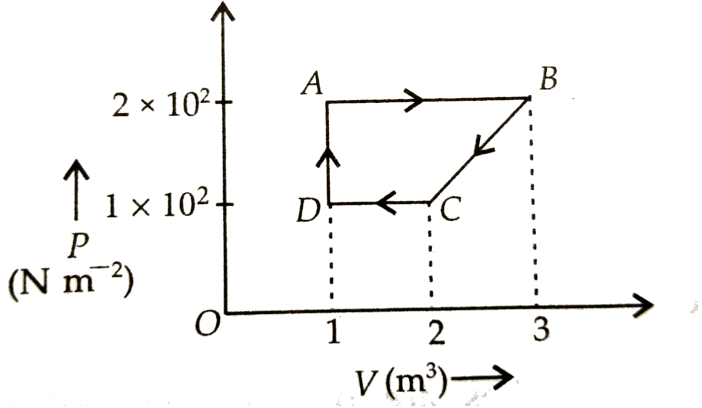
PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET SET 43

Physics

1. A cyclic process is shown in the figure. Work done during the cyclic process ABCDA is



A. 160 J

B. 150 J

C. 600 J

D. 900 J

Answer: B

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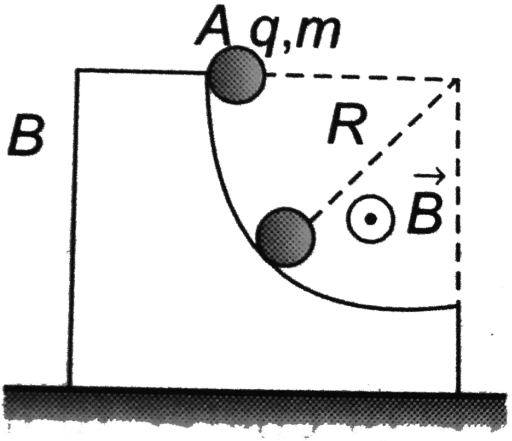
2. In the figure a charged small sphere of mass m and the charge q starts sliding from rest on a vertical fixed circular smooth track of radius R from the position A shown. There exist a uniform magnetic field of B. Find the maximum force exerted by track on the sphere during its motion.



A. mg

B. $3mg - qB\sqrt{2gR}$

C. $3mg + qB\sqrt{2gR}$

D. $mg - qB\sqrt{2gR}$

Answer: C

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3. Two identical spheres move in opposite directions with speeds v_1 and v_2 and pass behind an opaque screen, where they may

either cross without touching (Even 1) or make an elastic head-on collision (Event 2).

A. we can never make out which event has occurred

B. we can not make out which event has occurred only if $v_1 = v_2$

C. we can always make out which event has occurred

D. we can always make out which even has occurred only if $v_1 = v_2$

Answer: A

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4. A pulley fixed to the ceiling carries a string with blocks of mass m and $3m$ attached to its ends. The masses of string and pulley are negligible .When the system is released, its center of mass moves with what acceleration

A. g

B. g /2

C. g/4

D. zero

Answer: C

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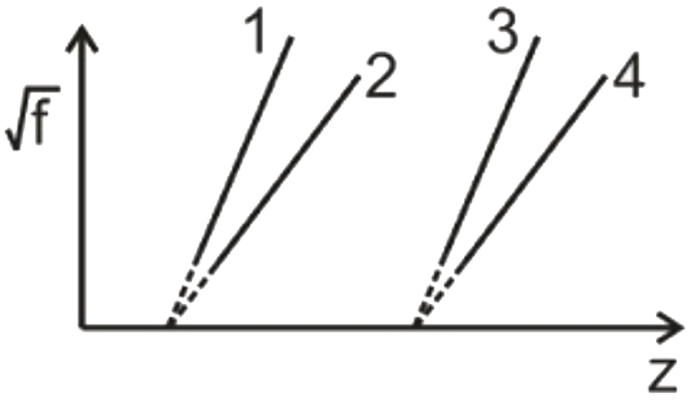
5. The graph given below, shows the variation of $\sqrt{f}$ vs z for characteristics X- rays. Lines 1,2,3 and 4 shown in the graph corresponds to any one of $K_\alpha, K_\beta, L_\alpha$ or L_α emission, then L_β is represented by (f = frequency, z = Atomic

number)



