PHYSICS

BOOKS - JEE MAINS PREVIOUS YEAR

JEE MAIN 2021

question

1. A body cools down from $100\,^{\circ}C$ to $90\,^{\circ}C$ in 20 minutes. It will cool down from $110\,^{\circ}C$ to $100\,^{\circ}C$ in ____

Watch Video Solution

2. A cube is given and it has -q charge in one corner and +q charges in all the remaining 7 corners. Find the electric field at the center of the cube

Watch Video Solution

3. What is the sign of focal lenght of convex mirror ?

A. $+ve$

B. $-ve$

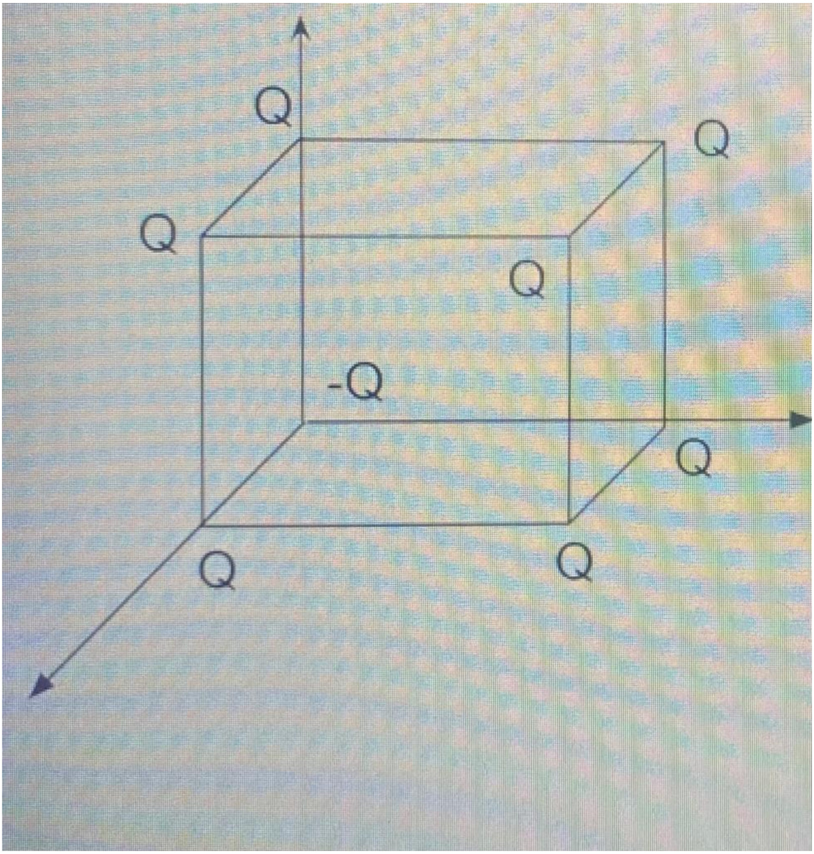
C. can be $+ve$ can be $-ve$

D. none of these

Answer: A

Watch Video Solution

4. Find the field at the center of cube of side a



A. $\dfrac{4KQ}{3a^2}$

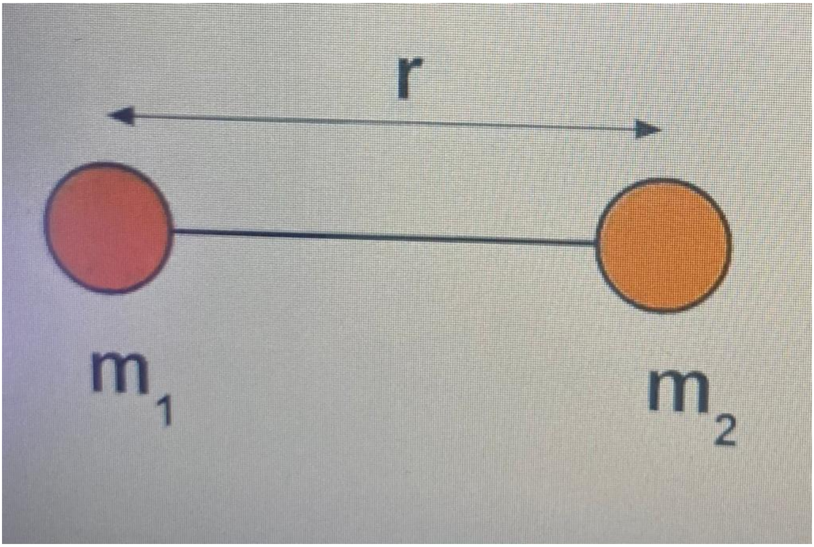
B. $\dfrac{8KQ}{3a^2}$

C. $\dfrac{16KQ}{3a^2}$

D. none of these

Watch Video Solution

5. In a double star system .Find w.



A. $w = \sqrt{\frac{G(m_1 + m_2)}{r^3}}$

B. $w = \sqrt{\frac{Gm_1m_2}{(m_1 + m_2)r^3}}$

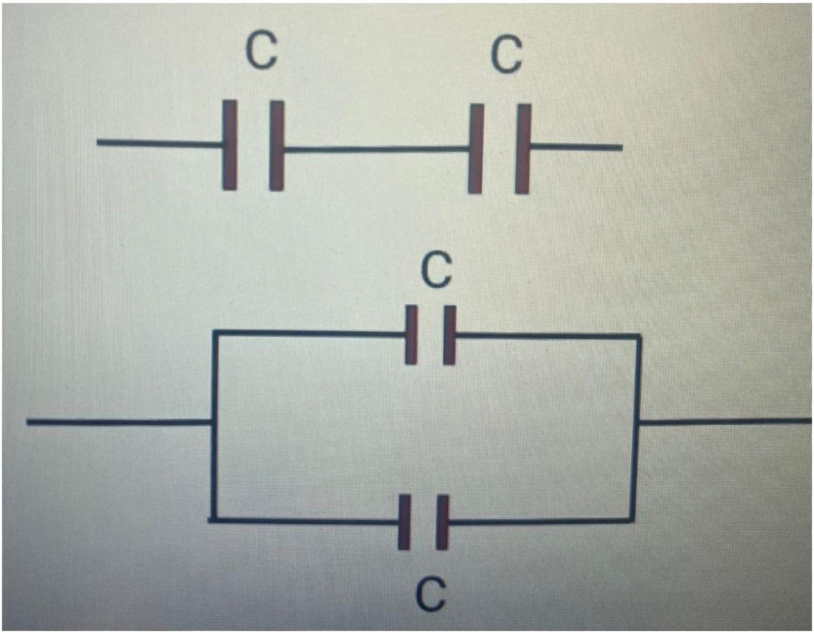
C. $w = \sqrt{\frac{Gm_1}{r^3}}$

D. $w = \sqrt{\frac{Gm_2}{r^3}}$

Answer: A

Watch Video Solution

6. Two equal capacitors are as shown in the two figure I and 2.The ratio of the equvalent capacitance in the two diagrams is.



A. $\frac{C_1}{C_2} = \frac{1}{2}$

B. $\frac{C_1}{C_2} = 1$

C. $\frac{C_1}{C_2} = \frac{1}{4}$

D. None of these

Watch Video Solution

7. Compare the magnitude of moment of inertis of masses and radius are equal (a) Ring about Diameter (I_a)

(b) Disc about perpendicular axis passing through centre (I_b)

(c) Solid cylinder about axis (I_c)

(d) Solid sphere about axis passing through centre (I_d)

A. $I_a = I_b = I_c > I_d$

B. $I_a = I_b > I_c > I_d$

C. $I_a < I_b < I_c < I_d$

D. None of these

Watch Video Solution

8. Find the minimum force F_0 that should be applied to the block of mass m = 0.5 kg so that the block stays in equilibrium with the rough vertical wall having friction coefficient $\mu = 0.2$ (Take $g = 10\frac{m}{s^2}$)`

A. $25N$

B. $20N$

C. $50N$

D. None of these

Watch Video Solution

9. A horizontal spring block system (mass m_2 spring constant k) is oscillating on a smooth surface with amplitude A. If at the mean position an identical block is kept on it so that they move together after what is the new amplitude?

A. A

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

C. $\frac{A}{\sqrt{2}}$

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

Watch Video Solution

10. In the shown circuit the following battery is of emf 4V and internal resistance 8Ω. Find the potential difference between points x and y as shown in the circuit.

A. $V_x - V_y = 2.4V$

B. $V_y - V_x = -2V$

C. $V_x - V_y = 4V$

D. $V_y - V_x = -4V$

Watch Video Solution

11. How does the energy of photon change of the corresponding wavelength increases?

A. $\in creases$

B. $decreases$

C. $may \in crease \text{ or } decrease$

D. $doesntdependonwave \le n > h$

Watch Video Solution

12. Match the following for the value of 'a' for following process represented by $PV^{\alpha} = constant?$

a) constant pressure	p) $\alpha = 0$
b) constant volume	q) $\alpha = 1$
c) constant temperature	r) $\alpha \to \infty$
d) No heat exchange	s) $\alpha = \gamma$

A. $a \to q, b \to s, c \to p, d \to r$

B. $a \to p, b \to r, c \to q, d \to s$

C. $a \to s, b \to p, c \to r, d \to q$

D. $a \to p, b \to r, c \to q, d \to s$

Answer: B

Watch Video Solution

13. An object of mass M oscillating with amplitude 'A' mass 'm' is added at mean position. Find new amplitude of oscillation.

Watch Video Solution

14. current in a wire is $20t^3 + 15t^2$ calculate the charge passing through it in 15 seconds

Watch Video Solution

15. Four particles each of mass M move along a circle of radius R under the action of their mutula gravitational attraction the speed of each paritcles is

A. $G\frac{M}{R}$

B. $\sqrt{2\sqrt{2}G\frac{M}{R}}$

C. $\sqrt{G\frac{M}{R}(2SQRT(2)+1)}$

D. $\sqrt{G\frac{M}{R}\frac{2SQRT(2)+1}{4}}$

Watch Video Solution

Watch Video Solution

16. If $\mu_r \& \varepsilon_r$ represents relative permeability of medium & relative permittivity of medium & speed of light in medium is $\frac{c}{\mu}$,where μ is refractive index will be

A. $\varepsilon_r \mu_r$

B. $\sqrt{\varepsilon_r \mu_r}$

C. $\frac{1}{\sqrt{\varepsilon_r \mu_r}}$

D. none of these

Watch Video Solution

17. An object is moving with speed v and collides with an identical mass at rest. After collision they both move at angle 30° with original direction. Find ratio of final speed of the mass to initial speed.

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

B. 2

C. $\sqrt{3}$

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

Watch Video Solution

18. Energy of proton on increasing the wavelength

A. decrease

B. increase

C. remain c onstant

D. none of these

Watch Video Solution

19. A proton $\&Li^{3+}$ are accelerated through same potential difference. If $M_Li^{3+} = 8.3M_p$ then find ratio of de broglie wavelength of $\frac{\lambda_{Li^{3+}}}{\lambda_p}$

A. 0.1

B. 0.2

C. 0.3

D. 0.4

Watch Video Solution

20. Statement 1: Two particle have same linear momentum, wavelength of both particle will be same

Statement 2: If wavelength of particle increase then energy and linear momentum also increases

A. both are correct

B. only 1 is correct

C. only 2 is correct

D. both are wrong

Watch Video Solution

21. For a transistor emitter current is 40 mA and collector current is 35 mA find the β of transistor

A. 44385

B. 44378

C. 44203

D. 44409

Watch Video Solution

22. If W=work done, T= Temperature, k_B= boltzmann constant X = displacement &$W = \alpha\left(\beta^2\right)e^{-\frac{x^2}{\alpha T k_B}}$ then find the dimension of β

A. $\left[M^1L^2T^{-2}\right]$

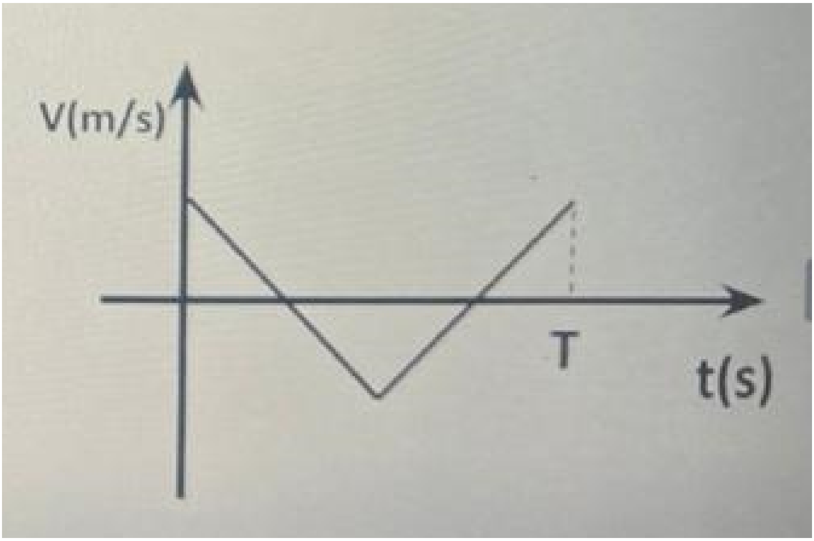
B. $\left[M^{-1}L^2T^{-2}\right]$

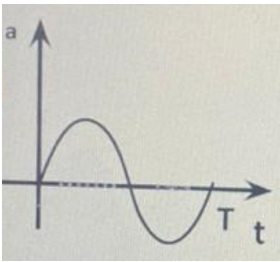
C. [M^1 L^1 T^-2]`

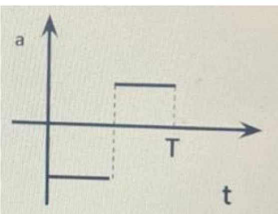
D. none

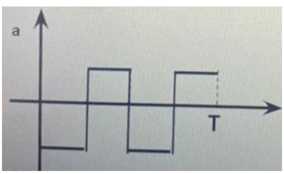
Watch Video Solution

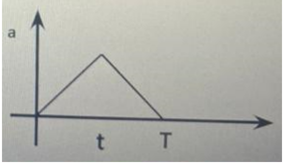
23. Choose the correct a vs t graph



A. 

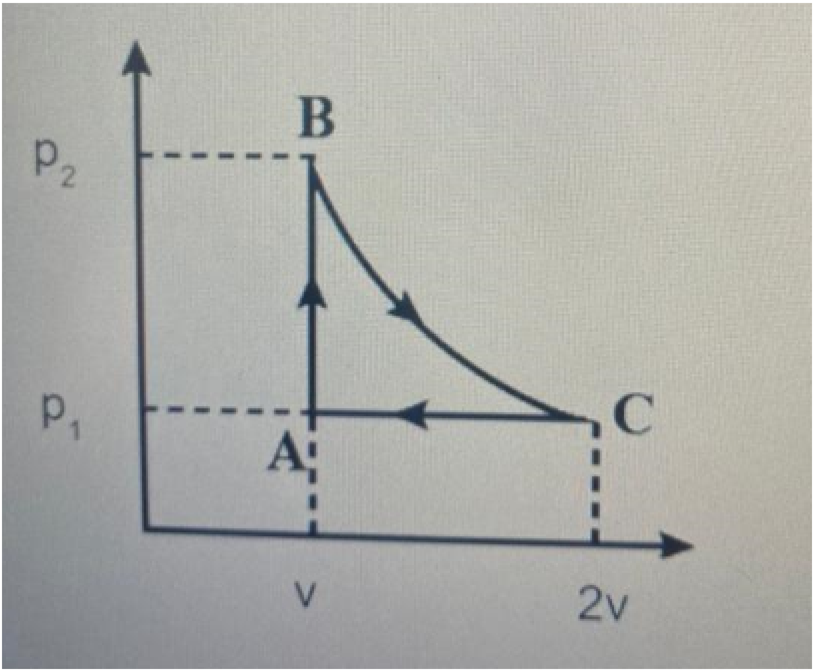
B. 

C. 

D. 

Watch Video Solution

24. In a cyclic process ABCA then process BC is isothermal. Find work done by gas in cycle ABCA (Given $P_1 = P$)



A. $2\ln(2PV)$

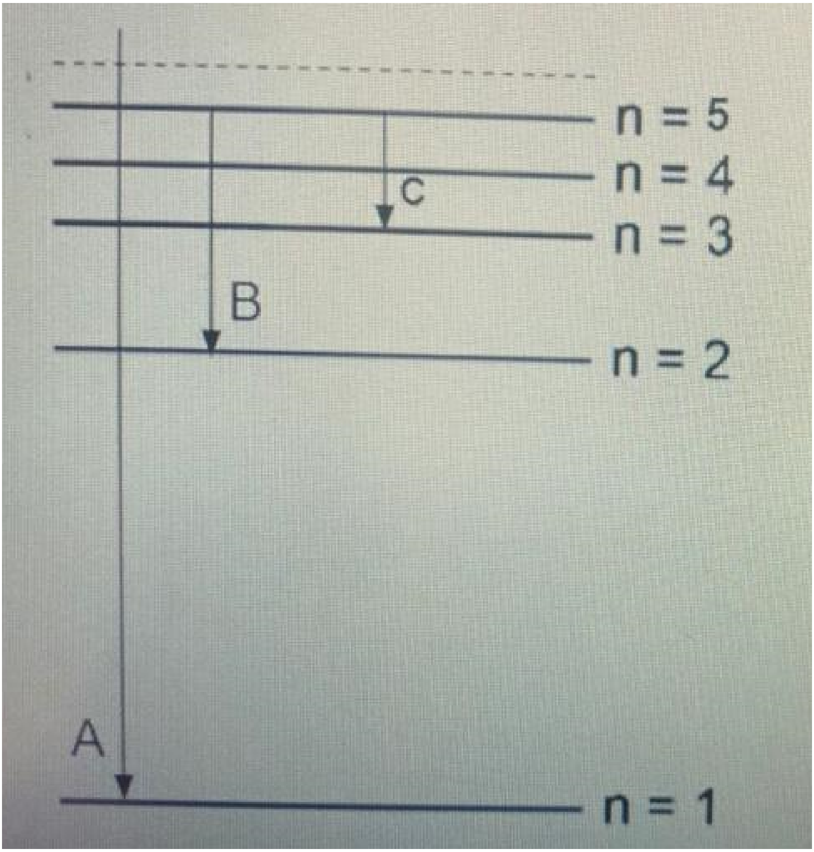
B. $(2LN2 - 1)PV$

C. $PVLN2$

D. none of these

Watch Video Solution

25. Choose the correct option(s) regarding hydrogen spectrum



A. A is the series limit of lyman

B. B is the third line of balmer

C. C is the second line of paschen

D. all of the above are correct

Watch Video Solution

26. Two planets S_1 and S_2 rotates about own axis S_1 completes one rev in 1hr and S_2 completes one rev in 8hr then find ratio of angular velocity of S_1 and S_2 $\left(\frac{\omega_1}{\omega_2}\right)$

A. 8

B. $\frac{1}{8}$

C. 4

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

Answer: A

Watch Video Solution

27. Radius of curvature of a equi convex lens is R. Find focal length ($n = \frac{3}{2}$)

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

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

C. R

D. -R

Answer: C

Watch Video Solution

28. A rod of length l and coefficient of linear expansion α. Find increase in length when temperature changes from T to T+ ΔT

A. $l\alpha\Delta T$

B. $l(1 + \alpha\Delta T)$

C. $l(1 + 2\alpha\Delta T)$

D. none of these

Answer: A

Watch Video Solution

29. Find the relation below young's modulus (Y), bulk modulus (K) and shear modulus (G)?

A. $Y = 6K\frac{G}{G + 3K}$

B. $Y = 4K\frac{G}{G + 3K}$

C. $Y = 9K\frac{G}{G + 3K}$

D. $Y = 12K\frac{G}{G + 3K}$

Answer: C

Watch Video Solution

30. In communication system message signal is modulated with carrier signal given below

$V_{\in} = 20\sin[2\pi(1500t)]$

$V_c = 80\sin[2\pi(100000t)]$ Find percentage modulation

A. 0.15

B. 0.2

C. 0.25

D. 0.35

Answer: C

Watch Video Solution

31. Two planets S_1 and S_2 rotates about own axis S_1 completes one rev in 1hr and S_2 completes one rev in 8hr then find ratio of angular velocity of S_1 and S_2 $\left(\frac{\omega_1}{\omega_2}\right)$

A. 8

B. $\frac{1}{8}$

C. 4

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

Answer: A

Watch Video Solution

32. Radius of curvature of a equi convex lens is R. Find focal length ($n = \frac{3}{2}$)

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

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

C. R

D. -R

Answer: C

Watch Video Solution

33. A rod of length l and coefficient of linear expansion α. Find increase in length when temperature changes from T to T+ ΔT

A. $l\alpha\Delta T$

B. $l(1 + \alpha\Delta T)$

C. $l(1 + 2\alpha\Delta T)$

D. none of these

Answer: A

Watch Video Solution

34. Find the relation below young's modulus (Y), bulk modulus (K) and shear modulus (G)?

A. $Y = 6K\frac{G}{G + 3K}$

B. $Y = 4K\frac{G}{G + 3K}$

C. $Y = 9K\frac{G}{G + 3K}$

D. $Y = 12K\frac{G}{G + 3K}$

Answer: C

Watch Video Solution

35. In communication system message signal is modulated with carrier signal given below

$V_{\in} = 20\sin[2\pi(1500t)]$

$V_c = 80\sin[2\pi(100000t)]$ Find percentage modulation

A. 0.15

B. 0.2

C. 0.25

D. 0.35

Answer: C

Watch Video Solution

36. Two electrons are fixed at a seperation of 2d from each other.A proton is placed at the mid point and displaced slightly in a direction perpendicular to line joining the two electrons. Find frequency of oscillation of proton

A. $f = \frac{1}{2}\pi\left(\sqrt{2k\frac{e^2}{m}d^3}\right)$

B. $f = \frac{1}{2}\pi\left(\sqrt{k\frac{e^2}{m}d^3}\right)$

C. $f = \frac{1}{2}\pi\left(\sqrt{k\frac{e^2}{2}md^3}\right)$

D. none

Watch Video Solution

37. The weight of a person on pole is 48N then the weight on equator is? (R= 6400km)

A. 48

B. 48.83

C. 47.84

D. 47

Watch Video Solution

38. Two bodies A & B have masses 1 kg and 2kg resp. have equal momentum. Find ratio of kinetic energy

A. 0.04236111111111

B. 0.08402777777778

C. 0.04444444444444

D. 0.04305555555556

Watch Video Solution

39. Which transition in hydrogen spectrum the maxima frequency

A. $3 \rightarrow 2$

B. $5 \rightarrow 4$

C. $9 \rightarrow 5$

D. $2 \rightarrow 1$

40. A rod of mass M, length L is bent in the form of hexagon. Then MOI about axis passing through geometric centre and perpendicular to plane of body will be

A. $6ML^2$

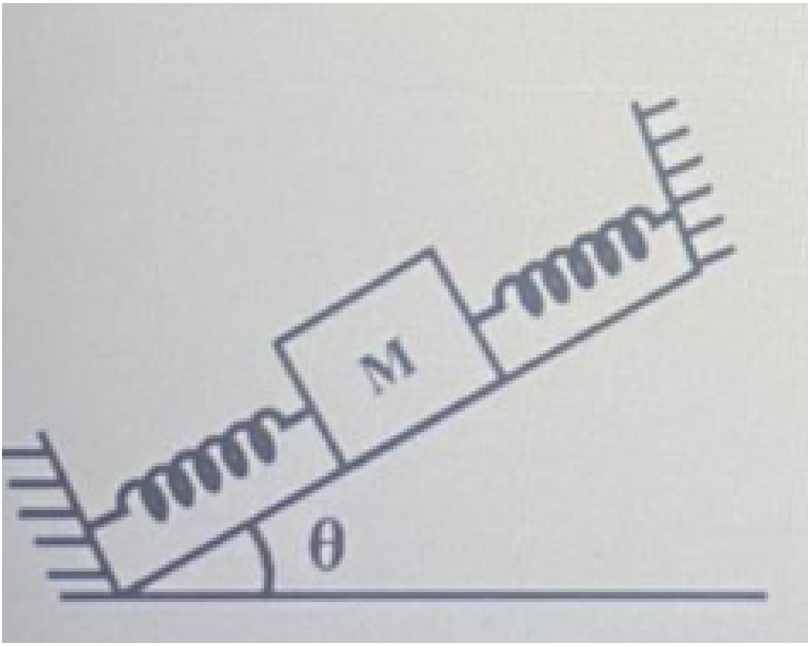
B. $\frac{ML^2}{6}$

C. $\frac{ML^2}{2}$

D. $5ML^2$

Watch Video Solution

41. Find the time period of SHM of the block of mass M



A. $T = 2\pi\sqrt{\frac{M}{2K}}$

B. $T = 2\pi\sqrt{\frac{M}{K}}$

C. $T = 2\pi\sqrt{\frac{2M}{K}}$

D. $T = 2\pi\sqrt{\frac{M}{4K}}$

Answer: A

Watch Video Solution

42. A particle is projected on x axis with velocity V. A force is acting on it in opposite direction, which is proportional to square of its position. At what distance from origin the particle will stop (m is mass, k = proportionality constant)

A. $\sqrt[3]{m\frac{V_0^2}{k}}$

B. $\sqrt[3]{3m\frac{V_0^2}{k}}$

C. $\sqrt[3]{3m\frac{V_0^2}{2}k}$

D. $\sqrt[3]{m\frac{V_0^2}{2}k}$

Watch Video Solution

43. Two cars are approaching eachother each moving with a speed v.Find beat frequency as heard by driver of one carboth are emitting sound of frequency f_0

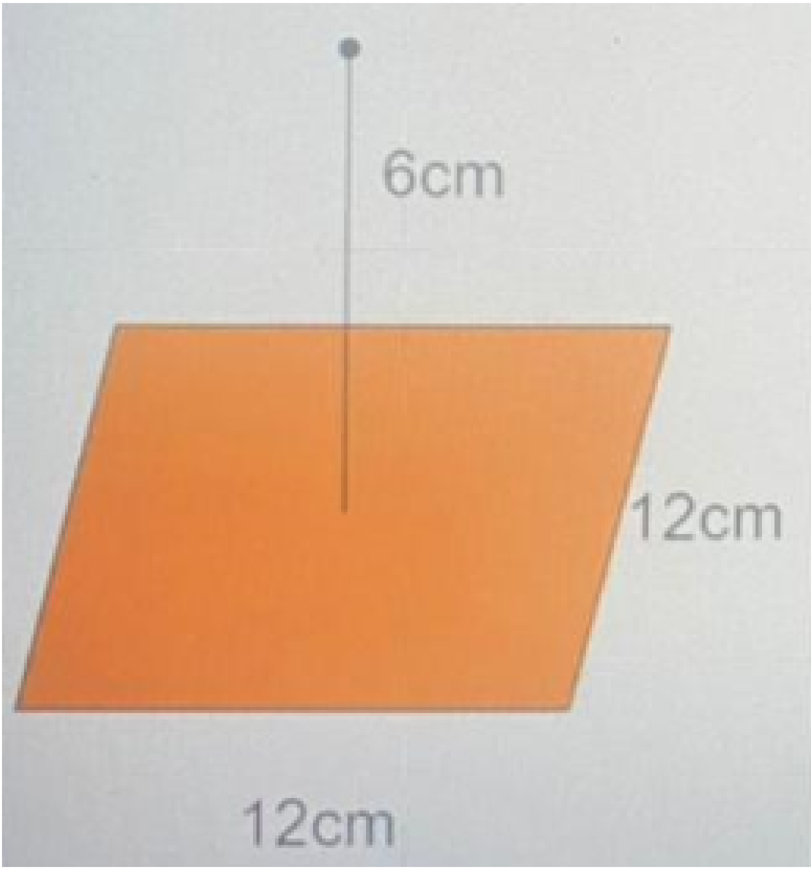
A. $beatequency = 2v\frac{f_0}{c} - v$

B. $beatequency = 2v\frac{f_0}{c} + v$

C. $beatequency = v\frac{f_0}{c} - v$

D. none

Watch Video Solution

44. Find the flux of point charge q through the square surface ABCD as shown 

A. $\frac{q}{6\varepsilon_0}$

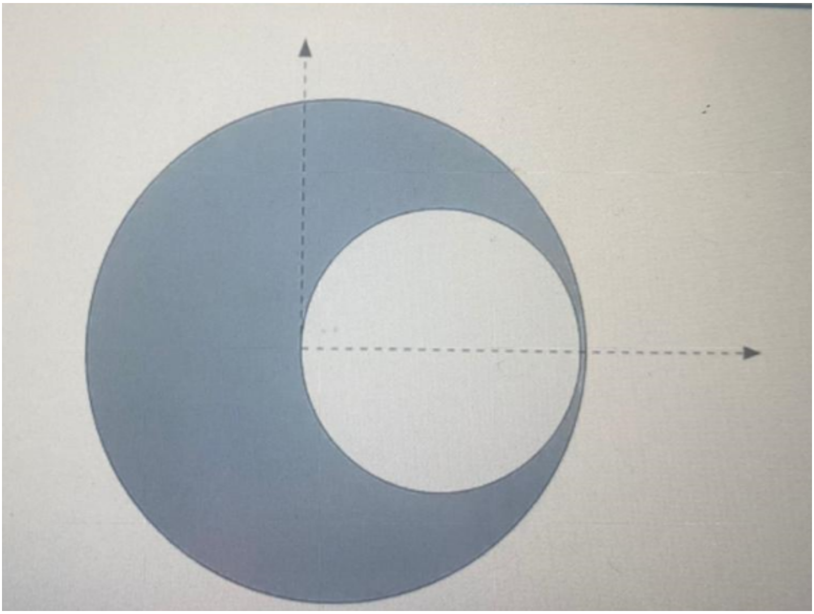
B. $\frac{q}{\varepsilon_0}$

C. $\frac{q}{4\varepsilon_0}$

D. $\frac{q}{2\varepsilon_0}$

Watch Video Solution

45. If a solid cavity whose diameteris removed from a solid sphere of radius R then the com of remaining part is at



A. $x = -\frac{R}{3}$

B. $x = -\frac{R}{7}$

C. $x = -\frac{R}{6}$

D. `x = -R/14

Watch Video Solution

46. What happens in domain of ferromagnetic material is placed in external magnetic field

A. increase in size

B. decrease in size

C. may increase or decrease in size

D. have no relation with the field

Watch Video Solution

47. A travelling wave is represented by

A. 155m sin wt coskx

B. 155m sin (wt-kx)

C. 15 cos wt sinkx

D. 20 coskx coswt

Watch Video Solution

48. In x-ray tube experiment accelerating voltage is given by 1.24 MV. Find cutoff wavelength.

A. 10^-3 nm

B. 10^-2 nm

C. 10^-4 nm

D. 10^-5nm

Answer: A

Watch Video Solution

49. In young's double slit experiment, what will happen when red light is replaced by violet light

Watch Video Solution

50. Four string wave equations are given below , which one of these represent the traveling waves

A. $y = e^{-kx}(t)$

B. $y = \sin(15t - 8x)$

C. $y = \sin(15x).\cos(8t)$

D. None of these

Watch Video Solution

51. In Zener breakdown

(i) Depletion layer (large or small)

(ii)Dopping (heavily or lightly)

A. large,heavily

B. large,lightly

C. small , heavily

D. Small,lightly

Watch Video Solution

52. RMS speed of gas molecule at 27^oC and 1 atm pressure is 200 m/s and rms speed at 127^oC and 2 atm pressure is $\left(\frac{200}{\sqrt{3}}\right)x$.Find value of x

A. 2

B. 4

C. 6

D. 8

Watch Video Solution

53. A wire has an elongation of 0.04m when a force F is applied on it . Now its length & diameter are double and same force F is applied on it. Find new elongation in the wire

A. 0.06 m

B. 0.04 m

C. 0.02 m

D. 0.01 m

Watch Video Solution

54. A ferromagnetic material is placed in an external magnetic field. The magnetic domains

A. Its domain size increases

B. Its domain size decreases

C. Its domain size remain same

D. None of these

Watch Video Solution

55. Pressure inside a containers filled with gas generated because of

A. change in momentum of molecules

B. molecules stick to the wall

C. violation of molecular

D. volume occupied by molecule

Watch Video Solution

56. A proton and an α-particle are accelerated through same potential difference. Find the ratio of their de-Brogile wavelength.

A. $1:2\sqrt{2}$

B. $2\sqrt{2}:1$

C. $4:1$

D. $1:4$

Watch Video Solution

57. In a YDSE experiment red light is replaces by violet light . Then

A. Fringe width increases

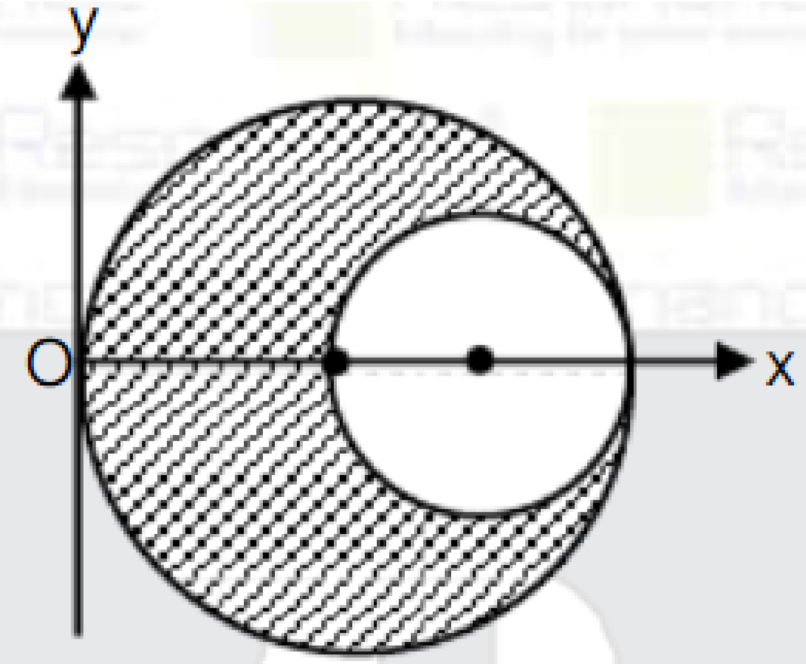
B. Intensity of minima increases

C. central maxima change to minima

D. Fringe will come closes

Watch Video Solution

58. A disc of radius $\frac{a}{2}$ is cut out from a uniform disc of radius a as shown in figure . Find the X Coordinate of centre of mass of remaining portion



A. $\frac{5a}{6}$

B. $\frac{a}{6}$

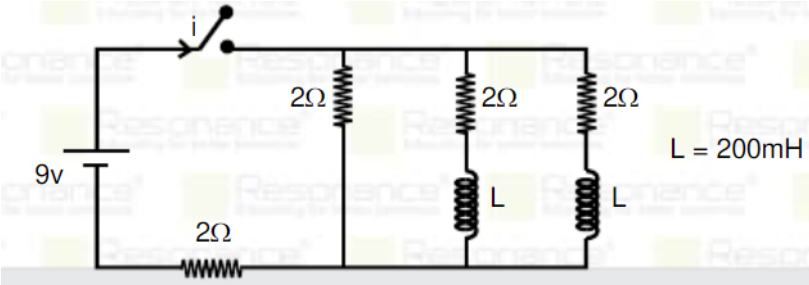
C. $\frac{a}{5}$

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

Answer: A

Watch Video Solution

59. Find the value of i (Current) at t=0 switch is closed, if initially current through inductors is zero,



A. $\frac{9}{4}$

B. $\frac{9}{8}$

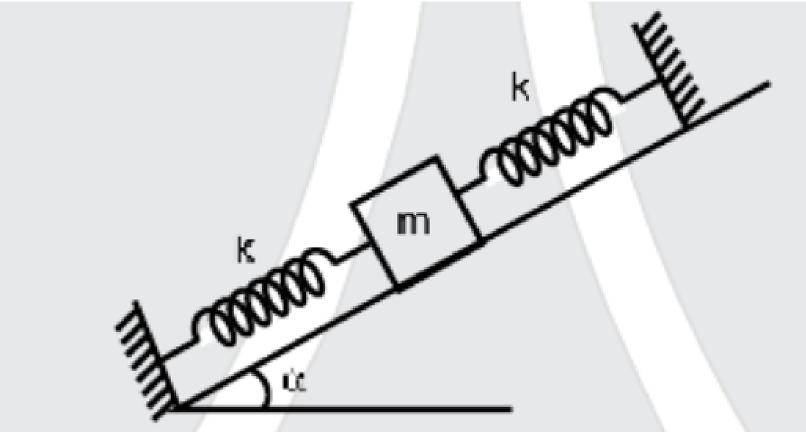
C. $\frac{27}{8}$

D. $\frac{9}{5}$

Answer: A

Watch Video Solution

60. A block is placed on inclined plane with two strings attached to it as shown in figure. Then calculate frequency of block for small displacement.



A. $\frac{1}{2\pi}\sqrt{\frac{k}{2m}}$

B. $\frac{1}{2\pi}\sqrt{2\frac{k}{m}}$

C. $\frac{1}{2\pi}\sqrt{4\frac{k}{m}}$

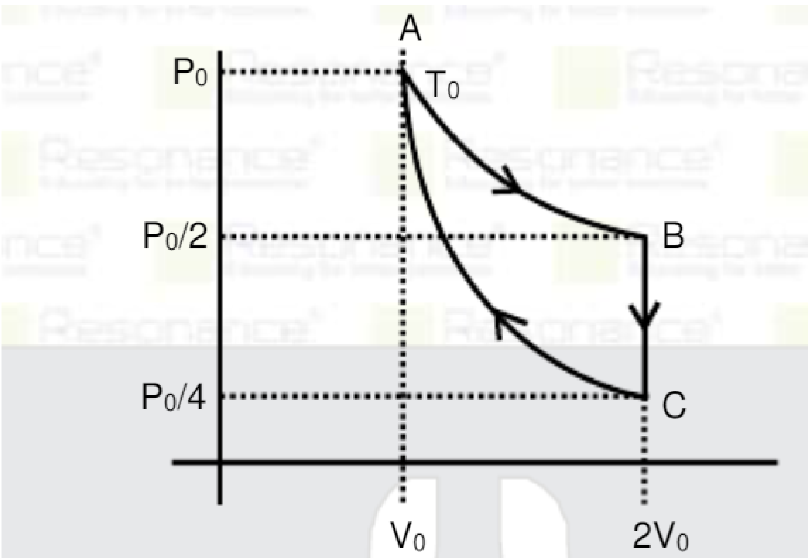
D. $\frac{1}{2\pi}\sqrt{\frac{m}{2k}}$

Watch Video Solution

61. A square of side a=12cm placed in Xy plane centre at origin . A charge q=12 μC place at z=6cm. If flux through square plate ix $X \times 10^2$, then find x: (##JM_21_M2_20210224_PHY_27_Q01.png" width="80%">

Watch Video Solution

62. Find work in the given cycle, If AB is isothermal process and CA is adiabatic.



A. $nRT_{\circ}\left[\ln 2 - \frac{1}{2(\gamma+1)}\right]$

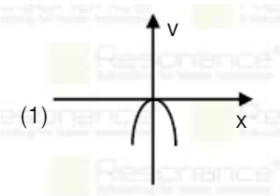
B. $nRT_{\circ}\left[\ln 2 + \frac{1}{2(\gamma-1)}\right]$

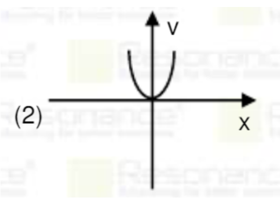
C. $nRT_{\circ}\left[\ln 2 - \frac{1}{2(\gamma - 1)}\right]$

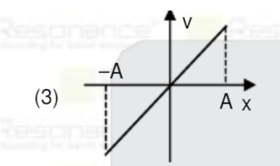
D. $nRT_{\circ}\left[\ln 2 - \frac{1}{(\gamma - 1)}\right]$

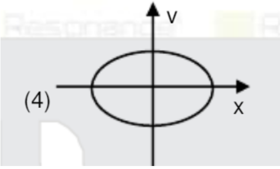
Watch Video Solution

63. The graph of v versus x in a SHM is (v: velocity, x= displacement)

A. 

B. 

C. 

D. 

Watch Video Solution

64. A RLC Circuit is operating at resonant frequency $\omega_{\circ} = 10^5$ rad/sec. It genrate power 16W when 120V rms is applied. Find resistance R.

A. 300Ω

B. 600Ω

C. 900Ω

D. 1200Ω

Watch Video Solution

65. The distance of two points from the centre of loop on the axis is 0.05cm and 0.02cm and the ratio of the magnetic fields at these points is $8:1$ respectively. Find the radius of the loop

A. 1mm

B. 0.1mm

C. 10mm

D. 0.01mm

Answer: A

Watch Video Solution

66. Proton, deuteron and alpha particle have same momentum. They are projected in the same magnetic field. Then choose the correct ratio of forces and their speeds.

A. $F_p : F_d : F_a = 4:2:1, V_p : V_d : V_a = 2:1:1$

B. $F_p : F_d : F_a = 2 : 1 : 1, V_p : V_d : V_a = 4 : 2 : 1$

C. $F_p : F_d : F_a = 1 : 2 : 1, V_p : V_d : V_a = 1 : 2 : 1$

D. $F_p : F_d : F_a = 1 : 1 : 1, V_p : V_d : V_a = 1 : 1 : 1$

Watch Video Solution

67. STATEMENT 1: A free rod when heated experiences no thermal stress.

STATEMENT 2: The rod when heated increases in length.

A. Statement 1 is true, Statement 2 is true, Statement 2 is the correct explanation of statement 1.

B. Statement 1 is true, Statement 2 is true

C. Statement 1 is true, Statement 2 is false

D. statement 1 is true, Statement 2 is true, Statement 2 is not the correct explanation of statement 1.

Answer: D

Watch Video Solution

68. STATEMENT 1: Two planets have same escape velocity & their masses are not equal.

STATEMENT 2: Ratio of mass to radius must be equal.

A. Statement 1 is true, Statement 2 is true, Statement 2 is the correct explanation of statement 1.

B. Statement 1 is true, Statement 2 is true

C. Statement 1 is true, Statement 2 is false

D. Statement 1 is true, Statement 2 is true, Statement 2 is not the correct explanation of statement 1.

Watch Video Solution

69. The time period of a $2m$ long simple pendulum is 2 seconds. Find the value of $'g'$ at that place?

A. $2\pi^2$

B. π^2

C. $4\pi^2$

D. $\pi^{/}2$

Answer: A

Watch Video Solution

70. The pitch of a micrometer screw gauge is 1 mm and the circular scale has 100 divisions. When there is nothing between the jaws, the zero of the circular scale is 8 divisions below the main scale. When a wire is put between the jaws, the 1st division of main scale is visible and 72nd division of circular scale coincides with main scale. The radius of wire is?

A. 1.8mm

B. 0.9mm

C. 1.64mm

D. 0.82mm

Answer: D

Watch Video Solution

71. If a train engine crosses a signal with a velocity u & has constant acceleration and the last bogey of train crosses the signal with velocity v, then middle point of train crosses the signal with velocity ?

A. $\frac{v+u}{2}$

B. $\sqrt{\frac{v^2+u^2}{2}}$

C. $\sqrt{\dfrac{v^2 - u^2}{2}}$

D. $\dfrac{v - u}{2}$

Answer: B

Watch Video Solution

72. Two satellites A and B revolve in around the earth in a circular orbits. Satellite A has mass $200kg$ revolving at a distance of $600km$ from the earth surface. Satellite B of mass $400kg$ revolves at a distance of $1600km$ from earth surface. What will be the ratio of their time period?

A. $\left(\dfrac{7}{8}\right)^{\frac{1}{2}}$

B. $\left(\dfrac{7}{8}\right)$

C. $\left(\dfrac{7}{8}\right)^{\frac{3}{2}}$

D. $\left(\dfrac{7}{8}\right)^{\frac{2}{3}}$

Answer: C

View Text Solution

73. Heat is supplied to a diatomic gas at constant pressure.

The ratio of $\Delta Q : \Delta U : \Delta W$ is

A. $5 : 7 : 1$

B. $5 : 7 : 2$

C. $2 : 7 : 5$

D. $1 : 1 : 1$

Answer: B

Watch Video Solution

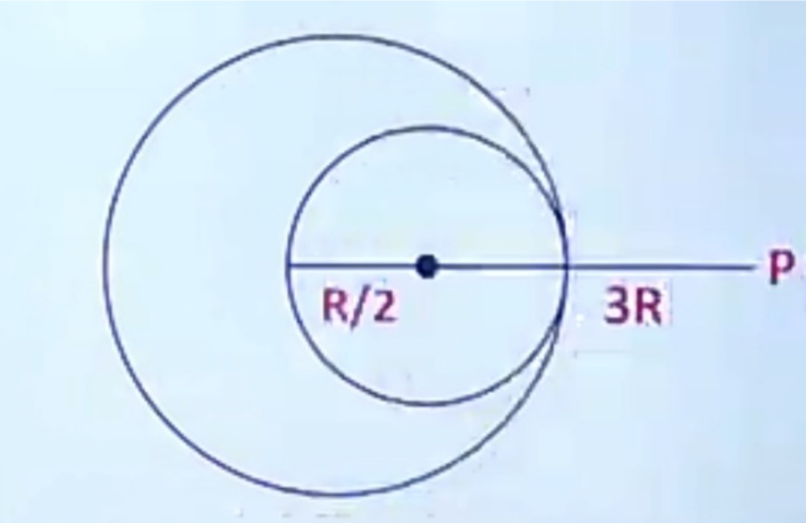
74. Match the following physical quantities with the correct dimensions ?

1	2
h (planck's constant)	$[M^1 L^2 A^{-1} T^{-3}]$
KE (kinetic energy)	$[M^1 L^2 T^{-1}]$
V (voltage)	$[M^1 L^1 T^{-1}]$
P (momentum)	$[M^1 L^2 T^{-2}]$

Watch Video Solution

75. A solid sphere of uniform density and radius R applies a gravitational force of attraction equal to F_1 on a particle placed at a distance 3R from the center of the sphere. The 1 sphere with the cavity now applies a gravitational force F_2, on the same particle. Then ratio

$\frac{F_1}{F_2}$ is



Watch Video Solution

76. If electric field is $3\hat{i} + 4\hat{j}$ then find out ratio of flux when a rectangular plane is put on x - z plane and when same plane is put on y - z plane.

A. $\phi_1 : \phi_2 = 4 : 3$

B. $\phi_1 : \phi_2 = 3 : 4$

C. $\phi_1 : \phi_2 = 2 : 3$

D. $\phi_1 : \phi_2 = 3 : 2$

Answer: A

Watch Video Solution

77. A gas follow $P = kV^3$.Find work done in raising temperature from 100^oC to 300^oC

Watch Video Solution

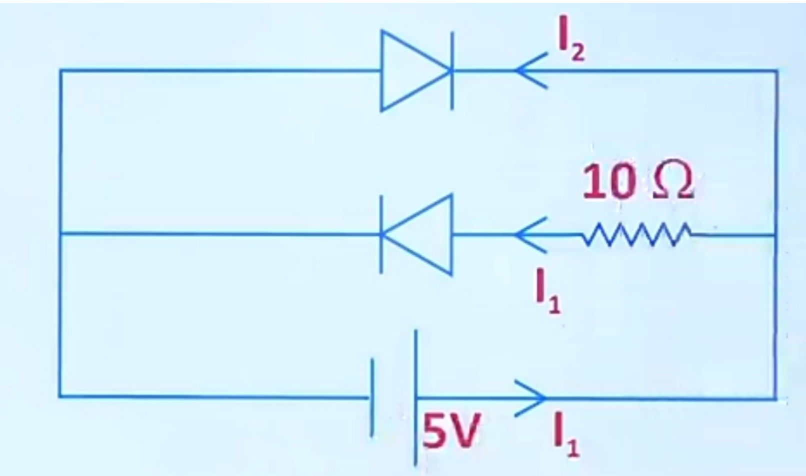
78. An α particle and a proton are accelerated from rest by a potential difference of 100V. After this, their de-Broglie wavelengths are λ_a and λ_p respectively. The ratio $\frac{\lambda_p}{\lambda_a}$, to the nearest integer, is.

Watch Video Solution

79. A convex lens gives same height image when object is placed at 10cm and 30cm. What is focal lenth of lens

Watch Video Solution

80. Find the value of current in circuit



Watch Video Solution

81. Half-life of a radioactive substance A is two times the half-life of another radioactive substance B. Initially, the number of A and B are

N_A and N_B, respectively . After three half-lives of A, number of nuclei of both are equal. Then, the ratio N_A / N_B is .

Watch Video Solution

82. A circular coil of wire consisting of 100 turns each of radius $8cm$ carries a current of $0.4A$. What is the magnitude of magnetic field at the center of the coil

Watch Video Solution

83. A proton, deutron and α particle are moving with same momentum in uniform magnetic field. The ratio of magnetic forces acting on them is__and their speed are in ratio___

Watch Video Solution

84. A box filled with gas moving with constant velocity 30 m/s. Having monoatomic gas of mass (4u). Now block is suddenly stopped. Then find the change in temperature of gas

A. 10K

B. 1K

C. 3K

D. 144K

Answer: D

Watch Video Solution

85. A drop is charged to 2V Now 512 drop & identical are combined to form a single drop there the voltage of bigger drop is?

A. 148V

B. 128V

C. 125V

D. 127V

Answer: B

Watch Video Solution

86. Resonance tube of diameter d = 6 cm. Sounded with tuning fork of frequency t= 504 Hz. t speed of sound is equal to 336 min. than find the height of air column.

A. 14.87cm

B. 10.32cm

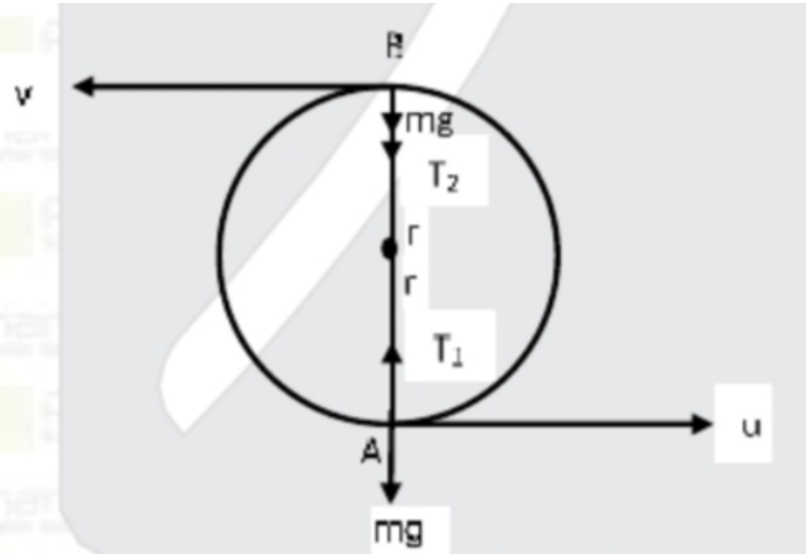
C. 24.52cm

D. 23.32cm

Answer: A

Watch Video Solution

87. A particle is moving in a vertical circle with radius 1 m. It the ratio of $\frac{T_{\max}}{T_{\min}} = 5$ find the velocity at highest point ?



A. 5m/s

B. 10m/s

C. 15m/s

D. 20m/s

Answer: A

Watch Video Solution

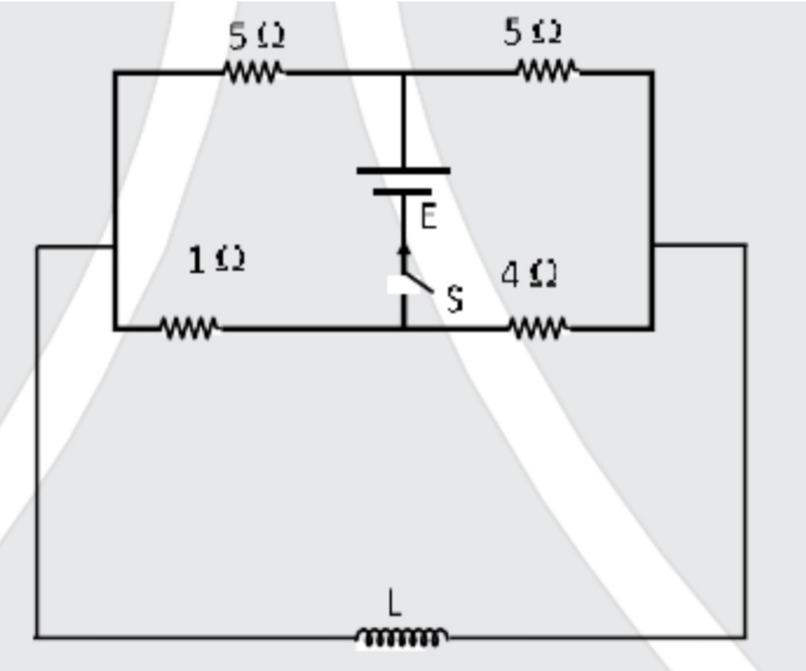
88. Potential energy is region is given by U= $\frac{\alpha}{r^{10}}$ - $\frac{\beta}{r^5}$ at equilibrium. Inter molecular distance between particle is given as r= $\left(\frac{2\alpha}{\beta}\right)^{\frac{a}{b}}$. Then a will be:

Watch Video Solution

89. Two sources of light whose ratio of intensities are $\frac{I_1}{I_2} = 2x$. Find the value of $\frac{I_{\max} - I_{\min}}{I_{\max} + I_{\min}}$

Watch Video Solution

90. Find the current passing through battery at $t = 0$ and $t = \infty$



A. $\left(\frac{5}{18}\right)E, \left(\frac{10}{33}\right)E$

B. $\left(\frac{10}{18}\right)E, \left(\frac{5}{33}\right)E$

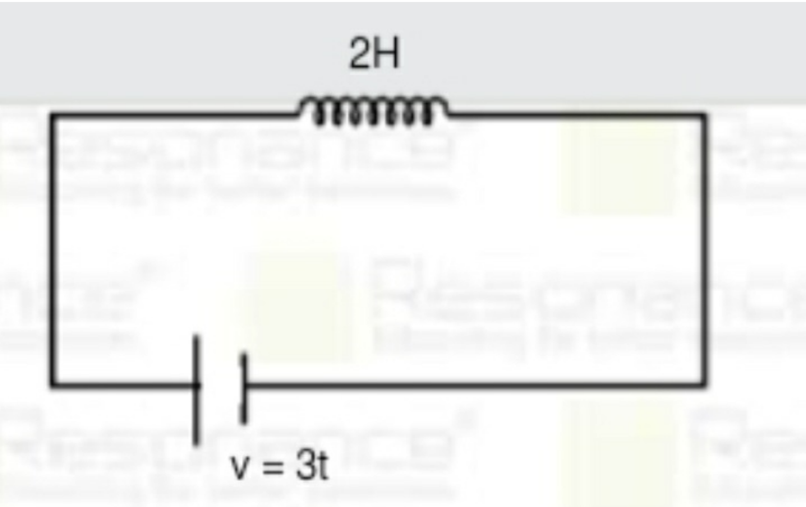
C. $\left(\frac{5}{9}\right)E, \left(\frac{10}{13}\right)E$

D. $\left(\frac{5}{10}\right)E, \left(\frac{20}{33}\right)E$

Answer: A

Watch Video Solution

91. A circuit contains an inductor of value 2H as shown at $t = 0$ no current was flowing through battery. Find the energy stored in inductor at t=4 sec.



A. $144J$

B. $150J$

C. $160J$

D. $180J$

Answer: A

Watch Video Solution

92. Statement-1: A message signal of frequency $1KHz$ modulate with carrier signal of frequency $1MHz$ bandwidth of modulated signal is $2KHz$

Statement-2: Maximum and minimum frequency of the modulated signal are $1002KHz$ and $998KHz$ respectively

A. Statement 1 is true, Statement 2 is true, Statement 2 is the correct explanation of statement 1.

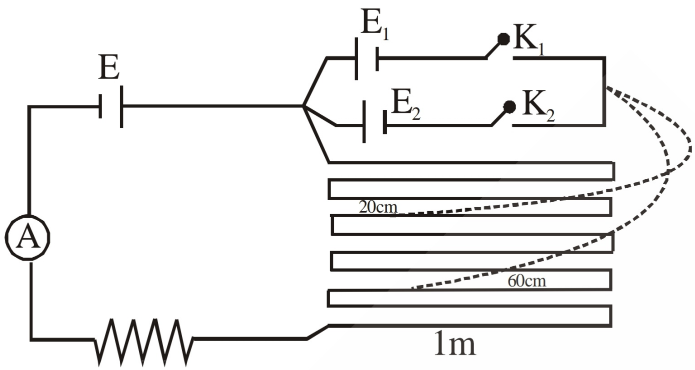
B. Statement 1 is true, Statement 2 is true

C. Statement 1 is true, Statement 2 is false

D. Statement 1 is true, Statement 2 is true, Statement 2 is not the correct explanation of statement 1.

Watch Video Solution

93. In given potentiometer experiment key K_1, is closed first keeping K_2 open and then K_2 is closed keeping K_1 open the figure shows the output, find $\frac{E_2}{E_1}$

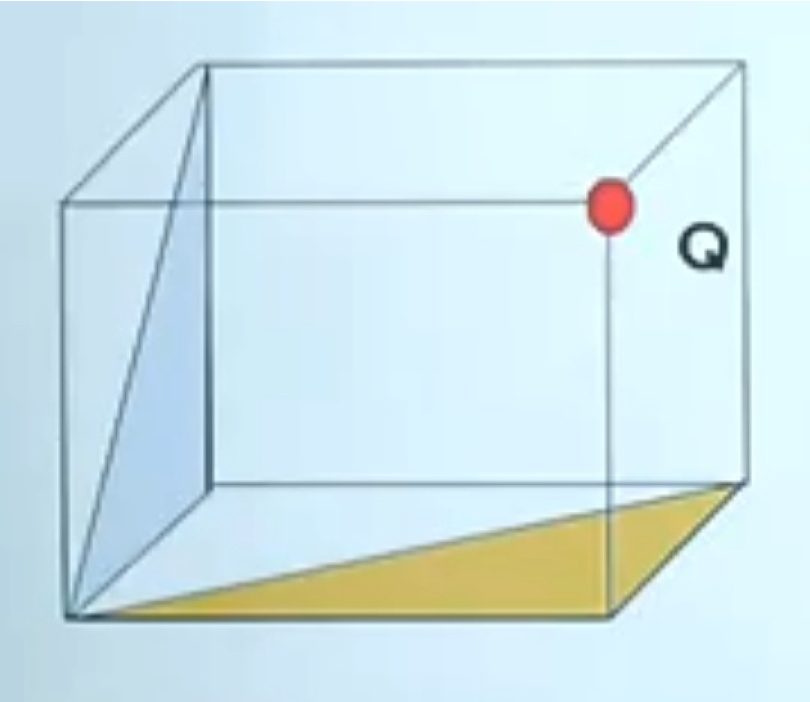


Watch Video Solution

94. A transmitter circuit used for transmission of EM waves having wavelength $960m$ If capacitor used in circuit was of $2.56 microF$, then the self inductance of the inductor coil used in the circuit such that resonance occurs, is $P \cdot 10^{-8}$ Find P

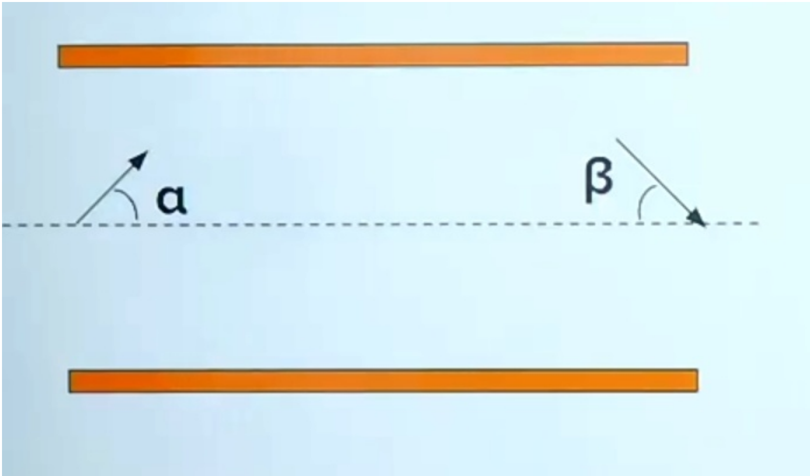
Watch Video Solution

95. Find the flux through shaded region, due to charge Q placed at vertex of a cube



Watch Video Solution

96. An electron enters with kinetic energy KE_1, between the plates of a capacitor with a velocity making angle α as shown and leaves with KE_2 making angle β?. Find $\frac{KE_1}{KE_2}$?



A. $\frac{\cos^2(\alpha)}{\cos^2(\beta)}$

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

C. $\frac{\sin(\alpha)}{\cos(\beta)}$

D. $\frac{\cos(\alpha)}{\sin(\beta)}$

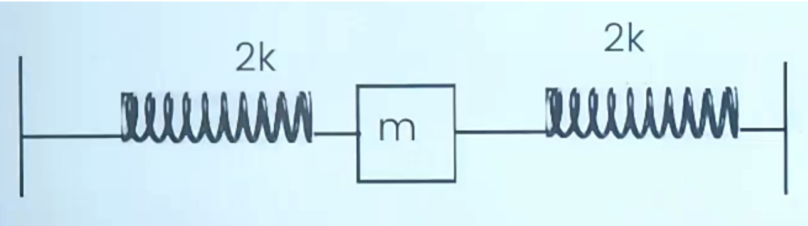
Answer: B

Watch Video Solution

97. If $\vec{A} \times \vec{B} = \vec{B} \times \vec{A}$, then the angle between $A \rightarrow B$ is

Watch Video Solution

98. Find the time period

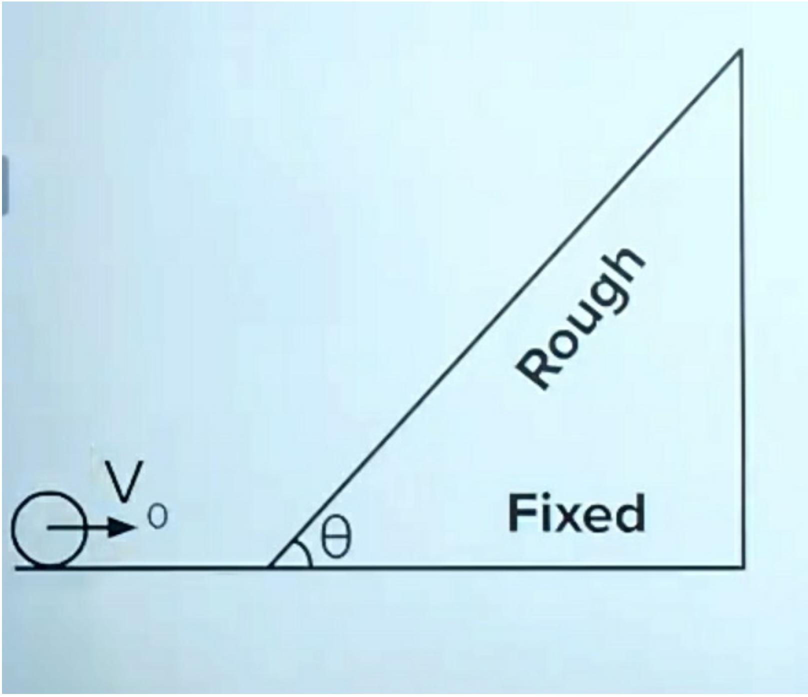


Watch Video Solution

99. Find the dimension of $\frac{1}{(4\pi)\varepsilon_0} \frac{e^2}{hc}\Bigg)$

Watch Video Solution

100. A solid spherical ball is rolling without slipping towards a fixed inclined plane with speed $V0$. Find the maximum height, that the ball reached on the incline.



Watch Video Solution

101. Two small conducting spheres have charges $2.1nC$ and $-0.1nC$are touched to each other and then separated by a distance of 0.5 m. Find the force between them

A. $18nN$

B. $72nN$

C. $9nN$

D. $36nN$

Watch Video Solution

102. Two masses $M_1 \& M_2$ have same kinetic energy. If $V_2 = 2V_1$, then find ratio of their momentum

A. $\sqrt[2]{}$

B. $($ root $(2))$

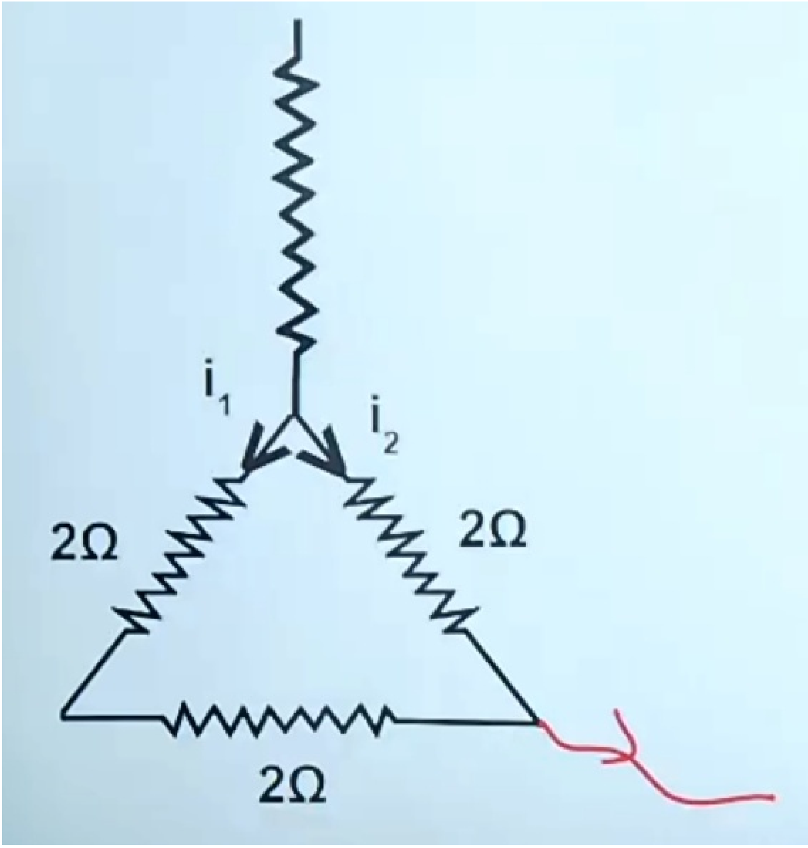
C. 2

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

Answer: C

Watch Video Solution

103. Find the ratio of $\frac{i_1}{i_2}$



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

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

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

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

Answer: A

Watch Video Solution

104. A stone is released from top of a building of height h. When it goes by $5m$ from top then at this $25m$ below the top of the building. Both the stones reached the ground simultaneously. Find height h of the building.

