PHYSICS

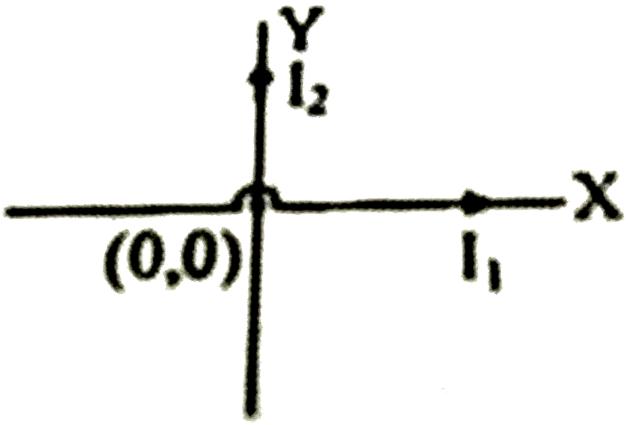
BOOKS - NTA MOCK TESTS

NEET MOCK TEST 2

Physics

1. Two long straight conductors with current I_1 and I_2 are placed along X and Y axes. The equation of locus of points of zero magnetic

induction is :



A. $y = x$

B. $y = \frac{I_2 x}{I_1}$

C. $y = \frac{I_1}{I_2} x$

D. $y = \frac{x}{I_1 I_2}$

Answer: C

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2. The bob of a simple pendulum is a spherical hollow ball filled with water. A plugged hole near the bottom of the oscillating bob gets suddenly unplugged. During observation, till water is coming out, the time period of oscillation would.

A. First increase and then decrease to the original value

B. First decrease and then increase to the original value

C. Remain unchanged

D. Increase towards a saturation value

Answer: A

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3. If n, e, τ and m are representing electron density, electron charge, relaxation time and mass of an electron respectively then the

resistance of wire of length l and cross sectional area A is given by

A. $\frac{ml}{ne^2\tau A}$

B. $\frac{m\tau A}{ne^2 l}$

C. $\frac{ne^2\tau A}{m} \cdot \frac{A}{l}$

D. $\frac{ne^2 m}{\tau} \cdot \frac{l}{A}$

Answer: A

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4. At room temperature copper has free electron density of $8.4 \times 10^{28} perm^3$. The copper conductor has a cross-section of $10^{-6} m^2$ and carries a current of 5.4 A. What is the electron drift velocity in copper?

A. $4ms^{-1}$

B. $0.4ms^{-1}$

C. $4\ \mathrm{cm\ s^{-1}}$

D. $0.4\ \mathrm{mm\ s^{-1}}$

Answer: D

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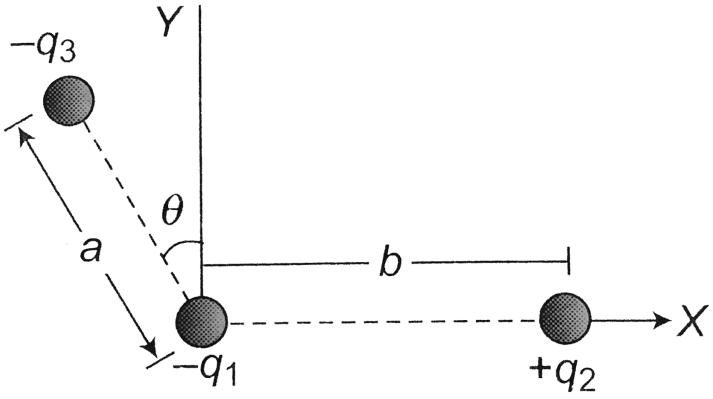
5. Three charges $-q_1, +q_2$ and $-q_3$ are placed as shown in the figure. The x-component of the force on $-q_1$ is proportional to



A. $\frac{q_2}{b^2} - \frac{q_3}{a^2}\cos\theta$

B. $\frac{q_2}{b^2} + \frac{q_3}{a^2}\sin\theta$

C. $\frac{q_2}{b_2} + \frac{q_3}{a^2}\cos\theta$

D. $\frac{q_2}{b^2} - \frac{q_3}{a^2}\sin\theta$

Answer: B

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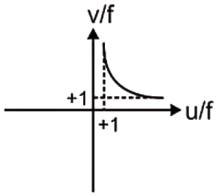
6. A real inverted image in a concave mirror is represented by (u,v, f are corrdinates)

A.



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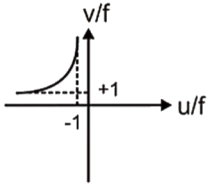
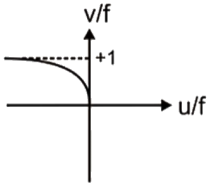
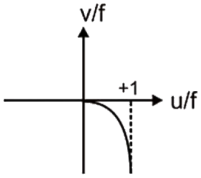


C.



D.



Answer: A

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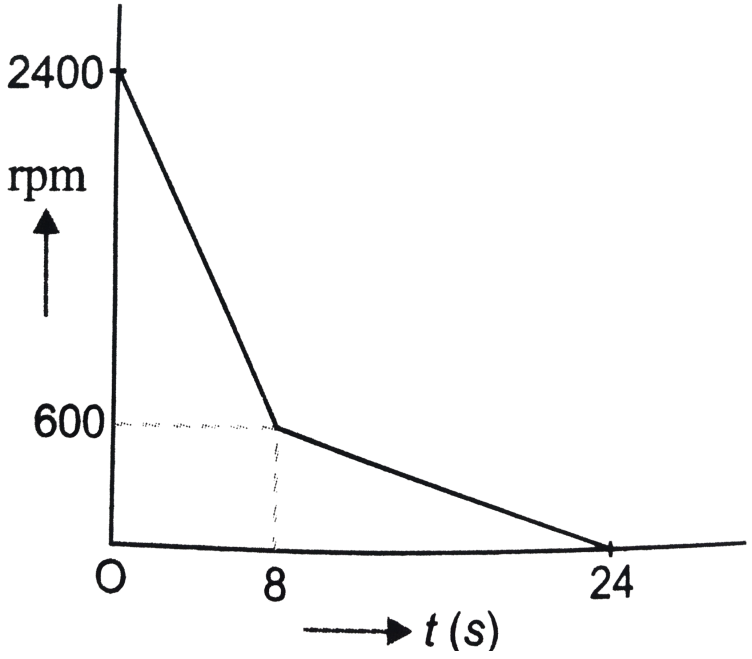
7. A table fan rotating at a speed of 2400 rpm is switched off and the resulting variation of the revolution/minute with time is shown in Fig. The total number of revolutions of the fan before it comes to rest is



A. 420

B. 280

C. 240

D. 380

Answer: B

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8. A ball rolls of the top of a stairway with horizontal velocity of magnitude $1.8ms^{-1}$. The steps are $0.20m$ high and $0.02m$ wide ,

Which step will the ball hit first ? ($g = 10m/s^2$).

A. First

B. Second

C. Third

D. Fourth

Answer: D

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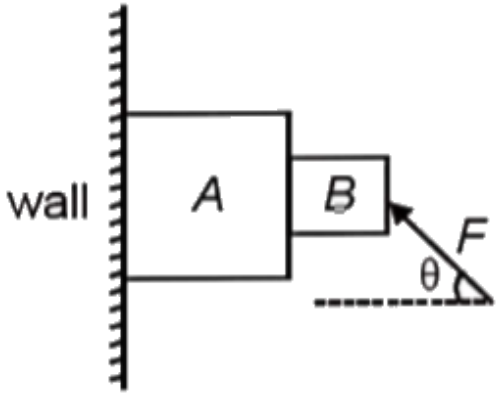
9. Consider the situation shown in the figure. The wall is smooth but the surface of blocks A and B in contact are rough. The friction of B due to A in equilibrium



A. Is upward

B. Is downward

C. Is zero

D. The system cannot remain in equilibrium for any value of F

Answer: B

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10. The electromagnetic waves travel in free space with the velocity of

A. sound

B. Light

C. Greater than that of light

D. Greater than that of sound

Answer: B

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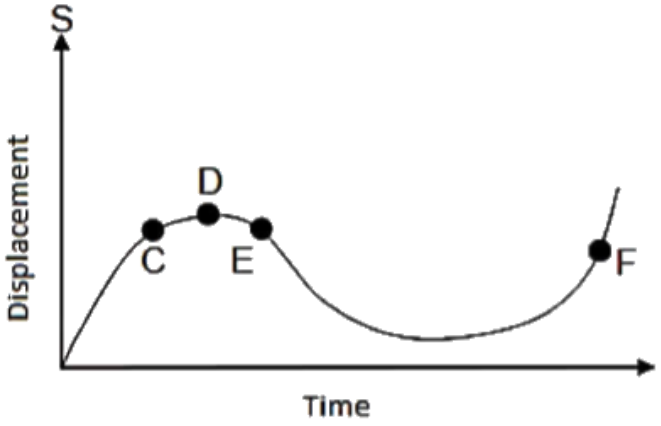
11. The displacement time graph of a moving particle is shown below



The instantaneous velocity of the particle is negative at the point

A. C

B. E

C. D

D. F

Answer: B

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12. A stone is thrown at $25m/s$ at 53° above the horizontal. At what time its velocity is at 45° below the horizontal?

A. 0.5s

B. 4s

C. 3.5s

D. 2.5s

Answer: C

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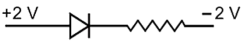
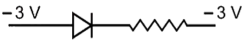
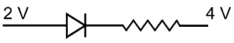
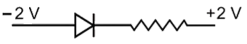
13. The forward biased diode connection among the following is

A. 