A. Line 1

B. Line 2

C. Line 3

D. Line 4

Answer: C

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6. A biconvex lens of focal length f forms a circular image of radius r of sun in focal plane . Then which option is correct

A. $\pi r^2 \propto f$

B. $\pi r^2 \propto f^2$

C. If lower half part is covered by black sheet, then area of the image is equal to $\frac{\pi r^2}{2}$

D. If f is doubled, intensity will increase

Answer: B

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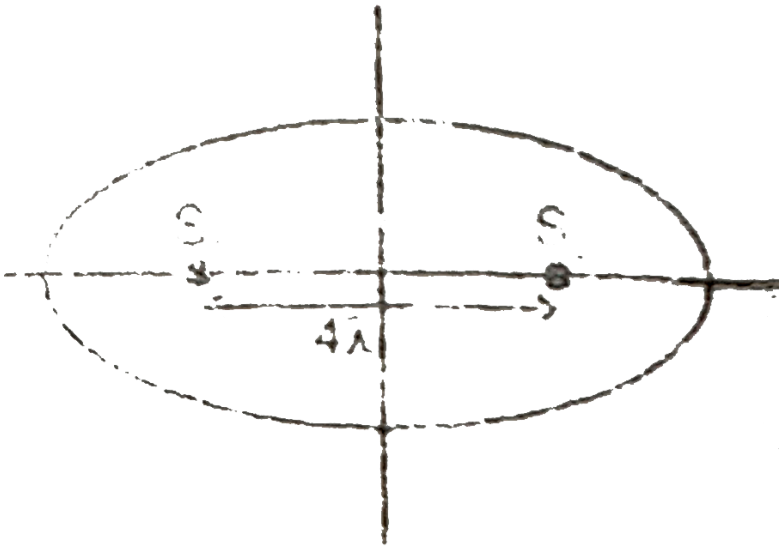
7. S_1S_2 are two coherent cources (having initial phase difference zero) of sound located along$x$-axis separated by 4λ where λ is wavelength of sound emitted by them. Number of maxima located on the ellopical

boundry around it will be.



A. 16

B. 12

C. 8

D. 4

Answer: A

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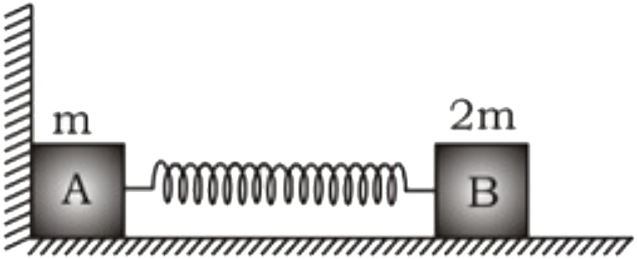
8. Two blocks A and B mass m and 2 m respectively are connected together by a light spring of stiffness K and natural length l. The system is lying on a smooth horizontal surface with the block A in contact with a fixed vertical wall as shown in the figure. The block B is pressed towards the wall by a distance x_0 from the natural position of spring and then

released. There is no friction anywhere.



If block B is released time t = 0 and A just loses contact with the wall at time $t = \Delta t$ then the average acceleration of the centre of mass of the system during the time $t = 0$ to $t = \Delta t$ is :