A. $25m$

B. $35m$

C. $40m$

D. $45m$

Watch Video Solution

105. In an amplitude modulated wave, message wave frequency f_m and carrier wave of frequency f_c Find out wavelength of amplitude modulated wave

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

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

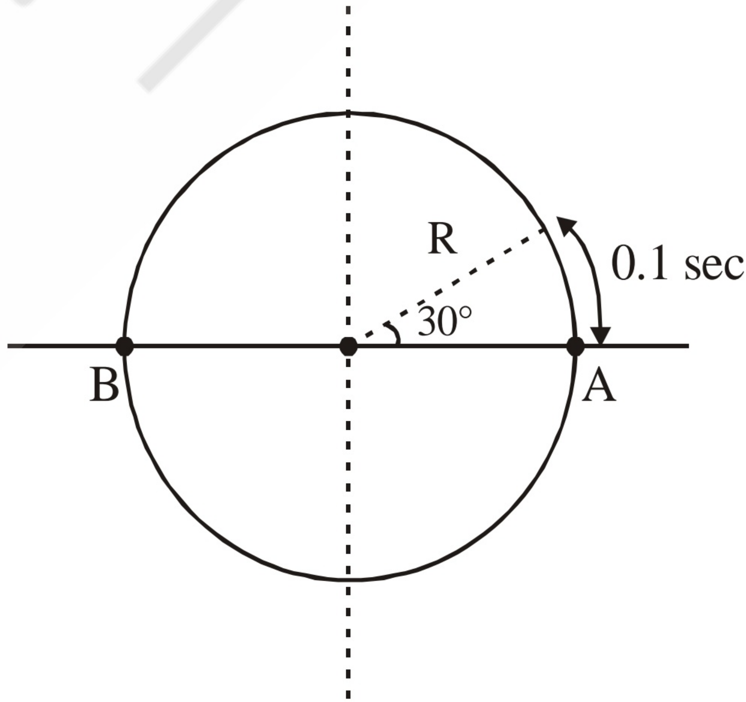
C. `c/(f_c+f_m)

D. $\frac{c}{f_c - f_m}$

Answer: A

Watch Video Solution

106. A unit mass particle is moving in a circle of radius R such that its projection on diameter executes SHM. In 0.1 sec interval, particle undergoes angular displacement of 30°. Find force acting on particle at position B. If it starts from A. ($R = 0.36 m$)



A. 9.7

B. 0.1

C. 100

D. 53.2

Answer: A

Watch Video Solution

107. Sun light is diffracted through a circular aperture of diameter $0.1 \mu m$. If diameter is slightly increased then

A. Size of circular fringe will increase intensity decrease

B. Size of circular fringe will increase intensity increase

C. Size of circular fringe will decrease intensity decrease

D. Size of circular fringe will decrease intensity increase

Answer: D

Watch Video Solution

108. Proton and electron are moving along circular path with same speed. Find out ratioof debroglie wavelength that is $\frac{\lambda_e}{\lambda_p} If$m_p =1836 m_e`

A. 1836

B. 1837

C. $\frac{1}{1836}$

D. $\frac{1}{1837}$

Answer: A

Watch Video Solution

109. In a given AC series circuit containing elements R, L and C & source voltage $= 220v$, and $\omega = 300ra\frac{d}{s}$ it is known that if L alone is removed or if C alone is removed, phase difference between current & voltage remains 45° Find i_rms? $(R = 110\Omega)$

A. $2A$

B. $2.5A$

C. $1A$

D. $1.5A$

Answer: A

Watch Video Solution

110. Statement-1 : Rotational KE of a gas molecule follows Maxwell's speed distribution curve.

Statement-2: Rotational KE & translational KE of a diatomic gas molecule is same,

A. 1-true 2-false

B. 1-false 2-true

C. 1-false 2-false

D. 1-true 2-false

Answer: C

Watch Video Solution

111. If an electron of a hydrogen atom jumps from $n = 2$ to $n = 1$ then find the wavelength of released photon

A. $121.5nm$

B. $123.15nm$

C. $125.15nm$

D. $128.15nm$

Answer: A

Watch Video Solution

112. In a photoelectric effect experiment, the stopping potential is 0.71 V and corresponding wavelength of incident photon was 491 nm. Now the stopping potential of battery is increased to 1.4 V. Find new wavelength of incident photon ?

A. $390nm$

B. $321nm$

C. $275nm$

D. $392nm$

Answer: B

Watch Video Solution

113. Two particles having mass $M_1 = 4gm, M_2 = 16gm$. If kinetic energy of both particle are equal then ratio of their momentum is $n:2$ then n is

A. 2

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

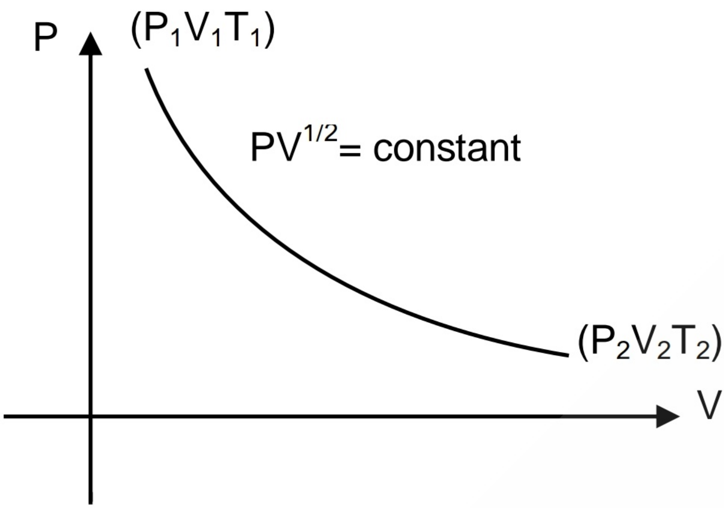
C. 4

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

Answer: B

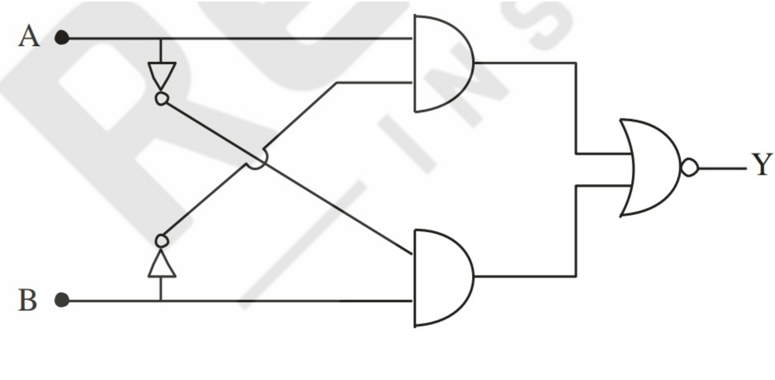
Watch Video Solution

114. A gas follows $PV^{\frac{1}{2}} = constant$ as shown. If $V_2 = 2V_1$, find $\frac{T_2}{T_1}$



Watch Video Solution

115. For given logic gate circuit, which truth table is right.



A.

A	B	Y
0	0	1
1	0	0
0	1	0
1	1	1

A	B	Y
0	0	0
1	0	1
0	1	0
1	1	0

B.

A	B	Y
0	0	0
1	0	0
0	1	0
1	1	1

C.

A	B	Y
0	0	0
1	0	1
0	1	1
1	1	1

D.

Answer: A::B::C::D

Watch Video Solution

116. Match the column I and column II.

Column I	Column II
(A) Transformer	(P) AC to DC
(B) Rectifier	(Q) Step up – Step down
(C) Filter	(R) Ripple is removed
(D) Stabiliser	(S) For any input, output would be same

Watch Video Solution

117. A particle starts performing SHM on a smooth horizontal plane and it is released from $x = \frac{A}{2}$ and it is moving in -ve x-direction then $\phi = ?$

A. $\frac{\pi}{6}$

B. $5\frac{\pi}{6}$

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

D. $\frac{\pi}{3}$

Answer: B

Watch Video Solution

118. For an extrinsic semiconductor if doping concentration is incrase then

A. For N-type and P-type fermi level will increase if $T > T_f$

B. For N-type fermi level will increase and for P-type fermi level will decrease

C. For N-type fermi level will decrease and for P-type fermi level will increase

D. For N-type fermi level will decrease and for P-type fermi level will decrease

Watch Video Solution

119. If tension is increased by 4% in vibrating string find $\%$ change in speed of wave?

Watch Video Solution

120. A satelite is projected from surface of earth so that it can attain 10R height from surface of earth . its speed is $V = V_e\left(\left(\text{root}\left(\frac{x}{11}\right)\right)\right)$ find x

Watch Video Solution

121. For Carnot engine $\frac{W}{Q \in} = \frac{1}{4}$. If sink temperature is decreased by $52\,^{\circ}C$ then $\frac{W}{Q \in} = \frac{1}{2}$. Find out source temperature in $^{\circ}C$.

Watch Video Solution

122. For a x-ray if it's wavelength is $10A^{\circ}$ & mass of a particle having same energy and same wavelength as x-ray is $\frac{xh}{3}$ where h is plank's constant then value of x is

Watch Video Solution

123. A particle is dropped from the top of a tower. When it has travelled a distance of $5m$, another particle is dropped from a distance of $25m$ below the top of tower. If both of them reach the bottom of tower simultaneously, then find the height of tower.

Watch Video Solution

124. What is the orientation of ferromagnetic material below curie temprature

A. Magnetization is zero

B. Magnetic dipole are randomly distributed

C. Material is paramagnetic

D. Magnetic dipole are aligned parellel

Answer: D

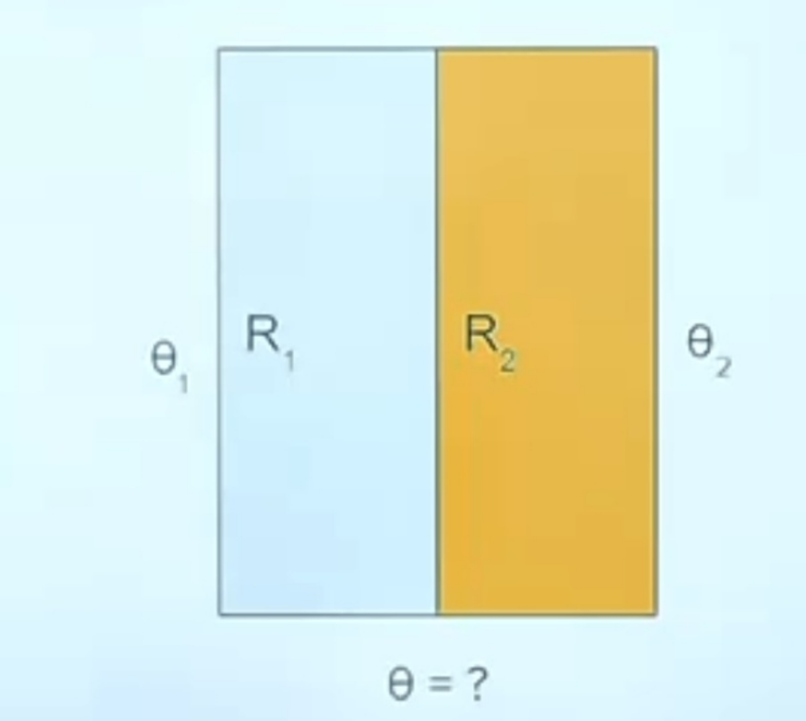
Watch Video Solution

125. Four identical solid spheres each of mass M and radius are fixed at four corners of a light square frame of side length b such that centres of spheres coincide with corners of square. Find out the moment of inertia of system about one side of square frame

Watch Video Solution

126. Two slabs are placed adjacently having thermal resistance $R_1 \& R_2$, their free ends maintained at temperature of θ_1, & and θ_2, respectively.

Find the temperature of junction.

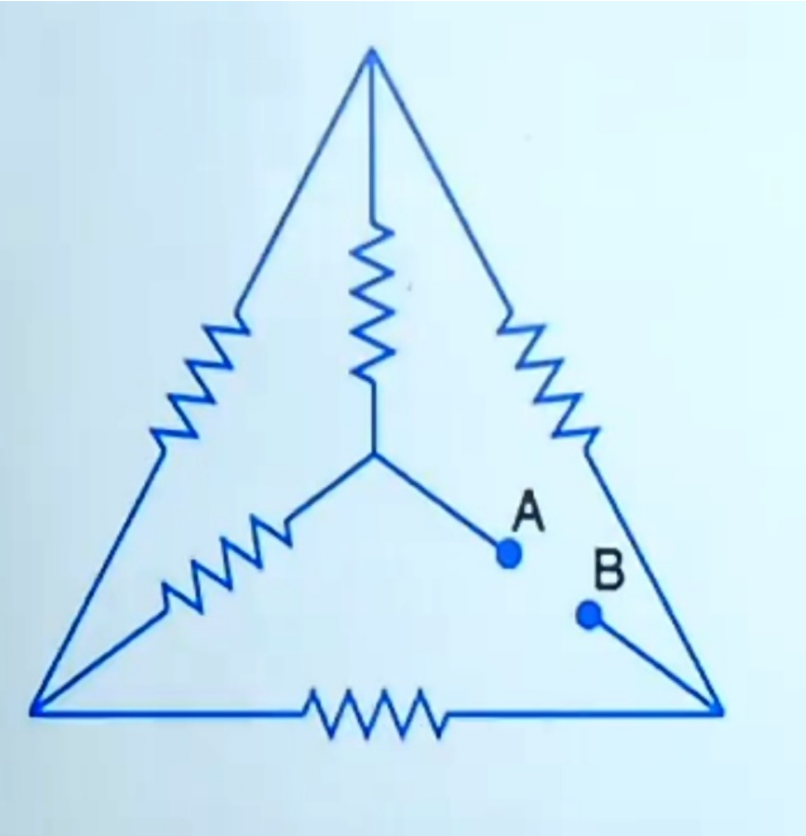


Watch Video Solution

127. When two capacitors C_1 and C_2 are in parellel, the equivalent capacitance is C_{II}. When the same two are in series the equivalent is C_s. The ratio of $\frac{C_{II}}{C_s}$ is $15:4$. Find $\frac{C_2}{C_1}$

Watch Video Solution

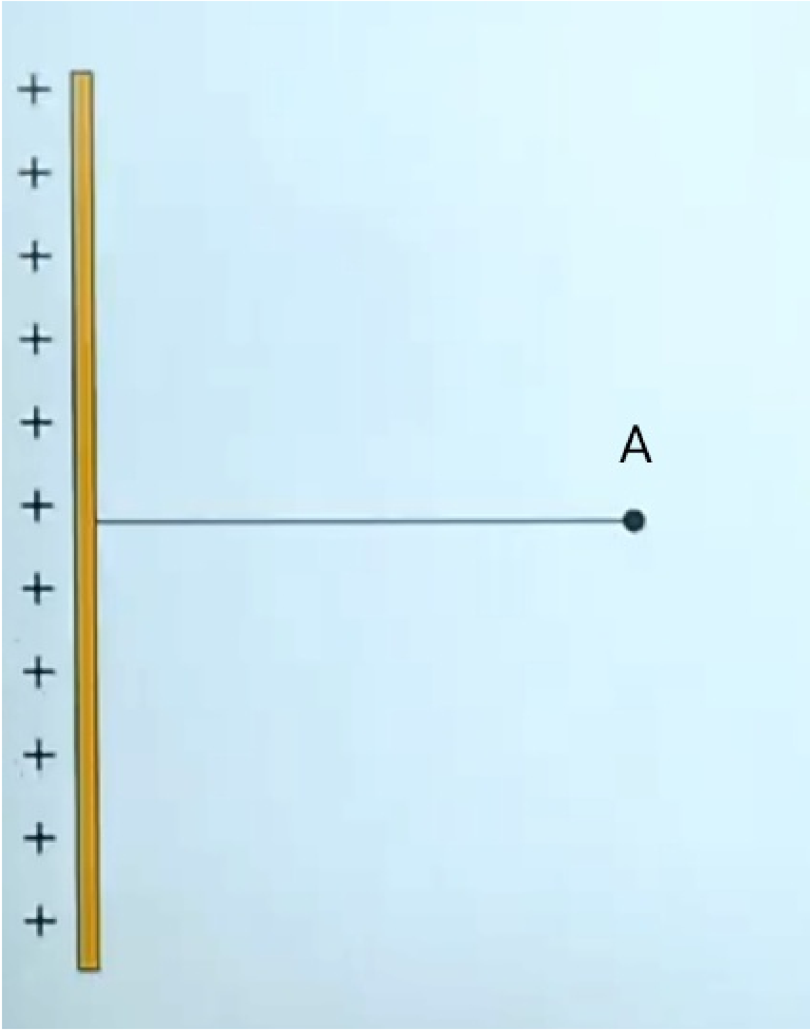
128. Find the equivalent resistance between A & B if all resistance are 'R' ?



Watch Video Solution

129. A wire of length L carries charge Q uniformly distributed along its length. Find the electric field at a distance $\frac{\sqrt{3}L}{2}$ from the wire at point

A as shown.



Watch Video Solution

130. Find the significant figure in 50000.020×10^{-3}

A. 6

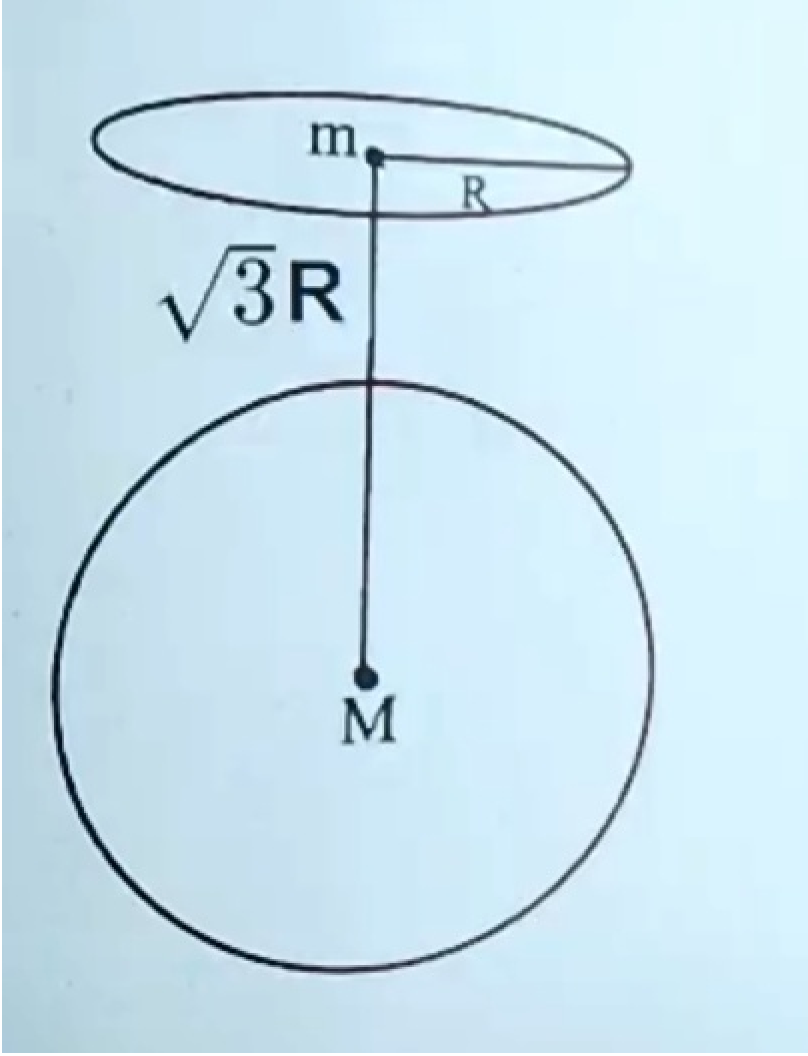
B. 7

C. 8

D. 9

Watch Video Solution

131. Find the force of attraction between a solid sphere of mass M and a ring of mass m as shown.



Watch Video Solution

132. For an amplitude modulated wave the max voltage is 16 volts and minimum voltage is 8 volts then if the modulation factor $n \cdot 10^{-2}$ then

n is ?

Watch Video Solution

133. A travelling wave is given by $y = -0.21\sin(x + 3t)$ where x is in m, t is in seconds, y is in mm. (mass per unit length $0.135\frac{g}{c}m$). Find the tension in the wire.

A. $0.1215N$

B. $20N$

C. $15.35N$

D. $5N$

Answer: A

Watch Video Solution

134. An AC current is given by $i(t) = I_1 \sin wt + I_2 \cos wt$. Find the rms value of current.

Watch Video Solution

135. Some drops each of radius r coalesce to form a large drop of radius R. The surface tension T. Find the change in surface energy per unit volume?

A. $T\left(\frac{1}{r} - \frac{1}{R}\right)$

B. $3T\left(\frac{1}{r} - \frac{1}{R}\right)$

C. $3T\left(\frac{1}{R} - \frac{1}{r}\right)$

D. $T\left(\frac{1}{R} - \frac{1}{r}\right)$

Watch Video Solution

136. A block of mass, 2 kg is kept on a smooth surface as shown. It is being applied by a force $F = 20\hat{i} + 10\hat{j}$ Find the displacement of the block in 10 seconds.

A. 500m

B. 10m

C. 100m

D. 50m

Answer: A

Watch Video Solution

137. If the force acting on the body moving in uniform circular motion is inversely proportional to r^3, then the time period of its revolution is proportional to ?

Watch Video Solution

138. In YDSE experiment separation between plane of slits and screen is $1m$. Separation between slits is $2mm$. The wavelength of light is $500nm$. The fringe width is

A. 0.85 mm

B. 0.50 mm

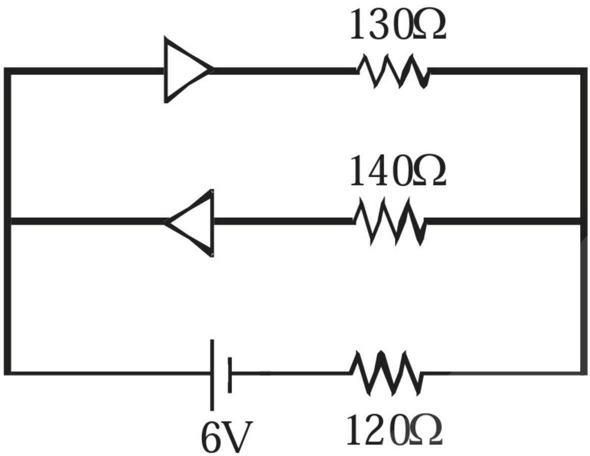
C. 0.75 mm

D. 0.25 mm

Answer: D

Watch Video Solution

139. Find the current I in circuit



A. 20 mA

B. 2 mA

C. 0.1 mA

D. 10 mA

Answer: A::B

Watch Video Solution

140. Assume that a tunnel is dug along a cord of earth at a perpendicular distance $\frac{R}{2}$ from earth's centre where R is the radius of earth. The wall of tunnel is frictionless. Find the time period of particle excuting SHM in tunnel

Watch Video Solution

141. Find the ratio of wavelength of 3rd member of lyman to 1st member of paschen series

Watch Video Solution

142. A material has normal density ρ and bulk modulus K. The increase in the density of the material when it is subjected to an external pressure P from all sides is

A. $\frac{P}{\rho K}$

B. $K\frac{P}{\rho}$

C. $P\frac{\rho}{K}$

D. $K\frac{\rho}{P}$

Answer: C

Watch Video Solution

143. If W=work done, T= Temperature, k_B= boltzmann constant X = discplacement & $W = \left(\alpha^2\right)\beta e^{\frac{-x^2\beta}{Tk_B}}$ then find dimension of β

Watch Video Solution

144. Statement-1 Resolving power of electron microscope is greater than optical microscope : Statement-2 De-broglie wavelenth of electron is very less than visible light

A. S-1 is true S-2 is true but S-2 is not correct explanation of S-1

B. S-1 is true S-2 is true and S-2 is correct explanation of S-1

C. S-1 is correct S-2 is false

D. Both statements are false

Answer: B

Watch Video Solution

145. In a spherical mirror height of an object is 100 cm and height an image is 25 cm and their orientations are same then

A. real image, convex mirror

B. real image concave mirror

C. virtual image , concave mirror

D. virtual image , convex mirror

Answer: D

Watch Video Solution

Watch Video Solution

146. In a gas LED separation between valance band and conduction band is $1.9 eV$. Then the light emitted is:

A. 1024 nm , Red

B. 1024 nm , Orange

C. 654 nm , Red

D. 654 nm , Orange

Watch Video Solution

147. A planet is revolving about sun in an elliptical orbit. Choose the correct option based on the statements given below, (i) Areal velocity is constant. (ii) Arval velocity is proportional to velocity (iii) When planet is nearest to sun it's speed is maximum, (iv) Planet will move with constant speed. (v) Areal velocity is inversely proportional to velocity.

A. (i) is correct

B. (ii) is correct

C. (iv) is correct

D. (v) is correct

Answer: A

Watch Video Solution

148. Object of mass M (M>> m) moving with velocity u collides with the object of mass m. at rest Consider following statements.

Statement (1): After collision maximum velocity of object of mass m will be 2u.

Statement (2): In elastic collision kinetic energy and momentum both are conserved.

A. S-1 is true S-2 is true but S-2 is not correct explanation of S-1

B. S-1 is true S-2 is true and S-2 is correct explanation of S-1

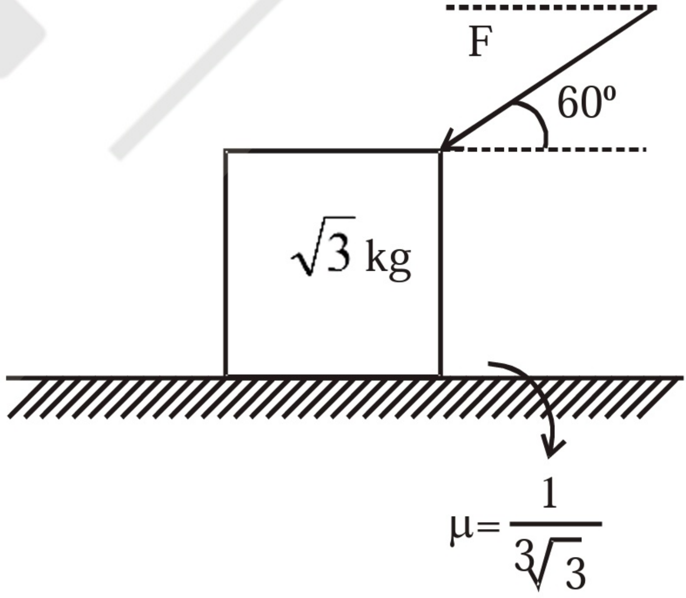
C. S-1 is correct S-2 is false

D. Both statements are false

Answer: B

Watch Video Solution

149. If limiting value of force for block just to slide is 3x, then write the value of x



Watch Video Solution

150. In a series L-C-R circuit At resonance quality factor is 100. Now value of self inductance doubled and resistance is decreased two fold then find new value of quality factor.

Watch Video Solution

151. A 1000 W bulb has optical efficiency 1.2%. Find the amplitude (V/m) of electric field at distance $2m$ from bulb?

Watch Video Solution

152. A non-conducting container is divided into two parts of volume 4.5 Litre and 5.5 Litre, pressure 2 atmosphere and 3 atmosphere, number of moles 3 and 4. If partition valve is opened then find out common pressure (in atmosphere). (In both parts ideal gases are identical)

Watch Video Solution

153. 20 coulomb charge flows through 15 volt battery in a certain interval. Find work done (in J) by the battery?

Watch Video Solution

154. When a man holding spring balance in stationary lift then it's reading is $60kg$. Now if lift starts descends with constant acceleration 1.8 m/s^2 then what is the new reading of spring balance in newton (take g =10 m/s^2)

Watch Video Solution

155. If a wire of length l has a resistance of R, is stretched by 25%. The percentage change in its resistance is ?

A. 25%

B. 50%

C. 45.5%

D. 56.25%

Answer: D

Watch Video Solution

156. Find the dimension of $\frac{C}{V}$ where C= Capacitance and V is potential difference

Watch Video Solution

157. A radioactive sample is undergoing α - decay. At time t_1, its activity is A & at A another time t_2, the activity is $\frac{A}{5}$. What is the average life time for the sample

A. $\frac{t_1 - t_2}{\ln 2}$

B. $(t_1 - t_2)\ln 5$

C. $\frac{t_1 - t_2}{2}$

D. $\frac{t_2 - t_1}{\ln 5}$

Answer: D

Watch Video Solution

158. STATEMENT 1: A seconds pendulum, has a time period of 1 second. STATEMENT 2: It takes precisely 1 second to move between the two extreme positions.

A. Statement 1 is true, Statement 2 is true, Statement 2 is the correct explanation of statement 1.

B. Statement 1 is false, Statement 2 is true

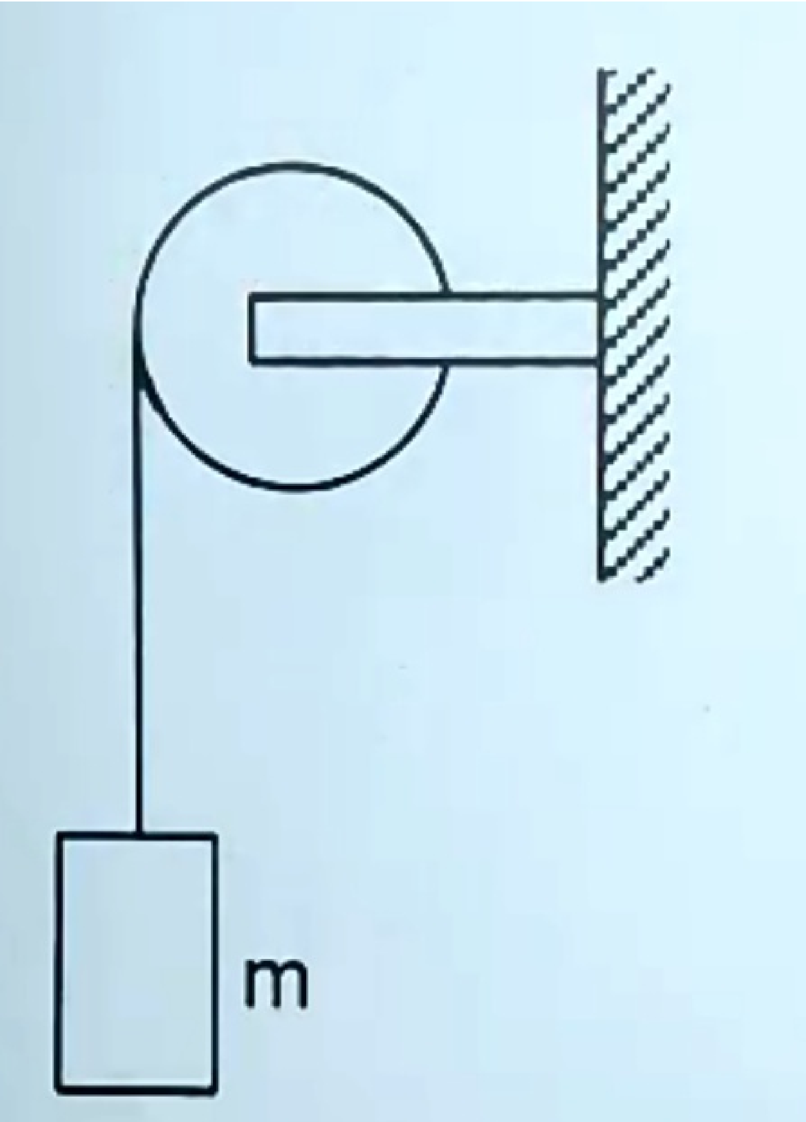
C. Statement 1 is true, Statement 2 is false

D. statement 1 is true, Statement 2 is true, Statement 2 is not the correct explanation of statement 1.

Answer: B

Watch Video Solution

159. A chord is tied to a wheel of moment of inertia I and radius r. The other end is attached to a mass m as shown. If the mass m falls by a height h then the square of angular speed of the wheel is ?



Watch Video Solution

160. An aeroplane with its wings spread $10m$ is flying with speed $180k\frac{m}{h}$ in horizontal direction. The total intensity of earth's field is $2.5X10^{-4}$ Tesla and angle of dip is $60°$. Then find emf induced between the tips of the plane wings.

A. $108.25mV$

B. $54mV$

C. $216mV$

D. $140mV$

Answer: A

Watch Video Solution

161. Velocity v/s position graph of a body performing SHM is

A. elipse

B. circle

C. parabola

D. straight line

Answer: A

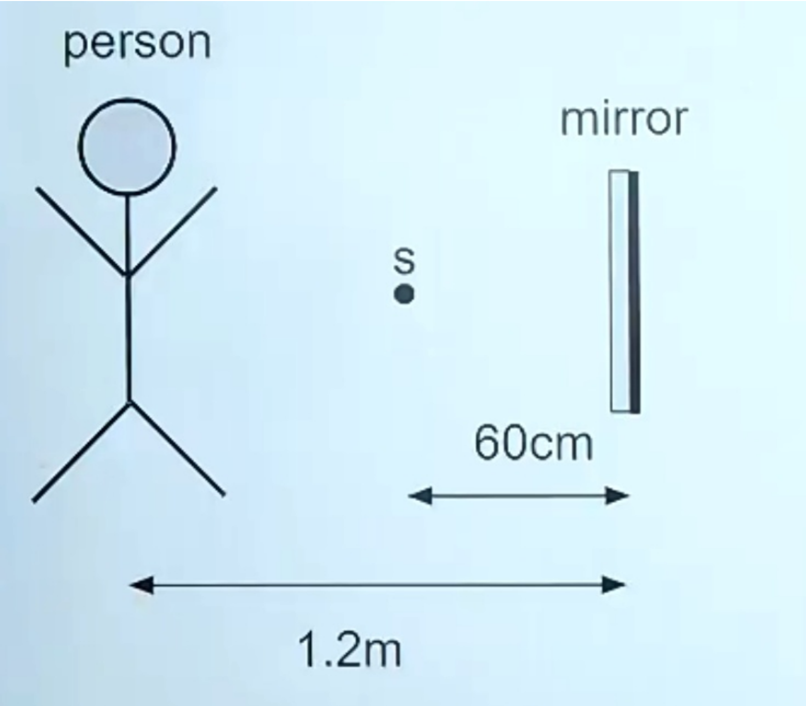
Watch Video Solution

162. What is the recoil velocity of Hydrogen atom when a photon is emitted due to corresponding transition from $n = 5$ to $n = 1$. (R_H = Rydberg's constant, m_H, = mass of hydrogen)

Watch Video Solution

163. A person walks parallel to a $50cm$ wide plane mirror as shown. How much distance will he be able to see the image of a source placed $60cm$

in front of it ?



A. $50cm$

B. $100cm$

C. $150cm$

D. $200cm$

Answer: C

Watch Video Solution

164. If incident ray, refracted ray and normal ray are represented by unit vectors $\vec{a}, \vec{b},$ and $\vec{c}$ then relation between them is ?

A. $\vec{a} - \vec{b} = \vec{c}$

B. $\vec{a}.\left(\vec{b} \times \vec{c}\right) = 0$

C. $\vec{a} + \vec{c} = 2\vec{b}$

D. $\vec{a} \times \left(\vec{b} \times \vec{c}\right) = 0$

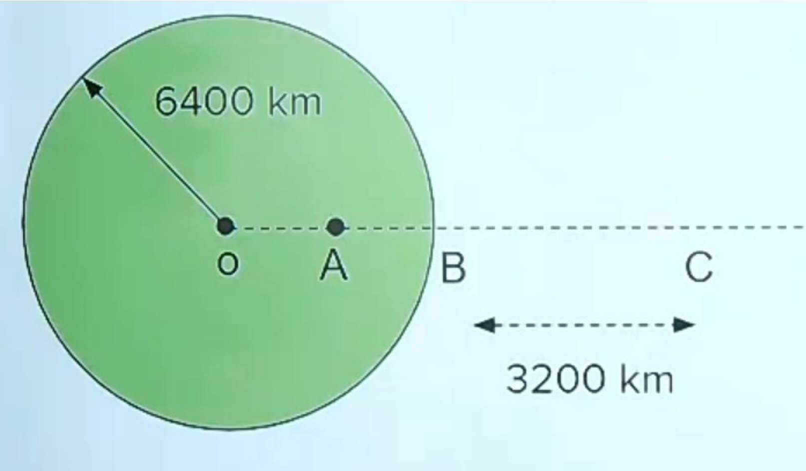
Answer: B

Watch Video Solution

165. A body starts from rest & moves with constant acceleration a_1 for time t_1 then it retards uniformly with a_2, in time t_2 and finally comes at rest. Find $\frac{t_1}{t_2}$

Watch Video Solution

166. For earth's gravitaion- given : $[g_A = g_c < g_B]$ Find $\frac{OA}{AB}$



A. $1:1$

B. $2:3$

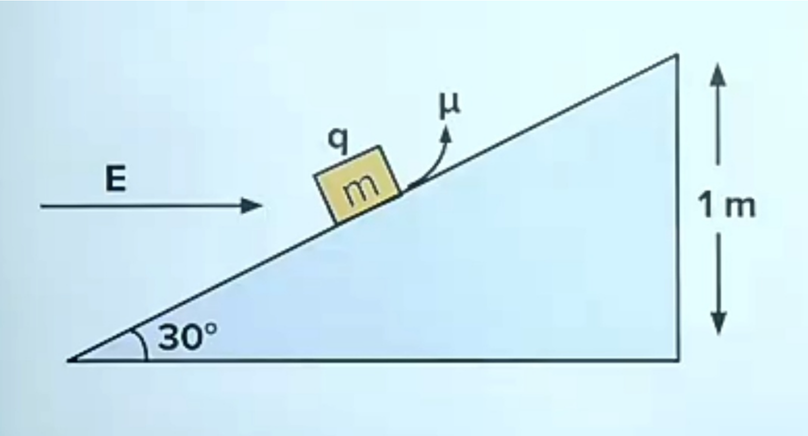
C. $4:5$

D. $4:9$

Answer: C

Watch Video Solution

167. Find the time taken by the block to reach the bottom of inclined plane. $E = 200\hat{i}$ N/C , $M = 1kg$,$q = 5mC, g = 10\frac{m}{s^2}$ $\mu = 0.2$



A. 1.31 sec

B. 1.65 sec

C. 1.9 sec

D. 2.3 sec

Answer: A

Watch Video Solution

168. If internal energy of gas is $U = 3PV + 4$ then the gas can be

A. monoatomic

B. diatomic

C. polyatomic

D. either mono or diatomic

Answer: C

Watch Video Solution

169. The length of a metal wire is l_1 when the tensionin it is T_1 and $is l_2$ when the tension is T_2. The natural length of the wire is

Watch Video Solution

170. 27 identical drops, each charged to potential 10 volts, combined to form a bigger drop. Find potential of this bigger drop ?

A. $148V$

B. $90V$

C. 180 V`

D. $127V$

Answer: B

Watch Video Solution

171. Initially, energy of incident photon was double of the work function of metal in a photoelectric effect. Finally energy of incident photon made 10 times of the work function. The ratio of maximum possible speed of photo electrons in initial & final case is $\frac{\alpha}{\beta}$. Then find minimum value of α :

A. 2

B. 1

C. 4

D. 3

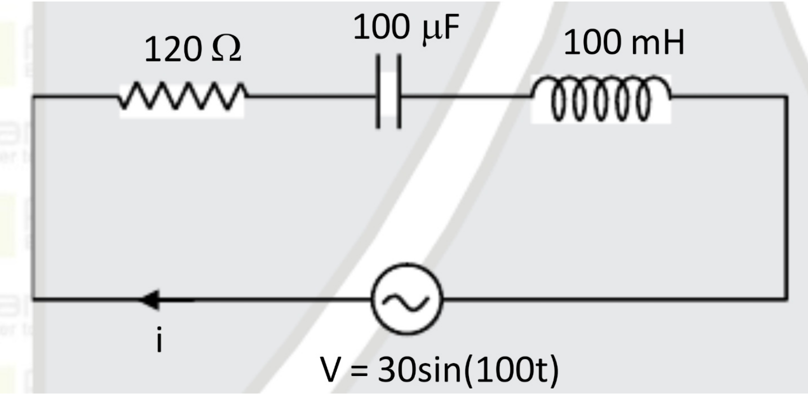
Answer: B

Watch Video Solution

172. A particle is performing SHM. At what distance from mean position, the velocity of the particle becomes half of the maximum velocity ?

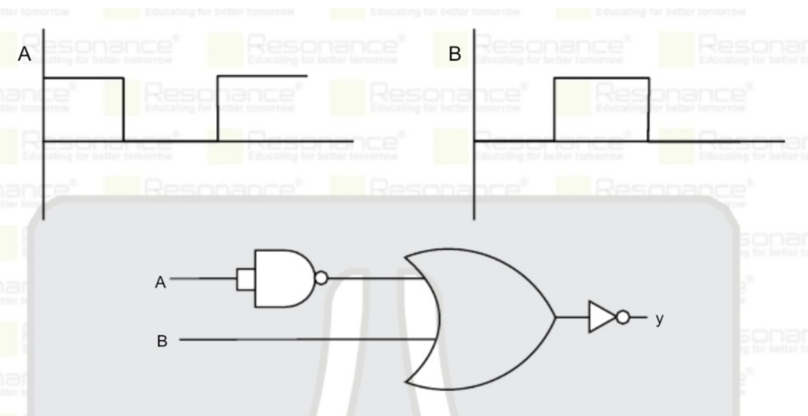
Watch Video Solution

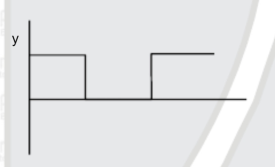
173. R-L-C series AC circuit shown in fig. Find `i_(max)

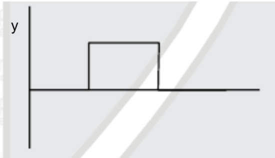


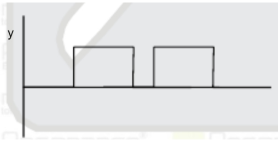
Watch Video Solution

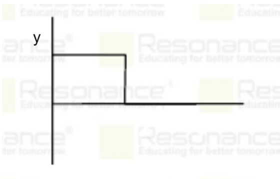
174. The following inputs are given to following circuit



A. 

B. 

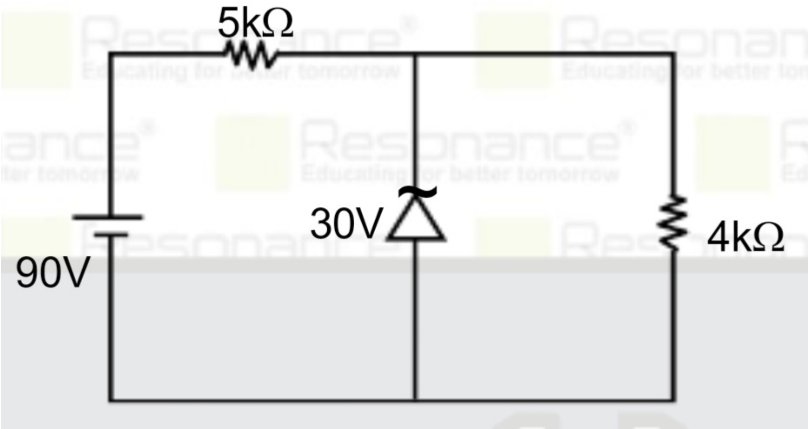
C. 

D. 

Answer: A

Watch Video Solution

175. A zener diode of $30V$ is connected as shown with $90V$ battery as shown in figure. Calculate the current passing through the diode.



A. $7.5mA$

B. $12mA$

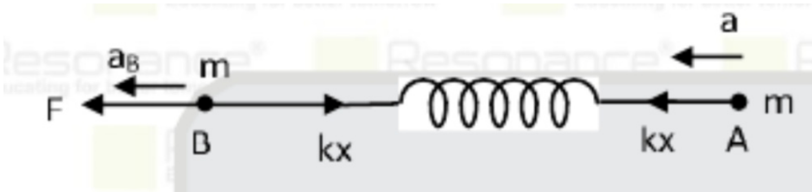
C. $4.5mA$

D. $10mA$

Answer: C

Watch Video Solution

176. Two point masses, each of mass 'm' are connected to the end of spring. If force F is applied on one of the mass, then find the acceleration of this mass if the acceleration of other mass is a ?



Watch Video Solution

177. Trajectory of a projectile is given by $y = \alpha x + \beta x^2$. Then find $(\alpha + \beta)$.

Watch Video Solution

178. Statement-1: In a simple microscope, angular height of image is same as angular height of object Statement-2 : Least distance of distinct vision for an eye is $25cm$. If object is placed at a distance less than 25 cm angular height increases.

A. Statement 1 is true, Statement 2 is true, Statement 2 is the correct explanation of statement 1.

B. Statement 1 is false, Statement 2 is true

C. Statement 1 is true, Statement 2 is false

D. statement 1 is true, Statement 2 is true, Statement 2 is not the correct explanation of statement 1.

Answer: d

Watch Video Solution

179. For one mole of an ideal monoatomic gas, volume and temperature are related as $V = KT^{\frac{2}{3}}$. If change in temperature of gas is 90K, then work done is given by W = xR. Find value of x

A. 60

B. 20

C. 90

D. 30

Answer: A

Watch Video Solution

180. Two hollow spheres (1 and 2) each having charge Q distributed uniformly. A dipole is placed inside a sphere-1.and nothing is placed inside sphere-2. Choose the correct statement regarding electric field (E) inside the sphere and electric flux (ϕ) linked with the spheres

A. $\phi_1 = 0, E_1 = 0$ and $\phi_2 = 0, E_2 = 0$

B. $\phi_1 \neq 0, E_1 = 0$ and $\phi_2 = 0, E_2 \neq 0$

C. $\phi_1 \neq 0, E_1 \neq 0$ and $\phi_2 \neq 0, E_2 = 0$

D. $\phi_1 \neq 0, E_1 \neq 0$ and $\phi_2 \neq 0, E_2 \neq 0$

Answer: C

Watch Video Solution

181. A particle is executing SHM with time period T Starting from mean position, time taken by it to complete $\frac{5}{8}$ oscillations is,

Watch Video Solution

182. Statement-1: Time period of a second pendulum is 1 sec. Statement-2 : Time taken to complete half of oscillation is precisely 1 sec.

A. Statement 1 is true, Statement 2 is true, Statement 2 is the correct explanation of statement 1.

B. Statement 1 is false, Statement 2 is true

C. Statement 1 is true, Statement 2 is false

D. statement 1 is true, Statement 2 is true, Statement 2 is not the correct explanation of statement 1.

Answer: B

Watch Video Solution

183. Two tuning forks, one of frequency $340Hz$ and second of some unknown frequency produces 5 beats. When filling is done to second fork, then they produces 2 beats. Find initial frequency of second tuning fork.

A. $342Hz$

B. $338Hz$

C. $345Hz$

D. $335Hz$

Answer: D

Watch Video Solution

184. Carrier frequency and band width of a signal is $5.4MHz$ and $90kHz$ respectively. How many channels are there ?

Watch Video Solution

185. Heat and Work are

A. extensive variables

B. intensive variables

C. path functions

D. point functions

Answer: C

Watch Video Solution

186. The stopping potential eV_s depends on

A. frequency

B. $amplitude$

C. $phase$

D. intensity`

Watch Video Solution

187. 16 gm O_2, 28 gm N_2, 44 gm CO_2 at V, T. Find P

A. $\frac{3}{2}R\frac{T}{V}$

B. $\frac{5}{2}R\frac{T}{V}$

C. $\frac{1}{2}R\frac{T}{V}$

D. $R\frac{T}{V}$

Watch Video Solution

188. Height of Antenna = 25m, Height of building = 75m. Find wavelength

A. 100

B. 200

C. 300

D. 400

Watch Video Solution

189. The magnetic moment of a magnetised steel wire is M. If wire is bent to form a semin-circular arc then magnetic moment becomes

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

B. $\pi\frac{m}{2}$

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

D. $\frac{m}{4}\pi$

Answer: C

Watch Video Solution

190. If the body is taken in a lift up with a $a = \frac{g}{2}$. Then new time period?

A. $2\pi\sqrt{3\frac{l}{2}g}$

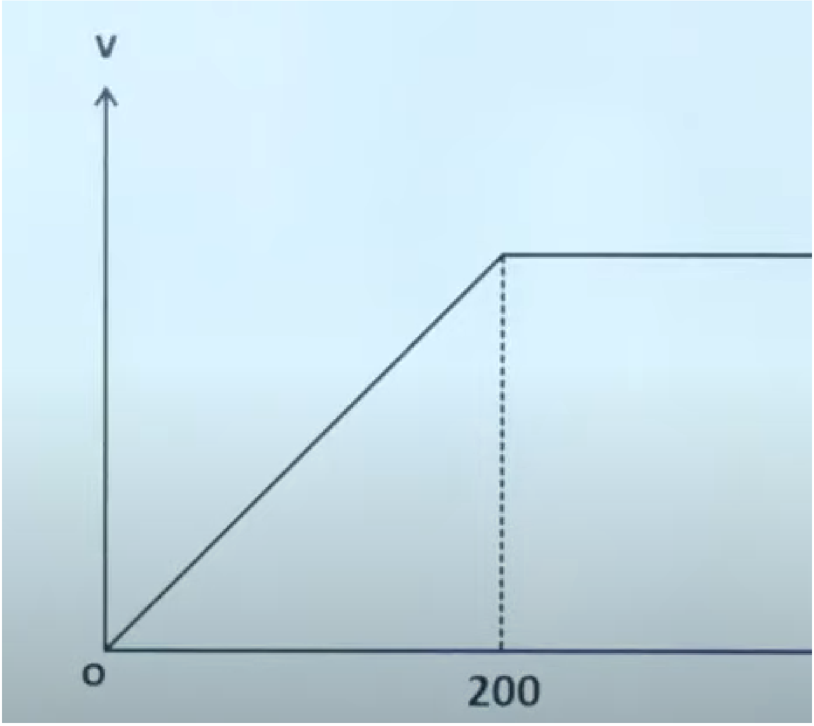
B. $2\pi\sqrt{3\frac{l}{4}g}$

C. $2\pi\sqrt{2\frac{l}{3}g}$

D. $2\pi\sqrt{\frac{l}{g}}$

Watch Video Solution

191. Velocity-displacement graph is given in figure below. Then draw acceleration-displacement graph



Watch Video Solution

192. Take a square ABCD of side l and BD is diagnol. Find MOI along a line passing through corner parallel to BD

A. $3ml^2$

B. $2ml^2$

C. ml^2

D. $4ml^2$

Watch Video Solution

193. A pendulum is located inside lift.If initially time period is pendulum is T. Find its time period if lift accelerate upwards with acceleration g/2

Watch Video Solution

194. The angle of deviation is minimum at

1. i &e are symmetric about prism

2. i = e

3. ray inside prism is parallel to prism

4. e = 2i

A. all 1,2,3

B. 1,3

C. 2,3

D. 3,4

Watch Video Solution

195. Inside a parallel plate capacitor of width 'd' a di-electric plate with dielectric constant k & width 3d/4 is inserted the new capacitance is C'. Before insertion of dielectric the capacitance was C_0. Find relation between $C_0 \& C'$

Watch Video Solution

196. Pressure due to water at distance $d = 6 \times 10^{-3}$. Find % pressure change at d = 2d

A. 100

B. 33.33

C. 200/3

D. 50

Watch Video Solution

197. In em wave, energy densities in magnetic and electric fields are

A. greater

B. lesser

C. equal

D. not equal

Watch Video Solution

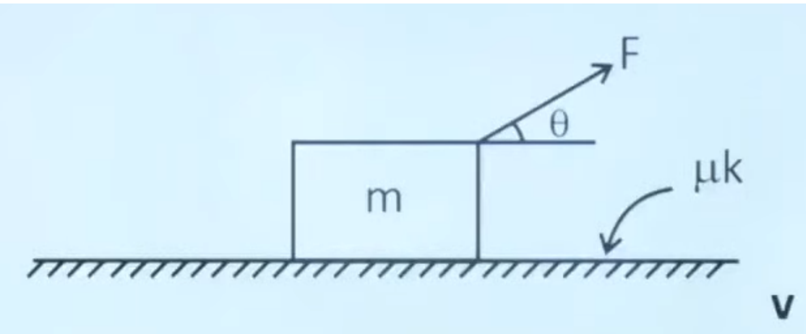
198. In YDSE apparatus screen is placed at distance of 1m, seperation between slit is 1 mm and fringe width is 6mm. Find wavelength of light in nm.

Watch Video Solution

199. If $\phi = 3eV$ and $\lambda = 248nm$ then de-broglie wavelength is

Watch Video Solution

200. Find acceleration of block in x-direction

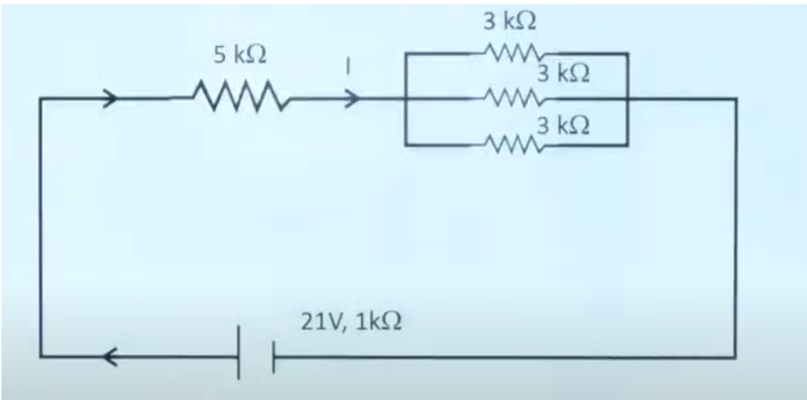


V

Watch Video Solution

201. Length of a main scale division of vernier calliper is a cm & (n-1) division of main scale are equal to n-division of vernier scale. Find least count

Watch Video Solution

202. Find I. 

Watch Video Solution

203. Two wire A and B whose resistivity length area potential and current are ρ, L, A, V, I and `rho, 2L, A/2, V resp. Find current in wire B

Watch Video Solution

204. Relation between energy density of electric field and magnetic field in em wave.

A. $U_E = U_B$

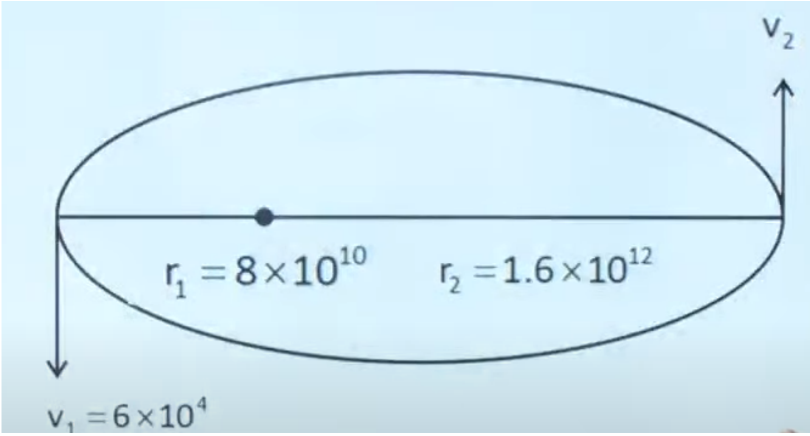
B. $U_E > U_B$

C. $U_E < U_B$

D. $U_E \neq U_B$

Answer: A

Watch Video Solution

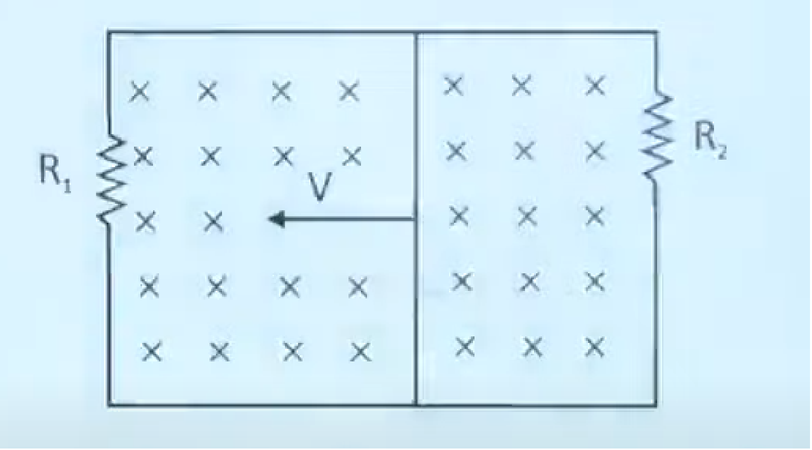
205. Find v_2. 

Watch Video Solution

206. If $\lambda_1, \lambda_2, \lambda_3$ are wavelengths of first 3 lines of balmer series. Find $\frac{\lambda_1}{\lambda_3}$

Watch Video Solution

207. Find direction of current.



A. clockwise in both

B. anticlockwise in both

C. anticlockwise and clockwise

D. clockwise and anticlockwise

Answer: D

Watch Video Solution

208. A body is moving in vertical circle with time period of 40 seconds. If radius is 20cm mass of body is 200 gm then find normal reaction along vertical side of the path is

A. $1x10^{-3}N$

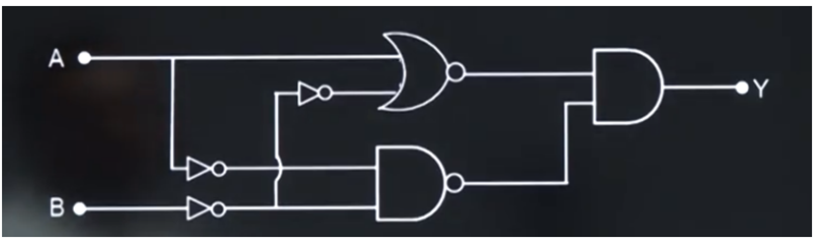
B. $2.5x10^{-3}N$

C. $5x10^{-3}N$

D. $7.5 \times 10^{-3}N$

Watch Video Solution

209. In the given following logic gates input of A & B may be 0 & 1 find output of gate.



Watch Video Solution

210. A planet is revolving around the Sun in an elliptical orbit. Its closest distance from the Sun is r and farthest distance is R. If the orbital velocity of the planet closest to the Sun is v, then what is the velocity at the farthest point?

A. $v_1 \frac{r_2}{r_1}$

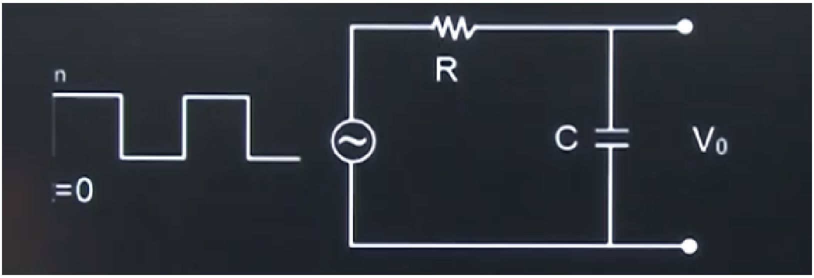
B. $v_1 \frac{r_1}{r_2}$

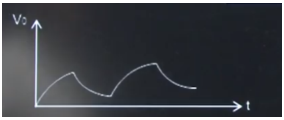
C. $v_1 \frac{\left(r_1\right)^2}{\left(r_2\right)^2}$

D. `v_1 (r_2)^2/(r_1)^2

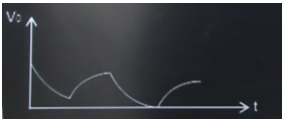
Watch Video Solution

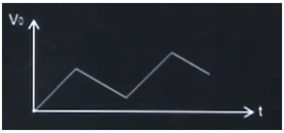
211. Output (V_0) of thegiven RC circuit is



A. 

B. 

C. 

D. 

Watch Video Solution

212. The voltage measured across resistance is $V = (50 \pm 0.1)V$ and current is$I = (10 \pm 0.2)$. Find error in resistance

A. $\pm 1.12 ohm$

B. $\pm 0.11 ohm$

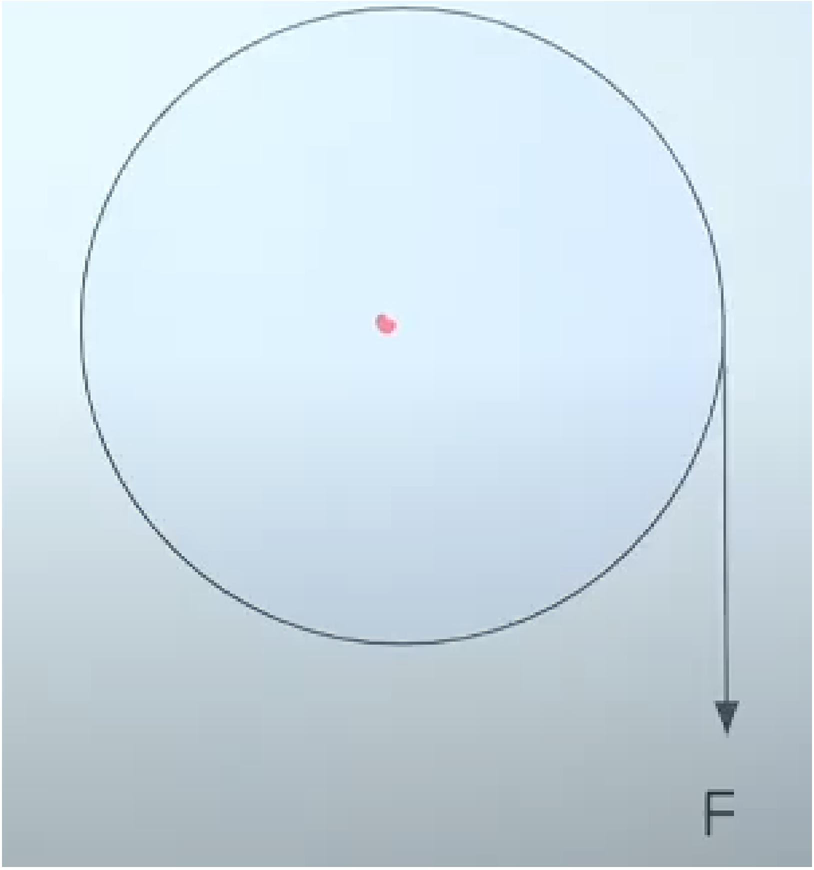
C. $\pm 0.21 ohm$

D. $\pm 2.12 ohm$

Answer: B

Watch Video Solution

213. An uniform circular pulley of 20 kg and radius 0.2m is hinged at center. A force of 20N is acting on it as shown. It takes 'n' turns to attain angular velocity of 50 rad/s. find n



A. 18

B. 19.9

C. 20.5

D. 7.2

Watch Video Solution

214. A conductor of length l, area of cross section A and resistivity ρ has resistance = R. It is connected across a cell of voltage V . What will be the current flowing resistor if its length is doubled and cross section area is halved.

A. V/IR

B. V/4R

C. 4V/R

D. V/2R

Watch Video Solution

215. For a damped oscillator damping constant is 20gm/s, mass is 500gm. Find time taken for the amplitude to become half the initial

A. 50

B. ln 2

C. 50 ln 2

D. 25/2 ln 2

Watch Video Solution

216. There are two species A & B with half lives 54 & 18 minutes resp. The time after which concentration of A is 16 times that of B will be

A. 27 min

B. 54 min

C. 81 min

D. 108 min

Watch Video Solution

Watch Video Solution

217. An electron and a proton are accelerated by same voltage difference. Find the ratio of the de broglie wavelength of electron and proton

A. $\frac{1860}{1}$

B. $\frac{41.4}{1}$

C. $\frac{43}{1}$

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

Answer: C

Watch Video Solution

218. The focal length of a lens whose refractive index is same as that of outside medium is

A. zero

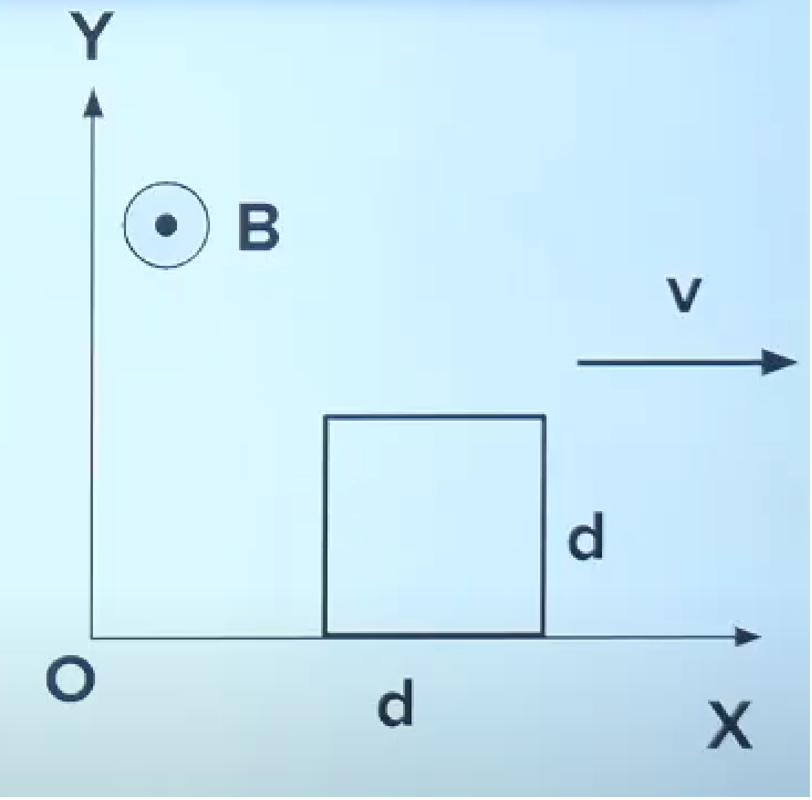
B. unity

C. infinity

D. none

Watch Video Solution

219. A square loop of side d is moved with velocity $v\hat{i}$ in an non-uniform magnetic field $\frac{B_0}{a}x\hat{k}$ then the emf induced shown is?