B. 

C. 

D. 

Answer: A

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14. The length l , breadth b, and thickness t of a block of wood were measured with the help of a measuring scale. The results with permissible errors (in cm) are

$l = 15.12 \pm 0.01, b = 10.15 \pm 0.01$, and $t = 5.28 \pm 0.01.$

The percentage error in volume up to proper significant figures is

A. $0.64\ \%$

B. $0.26\ \%$

C. $0.35\ \%$

D. $0.48\ \%$

Answer: C

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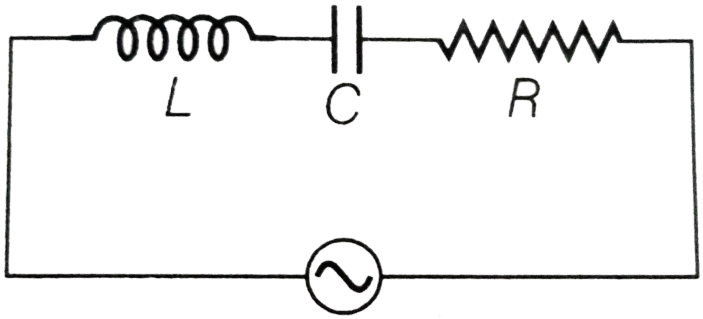
15. A $100V$, AC source of frequency of $500Hz$ is connected to an L-C-R circuit with $L = 8.1mH, C = 12.5\mu F, R = 10\Omega$ all

connected in series as shown in figure. What is the quality factor of circuit?



A. 2.02

B. 2.54

C. 50.54

D. 200.54

Answer: B

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16. Assertion (A) : The film which appears bright in reflected system will appear dark in the transmitted system and vice-versa.

Reason (R) : The conditions for film to appear bright or dark in the reflected light are just reverse to those in the transmitted light

A. (A) is true and (R) is true and (R) is the correct explanation of (A).

B. (A) and (R) are true but (R) is not the correct explanation of (A)

C. (A) is true, (R) is false

D. (A) is false, (R) is true

Answer: A

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17. Two particles A and B execute simple harmonic motions of period T and $5T/4$. They start from mean position. The phase

difference between them when the particle A complete an oscillation will be

A. $\pi/2$

B. Zero

C. $2\pi/5$

D. $\pi/4$

Answer: C

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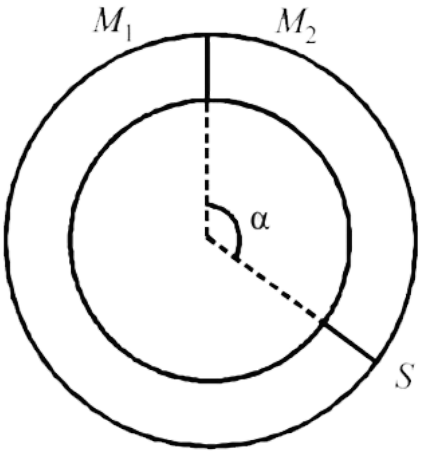
18. A ring shaped tube contain two ideal gases with equal masses and relative molar masses $M_1 = 32$ and $M_2 = 28$.

The gases are separated by one fixed partition and another movable stopper S which can move freely without friction inside the ring. The angle α as shown in the figure is .....

degrees.



A. 182°

B. 170°

C. 192°

D. 180°

Answer: C

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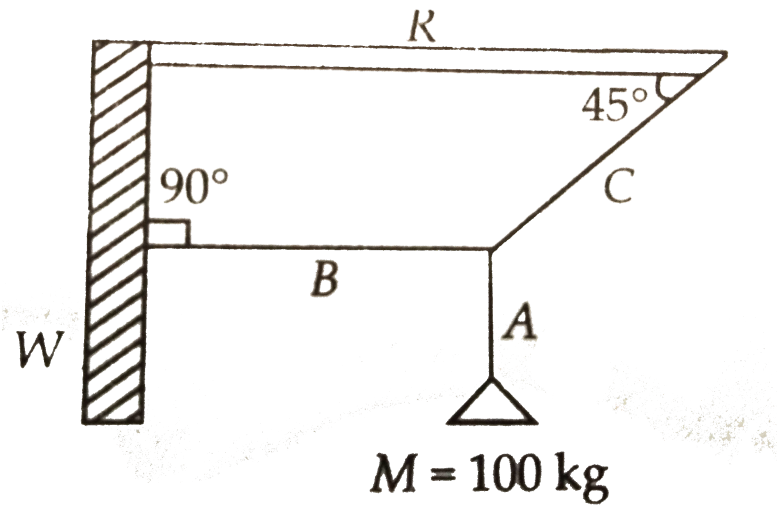
19. A mass M of 100 kg is suspended with the use of strings A, B and C as shown in the figure, where W is the vertical wall and R is a rigid horizontal rod. The tension in the string B is



A. 100 gN

B. Zero

C. $100\sqrt{2}gN$

D. $\frac{100}{\sqrt{2}}gN$

Answer: A

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20. An inverted bell lying at the bottom of a lake $47.6m$ deep has $50cm^3$ of air trapped in it. The bell is brought to the surface of the

lake. The volume of the trapped air will be (atmospheric pressure $= 70cm$ of Hg and density of $Hg = 13.6g/cm^3$).

A. $350cm^3$

B. $300cm^3$

C. $250cm^3$

D. $22cm^3$

Answer: B

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21. In the experiment to determine the focal length of a concave mirror by graphical methods the u - v graph is

A. A straight line

B. A circle

C. An ellipse

D. None of these

Answer: D

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22. A polarized light of intensity I_0 is passed through another polarizer whose pass axis makes an angle of 60° with the pass axis of the former, What is the intensity of emergent polarized light from second polarizer?

A. $I = I_0$

B. $I = \frac{I_0}{6}$

C. $I = \frac{I_0}{5}$

D. $\frac{I_0}{4}$

Answer: D

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23. Electromagnetic waves propagate in the direction parallel to the vector

A. $\overrightarrow{E}$

B. $\overrightarrow{B}$

C. $\overrightarrow{E} \times \overrightarrow{B}$

D. $\overrightarrow{B} \times \overrightarrow{E}$

Answer: C

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24. A point object O is placed at a distance of 0.3 m from a convex lens of focal length 0.2 m. It is then cut into two halves each of which is displaced by 0.0005 m as shown in figure.

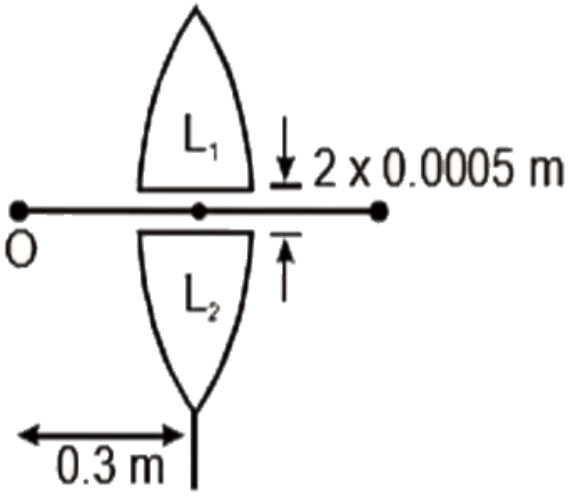

image will be formed from the lens at a distance of

A. 30 cm

B. 40 cm

C. 50 cm

D. 60 cm

Answer: D

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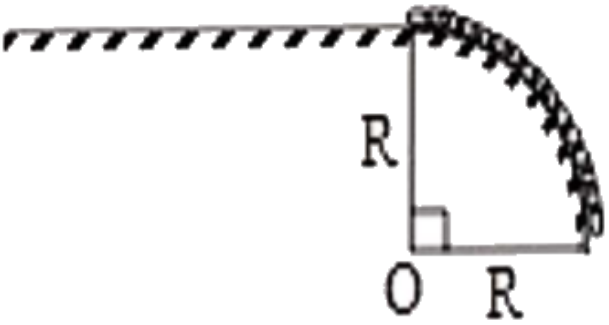
25. A chain of length $l < \frac{\pi R}{2}$ is placed on a smooth surface whose some part is horizontal and some part is on quarter circular of radius R in the vertical plane as shown. Initially the whole part of chain lies in the circular part with one end at topmost point of circular surface. If the mass of chain is m, then work required to pull very slowly the whole chain on

horizontal part is -



A. $\frac{m}{l}gR^2\left[\sin\left(\frac{l}{R}\right)\right]$

B. $\frac{m}{l}gR^2\left[\cos\left(\frac{l}{R}\right)\right]$

C. $\frac{m}{l}gR^2\left[\left(\frac{l}{R}\right)-\sin\left(\frac{l}{R}\right)\right]$

D. $\frac{m}{l}gR^2\left[\left(\frac{l}{R}\right)-\cos\left(\frac{l}{R}\right)\right]$

Answer: C

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26. The radii of two planets are respectively R_1 and R_2 and their densities are respectively ρ_1 and ρ_2.The ratio of the accelerations due to gravity at their surface is

A. $g_1 : g_2 = \frac{\rho_1}{R_1^2} : \frac{\rho_2}{R_2^2}$

B. $g_1 : g_2 = R_1 R_2 : \rho_1 \rho_2$

C. $g_1 : g_2 = R_1 \rho_2 : R_2 \rho_1$

D. $g_1 : g_2 = R_1 \rho_1 : R_2 \rho_2$

Answer: D

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27. The efficiency of a Carnot engine working between 800 K and 500 K is -

A. 0.45

B. 0.625

C. 0.375

D. 0.5

Answer: B

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28. In a resonance pipe the first and second resonance are obtained at depths 22.7 cm and 70.2 respectively. What will be the end correction?