A. $\sqrt{\frac{2}{9}\frac{K}{m}}\frac{x_0}{\Delta t}$

B. $\sqrt{\frac{K}{2m}}\frac{x_0}{\Delta t}$

C. $\sqrt{\frac{2K}{m}}\frac{x_0}{\Delta t}$

D. $\sqrt{\frac{K}{m}}\frac{x_0}{\Delta t}$

Answer: A

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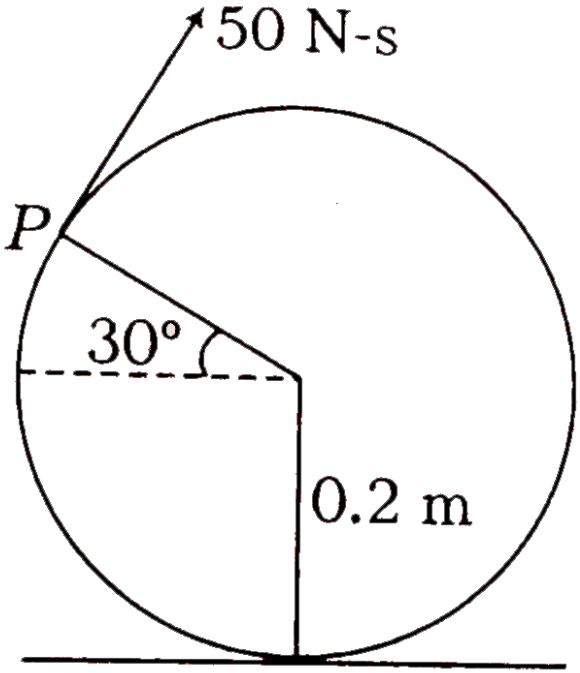
9. A solid ball of radius 0.2 m and mass 1 kg is given an instantaneous impulse of 50 N-s at point P as shown. Find the number of rotations made by the ball about its diameter before hitting the ground. The ball is kept on

smooth surface intially



A. $\frac{625\sqrt{3}}{2\pi}$

B. $\frac{2500\sqrt{3}}{2\pi}$

C. $\frac{3125\sqrt{3}}{2\pi}$

D. $\frac{1250\sqrt{3}}{2\pi}$

Answer: C

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10. A cylindrical vessel of radius R and height H and open at the top is completely filled with y . A small circular hole of radius r is made near the bottom of vessel . The time taken for 25 % of water to flow out is

A. $\frac{\sqrt{2H}}{g\left(\sqrt{3}-1\right)}$

B. $\frac{R^2}{r^2}\sqrt{\frac{2H}{g}}\left(1+\frac{2}{\sqrt{3}}\right)$

C. $\frac{R^2}{r^2}\sqrt{\frac{2H}{g}}\left(1-\frac{2}{\sqrt{3}}\right)$

D. $\frac{R^2}{r^2}\sqrt{\frac{2H}{g}}\left(\sqrt{3}-1\right)$

Answer: C

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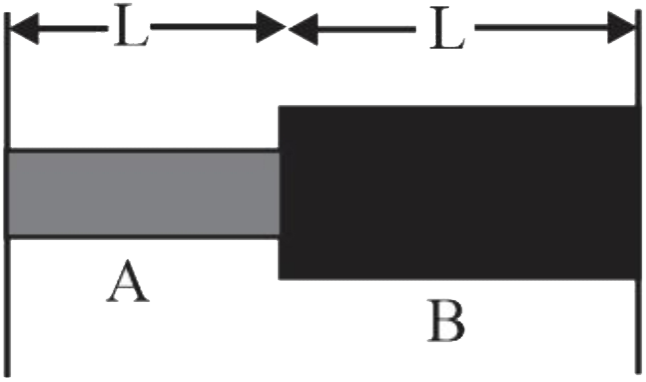
11. The system of two rods shown in figure is vibrating at the same frequency and forming a

standing wave. The ratio of the number of antinodes in the two rods if radius of rod B is twice radius of A is :



A. 1

B. 2

C. 3

D. 4

Answer: B

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12. The shorted wavelength of X- rays emitted from an X- rays tube depends on

A. The current in the tube

B. The voltage applied to the tube

C. The nature of the gas in tube

D. The atomic number of the target material

Answer: B

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13. A metal ball falls from a height of 1m on to a steel plate and jumps upto a height of 81 cm. The coefficient of restitution of the ball and steel plate is

A. 0.2

B. 9

C. 0.9

D. 90

Answer: C

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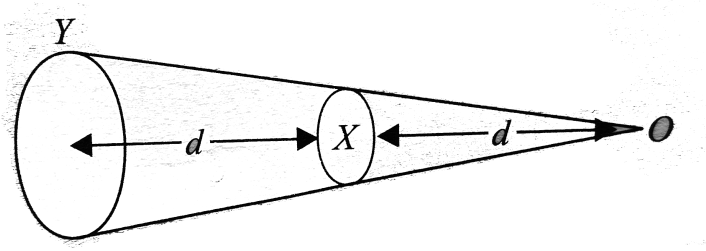
14. Two circular coils X and Y, having equal number of turns and carrying currents in the same sense, subtend same solid angle at point

O. If the smaller coil X is midway between O and Y and if we represent the magnetic induction due to bigger coil Y at O as B_y and the due to smaller coil X at O as B_x,then find the ratio B_x / B_y.