A. $B_0 d \frac{v}{a}$

B. $B_0 a^2 \frac{v}{d}$

C. $2B_0 d^2 \frac{v}{a}$

D. $B_0 d^2 \frac{v}{a}$

Watch Video Solution

220. The half life of radioactive element is 20 min . The time interval between the stages of its 33% and 67% decay is

A. 10 mins

B. 20 mins

C. 40 mins

D. 80 mins

Watch Video Solution

221. A dielectric (k=3.2) is placed in a capacitor of distance 1m and area $2m^2$. The width of dielectric is 0.5m. If net capacitance is $x\varepsilon_0$

Watch Video Solution

222. A charge q moves by a distance 'dl' under the presence of magnetic field B. Find work done by field

A. $q\vec{B}\overrightarrow{dl}$

B. $q^2\vec{B}\frac{\overrightarrow{dl}}{2}$

C. infinity

D. 0

Watch Video Solution

223. Red and violet light have

A. same frequency different wavelength

B. different frequency same wavelength

C. different frequency different wavelength

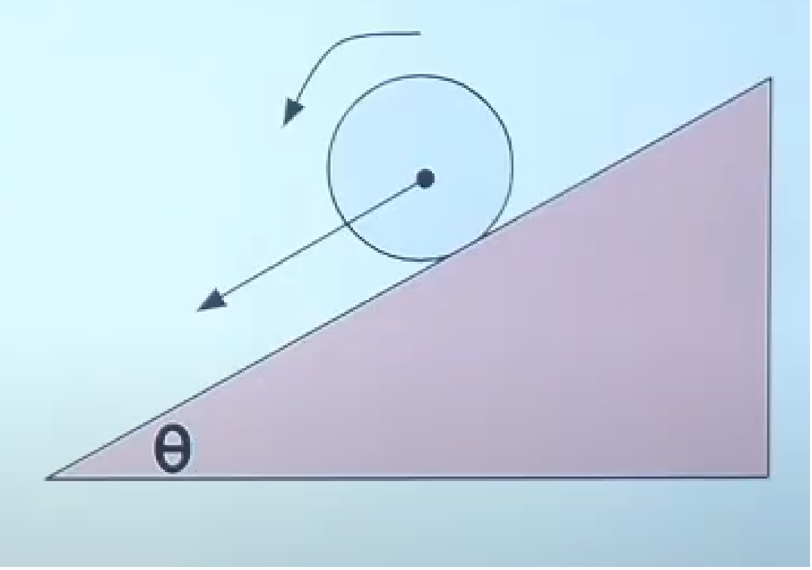
D. same frequency same wavelength

Watch Video Solution

224. Heat dissipation across a resistance R is 500J, if 1.5 A is passed through resistance for 20s what will be heat generation if 3A current is passed across the same resistance for 20 sec

Watch Video Solution

225. The acceleration of a disc rolling (purely) down an inclined plane of inclination θ is given as $a = x\frac{g(\sin\theta)}{3}$ .Find x



Watch Video Solution

226. A block of mass = 5.99kg hangs from string. A small m = 10g strikes it with velocity v. If the height to which system rises is 9.8cm then find v. Assume perfectly inelastic collision and $g = 9.8\frac{m}{s^2}$

A. 800 m/s

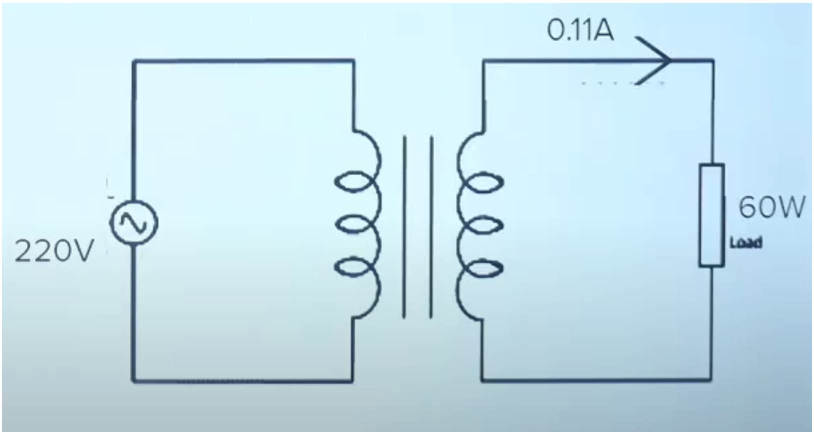
B. 840 m/s

C. 900 m/s

D. 1000 m/s

Watch Video Solution

227. For the diagram shown what is the type of transformer



A. step-up

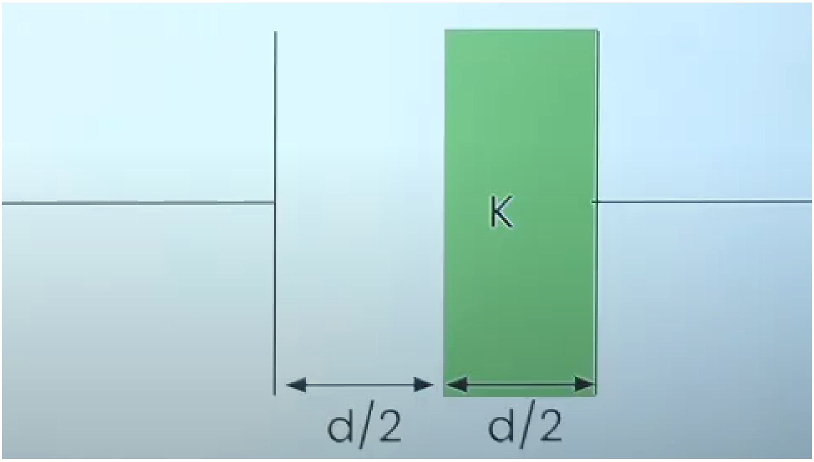
B. step-down

C. auxillary

D. axial

Watch Video Solution

228. Find the equivalent capacitance for given figure A=$0.2m^2$ d = 4m k = 3.2



A. $0.1\varepsilon_0$

B. $0.2\varepsilon_0$

C. $0.3\varepsilon_0$

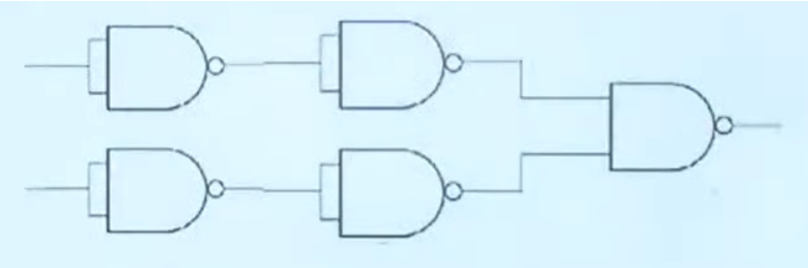
D. $0.4\varepsilon_0$

Watch Video Solution

229. Source temperature of a carnot engine is 127 celsius if efficiency of carnot engine is 60% then find sink temperature

Watch Video Solution

230. The above circuit represents a



A. AND GATE

B. NOT GATE

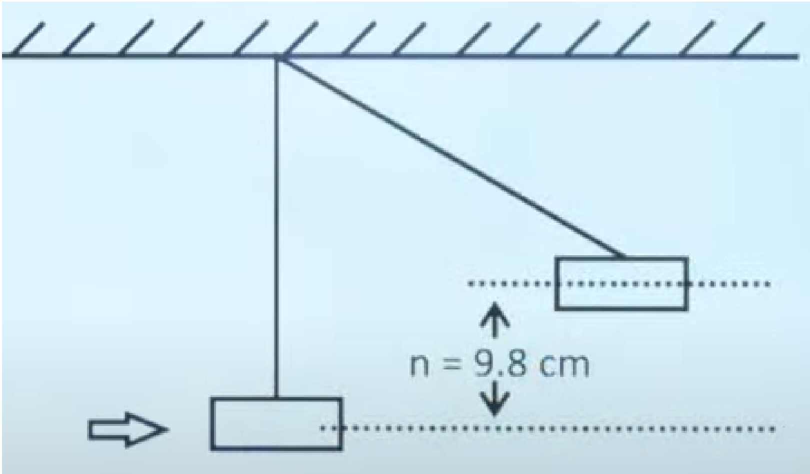
C. OR GATE

D. NAND GATE

Answer: D

Watch Video Solution

231. A bullet hits a wedge and stuck inside it as shown. The center of mass of system rises by height of 9.8cm find the initial velocity of bullet (mass of bullet= 10gm, mass of wedge = 5.99kg)



Watch Video Solution

232. If the range of single transmission between sending and reciving antennas of equal heights is 45 km. find height of antennas

A. 30 m

B. 39.5 m

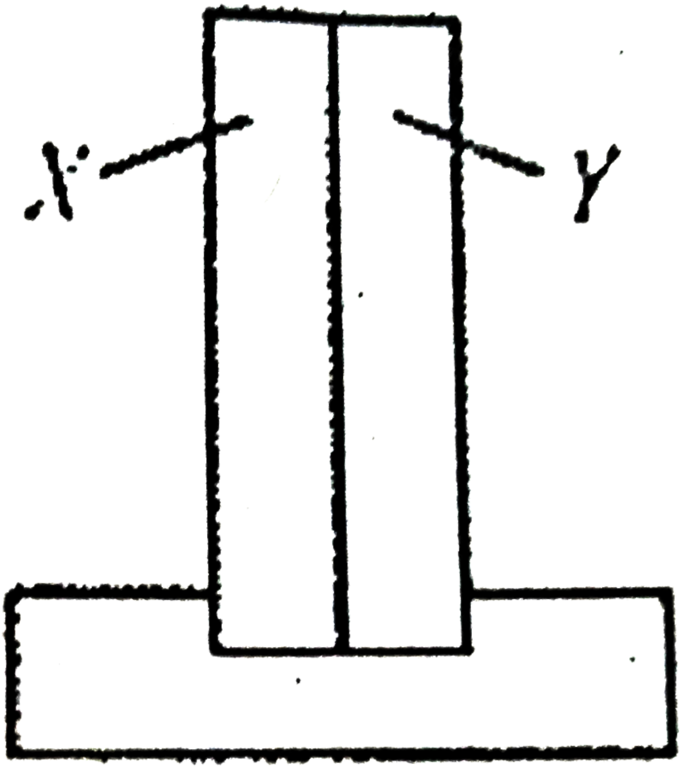
C. 45 m

D. 64 m

Answer: B

Watch Video Solution

233. A bimetallic strip consists of metals X and Y. It mounted rigidly at the base as shown. The metal X has a higher coefficient of expansion compared to that for metal Y. When the bimetallic strip is placed in a cold bath



A. combination will bend with X on convex side

B. combination will bend on Y side on convex side

C. no bending

D. cannot be predicted

Watch Video Solution

234. Find resistance if it dissipates 10 mJ of energy per second when current of 1 mA passes through it

A. 1 K ohm

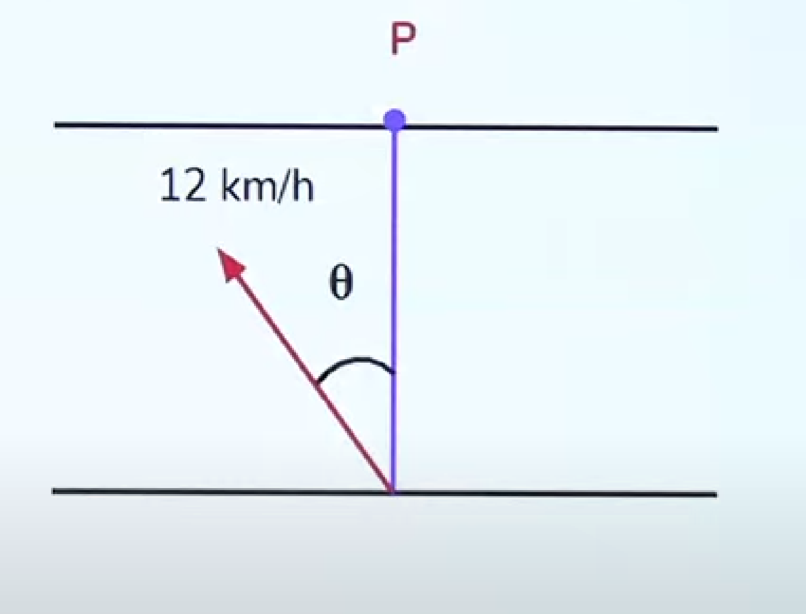
B. 100 k ohm

C. 10K ohm

D. 100 ohm

Watch Video Solution

235. A swimmer can swim with speed 12 m/s in still water. Speed of river is 6 m/s. Find angle at which he should swim with downstream so that he reaches directly opposite point on other side



A. 90 DEGREES

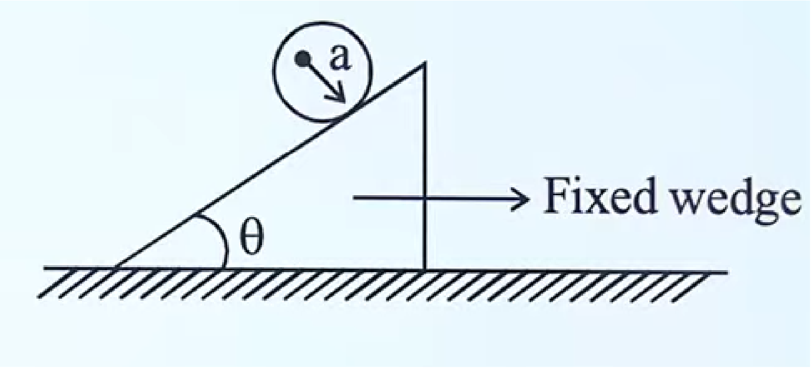
B. 150 DEGREES

C. 60 DEGREES

D. 120 DEGREES

Watch Video Solution

236. A disc having radius 'a' is rolling on an inclined plane as shown in figure. If acceleration of disc $\frac{2}{b}g\sin(\theta)$ then find b



Watch Video Solution

237. A closed organ pipe of length L and an open organ pipe contain gases of densities ρ_1 and ρ_2 resp. The compressiblity of gases are equal in both pipes. Both pipes are vibrating in first overtones with same frequency. The length of open organ pipe is

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

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

C. $4\frac{L}{3}\left(\sqrt{\rho_1 + \rho_2}\right)$

D. $4\frac{L}{3}\left(\sqrt{\frac{\rho_1}{\rho_2}}\right)$

Watch Video Solution

238. Amplitude of mass spring system which is executing SHM decreases with time. If mass = 500g decay constant = 20 g/s then how much time is required for the amplitude of the system to drop to half of its initial value.

A. 15.01s

B. 17.32s

C. 14.65s

D. 34.66s

Watch Video Solution

239. A convex lens, $\mu = 1.4$ both sides R_1, R_2 to radius of curvature of both sides. Focal length = ?

A. 1

B. $R_1 R_2$

C. infinity

D. -1

Watch Video Solution

240. In a vessel containing an ideal gas the pressure $1.1x10^5$ Pa temperature is 27 celsuis and diameter of molecules is 0.8 nm. Find mean freepath of molecules if boltzmann constant is $1.38x10^{-23}$.

A. 13.2 nm

B. 132 nm

C. 32 nm

D. 1.32 nm

Watch Video Solution

241. For a heat engine the temperature of the source is $127^\circ C$ .To have 60% efficiency the temperature of the sink is

A. 143

B. -105

C. -113

D. 113

Watch Video Solution

242. 1.5 milli gram of gold (molar mass 198 g/mole) is undergoing radioactive decay having half life of 2.7 days. Find initial activity of substance

A. 366 curie

B. 466 curie

C. 536 curie

D. 636 curie

Watch Video Solution

243. A particle of mass 2 kg is placed at rest at origin. A force $\vec{F} = 2\hat{i} + 3\hat{j} + 5\hat{k}$ is acting on particle. At t = 4 sec the position vector of particle is found to be $8\hat{i} + b\hat{j} + 20\hat{k}$. Find b

A. 12

B. -6

C. 2

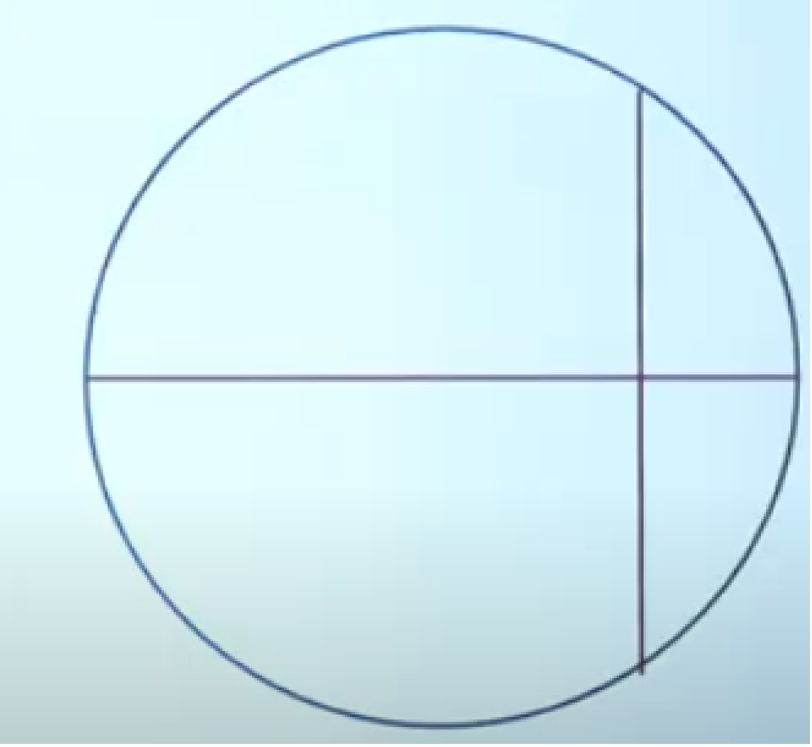
D. 10

Watch Video Solution

244. Find the magnitude of torque produced by a force $\vec{F} = 4\hat{i} + 3\hat{j} + \hat{k}$ about point (2,3,5)

Watch Video Solution

245. Diameter of plano-convex lens is 6 cm and thickness at the centre is 3mm. If speed of light in material of lens is 2 x 10^8 m/s, the focal length of the lens is



A. 20 cm

B. 30 cm

C. 10 cm

D. 15 cm

Answer: B

Watch Video Solution

246. A boy moves a ball of mass 0.5 kg in horizontal surface with 20 m/s. It collides and moves with 5% of its initial kinetic energy. Find final speed

A. $\sqrt{5}\frac{m}{s}$

B. $4\sqrt{5}\frac{m}{s}$

C. $2\sqrt{5}\frac{m}{s}$

D. $2\frac{m}{s}$

Answer: C

Watch Video Solution

247. Find B. Given n = 1000 turns/m $\mu_r = 500$ $\mu_0 = 4\pi x 10^{-7} T\frac{m}{A}$ I = 10 A

A. $2\pi Tesla$

B. $3\pi Tesla$

C. $5\pi Tesla$

D. $7\pi Tesla$

Answer: A

Watch Video Solution

248. A particle accelerates from rest with uniform acceleration α then decelerates to rest witha constant deceleration β. Find total displacement. Given time is T

A. $\frac{\alpha\beta T^2}{2}(\alpha+\beta)$

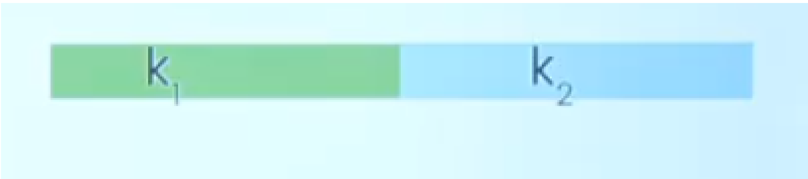
B. $\frac{\alpha\beta T^2}{\alpha+\beta}$

C. $\alpha T^2+\beta T^2$

D. $\frac{\alpha T^2+\beta T^2}{2}$

Answer: A

Watch Video Solution

249. Two identical metallic wires are connected one after other. Find their K_eq 

A. $k_1 + k_2$

B. $k_1 \frac{k_2}{k_1 + k_2}$

C. $\frac{k_1 + k_2}{2}$

D. $\frac{2k_1k_2}{k_1 + k_2}$

Answer: D

Watch Video Solution

250. An electron (e,m) and photon have same energy E. Then the ratio $\lambda_e : \lambda_p$ is?

A. $\frac{1}{c}\left(\sqrt{\frac{E}{2m}}\right)$

B. $\frac{1}{c}\left(\sqrt{\frac{E}{m}}\right)$

C. $\frac{2}{c}\left(\sqrt{\frac{E}{m}}\right)$

D. $\frac{1}{2}c\left(\sqrt{\frac{E}{m}}\right)$

Watch Video Solution

251. In a metal conductor 0.1 A current is following. The cross sectional area is $5mm^2$. Drift velocity is given to be 2×10^{-3} m/s. Find free electron density

A. 625×10^{23}

B. 62.5×10^{23}

C. 500×10^{23}

D. 400×10^{23}

Watch Video Solution

252. For a polyatomic ideal gas, vibrational degree are 24. $\frac{C_p}{C_v}$ is

A. 1.01

B. 1.03

C. 1.05

D. 1.07

Watch Video Solution

253. The r.m.s. value of $I = I_1 \sin\omega t + I_2 \cos\omega t$ is

A. $\sqrt{\dfrac{(I_1)^2 + (I_2)^2}{2}}$

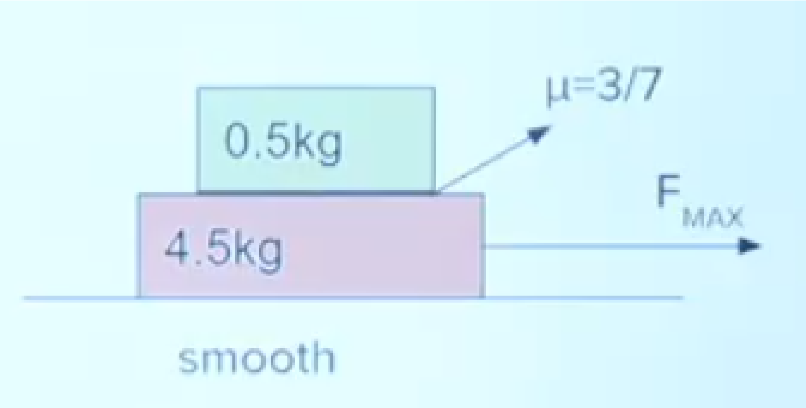
B. $\sqrt{\dfrac{I_1 I_2}{I_1 + I_2}}$

C. $\dfrac{I_1 + I_2}{2}$

D. $\dfrac{\text{mod}\ (I_1 - I_2)}{2}$

Watch Video Solution

254. F_{max} such that block moves together $\left(g = 9.8 \frac{m}{s^2}\right)$



A. 21N

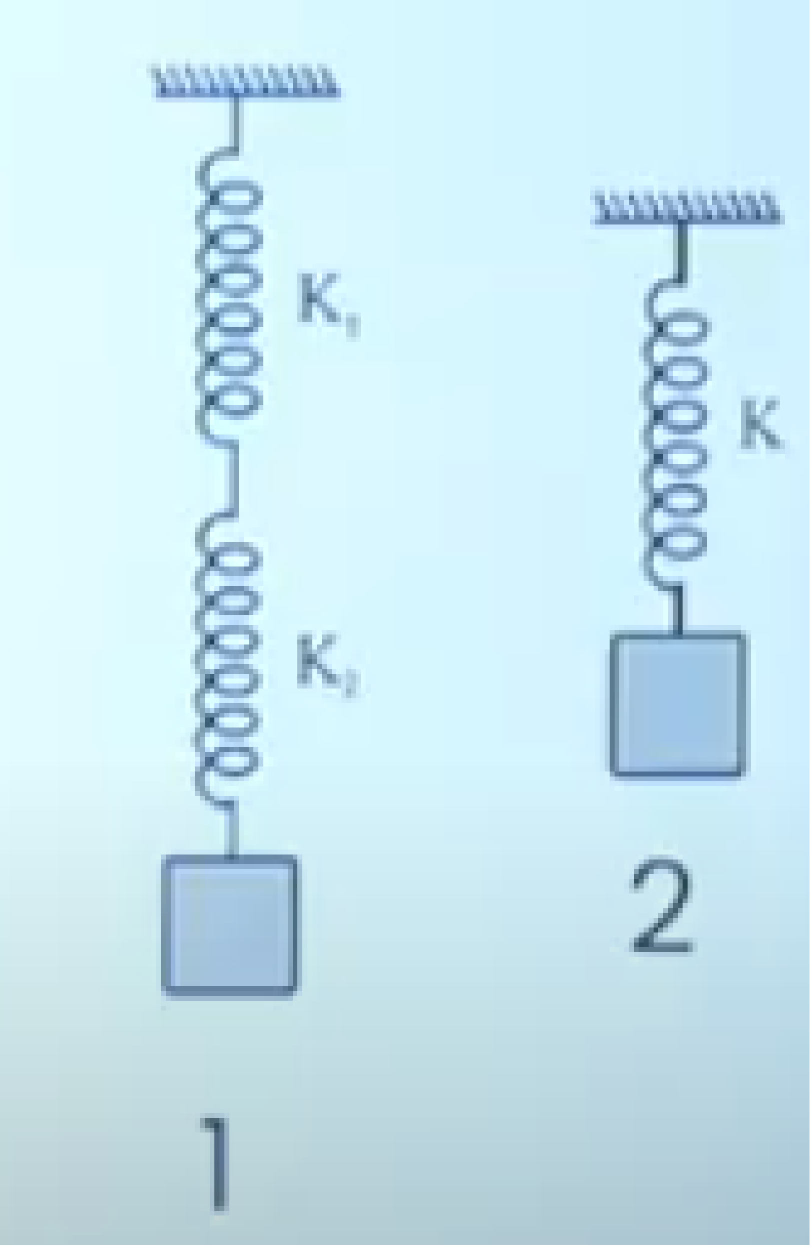
B. 40N

C. 38N

D. 10N

Watch Video Solution

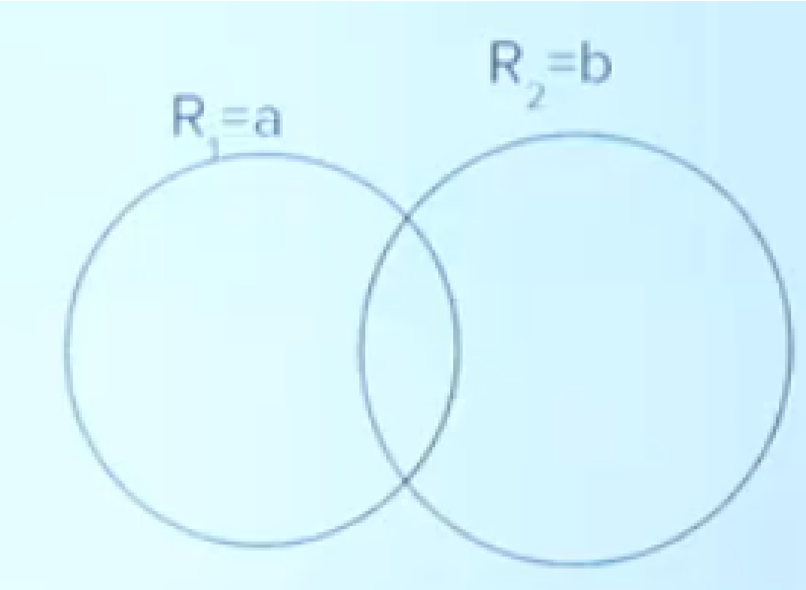
255. Given ratio of time period $\frac{T_1}{T_2}$. For the two systems shown here is



$\sqrt{x}$. Find x

Watch Video Solution

256. Find radius of curvature of common surface



A. $R = \dfrac{ab}{\text{mod } (a - b)}$

B. $R = a + b$

C. $R = \text{mod } (a - b)$

D. $R = \sqrt{a^2 + b^2}$

Watch Video Solution

257. If equivalent resistors in series is S and parallel is P. ans S = nP find minimum value of n?

A. 1

B. 2

C. 0

D. 4

Answer: D

Watch Video Solution

258. Two polyatomic ideal gases are mixed together temperatures T_1 and T_2, number of molecules N_1 and N_2, mass of particles m_1 and m_2, degrees of freedom f_1 and f_2 find final temperatures of mixtures.

A. $\dfrac{N_1T_1 + N_2T_2}{N_1 + N_2}$

B. $\dfrac{N_1 f_1 T_1 + N_2 f_2 T_2}{N_1 f_1 + N_2 f_2}$

C. $\dfrac{f_1 T_1 + f_2 T_2}{f_1 + f_2}$

D. $\dfrac{T_1 + T_2}{2}$

Answer: B

Watch Video Solution

259. In a SHM distance from mean position where kinetic energy equals potential energy is

A. A

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

C. $\dfrac{A}{\sqrt{2}}$

D. $\dfrac{A}{4}$

Watch Video Solution

260. A carnot engine operating between 400K & 800K does 1200J of work in 1cycle. Find heat extracted from source

A. 2400J

B. 3000J

C. 200J

D. 1500J

Watch Video Solution

261. If V_n is speed of an electron in nth orbit of a hydrogen atom then correct proportionality is

A. $V_n \propto n^2$

B. $V_n \propto n$

C. $V_n \propto \frac{1}{n}$

D. $V_n \propto \frac{1}{n^2}$

Watch Video Solution

262. The radius of earth is R and escape speed is v_e. If the radius of earth needs to be changed to nR so that escape speed becomes $10v_e$. Find n

A. 44470

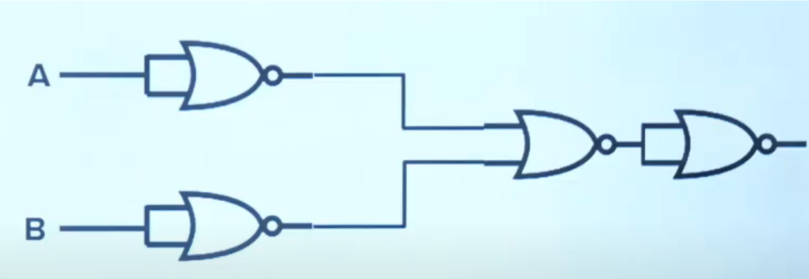
B. 10

C. 1/100

D. 100

Watch Video Solution

263. Given diagram is equivalent to



A. OR GATE

B. AND GATE

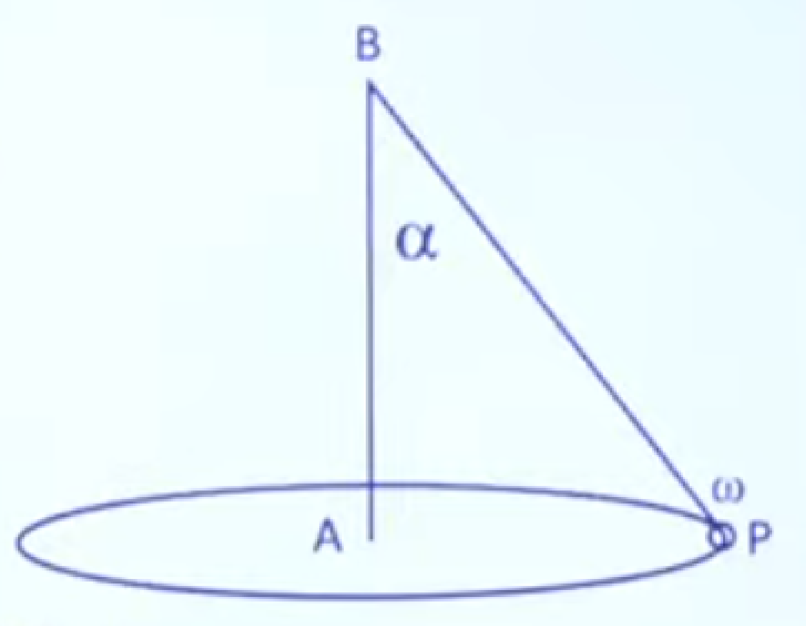
C. NAND GATE

D. NOR GATE

Answer: C

Watch Video Solution

264. Particles is moving on circular track such that its angular velocity is constant then



A. L_a and L_b both constant in magnitude

B. L_a is not conserved

C. L_b is conserved

D. none

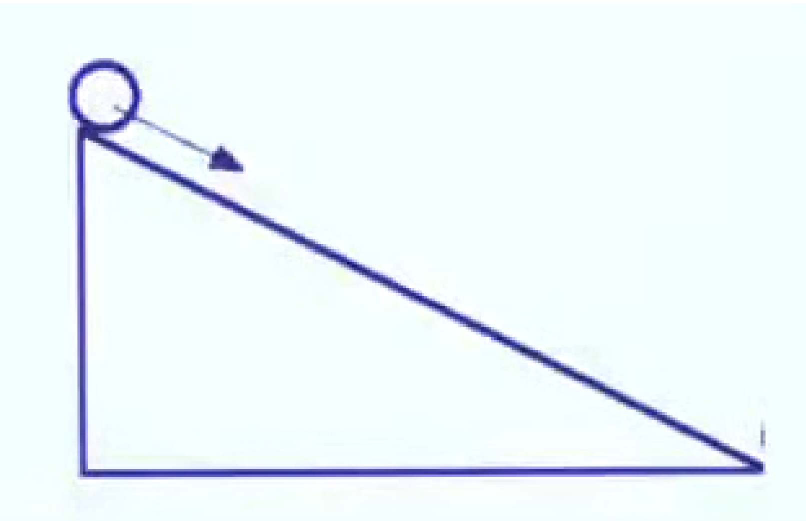
Answer: A

Watch Video Solution

265. A radio antenna of 30m. The acceptor is on the ground $Rearth = 6400km$. What is the area covered for signalling

Watch Video Solution

266. Which of the following will reach first on ground if objects are of same mass and radius are under pure rolling.



A. RING

B. CYLINDER

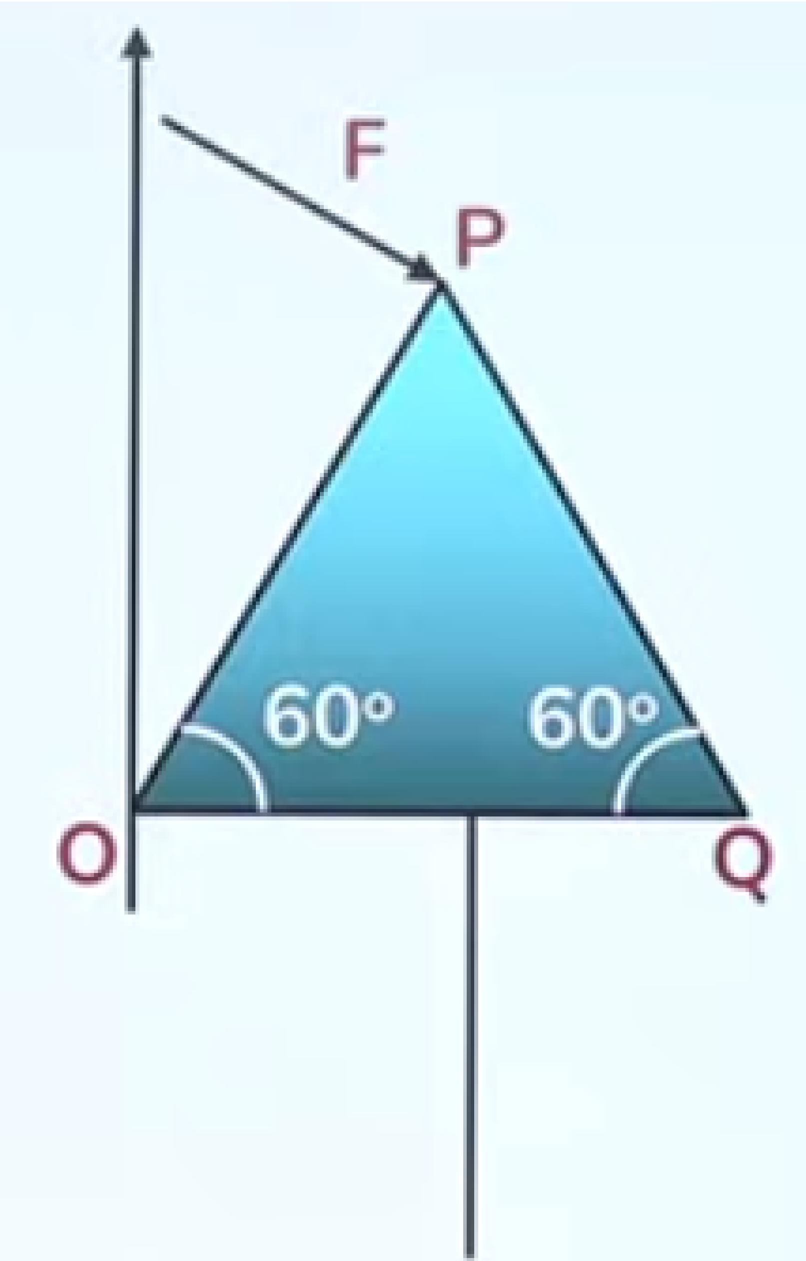
C. DISC

D. SOLID SPHERE

Answer: D

Watch Video Solution

267. Torque about O & Q



Watch Video Solution

268. In which orbit of carbon ion(hydrogen like ion) electron has equal energy to that of hydrogen atom in ground state

A. n=3

B. n=4

C. n=5

D. n=6

Watch Video Solution

269. A body is rotating with 900 rpm. The angular velocity mereates to 2460 rpm in 26secs due to a constant angular acceleration. Total number of revolutions during acceleration is

A. 728 rev

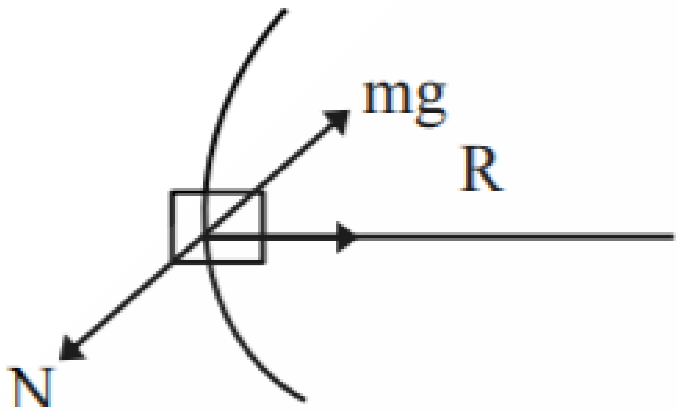
B. 364 rev

C. 1456 rev

D. 182 rev

Watch Video Solution

270. A car is moving with velocity v on circular turn of radius R. Mass of the car is m. Evaluate the negative lift $\left(F_L\right)$ acting on the car



A. $\dfrac{mv^2}{\mu R}$ - $2mg$

B. $\frac{mv^2}{2\mu R}$ - $2mg$

C. $\frac{mv^2}{\mu R}$ - mg

D. $\frac{mv^2}{3\mu R}$ - mg

Answer: C

Watch Video Solution

271. If vernier calliper has positive error of 0.2mm. If zero of vernier scale lies between 8.5cm and 8.6cm. If 6th division of vernier scale coincides with main scale. Then reading will be (LC = 0.1MM)

A. 8.56 CM

B. 8.54 CM

C. 8.58 CM

D. 8.60 CM

Answer: B

Watch Video Solution

272. Find energy absorbed by the surface of area $30cm^2$ in 40 minutes. If force applied by light is 2.5×10^{-3} N normally?

A. 540×10^7J

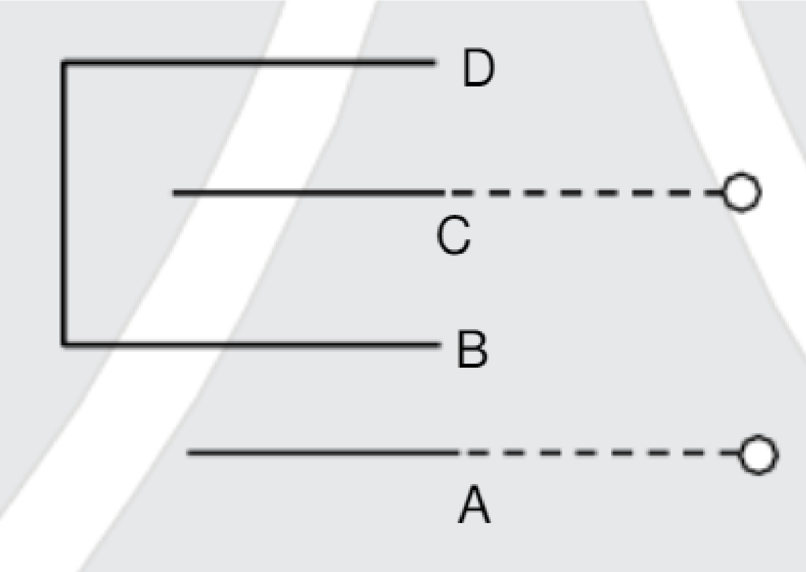
B. 60×10^7J

C. 18×10^8J

D. 180×10^7J

Watch Video Solution

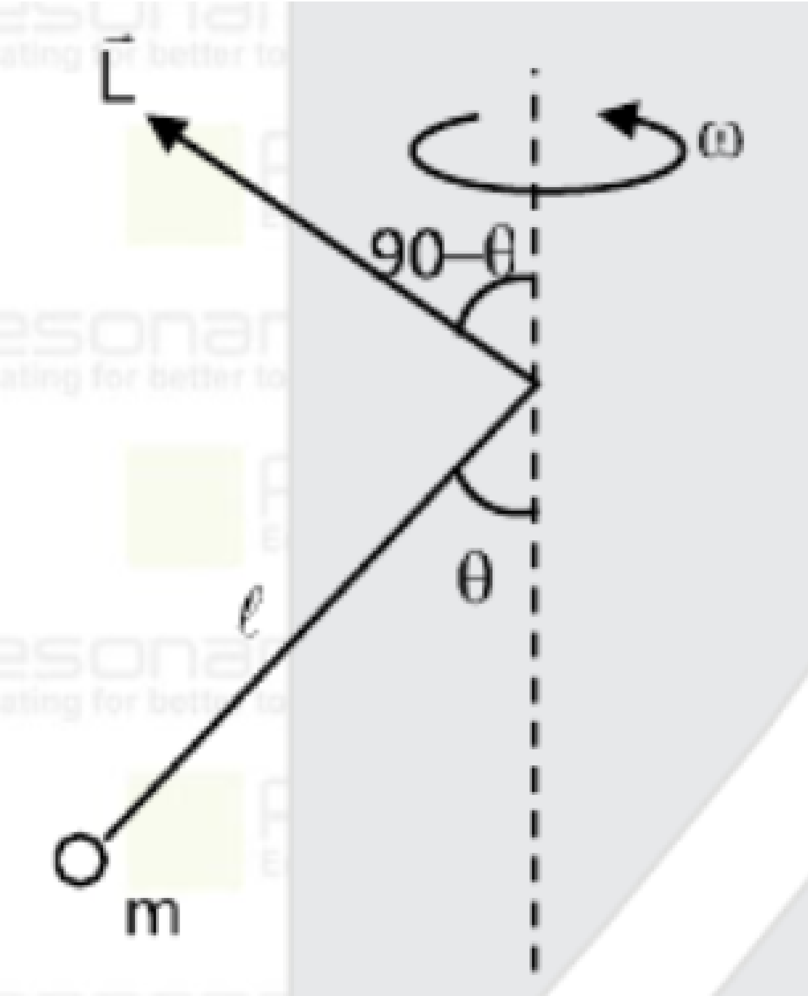
273. Four parallel plates A,B,C,D each of length 2m, wdth 3/2m, are placed parallel to eachother at distance d. If B&D are now connected, the equivalent capacitance between A & C is $x\frac{\varepsilon_0}{d}$ Then value of x is



Watch Video Solution

274. A bob of mass m attached to an inextensible string of length l, is suspended from a vertical support. Bob rotates in a horizontal circle with angular speed ω and string makes an angle of θ with the vertical.

Find the angular momentum of bob about axis of rotation



A. $ml^2\omega\sin^2(\theta)$

B. $2ml^2\omega\sin^2(\theta)$

C. $ml^2\omega\cos^2(\theta)$

D. $2ml^2\omega\cos^2(\theta)$

Watch Video Solution

275. Find out the ratio $\frac{C_p}{C_v}$ of polyatomic gas for 2 vibrational degree of freedom

Watch Video Solution

276. If $\vec{E} = \frac{3}{5}\hat{i} + \frac{4}{5}\hat{j}$ then find electric flux through an area of 0.4 m^2 parallel to y-z plane

A. $0.12N\frac{m^2}{C}$

B. $0.24N\frac{m^2}{C}$

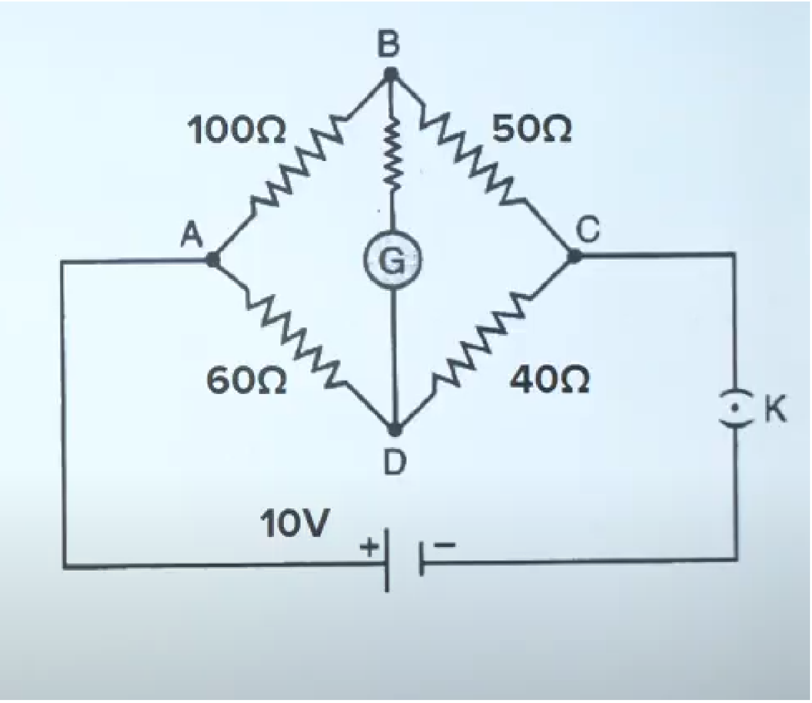
C. $0.36N\frac{m^2}{C}$

D. $0.48N\frac{m^2}{C}$

Answer: B

Watch Video Solution

277. Find current through galvanometer



A. $\frac{57}{965}$

B. $\frac{79}{965}$

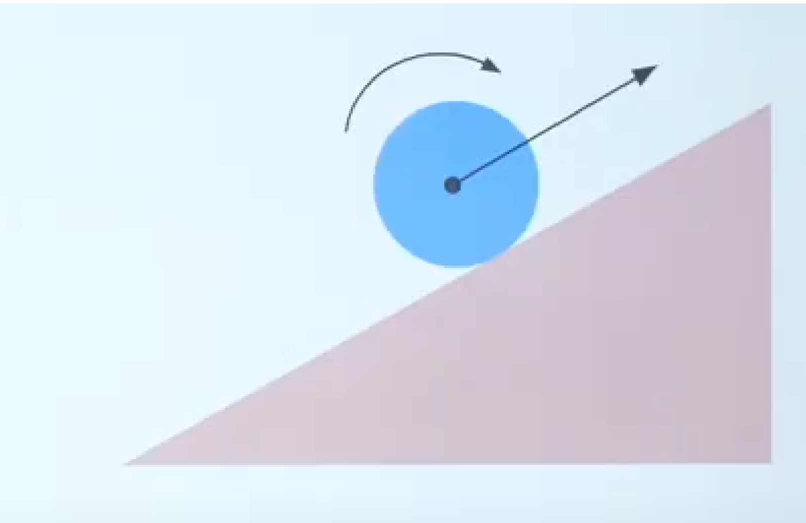
C. $\frac{22}{765}$

D. 0

Answer: C

Watch Video Solution

278. A sphere of radius 1cm moving with 1 m/s starts going up the plane performing pure rolling on an inclined plane of inclination 30 degrees. Find total time taken by it to go up and come down the plane



A. $\frac{7}{25}$ sec

B. $\frac{14}{25}$ sec

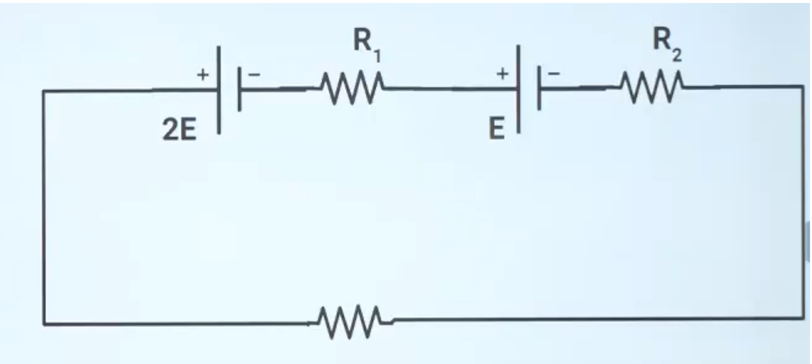
C. $\frac{21}{25}$ sec

D. 1 sec

Answer: B

Watch Video Solution

279. Internal resistance of battery of emf 2E is R_1 and battery of emf E is R_2. If the potential difference across the cell of emf 2E is zero, then value of R is



A. $\frac{R_1 + R_2}{2}$

B. $(R_1 - R_2)$

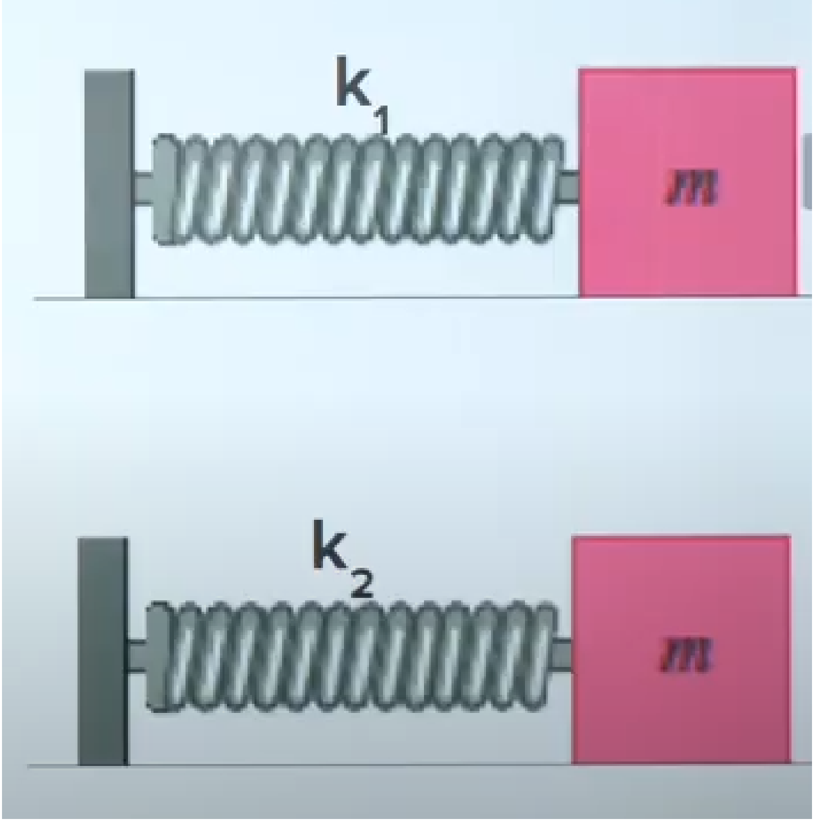
C. $\dfrac{R_1 - R_2}{2}$

D. $\dfrac{R_1 - 2R_2}{2}$

Answer: D

Watch Video Solution

280. If maximum velocities of both the SHMs is same then find the ratio of amplitudes of the two cases



A. $\sqrt{\dfrac{k_2}{k_1}}$

B. $\sqrt{\dfrac{k_1}{k_2}}$

C. $\dfrac{k_2}{k_1}$

D. $\dfrac{k_1}{k_2}$

Answer: A

Watch Video Solution

281. An object is taken to a depth of 2km inside an ocean. Percentage change in volume is 1.39%. Find bulk modulus

A. $1.47 \times 10^{9} \dfrac{N}{m^{2}}$

B. $1.08 \times 10^{9} \dfrac{N}{m^{2}}$

C. $1.75 \times 10^{9} \dfrac{N}{m^{2}}$

D. $2.34 \times 10^{9} \dfrac{N}{m^{2}}$

Answer: A

Watch Video Solution

282. If velocity of a moving particle in is $v = a + gt + ft^{2}$ (a,g,f are constants). At t=0 body is at origin. Find displacement after t=1s.

A. $a + g + f$

B. $g + 2f$

C. $a + \left(\frac{g}{2}\right) + \left(\frac{f}{3}\right)$

D. $\left(\frac{a}{2}\right) + \left(\frac{g}{3}\right) + \left(\frac{f}{4}\right)$

Answer: C

Watch Video Solution

283. If carrier wave is given by $y_c = A_c \sin(\omega_c t)$ and message signal is $y_s = A_s \sin(\omega_s t)$ find bandwidth of AM wave (in hz)

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

B. $\frac{\omega_s}{2\pi}$

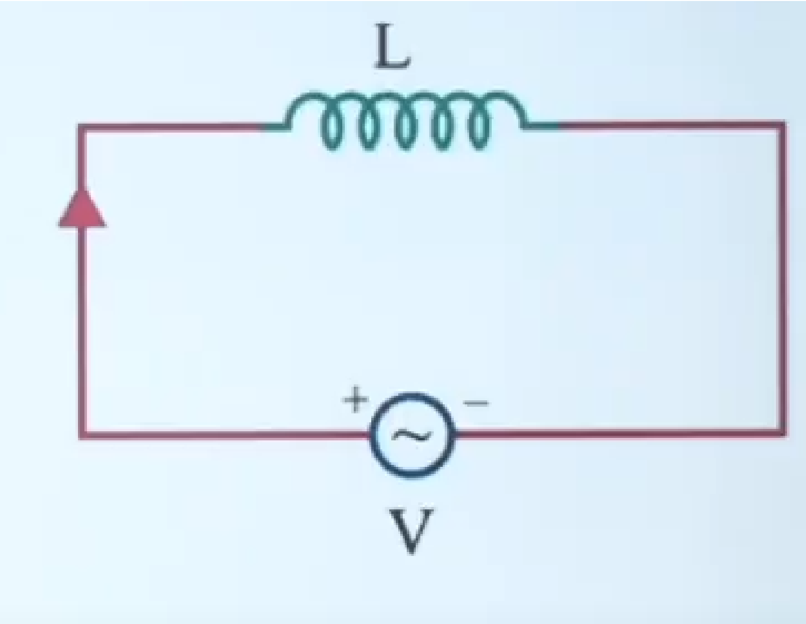
C. $\frac{\omega_c - \omega_s}{\pi}$

D. $2\frac{\omega_c - \omega_s}{\pi}$

Answer: A

Watch Video Solution

284. If ω is doubled in purely inductive circuit. find effect on X_L and i ?



A. no change

B. both doubled

C. X_L is doubled, current is halved

D. X_L is halved, current is doubled`

Watch Video Solution

285. If initial amplitude during a damped oscillation of mass m is 12 cm and after 2s it reduces to 6cm then find damping constant(b)

A. $m\ln(2)$

B. $2m$

C. $m^2\ln 2$

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

Answer: A

Watch Video Solution

286. Radius of planet is R and time for rotation is 24hrs. A geostationary satellite is at an altitude 11 R of parallel. Find time period of a satellite which is at an altitude of 2R?

A. 12hrs

B. 8hrs

C. 4hrs

D. 3hrs

Answer: D

Watch Video Solution

287. Particles on a string vibrate with amplitude of 6cm speed of wave is 300 m/s and angular frequency of oscillations is 245. Find wave equation of wave is travelling along positive x-direction.

A. $y = 0.06\sin\left(245t - 49\frac{x}{60}\right)$

B. $y = 0.06\sin\left(245t + 49\frac{x}{60}\right)$

C. $y = 0.06\sin(245t - 300x)$

D. $y = 0.06\sin(245t + 300x)$

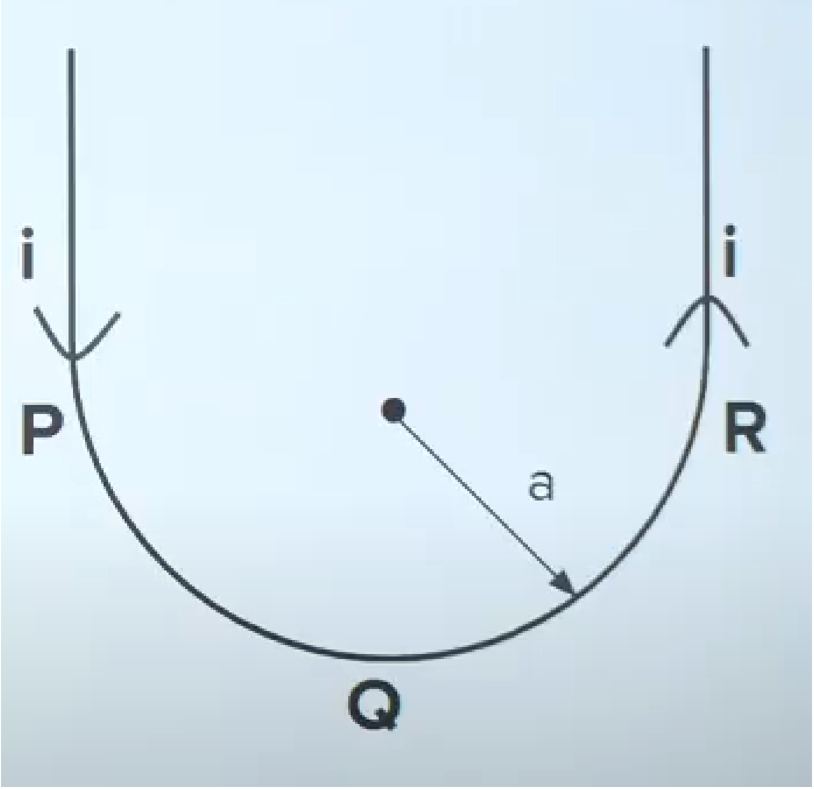
Answer: A

Watch Video Solution

288. Match the following for AC circuit

Column 1	Column II
1) purely inductive 2) Purely capacitive 3) Purely resistive 4) Series LCR	p) Voltage leads current q) current and voltage in phase r) Current leads voltage s) Current may lead or lag or be in phase of voltage

Watch Video Solution

289. In figure shown U-shaped wire a current i is flowing as shown. Section PQR is a semicircle of radius a.If O is origin then find magnetic field at O 

A. $\left(\frac{\mu_0 i}{2\pi a} + \frac{\mu_0 i}{4a}\right)\hat{k}$

B. $\frac{\mu_0 i}{4a}\hat{k}$

C. $-\left(\frac{\mu_0 i}{2\pi a} + \frac{\mu_0 i}{4a}\right)\hat{k}$

D. $-\frac{\mu_0 i}{4a}\hat{k}$

Watch Video Solution

290. A ball falls from a height of 5m and each time it rises by 81/100 of its initial height and so on. (g=10m/s^2) Find average speed for long time.

A. 3

B. 2.5

C. 2

D. 3.5

Answer: B

Watch Video Solution

291. Light of frequency f_1 and f_2 fall on same metal and the max speed of photo electron is v_1 and v_2 resp. and mass is m. Find relation between v_1 and v_2.

A. $v_2^2 - v_1^2 = \frac{h\left(\left(f_2 - f_1\right)\right)}{2}m$

B. $v_2^2 - v_1^2 = \frac{h\left(f_2 - f_1\right)}{m}$

C. $v_2^2 - v_1^2 = \frac{2h\left(f_2 - f_1\right)}{m}$

D. $v_2 - v_1 = \frac{2h\left(f_2 - f_1\right)}{m}$

Answer: A

Watch Video Solution

292. visible line of hydrogen spectrum will be

A. lyman

B. balmer

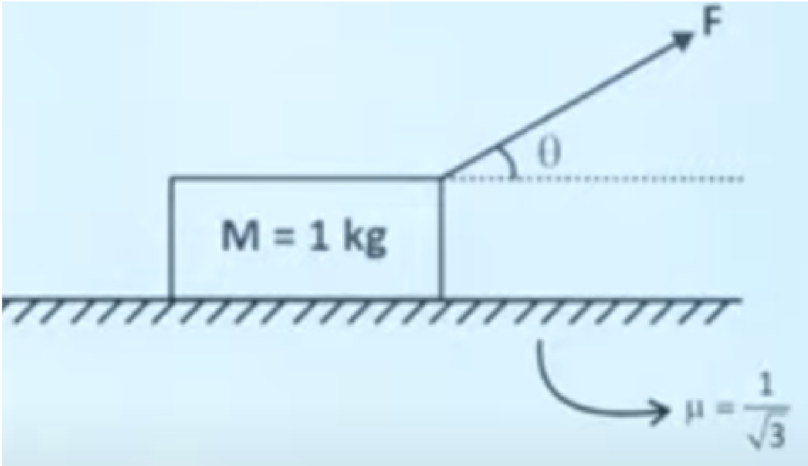
C. brackett

D. pfund

Answer: B

Watch Video Solution

293. Find out $F_{\min}$ so that block will move



Watch Video Solution

294. A geostationary satellite is orbiting the earth at height 11R above surface of the earth. R being radius of earth. If the time period of this satellite is 24hr find out time period of another satellite which is revolving at 2R from surface of earth

A. $6\sqrt{2}$

B. 5

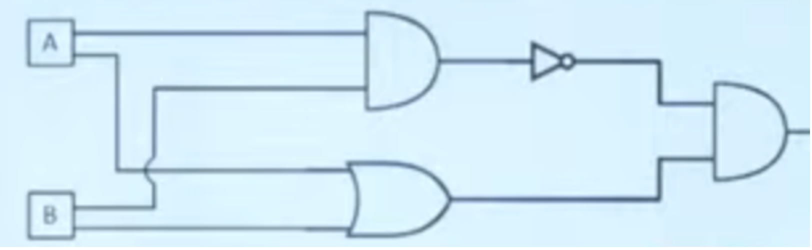
C. 3

D. 8

Answer: C

Watch Video Solution

295. find output



A. NAND

B. XOR

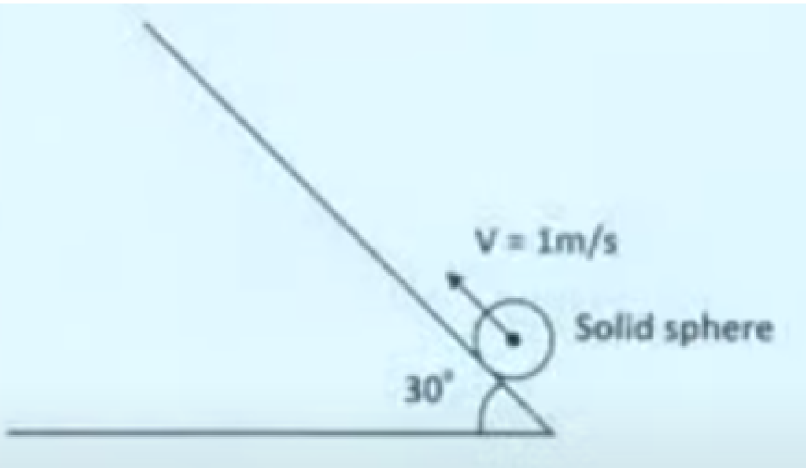
C. NOR

D. XNOR

Answer: B

Watch Video Solution

296. a solid sphere of mass 2 kg and radius 0.5 m is projected from point A on a rough inclined plane as shown in figure. If it rolls without sliding find time taken to reach again at A is?



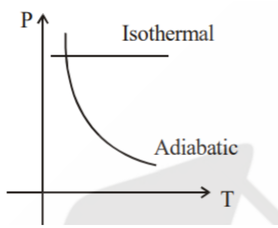
Watch Video Solution

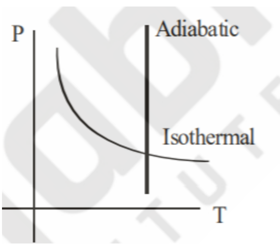
Watch Video Solution

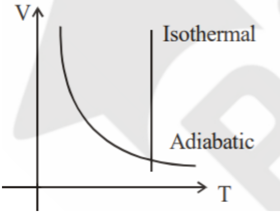
297. For a satellite at a distance 11R from the surface of a planet P of radius R. Its time period is 24hrs. Evaluate time period of another satellite at a distance 2R from surface of P

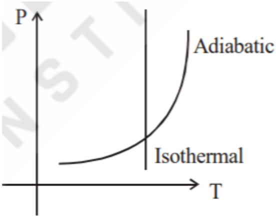
Watch Video Solution

298. Sample of gases are taken through isothermal and adiabatic process. Choose which of the following diagram correctly represent isothermal and adiabatic process

A. 

B. 

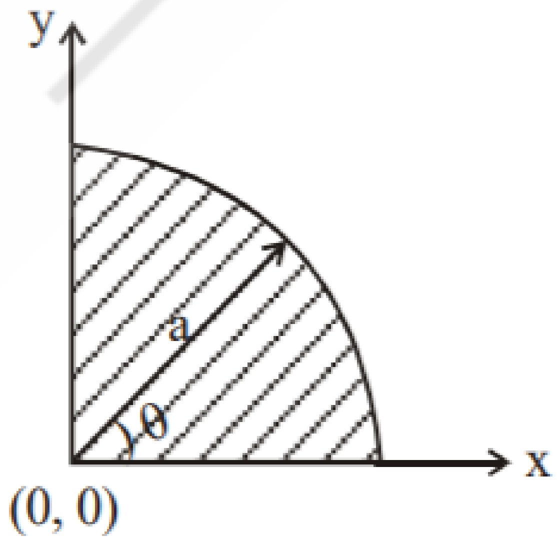
C. 

D. 

Answer: D

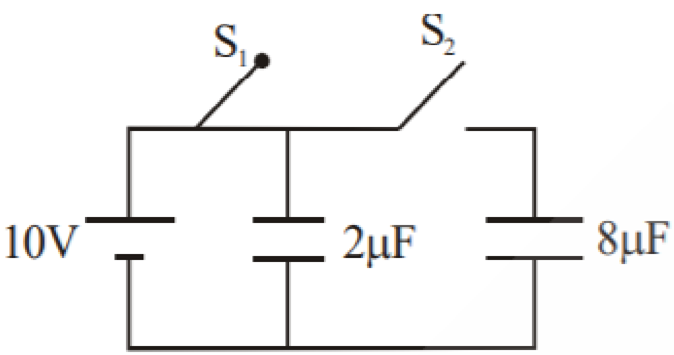
Watch Video Solution

299. The diagram shows a quarter disc having uniform mass distribution. If coordinate of center of mass is $\left(x\frac{a}{3\pi}, x\frac{a}{3\pi}\right)$ then x =



Watch Video Solution

300. A $2\mu F$ capacitor is charged with 10 volt cell. Now cell is removed and this capacitor is connected with uncharged $8\mu F$ capacitor. Find out final charge on $8\mu F$ capacitor.



A. $16\mu F$

B. $8\mu F$

C. $12\mu F$

D. $2\mu F$

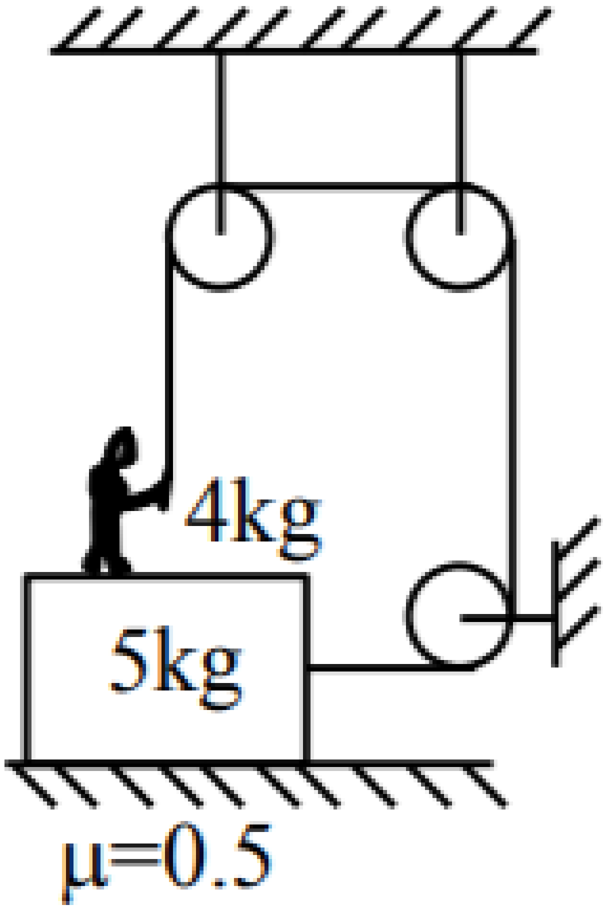
Answer: A

Watch Video Solution

301. The potential energy of a particle moving in a circular path is given by $U = U_0 r^4$ where r is radius of circular path. Assume bohr model to be valid. The radius of nth orbit is $r \propto n^{\frac{1}{\alpha}}$ where α is

Watch Video Solution

302. Find the minimum value of force (in N) man should apply so that block can move



Watch Video Solution

303. In a liquid whose ρ = 1000 kg/m^3 at a depth of 2km the value of $\frac{\Delta V}{V} = 1.36\,\%$ is given then find the ratio of (hydraulic stress)/(hydraulic strain). $(g = 9.8\frac{m}{s^2})$

A. $14.41x10^8\frac{N}{m^2}$

B. $34.41x10^8\frac{N}{m^2}$

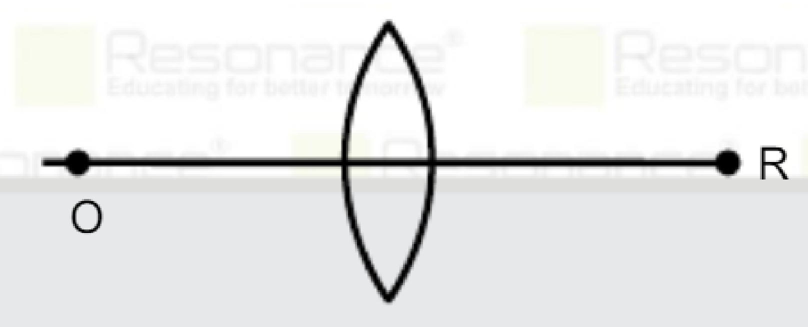
C. $1.441x10^8\frac{N}{m^2}$

D. $44.41x10^8\frac{N}{m^2}$

Answer: A

Watch Video Solution

304. An equi-convex lens in air forms real image at distance 10cm from lens for real object. If image distance is 2/3rd of object distance. Wavelength of light in medium of lens is 2/3rd of wavelength in vacuum. Find radius of curvature of lens.



A. 6 cm

B. 15 cm

C. 9 cm

D. 10 cm

Answer: A

Watch Video Solution

305. An AC voltage rating 240V, 50Hz. Find the time to change current from max. value to rms value.

A. $2.55ms$

B. $2.5ms$

C. $0.25ms$

D. $25ms$

Answer: B

Watch Video Solution

306. Angular velocity of a ring is ω. If we put two masses each of mass m at the diametrically opposite points then the resultant angular velocity (m=mass of ring)

Watch Video Solution

307. A block is pulled with constant power what is the relation between displacement(x) and time(t) for this

A. $x \propto t^{\frac{3}{2}}$

B. $x \propto t^{\frac{2}{3}}$

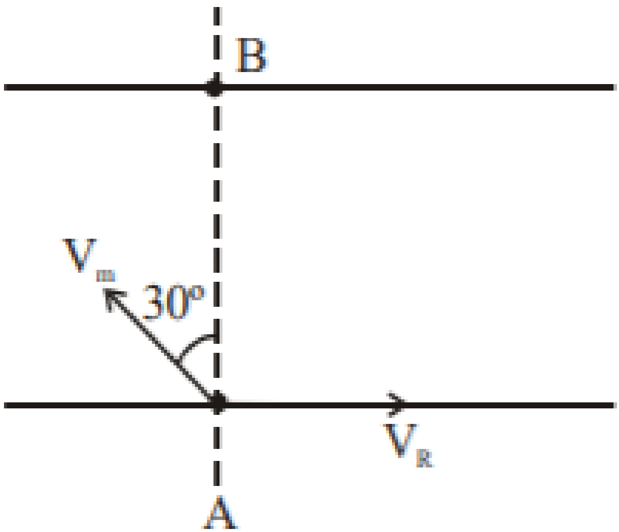
C. $x \propto t^{\frac{1}{2}}$

D. $x \propto t^2$

Answer: A

Watch Video Solution

308. A swimmer swims with a speed of $10\frac{m}{s}$ at angle of 120^0 from direction of river flow. Find velocity of river flow such that swimmer reach exactly opposite point of bank.