A. 1.05 cm

B. 115.5 cm

C. 92.5 cm

D. 113.5 cm

Answer: A

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29. In an excited state of hydrogen like atom an electron has total energy of $-3.4eV$. If the kinetic energy of the electron is E and its de-Broglie wavelength is λ, then

A. $E = 6.8eV, \lambda = 6.6 \times 10^{-10}m$

B. $3.4eV, \lambda = 6.6 \times 10^{-10}m$

C. $E = 3.4eV, \lambda = 6.6 \times 10^{-11}m$

D. $E = 6.8eV, \lambda = 6.6 \times 10^{-11}m$

Answer: C

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30. What is the dimensional formula of $\frac{1}{\mu_0 \varepsilon_0}$ where the symbols have their usual meanings?

A. $M^0 L^2 T^{-2}$

B. $M^0L^{-2}T^{-2}$

C. $M^0L^{-2}T^{-2}$

D. $M^0L^1T^{-2}$

Answer: A

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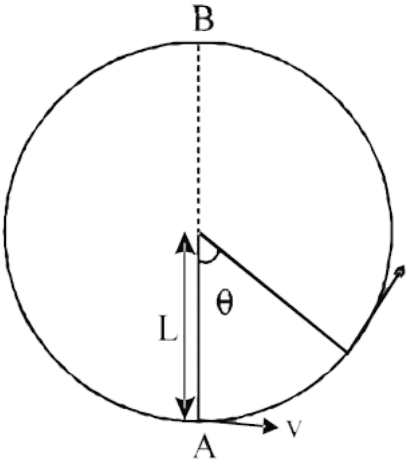
31. A bob of mass M is suspended by a massless string of length L. The horizontal velocity v at position A is just sufficient to make it reach the point B. The angle θ at which

the speed of the bob is half of that at A, satisfies



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

B. $\frac{\pi}{4} < \theta < \frac{\pi}{2}$

C. $\frac{\pi}{2} < \theta < \frac{3\pi}{4}$

D. $\frac{3\pi}{4} < \theta < \pi$

Answer: C

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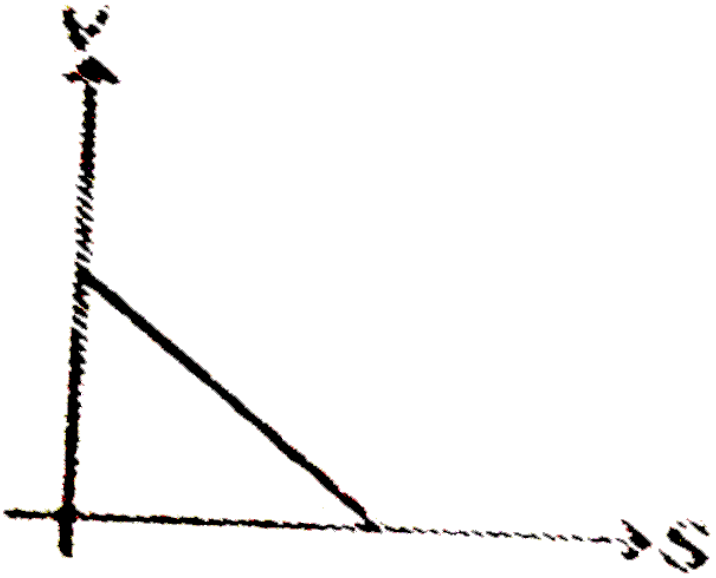
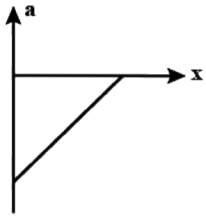
32. Velocity displacement graph of a particle moving in a straight line is as shown in figure.



A.



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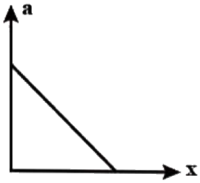
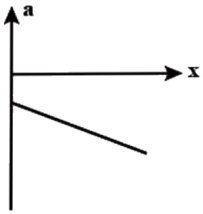
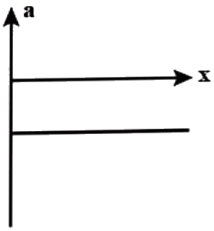


C.



D.



Answer: A

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33. A drum of radius R and mass M rolls down without slipping along an inclined plane of angle θ. The frictional force

A. Converts translational energy to rotational energy

B. Dissipates energy as heat

C. Decreases the rotational motion

D. Decreases the rotational and translational motion

Answer: A

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34. A sample of $.^{18}F$ is used internally as a medical diagnostic tool to look for the effects of the positron decay $\left(T_{1/2} = 110 \text{ min}\right)$. How long does it take for $99\,\%$ of the $.^{18}F$ to decay?

A. 12.4 h

B. `12.0 h

C. 12.2 h

D. 12.5 h

Answer: C

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35. If the mass of neutron is $1.7 \times 10^{-27} kg$, then the de Broglie wavelength of neutron of energy 3eV is $\left(h = 6.6 \times 10^{-34} J.\ s\right)$

A. $1.6 \times 10^{-16} m$

B. $1.6 \times 10^{-11} m$

C. $1.4 \times 10^{-10} m$

D. $1.4 \times 10^{-11} m$

Answer: B

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36. A magnetic needle free to rotate in a vertical plane parallel to the magnetic meridian has its north tip pointing down at 22° with the horizontal. The horizontal

component of the earth's magnetic field at the place is known to be $0 \cdot 35G$. Determine the strength of the earth's magnetic field at the place.

A. 0.38 G

B. 0.35 G

C. 0.30 G

D. 0.40 G

Answer: A

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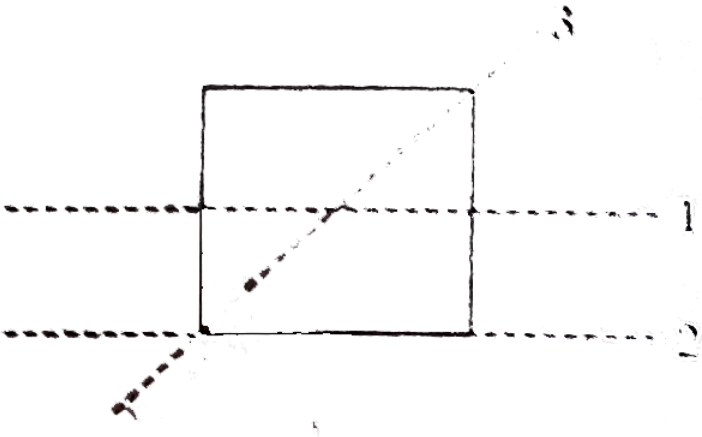
37. Four rods of equal length l and mass m each forms a square as shown in figure

Moment of inertia about three axes 1,2 and 3 are say I_1, I_2 and I_3. Then, match the following columns



Column-I		Column-II	
(A)	I_1	(p)	$\frac{4}{3}ml^2$
(B)	I_2	(q)	$\frac{2}{3}ml^2$
(C)	I_3	(r)	$\frac{1}{2}ml^2$
		(s)	None

A. (A)-Q, (B)-S, (C)-Q

B. (A)-S, (B)-Q, (C)-Q

C. (A)-Q, (B)-Q, (C)-S

D. (A)-R, (B)-Q, (C)-S

Answer: A

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38. A room at $20^{\circ}C$ is heated by a heater of resistance 20 ohm connected to 200 V mains. The temperature is uniform throughout the room and the heat is transmitted through a glass window of area $1m^2$ and thickness 0.2 cm. Calculate the temperature outside. Thermal conductivity of glass is $0.2cal/mC^{\circ}s$ and mechanical equivalent of heat is $4.2J/cal$.

A. $13.69^{\circ} C$

B. $15.24^{\circ} C$

C. $17.85^{\circ} C$

D. $19.96^{\circ} C$

Answer: B

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39. A gas mixture consists of 2 moles of oxygen and 4 moles of argon at temperature

T. Neglecting all vibrational modes, the total internal energy of the system is

A. 4 RT

B. 15 RT

C. 9 RT

D. 11 RT

Answer: D

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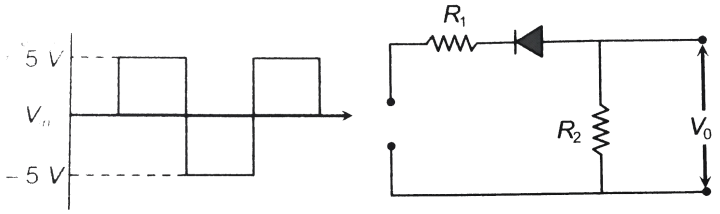
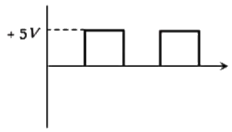
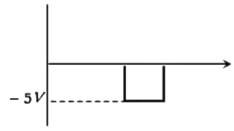
40. A waveform shown when applied to the following circuit will produce which of the following output waveform? [Assuming ideal diode configuration and $R_1 = R_2$]



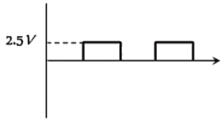
A.

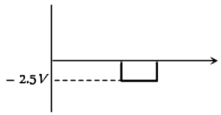


B.



C.



D. 