A. $\frac{B_y}{B_x} = 1$

B. $\frac{B_y}{B_x} = 2$

C. $\frac{B_y}{B_x} = 1/2$

D. $\frac{B_y}{B_x} = 1/4$

Answer: C

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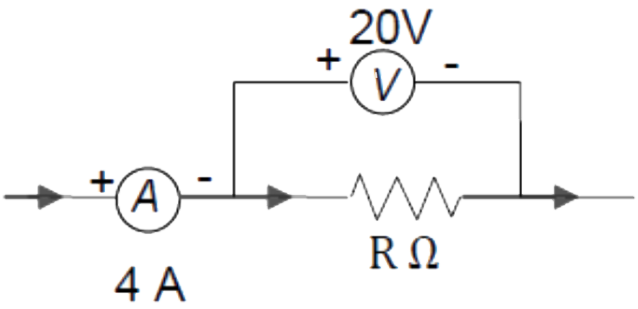
15. A Candidate connects a moving coil ammeter A and a moving coil voltmeter V and a resistance R as shown figure



If the voltmeter reads 20 V and the ammeter reads 4 A , then R is

A. Equal to 5Ω

B. Greater than 5Ω

C. Less than 5Ω

D. Less than 5Ω

Answer: B

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16. A current $I = 10\sin(100\pi t)$ amp. Is passed in first coil, which induces a maximum e.m.f of 5π volt in second coil. The mutual inductance between the coils is-

A. 10 mH

B. 15 mH

C. 25 mH

D. 5 mH

Answer: D

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17. Two uniformly long charged wires with linear densities λ and 3λ are placed along X and Y axis respectively. Determined the slope of electric field at any point on the l ine $y = \sqrt{3}x$

A. $3\sqrt{3}$

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

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

D. $\sqrt{3}$

Answer: C

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18. A simple pendulum of length 1 m is oscillating with an angular frequency $10 rad / s$. The suopport of the down with a small angular frequecy of $1 rad / s$ and an amplitude of $10^{-2} m$. The relative changes in the angular frequency of the pendulum is best given by.

A. $10^{-1} rads^{-1}$

B. $1 rads^{-1}$

C. $10^{-5} rads^{-1}$

D. $10^{-3} rads^{-1}$

Answer: D

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19. Acceleration due to gravity at earth's surface is $10 m^{-2}$ The value of acceleration due to gravity at the surface of a planet of mass $\frac{1}{2}$ th and radius $\frac{1}{2}$ of f the earth is -

A. $5ms^{-2}$

B. $10ms^{-2}$

C. $20ms^{-2}$

D. $40ms^{-2}$

Answer: C

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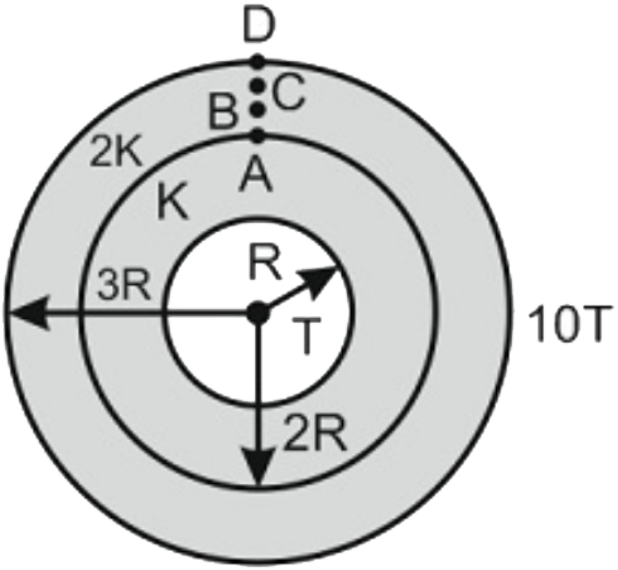
20. A composite spherical shell is made up to two materials having thermal conductivities k and 2k respectively as shown in the diagram .

The temperature at the innermost surface is maintained at T whereas the temperature at the outermost surface is maintained at 10 T . A, B, C and D are four points in the outer material such that AB = BC = CD.