Watch Video Solution

309. Radius of orbit of a satellite is R and T is time period. Find T' when orbit radius increase to 9R

Watch Video Solution

310. A bullet of mass 0.1Kg moves with velocity $10\frac{m}{s}$ it strikes a block and comes to rest after travels 0.5 m inside block. Find retardation of bullet

Watch Video Solution

311. Find the distance between third and first maxima. $\left(d = 0.5mm, D = 0.5m, \lambda = 5890A^0\right)$

Watch Video Solution

312. An oil drop of radiuss $2mm$ with density $3\left(\frac{g}{cm^3}\right)$ is held stationary under a constant $\vec{E} = 3.35 \times 10^5 \frac{V}{m}$ in the milikan's drop experiment. What is number of excess electron that oil drop will possess $(g = 9.81)\frac{m}{s^2}$

Watch Video Solution

313. A flexible wire loop is placed in a uniform external magnetic field if current is passed through wire assuming normal magnetic field. What will be the effect on wire.

A. shape will change

B. shape will not change

C. wire will get straight stretched

D. loop becomes circular parallel to field

Answer: A

Watch Video Solution

314. What will be average value of energy along one degree of freedom for an ideal gas in thermal equilibrium at temp. T

Watch Video Solution

315. In a SHM with time period 2s. Time taken for displacement x to reach $\frac{A}{2}$ from mean position is $\frac{1}{a}$ find a?

Watch Video Solution

316. If resistance is increased gradually in LCR circuit.

A. quality factor increases

B. Resonance frequency gets increased

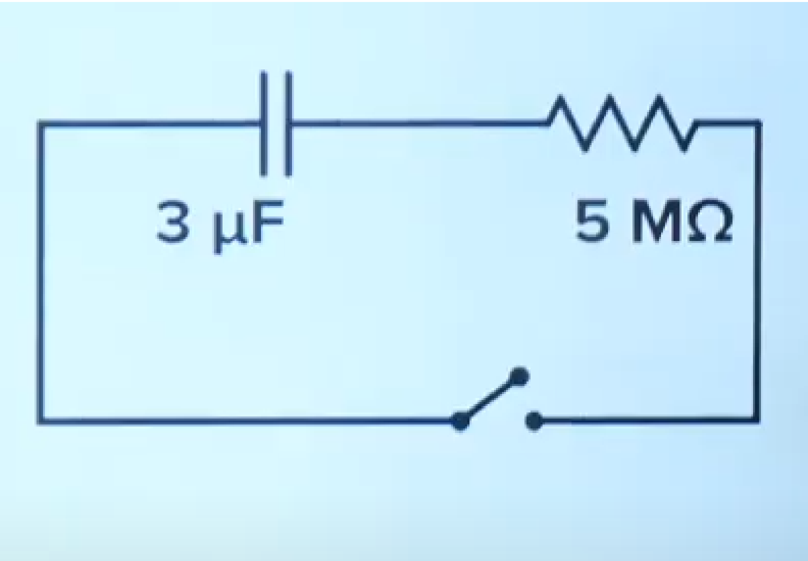
C. quality factor and resonance frequency remain same

D. band width increase

Answer: D

Watch Video Solution

317. Initial charge on capacitor of $3\mu C$. Find initial current when switched is closed.



A. $1\mu A$

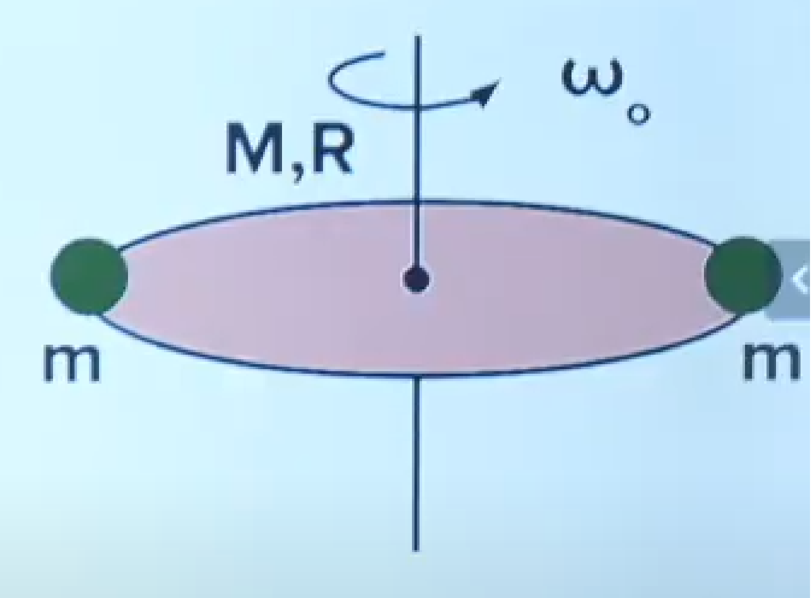
B. $0.2\mu A$

C. $3\mu A$

D. $4\mu A$

Watch Video Solution

318. A disc of mass M and radius R is rotating about its axis with initial angular velocity of ω_0 as shown. Now two small masses of m each one kept on the circumference diametrically opposite to eachother. Find new angular velocity



A. $\frac{M\omega_0}{M + 2m}$

B. $\frac{M\omega_0}{M + m}$

C. $\frac{M\omega_0}{M + 4m}$

D. none

Watch Video Solution

319. A girl cant see window mesh properly. She saw window mesh distorted and non-uniform. She went to doctor. Doctor says she is suffering from-

A. myopia and hypermetropia

B. astigmatism

C. hypermetropia and astigmatism

D. myopia and astigmatism

Watch Video Solution

320. A constant power delivering machine towed a box. The box travels in a straight line. The distance covered in time t is proportional to

A. 2/3

B. 3/2

C. 1

D. none

Watch Video Solution

321. An electromagnetic wave of 100MHz is travelling in +X direction and magnetic field at origin at an instant is $2 \times 10^{-8} T\hat{k}$. Find $\vec{E}$ at origin at same at same instant

A. $0.6\hat{j}$

B. $6\hat{j}$

C. $0.6\hat{k}$

D. $6\hat{k}$

Watch Video Solution

322. Velocity of particle $= 4v_e$, if $\frac{\lambda_p}{\lambda_e} = \frac{2}{1}$. Find $\frac{m_p}{m_e}$?

A. 1/8

B. 44409

C. 4

D. 44287

Watch Video Solution

323. A radioactive material X decays via two processes to produce Y&Z parallely with half live 1hr and 2hr resp. Find effective half life

A. 3hrs

B. 3/2 hrs

C. 2/3 hrs

D. 1 hrs

Watch Video Solution

324. Match following layers of our atmosphere with approximate maximum height from earth's surface.

Column I	Column Ii
1) Troposphere	a) 700 km
2) Stratosphere	b) 80 km
3) Mesosphere	c) 50 km
4) Thermosphere	d) 11 km
5) Exosphere	e) 1000 km

Watch Video Solution

325. In a hydrogen atom if electron is replaced by a muon then find the ionisation energy of atom. (Given mass of μ = 207 m_e`)

A. 13.6 eV

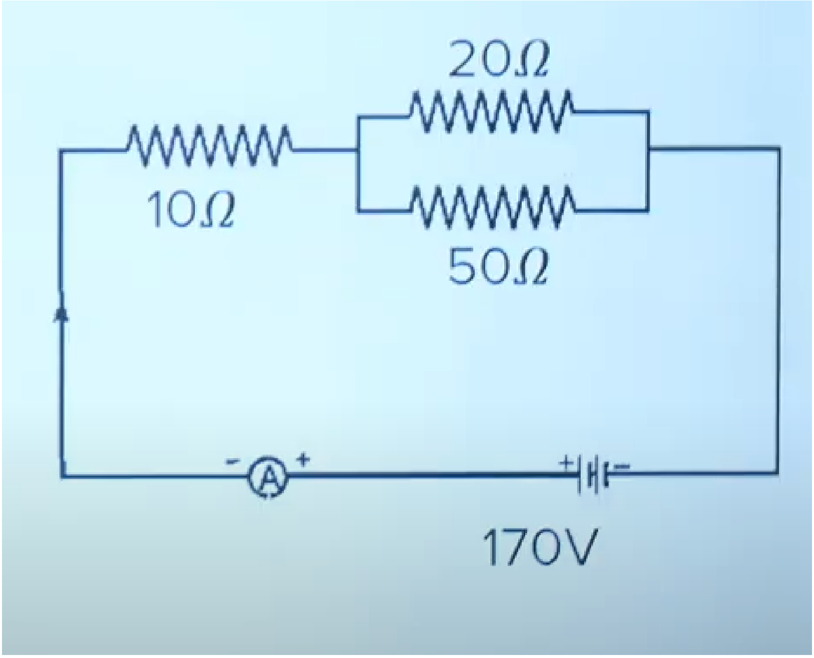
B. 27.2 eV

C. 2815.2 eV

D. 2720 eV

Watch Video Solution

326. In the given circuit find potential difference across $10 ohm$ resistance



A. 100V

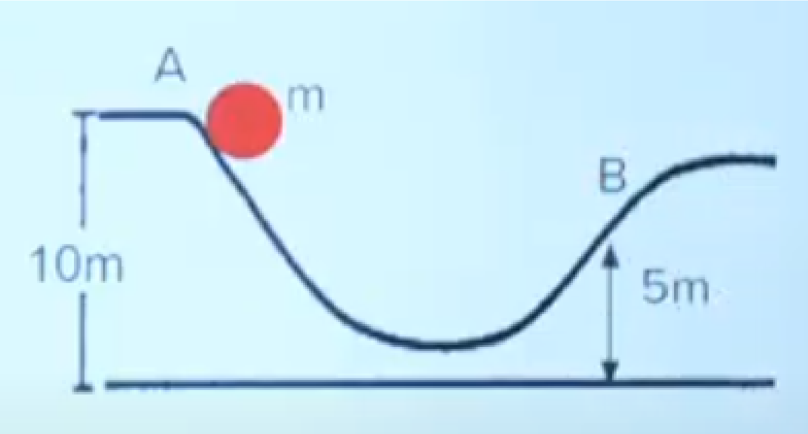
B. 10V

C. 70V

D. NONE

Watch Video Solution

327. A body of mass 10kg is at height of 10m at point A as shown on a smooth track. Find speed at B.



A. 5 m/s

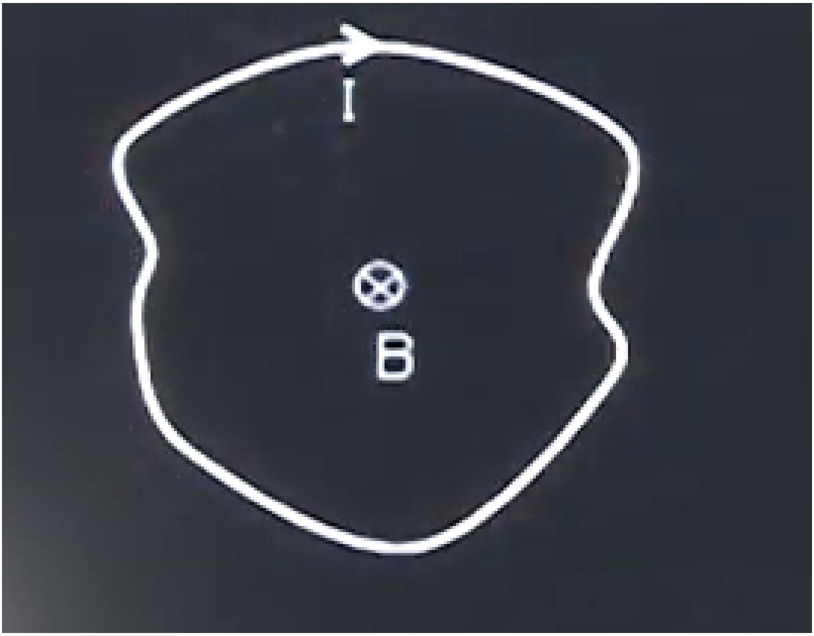
B. $\sqrt{20}\frac{m}{s}$

C. 10 m/s

D. 20 m/s

Watch Video Solution

328. A current carrying loop of random shape is placed perpendicular to magnetic field. Then shape of the loop will be:



A. ellipse

B. circle

C. straight line

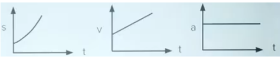
D. rectangle

Answer: B

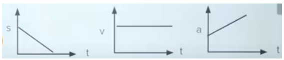
Watch Video Solution

Watch Video Solution

329. 4 sets of graphs one given. Each set consists of a displacement-time(s-t), velocity-time(v-t) & acceleration time (a-t) graph. Which set correctly illustrates all 3 graphs.

A. 

B. 

C. 

D. 

Watch Video Solution

330. Initially a body of mass 10kg is moving along x-axis with velocity $10\sqrt{3}$ m/s. It collides with another body of mass 20kg and comes to rest. The 20kg mass object disintegrates in 2 parts each of mass 10kg. One part moves along y-axis with velocity 10m/s and another at 30 degrees with x-axis. Evaluate velocity of object which moves at angle 30 degrees with x-axis

Watch Video Solution

331. Two wires A & B of same material having elongation 2mm and 4mm resp. on applying 2N take. If radius of B is 4 times the radius of A and ratio of length of A is to B in the form of 1/x then the value of x is.

Watch Video Solution

332. In a wire V = 5.0V, I = 2.00A, L=10.0cm and diameter d=5.00mm. Evaluate $\frac{\Delta(\rho) \times 100}{\rho}$

A. 3.9

B. 0.019

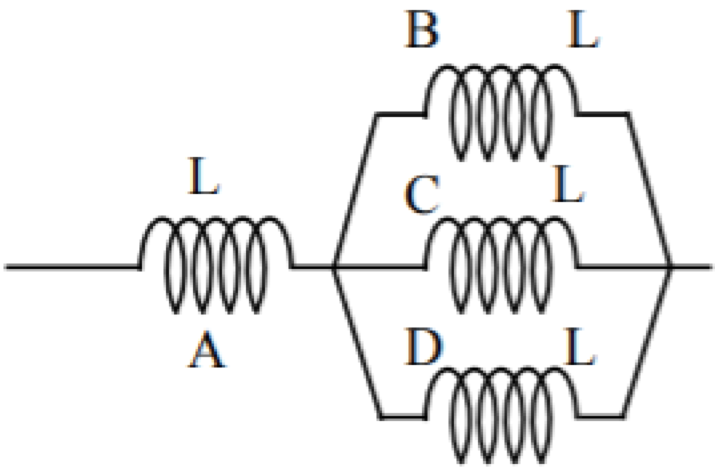
C. 0.029

D. 0.03

Answer: A

Watch Video Solution

333. Four identical solenoids are connected as shown.



If magnetic field in A is 3T, evaluate magnetic field in C

A. 1T

B. 9T

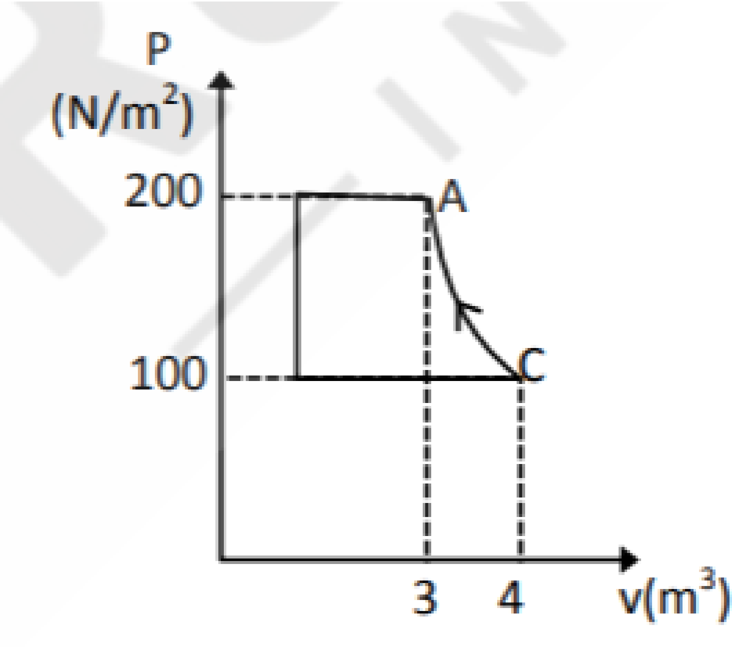
C. 12T

D. 6T

Answer: A

Watch Video Solution

334. In given PV graph process CA is adiabatic. Find work done in process CA if gas is diatomic $(\gamma = 1.4)$



A. -400J

B. -500J

C. 200J

D. 400J

Answer: B

Watch Video Solution

335. The relation between α and β of a transistor is

A. $\beta = \dfrac{\alpha}{1 - \alpha}$

B. $\beta = \dfrac{1 + \alpha}{\alpha}$

C. $\beta = \dfrac{\alpha}{1 + \alpha}$

D. $\beta = \dfrac{1 - \alpha}{\alpha}$

Answer: A

Watch Video Solution

336. The areal velocity of a planet of mass m moving in elliptical orbit around the sun with an angular momentum of L units is equal to

A. $\frac{dA}{dt}=\frac{L}{m}$

B. $\frac{dA}{dt}=\frac{2m}{L}$

C. $\frac{dA}{dt}=\frac{L}{2m}$

D. $\frac{dA}{dt}=\frac{m}{L}$

Answer: C

Watch Video Solution

337. An ideal gas follows a process PV^{γ} = constant where γ = adiabatic exponent.The slope of P-V graph will be represented by

A. - $\frac{\gamma V}{P}$

B. - $\frac{\gamma P}{V}$

C. - $\frac{P}{V}$

D. - $\frac{V}{P}$

Watch Video Solution

338. In nuclear decay process if $\frac{n}{p}$ ratio increases then which decay process may have ocurred

A. β - $decay$

B. $\gamma decay$

C. $\beta^{+} decay$

D. none

Watch Video Solution

339. What is the ratio of RMS and average speed of oxygen molecule?

A. $\sqrt{\frac{3\pi}{8}}$

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

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

D. $\sqrt{\frac{8}{3\pi}}$

Watch Video Solution

340. In a series LCR circuit $X_L = 10 ohm, X_C$ = 4 ohm and R = 4 ohm. Find power factor.

A. 2

B. $\frac{2}{\sqrt{13}}$

C. $\sqrt{2}$

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

Watch Video Solution

341. A particle of mass 5gm thrown from ground with speed of $5\sqrt{2}$ m/s at an angle 45^0 from ground. Find change in momentum from throwing instant upto time instant when fell on to ground.

A. 0.5N

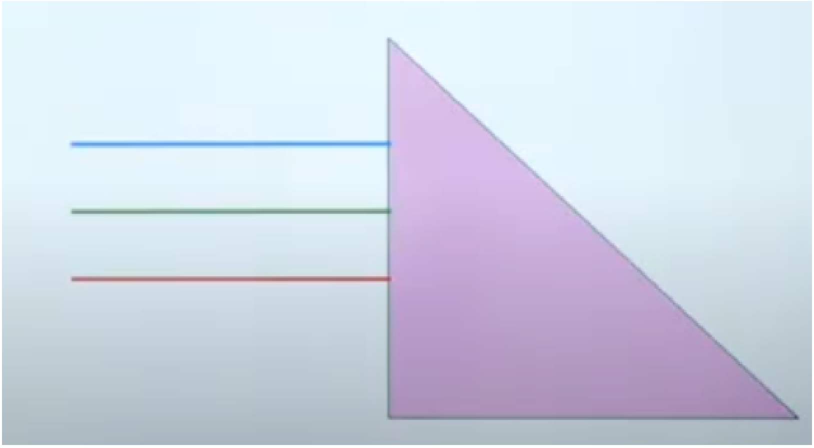
B. 0.025N

C. 0.05N

D. 0.25N

Watch Video Solution

342. Which of the following colors pass through prism? (μ_B = 1.49, μ_G = 1.41,μ_R =1.27)



A. all three

B. blue

C. red

D. none

Watch Video Solution

343. A rod of mass M and length L is bent to form a semicircle. The MOI about an axis perpendicular to plane of semicircle about its center is

A. $\dfrac{ML^2}{12}$

B. $\dfrac{ML^2}{\pi^2}$

C. $\dfrac{ML^2}{4\pi^2}$

D. $\dfrac{ML^2}{2}$

Watch Video Solution

344. A comet is approaching earth with speed of 286 km/s. It is observed that the light coming from comet is shifted by $X \times 10^{-10}m$ wavelength of $630nm$, Find X

A. 1

B. 30

C. 6

D. 100

Watch Video Solution

345. An isolated proton cannot split into a neutron

A. because proton is heavier than neutron

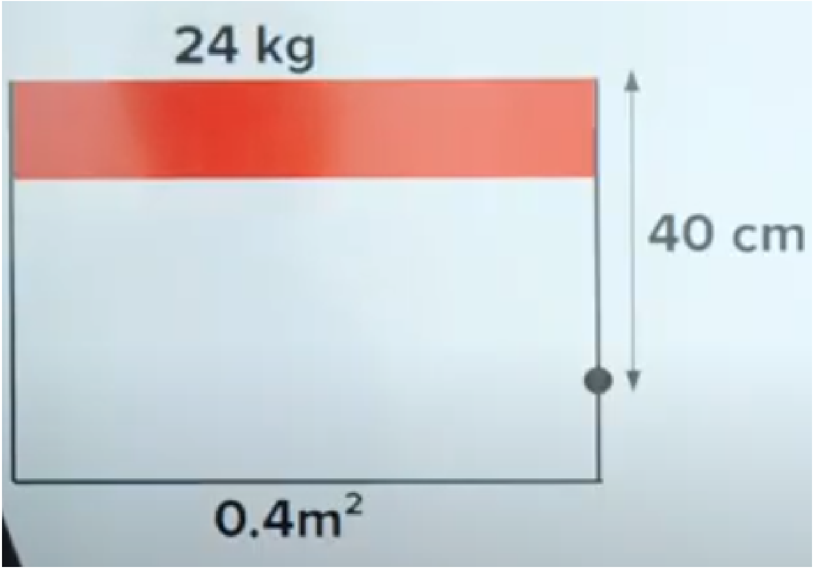
B. a proton can convert into neutron inside nucleus

C. it is not possible to convert proton to neutron in any condition

D. none

Watch Video Solution

346. A piston (smooth and free) is placed on free surface of fluid as shown. Find speed of efflux



Watch Video Solution

347. Which of following in an equation of SHM with time period $\frac{\pi}{\omega}$?

A. $\text{sine}^2(\omega t)$

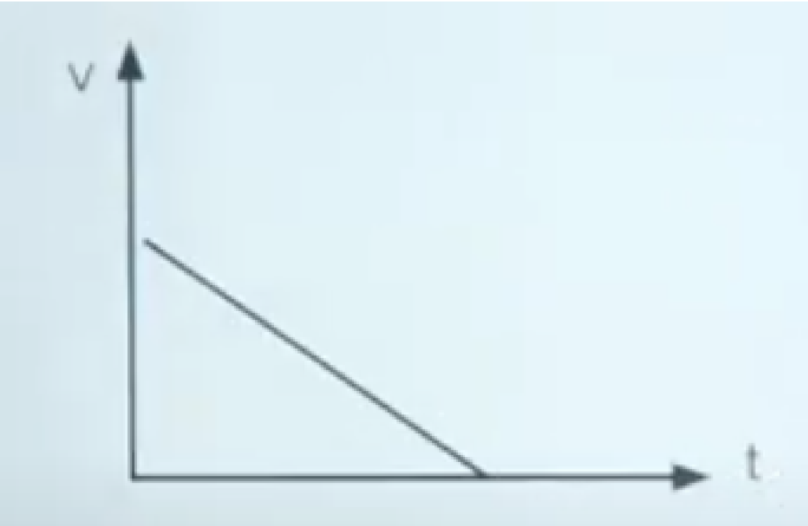
B. $\cos(\omega t) + \cos(2\omega t) + \cos(3\omega t)$

C. $3\cos\left(\left(\frac{\pi}{4}\right) - 2\omega t\right)$

D. none

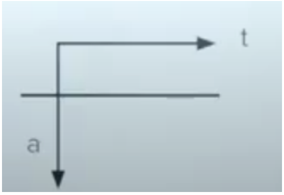
Watch Video Solution

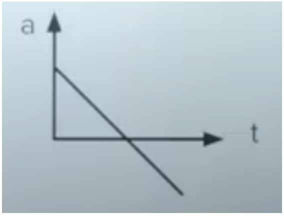
348. From given v-t graph identify correct a-t graph



A. 

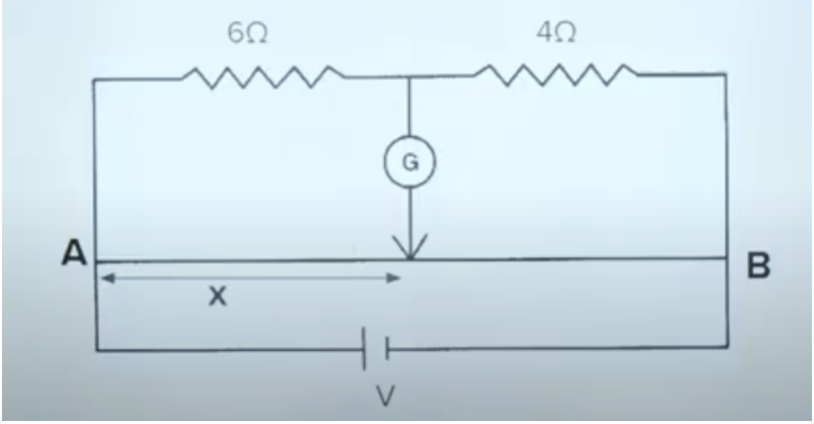
B. 

C. 

D. 

Watch Video Solution

349. In given setup if there is no deflection in galvanometer then find value of x. Total length of wire AB is 78cm



A. 46.8 cm

B. 31.2 cm

C. 39 cm

D. 50 cm

Watch Video Solution

350. If we take 2 cases as:

1. antenna is at height 20m

2. antenna is at 25m above ground level then the difference in range between two cases in percentage in n%. Find n

A. 0.12

B. 0.25

C. 0.35

D. 0.4

Answer: A

Watch Video Solution

351. A proton and alpha particle with kinetic energies K_p and K_α resp. enters a region of uniform magnetic field perpendicularly. The ratio of radii $R_p : R_\alpha = 2:1$ then find $K_p : K_\alpha$

A. 0.16

B. 4.00

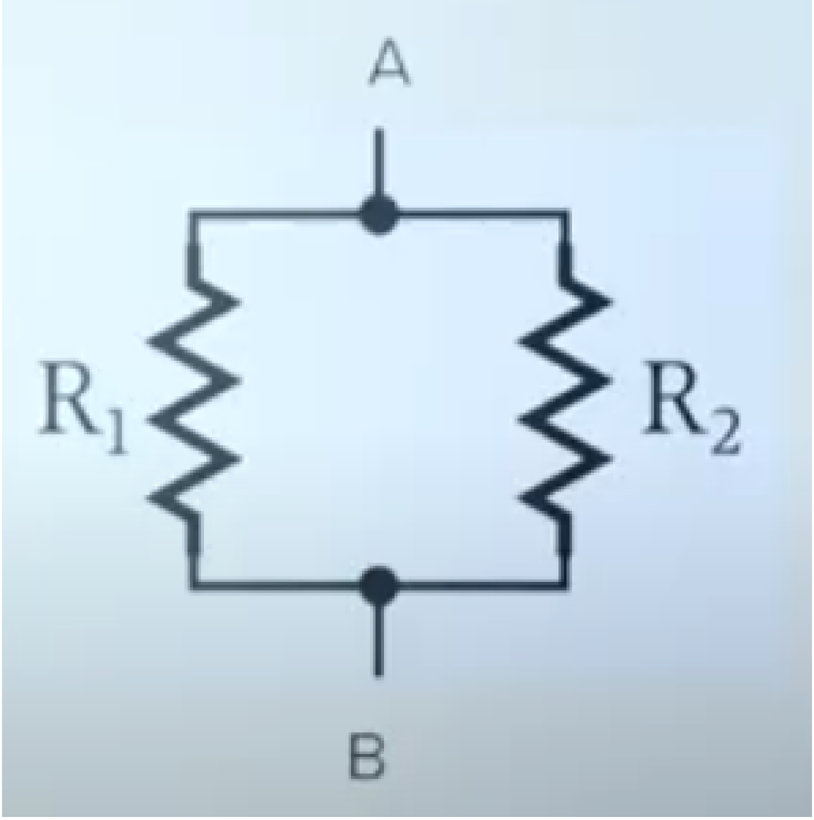
C. 0.3

D. 0.04

Watch Video Solution

352. For given circuit determine equivalent resistivity between point A & B. R_1 and R_2 have identical geometrical dimensions and resistivity 3

& 6resp.



A. 1

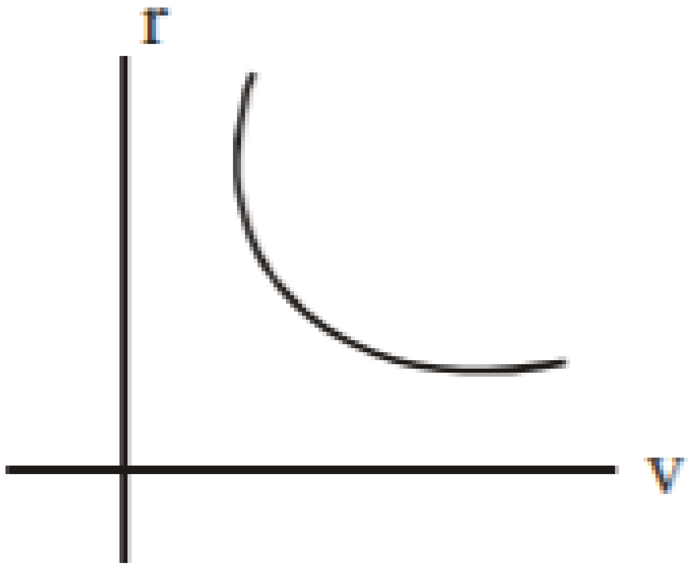
B. 3

C. 2

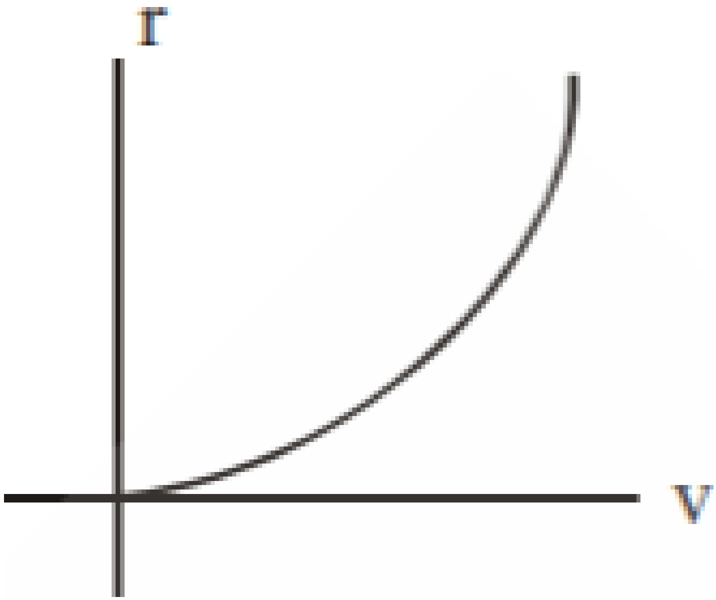
D. 4

Watch Video Solution

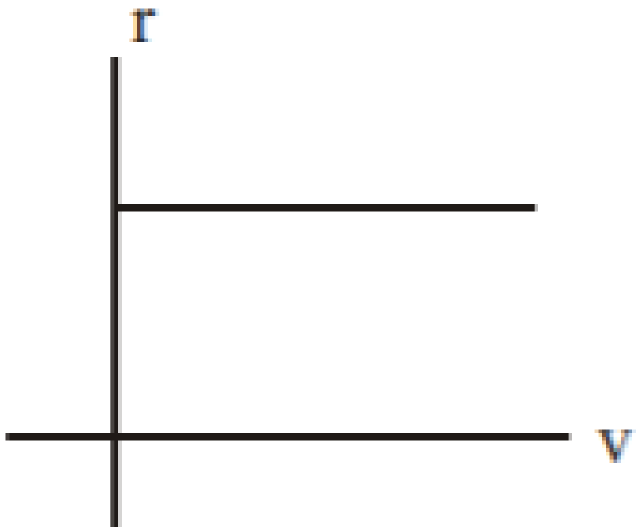
353. a particle moving in a circle track is given potential energy $U = -\frac{k}{r}$ where U is potential energy and r is radius. The correct graph between speed and radius of particles will be



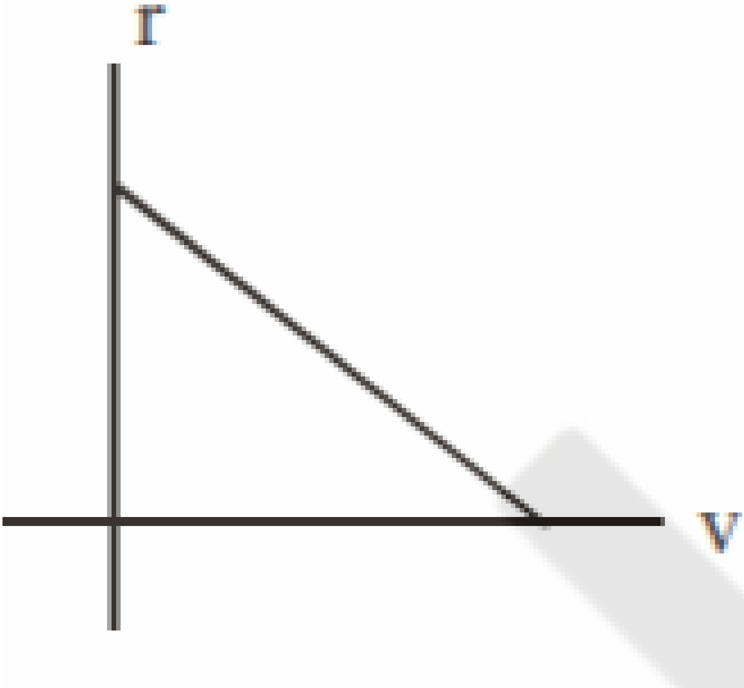
A.



B.



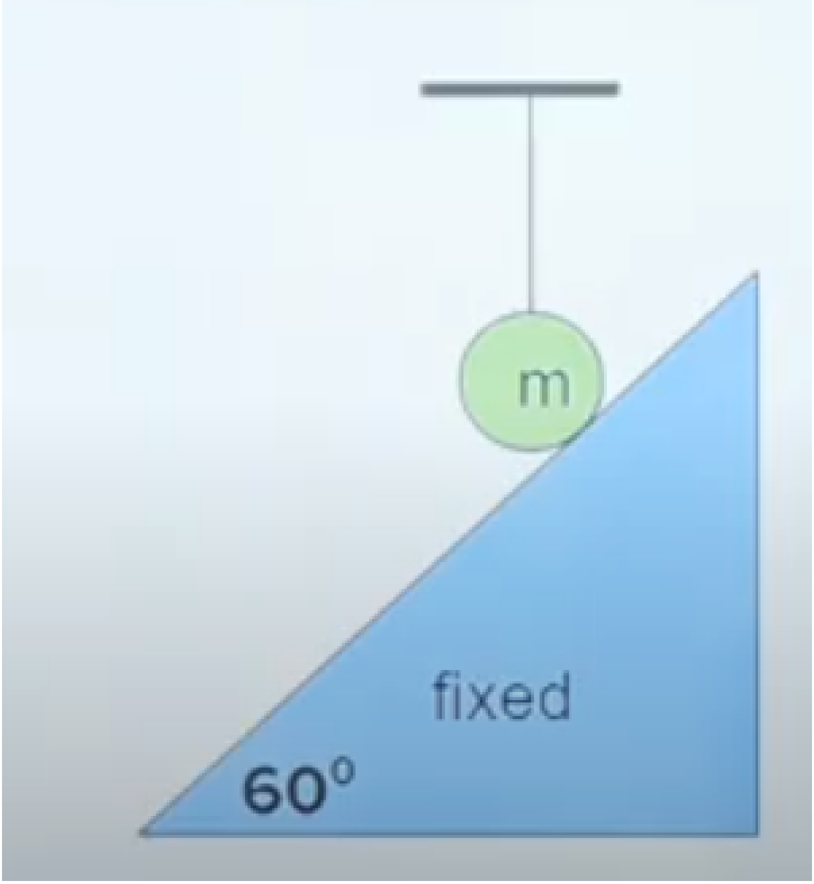
C.

D. 

Watch Video Solution

354. A solid cylinder of mass m is resting on fixed rough inclined plane with help of a thread. Find friction force between cylinder and inclined

plane. (given $\mu = 0.4$)



Watch Video Solution

355. Two resistance of identical shape but of different resistivity of values 3 and 6 are connected in parallel combination .The effective resistivity of the combination is

A. 18

B. 9

C. 4

D. $\left(\frac{1}{4}\right)$

Watch Video Solution

356. In adiabatic expansion the change in fractional part of pressure is

A. $-\frac{1}{\gamma}\left(\frac{dV}{V}\right)$

B. $-\gamma\left(\frac{dV}{V}\right)$

C. $\frac{dV}{V}$

D. $-\gamma\left(\frac{V}{dV}\right)$

Watch Video Solution

357. With what time period earth should rotate so that objects at equator will be weightless :

A. 84 min

B. 112 min

C. 600 min

D. none

Watch Video Solution

358. A charge of magnitude 1C is placed at origin. Infinite number of charges placed on y-axis at coordinates of 1m, 2m, 4m, 8m,...... of magnitude $1\mu C$. Then find force exerted by these charge on the charge placed at origin

A. $4 \times 10^3 N$

B. $8 \times 10^3 N$

C. $12 \times 10^3 N$

D. $16 \times 10^3 N$

Watch Video Solution

359. An inductor of inductance L and resistance R has energy stored E in it in the discharging LR circuit the time after which energy stored will be 25% of initial energy is

A. $\frac{L}{R}$

B. $\frac{L\ln 2}{R}$

C. $\frac{L}{2R}$

D. $\frac{L\ln(2)}{2R}$

Watch Video Solution

360. If EM wave is travelling in y-direction then pairs of electric and magnetic field are

A. E_x, B_z

B. E_x, B_y

C. E_z, B_y

D. E_y, B_z

Watch Video Solution

361. Radius = 7.5 ± 0.85 find error in volume

Watch Video Solution

362. m_1 mass is incident on m_2. which is in rest After collision they move with same speed in opposite direction. Find $\frac{m_2}{m_1}$

A. 0.08

B. 0.04

C. 0.33

D. 0.04

Watch Video Solution

363. Proton can decay into neutron

A. not possible since mass of proton is less than neutron

B. possible only in nucleus

C. always possible because decay is always with β^+ particle

D. not possible because decay is always with β^+ particle

Answer: B

Watch Video Solution

364. 1. Electric monopoles doesnt exist wheras magnetic monopoles exist

2. magnetic lines of solenoid at its ends and outside are not perfectly straight

3. magnetic field lines of toroid are confined in it

4. magnetic lines are not parallel inside bar magnet

5. perfect diamagnetic $\rightarrow \chi = -1$

which of the following statements are correct?

A. 1,2

B. 1,3,5

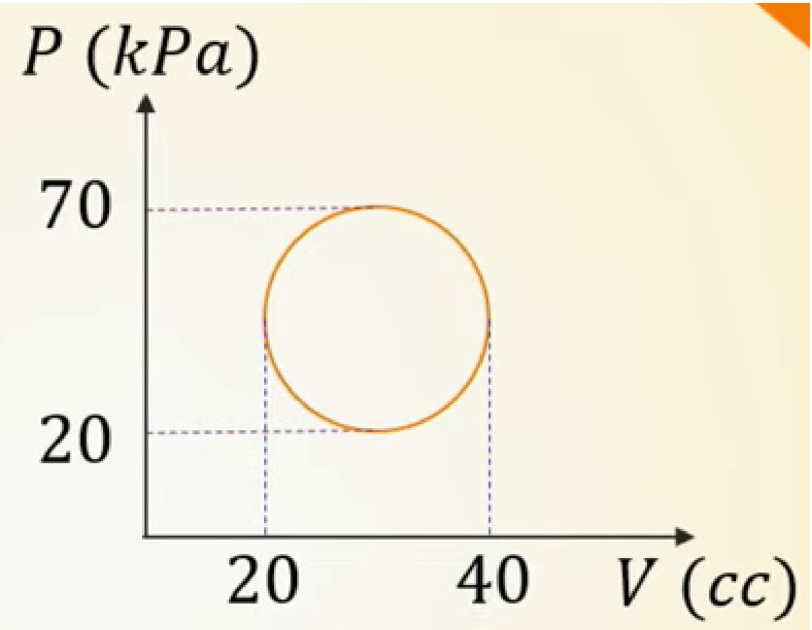
C. 2,3,5

D. 2 only

Answer: C

Watch Video Solution

365. consider the P-V diagram given below for a cyclic process.Find the net heat supplied to the system during the process



A. $0.625\pi J$

B. $0.25\pi J$

C. $0.1\pi J$

D. $0.2\pi J$

Watch Video Solution

366. A spring of force constant k = 100 N/m is compressed to x = 0.05 m by a block of mass 1 kg and released.Find the distance d where it falls

A. $\frac{5}{\sqrt{10}}m$

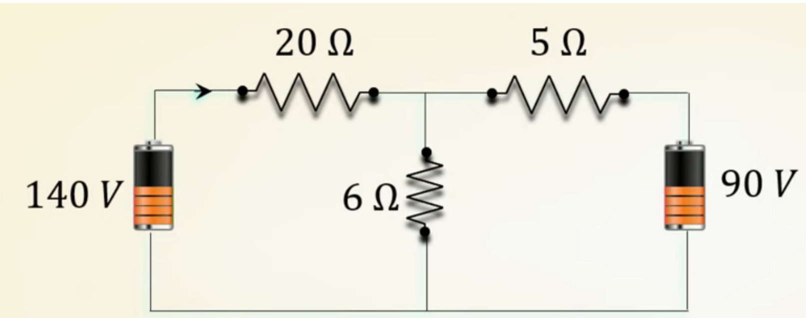
B. $5\sqrt{10}m$

C. $10\sqrt{10}m$

D. $1\sqrt{10}m$

Watch Video Solution

367. In the given circuit,find the current through 6Ω resistance



A. 18 A

B. 7A

C. 25A

D. 30A

Watch Video Solution

368. Four moles of a diatomic gas is heated from $0\,^{\circ}C$ to $50\,^{\circ}C$. Find the heat supplied to the gas if work done by it is zero.

A. 780 R

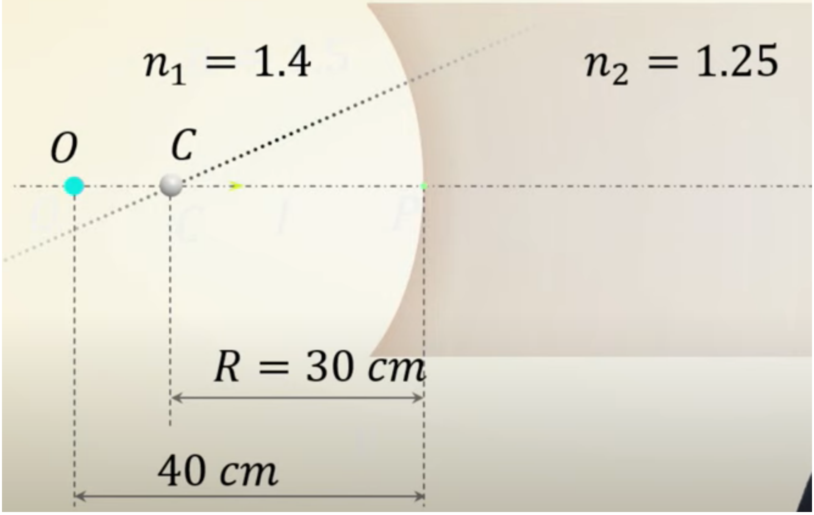
B. 500 R

C. 100 R

D. 650 R

Watch Video Solution

369. For the spherical interface shown in the figure, the two different media with refractive indices $n_1 = 1.4$ and $n_2 = 1.25$ are present as shown. The image will be formed at



A. $-\frac{125}{3} cm$

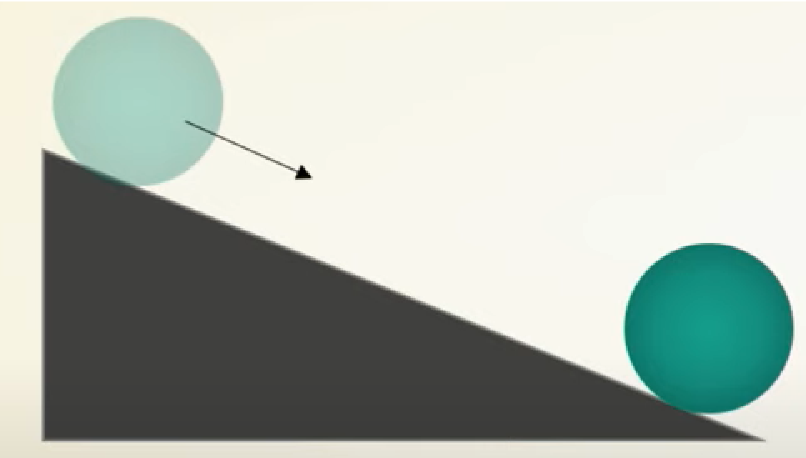
B. $-\frac{50}{6} cm$

C. $-\frac{25}{2} cm$

D. $-20 cm$

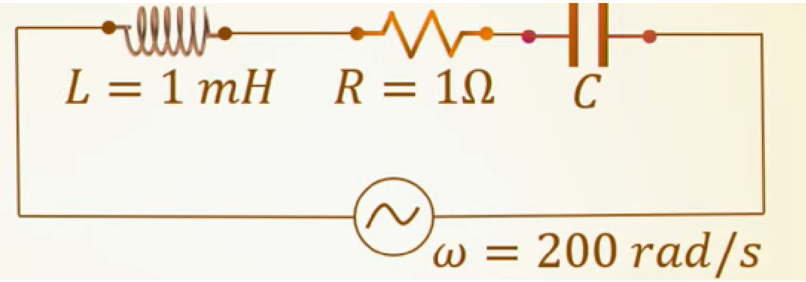
Watch Video Solution

370. A disc of mass m and radius R is released from rest.If it takes t_1 sec to slide down the smooth plane and t_2 sec is the time taken to roll down the rough plane, such that $\frac{t_2}{t_1} = \frac{\sqrt{3}}{x}$. Find x



Watch Video Solution

371. An AC circuit consists of a series combination of an inductance L = 1 mH. a resistance $R = 1\Omega$ and a capacitance C. It is observed that the current leads the voltage by 45°. Finf the value of capacitance 'C' if angular frequency of applied AC is 200 rad/S.



A. 5.6 mF

B. 3.92 mF

C. 2.56 mF

D. 5.2 mF

Watch Video Solution

372. An electron is projected into a magnetic field of B= 5×10^{-3} T and rotates in a circle of radius of R=3 mm. Find the work done by the force due to magnetic field.

A. 0 J

B. 15 mJ

C. 14 mJ

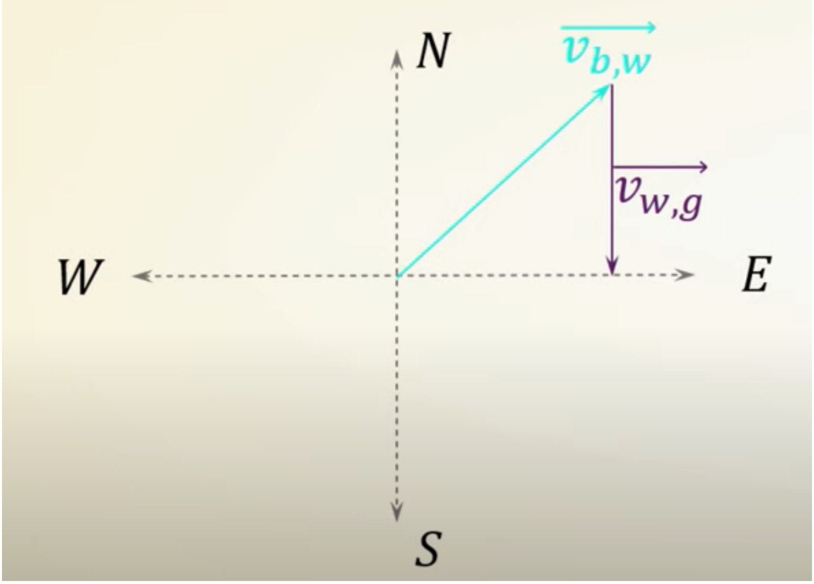
D. 20mJ

Watch Video Solution

373. A charge Q is divided into q and Q - q. If $\frac{Q}{q} = x$, such that repulsion between them is maximum, find x.

Watch Video Solution

374. Bird is flying in north-east direction with $v = 4\sqrt{2}\frac{m}{s}$ with respect to the wind and the wind is blowing from north to south with speed 1 m/s. Find the magnitude of the displacement of bird in 3 sec.



A. 5 m

B. 15m

C. 12m

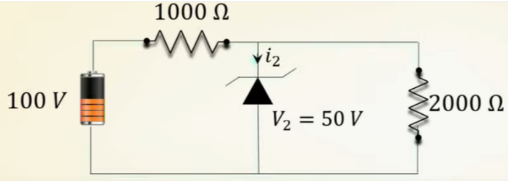
D. 20m

Watch Video Solution

375. Deutron and alpha particle having same K.E. in magnetic field. If the ratio of radius of Deutron and alpha particle is $x\sqrt{2}$. Then x=?

Watch Video Solution

376. In the circuit shown,find the current through the Zener diode.



A. 5 mA

B. 10mA

C. 15mA

D. 25mA

Watch Video Solution

377. If $\vec{A}.\vec{B} = \vec{A}\cdot\vec{B}$, find $\left|\vec{A} - \vec{B}\right|$

A. $\sqrt{A^2 + B^2 + \sqrt{2}AB}$

B. $\sqrt{A^2 + B^2 - \sqrt{2AB}}$

C. $\sqrt{A^2 + B^2 + \sqrt{2AB}}$

D. $\sqrt{A^2 + B^2 - \sqrt{2}AB}$

Watch Video Solution

378. For an element decaying through simultaneous reaction,the half life for respective decaying path is 1400 s and 700 s. Find the time taken when the number of atoms $\frac{N_0}{3}$ in the element sample. (N_0 is initial number of atoms in sample)

A. $\frac{1400}{5}\ln 3$

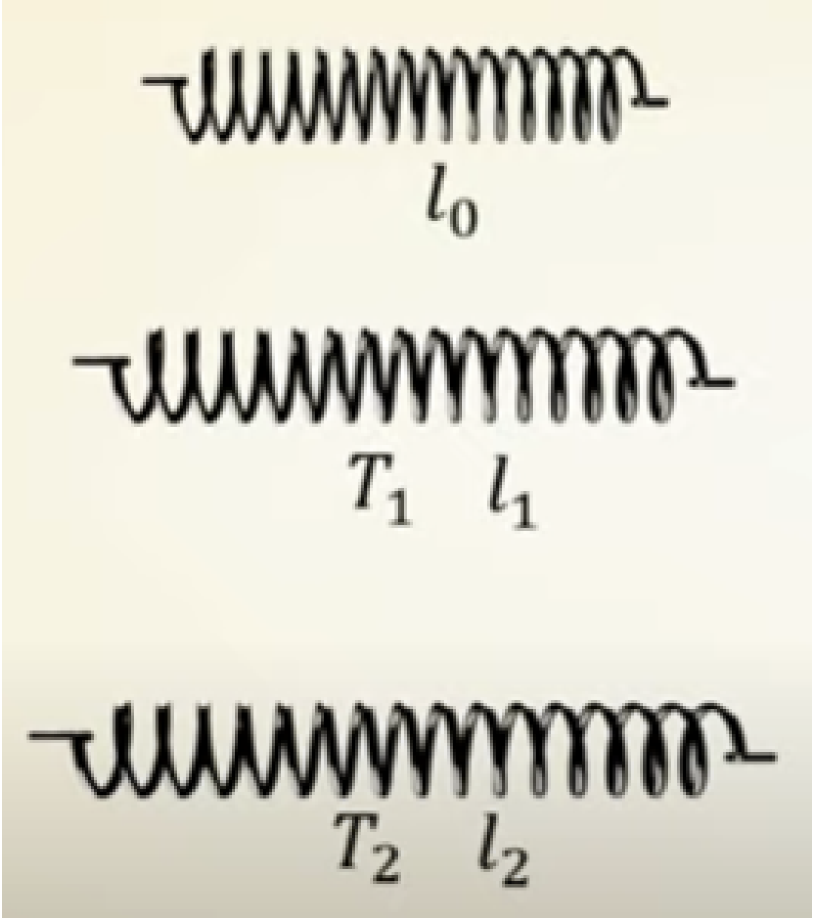
B. $\frac{1400}{3}\ln 3$

C. $\frac{1400}{3}\ln 2$

D. $\frac{700}{3}\ln 2$

Watch Video Solution

379. A spring with natural length l_0 has a tension T_1 when its length is l_1 and the tension is T_2 when its length is l_2.The natural length of spring will be:



A. $T_1 l_2 - T_2 \frac{l_1}{l_1} - l_2$

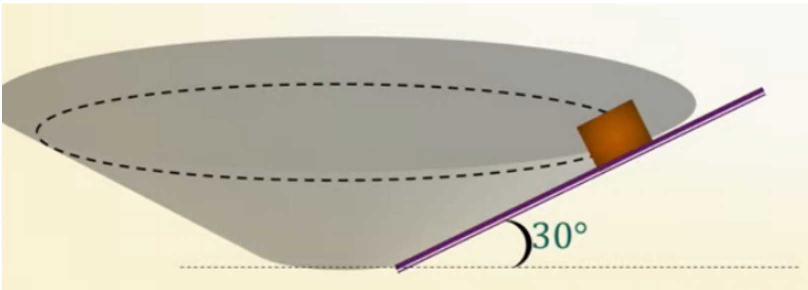
B. $T_2 l_1 - T_1 \frac{l_2}{T_2} - T_1$

C. $T_2 l_2 - T_1 \frac{l_1}{T_1} - T_2$

D. $T_2 l_1 - T_1 \frac{l_2}{T_2} + T_1$

Watch Video Solution

380. Consider a body of 800 kg moving with a maximum speed v on a road banked at $\theta = 30^\circ$, given $\cos 30^\circ = 0.87$.Find the normal reaction on the body. Coefficient of friction $\mu_s = 0.2$. [Take radius,r = 10 m]



A. 10.4 kN

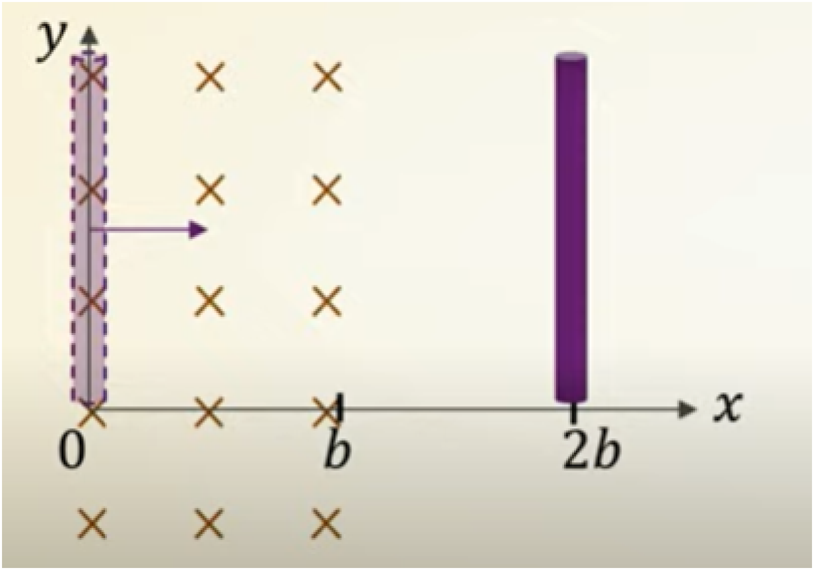
B. 12.6 kN

C. 11.6 kN

D. 8.3 kN

Watch Video Solution

381. A conducting rod of length l is moving perpendicular to magnetic field.The rod moves from 0 to 2b while field exists only from 0 to b. Find the graph for emf and power dissipated w.r.t x.



Watch Video Solution

382. A travelling wave is found to have the displacement by $y = \frac{1}{1 + x^2}$ at t = 0, after 3 sec the wave pulse is represented by equation $y = \frac{1}{1 + (1 + x)^2}$.The velocity of wave is:

A. 1 m/s

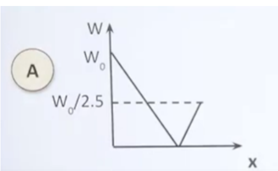
B. $\frac{1}{3}$ m/s

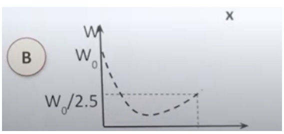
C. $\frac{2}{3}$ m/s

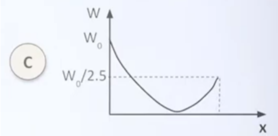
D. $\frac{1}{4}$ m/s

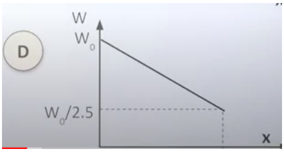
Watch Video Solution

383. A person is standing on weighing machine and is slowly taken from the surface of earth to the surface of mars.Given that the value of g on earth is $10ms^{-2}$ and that on Mars is $4ms^{-2}$.Draw graph of weight vs distance from earth's surface

A. 

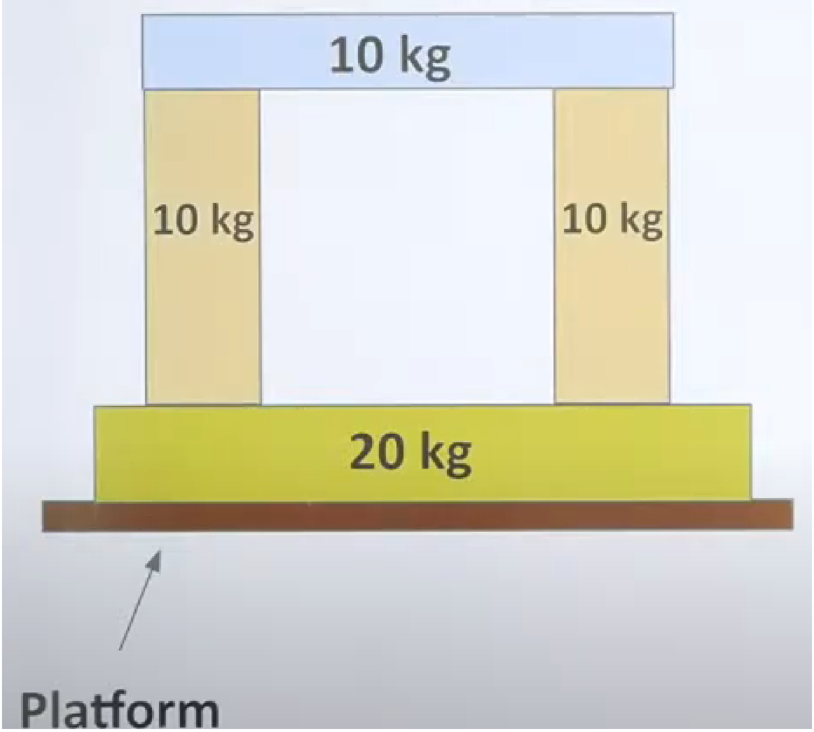
B. 

C. 

D. 

Watch Video Solution

384. A block of mass 20 kg is placed on a horizontal platform and three blocks each with mass 10 kg are arranged as given in figure below. If platform accelerates downward with acceleration $2\frac{m}{s^2}$, the the normal force between 10 kg and 20 kg block is:



A. 100 N

B. 150 N

C. 120 N

D. 140 N

Watch Video Solution

385. A car is moving towards a stationary wall making Horn of frequency 400 Hz. The reflected frequency heard by a driver of car is 500 Hz.Find the speed of car. [v= speed of sound]

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

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

C. $\frac{V}{9}$

D. $\frac{V}{12}$

Watch Video Solution

386. A current of 5A is flowing through magnesium wire.The current density is making an angle of 60° with Area vector.Find the electric field.(Given : Area =$2m^2$,ρ= Resistivity of Magnesium = 11×10^{-4} SI units)

A. $55 \times 10^{-4} \frac{V}{m}$

B. $\frac{5}{11} \times 10^{-4} \frac{V}{m}$

C. $\frac{11}{5} \times 10^{-4} \frac{V}{m}$

D. $\frac{55}{2} \times 10^{-4} \frac{V}{m}$

Watch Video Solution

387. A ball having charge to mass ratio 8 μc/g is placed at a distance of 10 cm from a wall.Suddenly an electric field $100Nm^{-1}$ is switched on. Assuming collisions to be elastic.Find Time period of oscillations.

A. 0.5 sec

B. 1 sec

C. $\sqrt{2}$ sec

D. $\sqrt{3}$ sec

Watch Video Solution

388. Light emitted by hydrogen gas corresponding to transition from $n = 3$ to $n = 2$ incident on a metal plate.The electron emitted from metal plate with maximum kinetic energy enters a magnetic field $5 \times 10^{-4} T$ perpendicularly. If the radius of path of electron is 7 mm then find the work function of metal.

A. 0.91 eV

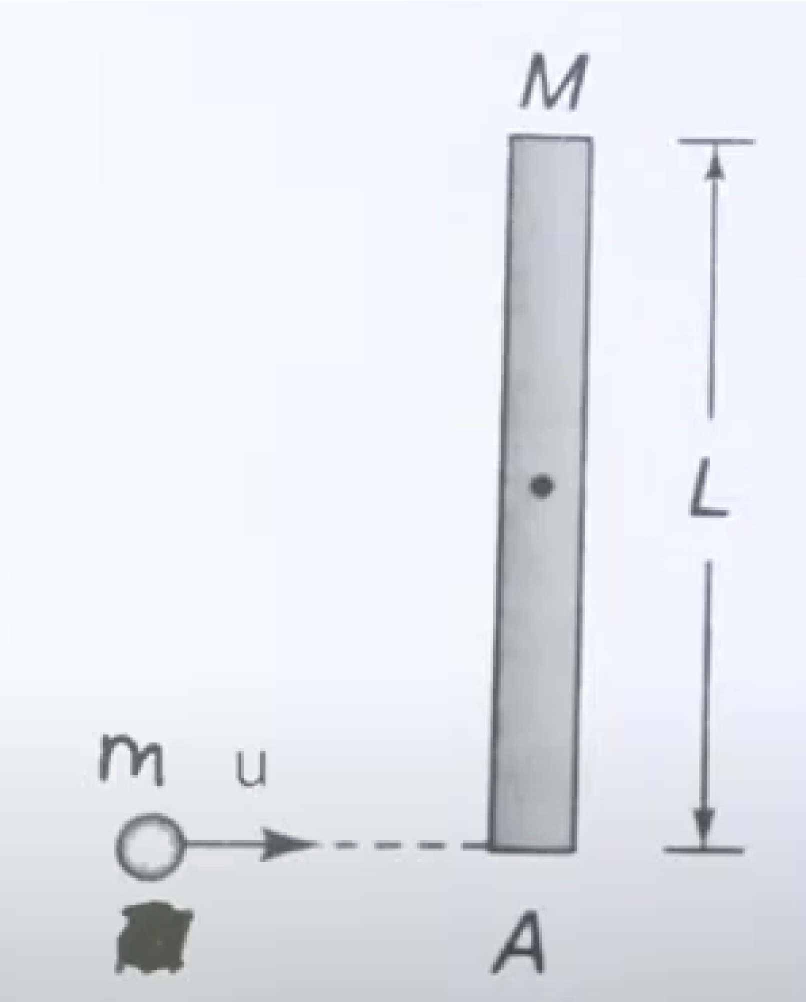
B. 0.81 eV

C. 1.01 eV

D. 0.5 eV

Watch Video Solution

389. A particle of mass m and speed u collides elastically with the end of a uniform rod of mass M and length L as shown. If the particle comes to rest after collision, find $\frac{m}{M}$



A. 44228

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

C. 44256

D. 44287

Watch Video Solution

390. A body of mass m emits a photon of frequency 'v',the loss in its internal energy is

A. hγ

B. $hv\left(1 - \frac{hv}{2mc^2}\right)$

C. $hv\left(1 + \frac{hv}{2mc^2}\right)$

D. zero

Watch Video Solution

391. A radioactive material is undergoing simultaneous disintegration into two different products with half lives 1400 years and 700 years respectively.Find the time taken by the sample to decay to one third of its initial value .

A. $\left(\frac{\ln 2}{\ln 3} \cdot \frac{1400}{3}\right)$ years

B. $\frac{\ln 3}{\ln 2}(1400)$ years

C. $\frac{\ln 3}{\ln 2}\frac{1400}{3}$years

D. $\frac{\ln 3}{\ln 2}(700)$ years

Watch Video Solution

392. In a series LCR circuit R = 5 Ω, L= 0.5mH,C=2.5 μF.THE RMS value of external voltage is 250 V.Find the power dissipated if circuit is in Resonance

Watch Video Solution

393. A particle has 4 times its initial kinetic energy.Find the percentage change in momentum?

A. 100 %

B. 200 %

C. 300 %

D. 400 %

Watch Video Solution

394. A particle is performing SHM aong x-axis,such that its velocity is v_1 when its displacement from mean position is x_1 and v_2 when its displacement from mean position is x_2.Time period of oscillation is

A. $\frac{1}{2}\pi\sqrt{\frac{x_2 - x_1}{\left(v_1 - v_2\right)}}$

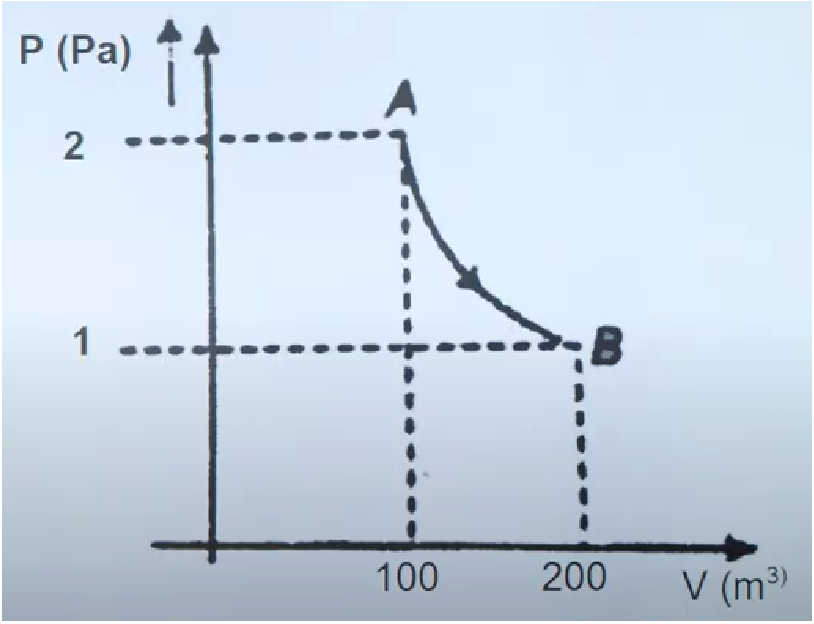
B. $2\pi\sqrt{\frac{\left(x_1^2+x_2^2\right)}{\left(v_2^2+v_1^2\right)}}$

C. $2\pi\sqrt{\frac{\left(x_1^2-x_2^2\right)}{\left(v_2^2-v_1^2\right)}}$

D. $2\pi\sqrt{\frac{\left(x_1x_2-x_1^2\right)}{\left(v_1v_2-v_1^2\right)}}$

Watch Video Solution

395. Find work done in the process A $\rightarrow$ B (isothermal) by gas?



A. 100 ln2

B. -100 ln 2

C. 200 ln2

D. -200 ln2

Watch Video Solution

396. The wavelength of sodium lamp is observed to be 2886 A° from earth and original wavelength was 2880 A°.Find speed of galaxy

A. $3 \times 10^5 ms^{-1}$

B. $4 \times 10^5 ms^{-1}$

C. $6.25 \times 10^5 ms^{-1}$

D. none

Watch Video Solution

397. Electrons with de-Broglie wavelength λ fall on the target in an X-ray tube. The cut-off wavelength of the emitted X-ray is

A. $\dfrac{2mc\lambda^2}{h}$

B. $2\dfrac{h}{m}c$

C. $\dfrac{h}{m}c$

D. none

Watch Video Solution

398. An electron $(9 \times 10^{-31} kg, 1.6 \times 10^{-19}$ C) is accelerated by a voltage of 40kv.What is the wavelength? h= 6.6×10^{-34} SI units.

