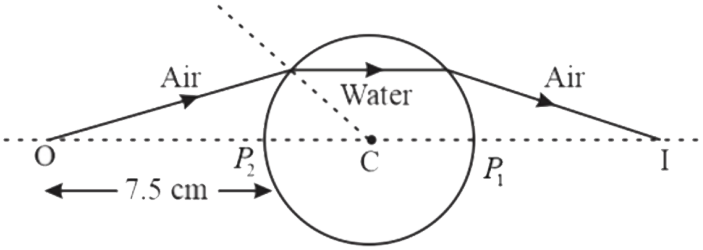
31. A thin walled glass sphere of radius 2.5 cm is filled with water. An object (O) is placed at 7.5 cm from the effect of glass wall, at what distance the image (I) of the object , measured from the centre of sphere is formed ?

(refractive index of water = 1.333)



A. 20 cm

B. 15 cm

C. 10 cm

D. 7.5 cm

Answer: C

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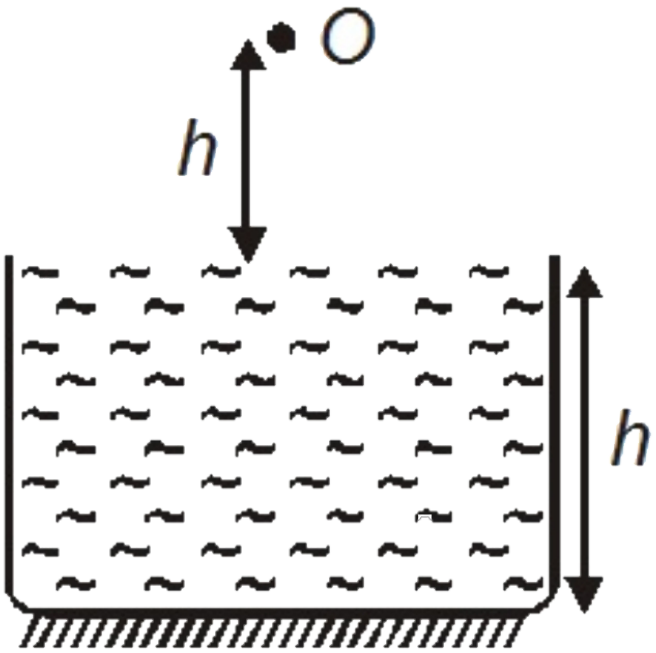
32. An object O is placed at a height h = 12 cm above water $\left(\mu = \frac{4}{3}\right)$ surface in a beaker . The lower surface of the beaker is polished , as shown in the figure . The location of final

image will be



A. 10 cm below water surface

B. 10 cm above water surface

C. 30 cm below water surface

D. 30 cm above water surface

Answer: C

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33. A uniform disc is rotating at a constant speed in a vertical plane about a fixed horizontal axis passing through the centre of the disc. A piece of the disc at the instant when it is at a horizontal level with the centre of the disc and moving upward . Then about

the fixed axis, the angular speed of the remaining disc is

A. remains unchanged

B. decreases

C. increase

D. initially increases and later decreases

Answer: A

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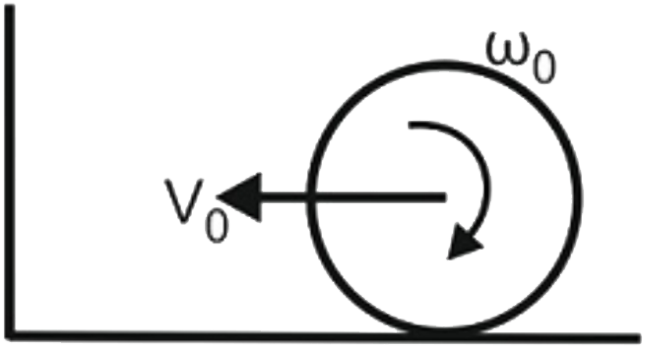
34. A solid sphere has linear velocity $v_0 = 4m/s$ and angular velocity $\omega_0 = 9$ rad/s as shown . Ground on which it is moving , is smooth . It collides elastically with a rough wall of coefficient with a rough wall of coefficient of friction μ. Radius of the sphere is 1 m and mass is 2 kg.



If the sphere after colliding with the wall rolls without slipping in opposite direction, the coefficient of friction μ is

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

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

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

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

Answer: D

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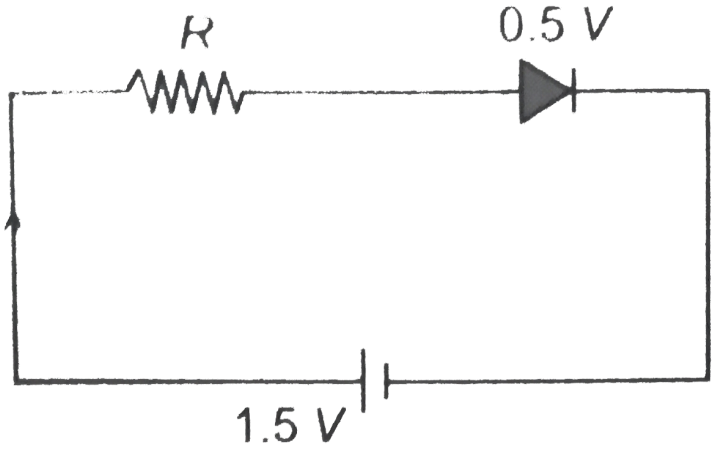
35. The diode used in the circuit shown in the figure has a constant voltage drop of $0.5V$ at all currents and a maximum power rating fo 100 milliwatts. What should be the value of the resistor R, connected in series with the diode for obtaining maximum current?