The effective thermal resistance between the

inner surface of the shell and the outer surface of the shell for the radial heat flow is

A. $\frac{1}{8\pi KR}$

B. $\frac{1}{7\pi KR}$

C. $\frac{1}{48\pi KR}$

D. $\frac{1}{49\pi KR}$

Answer: C

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21. In a certain process, 400 cal of heat are supplied to a system and the same time 105 J of mechanical work done on the system . The increase in its internal energy is

A. 20 cal

B. 303 cal

C. 404 cal

D. 425 cal

Answer: D

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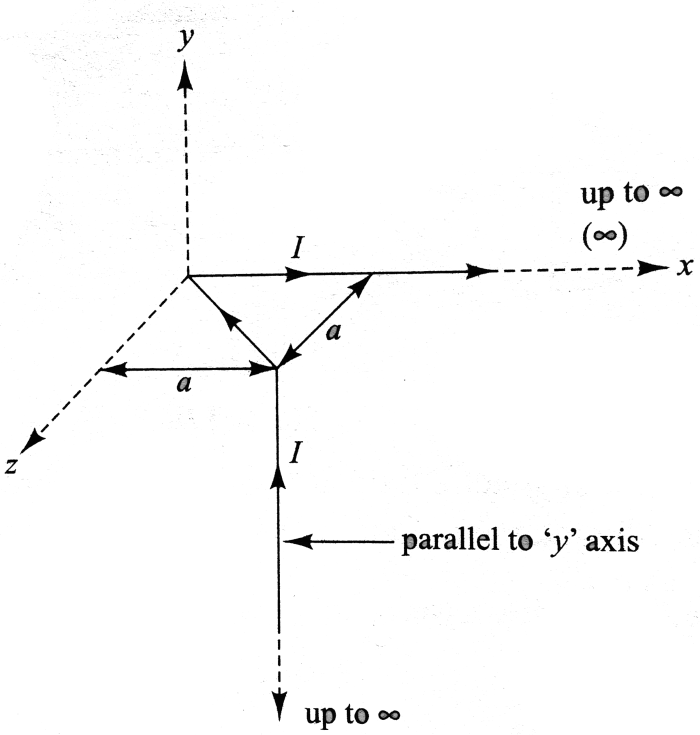
22. The magnetic field at the origin due to the current flowing in the wire is



A. $-\frac{\mu_0 I}{8\pi a}\left(\hat{i}+\hat{k}\right)$

B. $\frac{\mu_0 I}{2\pi a}\left(\hat{i}+\hat{k}\right)$

C. $\frac{\mu_0 I}{8\pi a}\left(-\hat{i}+\hat{k}\right)$

D. $\frac{\mu_{01}}{4\pi a\sqrt{2}}\left(\hat{i}-\hat{k}\right)$

Answer: C

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23. A very broad elevator is going up vertically with a constant acceleration of $2m/s^2$. At the instant when its velocity is $4m/s$ a ball is projected form the floor of the lift with a

speed of $4m/s$ relative to the floor at an elevation of 30°. Time taken by the ball to return the floor is $(g = 10ms^2)$

A. 1/2 s

B. 1/3 s

C. 1/4 s

D. 1 s

Answer: B

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24. A shell of mass 10 kg is moving with a velocity with a velocity of $10ms^{-1}$ when it blasts and forms two parts of mass 9 kg and 1 kg respectively. If the 1st mass is stationary, the velocity of the 2nd is

A. $1ms^{-1}$

B. $10ms^{-1}$

C. $100ms^{-1}$

D. $1000ms^{-1}$

Answer: C

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25. Two lithium nuclei in a lithium vapour at room temperature do not combine to form a carbon nucleus because