Watch Video Solution

399. A body rotating have an angular velocity of 300 rpm and its angular acceleration is $\frac{\pi}{20}\left(\frac{Rad}{s^2}\right)$.Revolutions done by this particle in 10 sec is

A. $\frac{205}{4}(rev)$

B. $\frac{307}{3}(rev)$

C. 75 (rev)

D. $\frac{189}{2}(rev)$

Watch Video Solution

400. A body is under the influence of a force such that it delivers a constant power p. The variation of position with time of body as

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

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

C. $t^{\frac{5}{2}}$

D. none

Watch Video Solution

401. The angle of dip in a plane at an angle of 30° with magnetic meridian is 45°.The value of true Dip is

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

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

C. 30°

D. 60°

Watch Video Solution

402. A boy at the airport takes time t_1 to walk on escalator if the escalator is at rest and takes time t_2 if boy is at rest on moving escalator.Then find the time taken to walk on the escalator for same path?

A. $\left|t_1 - t_2\right|$

B. $\frac{t_1 + t_2}{2}$

C. $\frac{2t_1t_2}{t_1 + t_2}$

D. $\frac{t_1t_2}{t_1 + t_2}$

Watch Video Solution

403. When a metal is illuminated by light of wavelength λ , the stopping potential is $V_\circ$ and for wavelength 2λ, it is $3V_\circ$.Then the threshold wavelength is ?

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

B. $\frac{4\lambda}{5}$

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

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

Watch Video Solution

Watch Video Solution

404. A solid cylinder and ring are released from rest in top of inclined plane. Find ratio of their velocities when they reach bottom,assuming pure rolling

A. $\sqrt{\frac{3}{5}}$

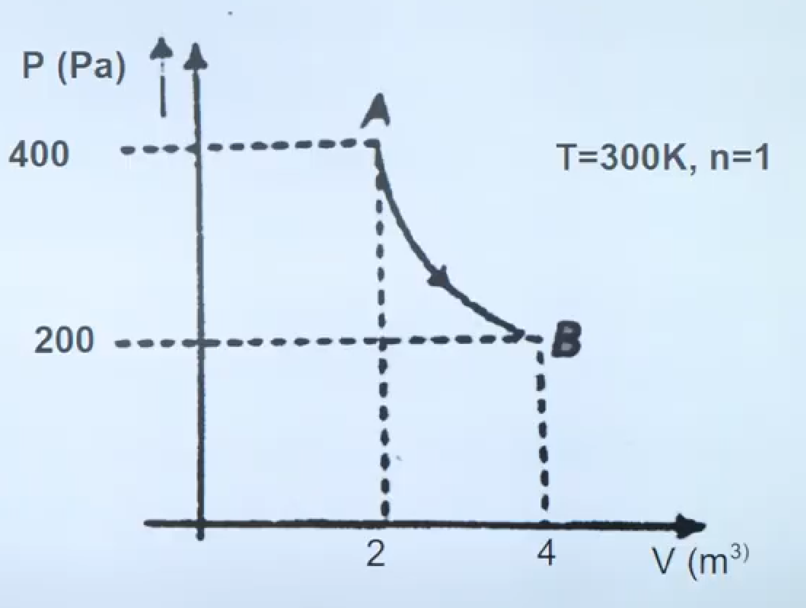
B. $\sqrt{\frac{5}{3}}$

C. $\sqrt{\frac{7}{5}}$

D. $\sqrt{\frac{4}{3}}$

Watch Video Solution

405. A gas is taken through an isothermal process as shown.Find the work done by the gas



A. 240 J

B. 360 J

C. 560 J

D. none

Watch Video Solution

406. For a medium, the magnetic susceptibility is 499.The permeability of free space is $4\pi \times 10^{-7}$ SI units. Then the permeability of the medium is?

A. $2\pi \times 10^{-4}$ SI units

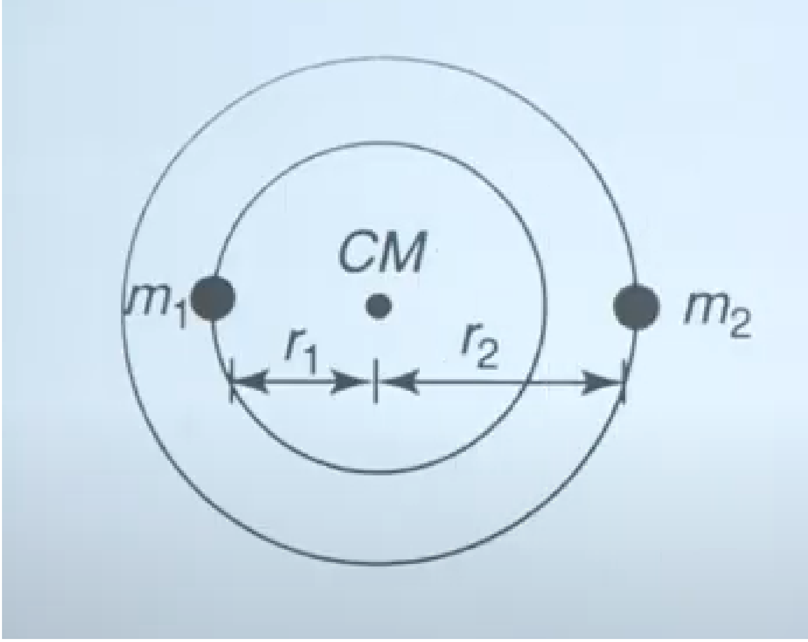
B. $2\pi \times 10^{-7}$ SI units

C. $\frac{5\pi}{4} \times 10^{-4}$ SI units

D. $\frac{4\pi}{5} \times 10^{-4}$ SI units

Watch Video Solution

407. Two stars of masses m_1 and m_2 form a binary system,revolving around each other in circular orbits of radii r_1 and r_2 respectively.Time period of revolution for this system is



A. $2\pi\sqrt{\dfrac{(r_1+r_2)^3}{G(m_1+m_2)}}$

B. $2\pi\sqrt{\dfrac{(r_1+r_2)r_2^2}{G(m_1+m_2)}}$

C. $\dfrac{2\pi(r_1+r_2)^{\frac{3}{2}}}{\sqrt{G(m_1+m_2)}}$

D. $\dfrac{2\pi(r_1+r_2)^2 r_1}{G(m_1+m_2)}$

Watch Video Solution

408. An element has $\frac{1}{16}^{th}$ of initial activity in 20 sec.Half life of the nuclei is

A. 5 (sec)

B. $\frac{4}{3}(\sec)$

C. 2.5 (sec)

D. 7.5 (sec)

Watch Video Solution

409. Rotational kinetic energy is 50% of translational kinetic energy.What is the object?

A. Disc

B. ring

C. sphere

D. hollow cylinder

Watch Video Solution

410. Direction of E.M wave velocity is E = $E_{\circ}(i)$ and B = $B_{\circ}\left(k^{\wedge}\right)$

A. $\hat{J}$

B. - $\hat{J}$

C. $\hat{K}$

D. -$\hat{K}$

Watch Video Solution

411. $\left|\vec{P}\right| = \left|\vec{Q}\right|, \left|\vec{P} + \vec{Q}\right| = \left|\vec{P} - \vec{Q}\right|$.Find the angle between P and Q

A. 45°

B. 90°

C. 135°

D. 150°

Watch Video Solution

412. A body is moved from rest along straight line by a machine delievering constant power.Time taken by body to travel a distance 'S' is proportional to

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

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

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

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

Watch Video Solution

413. A uniform rod of young's modulus Y is tretched by two tension T_1 and T_2 such that rods gets expanded to length L_1 and L_2 respectively.Find initial length of rod?

A. $\dfrac{L_1T_1 - L_2T_2}{T_1 - T_2}$

B. $\dfrac{L_2T_1 - L_1T_2}{T_2 - T_1}$

C. $\dfrac{L_1T_2 - L_2T_1}{T_2 - T_1}$

D. $\dfrac{L_1}{T_1} \cdot \dfrac{T_2}{T_2}$

Watch Video Solution

414. Time (T),Velocity (C) and angular momentum (h) are chosen as fundamental quantities instead of mass,length and time. In term of these,dimension of mass would be:

A. $[M]=\left[T^{-1}C^{-2}h\right]$

B. $[M]=[T^{-1}C^{2}h\big]$

C. $[M]=\left[T^{-1}C^{-2}h^{-1}\right]$

D. $[M]=\left[T^{1}C^{-2}h\right]$

Watch Video Solution

415. Find the relation between γ (adiabatic constant) and degree of freedom (f)

A. $f=\dfrac{2}{\gamma-1}$

B. $f=\dfrac{\gamma}{\gamma-1}$

C. $f=\frac{\gamma-1}{2}$

D. $f=\frac{\gamma-1}{\gamma}$

Watch Video Solution

416. Two identical drops of Hg coalesce to form a bigger drop.Find ratio of surface energy of bigger drop to smaller drop.

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

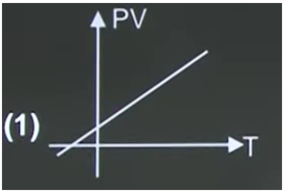
B. $3^{\frac{2}{5}}$

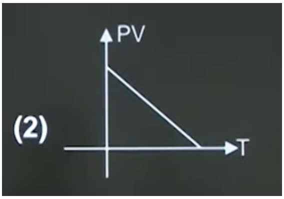
C. $2^{\frac{2}{3}}$

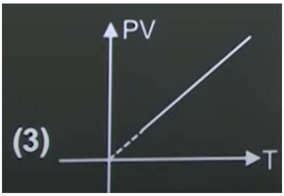
D. $5^{\frac{2}{3}}$

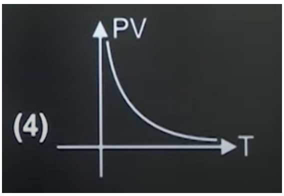
Watch Video Solution

417. Identify correct graph between PV and T for an ideal gas of given number of moles:

A. 

B. 

C. 

D. 

Watch Video Solution

418. Two satellites of mass M_A and M_B are revolving around a planet of mass M in radius R_A and R_B respectively. Then?

A. $T_A > T_B$ if $R_A > R_B$

B. $T_A > T_B$ if $M_A > M_B$

C. $T_A = T_B$ if $M_A > M_B$

D. $T_A > T_B$ if $R_A < R_B$

Watch Video Solution

419. If $N_{\circ}$ active nuclei becomes $\frac{N_{\circ}}{16}$ in 80 days.Find half life of nuclei?

A. 40 days

B. 20 days

C. 60 days

D. 30 days

Watch Video Solution

420. A satellite is revolving around a planet in an orbit of radius R. Suddenly radius of orbit becomes 1.02 R then what will be the percentage change in its time period of revolution?

Watch Video Solution

421. A body takes 5 minutes to cool from 75^0C to 65^0C. Find the temperature in the next 5 minutes, if the room temperature is 25^0C.

A. 57^0C

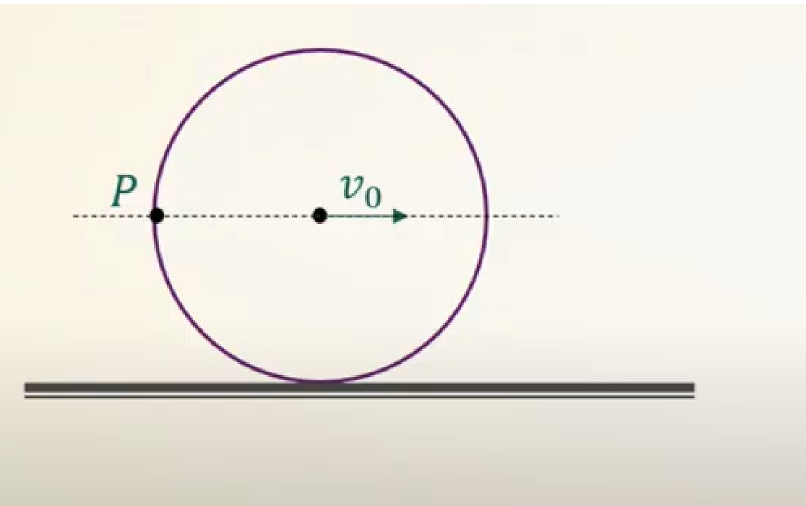
B. 67^0C

C. 77^0C

D. $87^0 C$

Watch Video Solution

422. The centre of the wheel rolling on a plane surface moves with velocity v_0. A particle on the rim of the wheel at same level as the centre will be $\sqrt{x} v_0$. Find x



A. $\sqrt{2}$

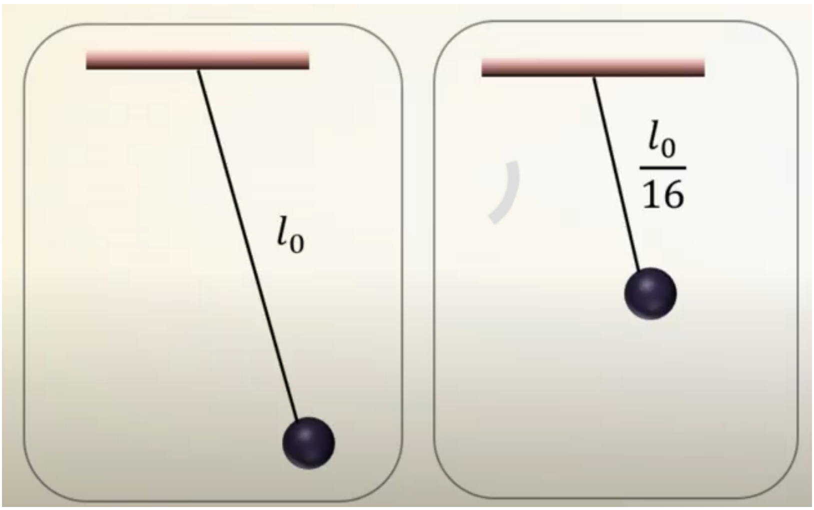
B. 2

C. 3

D. 4

Watch Video Solution

423. A simple pendulum of length l_0 can perform simple harmonic oscillations with a time period T_0. If the length of the pendulum is decreased to $\frac{l_0}{16}$ then the time time period of oscillation will become.



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

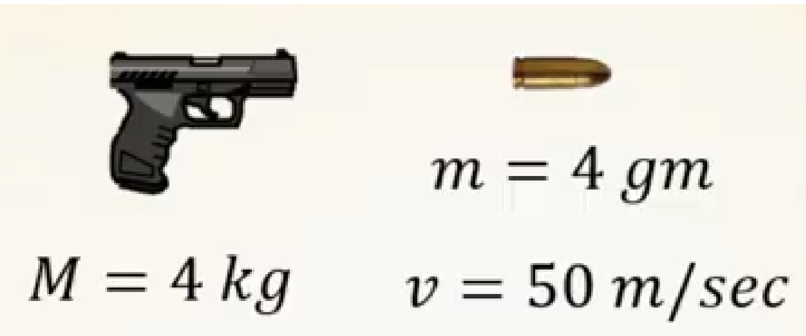
B. $\frac{T_0}{4}$

C. $\frac{T_0}{6}$

D. $\frac{T_0}{8}$

Watch Video Solution

424. A gun of mass 4 kg initially at rest fires a bullet of mass 4g with a speed of 50m/s as seen by an observer on ground. Find the impulse on bullet and recoil speed of the gun.



A. $0.2kg\frac{m}{\sec}, 0.05\frac{m}{s}$

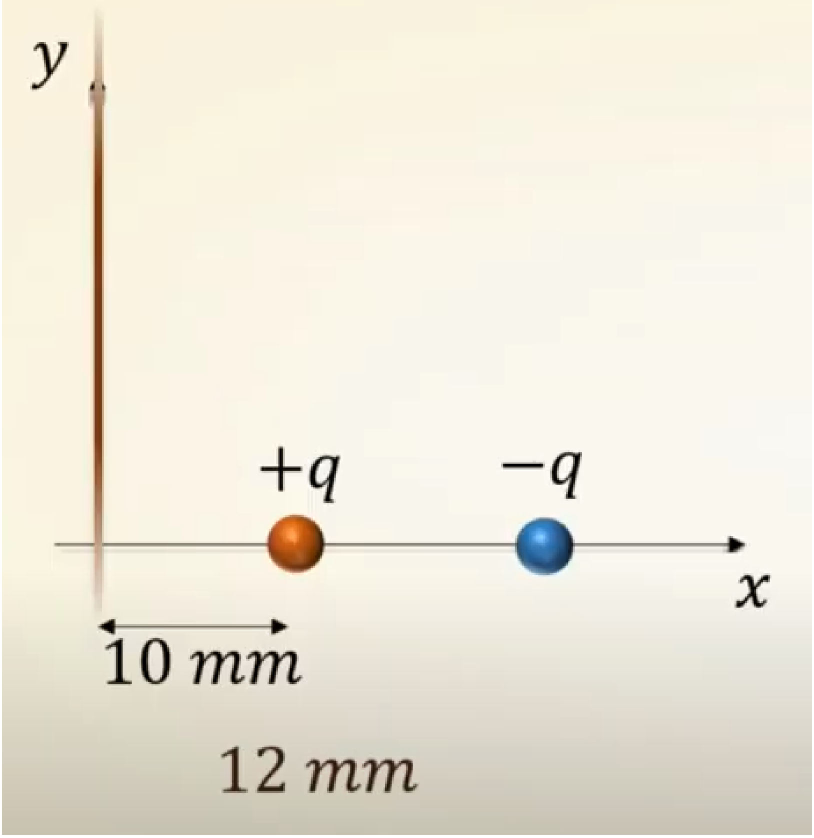
B. $0.2kg\frac{m}{\sec}, 0.01\frac{m}{s}$

C. $0.1kg\frac{m}{\sec}, 0.01\frac{m}{s}$

D. $0.1kg\frac{m}{\sec}, 0.05\frac{m}{s}$

Watch Video Solution

425. A line charge having a linear charge density of $3 \times 10^{-6}\frac{C}{m}$ is placed as shown in figure. A dipole is placed on x-axis as shown. Find the charge q if it is subjected to a force of 4N.



A. $\frac{40}{3}\mu C$

B. $\frac{20}{3}\mu C$

C. $\frac{40}{9}\mu C$

D. $\frac{80}{3}\mu C$

Watch Video Solution

Watch Video Solution

426. A radioactive element of mass number 108 undergoes alpha-decay. If the Q-value of the reaction is known to be 5.5 MeV then find the kinetic energy of alpha-particle

A. $3.6MeV$

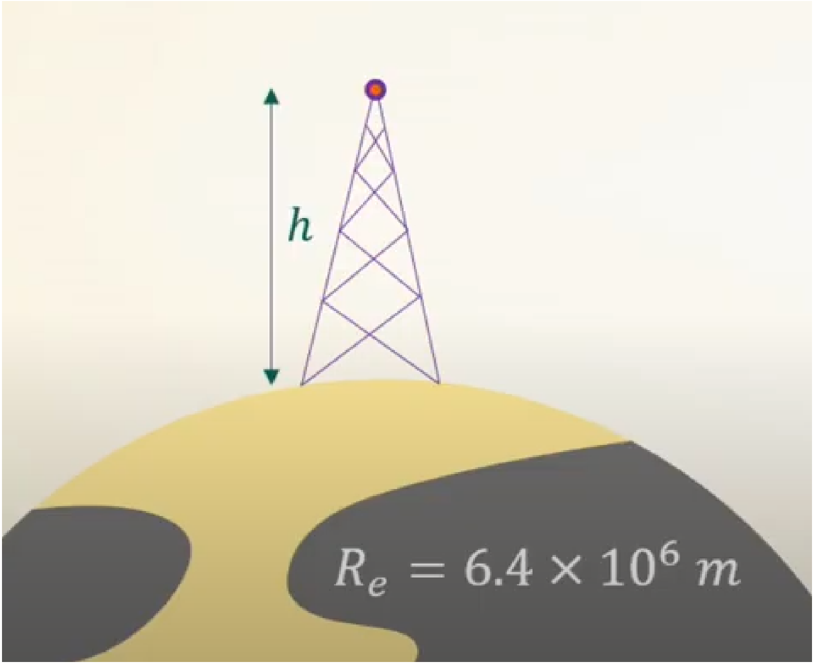
B. $4.5MeV$

C. $5MeV$

D. $5.3MeV$

Watch Video Solution

427. What should be height of transmission antenna if the television telecast is to cover a radius of 1500 km? The average population around the tower is 2000 person per square mile.



A. 1.76 x 10^5 m`

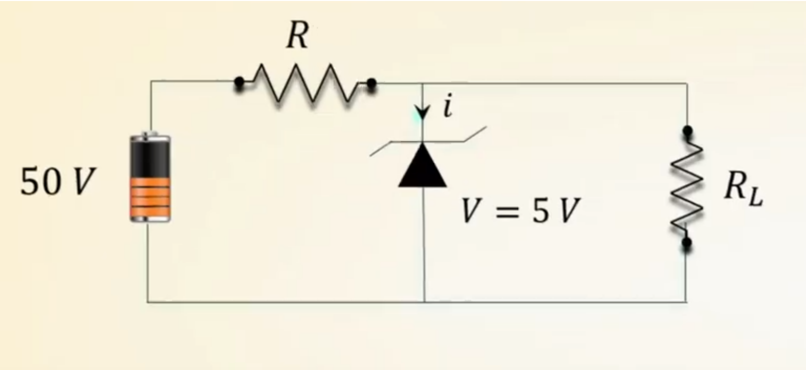
B. 2.24 x 10^6 m

C. 3.5 x 10^4 m

D. 5 x 10^3 m

Watch Video Solution

428. The current through diode is 90 mA. Find the maximum value of R.



A. 100Ω

B. 500Ω

C. 250Ω

D. none of these

Watch Video Solution

429. A proton of mass m_p and electron of mass m_e are accelerated through the same potential the ratio of debroglie wavelength of electron to that of proton is

A. $\sqrt{\dfrac{m_p}{m_e}}$

B. 1

C. $\dfrac{m_e}{m_p}$

D. $\dfrac{m_p}{m_e}$

Watch Video Solution

430. A ring, a solid cylinder and sphere are rolled down on an inclined plane without slipping. Velocity of centre of mass is

A. maximum for sphere, minimum for ring`

B. maximum for ring, minimum for cylinder`

C. all have same velocity`

D. cannot be determined`

Watch Video Solution

431. A porter carries 80 kg mass on his head. As he reaches the destination, he keeps the load down by moving a distance 80 cm from his head to ground. The work done by partner is(assume the load to be moved slowly)

A. 734 J

B. -6272 J

C. 672.2 J

D. -627.2 J

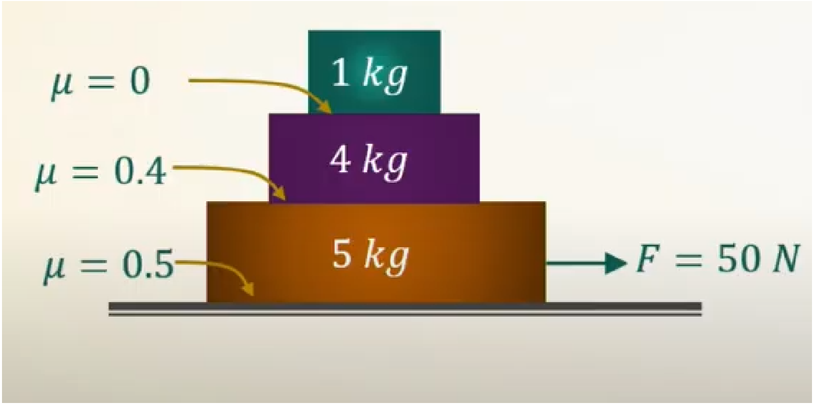
Watch Video Solution

432. For an LCR circuit connected to the AC source match the following

(p) $\omega L > \dfrac{1}{\omega C}$	(1) Current Lags Voltage
(q) $\omega L = \dfrac{1}{\omega C}$	(2) Current is same as Voltage
(r) $\omega L < \dfrac{1}{\omega C}$	(3) Current Leads Voltage
(s) Resonant Frequency	(4) Maximum Current flows

Watch Video Solution

433. Three blocks are placed as shown. The coefficient of friction between any two surfaces is also as given in the diagram. Find the acceleration of the 1kg block at the instant when a force of 50N is applied on 5kg block.



A. $0\frac{m}{s^2}$

B. $1\frac{m}{s^2}$

C. $2\frac{m}{s^2}$

D. $3\frac{m}{s^2}$

Watch Video Solution

434. What is the projection of $\vec{A} = \hat{i} + \hat{j} + \hat{k}$ on $\vec{B} = \left(\hat{i} + \hat{k}\right)$

A. $\sqrt{2}$

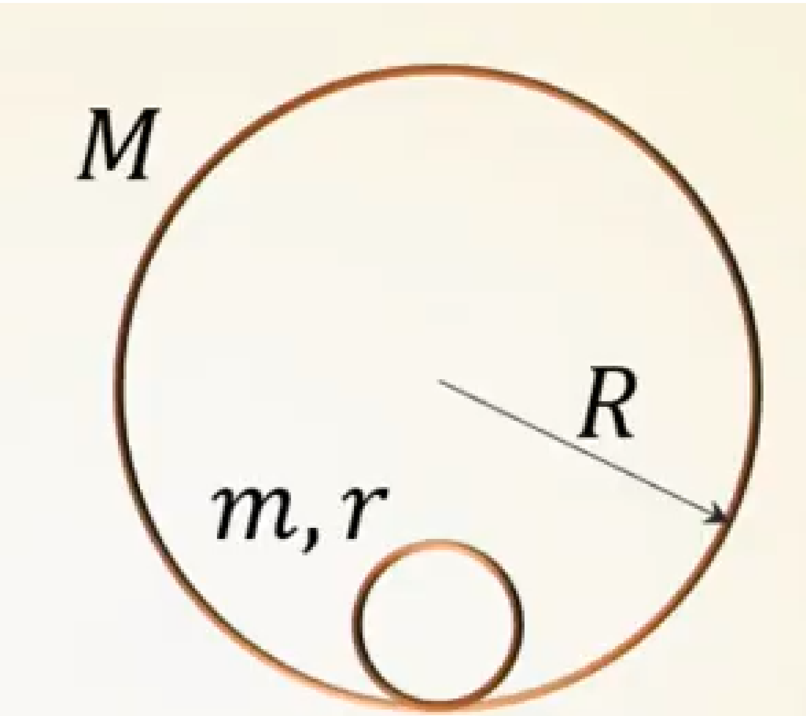
B. 1

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

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

Watch Video Solution

435. Find the time period of oscillation of m if M>>m and r = 4cm and



R= 16 cm

A. 0.7 sec

B. 0.8 sec

C. 0.9 sec

D. 0.10 sec

Watch Video Solution

436. Which of the following is correct?

A. true dip is same as apparent dip

B. true dip is not mathematically related to apparent dip

C. true dip is greater than equal to apparent dip

D. apparent dip is greater than equal to true dip

Watch Video Solution

437. Intensity of sunlight is observed as $0.092\frac{W}{m^2}$ at a point in free space. What will be the peak value of magnetic field at point

Watch Video Solution

438. In a condition of minimum deviation $\mu = \sqrt{3}$. Angle of incidence = 2 x angle of refraction then find angle of prism.

Watch Video Solution

439. The nucleus with atomic number 184 initially at rest an alpha-particle, if Q value of reaction is 5.5 MeV. Calculate KE of alpha-particle

A. 5.5

B. 5.3

C. 5

D. none

Watch Video Solution

440. Average kinetic energy of a monoatomic gas in thermal equilibrium

A. 3/2 kT

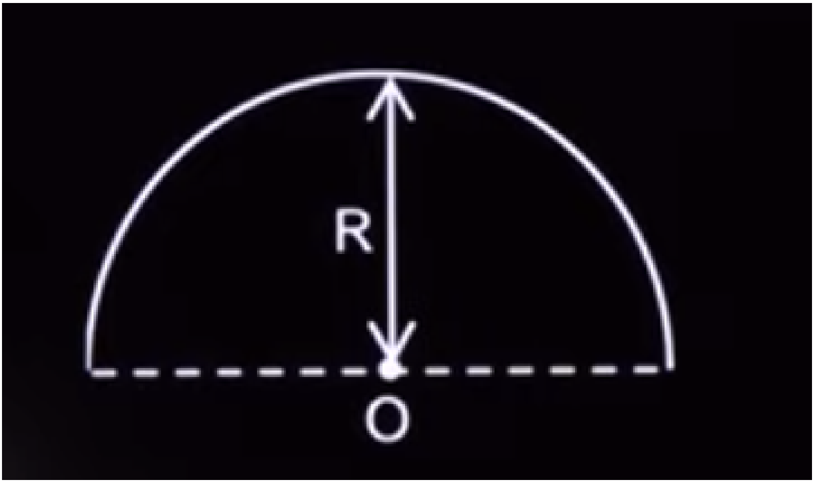
B. 2/3 KT

C. 1/3 KT

D. none

Watch Video Solution

441. Distance of center of mass from point O by $\lambda\frac{R}{\pi}$ for uniform semi ring. Find value of λ



A. 1

B. 2

C. 3

D. 44228

Watch Video Solution

442. A cell first connected across 5Ω resistance develops a potential difference of 1.25 V across it. Same cell again connected across 2Ω resistance develops 1V potential difference across it find emf of cell

A. 5 V

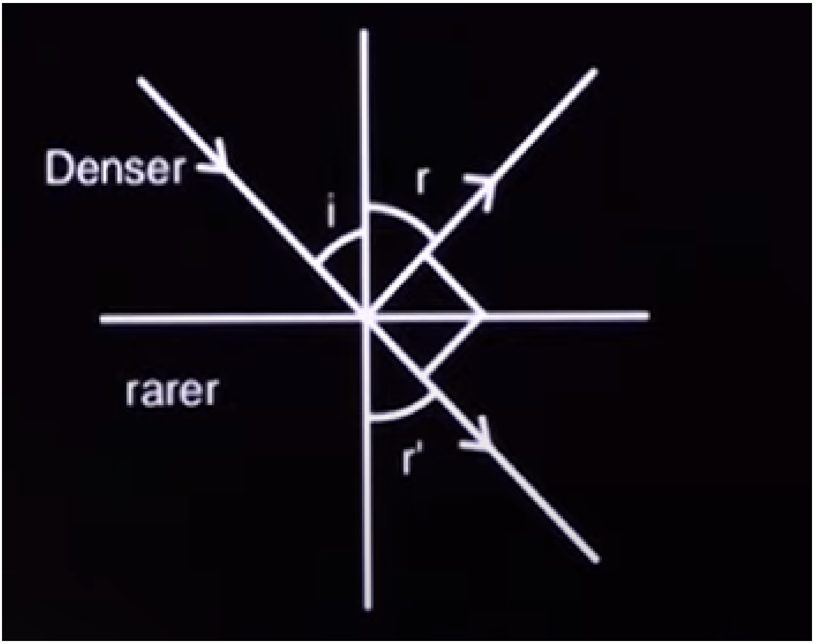
B. 15 V

C. 7 V

D. 4 V

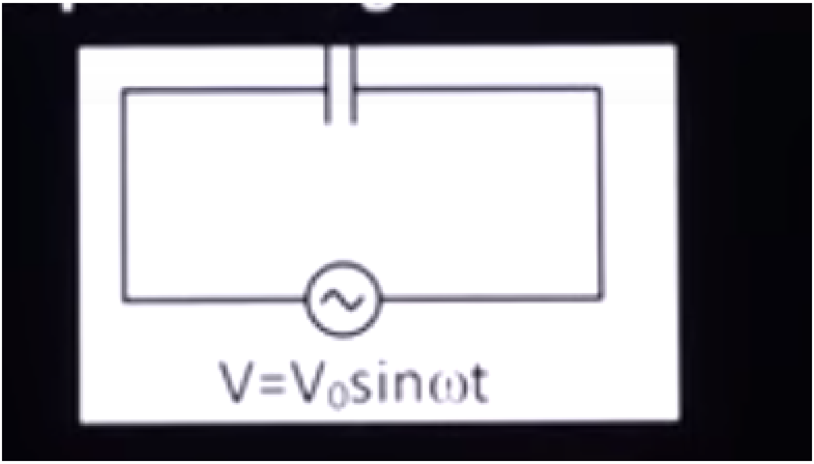
Watch Video Solution

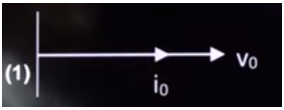
443. A ray incident from denser medium to rarer medium. If angle between reflected ray and refracted ray is 90^0 then angle angle of reflection r and angle of refraction r' will be respectively.



Watch Video Solution

444. In given ac circuit correct phase diagram will be



A. 

B. 

C. 

D. 

Watch Video Solution

445. For an iron track temperature is increased by $10\,^{\circ}C$ Given $/\alpha = \frac{10^{-5}}{C}$, $Y = 10^{11}\frac{N}{m^2}$ area of crosssection A = $10^{-2}m^2$. Find energy stored per unit length

A. $5\frac{J}{m}$

B. $10\frac{J}{m}$

C. $15\frac{J}{m}$

D. $20\frac{J}{m}$

Watch Video Solution

446. Statement 1: On increase in temperature ferromagnetic material converts into paramagnetic material.

Statement 2: At high temperature, randomness of domains ferromagnetic material increases

A. statement 1 & 2 both are true

B. statement 1 & 2 both are true statement 2 is correct explanation of statement 1

C. statement 1 is false and statement 2 is true

D. statement 2 is false and statement 1 is true

Watch Video Solution

447. A photodiode activeness when photon of wavelength 612 nm incident on it. Then the depletion layer voltage of photodiode will be (given: hc = 1224 ev-nm)

A. 2V

B. 1V

C. 4V

D. 3V

Watch Video Solution

448. A block is doing SHM its displacement from mean position is given by $x(t) = A\sin(wt) + B\cos(wt)$ if at t= 0 x = 0 displacement $x(t) = C\cos(wt - \phi)$ then find value of C and ϕ

A. $\sqrt{A^2 + b^2}, \frac{\pi}{2}$

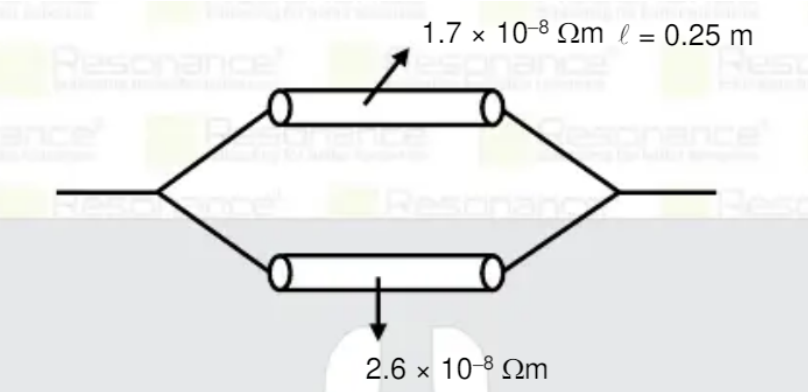
B. $\sqrt{A^2 + b^2}, 0$

C. $A^2 + b^2, \frac{\pi}{2}$

D. $A^2 + b{,}0$

Watch Video Solution

449. Two rods of length 0.25 and area $3mm^2$ are connected as shown in figure and their resistivities are $1.7x10^{-8}\Omega m$ Find equivalent resistance



A. $0.85m\Omega$

B. $0.95m\Omega$

C. $0.80m\Omega$

D. $0.75m\Omega$

Watch Video Solution

450. Bulb rated 200W, 100V. Find R connected in series to bulb in a circuit with 200V so that bulb delivers same power.

Watch Video Solution

451. Compare debroglie wavelengths of e, p, alpha particles if all have same kinetic energy.

A. $\lambda_e = \lambda_p < \lambda_\alpha$

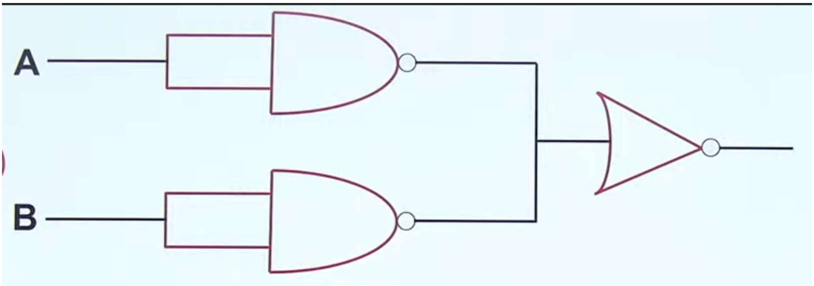
B. $\lambda_e = \lambda_p > \lambda_\alpha$

C. $\lambda_e > \lambda_p > \lambda_\alpha$

D. $\lambda_e = \lambda_p = \lambda_\alpha$

Watch Video Solution

452. Find the output.



A. AND

B. OR

C. $NAND$

D. XOR

Watch Video Solution

453. A particle of mass '4m' breaks into '3m' and 'm'. Find $\frac{\lambda_m}{\lambda_{3}m}$

Watch Video Solution

454. A rubber ball is released from 5m height and bounces to 81/100 of its height every time. Find its average speed.

Watch Video Solution

455. $C_p - C_v = R$ for P

$C_p - C_v = 1.10R$ for Q

Find relation between T_p and T_Q

A. $T_P < T_Q$

B. $T_P > T_Q$

C. $T_P = T_Q$

D. $no \neq$

Watch Video Solution

456. Difference between $t_{\frac{3}{4}}$ and $t_{\frac{1}{2}}$ - Radioactivity

A. $t\left(\frac{3}{4}\right)=2t_{\frac{1}{2}}$

B. $t\left(\frac{3}{4}\right)=t_{\frac{1}{2}}$

C. $t\left(\frac{3}{4}\right)=3t_{\frac{1}{2}}$

D. $no \neq$

Answer: A

Watch Video Solution

457. If the minimum and maximum distance to revolve around the sun is x_1 and x_2 respectively. Calculate velocity to revolve is v_0 then the maximum velocity is

A. $v_0\frac{(x_1)^2}{(x_2)^2}$

B. $v_0 \frac{(x_2)^2}{(x_1)^2}$

C. $v_0 \frac{x_2}{x_1}$

D. $v_0 \frac{x_1}{x_2}$

Watch Video Solution

458. Two wires of equal dimensions and young's modulus Y_1 and Y_2 are connected end to end. What is the equivalent young's modulus for the combination?

A. $\frac{Y_1 + Y_2}{2}$

B. $\sqrt{Y_1 + Y_2}$

C. $\frac{2Y_1Y_2}{Y_1 + Y_2}$

D. $\sqrt{\frac{Y_1^2 y_2^2}{2}}$

Answer: C

Watch Video Solution

459. In a YDSE setup, the distance between the slits varies as $d = d_0 + A\sin(wt)$ What is the difference between maximum and minimum fringe width?

A. $\dfrac{2\lambda AD}{(d_0)^2}$

B. $\dfrac{2\lambda AD}{(d_0)^2 - A^2}$

C. $\dfrac{2\lambda AD}{(d_0)^2 + A^2}$

D. $\dfrac{2\lambda Ad_0}{(d_0)^2 - A^2}$

Answer: B

Watch Video Solution

460. In an amplitude modulator circuit the carrier wave is given by $C(t) = 4\sin\left(2\pi \times 10^7 t\right)$ while modulating signal is given by $m(t) = 2\sin\left(2\pi \times 10^5 t\right)$. Then the bandwidth of the broadcast signal will be

A. $0.2MHZ$

B. $2MHZ$

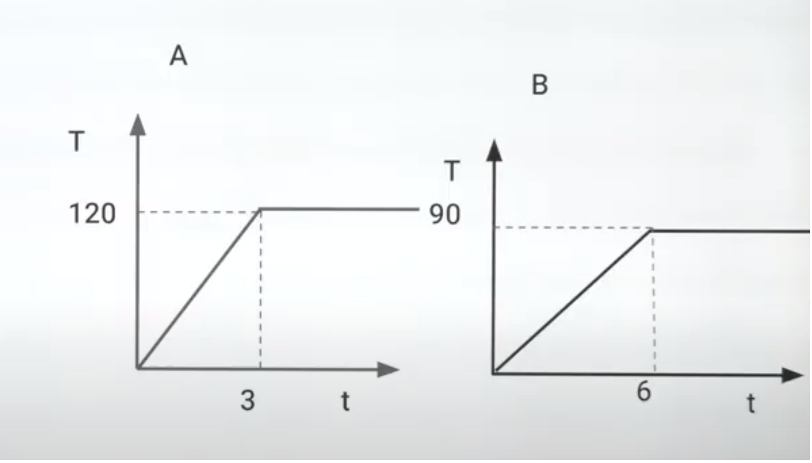
C. $20MHZ$

D. $40MHZ$

Answer: A

Watch Video Solution

461. Temperature vs. time graphs are given below for 2 substances. Compare specific heat capacity



A. $S_A > S_B$

B. $S_B > S_A$

C. $S_A = S_B$

D. Can't be determined

Watch Video Solution

462. Find the ratio of the impulse transferred to the wall by a ball incident normally and then at 45^0 with normal?

A. $1:2$

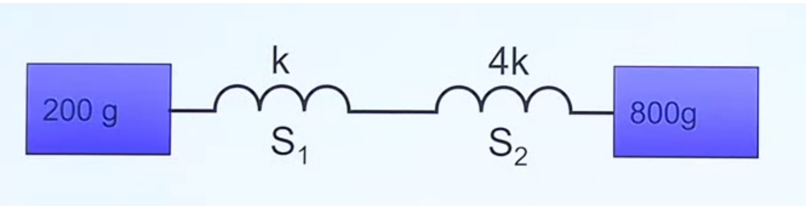
B. $\sqrt{2}:1$

C. $1:\sqrt{2}$

D. $2:1$

Watch Video Solution

463. K = 20N/m, if elongation is same then frequency ?



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

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

C. $2\pi\sqrt{\frac{4m}{5k}}$

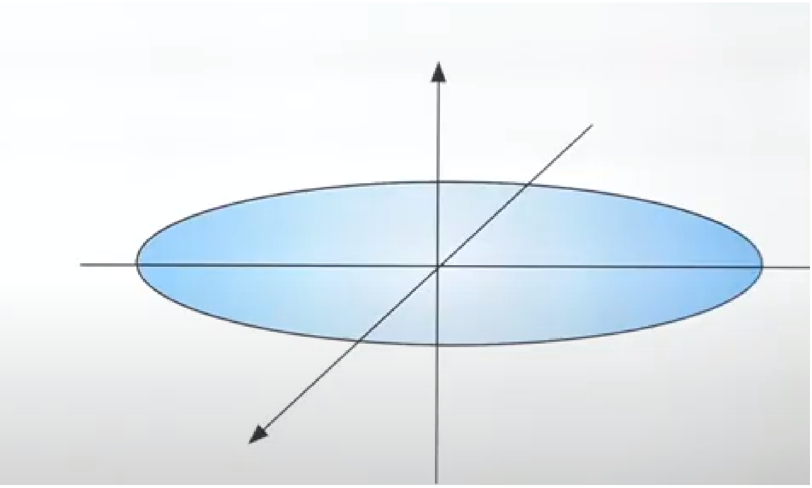
D. none

Watch Video Solution

464. x and y are the axes along the diameter of a disk of mass m and radius R. z-axis is perpendicular to plane of the disk.

Assertion: radius of gyration is same about all the axis

Reason: all axes are symmetry axes.



A. Assertion and Reason both are correct and Reason is correct explanation for assertion.

B. Assertion and reason both are correct but reason doesnt explain assertion

C. assertion is right and reason is wrong

D. assertion is wrong and reason is right

Watch Video Solution

465. Half lifetime of gold is 3 days. Find the activity of a sample of 2mg of gold

A. 85 curie

B. 594 curie

C. 441 curie

D. 121 curie

Watch Video Solution

Watch Video Solution

466. A ball of mass 2 kg moving with 4 m/s collides elastically with a stationary ball. If it continues to move in original direction with 1/4th of its original velocity. Find velocity of centre of mass of system

A. 3 m/s

B. 2/5 m/s

C. 5/2 m/s

D. 2 m/s

Watch Video Solution

467. A particle tied to string of length 0.5m is given a velocity 3 m/s at its bottom point while undergoing vertical circular motion. What will be its speed when it makes an angle of 60^0 with lower vertical

A. 1.5 m/s

B. 2.5 m/s

C. $2\sqrt{2}$

D. 2 m/s

Watch Video Solution

468. If postion vector of a particle is given by $\vec{r} = 10\alpha t^2\hat{i} + [5\beta t - 5]\hat{j}$.

Find time when its angular momentum about origin is O.

A. β

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

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

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

Watch Video Solution

Watch Video Solution

469. Photon of wavelength 400nm strikes on a material with energy 1000J in 10secs. What will be no. of electron leaving the material in one second?

A. 5×10^{9}

B. 5×10^{16}

C. 5×10^{13}

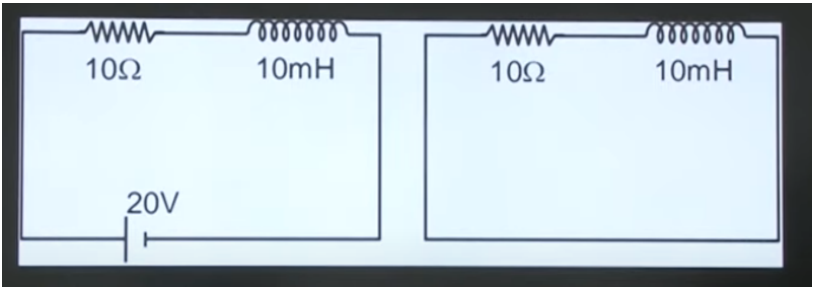
D. 5×10^{10}

Answer: B

Watch Video Solution

470. Battery is connected to a resistor and a inductor for a long time as shown in figure then battery is removed and short circuited. Find

the current in the circuit after 1ms after battery get removed.



A. 1.32A

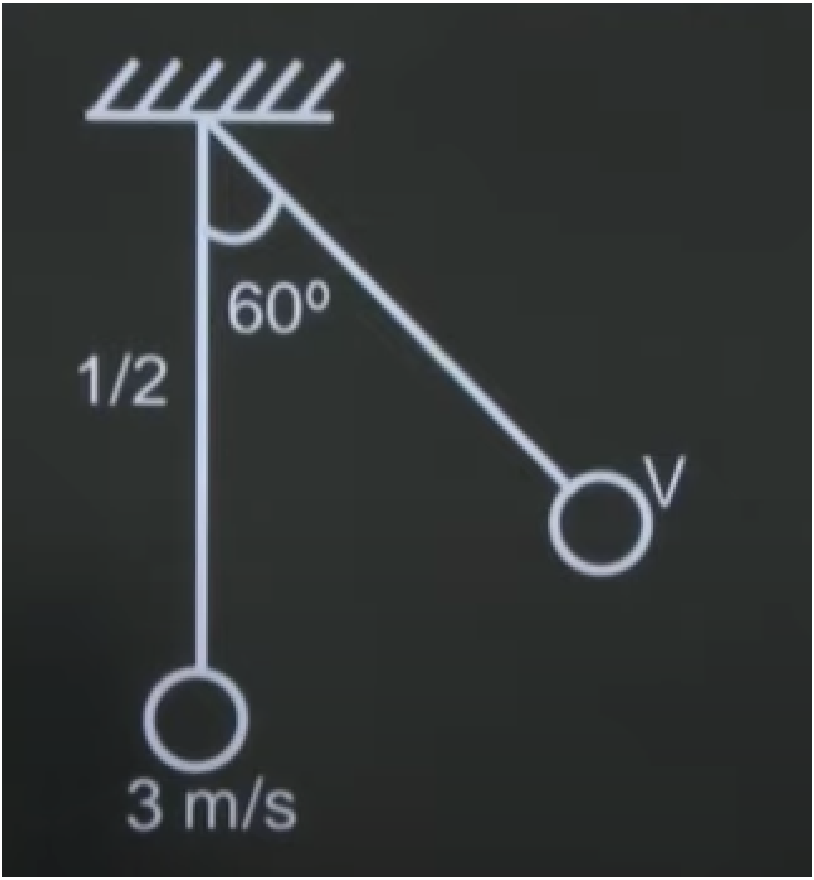
B. 0.44A

C. 0.65A

D. 0.74A

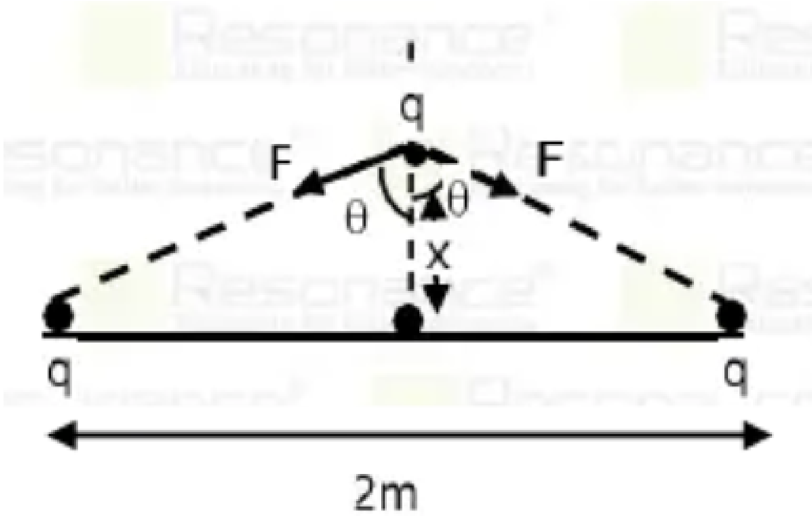
Watch Video Solution

471. A simple pendulum of length 1/2m has initial speed 3m/s when pendulum mass is at lowermost point. What will be the speed pf pendulum mass, when the string of pendulum makes an angle of 60^0 with vertical.



Watch Video Solution

472. Two similar charge of magnitude q are fixed at distance of 2m. And another opposite charge of same magnitude is brought at center point between two charges and given a slight displacement along equatorial direction and released then angular frequency of oscillationd of opposite charge will be (value of $q^2 = 10C^2$) (mass of opposite charge 0.2g)

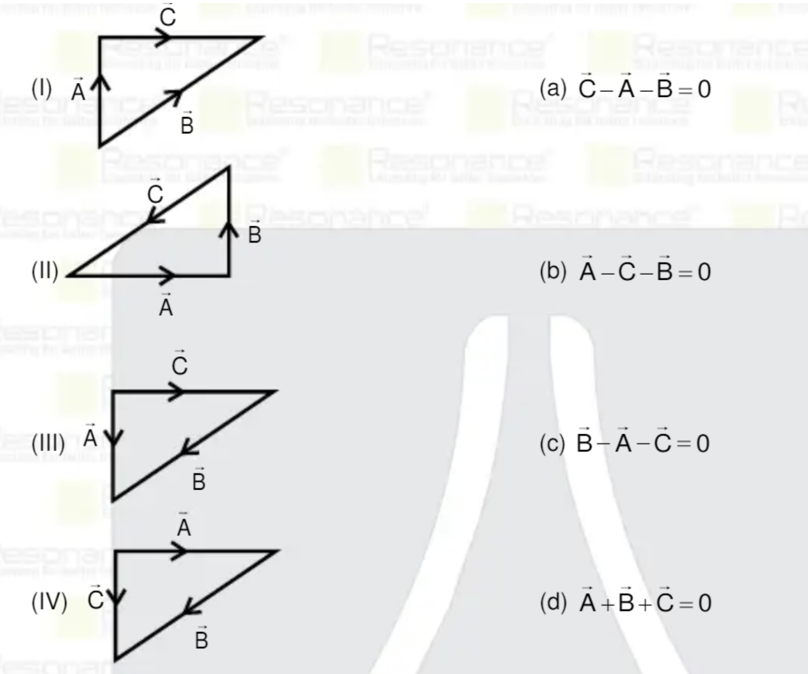


Watch Video Solution

473. Water drops are falling from a tap in regular interval of time. A drop falls from the tap and after 4secs of falling the drop is 34.3m away from next drop. Then drops are falling at rate of ($g = 9.8\frac{m}{s^2}$)

Watch Video Solution

474. Match the following column



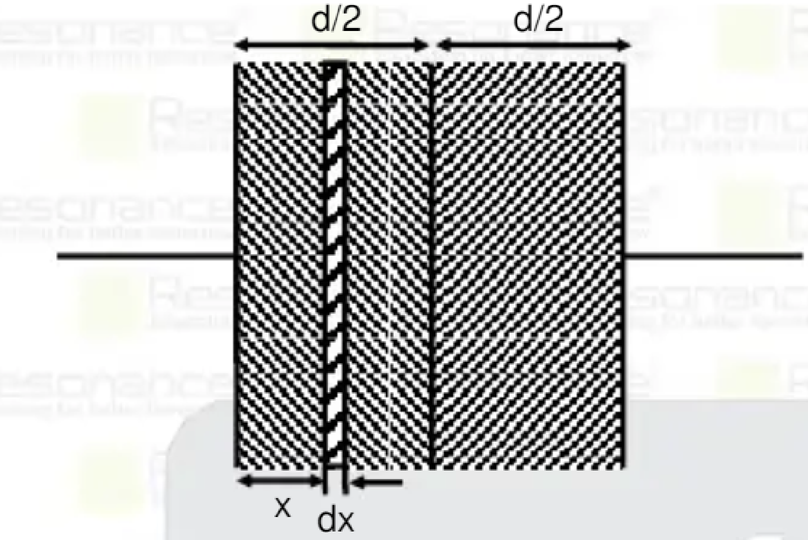
Watch Video Solution

475. In a parallel plate capacitor distance between the plate is 'd'. If dielectric of variable permeability is filled as

$$\varepsilon(x) = \varepsilon_0 + kx, 0 < x \le \frac{d}{2}$$

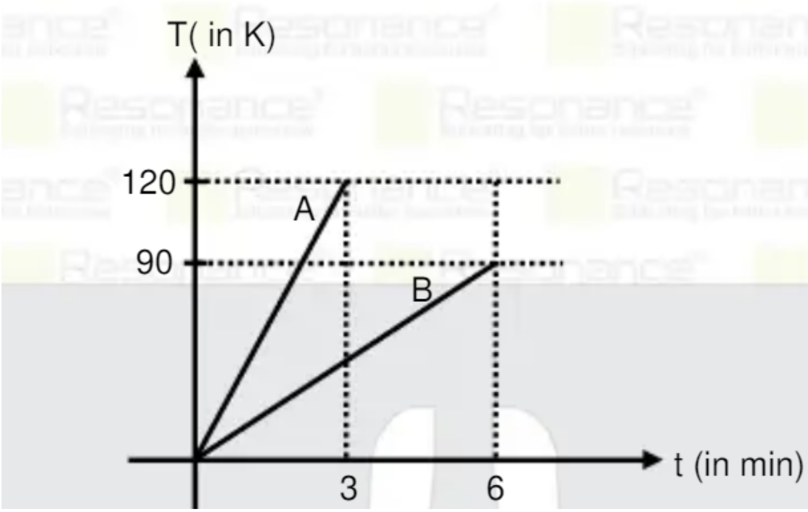
$$\varepsilon(x) = \varepsilon_0 + k(d - x), \frac{d}{2} < x \le d$$

Find capacitance.



Watch Video Solution

476. The temperature vs time graph for two different gases A and B having same number of moles is as shown in figure. If heat is supplied by same rate to both the gases. Find ratio of specific heat capacity of both gases.



Watch Video Solution

477. For a magnetic material, relative change in magnetic susceptiblity is equal to $2.2x10^{-4}$. Find the percentage change in magnetic field.

Watch Video Solution

478. A ray incident at angle 30 degrees on the interface of diamond and vacuum from the diamond side then which of following is correct (

$\mu_{\diamond} = 2.42)$

A. The incident ray will not get reflected.

B. The ray will not get reflected if incident at 53^o

C. The ray will get reflected if incident at 22^o

D. There is always TIR for angle greater than 30^o

Watch Video Solution

479. A radioactive material of mass number 198 decays with half life of 3 days. If initial amount of radioactive material is 2mg then its initial activity will be?

Watch Video Solution

480. Two particles having identical masses and charges 2Q and Q are moving with velocities v and 2v resp. In uniform magnetic field B. Find ratio of radius of circle described by them

A. 44228

B. 0.0840277777777778

C. 44287

D. 0.167361111111111

Watch Video Solution

481. A radioactive nucleus decays so that after 30 years only 1/8th of intial sample is active. What is half life of sample

A. 20 years

B. 10 years

C. 40 years

D. 5 years

Watch Video Solution

482. A balloon is ringing up with constant velocity of 10 m/s. At a height of 75m a small mass is dropped from it. At what height from the ground would the balloon be when the mass reaches the ground?

Watch Video Solution

483. Two soap bubbles of radius R_1 and R_2 combine isothermally to form a new soap bubble. Find radius of new soap bubble

A. $\dfrac{R_1 + R_2}{2}$

B. $\sqrt{R_1 R_2}$

C. $\dfrac{R_1R_2}{R_1+R_2}$

D. $\sqrt{R_1^2+R_2^2}$

Watch Video Solution

484. The efficiency of heat engine is 1/6 when the temperature of sink is reduced by $62^0C$the efficiency doubles. What is the temperature of source?

Watch Video Solution

485. If $\delta_{\min}$ is the minimum deviation through a prism and μ is refractive index and A is angle of prism

Watch Video Solution

486. A force $(5y + 20)\hat{j}$ displaces a particle from y=0 to y=10. Find work done by force

A. 250J

B. 350J

C. 450J

D. 550J

Watch Video Solution

487. For an amplitude modulated wave message signal peak voltage = 20V carrier signal peak voltage = 20V. What is modulated index.

A. $50\ \%$

B. $200\ \%$

C. $0\ \%$

D. $100\ \%$

Watch Video Solution

488. For force equation $F = A\cos(Bx) + C\sin(Dt)$. Find dimension of $\frac{AD}{B}$

A. M^1T^{-1}

B. $M^1L^2T^{-3}$

C. M^1T^3

D. M^1T^{-3}

Watch Video Solution

489. Two charges of equal magnitude are thrown with speeds ratio (3:2) perpendicular to magnetic field. If their masses are in ratio of 1:2.

Find ratio of their radii.

A. 44259

B. 44289

C. 44256

D. 3

Watch Video Solution

490. A particle starts from rest with acceleration $a = \alpha t + \beta t^2$ where α and β are constants. Find its displacement between t = 1 and t= 2 second.

A. $7\frac{\alpha}{3} + 5\frac{\beta}{4}$

B. $7\frac{\alpha}{6} + 5\frac{\beta}{4}$

C. $7\alpha + 5\beta$

D. none

Watch Video Solution

491. If $\vec{X}$ and $\vec{Y}$ are two vectors such that $I\vec{X}I$= $I\vec{Y}I$ and $I\vec{X}$ - $\vec{Y}I$ = 10 $I\left(\vec{X}+\vec{Y}\right)I$ then find angle between $\vec{X}$ and $\vec{Y}$

Watch Video Solution

492. In an AC circuit having resistance of 10Ω. Find the time taken by current to reach RMS value from maximum value. Frequency and RMS voltage of source is 50hz and 220V

A. 2.5 msec

B. 5 msec

C. 10 msec

D. 1 m sec

Watch Video Solution

493. If velocity of photon is C and that on an electron is V then find ratio of KE of electron to photon if their de broglie wavelength is same

A. C/V

B. 2C/V

C. V/2C

D. V/C

Watch Video Solution

494. A disc of radius 2m and mass M is rotating with 200 rpm. Find torque required to stop disc in 10 secs.

A. $\frac{4\pi M}{3}$ SI UNITS

B. $\frac{2\pi M}{3}$ SI UNITS

C. $\frac{\pi M}{3}$ SI UNITS

D. $\frac{8\pi M}{3}$ SI UNITS

Watch Video Solution

495. There is a planet P mass 2M and mass of earth M density of earth to density of planet. Body weight in earth is W. Then the weight of object on planet P is

A. W

B. $\frac{W}{(2)}$1/3`

C. $2^{\wedge}\frac{1}{3}W$

D. none

Watch Video Solution

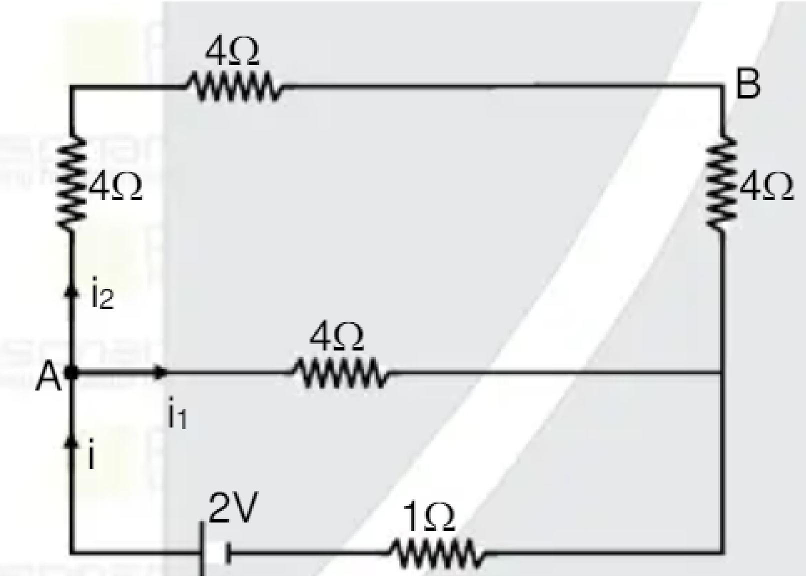
496. A particle performing SHM with amplitude A. Find the ratio of kinetic energy and total energy when particle is at A/2.

Watch Video Solution

497. In photoelectric effect stopping is $3V_0$ for incident wavelength λ_0 and stopping potential V_0 for incident wavelength $2\lambda_0$. Find threshold wavelength.

Watch Video Solution

498. A square loop of total resistance 16 ohm. If a battery of 2V and 1ohm internal resistance is connected across one of its side then find potential difference across its diagnol



Watch Video Solution

499. $\vec{A}$ and $\vec{B}$ are two vectors such that $I\vec{A}I = 2$ and I vec(B) I = 5. If $I\vec{A}x\vec{B}I = 8$ then $I\vec{A}.\ \vec{B}I$

A. 2

B. 6

C. 7

D. 9

Watch Video Solution

500. Find significant figure for the value 0.00346

A. 5

B. 4

C. 3

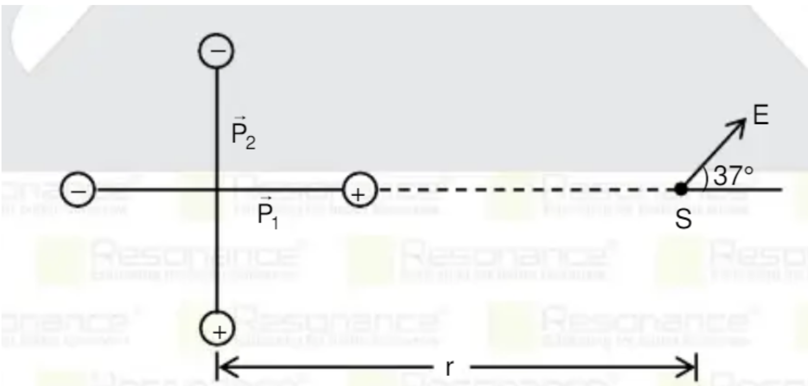
D. 2

Watch Video Solution

501. A photon of wavelength 500 nm falls on metal surface of work function 1.3 eV. An electron releases from metal moved in a perpendicular magnetic field. In a circular path of radius 30 cm. Then the magnitude of magnetic field be?

Watch Video Solution

502. Two electric dipole $\vec{P}_1$ and $\vec{P}_2$ are kept as shown in figure. Net electric field at point S is E makes an angle 37^0 with $\vec{P}_1$ then find ratio



of $\vec{P}_1$ and $\vec{P}_2$

A. 44230

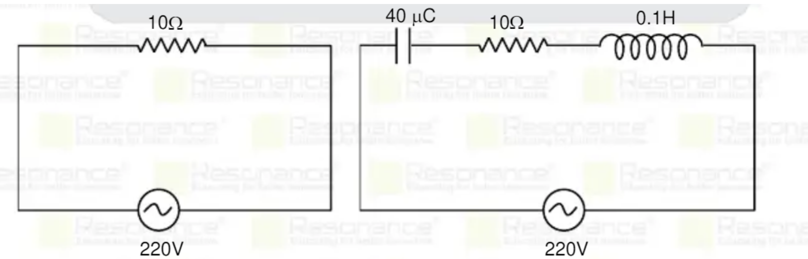
B. 44228

C. 44257

D. 44289

Watch Video Solution

503. Power in both the given circuit are same then find angular frequency of AC source



A. 200

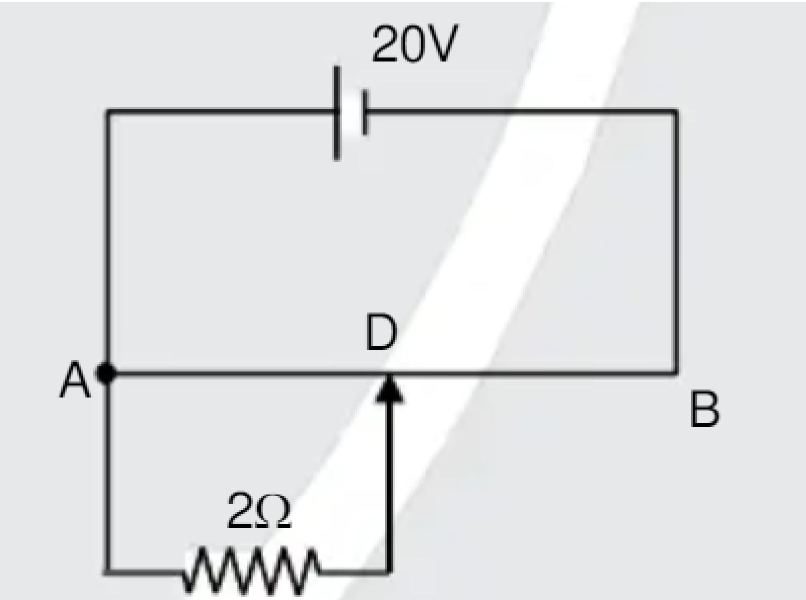
B. 300

C. 400

D. 500

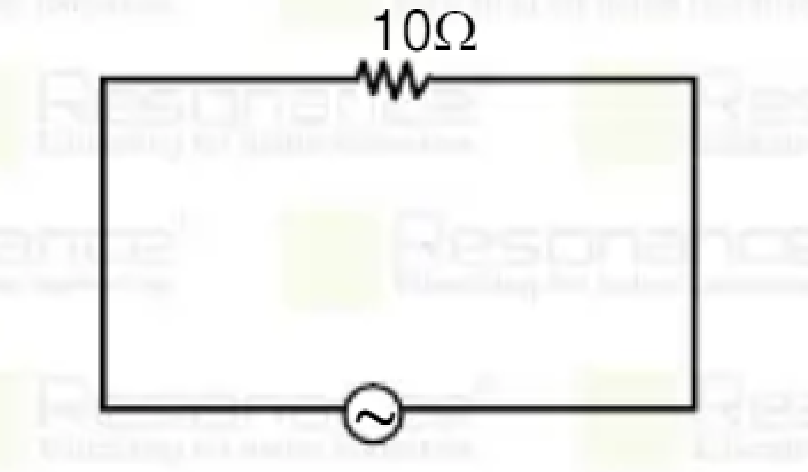
Watch Video Solution

504. For given circuit find the potential drop across 2 ohm resistance?. The wire AB is of length 10cm and its resistance is 1 ohm/cm. Point D is mid point of wire AB



Watch Video Solution

505. An AC source with $V_{max} = 200V$ and $f = 50hz$ aconnected across 10 ohm resistance. Find the source voltage changes from maximum to



rms value.