Answer: D

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41. The maximum energy in thermal radiation from a source occurs at the wavelength 4000Å. The effective temperature of the source

A. 7325K

B. 800K

C. $10^4 K$

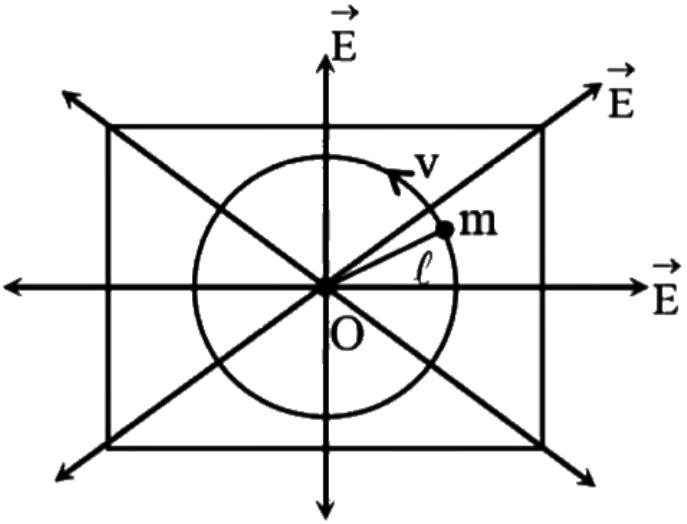
D. $10^6 K$

Answer: A

Watch Video Solution

42. A bob of mass m is tied with a thread and is made to move in a circular path on a frictionless table surface about point 'O' as shown in diagram. A hypothetical electric field

in radial direction exists along the table surface. In this condition the bob is uncharged and tension in the thread is T. If bob is given some charge-



A. Tension is thread must increase

B. Tension in thread may increase or decrease

C. Tension in thread will remain unchanged

D. Tension in thread must decrease

Answer: B

Watch Video Solution

43. An accurate pendulum clock is mounted on ground floor of a high building. How much time will it lose or gain in one day if its is

transferred to top storey of a building which is h = 200m higher than the ground floor? Radius of earth is $6.4 \times 10^6 m$

A. It will lose 6.2 s

B. It will lose 2.7 s

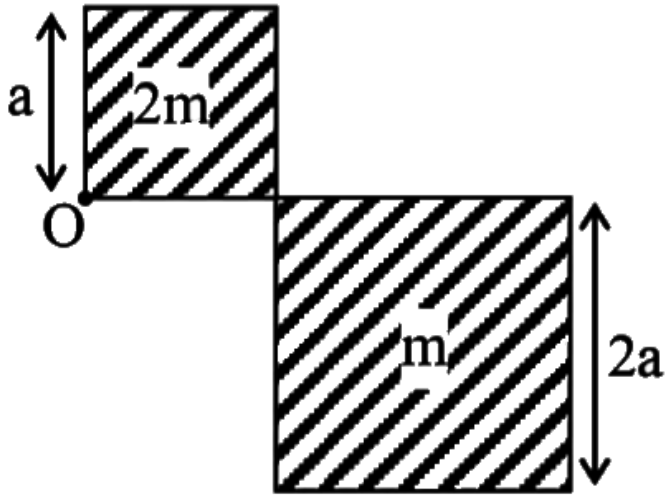
C. It will gain 5.2 s

D. It will gain 1.6 s

Answer: B

Watch Video Solution

44. The distance of centre of mass from point O of two square plates system, as shown,(if masses of plates are 2m and m and their edges are 'a' and '2a' respectively) is



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

B. a

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

D. $\frac{2a}{3}$

Answer: B

Watch Video Solution

45. The firld of view is maximum for

A. plane mirror

B. concave mirror

C. convex mirror

D. cylindrical power

Answer: C

Watch Video Solution

46. An electric dipole of length 2 cm is placed with its axis making an angle of 60° to a uniform electric field of $10^5 NC^{-1}$ if its experiences a torque is $8\sqrt{3}$Nm, calculate the

(i). Magnitude of the charge on the dipole and

(ii). potential energy of the dipole.

A. $-10J$

B. $-20J$

C. $-30J$

D. $-40J$

Answer: C

Watch Video Solution

47. A proton and an electron are released from an infinite distance apart and they get attracted towars each other. Which of the

following statement about their kinetic energy is true?

A. Kinetic energy of electron is more than that of proton

B. Kinetic energy of electron is less than that of proton

C. Kinetic energy of electron = kinetic energy of proton

D. None of the above is true as it depends on the distance between the particles

Answer: A

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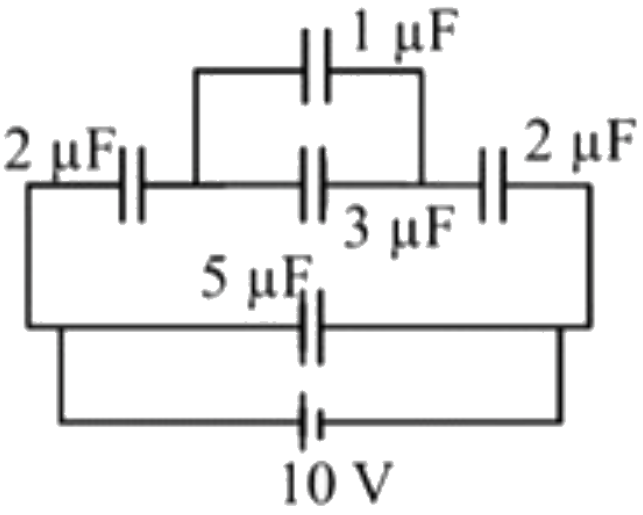
48. The ratio of potential differences between $1\mu F$ and $5\mu F$ capacitors is



A. $1:2$

B. $3:1$

C. $1:5$

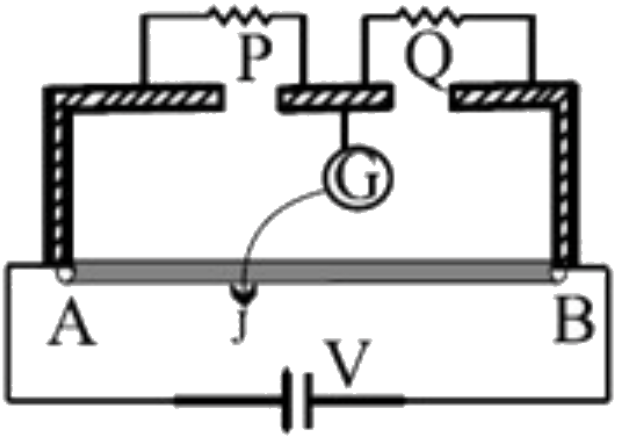
D. $10:1$

Answer: C

Watch Video Solution

49. In a meter bridge circuit as shown in the figure, the bridge is balanced when $AJ = 20$ cm. On interchanging P and Q the balance

length shifts by



A. zero

B. 80 cm

C. 40 cm

D. 60 cm

Answer: D

Watch Video Solution

50. The ratio of the resistances of a conductor at a temperature of $15^\circ C$ to its resistance at a temperature of $37.5^\circ C$ is $4:5$. The temperature coefficient of resistance of the conductor is

A. $\frac{1}{25}.^\circ C^{-1}$

B. $\frac{1}{50}.^\circ C^{-1}$

C. $\frac{1}{80}.^{\circ} C^{-1}$

D. $\frac{1}{75}.^{\circ} C^{-1}$

Answer: D

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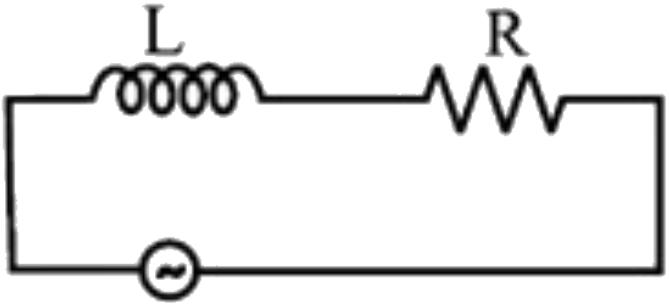
51. When a material is inserted inside the inductor the current in the circuit increases,

then the nature of the material is



A. ferromagnetic

B. paramagnetic

C. diamagnetic

D. all of the above

Answer: C

Watch Video Solution

52. A flux of $10^{-3}Wb$ passes through a strip having an area $A = 0.02m^2$. The plane of the strip is at an angle of 60° to be direction of a uniform field B. The value of B is

A. 0.1 T

B. 0.058 T

C. 4.0 mT

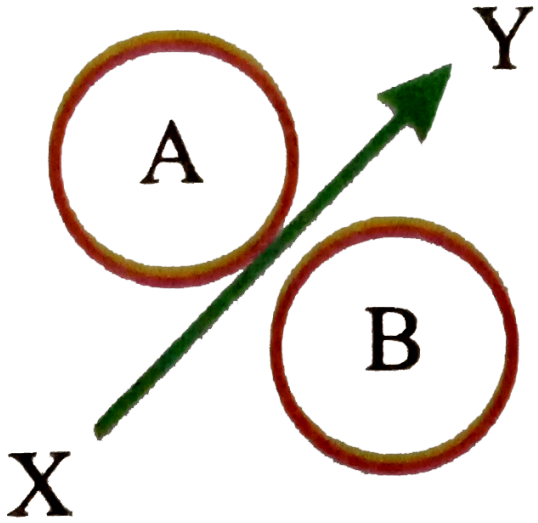
D. none of the above.