A. Carbon nucleus is an unstable particle

B. It is not energetically favorable

C. Nuclei do not come very close due to close due to Coulombic repulsion

D. Lithium nucleus is more tightly bound than a carbon nucleus

Answer: C

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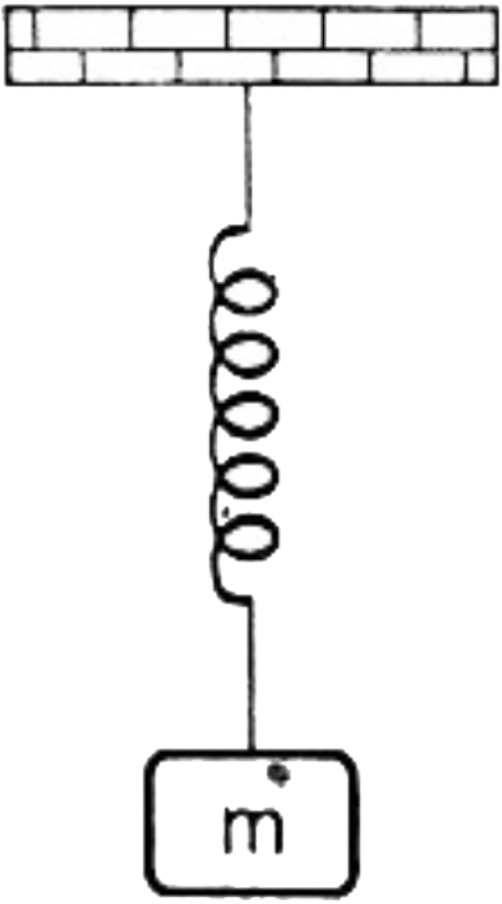
26. A point mass m = 20 kg, is suspended by a massless spring of constant 2000 N/M. The point mass is released when elongation in the spring is 15 cm. The equation of displacement of particle as a function of time is (Take

$g = 10m/s^2$)



A. $y = 10\sin 10t$

B. $y = 10\cos 10t$

C. $y = 10\sin\left(10t + \frac{\pi}{6}\right)$

D. None of these

Answer: C

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27. The radiation corresponding to $3 \to 2$ transition of hydrogen atom falls on a metal surface to produce photoelectrons . These electrons are made to enter circuit a magnetic

field $3 \times 10^{-4} T$ if the ratio of the largest circular path follow by these electron is `10.0 mm , the work function of the metal is close to

A. 1.8 eV

B. 1.1 eV

C. 0.8 eV

D. 1.6 eV

Answer: B

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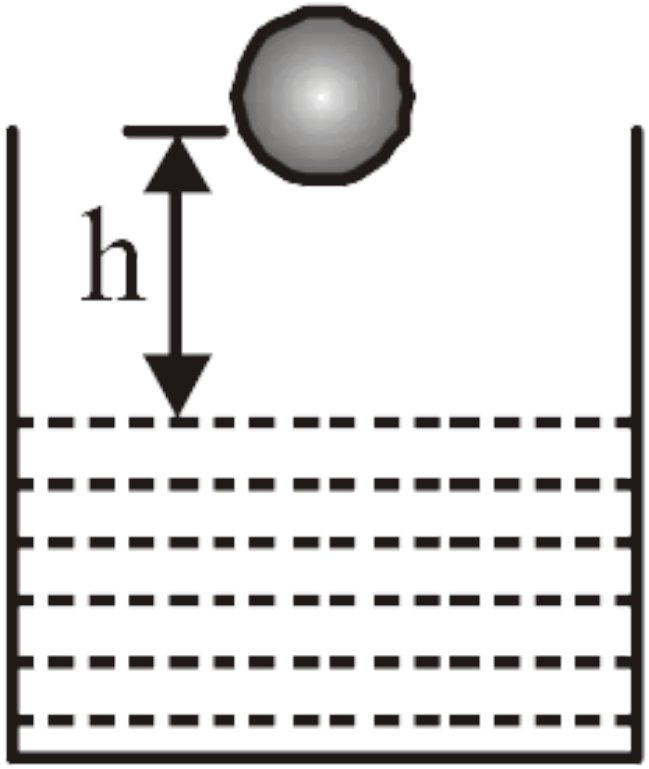
28. A ball of radius r and density r falls freely under gravity through a distance h before entering water. Velocity of ball does not change even on entering water. If viscosity of water is η the value of h is given by