Watch Video Solution

506. Find energy required to break an aluminium nucleus into its constituent nucleons $(m_n = 1.00867u, m_p = 1.00783u, m_A l = 26.98154u)$

Watch Video Solution

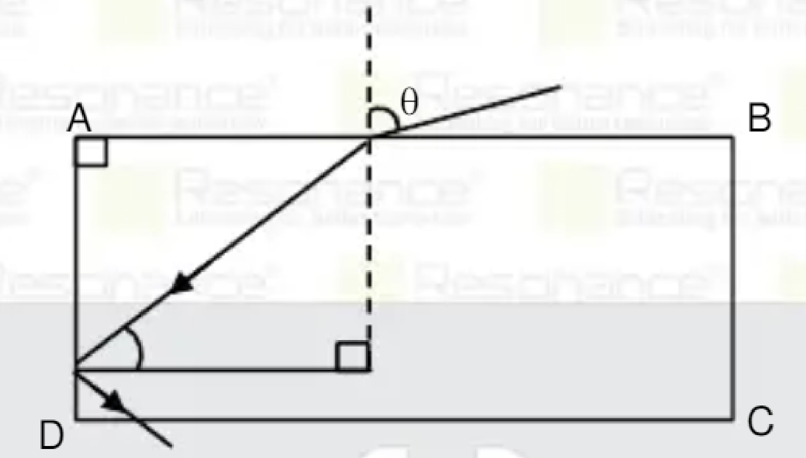
507. A cell of voltage V_0 is connected across a capacitor of capacitance C. Now the space between the plates is filled with a material of dielectric constant K. Find ratio of charge appear on the plates of capacitor before and after filling.

Watch Video Solution

508. Pure Si at room temperature has equal electron and hole concentation of $1.5x10^{16}m^{-3}$. Doping by indium increases n_h to $3x10^{22}m^{-3}$. Calculate n_e in the doped Si

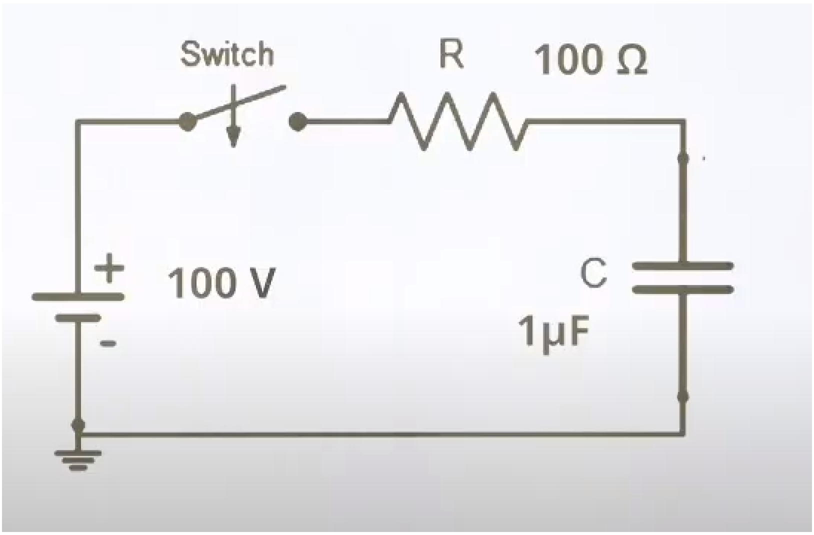
Watch Video Solution

509. A ray is incident on a slab of refractive index 5/4 at an angle $/\theta$ as shown. Find maximum angle $/\theta$ so that TIR occur at surface AD.



Watch Video Solution

510. The switch is closed at t=0. Find time after which voltage across capacitor becomes 50 V. (take ln 2 = 0.6)



A. $100\mu C$

B. $60\mu C$

C. $80\mu C$

D. $70\mu C$

Watch Video Solution

511. Energy of an oscillating system is E and amplitude. At a particular instant KE of system is $3\frac{E}{4}$. Find displacement of oscillating particle from its mean position.

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

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

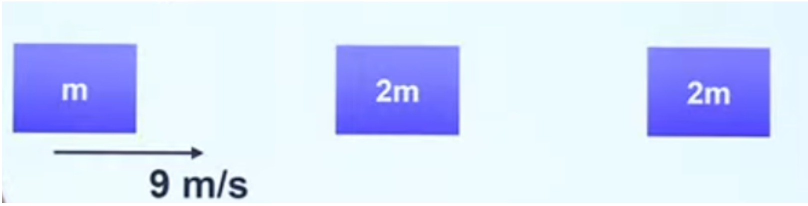
C. $\frac{A}{4}$

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

Watch Video Solution

512. A and B ---- → Elastic collision

B and C ---- → inelastic collision. Find final speed of C



A. 9

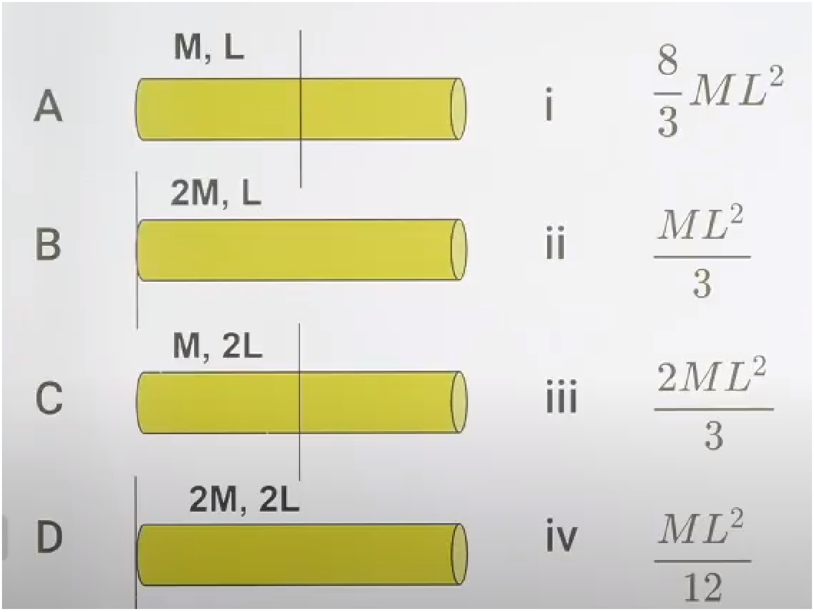
B. 4

C. 3

D. 6

Watch Video Solution

513. Match the moment of inertia of the rods with given mass and length in column A about the given axis



A. $A(iv), B(iii), C(ii), D(i)$

B. $A(ii), B(iii), C(iv), D(i)$

C. $A(iii), B(ii), C(iv), D(i)$

D. $A(ii), B(iv), C(i), D(iii)$

Watch Video Solution

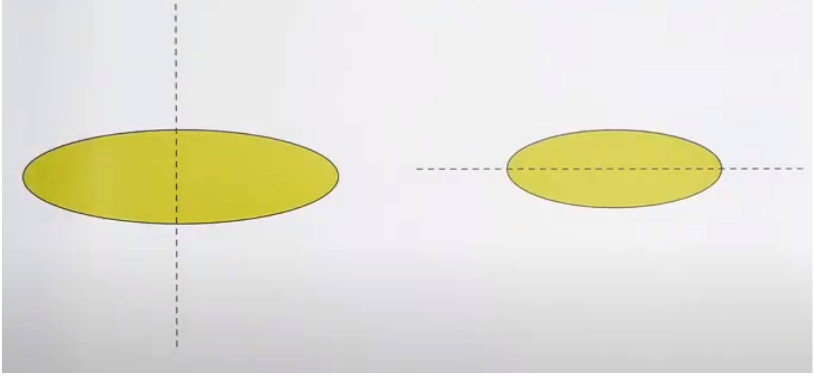
514. A body cools from $61^0 C$ to $59^0 C$ in T_0. How much time it would take to cool from $51^0 C$ to $49^0 C$. If room temperature is $30^0 C$

Watch Video Solution

515. Two discs having same surface mass density having radii r and R.

I_1 ------ $\rightarrow$ moment of intertia of first disc about an axis perpendicular to the plane and passing through centre

I_2 ------- $\rightarrow$ Moment of inertias of second disc about one of its diameter. Find $\frac{I_1}{I_2}$



A. $\frac{r^4}{R^4}$

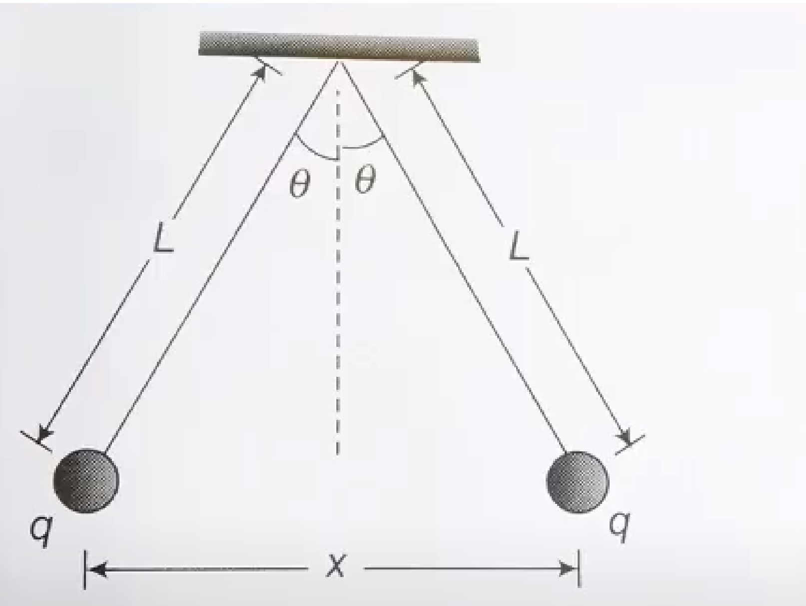
B. $2\frac{r^4}{R^4}$

C. $\frac{r^4}{2}R^4$

D. $2\frac{r^2}{R^4}$

Watch Video Solution

516. Two point charges are suspended from a given point as shown in figure. Find the equilibrium seperation between them



A. $q\sqrt{\frac{4\pi\varepsilon_0}{m}g\tan(/\theta)}$

B. $q\sqrt{\frac{\cot(/\theta)}{4}\pi\varepsilon_0 mg}$

C. $q\sqrt{\left(\frac{\sin(/\theta)}{m}g4\pi\varepsilon_0\right.}$

D. $q\sqrt{\frac{\cos(/\theta)}{4}\pi\varepsilon_0 mg}$

Watch Video Solution

517. In a YDSE setup, orange light is replaced by blue light. Then,

A. frindge width will increase

B. frindge width will decrease

C. at center, instead of maxima there would be a minima

D. intensity of central maxima will decrease

Watch Video Solution

518. The relative permittivity of distilled water is 81. The velocity of light in it will be

A. 3.3 x 10^7

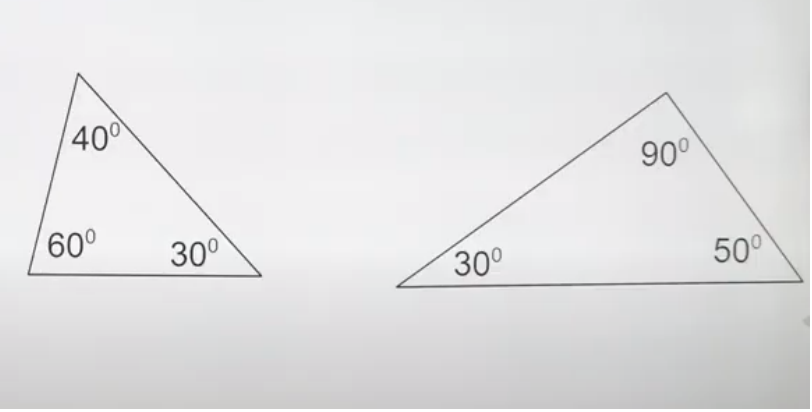
B. 4.3 x 10^7

C. 3.3 x 10^6

D. none

Watch Video Solution

519. Two prisms P_1 and $P_2$with refractive index are a function of wavelength λ are μ_1 and μ_2 resp. where $\mu_1 = 1.2 + \dfrac{10.8x10^{-14}}{\lambda^2}$ and $\mu_2 = 1.45 + \dfrac{1.8x10^{-14}}{\lambda^2}$. Find λ for which when P_1 and P_2 are put together no deviation of light happened in the contact surface



A. 900 nm

B. 600 nm

C. 800 nm

D. 700 nm

Watch Video Solution

520. A cylindrical massless container of cross sectional area A have a fluid filled up to height h and have a small orifice of area a in wall near its bottom. Find minimum coefficient between container and ground so that container does not move

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

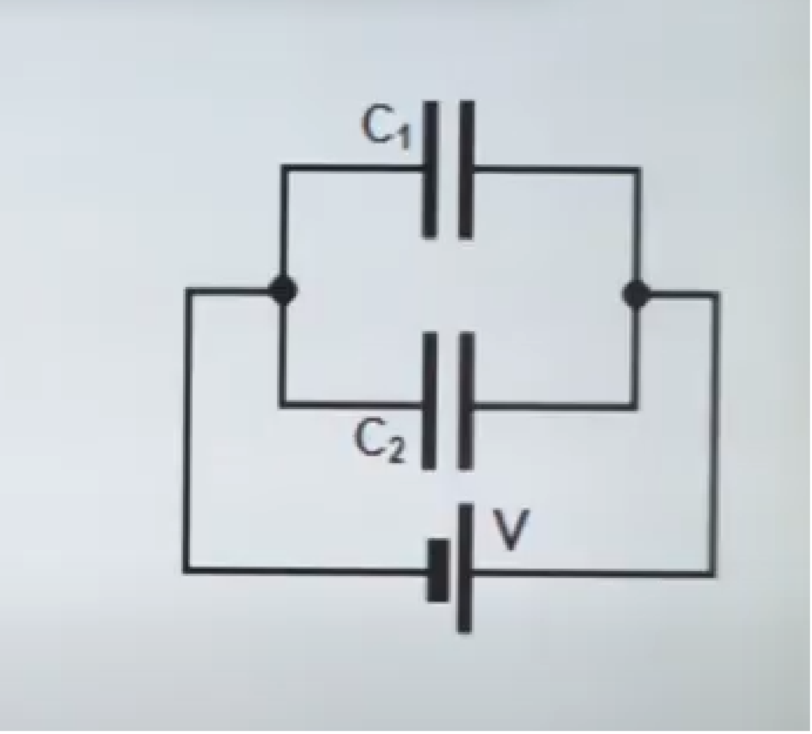
B. $\frac{a}{2A}$

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

D. none

Watch Video Solution

521. Two capacitor C_1 with capacitance 2C and C_2 with capacitance C are connected in parallel. They are changed and then the batter is removed. If a material of dielectric constant K is inserted in C_2. Find final potential across them.



A. KV

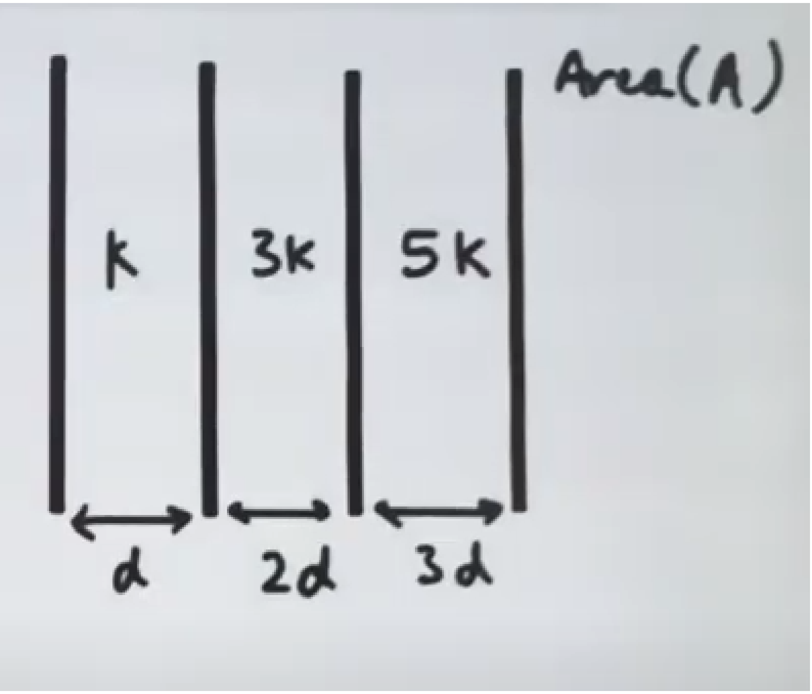
B. $\frac{3V}{K+2}$

C. $\frac{V}{K}$

D. $\frac{3}{KV}$

Watch Video Solution

522. Equivalent capacitance of following arrangement of identical parallel plates is



Watch Video Solution

523. Two identical tennis ball of mass m and charge q are hinged by a common support with help of a string of length 'l'. If system is in equilibrium then find distance between balls? ignore gravitational interactions between balls. (θ is very small)

A. $\left(\frac{kq^2l}{mg}\right)^{\frac{1}{3}}$

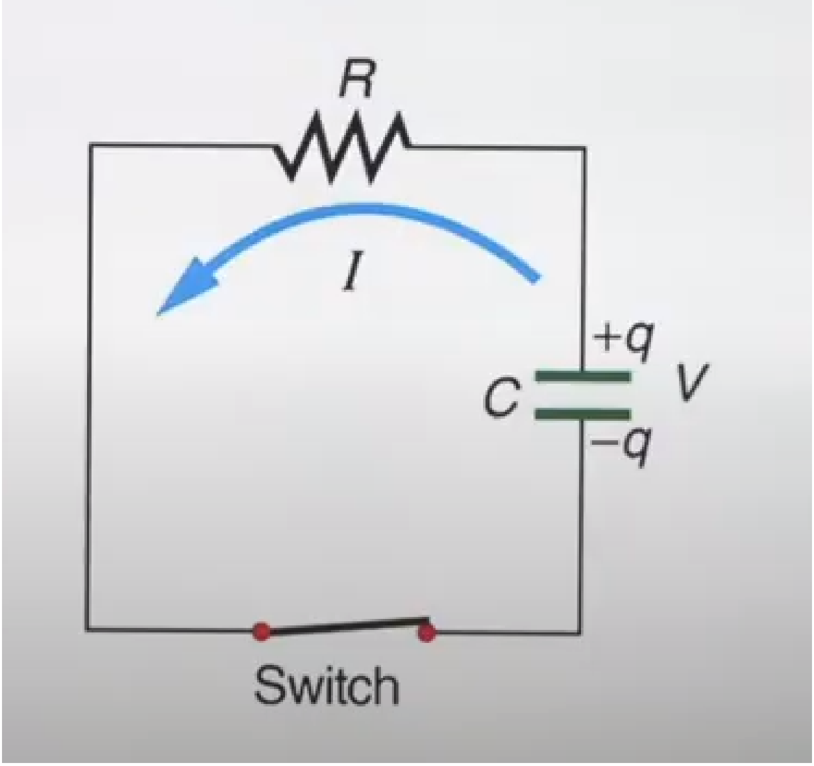
B. $\left(\frac{3kq^2l}{mg}\right)^{\frac{1}{3}}$

C. $\left(\frac{2kq^2l}{mg}\right)^{\frac{1}{3}}$

D. $\left(\frac{3kq^2l}{2mg}\right)^{\frac{1}{3}}$

Watch Video Solution

524. A capacitor of capacitance $100\mu F$ discharges through a resistor R. At the same time a radioactive substances decays with mean life 30 ms. If ratio of charge on capacitor and activity of substance does not change with time then find R.



A. 300Ω

B. 100Ω

C. 200Ω

D. 400Ω

Watch Video Solution

525. Young's modulus of a string is $0.5x10^9 Pa$, length of wire without any force applied is 0.1m and area is $0.04x10 - 4m^2$. If this wire is stretched by a length of 0.001 m. The energy stored in this string is transfered to a particle of mass 20g. Find speed of this particle

A. 1 m/s

B. 0.5 m/s

C. 2 m/s

D. 0.25 m/s

Watch Video Solution

526. Pressure of monoatomic gas in a container is 2 atm. Average KE per molecule is 2 x 10-9J. Volume of gas is 1litre. Find number of molecules of gas present in the container

A. $\frac{3}{2}x10^{11}$

B. $\frac{3}{2}x10^{10}$

C. $\frac{5}{2}x10^{12}$

D. $\frac{5}{2}x10^{11}$

Watch Video Solution

527. A particle of mass $9.1 \times 10^{-31} kg$ is moving with $10^6 \frac{m}{s}$ has debroglie wavelength λ_1. A photon of momentum $10^{-27} kg \frac{m}{s}$ has wavelength λ_2 then $\frac{\lambda_1}{\lambda_2}$ is

A. 910

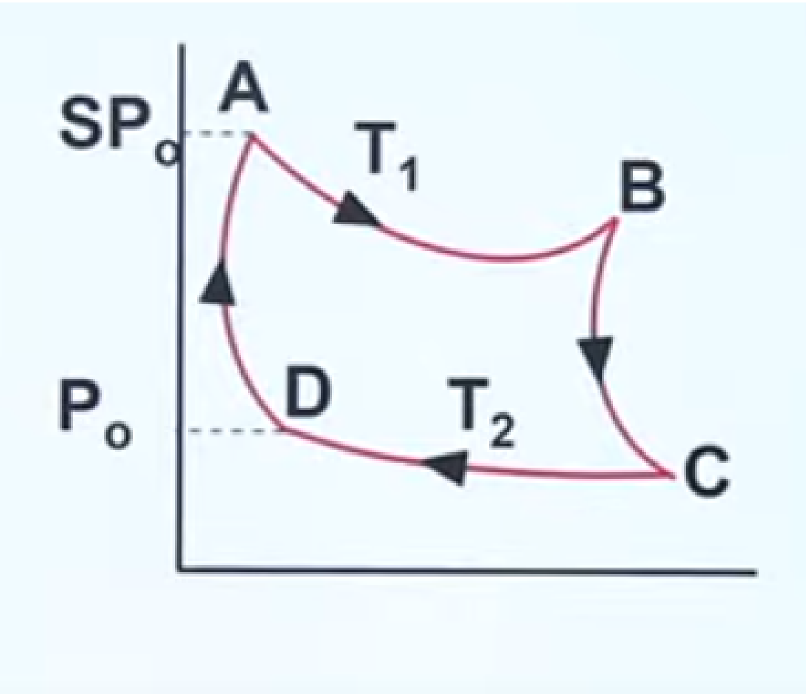
B. 667

C. 1/310

D. 1

Watch Video Solution

528. For a cyclic process ABCD, AB has temperature T_1 and BC has T_2 $\left(T_1 > T_2\right)$ then,



A. $W_{AB} = W_{CD}$

B. $W_{AD} = W_{BC}$

C. $W_{AB} + W_{CD} > 0$

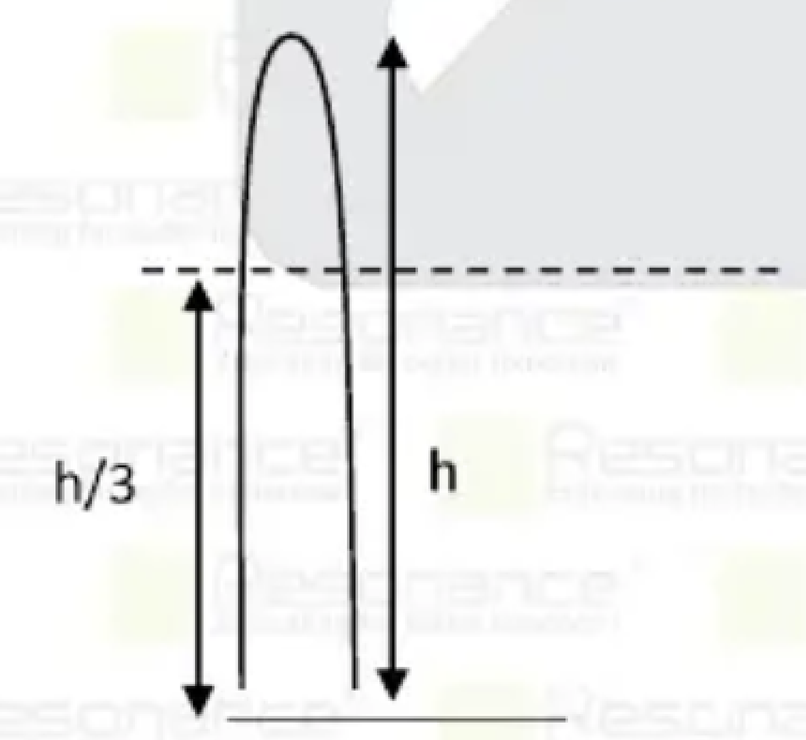
D. $NONE$

Watch Video Solution

529. An electron is with velocity 2.2×10^{-6} and radius 0.5 Angstroms in circular orbit. Find current

Watch Video Solution

530. A particle is thrown upward at t=0. It attains maximum height of h. It is found at height h/3 at $t = t_1$ and $t = t_2$. Find $\frac{t_1}{t_2}$



A. $\dfrac{\sqrt{3}-1}{\sqrt{3}+1}$

B. $\dfrac{1}{3}$

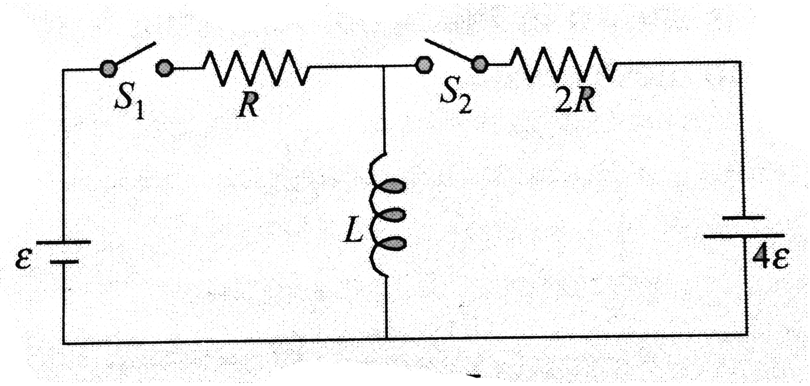
C. $\left(\sqrt{6}-\dfrac{\sqrt{5}}{\sqrt{6}+\sqrt{5}}\right.$

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

Answer: C

Watch Video Solution

531. In a circuit S_1 remains closed for a long time and S_2 remain open. Now S_2 is closed and S_1 is opened. Find out the di/dt in the right loop just after the moment.



A. $-4\frac{\varepsilon}{L}$

B. $-6\frac{\varepsilon}{L}$

C. $-2\frac{\varepsilon}{L}$

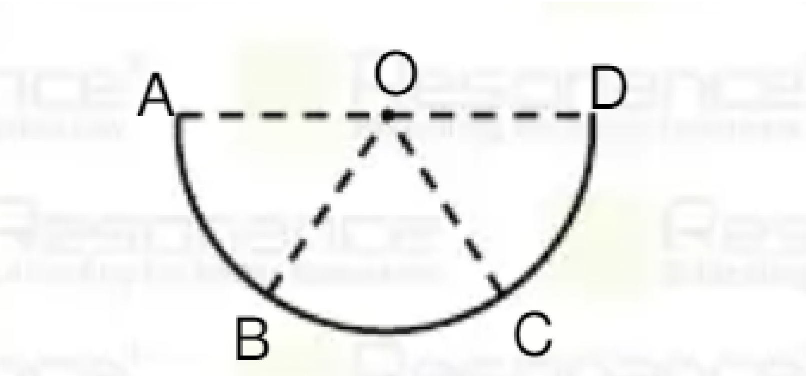
D. $-\frac{\varepsilon}{L}$

Answer: B

Watch Video Solution

532. For the given semicircle with centre O. Choose the correct relation? If A,B,C & D are points on the semicircle such that

$|\overrightarrow{AB}| = |\overrightarrow{BC}| = |\overrightarrow{CD}|$



Watch Video Solution

533. A monoatomic gas is kept in a 1 litre container at pressure 1 atm. If average energy per molecule is $2x10^{-9}J$. Find number of molecules in the container.

A. $0.75x10^{-6}$

B. $0.75x10^{9}$

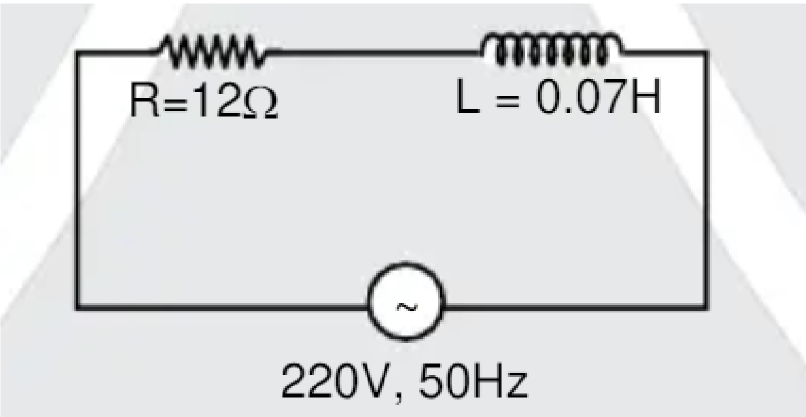
C. $0.5x10^{-11}$

D. $0.75x10^{11}$

Answer: D

Watch Video Solution

534. For the given circuit find current 'I' and phase difference between V & I



Watch Video Solution

535. Circular scale divisions of a screw gauge is 50. Five full rotations advances circular scale by 5mm.

Statement 1- Least count of screw gauge is 0.001 cm

least count = pitch/(total number of divisions)

A. statement 1 &2 both are true

B. statement 1 & 2 are true and statement-2 is correct explanation of statement 1

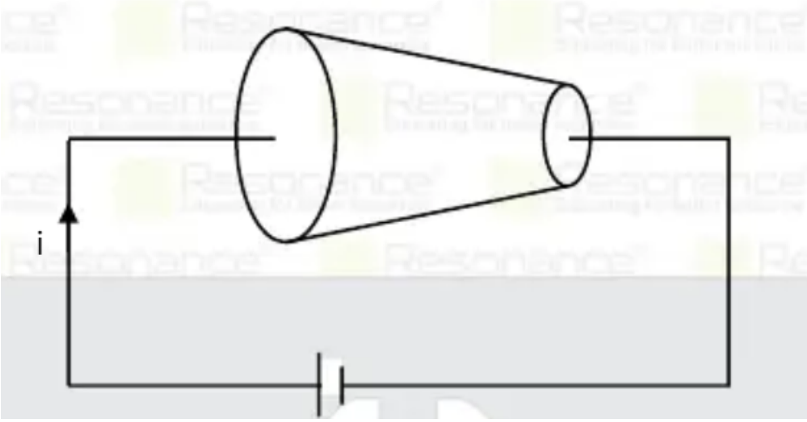
C. statement-1 is false and statement-2 is true

D. statement-2 is true and statement-1 is false

Answer: C

Watch Video Solution

536. Figure shows a conductor of tapered cone shape. As one goes from left to right on conductor choose correct option.



A. current decreases

B. drift velocity of electron increases

C. electric field inside conductor decreases

D. all of the above

Answer: B

Watch Video Solution

537. A bar magnet of magnetic moment $9.85A - m^2$ and moment of inertia $I = 10^{-6}kg - m^2$ makes 10 oscillation in 5secs inuniform magnetic field. Find intensity of magnetic field (take $\pi^2 = 9.85$)

A. $20\mu T$

B. $25\mu T$

C. $16\mu T$

D. $10\mu T$

Answer: C

Watch Video Solution

538. Two masses on 1kg each are rotating in a circle of radius R under their gravitational force. Find their angular speed in terms of G and R

Watch Video Solution

539. An electron is moving with 3eV and is captured by proton to form H in second excited state. The resulting photon is radiated on a metal of threshold wavelength 4000 angstrom. Find kinetic energy of photoelectrons

Watch Video Solution

540. Match dimensional formula of ε_0, μ_0 capacitance C and electric field

A	ϵ_0	i	$[M^1L^1T^{-2}I^{-2}]$
B	μ_0	ii	$[M^1L^{-3}T^4A^2]$
C	capacitance C	iii	$[M^1L^1I^{-1}T^{-3}]$
D	Electric Field	iv	$M^{-1}L^{-2}T^4I^2$

A. $A(ii), B(i), C(iv), D(iii)$

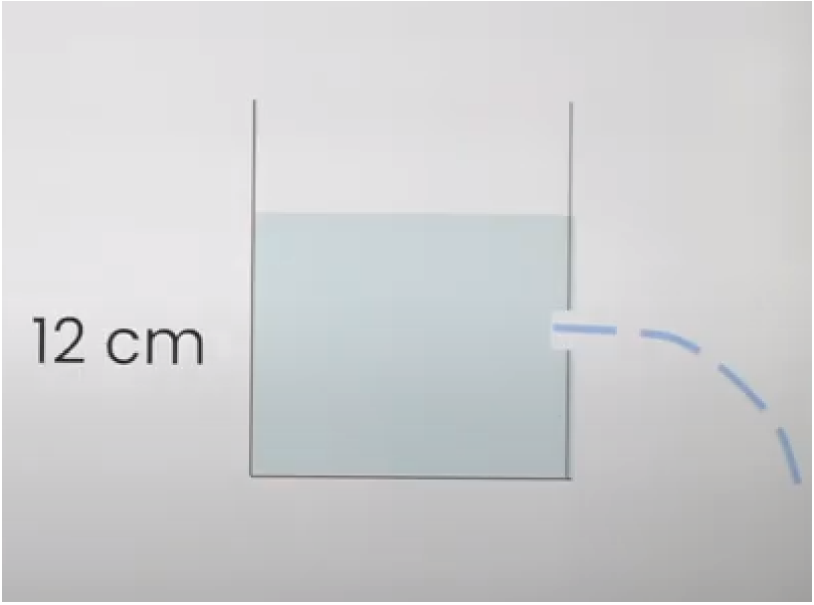
B. $A(ii), B(iv), C(iii), D(i)$

C. $A(i), B(ii), C(iii), D(iv)$

D. $A(ii), B(iii), C(i), D(iv)$

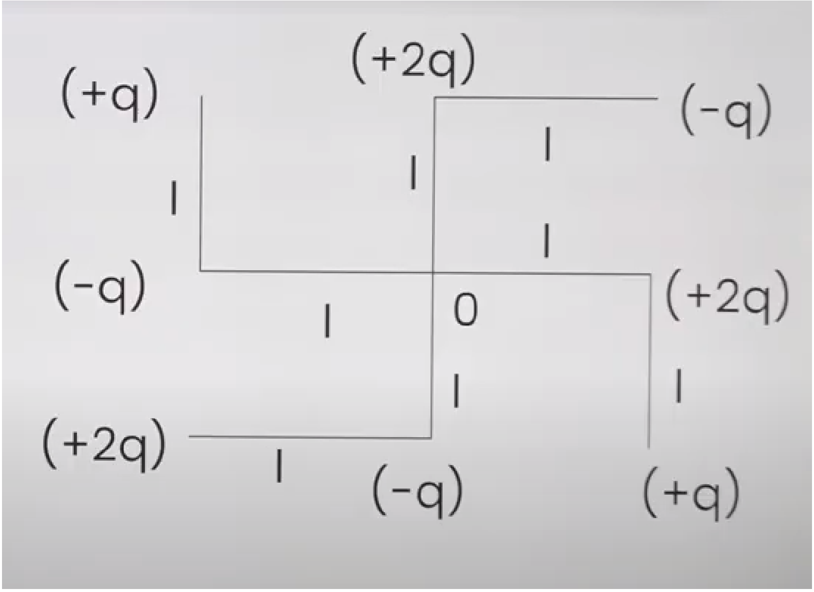
Watch Video Solution

541. A beaker filled to height of 12 cm was given find the location where a hole should be made for max range.



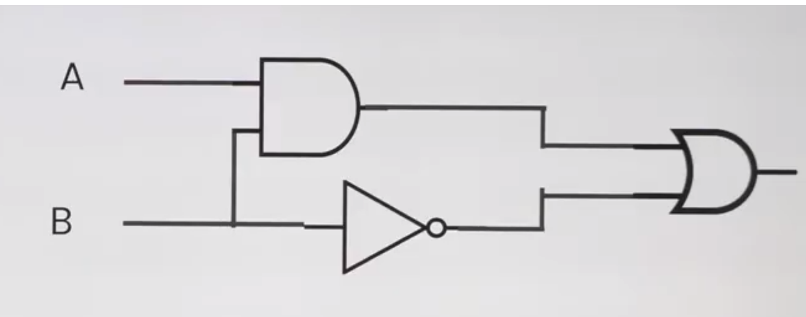
Watch Video Solution

542. Length of each arm is 'l' find $\vec{E}$ at O



Watch Video Solution

543. Find the truth table of the following diagram



Watch Video Solution

Watch Video Solution

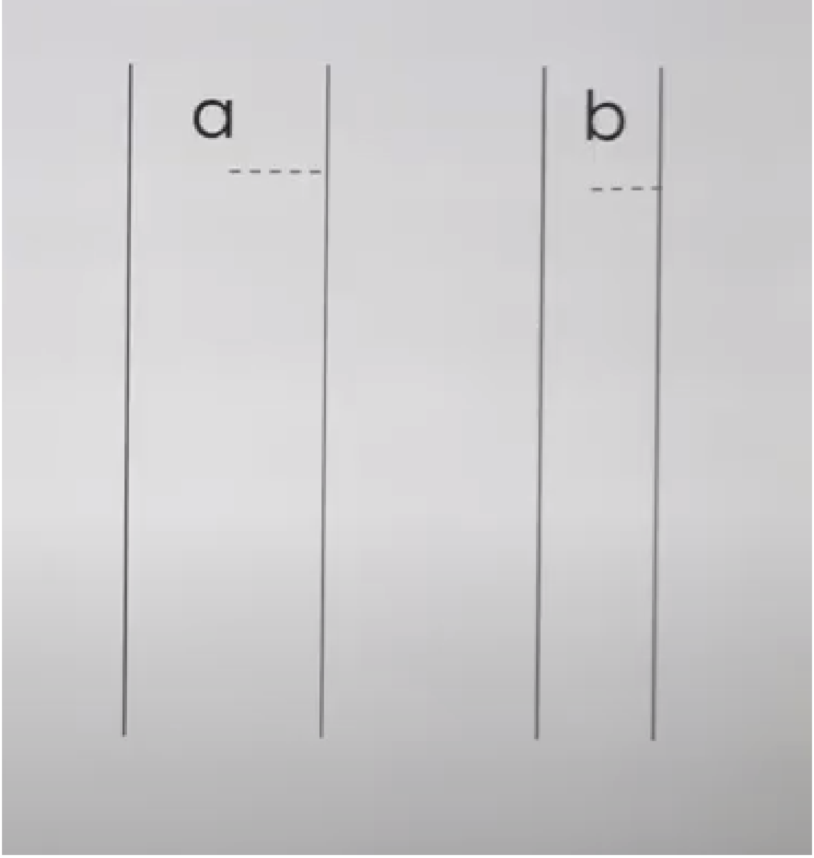
544. Force is given by $F = F_0\left(1 - \left(\frac{T - t}{T}\right)^2\right)$ mass = m, velocity after time $2T$

Watch Video Solution

545. Constant power p is supplied by engine to mass m displacement of mass after time t will be

Watch Video Solution

546. Same current I flows in both wires. I is uniformly distributed over area. Graph of magnetic field



Watch Video Solution

547. Frequency $f = 60hzC = 0.1\mu F$ find value of L at which circuit will be in resonance

Watch Video Solution

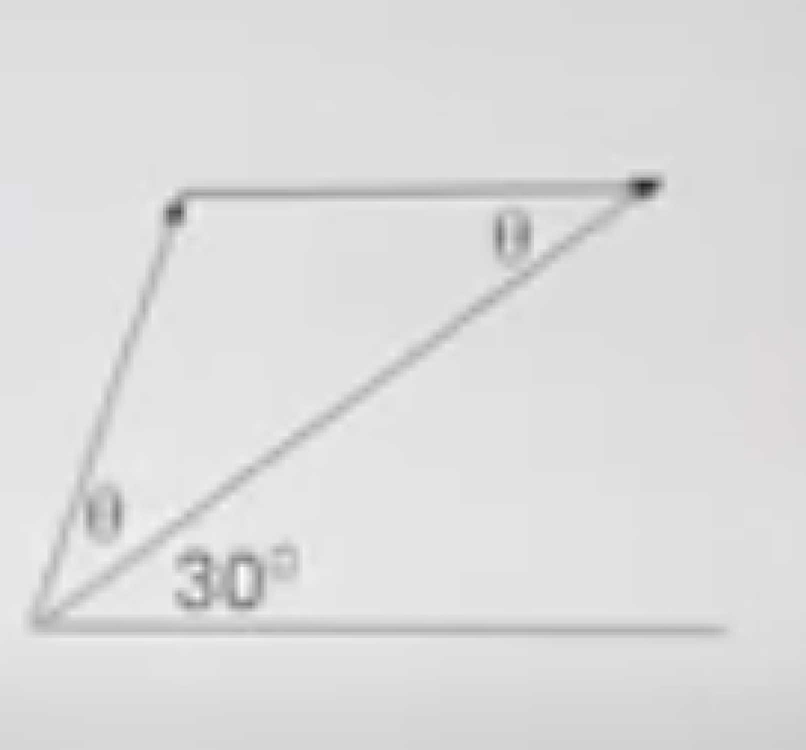
548. Magnetic flux $\phi = 10t^2 + 20t$ m wb, $R = 2\Omega$. Current in circuit at t=5s (in A) is

Watch Video Solution

549. Resistance is 16Ω at 15^0C and 20Ω at 100^0C find coefficient of resistivity

Watch Video Solution

550. Velocity of man w.r.t river is equal to velocity at river value of θ for which man reaches directly at B



Watch Video Solution

551. m = 0.5kg, T = 0.2 s, A= 5cm potential energy at t = T/4 = ?

Watch Video Solution

552. There are two canot engines A and B. Engine A absorbs energy from a source at temperature T_1 and releases energy to sink at temperature T. If engine B absorbs half of the energy released by A and B release energy to a sink at temperature T_3. If work done by 2 engines is same. What is T in terms of T_1 and T_3

Watch Video Solution

553. Modulation voltage and carrier voltage of a wave is 12 and 4. Find modulation index

A. 2

B. 3

C. 4

D. 5

Watch Video Solution

554. 1 mole of an ideal gas undergo adiabatic process which increases temperature from $27^0C \to 37^0C$. Gas is polyatomic has 4 vibrational mode of freedom. Find net work

A. work done on gas 582J

B. work done by gas 582J

C. work done on gas 382J

D. work done by gas 582J

Watch Video Solution

555. A conducting wire has resistance 16Ω at 15^0C and 20Ω at 100^0C find temperature of coeffecient of resistance

A. $\left(\frac{1}{340}\right)^0 C^{-1}$

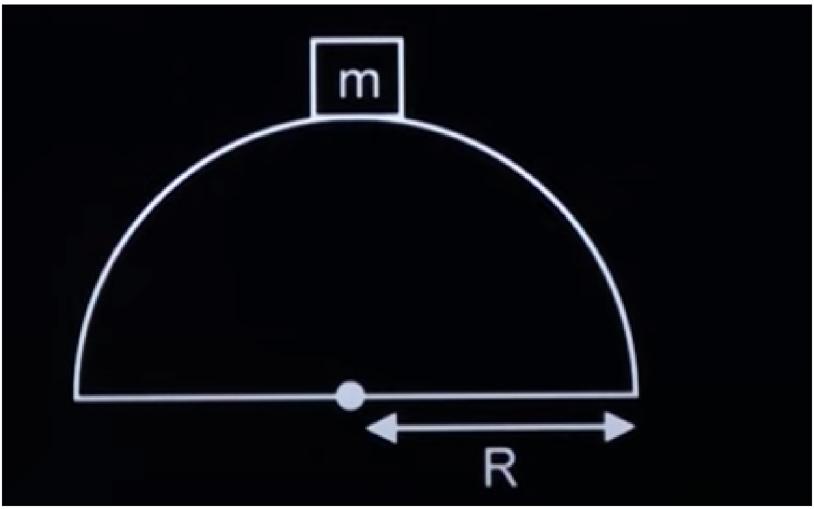
B. $\left(\frac{1}{200}\right)^{0} C^{-1}$

C. $\left(\frac{1}{470}\right)^{0} C^{-1}$

D. $\left(\frac{1}{300}\right)^{0} C^{-1}$

Watch Video Solution

556. A block of mass as shown is released from rest from top of a fixed smooth hemisphere. Find angle made by this particle with vertical at the instant when it looses contact with hemisphere.



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

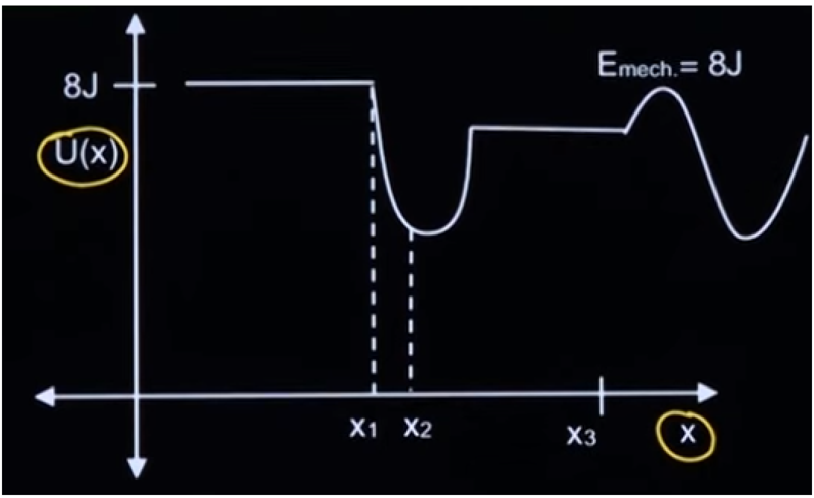
B. $\cos^{-1}\left(\frac{1}{3}\right)$

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

D. $\cos^{-1}\left(\frac{1}{4}\right)$

Watch Video Solution

557. Figure shows variation of potential energy veses displacement graph. find correct statement



A. $x < x_1$ KE is least and body has constant speed

B. $x = x_2$ KE is minimum

C. $x > x_2$ KE is maximum and velocity is maximum

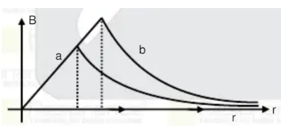
D. $x > x_2$ KE is minimum and velocity is minimum

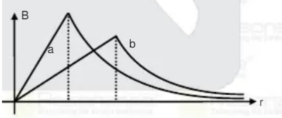
Watch Video Solution

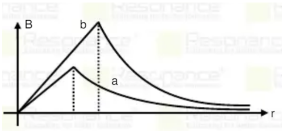
558. Write approx. value of plank's constant and permittivity constant

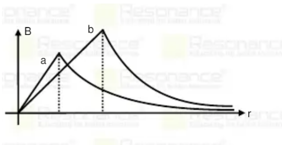
Watch Video Solution

559. Two long wires having same current having radius a and b what will be the correct representationof magnetic field intensity v/s. r.

A. 

B. 

C. 

D. 

Watch Video Solution

560. If thomson model is considered and α rays are bombarded on this model then α rays will be

A. deflected at wide angle

B. reflected all at

C. will pass undeviated

D. all deflected at same angle

Watch Video Solution

561. A body of mass m at rest starts moving along straight line by a machine delivering a constant power distance travelled by body in time t is

A. $\left(4\frac{\sqrt{2\frac{p}{m}}}{3}x(t)^{\frac{3}{2}}\right.$

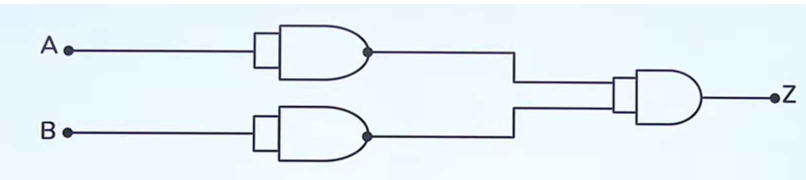
B. $\left(2\frac{\sqrt{2\frac{p}{m}}}{3}x(t)^{\frac{3}{2}}\right.$

C. $\left(\frac{\sqrt{2\frac{p}{m}}}{3}x(t)^{\frac{3}{2}}\right.$

D. $\left(2\dfrac{\sqrt{6\frac{p}{m}}}{3}x(t)^{\frac{3}{2}}\right.$

Watch Video Solution

562. Find output.



A. NOR

B. NAND

C. XOR

D. NONE

Watch Video Solution

563. Heat supplied is 6000 J/min. Power = 90W. Find time taken to increase the internal energy by 2.5 x 10^3 J

A. 150 sec

B. 250 sec

C. 510 sec

D. NONE

Watch Video Solution

564. At same temperature rms of hydrogen, oxygen and carbon dioxide be V_H, V_O, V_{CO_2}

A. $V_{H_2} > V_{O_2} > V_{CO_2}$

B. $V_{H_2} < V_{O_2} < V_{CO_2}$

C. $V_{H_2} < V_{O_2} > V_{CO_2}$

D. NONE

Watch Video Solution

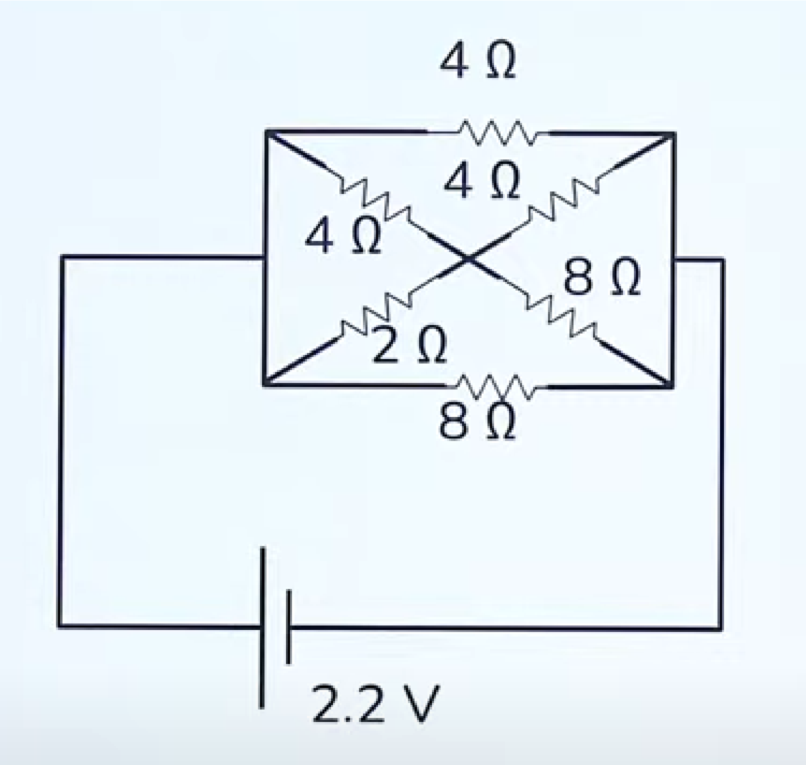
565. 3m long chain on a table. Mass of chain 3kg. 2m on the table... if it slips then find kinetic energy

Watch Video Solution

566. Find dimensions of p in the formula $p = ELM^{-5}G^{-2}$, E = energy, L = angular momentum, M = mass, G = gravitational constant

Watch Video Solution

567. Find power in entire circuit where internal resistance is 0.6 ohm.



A. 44505

B. 44327

C. 115

D. NONE

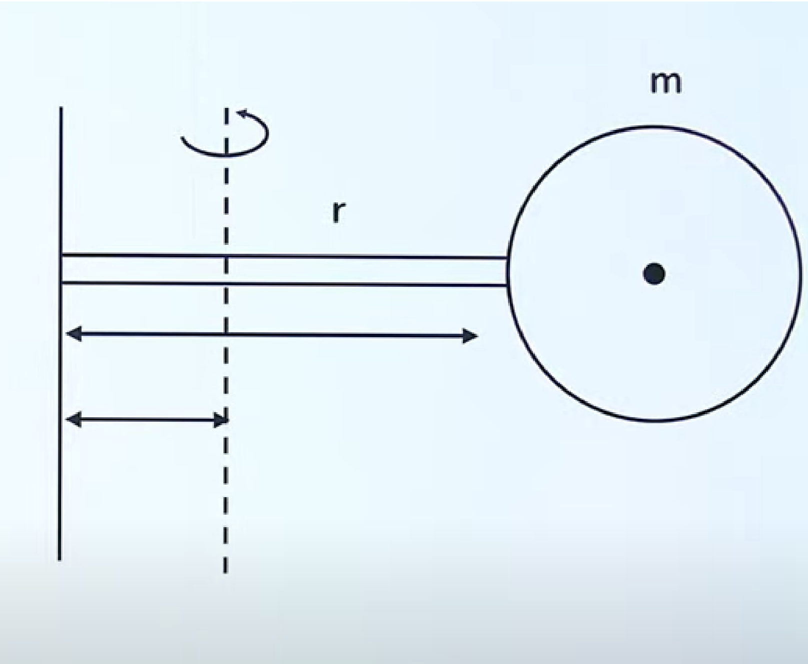
Watch Video Solution

Watch Video Solution

568. Wavelength changed from 280 to 400nm, work function = 2.5 eV then find change in stopping potential.

Watch Video Solution

569. Find moment of inertia of badminton such that circular part is parallel to axis of rotation.



Watch Video Solution

Watch Video Solution

570. Car A overtakes car B with relative velocity of 40 m/s with what velocity car A appearing in the mirror (f = 10 cm) of car B 1.9m far from it.

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

B. $40\frac{m}{s}$

C. $4\frac{m}{s}$

D. $0.1\frac{m}{s}$

Watch Video Solution

571. For hydrogen like atom, transition from n = 3 to n = 1 frequency is 192 x 10^15 then find frequency when transition takes place from n = 2 to n = 1

A. 162 x 10^15`

B. 126 x 10^15`

C. 162 x 10^18`

D. NONE

Watch Video Solution

572. In the absence of air source and observer moves away 20 m/s. The frequency observed by the observer is 1800 Hz and velocity of sound in air is 340 m/s then find original frequency of source

Watch Video Solution

573. Two spheres, each of radius r = 5 cm are thrown upwards at an interval of 3s. At what height they will collides? Initial speed is 30 m/s

A. 45 m

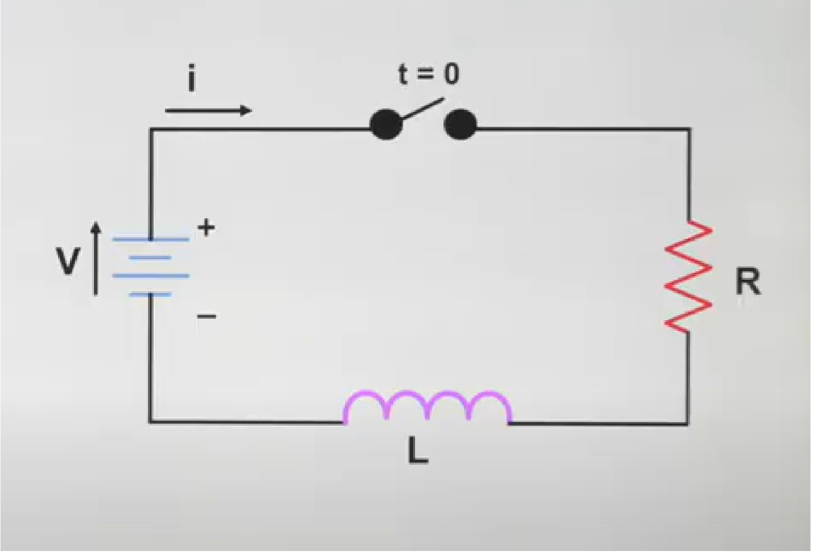
B. 30 m

C. 33.7 m

D. 43.3 m

Watch Video Solution

574. In LR circuit at steady state energy stored in inductor is 64J and power consumed by circuit is 640 W. Find time constant for this LR circuit.



A. 0.2

B. 0.1

C. 0.8

D. 0.25

Watch Video Solution

575. Initial fuel of rocket = 1000kg if it was given acceleration = 20 m/s^2 then find rate of consumption of fuel if velocity of fuel w.r.t rocket = 500 m/s

A. 40

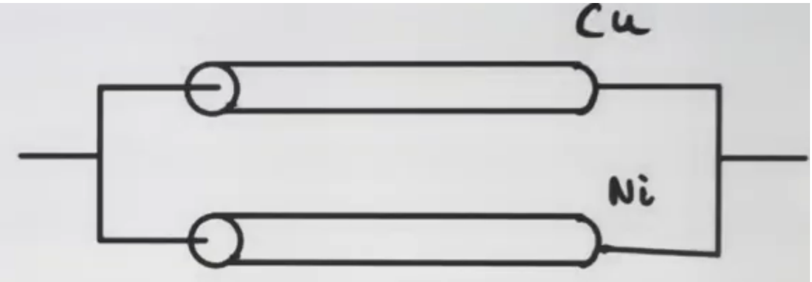
B. 60

C. 80

D. NONE

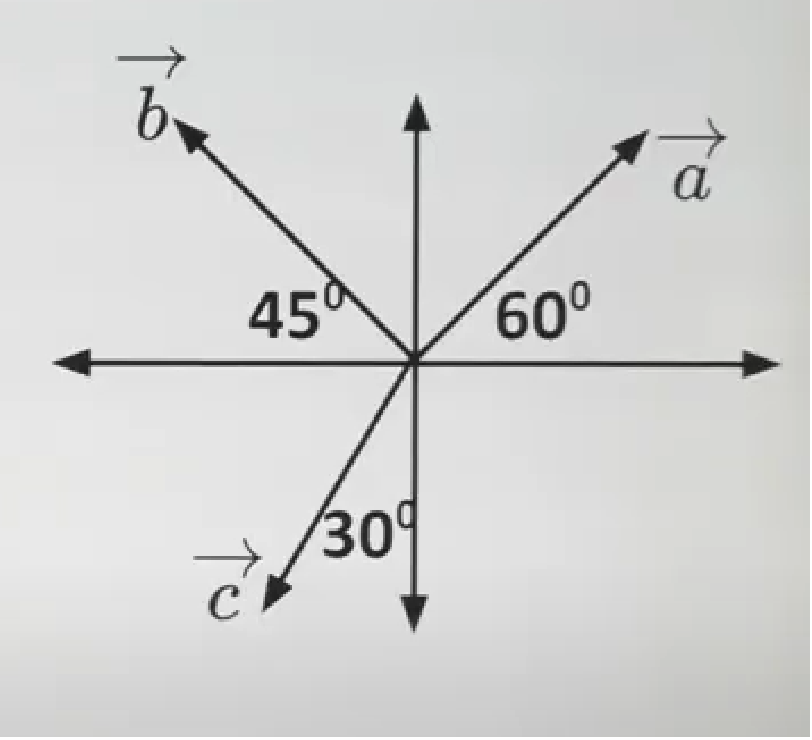
Watch Video Solution

576. $\rho_{Cu} = 12(\mu\Omega)(cm)$, $\rho_{Ni} = 51(\mu\Omega)(cm)$. If both conductors have equal length diameter 2mm each and have equivalent resistance of 3Ω. Find l



Watch Video Solution

577. Three vectors of equal magnitude are shown in figure. Find angle θ formed by $\vec{a} + \vec{b} - \vec{c}$ with x-axis, $\tan(\theta)$ = ?



A. $\dfrac{\sqrt{6}+1}{\sqrt{2}-1}$

B. $\dfrac{\sqrt{6}-1}{\sqrt{2}+1}$

C. $\dfrac{1}{\sqrt{2}}$

D. $\dfrac{\sqrt{2}-1}{\sqrt{6}+1}$

Watch Video Solution

578. In a standard YDSE, distance between slits is d and distance between screen and slit plane is D. The location of 1st maxima for red light is at y_1 distance from central maxima and for violet is at y_2 distance from central maxima. Find difference between wavelengths of red and violet lights.

A. $\frac{d(y_1 + y_2)}{D}$

B. $\frac{d(y_1 - y_2)}{2}D$

C. $\frac{d(y_1 - y_2)}{D}$

D. $\frac{d(y_1 + y_2)}{2}D$

Watch Video Solution

579. Find the dimensions of (A X (B + C)D) where A is mass, dimension of B is unknown, C is energy and D is dimension less constant:

A. $M^2L^2T^{-1}$

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

C. $M^2L^1T^{-2}$

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

Watch Video Solution

580. Two balls are projected vertically upward with same speed 35 m/s in 3s interval. Find height at which both balls collide.

A. 50

B. 30

C. 80

D. 100

Watch Video Solution

581. Given statements are based on bohr's atomic model for hydrogen like atom:

Statement 1- As principal quantum number increases, speed of electron also increases.

Statement 2- Speed of electron increases as energy increases

A. Both statements are true

B. Only statement 1 is true

C. Only statement 2 is true

D. Both statements are false

Watch Video Solution

582. A spherical shell of mass m and radius R is given then which of the following is incorrect for inside the sheel

A. Gravitational field is zero

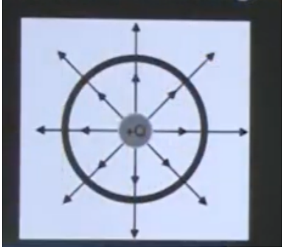
B. Gravitational potential is zero

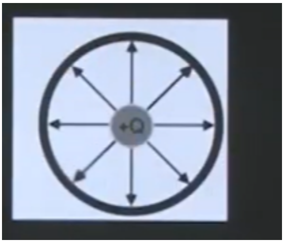
C. Gravitational field is same everywhere

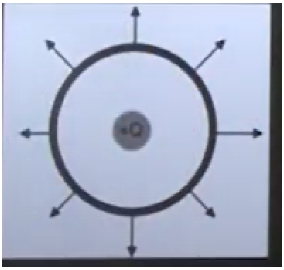
D. Graviational potential is same everywhere

Watch Video Solution

583. Charge Q is given to a spherical conductor of radius R. It is surrounded by a concentric conducting shell of inner radius a and outer radius b. Corresponding electric field diagram will be:

A. 

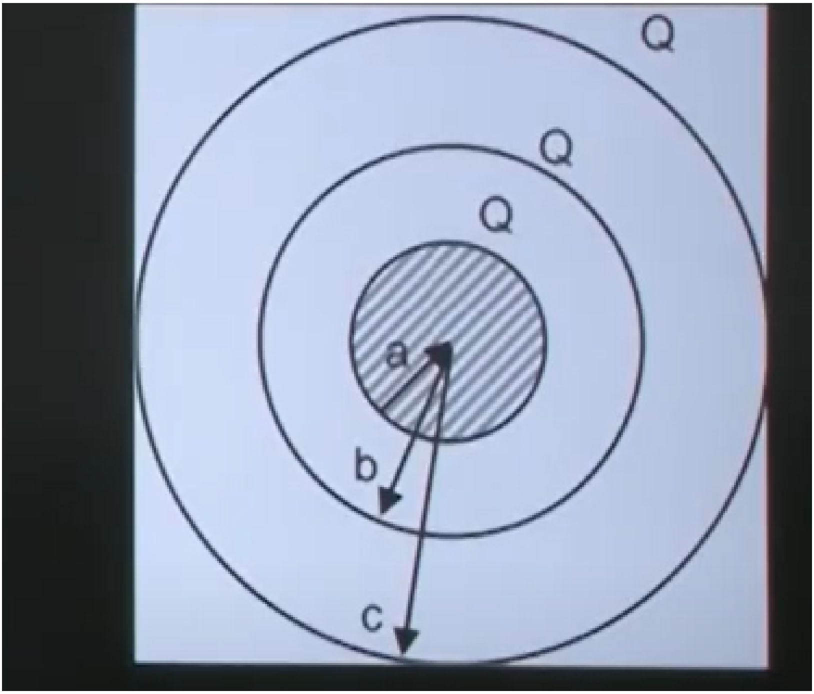
B. 

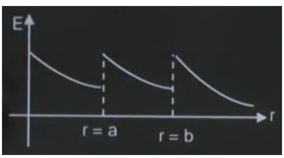
C. 

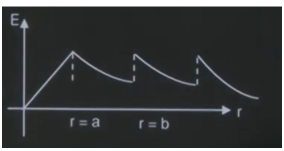
D. 

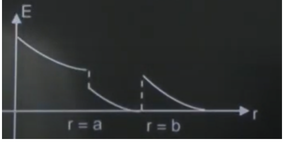
Watch Video Solution

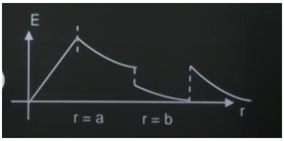
584. Find the graph between electric field intensity and distance 'r' from the center. For the given arrangement of concentric spheres. Charge in inner solid sphere is uniformly distributed in volume.



A. 

B. 

C. 

D. 

Watch Video Solution

585. An observer and a source both are moving away with velocity 20 m/s each in opposite direction. If frequency of sound observed is 1800Hz then what is actual frequency (velocity of sound= 340 m/s)

A. 1906

B. 1903

C. 1912

D. 1947

Watch Video Solution

586. Find capacitance in a series LCR circuit in order to get maximum power. ($X_L = 250\Omega$ and $f = 50Hz$)

A. $10.7\mu F$

B. $12.7\mu F$

C. $14.7\mu F$

D. $14.9\mu F$

Watch Video Solution

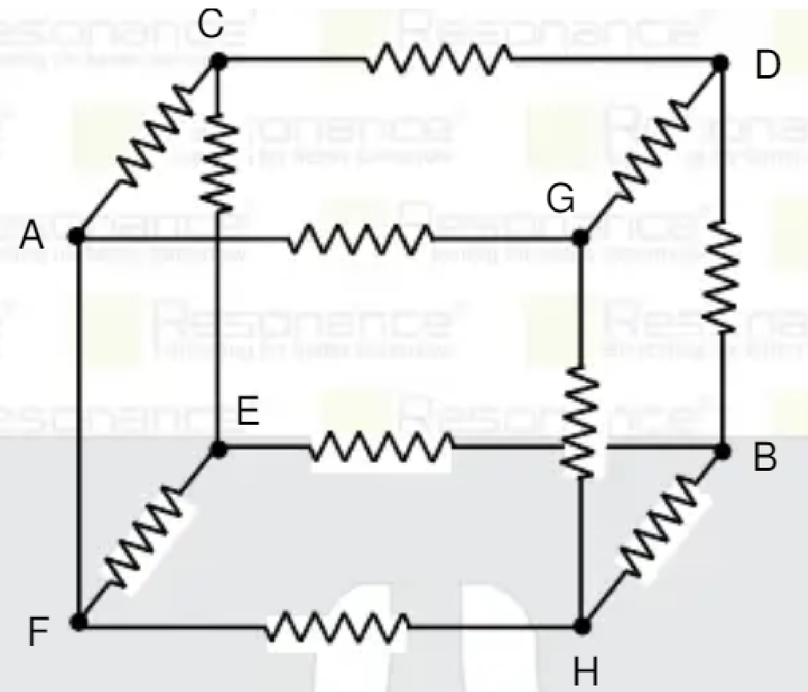
587. Two travelling waves produce a standing wave represented by equation $y = 1.0mm\cos\left(1.57cm^{-1}x\right)\sin\left(78.5s^{-1}\right.$ the node closest to origin in the region x > 0 will be at x = ...cm

Watch Video Solution

588. An amplitude modulated wave is represented by $C_m = 10(1 + 0.2\sin 12560t)\sin\left(1.11x10^4t\right)V$. The modulating frequency in KHz will be

Watch Video Solution

589. A cube made up of wire each of resistance R. The find equivalent resistance across its diagnol



A. $5\frac{R}{6}$

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

C. $7\frac{R}{12}$

D. R

Watch Video Solution

590. A carnot engine working between -10 deg C and 25 deg C temperature limit if produce a power of 35 W then what is heat input rate in engine.

A. 190J

B. 290J

C. 298J

D. 250J

Answer: C

Watch Video Solution

591. The two oppositely charged rings of radii a are seprated by s . Find the potential difference between center of the ring ?

Watch Video Solution

592. If B is the angle between $\vec{A}$ and $\vec{A} - \vec{B}$. Then $\tan B$ is

A. $\dfrac{2B\sqrt{3}}{2A - B}$

B. $\dfrac{2B}{\sqrt{3}A - B}$

C. $\dfrac{B\sqrt{3}}{2A + B}$

D. $\dfrac{2B}{\sqrt{3}A + B}$

Watch Video Solution

Watch Video Solution

593. $x_1 = \frac{5}{2}[\sin(2\pi t) + \cos(2\pi t)], x_2 = 5\left[\sin\left(2\pi l + \frac{\pi}{4}\right)\right]$

Find the ratio of amplitude of the given motion ?