Answer: B

Watch Video Solution

53. Consider the situation shown in the figure. If the current I in the long straight conducting wire XY is increased at a steady rate then the induced $e.m.f.$'s in loop A and

B will be



A. clockwise in A, anticlockwise in B

B. anticlockwise in A, clockwise in B

C. clockwise in both A and B

D. anticlockwise in both A and B

Answer: A

 Watch Video Solution

54. Magnetic susceptibility of a diamagnetic substances

A. decreases with temperature

B. is not affected by temperature

C. increases with temperature

D. first increases, then decreases with temperature

Answer: B

55. De Broglie wavelength of 0.05 eV thermal neutron is

A. 1.3Å

B. 2Å

C. 5.4Å

D. 8Å

Answer: A

 Watch Video Solution

56. The maximum velocity of electrons emitted from a metal surface is v when the frequecny of light falling on it is f. The maximum velocity when the frequency becomes 4f is

A. 2v

B. $> 2v$

C. $< 2v$

D. between 2v and 4v

Answer: B

Watch Video Solution

57. Choose the WROMG statement.

A. The nuclear force becomes weak if the nucleus contains too many protons compared to the number of neutrons

B. The nuclear force becomes weak if the nucleus contains too many neutrons compared to the number of protons

C. Nuclei with atomic number greater than 82 show a tendency to disintegrate

D. The nuclear force becomes very strong if the nucleus contains a large number of

nucleons

Answer: D

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58. Number of nuclei of a radioactive substance are 1000 and 900 at times $t = 0$ and time $t = 2s$. Then, number of nuclei at time $t = 4s$ will be

A. 800

B. 810

C. 790

D. 700

Answer: B

 Watch Video Solution

59. Which of the following has maximum specific heat?

A. Water

B. Alcohol

C. Glycerine

D. Oil

Answer: A

 Watch Video Solution

60. When p calories of heat is given to a body, it absorbs q calories, then the absorbtion power of body will be :-

A. $\frac{p}{q}$

B. $\frac{q}{p}$

C. $\frac{p^2}{q^2}$

D. $\frac{p^2}{p^2}$

Answer: B

Watch Video Solution

61. One likes to sit under sunshine in winter seasons, because

A. we get heat from the sun by conduction

B. we get heat from the sun by convection

C. we get heat from the sun by radiation

D. none of the above

Answer: C

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62. A piece of glass is heated to a high temperature and then allowed to cool. If it

cracks, a probable reason for this is the following property of glass

A. low thermal conductivity of glass

B. high thermal conductivity of glass

C. high specific heat of glass

D. high melting point ot glass

Answer: A

Watch Video Solution

63. The velocity of kerosene oil in a horizontal pipe is $5m/s$. If $g = 10m/s^2$ then the velocity head of oil wlill be

A. 1.25 m

B. 12.5 m

C. 0.125 m

D. 125 m

Answer: A

Watch Video Solution

64. A force of 100 dynes acts on mass of 5 gm for 10 sec . The velocity produced is

A. $2cms^{-1}$

B. $20cms^{-1}$

C. $200cms^{-1}$

D. $2000cms^{-1}$

Answer: C

Watch Video Solution

65. if temperature of an object is $140^\circ F$, then its temperature in centigrade is

A. $105^\circ C$

B. $32^\circ C$

C. $140^\circ C$

D. $60^\circ C$

Answer: D

Watch Video Solution

66. If specific heat of a substance is infinite, it means

A. heat is given out

B. heat is taken in

C. no change in temperature takes place whether heat is taken in or given out

D. all of the above

Answer: C

 Watch Video Solution

67. A tuning fork sounded together with a tuning fork of frequency 256 emits two beats. On loading the tuning fork of frequency 256, the number of beats heard are 1 per second. The frequency of tuning fork is

A. 257

B. 258

C. 256

D. 254

Answer: D

 Watch Video Solution

68. If the phase difference between the two wave is 2π during superposition, then the resultant amplitude is

A. maximum

B. minimum

C. maximum or minimum

D. none of the above

Answer: A

Watch Video Solution

69. When a sound wave of frequency 300 Hz passes through a medium the maximum displacement of a particle of the medium is 0.1 cm . The maximum velocity of the particle is equal to

A. $60\pi cms^{-1}$

B. $30\pi cms^{-1}$

C. $30cms^{-1}$

D. $60cms^{-1}$

Answer: A

Watch Video Solution

70. A particle excuting $S.H.M.$ of amplitude $4cm$and $T=4$ sec .The time take by it to move position extreme position to half the amplitude is

A. 1s

B. $\frac{1}{3}s$

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

D. $\sqrt{\frac{3}{2}}s$

Answer: C

Watch Video Solution

71. The thermal conductivity of a material in CGS system is 0.4. In steady state, the rate of

flow of heat 10 cal/sec-cm, then the thermal gradient will be

A. $10^{\circ} Ccm^{-1}$

B. $12^{\circ} Ccm^{-1}$

C. $25^{\circ} Ccm^{-1}$

D. $20^{\circ} Ccm^{-1}$

Answer: C

Watch Video Solution

72. If 150 J of heat is added to a system and the work done by the system is 110 j. then change in internal energy wil be

A. 260 J

B. 150 J

C. 110 J

D. 40 J

Answer: D

 Watch Video Solution

73. The volume of a gas at $20^\circ C$ is 200 ml. If the temperature is reduced to $-20^\circ C$ at constant pressure, its volume will be :-

A. 172.6 ml

B. 17.26 ml

C. 192.7 ml

D. 19.27 ml

Answer: A

Watch Video Solution

74. The apparent coefficient of expansion of liquid, when heated in a copper vessel is C and when heated in a silver vessel is S. If A is the linear coefficient of expansion of Copper, linear expansion coefficient of silver is

A. $\frac{C+S-3A}{3}$

B. $\frac{C+3A-S}{3}$

C. $\frac{S+3A-C}{3}$

D. $\frac{C+S+3A}{3}$

Answer: B

Watch Video Solution

75. In the glass capillary tube, the shape of the surface of the liquid depends upon

A. only on the cohesive force of liquid molecules

B. only on the abhesive force between the molecules of glass and liquid

C. only on relative cohesive and adhesive force between the atoms

D. neither on cohesive nor on adhesive force

Answer: C

Watch Video Solution

76. A beam of metal supported at the two edges is loaded at the centre. The depression at the centre is proportional to

A. Y^2

B. Y

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

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

Answer: C

Watch Video Solution

77. If the earth stops rotating, the value of ‘ g ’ at the equator will

A. increase

B. remain same

C. decrease

D. none of the above

Answer: A

Watch Video Solution

78. A force $\vec{F} = \left(5\hat{i} + 3\hat{j}\right)N$ is applied over a particle which displaces it from its original position to the point $\vec{s} = S\left(2\hat{i} - 1\hat{j}\right)m$. The work done on the particle is

A. $-7J$

B. $+13J$

C. $+7J$

D. $+11J$

Answer: C

Watch Video Solution

79. On account of the earth rotating about its axis

A. the linear velocity of objects at equator is greater than at other places

B. the angular velocity of objects at equator is more than that of objects at poles

C. the linear velocity of objects at all places at the earth is equal, but angular velocity is different

D. at all places the angular velocity and linear velocity are uniform

Answer: A

Watch Video Solution

80. A particle A suffers an oblique elastic collision particle B that is at rest initially. If their masses with a are the same, then after the collision

A. they will move in opposite directions

B. A continues to move in the original direction while B remains at rest

C. they will move in mutually perpendicular directions

D. A comes to rest and B starts moving in the direction of the original motion of A

Answer: C

Watch Video Solution

81. A circular disc A of radius r is made from an iron plate of thickness t and another circular disc B of radius 4r is made from an iron plate

of thickness $t/4$. The relation between the moments of inertia I_A and I_B is (about an axis passing through centre and perpendicular to the disc)

A. $I_A > I_B$

B. $I_A = I_B$

C. $I_A < I_B$

D. depends on the actual values of t and r.

Answer: C

Watch Video Solution

82. If one sphere collides head - on with another sphere of the same mass at rest inelastically. The ratio of their speeds $\left(\frac{v_2}{v_1}\right)$ after collision shall be

A. $\frac{(1-e)}{(1+e)}$

B. $\frac{2e}{(1+e)}$

C. $\frac{(1+e)}{(1-e)}$

D. e

Answer: C

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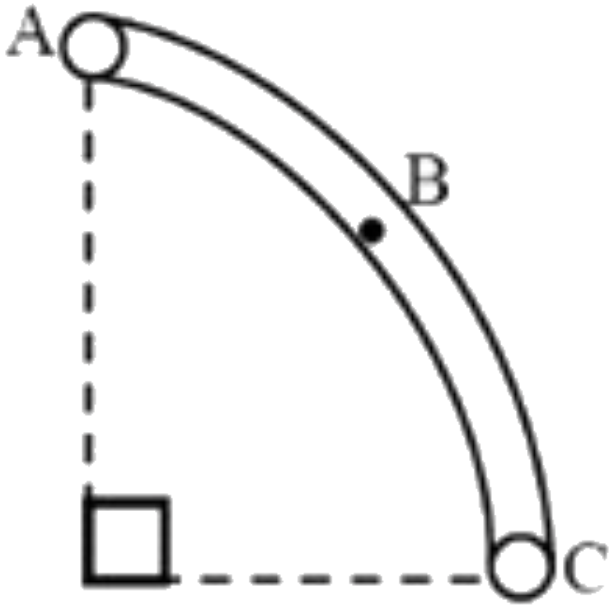
83. The tube AC forms a quarter circule in a vertical plane. The ball B has an area of cross - section slightly smaller than that of the tube and can move without friction through it. B is

placed at A and displaced slightly. It will



A. always be in contact with the inner wall of the tube

B. always be in contact with the outer wall of the tube

C. initially be in contact with the inner wall and later with the outer wall

D. initially be in contact with the outer wall and later with the inner wall

Answer: C

Watch Video Solution

84. Two substance of same size are made of same material but one is hollow and the other

is solid. They are heated to same temperature, then

A. both will expand equally

B. hollow sphere will expand more

C. solid sphere will expand more

D. the relative expansion of solid and hollow sphere depends on the material of sphere

Answer: A

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85. A TV tower has a height of 100 m. How much population is covered by the TV broadcast if the average population density around this tower is $1000km^{-2}$? Given, radius of the earth $= 6.37 \times 10^6$ m.