A. $\frac{2}{9}r^2\left(\frac{1-\rho}{\eta}\right)g$

B. $\frac{2}{81}r^2\left(\frac{\rho-1}{\eta}\right)g$

C. $\frac{2}{81}r^4\left(\frac{\rho-1}{\eta}\right)^2 g$

D. $\frac{2}{9}r^4\left(\frac{\rho-1}{\eta}\right)^2 g$

Answer: C

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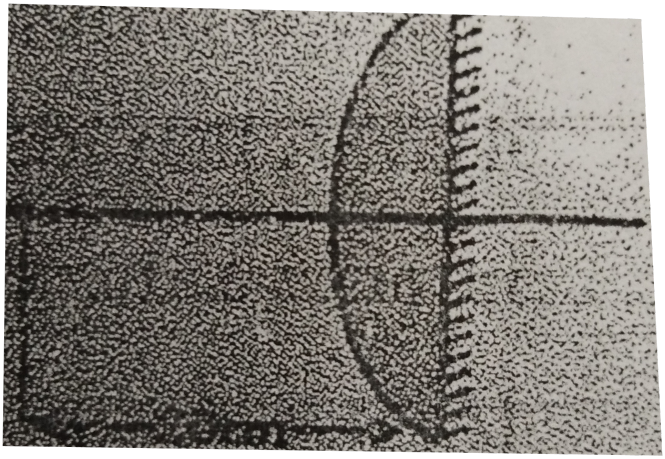
29. A point object is placed at distance of 20 cm from a thin plane - convex lens of focal length 15 cm . The plane surface of the lens is

now silvered . The image created by the system is :-



A. 60 cm to the right of the lens

B. 30 cm to the left of the lens

C. 24 cm to right of the lens

D. 12 cm to the left of the lens

Answer: D

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30. For spheres each of mass M and radius R are placed with their centers on the four corners A,B,C and D of a square of side b. The spheres A and B are hollow and C and D are solids. The moment of inertia of the system about side AD of square is

A. $\frac{8}{3}MR^2 + 2Mb^2$

B. $\frac{8}{5}MR^2 + 2Mb^2$

C. $\frac{32}{15}MR^2 + 2Mb^2$

D. $32Mr^2 + 4Mb^2$

Answer: C

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31. The forbidden energy gap in Ge is 0.72 eV , given $hc = 12440eV\text{Å}$ - The maximum wavelength of radiation that will generate electron hole pair is

A. 172220Å

B. 172.2Å

C. 17222Å

D. 1722Å

Answer: C

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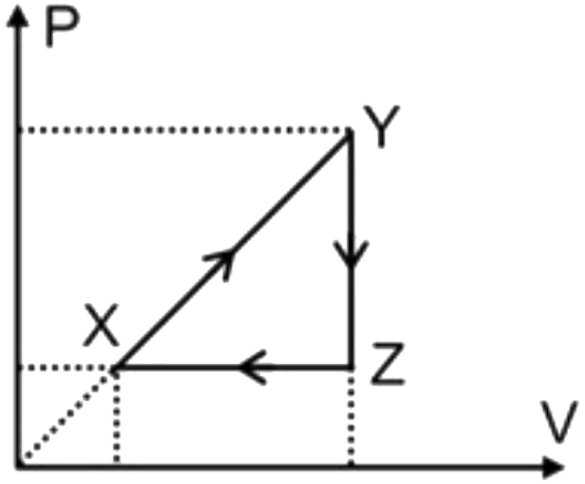
32. In the show indicator diagram over pressure - volume scales 'n' moles of an ideal gas is cycled . If the temperature of the gas in

the state X and Y are respectively T_X and T_Y .

Temperature of the gas in the state Z is the

(All temperature are in absolute scale)



A. Arithmetic mean of T_x and T_y

B. Geometric mean of T_x and T_y

C. Harmonic mean of T_x and T_y

D. None of the above is correct

Answer: B

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33. Dimensional formula of the physical quantity, resistance is

A. $\left[ML^2T^{-3}A^{-2}\right]$

B. $\left[ML^{-1}T^3A^{-1}\right]$

C. $\left[ML^2T^{-2}K^{-1}\right]$

D. $\left[ML^{-2}T^{-3}K^{2}\right]$

Answer: A

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34. In a Young's double slit experiment with light of wavelength λ the separation of slits is d and distance of screen is D such that $D > > d > > \lambda$. If the fringe width is β, the distance from point of maximum intensity to

the point where intensity falls to half of maximum intensity on either side is

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

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

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

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

Answer: A

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35. A stretched string of length L , fixed at both ends can sustain stationary waves of wavelength λ Which of the following value of wavelength is not possible ?