A. $\sqrt{2} : 1$

B. $2 : 1$

C. $1 : \sqrt{2}$

D. $1 : 2$

Watch Video Solution

594. A cylinder of height L, mass M, radius $\frac{L}{\sqrt{2}}$ has MOI $1.2 kgm^2$ about an axis at a distance of L/2 parallel to axis of cylinder. If length of cylinder is 80cm. Find the density of cylinder.

A. $5.3k\frac{g}{m^{-3}}$

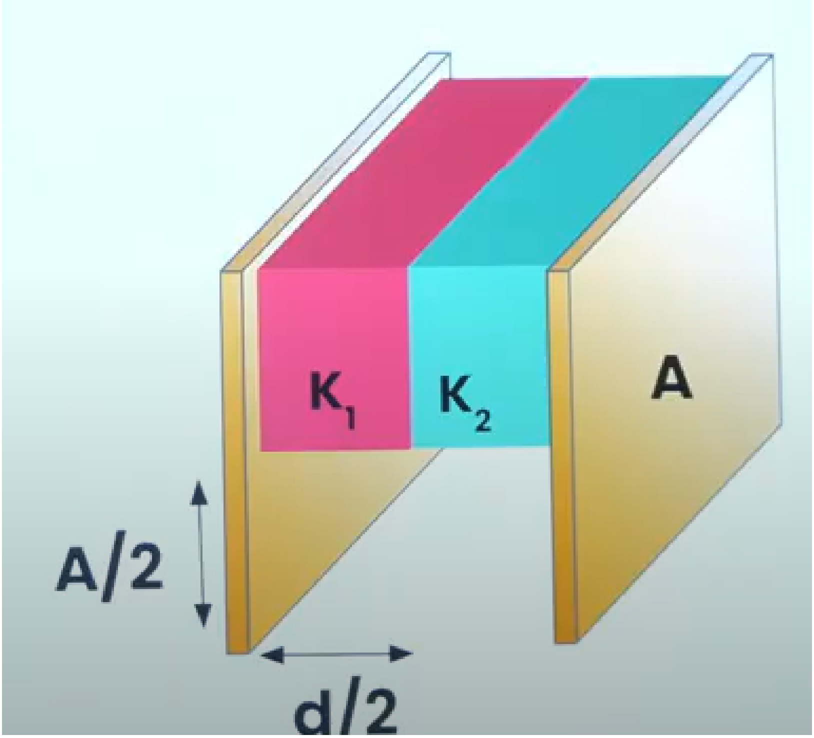
B. $15.3k\frac{g}{m^{-3}}$

C. $10.23k\frac{g}{m^{-3}}$

D. none

Watch Video Solution

595. Find equivalent capaciatnce of the given setup. (plate area = A, plate seperation = d)



A. $\left(\dfrac{k_1k_2}{k_1+k_2}+\dfrac{1}{2}\right)$

B. $\left(\dfrac{k_1k_2}{k_1+k_2}+2\right)$

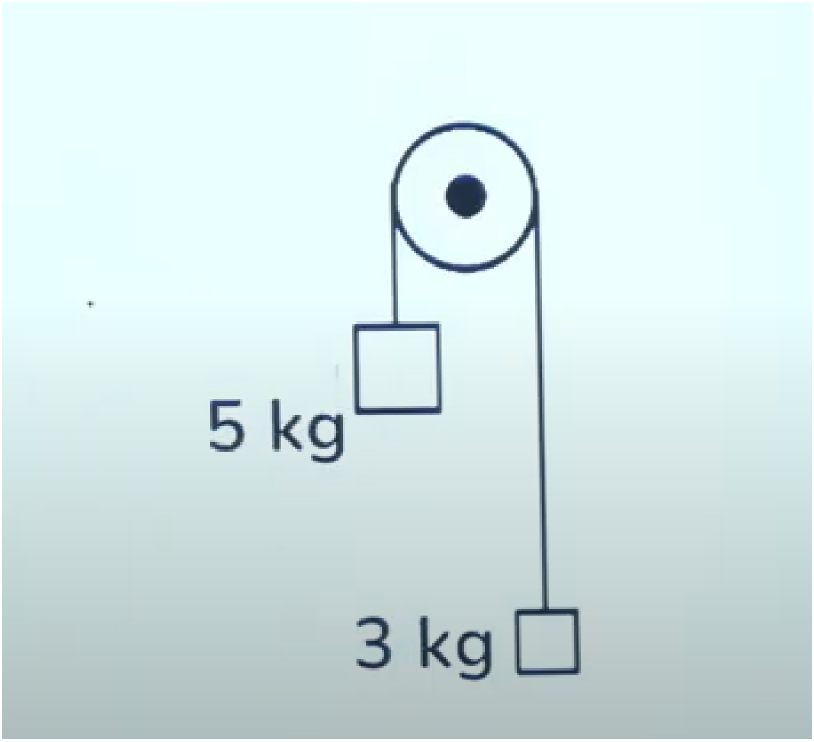
C. $\left(\dfrac{2k_1k_2}{k_1+k_2}\right)A\dfrac{\varepsilon_0}{d}$

D. $\left(\dfrac{k_1k_2}{2}\left(k_1+k_2\right)\right)A\dfrac{\varepsilon_0}{d}$

Watch Video Solution

Watch Video Solution

596. A wire is supporting two masses on a pulley as shown. If breaking stress of wire is $\left(\frac{2400}{\pi}\right)\frac{N}{m^{-2}}$. Find minimum radius of wire, so that it does not break.



A. 6.25 cm

B. 11 cm

C. 9.5 cm

D. 12.5 cm

Watch Video Solution

597. A ball of mass M is rotating in a conical pendulum by a string of length L. If radius of circular path is $\frac{L}{\sqrt{2}}$, find the velocity of mass

A. $\sqrt{gL}$

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

C. $\sqrt{2gL}$

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

Answer: D

Watch Video Solution

598. An Unpolarised light of Intensity I_0 is incident on two polaroids placed co-axially such that $\frac{I_0}{2}$ intensity is received on screen. By what angle the polaroid placed close to screen should be rotated so that intensity on screen becomes $\frac{3}{8}I_0$

A. 30°

B. 60°

C. 45°

D. 90°

Answer: A

Watch Video Solution

599. Match the dimensions of the physical quantities.

Magnetic flux	→	$M^1L^2T^{-2}A^{-1}$
Magnetic intensity	→	$L^{-1}A^1$
Intensity of magnetization	→	$L^{-1}A^1$
Magnetic induction	→	$M^1T^{-2}A^{-1}$

Watch Video Solution

600. The debroglie wavelength of an electron is $\lambda$and has energy E. If the debroglie wavelength is reduced by 25% then how much extra kinetic energy will the electron have now?

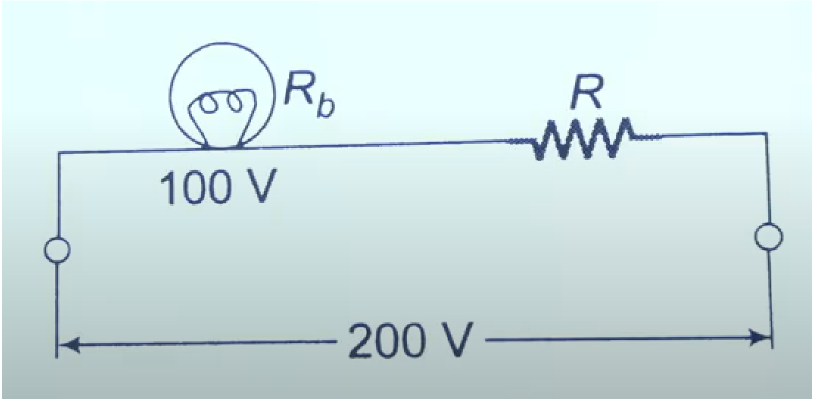
A. 16/9 E

B. 7/9 E

C. 9/7 E

D. 9/16 E

Watch Video Solution

601. A bulb with rating 100 V, 500 W is to be connected in series with an unknown resistance and a battery of 200 volts. What must be the value of this unknown resistance such that the bulb still dissipates 500W. 

A. 25 OHM

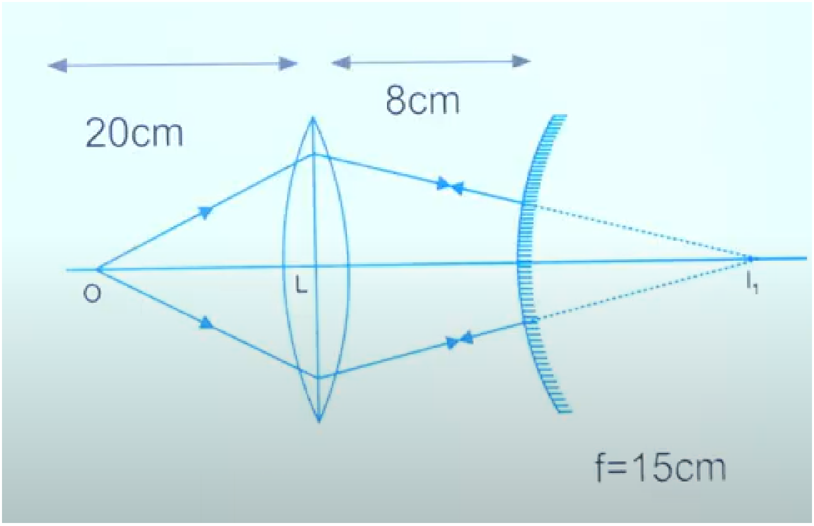
B. 50 OHM

C. 20 OHM

D. 10 OHM

Watch Video Solution

602. The image is formed on the object itself on the given arrangement. If mirror is removed. What is the distance between the object and the image?



Watch Video Solution

603. An EM wave is propagating along x-axis such that $\vec{E} = 800\sin(kx - wt)\hat{j}$. If an electron is projected with velocity $3 \times 10^7 \frac{m}{s}$. Along y-axis then the maximum magnetic force experienced by electron is

Watch Video Solution

Watch Video Solution

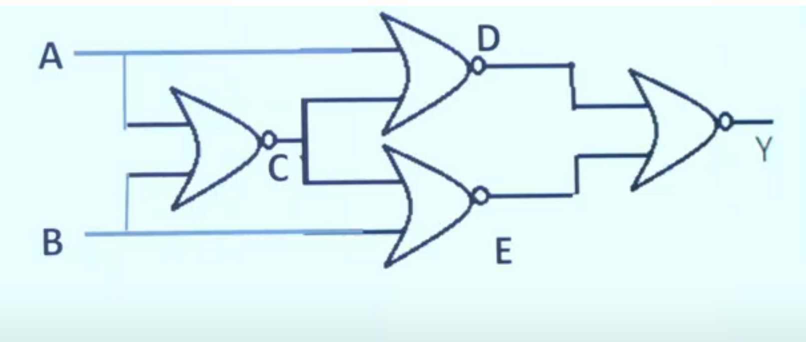
604. A container has 1 mole of some gas and 2 mole of other gas has volume $1m^3$ at 27^0C. Find the pressure of the gas in kPa.

Watch Video Solution

605. Find the amplitude of the resultant wave formed by the two waves given as $y_1 = 5\sin(wt - kx)$, $y_2 = 12\sin\left(wt - kx + 2\frac{\pi}{3}\right)$

Watch Video Solution

606. How will the truth table look like?



Watch Video Solution

607. Transmitter antenna height = 50m, receiver antenna height = 80m. Radius of earth = 6400 km. Find maximum distance between for LOS communication.

Watch Video Solution

608. Find the maximum induced emf.

Watch Video Solution

609. Equation of SHM for two particles is $x_1 = 5\sin\left(wt + \frac{\pi}{4}\right)$ and $x_2 = 5\sqrt{2}[\sin(2\pi t) + \cos(2\pi t)]$. Then how many times amplitude of second particle greater than first.

Watch Video Solution

610. Electric field of an em wave is $E = 200\sin\left(w\left(t - \frac{x}{c}\right)\right)\frac{V}{m}$. An electron is moving with speed $3x10^{7}\frac{m}{s}$. Find magnetic force on an electron.

A. $2.2x10^{-18}N$

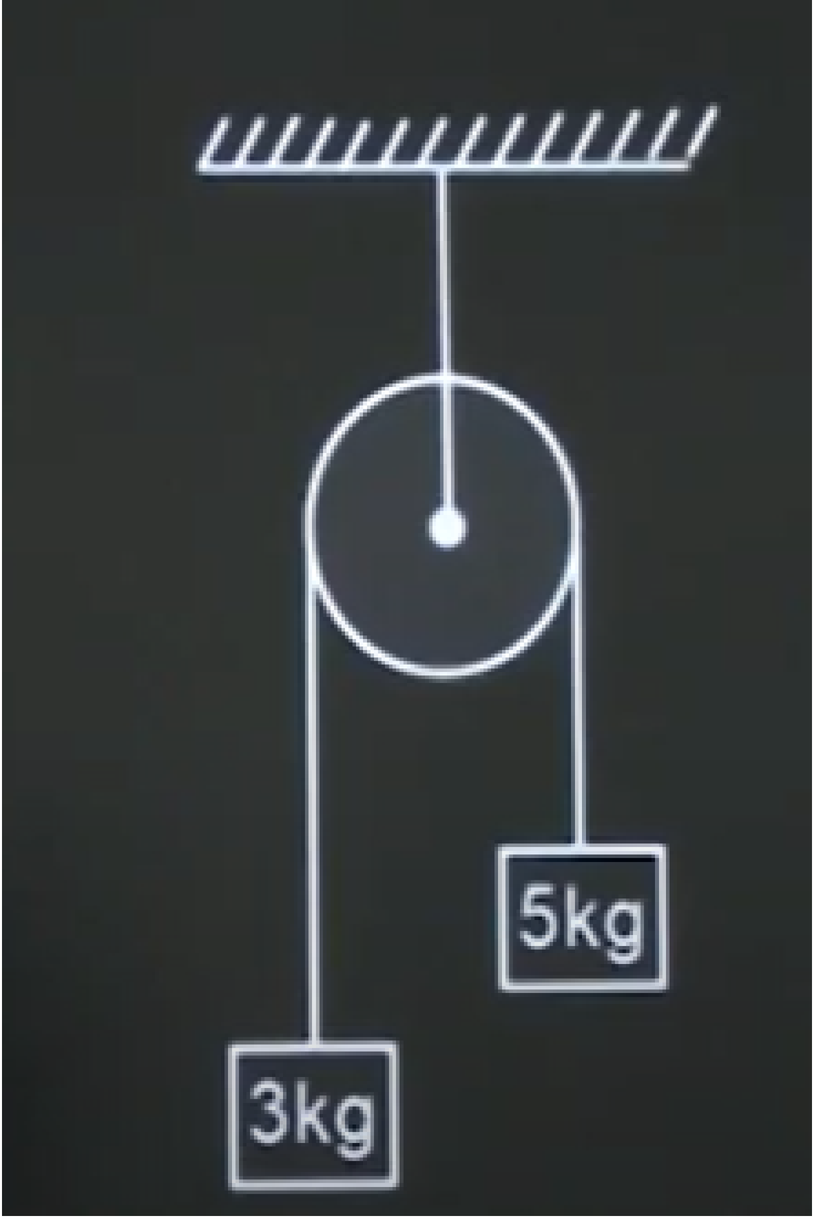
B. $3.2x10^{-18}N$

C. $1.2x10^{-18}N$

D. $4.2x10^{-18}N$

Watch Video Solution

611. In an atwood machine the maximum stress that a string can tolerate without break is $\frac{24}{\pi}x10^{-2}$ find the radius of string.



A. 12.5

B. 16.5

C. 20.5

D. 24.5

Watch Video Solution

612. A fighter jet plane is flying horizontally drops a bomb find the nature of path of bomb as seen by pilot.

A. hyperbola

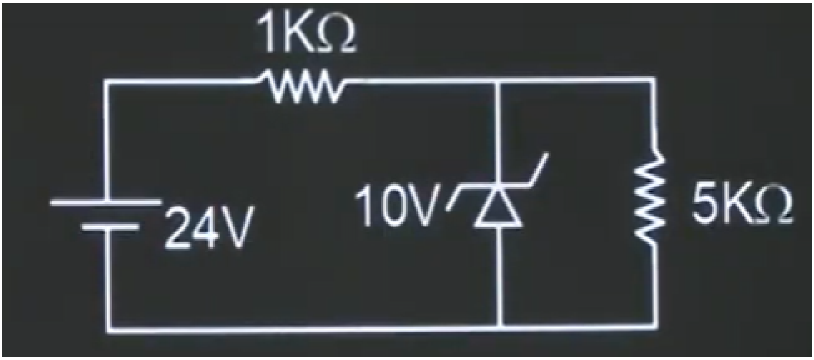
B. straight line

C. parabola

D. none

Watch Video Solution

613. Find power developed in zener diode



A. 0.24W

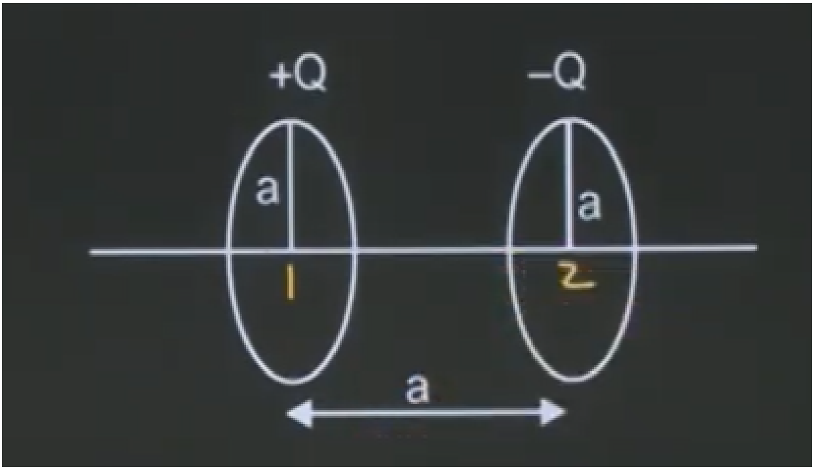
B. 0.20W

C. 0.12W

D. 0.8W

Watch Video Solution

614. Find potential difference between centres of rings



Watch Video Solution

615. Error in length of pendulum is 0.1% then the error of seconds in a day is

A. 20.12s

B. 25.13s

C. 30.21s

D. 43.2s

Watch Video Solution

616. Three liquids A,B,C have initial temperature 10 deg C, 20 deg C and 30 deg C resp. A and B are mixed then temperature of mixture is 16 deg C. If B and C are mixed then temperature of mixed is 26 deg C. If A and C are mixed the temperature of mixture is

A. 150/11

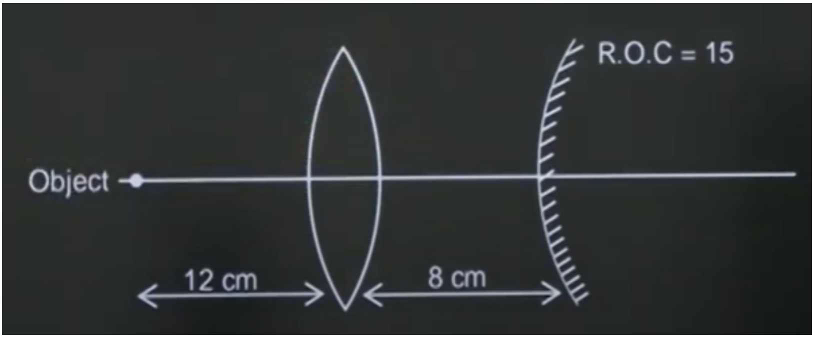
B. 160/11

C. 170/11

D. 120/11

Watch Video Solution

617. Object, convex lens and convex mirror are arranged as shown. The R.O.C of mirror is 15cm. Focal length of lens is unknown. It is given that image and object coincide. Find distance between image and object when mirror is removed.



A. 50

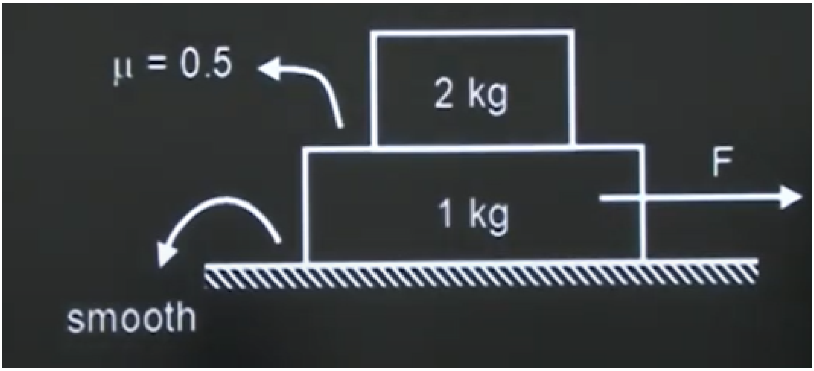
B. 35

C. 60

D. 27.5

Watch Video Solution

618. Two blocks of mass 2kg and 1kg are at rest on a smooth surface as shown. There is friction between 2kg and 1kg block with $\mu = 0.5$. Find maximum force to be applied on 1 kg for the two blocks to move together.



Watch Video Solution

619. Match list 1 and list 2 and select correct answers.

List-I		List-II	
P.	Magnetic permeability	1.	$[M^0 L^{-1} T^0 I^1]$
Q.	Magnetic flux	2.	$[M^1 T^2 I^{-1}]$
R.	Magnetization	3.	$[M^1 L^1 T^{-2} I^{-2}]$
S.	Magnetic induction	4.	$[M^1 L^2 I^{-1} T^{-2}]$

Watch Video Solution

620. Calculate moment of inertia of a square of each side of mass m, length l about a corner and perpendicular to plane.

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

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

C. $\frac{5}{6}ml^2$

D. none

Watch Video Solution

621. Which one of the following is not dimensionless?

A. relative permeability

B. quality factor

C. power factor

D. permeability of free space $\left(\mu_0\right)$

Watch Video Solution

622. If $PT^3 = Constant$ then find the coefficient of volume expansion.

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

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

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

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

Watch Video Solution

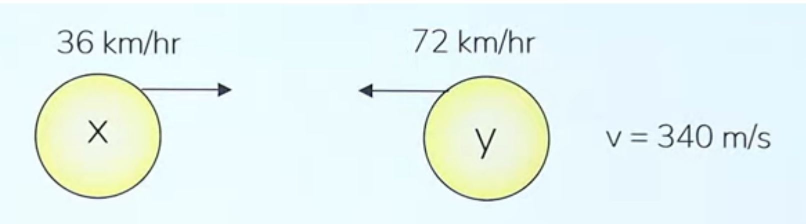
623. If $v = \sqrt{5000 + 24x} \frac{m}{s}$ then calculate acceleration.

Watch Video Solution

624. E/B. Find the unit. (E = electric field intensity, B = magnetic field intensity)

Watch Video Solution

625. Car X and Car Y approaching each other. Frequency heard by car Y is 1320 Hz. Then, find actual frequency.



Watch Video Solution

626. First n resistor R = 10ohm are ceonnected in series and this n resistor are connected to battery of V = 20V, $R_i = 10\Omega$. When this n resistor are conected to parallel to same battery then current increases 20times. Find n

A. 2

B. 3

C. 4

D. 5

Watch Video Solution

627. $E = A\sin(500x - wt)$ where $A = 50$ and $w = 10^{11}$, c = speed of light then velocity of EM wave.

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

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

C. c

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

Watch Video Solution

628. Concave mirror object at d_1 from curvature of radius R and image at d_2 from C. Then,

A. $R = 2\frac{d_1 d_2}{d_1 - d_2}$

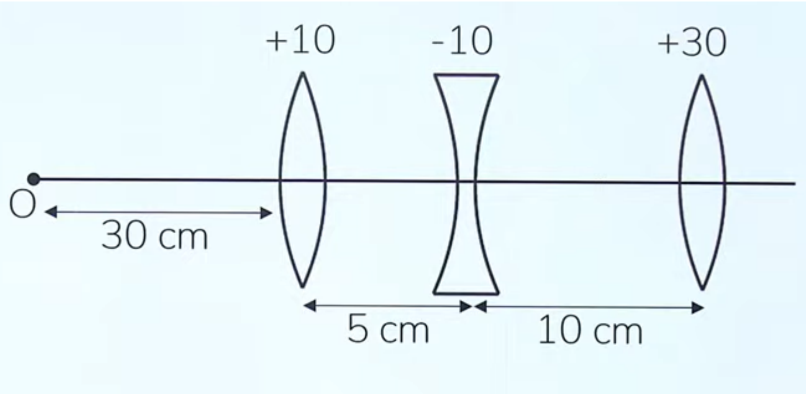
B. $R = \frac{d_1 d_2}{d_1 - d_2}$

C. $R = \frac{d_1 d_2}{d_1 + d_2}$

D. $R = 2\frac{d_1 d_2}{d_1 + d_2}$

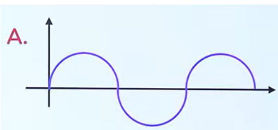
Watch Video Solution

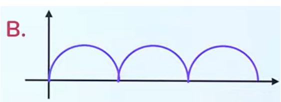
629. Image distance from O ?

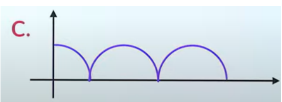


Watch Video Solution

630. Potential energy vs. time given $U = \frac{kX^2}{2}$.Plot graph of U vs. t.

A. 

B. 

C. 

D. none

Watch Video Solution

631. A disc is kept on xy plane with centre at origin. Find electric field at a point with distance Z from origin on z-axis.

A. $\left(\sigma\frac{1-\left(\frac{Z}{\sqrt{Z^2+r^2}}\right)}{\varepsilon_0}\right)$

B. $\left(\sigma\frac{1-\left(\frac{Z}{\sqrt{Z^2+r^2}}\right)}{2}\varepsilon_0\right)$

C. $\left(\sigma\frac{1+\left(\frac{Z}{\sqrt{Z^2+r^2}}\right)}{\varepsilon_0}\right)$

D. $\left(\sigma\frac{1-\left(\frac{z}{\sqrt{z^2-r^2}}\right)}{\varepsilon_0}\right)$

Watch Video Solution

632. The concentration of 10^{10} given. Half life = 1 min. What is the concentration left at 30secs?

A. 7 x 10^9`

B. 7 x 10^10`

C. 8 x 10^9`

D. none

Watch Video Solution

633. Height of transmission tower is 320m and receiving tower is 2000m. Find range.

Watch Video Solution

634. If the intensity of light is increased for the same colour?

A. frequency will increase

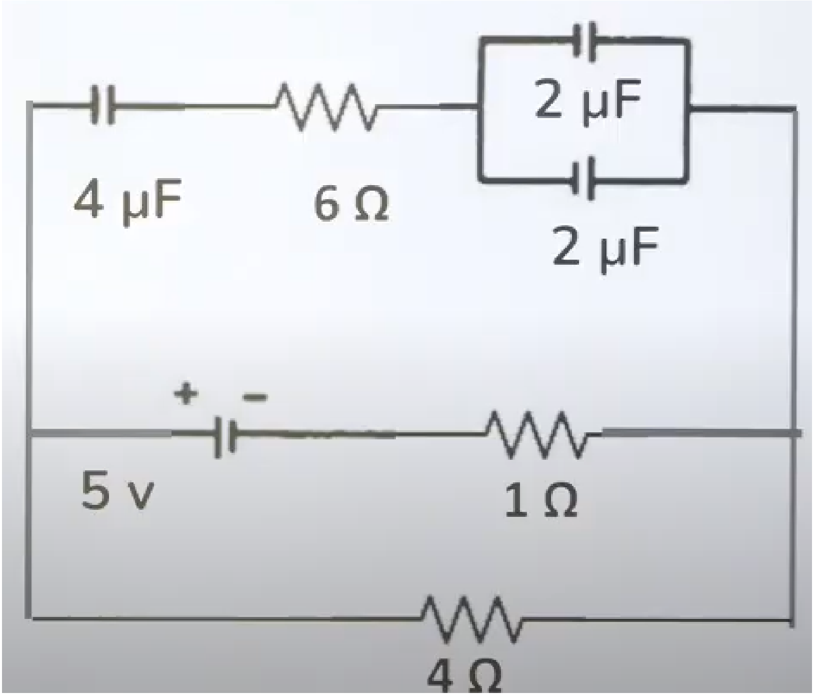
B. no. of photons will increase

C. KE of photoelectrons will increase

D. momentum will increase

Watch Video Solution

635. Find charge of $4\mu F$ capacitor in steady state.



A. $4\mu C$

B. $6\mu C$

C. $8\mu C$

D. $10\mu C$

Watch Video Solution

636. If $i = \sqrt{42}\sin\left(\frac{4t}{T}\right) + 10$. Find i_{rms}

A. $\sqrt{42} + 10$

B. $\sqrt{21} + 10$

C. 11

D. 31

Watch Video Solution

637. A uniform wire is of length 24a. It is first bent to form an equilateral triangle of side length a and connected to a battery. The magnetic moment was M_1. Now, the wire is bent to form a square of side length a and connected to same battery. The magnetic moment was M_2. Find ratio of M_1 and M_2. (Assume same current).

A. 1

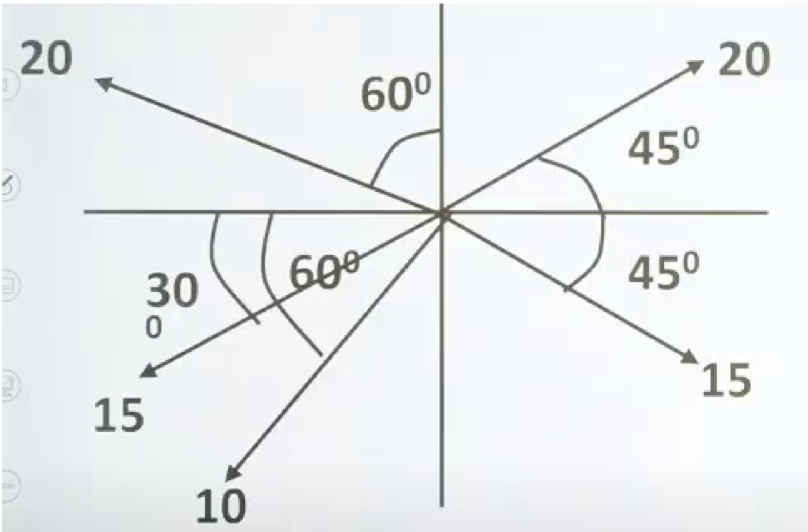
B. $\sqrt{3}$

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

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

Watch Video Solution

638. From the given diagram. Find the resultant of forces.



A. $-10.56\hat{i} - 2.624\hat{j}$

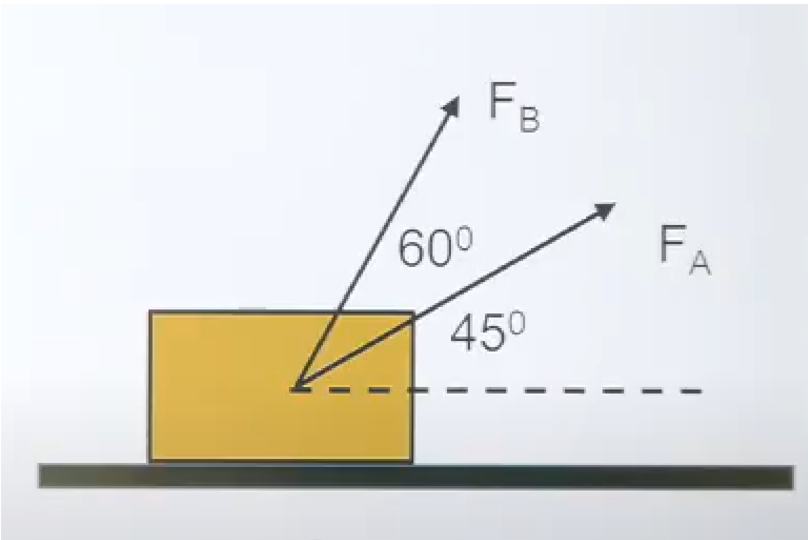
B. $10.56\hat{i} + 2.624\hat{j}$

C. $10.56\hat{i} - 2.624\hat{j}$

D. $-10.56\hat{i} + 4.624\hat{j}$

Watch Video Solution

639. If block displaces right and work done by both forces is equal find $\frac{F_A}{F_B}$



A. $\sqrt{2}$

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

C. 1

D. none

Watch Video Solution

640. 5 same cells (5V, 1ohm) connected in series and then in parallel with an external resistance R respectively. If current in both circuits is equal then find R.

A. 4 ohm

B. 3 ohm

C. 2 ohm

D. 1 ohm

Watch Video Solution

641. A huge circular arc of length 4.4 ly subtends an angle '4S' at the centre of the circle. How long it would take for a body to complete 4 revolution if its speed is 8 Au per second?

Watch Video Solution

642. Common emitter transistor is used in which region as an amplifier.

A. active region

B. saturation region

C. cut off region

D. cut and saturation

Watch Video Solution

643. A particle of mass 2M is divided in four particles of mass m, m, m-M, M-m. All particles are arrange on vertex of square of side a. Find ration of M/m for which potential energy of this system is maximum/minimum

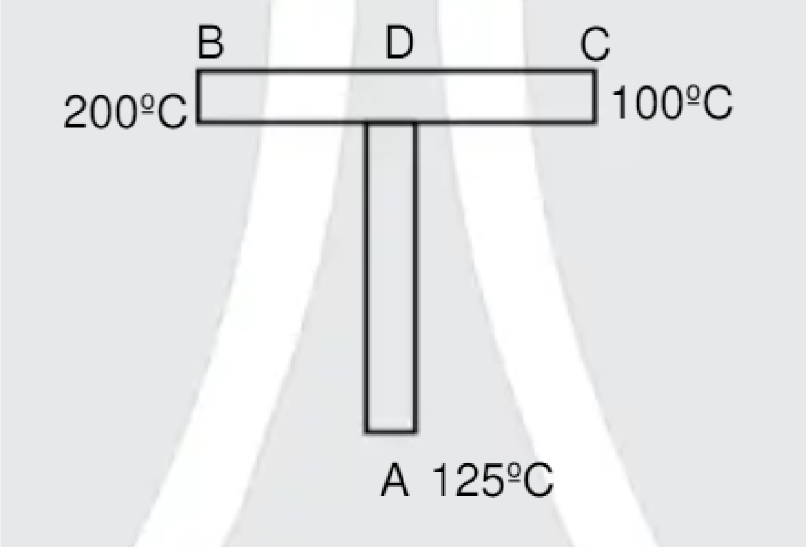
A. 2

B. 44228

C. 3

D. 44256

Watch Video Solution

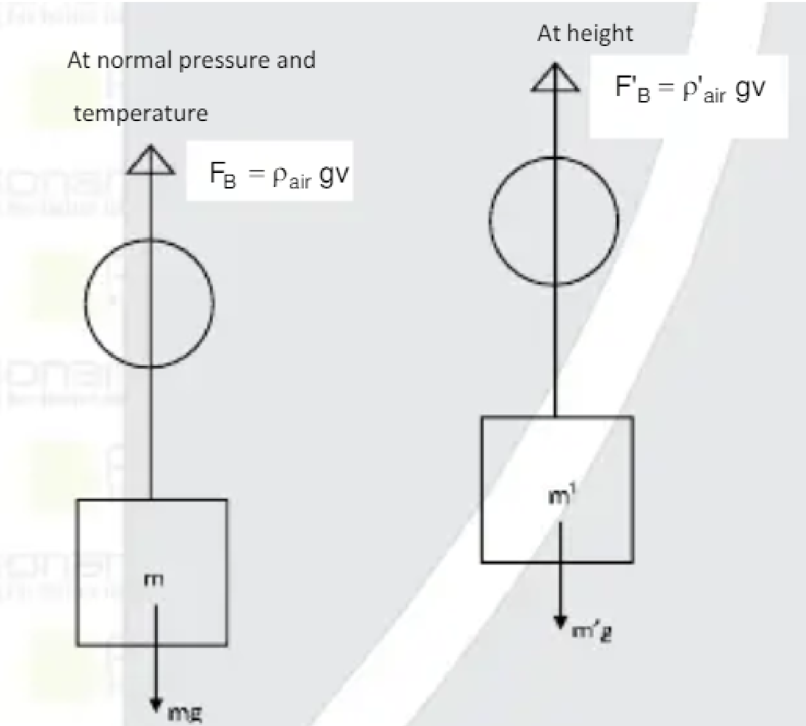
644. Two identical rods are arranged as shown. D is the midpoint of rod BC. Find the heat transfer rate through rods AD (given- L/KA = 10 k/W) 

Watch Video Solution

645. In millikan's oil drop experiment what will be the terminal velocity of an uncharged drop of radius $2.0x10^{-5}m$ and density of oil is $1.2x10^3 k\frac{g}{m^3}$. Take viscosity of liquid = $1.8x10^{-5}\frac{N}{m}$ (Neglect buoyancy force due to air)

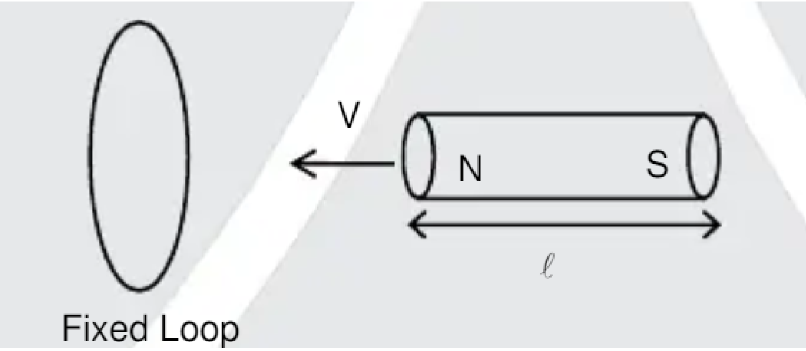
Watch Video Solution

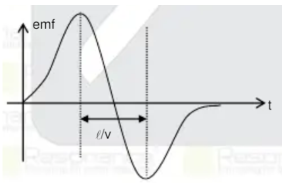
646. A balloon carries a total load of 185kg at normal pressure and temperature at 27 dec C. What load with the balloon carry on rising to a height at which the barometer pressure is 45cm of Hg and the temperature is -7 deg C. Assuming volume constant.

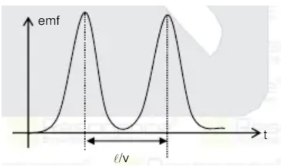


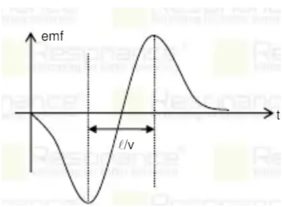
Watch Video Solution

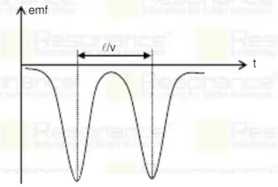
647. A bar magnet moving with velocity v towards a fixed conducting circular loop find the graph of emf v/s. t. Consider anticlockwise emf as positive emf where observer is right of south pole of magnet .



A. 

B. 

C. 

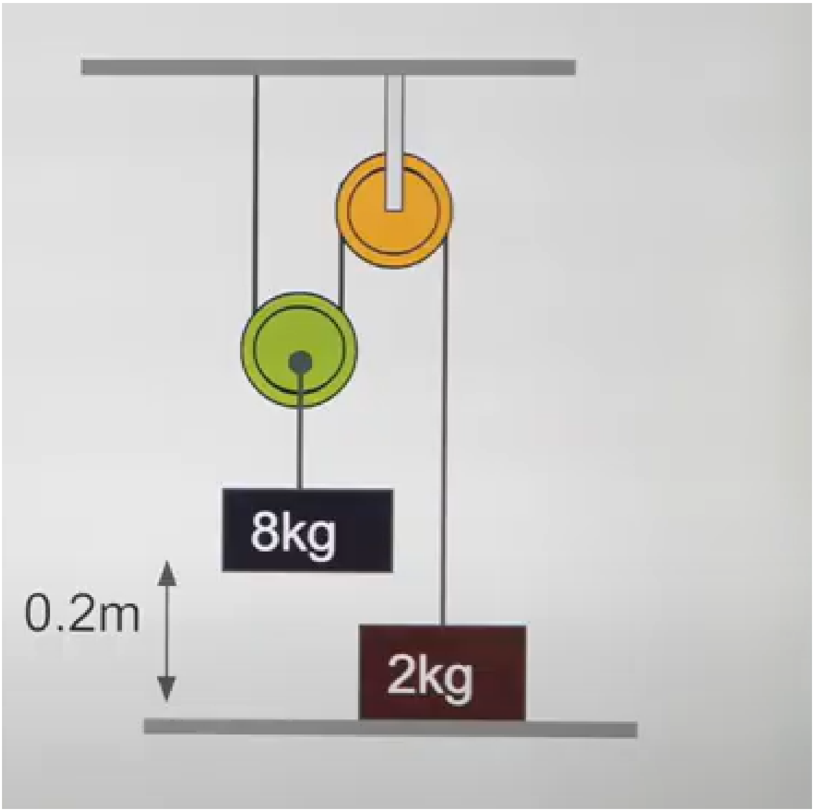
D. 

Watch Video Solution

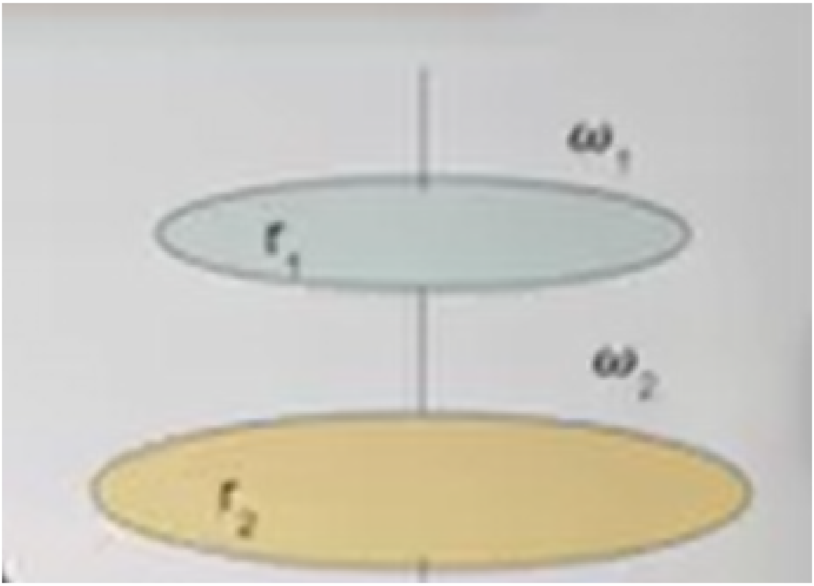
648. A drop falling from a shower of height 9.8 m. When it reaches the ground the third drop falls from shower . What is height of second drop from ground?

Watch Video Solution

649. If the system is left from rest find the time taken by the 8kg block to reach the ground.

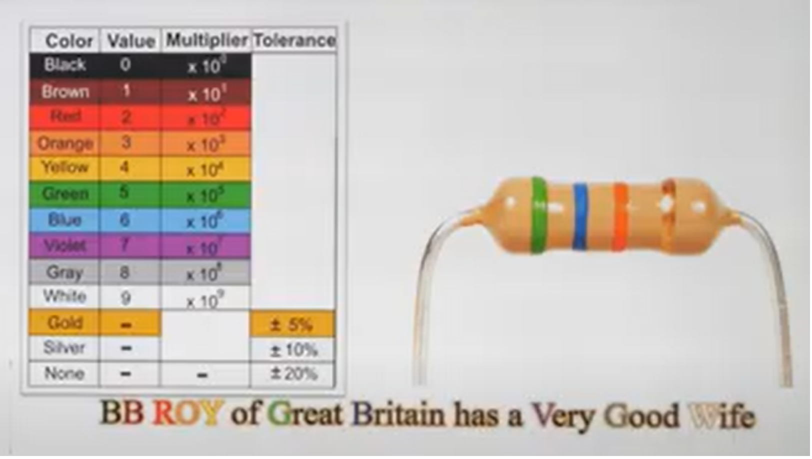


Watch Video Solution

650. Two coaxial discs rotating in the same sense, stick to each other and spin with common angular speed. Find the loss in kinetic energy of the system? 

Watch Video Solution

651. Determine the resistance of the given resistor with the given color sequence(violet, green, red, gold)



Color	Value	Multiplier	Tolerance
Black	0	x 10^0	
Brown	1	x 10^1	
Red	2	x 10^2	
Orange	3	x 10^3	
Yellow	4	x 10^4	
Green	5	x 10^5	
Blue	6	x 10^6	
Violet	7	x 10^7	
Gray	8	x 10^8	
White	9	x 10^9	
Gold	-		± 5%
Silver	-		± 10%
None	-	-	± 20%

A. $(2500 \pm 10\,\%)\Omega$

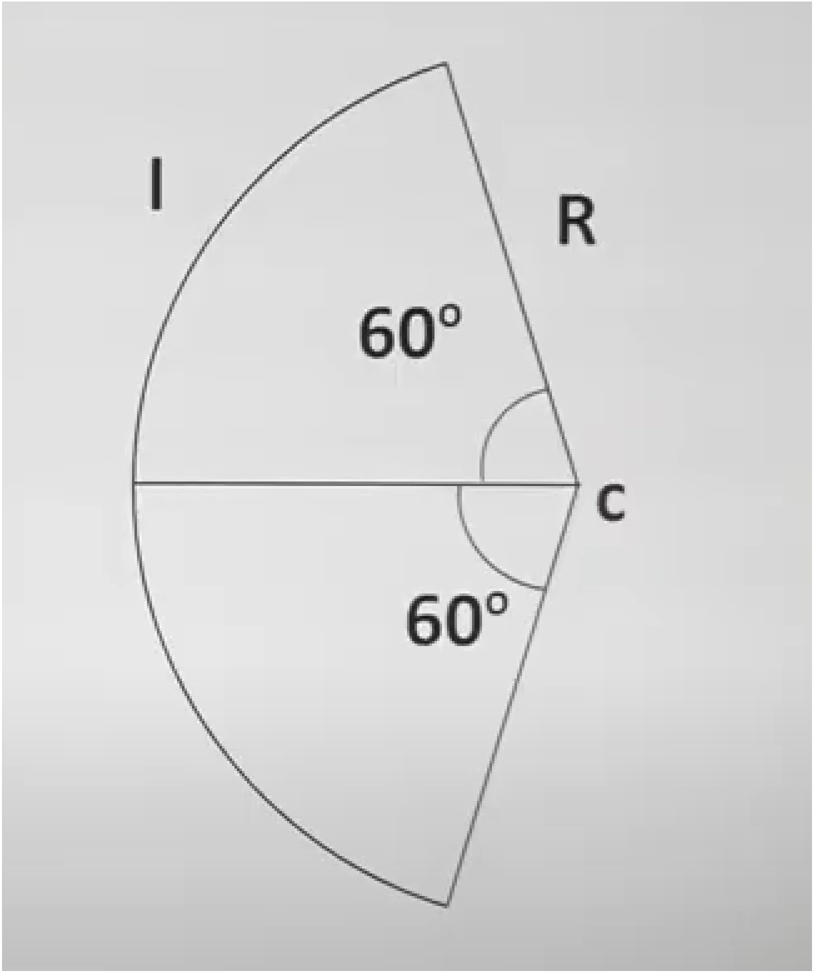
B. $(2500 \pm 5\,\%)\Omega$

C. $(7500 \pm 10\,\%)\Omega$

D. $(7500 \pm 5\,\%)\Omega$

Watch Video Solution

652. Find the electric field due to an uniformly charged arc, at the center 'c'.



A. $\frac{K\lambda}{2}R$

B. $\frac{K\lambda}{\sqrt{3}R}$

C. $\frac{K\lambda 2\sqrt{3}}{R}$

D. $\frac{K\lambda\sqrt{3}}{2}R$

Watch Video Solution

653. Two coherent sources of intensities I_0 each produce minimum intensity of zero then the maximum intensity they can produce by interference is?

A. I_0

B. $2I_0$

C. $4I_0$

D. $8I_0$

Watch Video Solution

654. Victoria falls is 68m high wht is the change in temperature of a drop if it falls that height if specific heat capacity is 1 cal/g deg C.

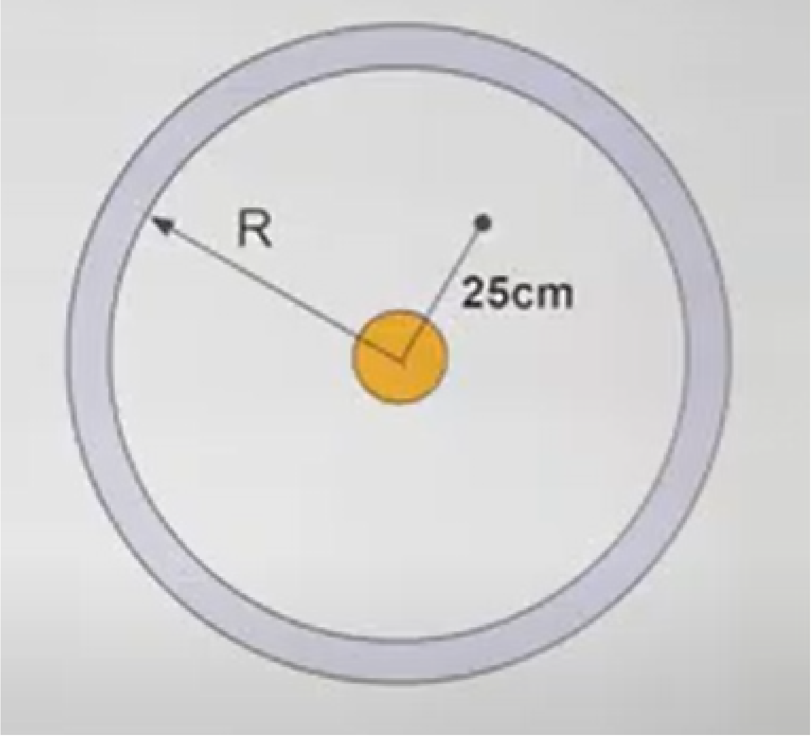
A. 0.16^0C

B. 0.10^0C

C. 0.66^0C

D. 1^0C

Watch Video Solution

655. A shell has mass 100 kg and radius 50m. A point mass 50 kg is placed at center of shell. Find potential at a pont 25m from center of shell. 

Watch Video Solution

656. If force F, time T and length L are used as fundamental quantities then dimensional formula for density will be

A. FT^2L^{-4}

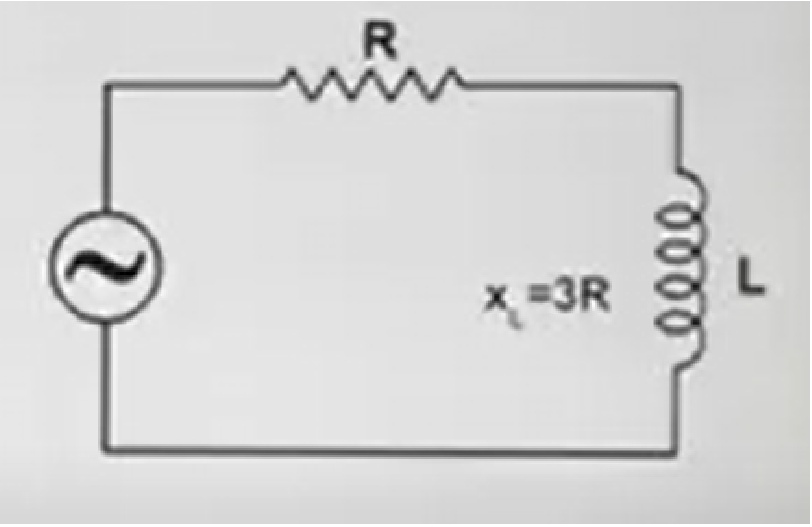
B. F^2TL^{-3}

C. FT^2L^4

D. $F^3T^6L^5$

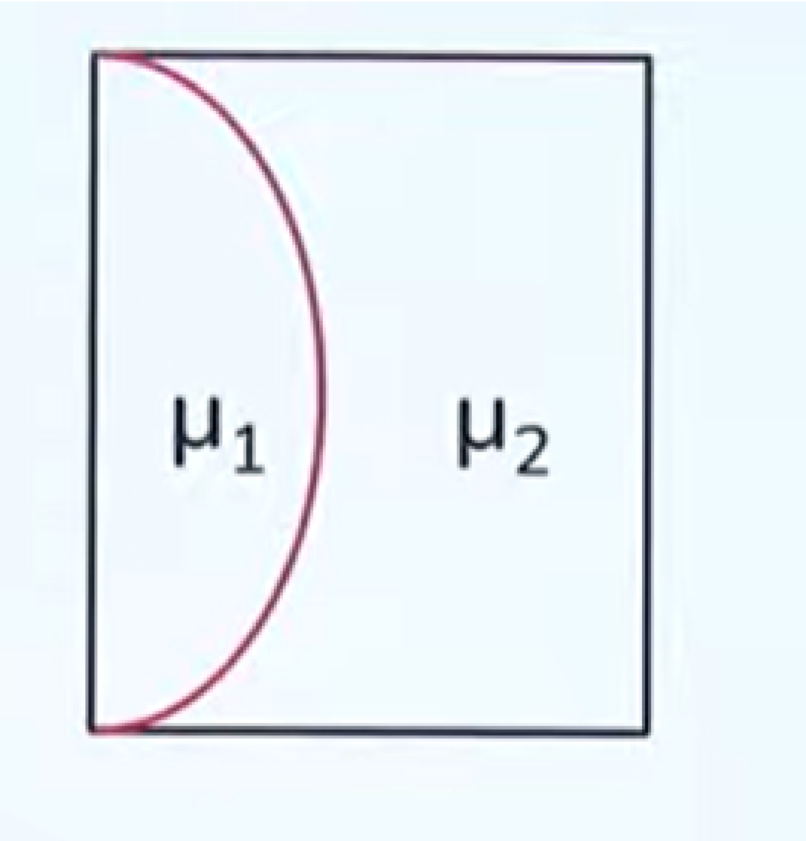
Watch Video Solution

657. The power factor of the circuit shown is p. Now a capacitor ($X_c = 2R$) is also joined in series. Find $\frac{p_1}{p_2}$



Watch Video Solution

658. Ratio of radius of curvature to focal length.



A. $\left(\mu_1 - \mu_2\right)$

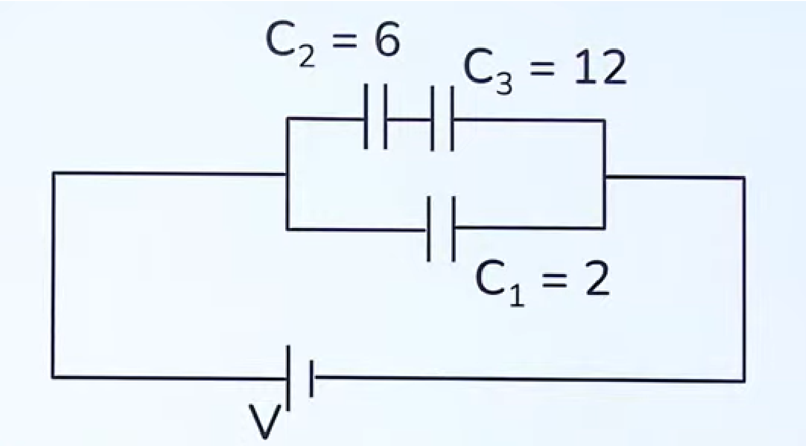
B. $\left(\mu_2 - \mu_1\right)$

C. $\dfrac{1}{\mu_1 - \mu_2}$

D. $\dfrac{1}{\mu_2 - \mu_1}$

Watch Video Solution

659. Ratio of charges is what?



Watch Video Solution

660. $v = 0.48$ for $\lambda = 6.424nm$ then what is v' for $\lambda = 4nm$

A. 1.25

B. 0.96

C. 1.5

D. 0.29

Watch Video Solution

661. For range of 44 km. What should be the suitable wavelength if tower is at a height of 400m.

Watch Video Solution

662. 50 mV galvanometer potential 2 div/mA and 50 divisions. what is the resistance?

A. 2

B. 4

C. 5

D. none

Watch Video Solution

663. In a sample of H like atoms highest quantum state is $n = 6$. Find total number of spectral lines in emission spectrum

A. 6

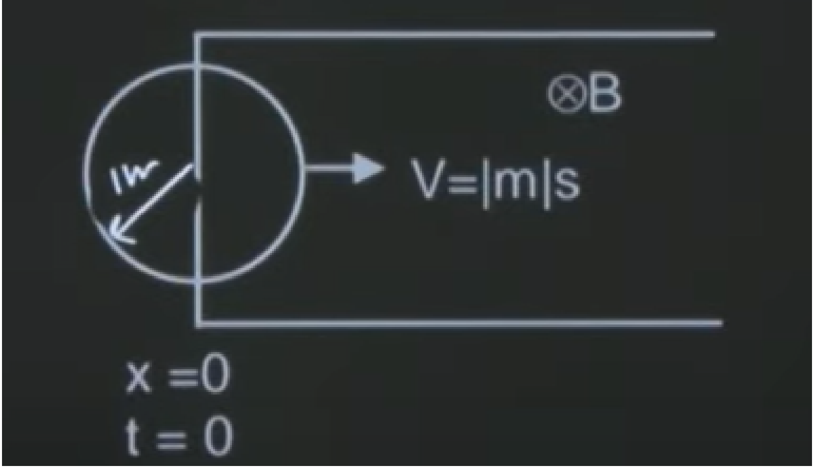
B. 15

C. 20

D. 5

Watch Video Solution

664. In the given arrangement magnetic field is $B = 1T$ and radius of circular loop is 1m. Find emf induced in 1s.



Watch Video Solution

665. Find the relation between current gain α and β of transistor.

A. $\beta = \dfrac{\alpha}{1 - \alpha}$

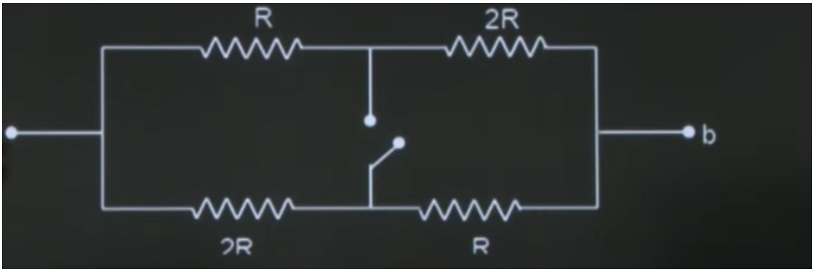
B. $\beta = \dfrac{\alpha}{1 + \alpha}$

C. $\beta = \dfrac{1 + \alpha}{\alpha}$

D. $\beta = \dfrac{1}{\alpha}$

Watch Video Solution

666. The ratio of equivalent resistance of the combined resistances when the switch is closed to switch is open is 8:x. Find value of x



A. 9

B. 4

C. 5

D. 2

Watch Video Solution

667. Equation of two SHM and $y_1 = 10\sin\left(3\pi t + \frac{\pi}{3}\right)$, $y_2 = 5\left[\sin(3\pi t) + \sqrt{3}\cos(3\pi t)\right]$. Find ratio of amplitude $\frac{A_1}{A_2}$

A. 3

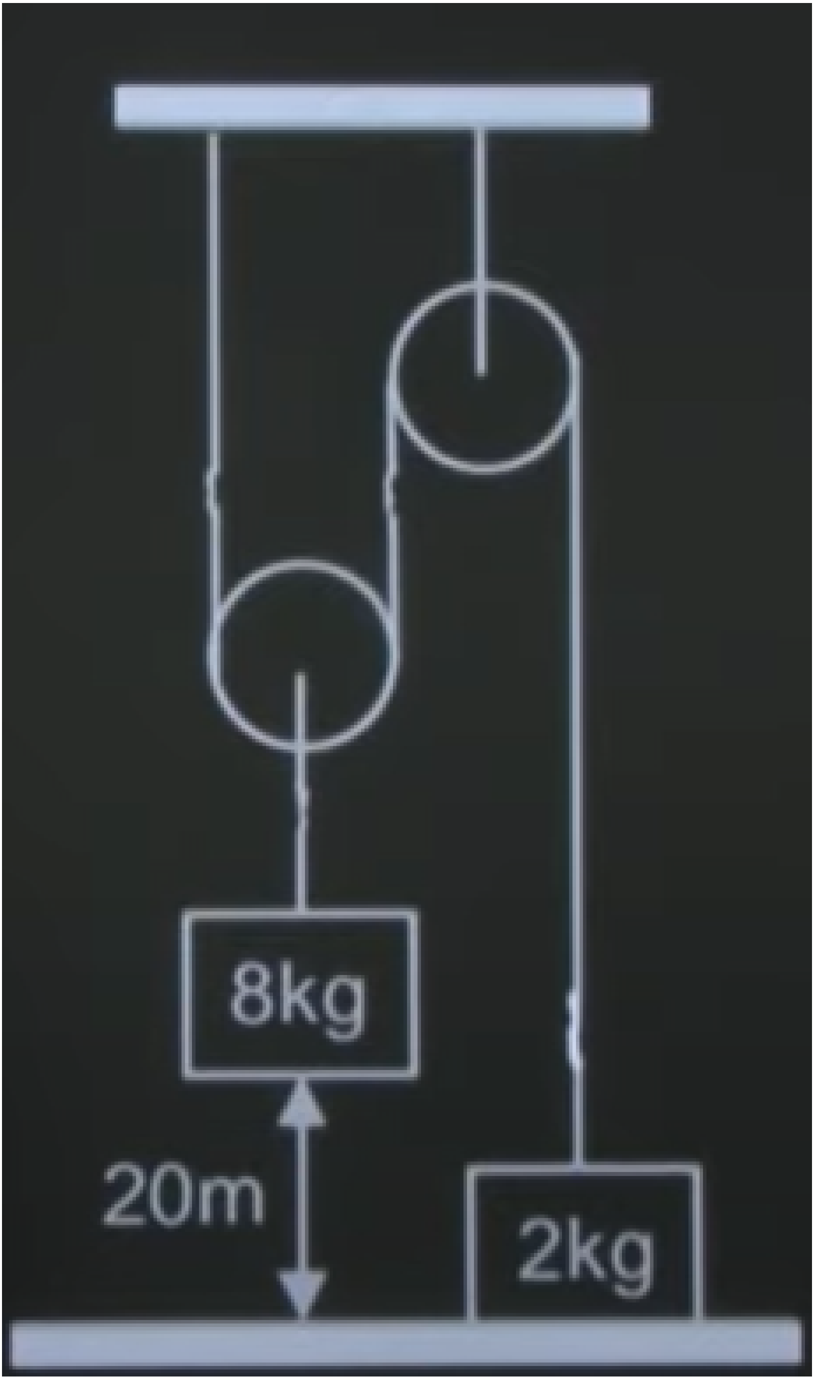
B. 2

C. 4

D. 1

Watch Video Solution

668. Find time taken by 8kg block to reach ground if initial system is at



rest.

A. 4s

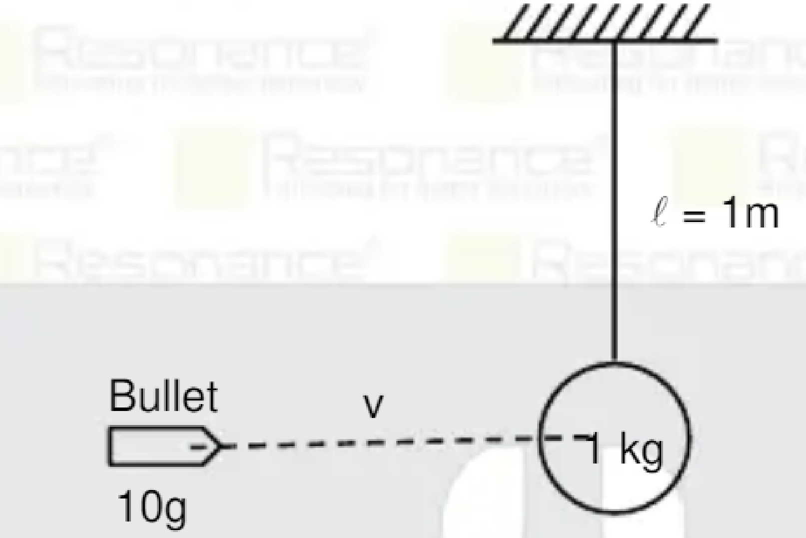
B. 3s

C. 2s

D. 6s

Watch Video Solution

669. A bullet of mass 10g travelling with velocity v collides with pendulum mass system of mass 1kg and length 1m and embedded in it as shown. Find minimum value of v so that pendulum mass undergoes complete circular motion.



Watch Video Solution

670. Water fall from height 63m. Find temperature difference of water between top and bottom position.

Watch Video Solution

671. A spherical shell of mass 50kg and radius 50m. A mass of 15kg is kept at center. Find value of gravitational potential at a distance 25m from center.

Watch Video Solution

672. What should be the length of smallest closed organ pipe which will resonate with tuning fork of frequency 250Hz?

A. 33cm

B. 25cm

C. 38cm

D. 28cm

Watch Video Solution

673. Find ratio of rms velocity of O_2 molecule to H_2 at same temperature.

A. 44287

B. 44228

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

D. 2

Watch Video Solution

674. In photoelectric experiment when wavelength of light is 642.4 nm falls on metal surface stopping potential of photo electron is 0.48eV. What will be the stoppingpotential when wavelength of light used is 474 nm?

A. 1.12 eV

B. 1.18 eV

C. 1.16eV

D. 1.10 eV

Watch Video Solution

675. In a region if electric field is 6V/m then magnetic field will be?

Watch Video Solution

676. Match the following.

Match the following

	Column (A)		Column (B)
(a)	Gas constant (R)	(p)	ML^2T^{-1}
(b)	Plank constant (h)	(q)	$ML^{-2}T^{-1}I^{-2}$
(c)	Coefficient of viscosity (η)	(r)	$ML^{-2}T^{-1}K^{-1}$
(d)	Permeability of free space (μ_0)	(s)	$ML^{-1}T^{-1}$

(1) a – r, b – p, c – s, d – q
(2) a – p, b – r, c – s, d – q
(3) a – r, b – p, c – q, d – s
(4) a – r, b – q, c – s, d – p

Watch Video Solution

677. In AC circuit, if $X_L = X_C = R$ then what is the impedance?

A. R

B. $R\sqrt{2}$

C. $R\sqrt{3}$

D. $2R$

Watch Video Solution

678. If 2% current passes through galvanometer. Shunt resistance is 5 ohms then resistance of galvanometer is what?

Watch Video Solution

679. Mass = 10kg hanging, area of cross section $100cm^2$, length 20cm, $y = 2x10^{11}$. Find total elongation.

Watch Video Solution

680. An aeroplane flies horizontally at height h with constant velocity v and drops a packet of food. The shortest distance between helicopter and person standing down when he catches the food packet?

Watch Video Solution

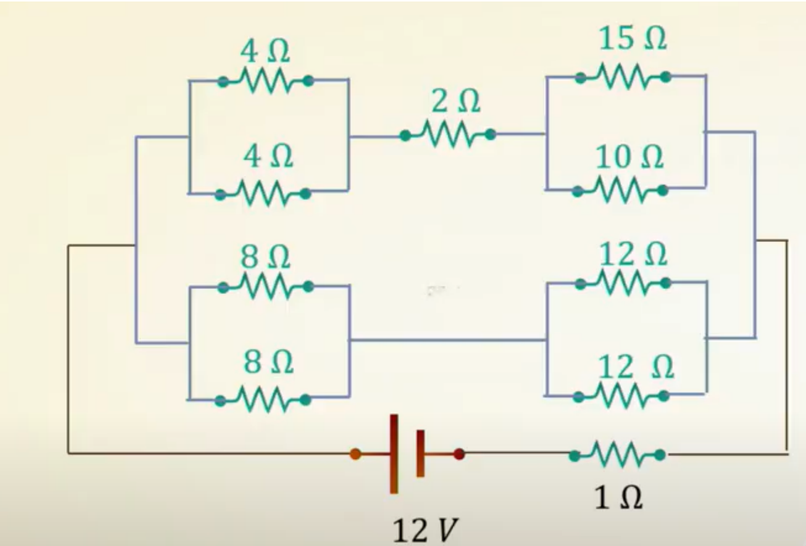
681. A particle 'A' disintegrates into other 'B' and then 'B' into 'C'. Find the graph suitable for number of atoms of B vs. time.

Watch Video Solution

682. Earth and moon centre distance is 'r'. From the mid point what should be the speed of the particle so that it can escape to infinity?