A. 1.5Ω

B. 5Ω

C. 6.675Ω

D. 200Ω

Answer: B

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36. A solenoid of radius 4 cm and 1000 turns , carries a current of 8 A. If it is equivalent to a magnet of same size and magnetisation $\vec{M}$

(Magnetic moment / Volume) of $20000Am^{-1}$,

then the length of the solenoid is

A. $10\pi cm$

B. $20\pi cm$

C. $30\pi cm$

D. $40\pi cm$

Answer: D

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37. Steam at $100^\circ C$ is passed into 1.1 kg of water contained in a calorimeter of water equivalent 0.02 kg at $15^\circ C$till the temperature of the calorimeter and its contents rises to $80^\circ C$. The mass of the steam condensed in kilogram is

A. 1.13

B. 0.065

C. 0.26

D. 0.135

Answer: A

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38. A 2 kg copper block is heated to $500^{\circ}C$ and then it is placed on a large block of ice at $0^{\circ}C$. If the specific heat capacity of copper is $400\mathrm{J/kg/}^{\circ}C$ and latent heat of fusion of water is 3.5×10^5 J/kg. The amount of ice that can melt is :

A. $\frac{7}{8}$ kg

B. $\frac{7}{5}$ kg

C. $\frac{8}{7}$ kg

D. $\frac{5}{7}$ kg

Answer: C

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39. The equation $\left(P + \frac{a}{V^2}\right)(V - b)$ constant. The units of a are

A. dy ne $\times cm^5$

B. dy ne $\times cm^4$

C. dy ne $\times cm^{-3}$

D. dy ne $\times cm^{-2}$

Answer: B

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40. The pressure on a circular plate is measured by measuring the force on the plate and the radius of the plate. If the errors in measurement of force and radius are 5% and

3% , respectively , then the percentage of error in the measurement of pressure is

A. 8

B. 14

C. 11

D. 12

Answer: C

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41. A beam of natural light falls on a system of 5 polaroids, which are arranged in succession such that the pass axis of each polaroid is turned through 60° with respect to the preceding one. The friction of the incident light intensity that passes through the system is :

A. 0.24

B. 0.16

C. 0.12

D. 0.32

Answer: B

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42. Visible light of wavelength 6000×10^{-8} cm falls normally on a single slit and produces a diffraction pattern. It is found that the second diffraction minimum is at 60° from the central maximum. If the first minimum is produced at θ_1, then θ_1 is close to :

A. 20°

B. 30°

C. 25°

D. 45°

Answer: C

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43. Two wires made up of the same material are of equal lengths but their diameter are in the ratio 1:2 . On stretching each of these two

strings by the same tension , then the ratio of the fundamental frequency of these strings is

A. $1:2$

B. $2:1$

C. $1:4$

D. $4:1$

Answer: B

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44. The phase difference between two points is $\pi/3$. If the frequency of wave is 50 Hz, then what is the distance between two points?

$\left(\text{Given, } \ v = 330ms^{-1}\right)$

A. 2.2 m

B. 1.1 m

C. 0.6 m

D. 1.7 m

Answer: B

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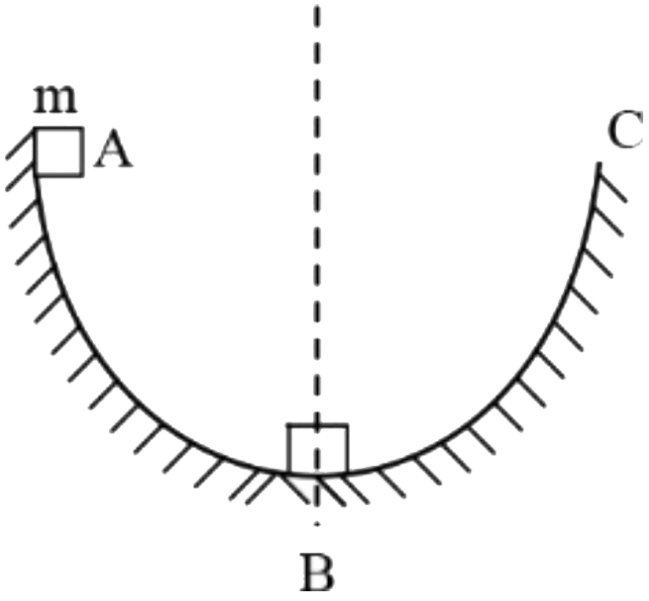
45. While slippling a on rough spherical surface of radius 'R' , block A of mass 'm' comes with velocity $\sqrt{1.4gR}$ at bottom B. Work done in slippling the block from 'B' to 'C' is



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

B. mgR

C. 1.3 mgR

D. $\frac{5}{4}$ mgR

Answer: C

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