A. 2L

B. 4L

C. L

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

Answer: B

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36. A car weighing $1000kg$ is going up an incline with a slope of 2 in 25 at a steady speed of $18kmph$. If $g = 10ms^{-2}$, the power of its engine is

A. 4 kW

B. 50 kW

C. 625 kW

D. 25 kW

Answer: A

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37. The amount of work done in moving a charge of 5 C across two points having a potential difference of 15 Volts is equal to

A. 0.333 J

B. 3 J

C. 6 J

D. 75 J

Answer: D

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38. 4 Masses 8 kg, 2 kg, 4 kg and 2 kg are placed at the corners A, B, C, D respectively of a square ABCD of diagonal 80 cm. The distance of centre of mass from A will be

A. 20 cm

B. 30 cm to the left of the lens

C. 40 cm

D. 60 cm

Answer: B

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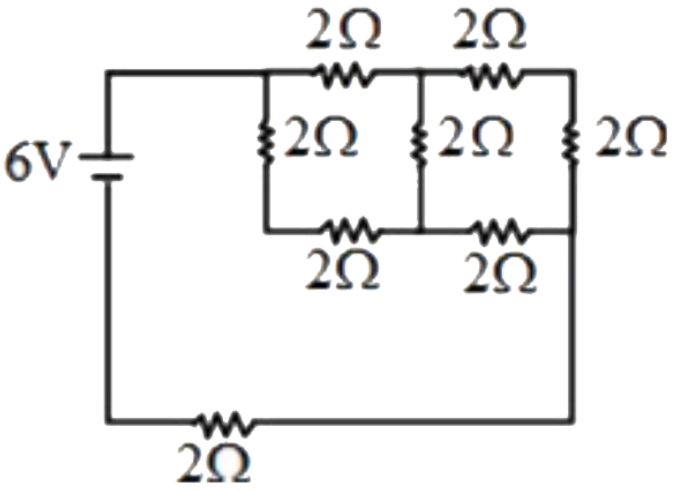
39. What is the current drawn from the battery of 6 V ?



A. 125A

B. 12.5 A

C. 1.25A

D. 2.5 A

Answer: C

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40. Under the influence of a unifrom magnetic field a charged particle is moving on a circle of

radius R with Constnant speed v. The time period of the motion

A. Depends on v and not on R

B. Depends on both R and v

C. Is independent of both R and v

D. Depends on R and not on v

Answer: C

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41. A particle executes simple harmonic motion between $x = -A$ and $x = +A$. The time taken for it to go from $0 \to A/2 is T_1$ and to go from $A/2 \to (A)$ is (T_2). Then.

A. $T_1 < T_2$

B. $T_1 > T_2$

C. $T_1 = T_2$

D. $T_1 = 2T_2$

Answer: A

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42. A proton when accelerated through a potential difference of V volt has a wavelength λ associated with it. An alpha-particle in order to have the same λ must be accelerated through a potential difference of

A. V volt

B. 4V volt

C. 2V volt

D. (V/8) volt

Answer: D

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43. The length of an elastic string is a metre when the longitudinal tension is 4 N and b metre when the longitudinal tension is 5 N. The length of the string in metre when the longitudinal tension is 9 N is

A. 4a - 5b

B. 5b - 4a

C. 9b - 9a

D. a + b

Answer: B

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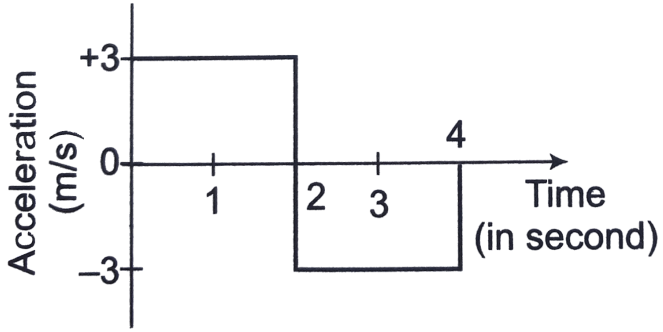
44. A particle starts from rest at t=0 and moves in a straight line with an acceleration as shown below. The velocity of the particle at

t=3 s is



A. $2ms^{-1}$

B. $4ms^{-1}$

C. $6ms^{-1}$

D. $8ms^{-1}$

Answer: B

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45. Which among the following is incorrect ?

A. In meld's experiment p^2T remain constant . (p = loop , T = Tension)

B. In Kundt's experiment distance between two heaps of powder is $\lambda / 2$

C. Quink's tube experiment is related with beats .

D. Echo phenomena are related with reflection of sound.

Answer: C

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