A. 2×10^6

B. 4×10^6

C. 3×10^8

D. 9×10^4

Answer: B

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86. A horizontal wid is blowing with a velocity v towards north-east. A man starts running towards north with acceleration a. The after which man will feel the wind blowing towards east is

A. $\frac{v}{a}$

B. $\frac{\sqrt{2}v}{a}$

C. $\frac{v}{\sqrt{2}a}$

D. $\frac{2v}{a}$

Answer: C

Watch Video Solution

87. At time t second, a particle of mass 3 kg has position vector r metre, where $r = 3t\hat{i} - 4\cos t\hat{j}$. Find the impulse of the force during the time interval $0 \leq t \leq \frac{\pi}{2}$

A. $12\hat{j}Ns$

B. $9\hat{j}Ns$

C. $4\hat{j}Ns$

D. $14\hat{j}Ns$

Answer: A

Watch Video Solution

88. IF an electron enters into a space between the plates of a parallel plate capacitor at an an angle α with the plates an leaves at an angle

β to the plates find the ratio of its kinetic energy while entering the capacitor of that while leaving.

A. $\left(\frac{\sin\beta}{\sin\alpha}\right)^2$

B. $\left(\frac{\cos\beta}{\cos\alpha}\right)^2$

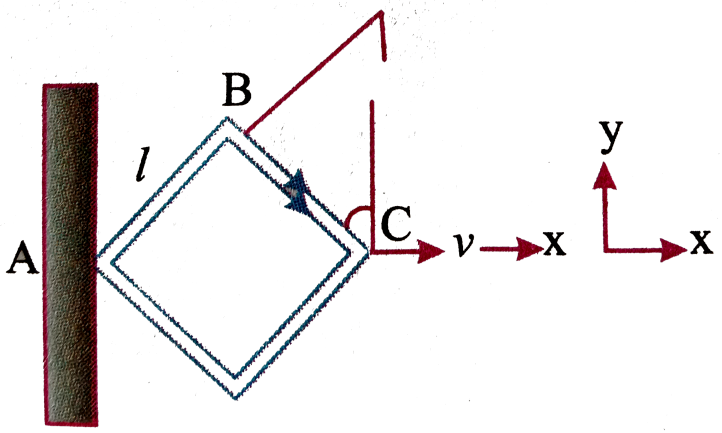
C. $\left(\frac{\cos\alpha}{\cos\beta}\right)^2$

D. $\left(\frac{\sin\alpha}{\sin\beta}\right)^2$

Answer: B

Watch Video Solution

89. Four rods of side length l have been hinged to form a rhombus. Vertex A is fixed to a rigid support, vertex C is being moved along the x-axis with constant velocity V as shown in figure. The rate at which vertex B is nearing the x-axis at the moment the rhombus is in the form of a squarem is



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

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

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

D. $\frac{v}{\sqrt{2}}$

Answer: C

Watch Video Solution

90. The angular velocity of a body is $\overrightarrow{\omega} = 2\hat{i} + 3\hat{j} + 4\hat{k}$ and a torque $\overrightarrow{\tau} = \hat{i} + 2\hat{j} + 3\hat{k}$ acts on it. The rotational power will be

A. 20 W

B. 15 W

C. $\sqrt{17}W$

D. $\sqrt{14}W$

Answer: A

Watch Video Solution

91. The potential energy of a particle of mass 5 kg moving in the $x-y$ plane is given by $U=(-7x+24y)J$, where x and y are given

in metre. If the particle starts from rest, from the origin, then the speed of the particle at $t = 2$s is

A. 5 m/s

B. 10 m/s

C. 14 m/s

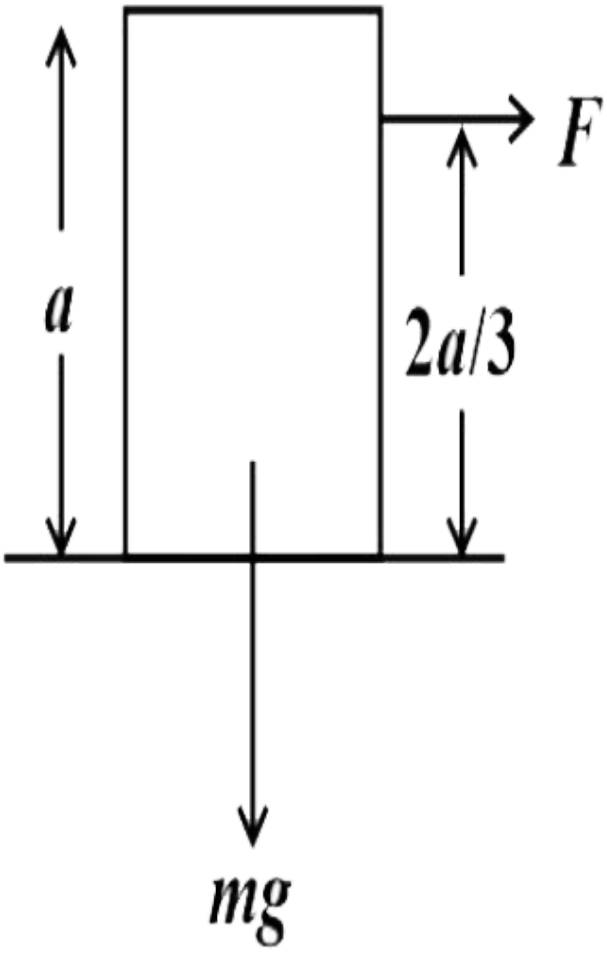
D. 17.5 m/s

Answer: B

Watch Video Solution

92. If the friction is sufficient to prevent the block from sliding, then the minimum value of F for which the cube begins to topple about

an edge is



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

B. $\frac{3}{4}mg$

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

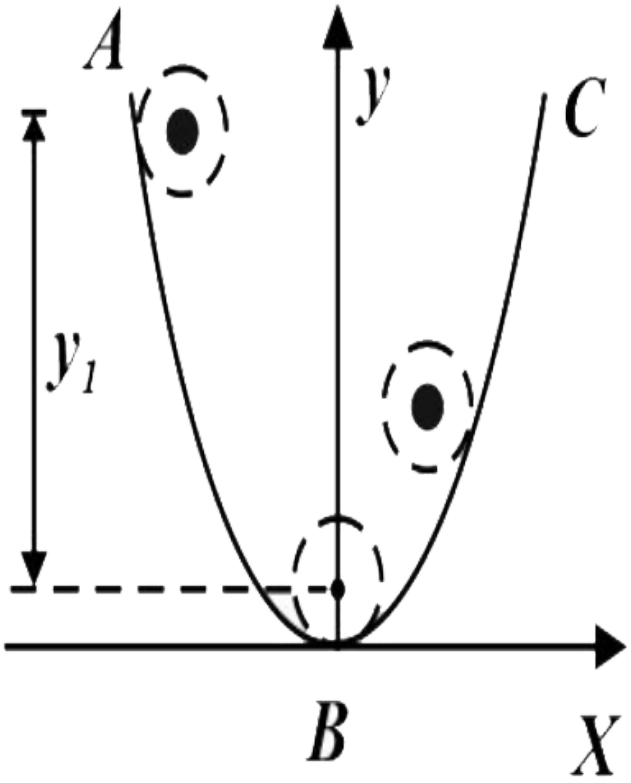
D. mg

Answer: B

Watch Video Solution

93. A uniform cylinder rolls down from rest, on a track whose vertical cross - section is a parabola given by the equation $y = kx^2$. If the surface is rough from A to B due to which the

cylinder doesn't slip but it is frictionless from B to C, then the height of ascent of cylinder towards C is



A. $\frac{y_1}{3}$

B. $\frac{2y_1}{3}$

C. $\frac{3y_1}{2}$

D. y_1

Answer: B

Watch Video Solution

94. A magnetic dipole is situated in the direction of a magnetic field. What is its potential energy? If it is rotated by 180°, then what amount of work will be done?

A. MB

B. 2 MB

C. -2 MB

D. zero

Answer: D

Watch Video Solution

95. A projectile is thrown with a velocity of 20 m/s, at an angle of 60° with the horizontal. After how much time the velocity vector will

make an angle of 45° with the horizontal (in upward direction) is (take g=$10m/s^2$) $-$

A. $\sqrt{3}s$

B. $\frac{1}{\sqrt{3}}s$

C. $\left(\sqrt{3}+1\right)s$

D. $\left(\sqrt{3}-1\right)s$

Answer: D

Watch Video Solution

96. A sample contains large number of nuclei. The probability that a nucleus in sample will decay after four half lives is

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

B. $\frac{3}{4}$

C. $\frac{15}{16}$

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

Answer: C

Watch Video Solution

97. Photoelectric emission is observed from a metallic surface for frequencies v_1 and v_2 of the incident light rays $(v_1 > v_2)$. If the maximum values of kinetic energy of the photoelectrons emitted in the two cases are in the ratio of $1 : k$, then the threshold frequency of the metallic surface is

A. $\frac{n_1 - n_2}{k - 1}$

B. $\frac{kn_1 - n_2}{k - 1}$

C. $\frac{kn_2 - n_1}{k - 1}$

D. $\frac{n_2 - n_1}{k}$

Answer: B

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98. In a compound microscope, the focal lengths of two lenses are $1.5cm$ and $6.25cm$ an object is placed at $2cm$ form objective and the final image is formed at $25cm$ from eye lens. The distance between the two lenses is

A. 6.00 cm

B. 7.75 cm

C. 9.25 cm

D. 11.00 cm

Answer: D

Watch Video Solution

99. When a ray is refracted from one medium into another, the wavelegths changes from 6000Å to 4000Å. The critical angle for a ray from the second medium will be

A. $\cos^{-1}\left(\frac{2}{3}\right)$

B. $\sin^{-1}\left(\frac{2}{3}\right)$

C. $\tan^{-1}\left(\frac{3}{2}\right)$

D. $\sin^{-1}\left(\frac{2}{\sqrt{13}}\right)$

Answer: B

Watch Video Solution

100. A $100V$ a.c. source of frequency $500Hz$ is connected to a LCR circuit with $L = 8.1$

millihenry, $C = 12.5\mu F$ and $R = 10$ ohm, all connected in series. What is the potential difference across the resistance?

A. 100 V

B. 200 V

C. 300 V

D. 400 V

Answer: A

Watch Video Solution

101. A rod of length l rotates with a small but uniform angular velocity ω about its perpendicular bisector. A uniform magnetic field B exists parallel to the axis of rotation. The potential difference between the centre of the rod and an end is

A. zero

B. $\frac{1}{2}\omega Bl^2$

C. ωBl^2

D. $2\omega Bl^2$

Answer: A

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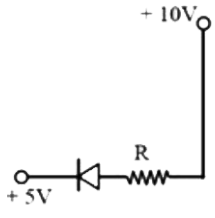
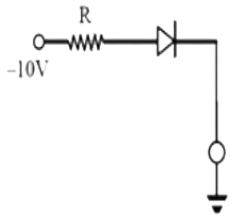
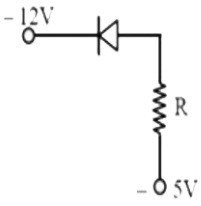
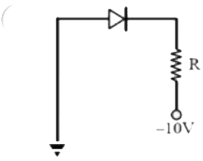
102. In the figure, which of the diode is in reverse bias

A. 

B. 

C. 

D. 

Answer: B

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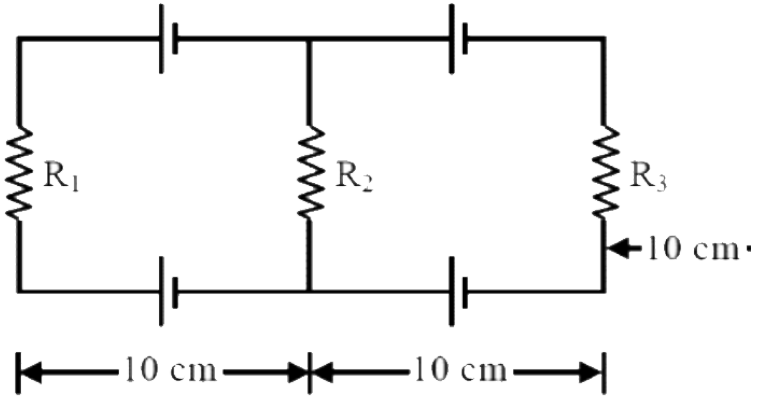
103. In the figure shown below each battery has emf = 5 V. Then the magnetic field at P is



A. zero

B. $\frac{10\mu_0}{R_1(4\pi)(.2)}$

C. $\frac{20\mu_0}{R_1 + R_2(.8\pi)}$

D. none of these

Answer: A

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104. Two long parallel wires are 30 cm apart carrying currents 10 A and 15 A respectively in the same direction. The force acting over a length of 5 m of the wires is

A. $5 \times 10^{-4} N, \quad (\text{attraction})$

B. $1 \times 10^{-4} N, \quad (\text{attraction})$

C. $5 \times 10^{-4} N, \quad (\text{repulsion})$

D. $1 \times 10^{-4} N, \quad (\text{repulsion})$

Answer: A

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105. The resistance of a moving coil galvanometer is 20Ω. It requires 0.01 A current for full - scale deflection. The value of resistance to convert it into a voltmeter of the range 20 V will be

A. 198Ω

B. 1980Ω

C. 20Ω

D. 0Ω

Answer: B

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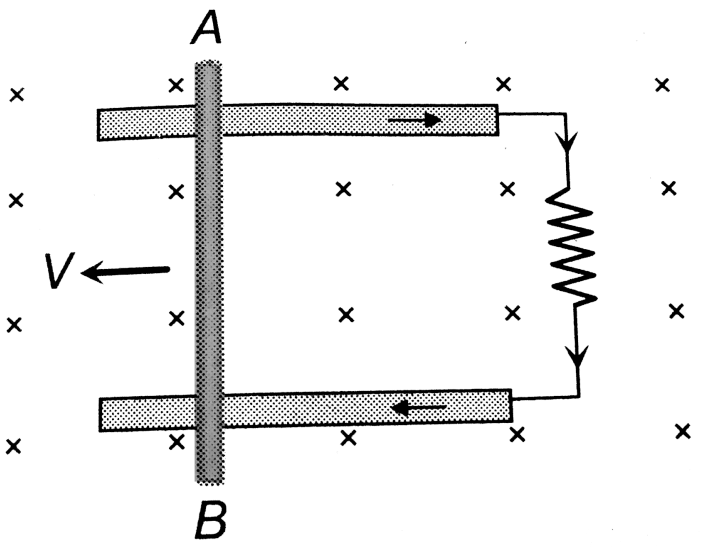
106. Consider the situation shown in the figure. The wire AB is sliding on the fixed rails with a constant velocity. If the wire AB is replaced by semicircular wire, the magnitude

of the induced current will



A. increase

B. remain the same

C. decrease

D. increase of decrease depending on whether the semicircle bulges towards

the resistance or away from it

Answer: B

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107. The coefficient of friction between two surface is 0.2. The maximum angle of friction is

A. $\sin^{-1}(0.2)$

B. $\cos^{-1}(0.2)$

C. $\tan^{-1}(0.1)$

D. $\cot^{-1}(5)$

Answer: D

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108. The ratio of thermal conductivity of two rods of different material is $5:4$. The two rods of same area of cross-section and same thermal resistance will have the lengths in the ratio

A. $4:5$

B. $9:1$

C. $1:9$

D. $5:4$

Answer: D

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109. A dielectric slab is inserted between the plates of an isolated capacitor. The force between the plates will

A. increase

B. decrease

C. remain unchanged

D. become zero

Answer: C

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110. The effective capacitance of two capacitors of capacitances C_1 and $C_2(C_2 > C_1)$ connected in parallel is $\frac{25}{6}$

times the effective capacitance when they are connected in series. The ratio $\frac{C_2}{C_1}$ is

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

B. $\frac{4}{3}$

C. $\frac{5}{3}$

D. $\frac{25}{6}$

Answer: A

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111. A particale moves under the effect of a force $F = Cs$ from $x = 0$ to $x = x_1$. The work down in the process is

A. cx_1^2

B. $\frac{1}{2}cx_1^2$

C. cx_1^3

D. zero

Answer: B

Watch Video Solution

112. Root mean square speed of an ideal gas at 300 K is 500 m/s. Temperature is increased four times then root mean square speed will become

A. 1000 m/s

B. 560 m/s

C. 2000 m/s

D. none of these

Answer: A

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113. When a laser beam returns after reflection from an aeroplane, the observed change in frequency is 1%, then the speed of the aeroplane is (c is the velocity of light)

A. $\frac{c}{50}$

B. $\frac{c}{100}$

C. $\frac{c}{200}$

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

Answer: C

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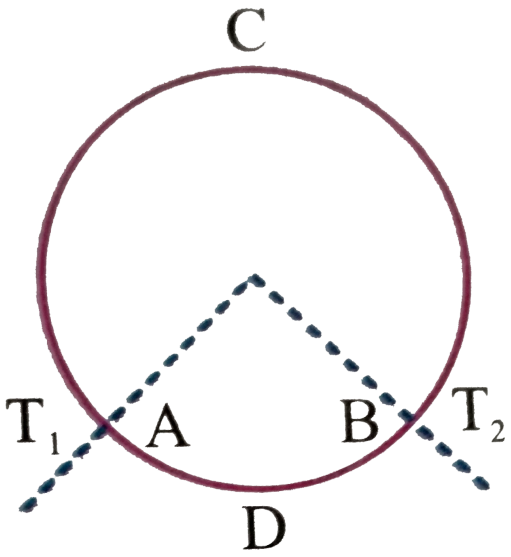
114. A ring consisting of two parts ADB and ACB of same conductivity k carries an amount of heat H The ADB part is now replaced with another metal keeping the temperature $T_{91})$ and T_2 constant The heat carried increases to $2H$ What should be the conductivity of the new ADB Given

$$\frac{ACB}{ADB} = 3$$



A. $\frac{7}{3}K$

B. $2K$

C. $\frac{5}{2}K$

D. 3K

Answer: A

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115. The period of oscillation of a simple pendulum of length (L) suspended from the roof of a vehicle which moves without friction down an inclined plane of inclination (prop), is given by.

A. $2\pi\sqrt{\frac{L}{g\cos\alpha}}$

B. $2\pi\sqrt{\frac{L}{g\sin\alpha}}$

C. $2\pi\sqrt{\frac{L}{g}}$

D. $2\pi\sqrt{\frac{L}{g\tan\alpha}}$

Answer: A

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116. Potential energy of a 3kg body at the surface of a planet is $-54J$, then escape velocity will be :

A. $18ms^{-1}$

B. $162ms^{-1}$

C. $36ms^{-1}$

D. $6ms^{-1}$

Answer: D

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117. A projectile is fired vertically upwards from the surface of the earth with a velocity Kv_e, where v_e is the escape velocity and $K < 1$.If R is the radius of the earth, the maximum height

to which it will rise measured from the centre of the earth will be (neglect air resistance)

A. $\frac{R}{k^2+1}$

B. $\frac{k^2R}{1-k^2}$

C. $\frac{R}{1-k^2}$

D. $\frac{k^2R}{k^2+1}$

Answer: C

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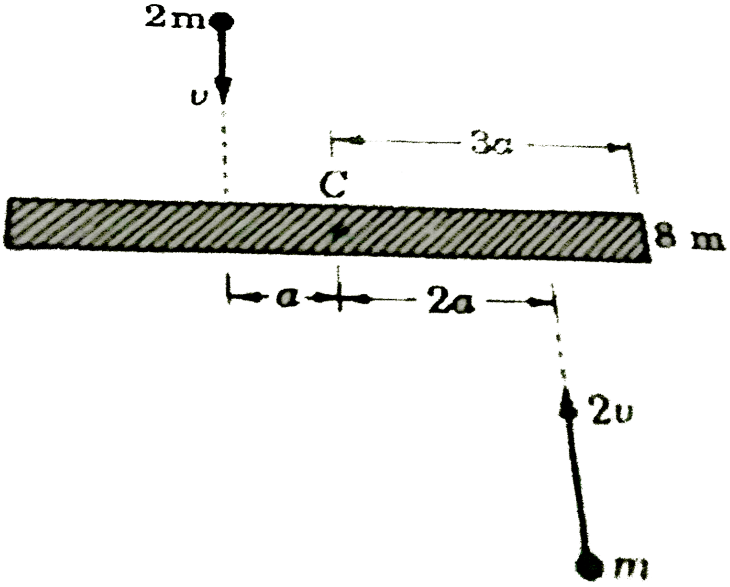
118. A uniform bar of length 6a and mass 8 m lies on a smooth horizontal table. Two point-masses m and 2m moving in the same horizontal plane with speeds 2v and v respectively strike the bar as shown in Fig, and stick to the bar after collision.



A. zero

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

C. $\frac{v}{5a}$

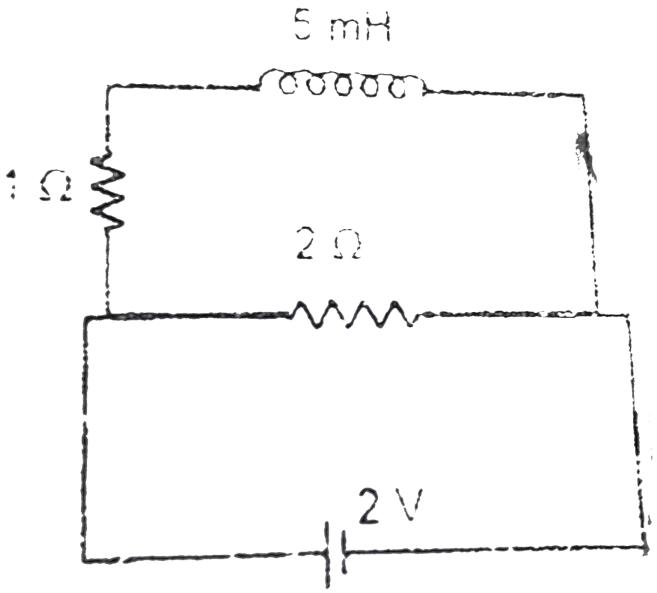
D. $\frac{3v}{5a}$

Answer: C

Watch Video Solution

119. When induced emf in inductor coil is $50\,\%$ of its maximum value then stored energy in inductor coil in the given circuit at

that instant will be:-



A. 2.5 mJ

B. 5 mJ

C. 15 mJ

D. 20 mJ

Answer: A

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120. The magnetic flux through a coil varies with time as $\phi = 5t - 6t + 9$. The ratio of E.M.F. at $t = 0s$ to $t = 0.5s$ will be

A. $9:1$

B. $1:6$

C. $6:1$

D. $1:9$

Answer: C

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121. Specific resistance of a wire depends on its

A. length of the wire

B. area of cross - section of the wire

C. resistance of the wire

D. material of the wire

Answer: D

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122. What is the ratio of the electrostatic potential at the corner and the centre point of a charged conducting cube? (The potential is considered 0 at infinity)

A. $2:1$

B. $4:1$

C. $1:2$

D. $1:1$

Answer: D

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123. The work done by all the forces (external and internal) on a system equals the change in

A. total energy

B. kinetic energy

C. potential energy

D. none of these

Answer: B

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124. The potential energy of a body mass m is $U = ax + by$ the magnitude of acceleration of the body will be-

A. $\frac{ab}{m}$

B. $\left(\frac{a+b}{m}\right)$

C. $\frac{\sqrt{a^2+b^2}}{m}$

D. $\frac{a^2+b^2}{m}$

Answer: C

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125. A ball of mass 1 kg moving with a velocity of $0.4\,\mathrm{ms}^{-1}$ collides with another stationary ball. After the collision, the first ball moves with a velocity of $0.3ms^{1}$ in a direction making an angle of 90° with its initial direction. The momentum of the second ball after the collision will be (in kg ms^{-1})

A. 0.1

B. 0.3

C. 0.5

D. 0.7

Answer: C

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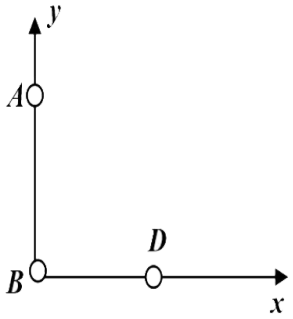
126. An inteference is observed due to two coherent sources A and B separated by a distance 4λ along Y-axis, where λ is the

wavelength of light. A detector 'D' is moved alog the positive X-axis. Find the totla number of maxima observe on the X-axis excluding the points $x = 0$ and $x = \infty$?



A. three

B. four

C. two

D. infinite

Answer: A

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127. A convex lens A of focal length 20cm and a concave lens G of focal length 5cm are kept along the same axis with the distance d between them. If a parallel beam of light falling on A leaves B as a parallel beam, then distance d in cm will be

A. 20

B. 15

C. 30

D. 50

Answer: B

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128. A variable force F acts along the x - axis given by $F = \left(3x^2\right) - 2x + 1N$. The work done by the force when a particle of mass 100 g moves from x = 50 cm to x = 100 cm is

A. 0.625 J

B. 6.25 J

C. 0.0625 J

D. 62.5 J

Answer: A

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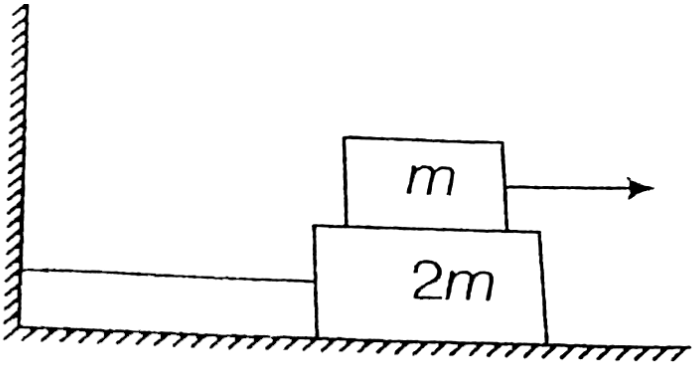
129. Two blocks of masses m and 2 m are placed one over the other as shown in figure.The coefficient of friction between m

and 2m is μ and between 2m and ground is $\frac{\mu}{3}$. If a horizontal force F is applied on upper block and T is tension developed in string, then choose the incorrect alternative.



A. If $F = \frac{\mu}{2}mg, T = 0$

B. If $F = \mu mg, T = 0$

C. If $F = 2\mu mg, T = \frac{\mu mg}{3}$

D. If $F = 3\mu mg, T = 0$

Answer: C

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130. According to Bohr's theory, the time averaged magnetic field at the centre (i.e. nucleus) of a hydrogen atom due to the motion of electrons in the n^{th} orbit is proportional to :

(n = principal quantum number)

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

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

C. n^5

D. n^3

Answer: B

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131. The half - life of a radioactive substance is 50 days. The substance will disintegrate completely in

A. 50 days

B. 500 days

C. 5000 days

D. infinite time

Answer: D

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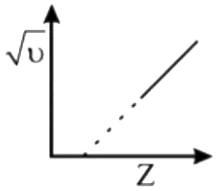
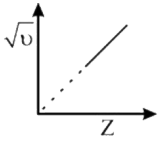
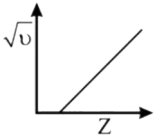
132. Which of the following curves is correct?

A. 

B. 

C. 

D. None of these

Answer: A

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133. A simple telescope, consisting of an objective of focal length 60 cm and a single eye lens of focal length 5 cm is focussed on a distant object in such a way that parallel rays comes out from the eye lens. If the object subtends an angle 2° at the objective, the angular width of the image

A. 50°

B. $\left(\frac{1}{6}\right)^\circ$

C. 10°

D. 24°

Answer: D

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134. An equilateral prism produces a minimum deviation of 30°. The angle of incidence is

A. 120°

B. 60°

C. 90°

D. none of these

Answer: B

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