Watch Video Solution

683. Find potential across $15 ohms$ resistance.



A. 6V

B. 12V

C. 18V

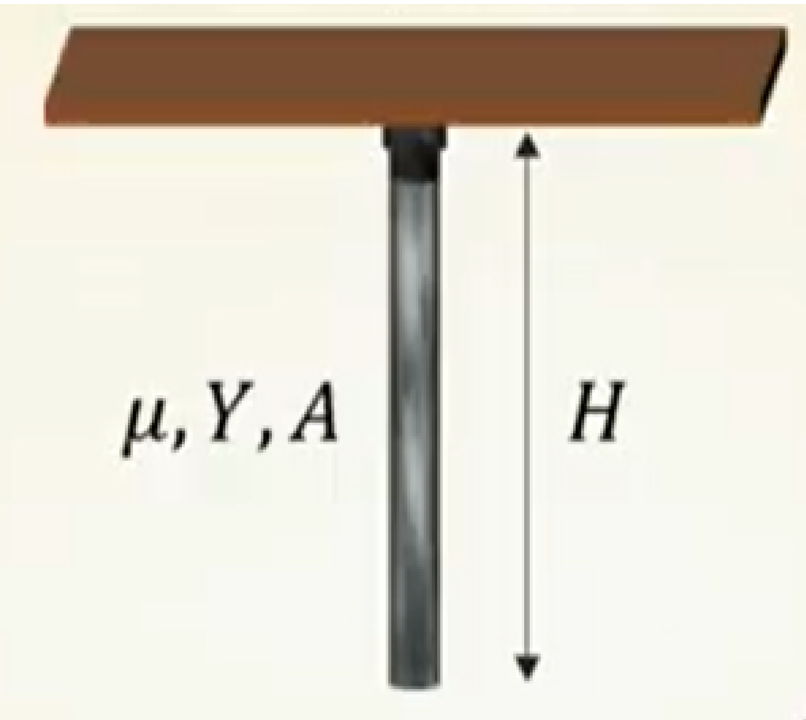
D. 3V

Watch Video Solution

684. The efficiency of carnot engine is 1/4. If the temperature of sink reduces by 58 degrees celsuis the efficiency doubles. Calculate temperature of sink.

Watch Video Solution

685. A rod of height H having mass μ is hangingvertically from ceiling. Find expansion at end of rod. Given young's modulus Y, cross section A.



A. $\frac{\mu g H}{AY}$

B. $\frac{\mu g H}{2AY}$

C. $\frac{\mu g H}{4AY}$

D. $\frac{2\mu g H}{AY}$

Watch Video Solution

686. A square loop having resistance of each side as 3 ohm each is bent to form a circle. Then, the resistance across two diametric end points is?

Watch Video Solution

687. Sum of height of transmission and carrier antenna is 160 m. Calculate maximum range.

A. 320 km

B. 640 km

C. 64 km

D. none

Watch Video Solution

688. Concave lens focal distance f, object kept at f. Find magnification and image distance.

A. $-\frac{f}{2}$

B. f

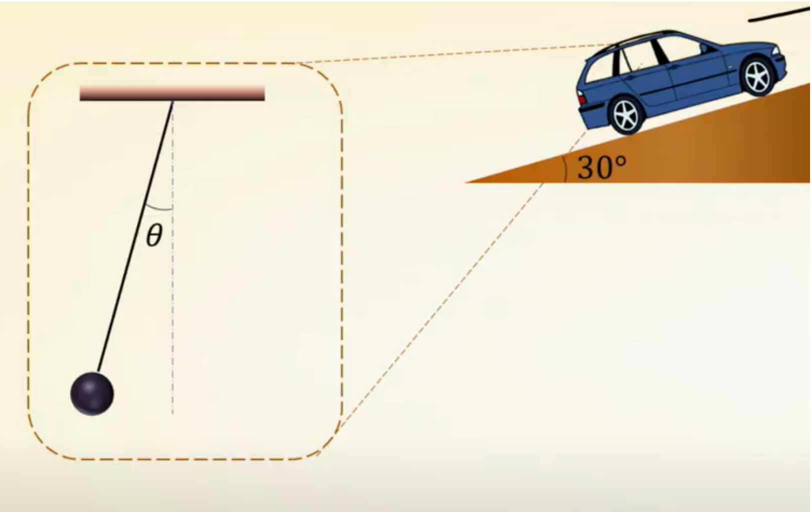
C. 4

D. infinity`

Watch Video Solution

Watch Video Solution

689. A car is going with an acceleration of $10\frac{m}{s^2}$ upwards on an inclined plane of inclination 30^0. There is a bob suspended in it. The angle θ which it makes with the vertical w.r.t ground is....



A. 45 degrees

B. 60 degrees

C. 30 degrees

D. 20 degrees

Watch Video Solution

690. A particles has velocity 40 m/s is exploded into two equal parts one with 60 m/s in same direction. The ratio of kinetic energy of individual particles after explosion is K:4, Then K is

A. 26

B. 36

C. 40

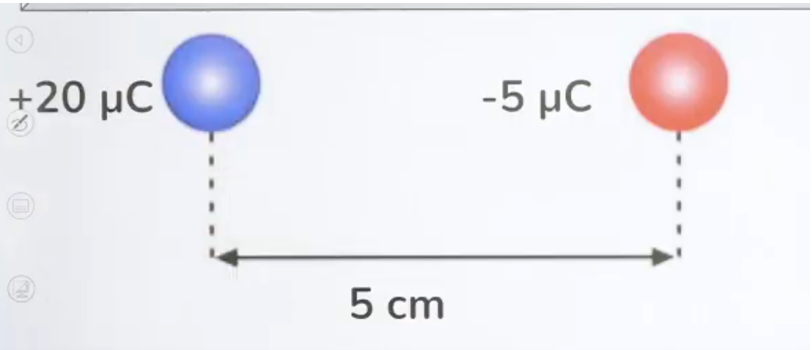
D. 15

Watch Video Solution

691. Volume decreases by 0.5% and bulk modulus is $9.8x10^{11}$. Density is $1000k\frac{g}{m^3}$, g = 9.8 m/s^2. Find depth.

Watch Video Solution

692. Two fixed charges are as shown. Where should the third charge be placed so that its in equilibrium?



A. 2.5 cm to left of $-5\mu C$

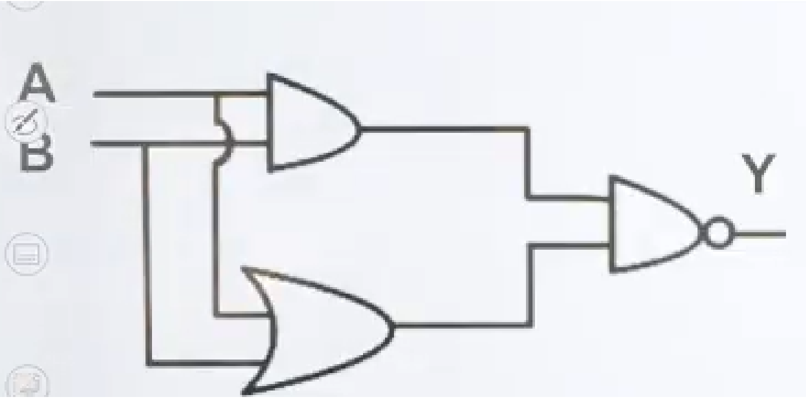
B. 10 cm to left of $+20\mu C$

C. 5 cm to right of $-5\mu C$

D. 10 cm to right of $-5\mu C$

Watch Video Solution

693. For inputs of A & B shown. What would be the truth table of the logic gates shown?



Watch Video Solution

694. A particle of mass 'M' is moving with a speed of 'v'. It collides with another particle of mass 'm'. After collision they are going at an angle of $(\theta)_1$ & $(\theta)_2$ resp. For what value of $\frac{M}{m}$, $(\theta)_1$ & $(\theta)_2$ will be equal (assume elastic collision)

A. $4(\sin)^2(\theta) - 1$

B. $4(\cos)^2(\theta) - 1$

C. $4(\text{cosec})^2(\theta) - 1$

D. $4(\sec)^2(\theta) - 1$

Watch Video Solution

695. Match the following column and select the correct option.

Column I	Column II
(a) Torque	(P) $M^1L^2T^0$
(b) Tension	(Q) $M^1L^0T^{-2}$
(c) Moment of inertia	(R) $M^1L^1T^{-2}$
(d) Surface tension	(S) $M^1L^2T^{-2}$

A. $a - S, b - P, c - R, d - Q$

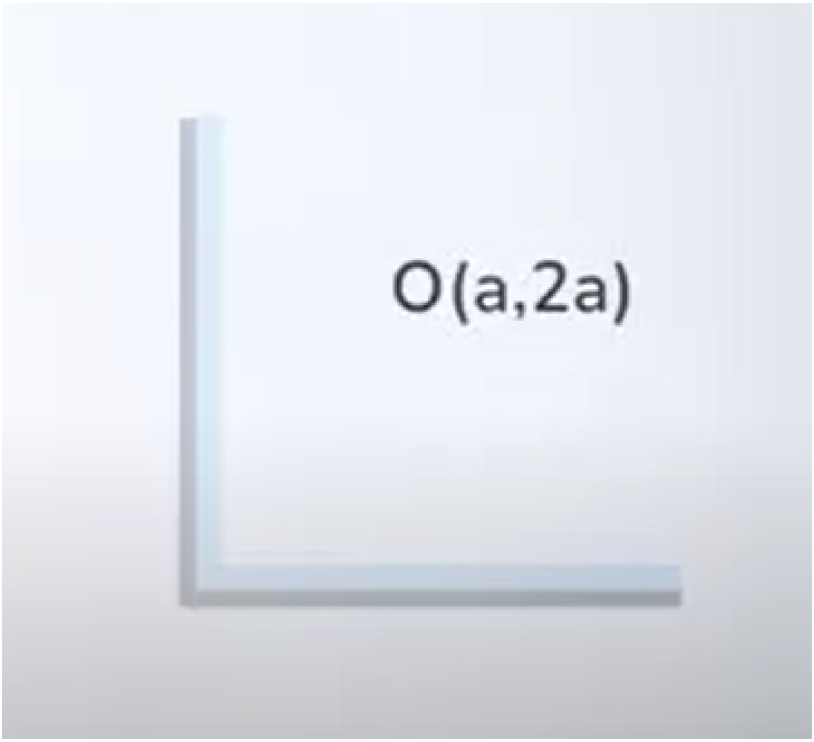
B. $a - S, b - R, c - P, d - Q$

C. $a - R, b - Q, c - S, d - P$

D. a - Q, b - P, c - R, d - S

Watch Video Solution

696. Find the shortest distance between the images. $\left(\sqrt{5} = 2.3\right)$



A. $4.6a$

B. $2.3a$

C. $2a$

D. $2\sqrt{5}a$

Watch Video Solution

697. A particle is moving in a horizontal circular motion of radius R with constant speed v, then the angular momentum of particle about the axis passing through centre is....

A. constant

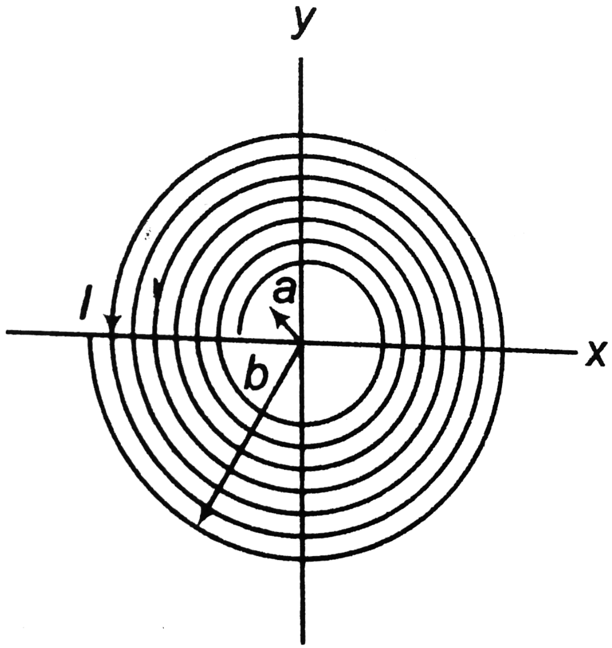
B. magnitude is varying

C. direction is varying

D. both magnitude and direction are varying

Watch Video Solution

698. A long insulated copper wire is closely wound as a spiral of N turns. The spiral has inner radius a and outer radius b. The spiral lies in the xy-plane and a steady current I flows through the wire. The$z$-component of the magetic field at the centre of the spiral is



A. $\dfrac{(\mu_0 NI)\ln\left(\frac{b}{a}\right)}{2(b - a)}$

B. $\dfrac{(\mu_0 NI)\ln\left(\frac{b+a}{b-a}\right)}{2(b - a)}$

C. $\dfrac{(\mu_0 NI)\ln\left(\frac{b}{a}\right)}{2(b)}$

D. $\dfrac{(\mu_0 NI)\ln\left(\frac{b+a}{b-a}\right)}{2(b)}$

Watch Video Solution

699. If $\left|2\vec{a}+3\vec{b}\right| = \left|3\vec{a}+\vec{b}\right|$ and angle between $\vec{a}$ and $\vec{b}$ is 60 degrees. If $\dfrac{\vec{a}}{8}$ is a unit vector. Find $\left|\vec{b}\right|$.

A. 8

B. 5

C. 3

D. 2

Watch Video Solution

700. If debroglie wavelength is same for an electron and proton, then which of the following relation is correct

A. $k_p > k_e, P_p > P_e$

B. $k_p > k_e, P_p = P_e$

C. $k_p < k_e, P_p < P_e$

D. $k_p < k_e, P_p = P_e$

Watch Video Solution

701. A particle is performing SHM with time period T. The time after which KE and PE of particle will be equal is $\frac{T}{x}$ then value of x is: (Consider t = 0 particle is at mean position and U = 0)

A. 16

B. 8

C. 4

D. 2

Watch Video Solution

702. A wire of mass density 9×10^{-4} is stretched by tension 900N is fixed at both ends. If it resonate at frequency 500Hz and 550Hz consecutively. Length of wire is ......m?

Watch Video Solution

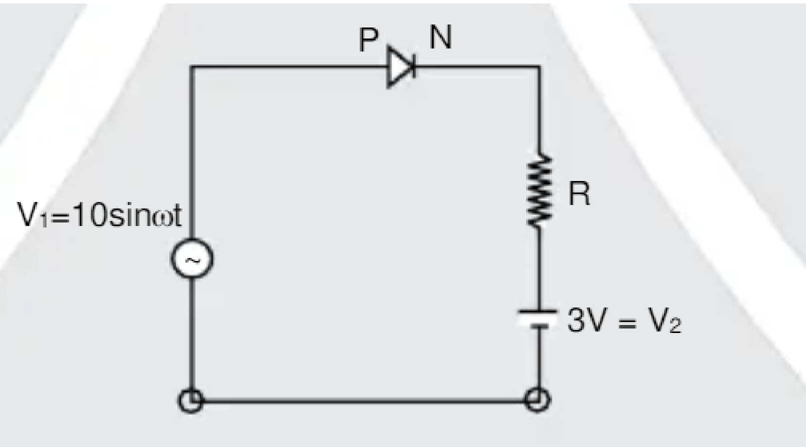
703. If for a system, dP/dV = -aP. If at pressure P_0, volume is zero, then find maximum possible temperature of system.

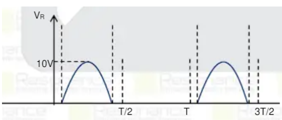
Watch Video Solution

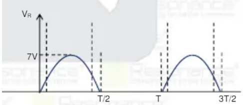
704. A car is moving on a Banked horizontal circular track of radius R with constant spped v . A particle is tied with a string from ceiling of the car. Find the angle made by string with vertical.

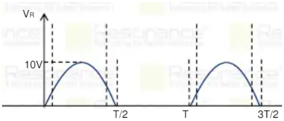
Watch Video Solution

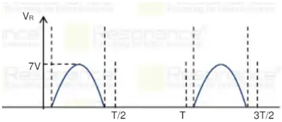
705. In given circuit, correct curve depicting voltage across resistance R, with time is?



A. 

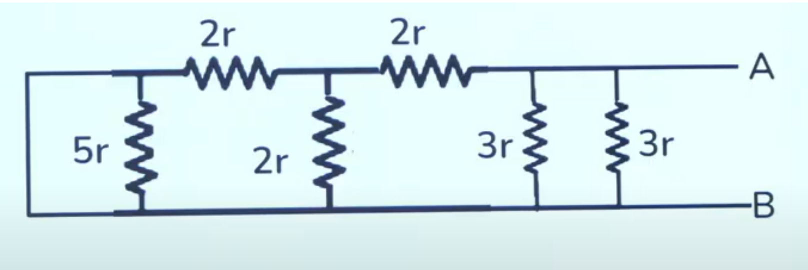
B. 

C. 

D. 

Watch Video Solution

706. Find equivalent resistance across points A and B.



A. 1R

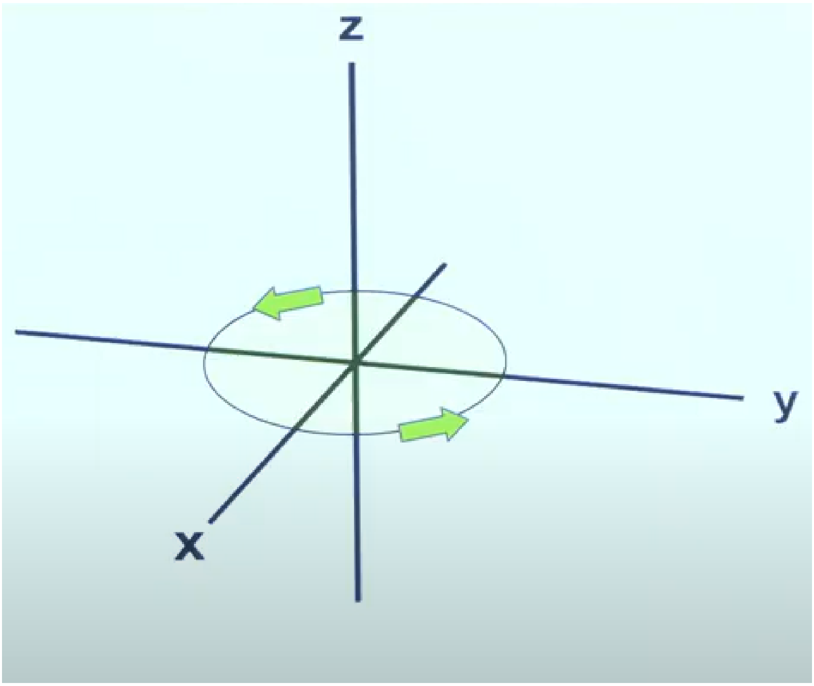
B. 3R

C. 2R

D. 4R

Watch Video Solution

707. A loop when viewed from top carries on anti-clockwise current as shown. The direction of magnetic field is



A. Along +z-axis

B. Along -z-axis

C. Along x-axis

D. Along y-axis

Watch Video Solution

708. A pendulum having length L has time period T_0 in air. When it is dipped in water having density $\frac{1}{4}th$ of density of bob. Length of pendulum is increased to $\frac{3}{4}$ times initial length. Then new time period T' is

A. $T' = T_0$

B. $T' = \frac{4T_0}{3}$

C. $T' = \frac{3T_0}{4}$

D. NONE

Watch Video Solution

709. A resistor produces 192 J/s heat when 4A current is passed through it. Find heat produced when 8A current is passed for 5secs

A. 3200J

B. 4284J

C. 3840J

D. NONE

Watch Video Solution

710. An equilateral triangle of side 10cm carries a current of 3A. Find the magnetic field at centroid of triangle.

A. $1.2x10^{-5}T$

B. $3.6x10^{-5}T$

C. $2.4x10^{-5}T$

D. $5.4x10^{-5}T$

Watch Video Solution

711. An electron of energy 2.6eV strikes an excited H-atom and gets absorbed. After that H-atom comes to ground state and a photon is released. Find the frequency of photon released.

A. $2.18x10^{15}Hz$

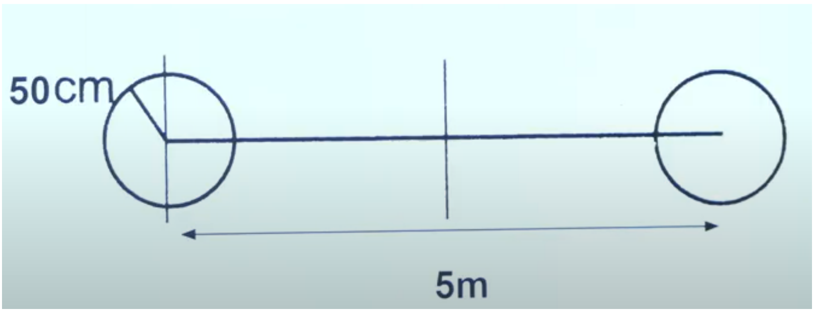
B. $4.12x10^{15}Hz$

C. $3.08x10^{15}Hz$

D. NONE

Watch Video Solution

712. Two spheres are of same mass 20kg and same radius 50cm connected of two ends of a rod of negligible mass. Find moment of inertia which is perpendicular to rod and passing through the midpoint of rod. Distance between sphere is 5m.



A. $367k\frac{g}{m^2}$

B. $728k\frac{g}{m^2}$

C. $364k\frac{g}{m^2}$

D. $734k\frac{g}{m^2}$

Watch Video Solution

713. A particle is moving along x-axis with velocity 40 m/s. It breaks into two parts in mass ratio 1:2. If speed of smaller part is 60 m/s along x-axis then find fractional changes in kinetic energy of system.

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

B. $\frac{3}{7}$

C. $\frac{1}{6}$

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

Watch Video Solution

714. If a capacitor connected to a battery is fully charged, then a dielectric (k) is inserted between plates then increase in the potential energy is

A. k times

B. k-1 times

C. $\frac{1}{k}$ times

D. k^2 times

Watch Video Solution

715. The ratio of gravitational field at depth R from earth surface to height R above surface is

A. $\sqrt{2}$

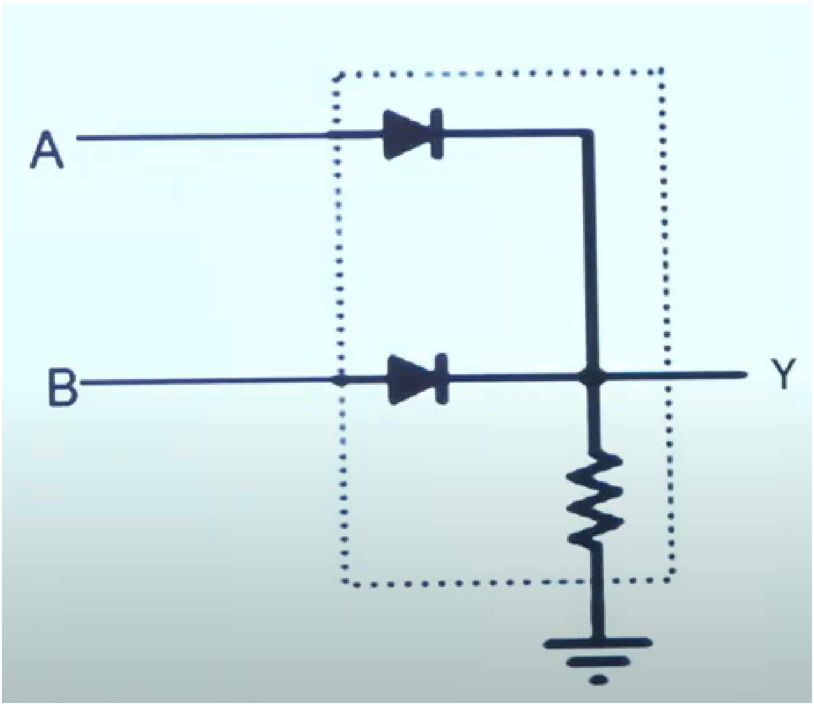
B. 0

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

D. NONE`

Watch Video Solution

716. Identify the gate



A. OR

B. NAND

C. NOR

D. AND

Watch Video Solution

717. In young's double slit experiment distance 4th bright on both side of center of screen is 2.4cm. Find frequency of light if distance between slits is 0.3m and distance of screen from slits is 1.5m.

Watch Video Solution

718. V - velocity, T - time, F - force is taken as fundamental quantities. Find dimension of mass [M].

A. $\left[FV^{-1}T^{-2}\right]$

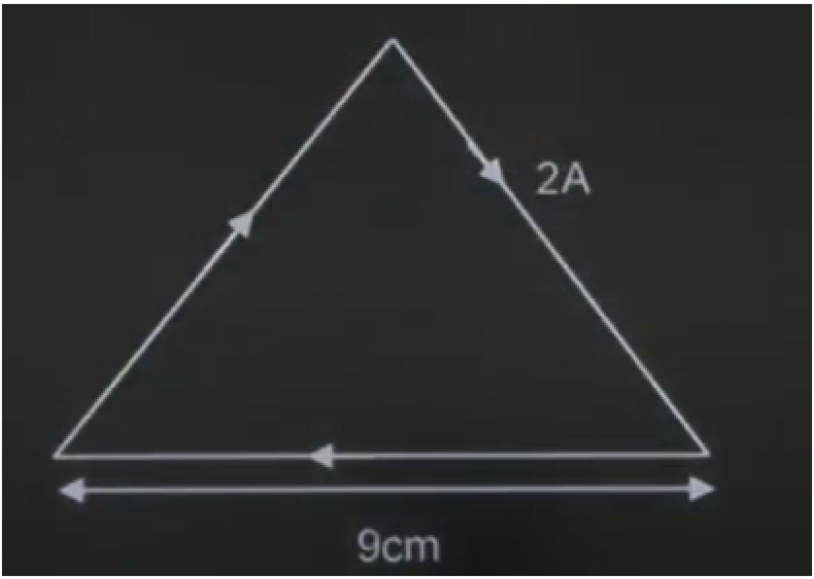
B. $\left[FV^2T^{-1}\right]$

C. $\left[FVT^{-1}\right]$

D. $\left[FV^{-1}T\right]$

Watch Video Solution

719. Magnetic field at center of an equilateral triangle of side length 9cm having current 2A is



A. $4X10^{-4}T$

B. $4X10^{-5}T$

C. $4X10^{-3}T$

D. $4X10^{-2}T$

Watch Video Solution

720. A table having four cylindrical legs of radius 50cm and 100cm(inner/outer). A mass of $50x10^3$ kg is kept on it at center of table $\left(y = 2x10^{11}\right)$. Find strain of each leg.

A. $2.65x10^7$

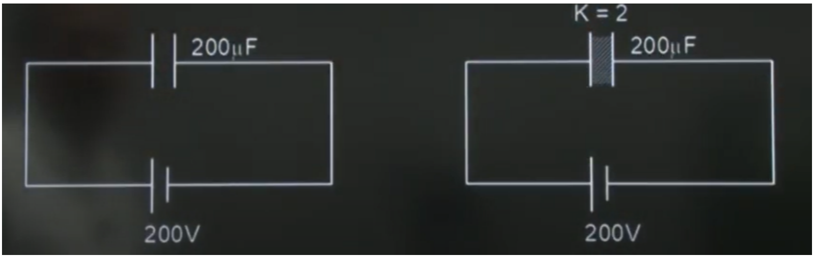
B. $2.65x10^{-7}$

C. $2.65x10^{-4}$

D. $2.65x10^4$

Watch Video Solution

721. A capacitor of capacitance $200\mu F$ is connected to a 200V battery. Dielectric material of dielectric constant 2 is introduce in between the plates of the capacitor. Find change in energy stored in the process.



A. 6J

B. 4J

C. 3J

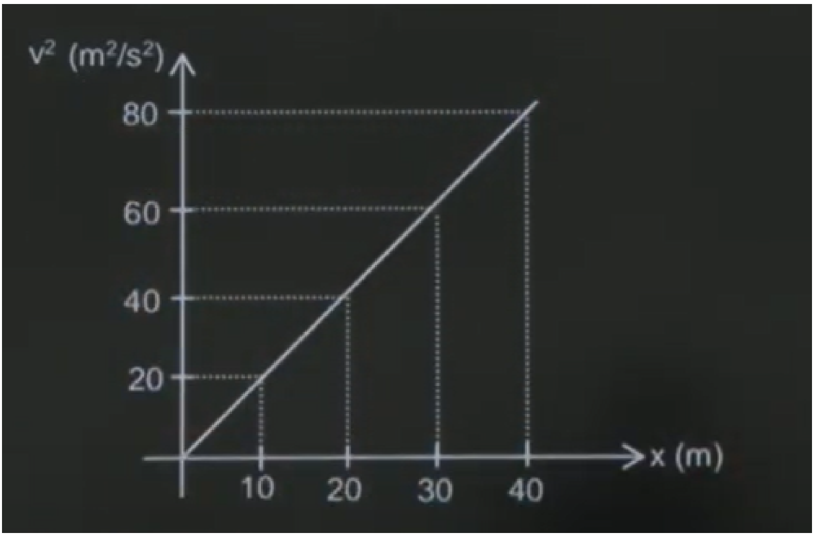
D. 2J

Watch Video Solution

722. In a circuit when current of 4A is flown in a resistance for 1sec heat produced is 192J. If the current is doubled then heat produced in 5s in same resistance is....

Watch Video Solution

723. A particle is moving in a straight line its speed depends on x as shown. The acceleration of particle is...



A. $1\frac{m}{s^2}$

B. $2\frac{m}{s^2}$

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

D. $4\frac{m}{s^2}$

Watch Video Solution

724. In an adiabatic process, volume of gas changes from $1200x10^{-6}m^3$ to $300x10^{-6}m^3$. Initial pressure of gas is 200 KPa. For the process is $\gamma = 1.5$. Find work done by gas in the process.

A. -480J

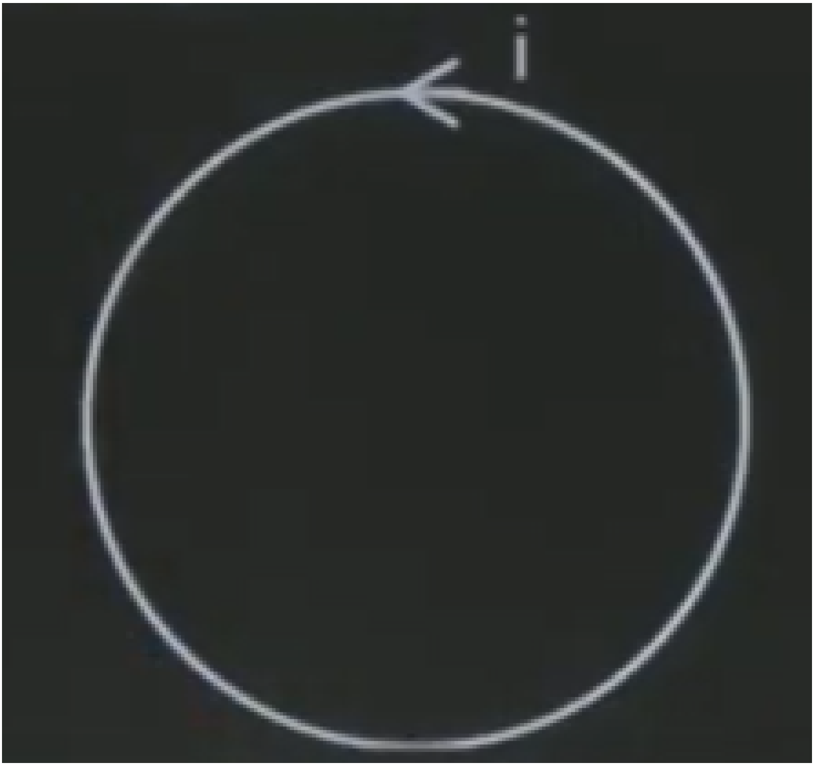
B. -280J

C. 480J

D. 280J

Watch Video Solution

725. Current is induced in a conducting loop placed in a magnetic field as shown. Choose correct option.



A. Magnetic field outward and increasing

B. Magnetic field outward and decreasing

C. Magnetic field parallel to plane of ring and increasing

D. Magnetic field parallel to plane of ring and decreasing

Watch Video Solution

726. The ratio of acceleration due to gravity at depth 'R' from the surface of planet and at height ' r' from the surface of planet where r

Watch Video Solution

727. Choose incorrect option

A. In uniform electric field, closed surface contain zero flux

B. If q is at centre in cube then same flux will passes through all faces

C. In gaussian surface if all the ield lines are entering then it mean flux pass through surface is negative

D. If electric field parallel to gaussian surface then flux is finite and non zero

Watch Video Solution

728. Statement 1: Three force $\vec{f_1}, \vec{f_2}$ and $\vec{f_3}$ are acted at vertices of a triangular body such that $\vec{f_1} + \vec{f_2} = -\vec{f_3}$ and these force are concurrent forces,

Statement 2: It explain translations equilibrium

A. Both Statements correct

B. Statement 1 incorrect and Statement 2 correct

C. Statement 2 incorrect and Statement 1 correct

D. Both Statements incorrect

Watch Video Solution

729. Choose correct alternative in SHM. (At mean position $U_i = 0$)

1. PE and KE in a SHM is always equal

2. Average PE and average KE for any time interval is same

3. Total energy is always conserved

4. Average KE and average PE is same for a time period.

A. 3,4 correct

B. 3 correct

C. 1,4 correct

D. 1,2 correct

Watch Video Solution

730. In a container of volume $1000cm^3$ there is a mixture of O_2 and H_2 at pressure of 200kPa and temperature of 300K. Determine ratio of mass of O_2 to that of H_2. If total mass of mixture is 0.76g.

A. $\frac{3}{8}$

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

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

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

Watch Video Solution

731. A varying magnetic field exist in space as follows $B = B_0\left(\frac{\hat{i} + \hat{j}}{\sqrt{2}}\right)[\cos(kz - wt)]$ two charge particles $q_1 = 4\pi$ C and $q_2 = 2\pi$ C placed at $\left(0, 0, \frac{\pi}{k}\right)$ and $\left(0, 0, 3\frac{\pi}{k}\right)$ and moving with equal velocities of $0.5c\hat{i}$ then find ratio of force on two charge at t= 0s is

A. 2

B. 4

C. 6

D. 8

Watch Video Solution

732. A vernier scale is used to measure diameter of spherical object. If 10 vernier scale division is equal to 9 main scale division and 1MSD is 1mm. The reading is such that after 8 division of main scale, 7th vernier scale division coincides with exact one division of main scale. Diameter of sphere is?

A. 4.8mm

B. 8.7mm

C. 5.7mm

D. 6.7mm

Watch Video Solution

733. Statement 1- In full wave rectifier to get steady output we need to add a capacitor parallel to load resistance.

Statement 2- In full wave rectifier to get steady output we need to add an inductor in series to load resistance

A. Both statements are true

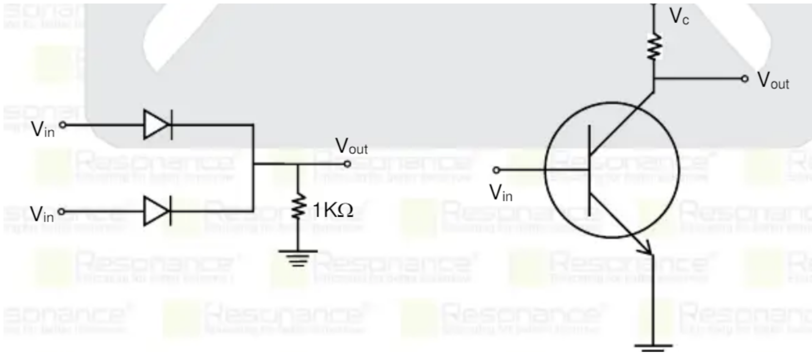
B. Statement 1 is true but 2 is false

C. Statement 1 is false but 2 is true

D. Both statements are false

Watch Video Solution

734. Identify the gate for the two circuits shown below-



A. AND, NOR

B. OR,NOT

C. AND,NOT

D. NOR,NOT

Watch Video Solution

735. Two resistances $4 \pm 0.4\Omega$ and $4 \pm 0.8\Omega$ are in parallel. Find the equivalent resistance?

A. $2 \pm 0.3\Omega$

B. $2 \pm 0.4\Omega$

C. $4 \pm 0.3\Omega$

D. $4 \pm 0.4\Omega$

Answer: A

Watch Video Solution

736. If half life of x is equal to mean life of y. Which one will decay faster?

A. x

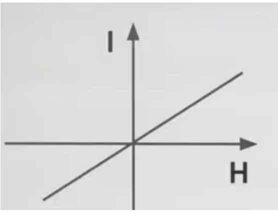
B. y

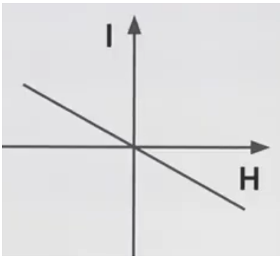
C. both at same time

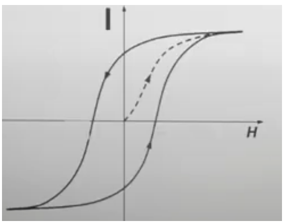
D. not enough information

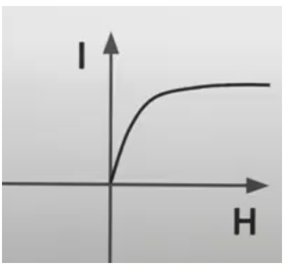
Watch Video Solution

737. The intensity of magnetization of the magnetic fields graph for a diamagnetic material is best represented by.

A. 

B. 

C. 

D. 

Watch Video Solution

738. The maximum voltages of carrier and signal are 250 mV and 150 mV resp. For amplitude modulated wave, the maximum and minimum amplitude ratio is...

A. 0.16736111111111

B. 0.044444444444444

C. 0.21041666666667

D. 0.12847222222222

Watch Video Solution

739. A resistor of 36 ohm is connected to 240V and then it is broken into 2 halves and connected to 240 V in parallel. Find ratio of power

dissipation

A. 0.0840277777777778

B. 0.0430555555555556

C. 0.0444444444444444

D. 0.167361111111111

Watch Video Solution

740. Find relative error if $y = \dfrac{mgl^3}{4bd^3\delta}$ and l = 1m, $\delta(l) = 1cm, m = 2kg$ $\Delta(m) = 1g,\ \delta = 5mm,\ \Delta(\delta) = 0.1mm,$ b= 4cm, $\Delta(b) = 1mm,$ d = 0.4 cm, $\Delta(d) = 0.1mm$ and g is errorless

A. 0.15

B. 0.0155

C. 0.83

D. 0.2

Watch Video Solution

741. Two particles are thrown with same initial speed from the same point with angles of projection42^0 and 48^0. Find relation between ranges and heights.

A. $R_1 < R_2, H_1 < H_2$

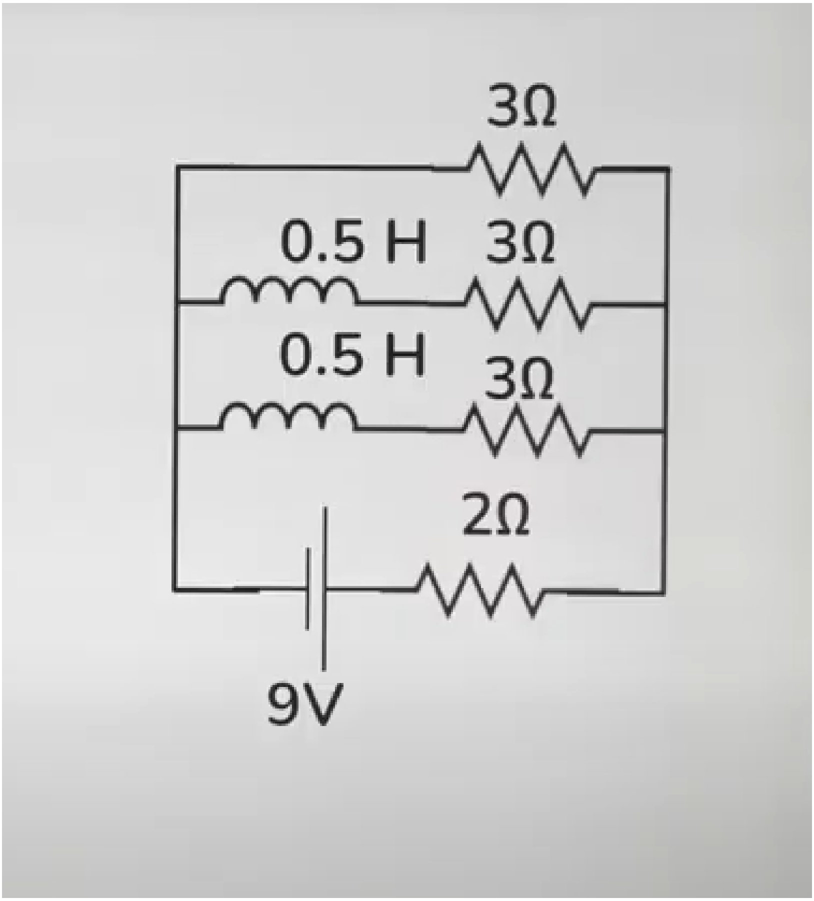
B. $R_1 > R_2, H_1 < H_2$

C. $R_1 = R_2, H_1 > H_2$

D. $R_1 = R_2, H_1 < H_2$

Watch Video Solution

742. Find the current flowing through the battery in steady state?



A. 1A

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

C. $3A$

D. $\frac{9}{11}A$

Watch Video Solution

743. An electron has been provided an accelerating voltage of 0.1V at what temperature will a nitrogen molecule have the same KE as above mention electron?

A. 2.64K

B. 464K

C. 864K

D. 1664K

Watch Video Solution

744. A particle is dropped from height h, just before striking the ground its velocity is $0.8\sqrt{gh}$. Find work done by air resistance. (assume mass to m)

A. 0.68 mgh

B. - 0.68 mgh

C. 0.32 mgh

D. -0.32 mgh

Watch Video Solution

745. An ice slab of cross section area $1cm^2$ and length 1m is being heated by a heater with resistance R=1000 OHM and current = 1A. How much time will it take to melt the slab. Given $S_{ice} = 2400\frac{J}{(kg)\cdot K}$ temperature of ice slab = -10^0C, density of ice = 10^3 kg/m , latent of ice = 330000 J/kg

A. 35.4 s

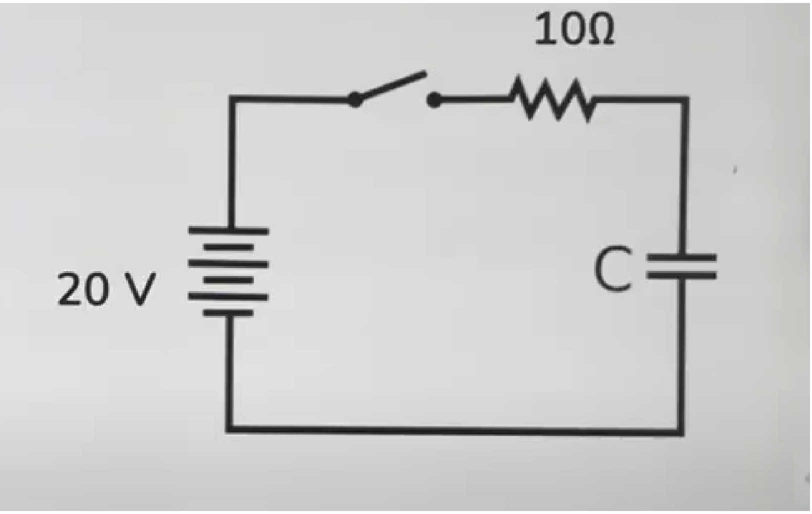
B. 45.4 s

C. 55.4 s

D. 65.4 s

Watch Video Solution

746. In the following circuit, find the capacitance of the capacitor if the potential drop across it in 10μ s is $2V$.



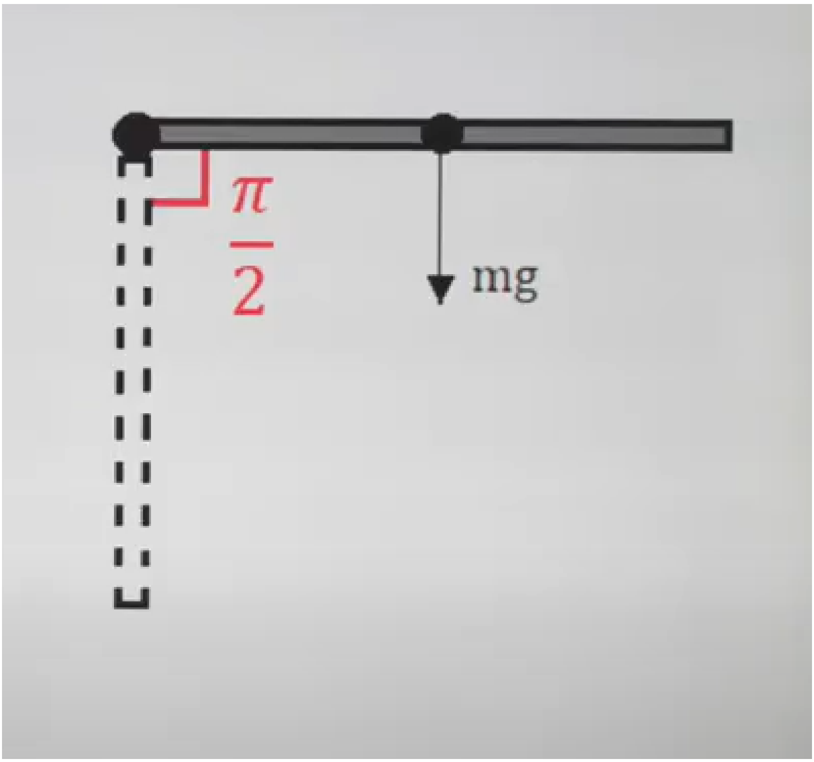
A. $9.5\mu F$

B. $45\mu F$

C. $195 \mu F$

D. $295 \mu F$

Watch Video Solution

747. A rod is released from the horizontal position as shown. It is free to rotate about hinge. Find angular velocity of rod when it become vertical? 

A. $W=\sqrt{\frac{3g}{2l}}$

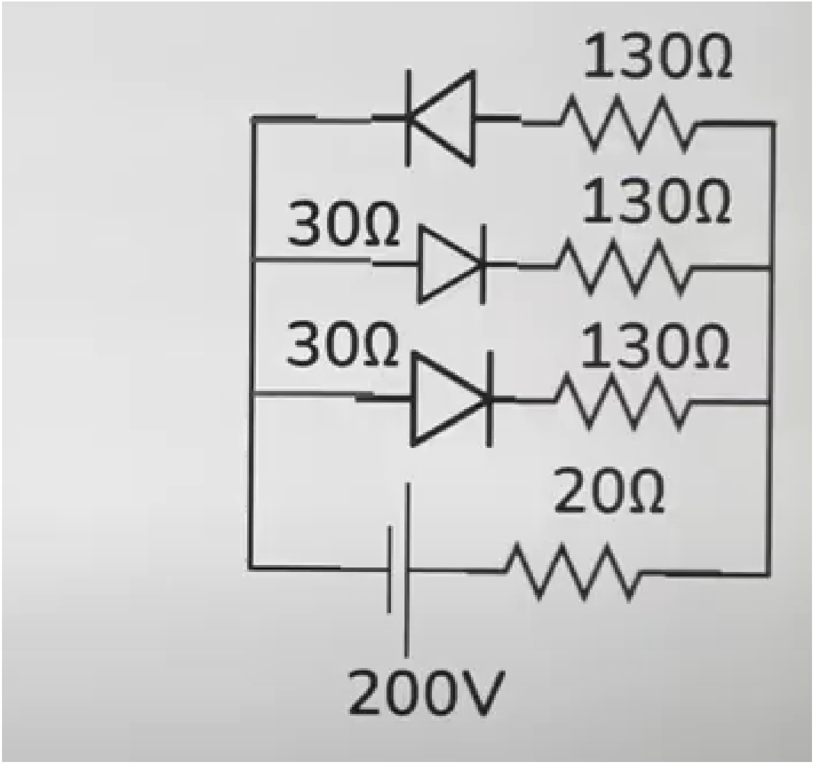
B. $W=\sqrt{\frac{3g}{l}}$

C. $W=\sqrt{\frac{2g}{3l}}$

D. NONE

Watch Video Solution

748. Find current through battery when switch is closed.



Watch Video Solution

749. In space electric field is given by $\vec{E} = 150y^2 J\frac{N}{C}$. A cube of side 0.5m is placed with one corner at origin along + y axis. Find charge enclosed inside cube:

A. $3.8x10^{-11}C$

B. $16.6x10^{-11}C$

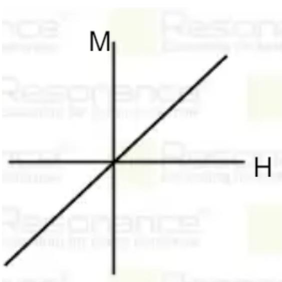
C. $8.3x10^{-10}C$

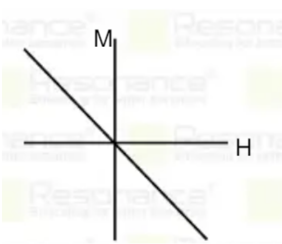
D. $8.3x10^{-11}C$

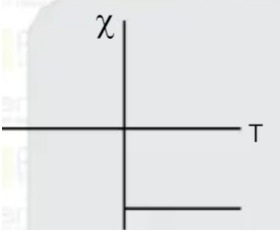
Answer: D

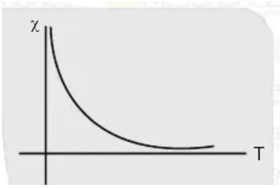
Watch Video Solution

750. Which one is correct for diamagnetic material?

A. 

B. 

C. 

D. 

Watch Video Solution

751. De-broglie's wavelength of an electron gas at 300K is xA^0 then x is...

Watch Video Solution

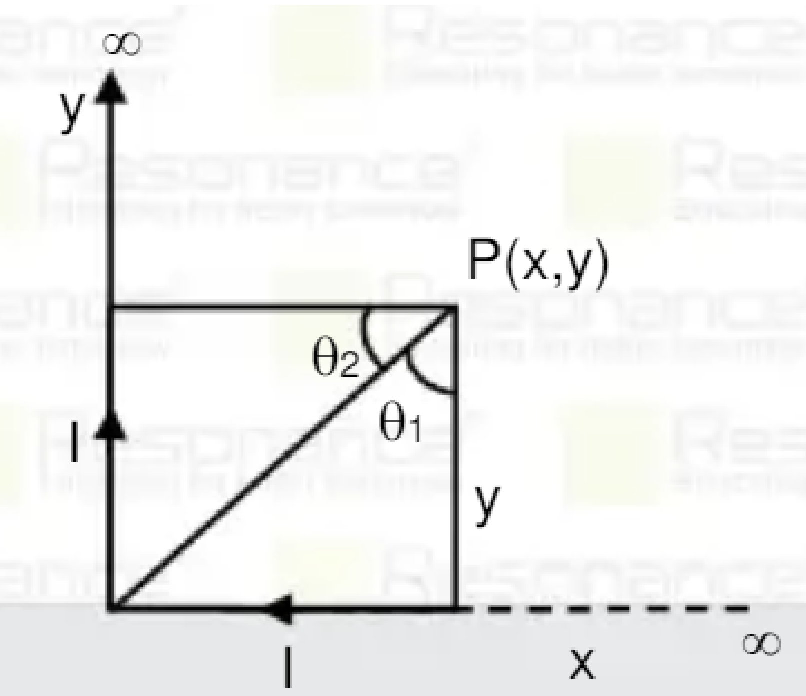
752. Electromagnetic wave in a medium of $\mu_r = 1$ is given as $E = 20\sin\left(20x10^{10} - 20x10^2x\right)$. Dielectric constant of medium is $\frac{1}{x}$ then find x

Watch Video Solution

753. In an amplitude modulation, amplitude of carrier wave is 250mV and amplitude of message signal is 150mV. If $\frac{A_{MAX}}{A_{MIN}} = \frac{X}{50}$ then find x...

Watch Video Solution

754. Find magnetic induction at P due to wire:



Watch Video Solution

755. In a YDSE ratio of slit width is 1:9. If $\frac{I_{MAX}}{I_{MIN}} = \frac{X}{4}$ then find x?

Watch Video Solution

756. An electron accelerated through a potential difference of 0.1V from rest attains a KE (KE_e) also there is a molecule of nitrogen gas having temperature 300K and KE (KE_{N_2}). Find $\frac{KE_e}{KE_{N_2}}$

A. 1.5

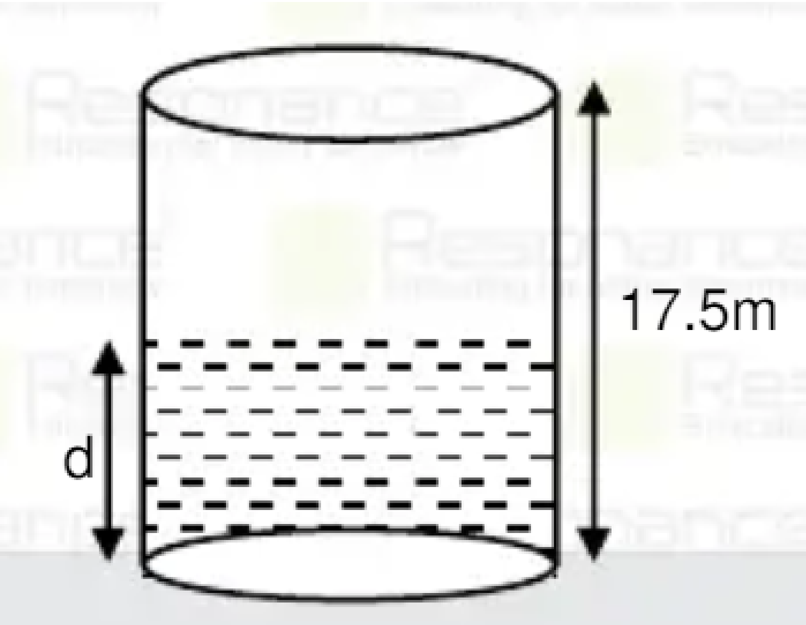
B. 2

C. 2.5

D. 1

Watch Video Solution

757. Find height of liquid in container when observer in air observes that height of liquid is half of actual height of cylinder.



A. 12 cm

B. 11.7 cm

C. 22.8 cm

D. none

Watch Video Solution

758. A capacitor is connected to a 20V battery and 10 ohm resistance. The potential difference across the capacitor rises from 0V to 2V in $10\mu s$. Find capacitance of capacitor (given $\ln\left(\frac{10}{9}\right) = 0.105$)

A. $9.5\mu F$

B. $12\mu F$

C. $14.5\mu F$

D. $15\mu F$

Watch Video Solution

759. Half life of A is same as that of mean life of B

A. A will decay faster than B

B. B will decay faster than A

C. Both will decay with same rate

D. Initial decay rate is same then both will decay with different rate

Watch Video Solution

760. Three moles of a monoatomic gas is subjected to a rise of temperature 400K under isobaric process. If ratio of increase in internal energy and work done by gas is $\frac{x}{10}$ then find x...

A. 10

B. 15

C. 25

D. 28

Answer: B

Watch Video Solution

SECTION-A

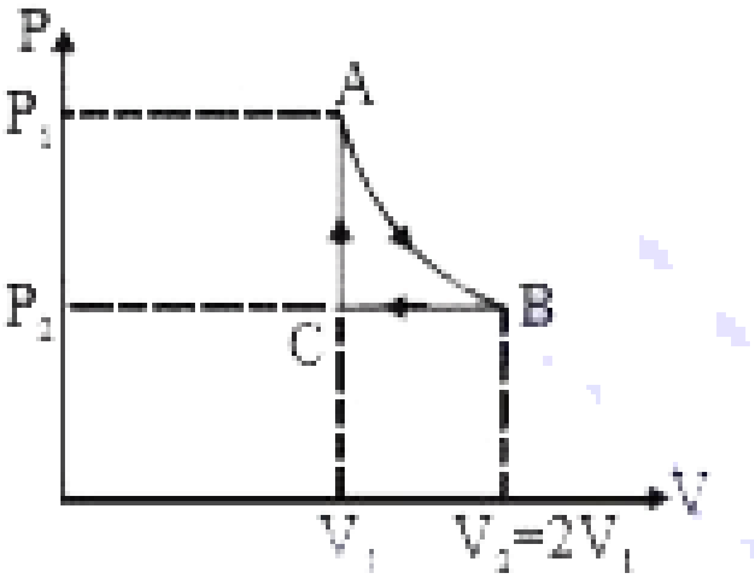
1. n mole a perfect gas undergoes a cyclic process ABCA (see figure) consisting of the following processes.

$A \rightarrow B$: Isothermal expansion at temperature T so that the volume is doubled from V_1 to $V_2 = 2V_1$ and pressure changes from P_1 to P_2

$B \rightarrow C$: Isobaric compression at pressure P_2 to initial volume V_1

$C \rightarrow A$: Isochoric change leading to change of pressure from P_2 toP_1 .

Total work done in the complete cycle ABCA is :



A. 0

B. $nRT\left(\ln 2+\frac{1}{2}\right)$

C. $nRT\ln 2$

D. $nRT\left(\ln 2-\frac{1}{2}\right)$

Answer: D

Watch Video Solution

2. The focal length f is related to the radius of curvature r of the spherical convex mirror by

A. $f = +\frac{1}{2}r$

B. $f = -r$

C. $f = -\frac{1}{2}r$

D. $f = r$

Answer: A

Watch Video Solution

3. In a Young's double slit experiment, the width of the one of the slit is three times the other slit. The amplitude of the light coming from a slit is proportional to the slit-width. Find the ratio of the maximum to the minimum intensity in the interference pattern.

A. $1:4$

B. $3:1$

C. $4:1$

D. $2:1$

Answer: C

Watch Video Solution

4. Two stars of masses m and 2m at a distance d rotate about their common centre of mass in free space. The period of revolution is :

A. $\frac{1}{2\pi}\sqrt{\frac{d^3}{3Gm}}$

B. $2\pi\sqrt{\frac{d^3}{3Gm}}$

C. $\frac{1}{2\pi}\sqrt{\frac{3Gm}{d^3}}$

D. $2\pi\sqrt{\frac{3Gm}{d^3}}$

Answer: B

Watch Video Solution

5. A current through a wire depends on time as $i = \alpha_0 t + \beta t^2$ where $\alpha_0 = 20A/s$ and $\beta = 8As^{-2}$. Find the charge crossed through a section of the wire in 15 s.

A. 2250 C

B. 11250 C

C. 2100 C

D. 260 C

Answer: B

Watch Video Solution

6. Moment of inertia (M.I.) of four bodies, having same mass and radius, are reported as ,

I_1 = M.I. of thin circular ring about its diameter.

I_2 = M.I. of circular disc about an axis perpendicular to the disc and going through the centre,

I_3 = M.I. of solid cylinder about its axis and

I_4 = M.I. of solid sphere about its diameter. Then :

A. $I_2 + I_3 < I_2 + I_4$

B. $I_1 + I_2 = I_3 + \frac{5}{2} I_4$

C. $I_1 = I_2 = I_3 > I_4$

D. $I_1 = I_2 = I_3 < I_4$

Answer: C

Watch Video Solution

7. Given below are two statements :

Statement-I : Two photons having equal linear momentum have equal wavelengths.

Statement-II : If the wavelength of photon is decreased, then the momentum and energy of a photon will also decrease.

In the light of the above statements, choose the correct answer from the options given below.

A. Both Statement I and Statement II are true

B. Statement I is false but Statement II is true

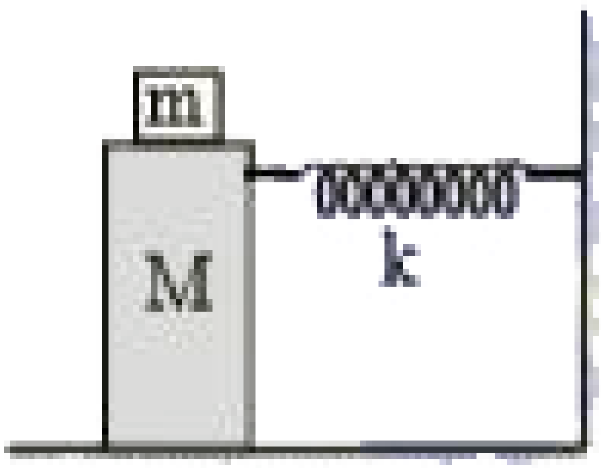
C. Both Statement I and Statement II are false

D. Statement I is true but Statement II is false

Answer: D

Watch Video Solution

8. In the given figure, a mass M is attached to a horizontal spring which is fixed on one side to a rigid support. The spring constant of the spring is k. The mass oscillates on a frictionless surface with time period T and amplitude A. When the mass is in equilibrium position, as shown in the figure, another mass m is gently fixed upon it. The new amplitude of oscillation will be :



A. $A\sqrt{\frac{M-m}{M}}$

B. $A\sqrt{\frac{M}{M+m}}$

C. $A\sqrt{\frac{M+m}{M}}$

D. $A\sqrt{\frac{M}{M - m}}$

Answer: B

Watch Video Solution

9. If Y, K and η are the values of Young's modulus, bulk modulus and modulus of rigidity of any material respectively. Choose the correct relation for these parameters.

A. $Y = \frac{9K\eta}{3K - \eta} N/m^2$

B. $\eta = \frac{3YK}{9K + Y} N/m^2$

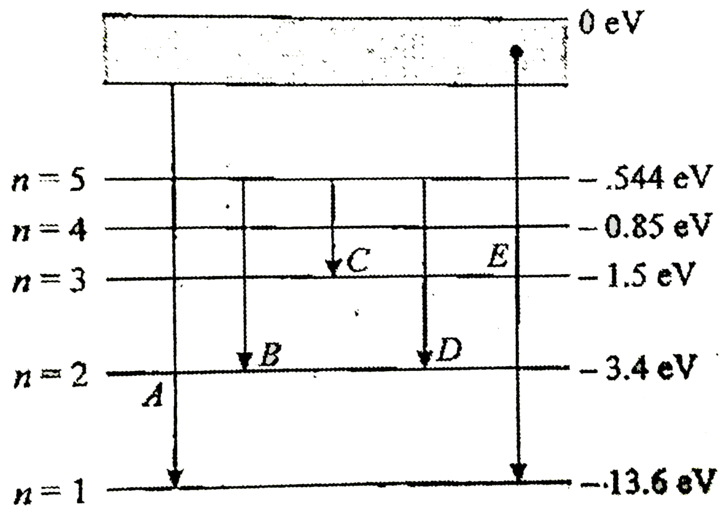
C. $Y = \frac{9K\eta}{2\eta + 3K} N/m^2$

D. $K = \frac{Yn}{9\eta - 3Y} N/m^2$

Answer: D

Watch Video Solution

10. In the following figure the energy levels of hydroge atom have been shown along with some transitions marked A, B,C,D and E.The transitionsy A,B and C respectively represent:



A. The ionization potential of hydrogen, second member of Balmer series and third member of Paschen series.

B. The first member of the Lyman series, third member of Balmer series and second member of Paschen series.

C. The series limit of Lyman series, third member of Balmer series and second member of Paschen series.

D. The series limit of Lyman series, second member of Balmer series and second member of Paschen series.

Answer: C

Watch Video Solution

11. Four identical particles of equal masses 1kg made to move along the circumference of a circle of radius 1 m under the action of their own mutual gravitational attraction. The speed of each particle will be :

A. $\sqrt{\frac{5}{2}\left(1+2\sqrt{2}\right)}$

B. $\sqrt{G\left(1+2\sqrt{2}\right)}$

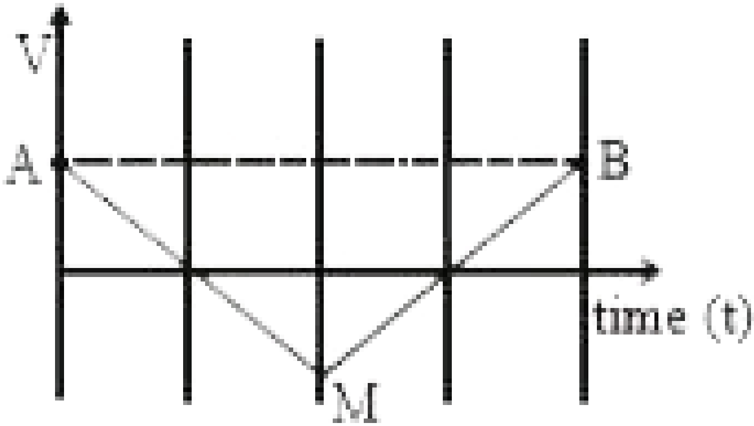
C. $\sqrt{\frac{G}{2}\left(2\sqrt{2}-1\right)}$

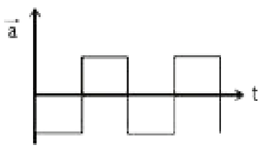
D. $\sqrt{\frac{\left(1+2\sqrt{2}\right)G}{2}}$

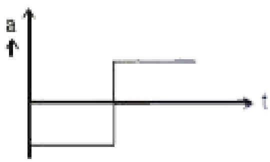
Answer: D

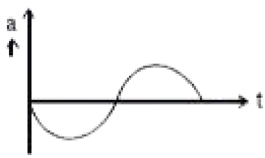
Watch Video Solution

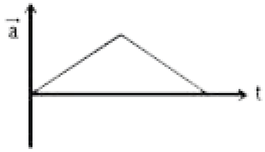
12. If the velocity-time graph has the shape AMB, what would be the shape of the corresponding acceleration-time graph ?



A. 

B. 

C. 

D. 

Answer: B

Watch Video Solution

13. Two equal capacitors are first connected in series and then in parallel. The ratio of the equivalent capacities in the two cases will be:

A. $4:1$

B. $2:1$

C. $1:4$

D. $1:2$

Answer: C

Watch Video Solution

14. If an emitter current is changed by 4 mA, the collector current changes by 3.5 mA. The value of β will be :

A. 7

B. 0.5

C. 0.875

D. 3.5

Answer: A

Watch Video Solution

15. Match List-I with List-II:

List-I	List-II
(a) Isothermal	(i) Pressure constant
(b) Isochoric	(ii) Temperature constant
(c) Adiabatic	(iii) Volume constant
(d) Isobaric	(iv) Heat content is constant

Watch Video Solution

16. Each side of a box made of metal sheet in cubic shape is 'a' at room temperature 'T', the coefficient of linear expansion of the metal sheet is 'α'. The metal sheet is heated uniformly, by a small temperature ΔT, so that its new temperature is $T + \Delta T$. Calculate the increase in the volume of the metal box.

A. $3a^3\alpha\Delta T$

B. $4a^2\alpha\Delta T$

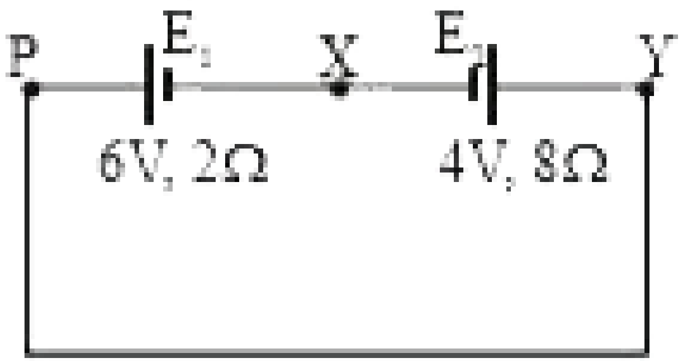
C. $4\pi a \wedge 3\alpha\Delta T$

D. $\frac{4}{3}\pi a^3\alpha\Delta T$

Answer: A

Watch Video Solution

17. A cell E_1 of emf 6V and internal resistance 2Ω is connected with another cell E_2 of emf 4V and internal resistance 8Ω (as shown in the figure). The potential difference across points X and Y is :



A. 10.0 V

B. 3.6 V

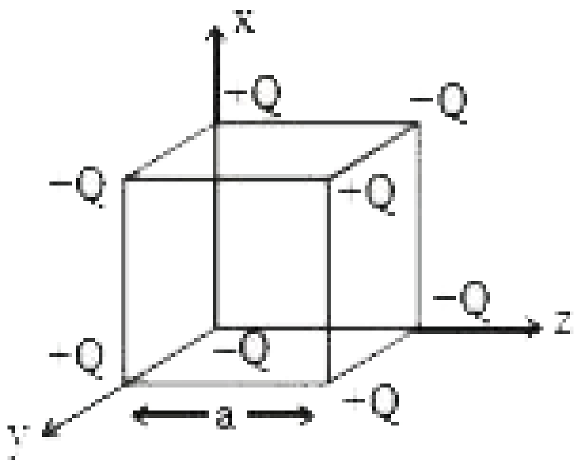
C. 5.6V

D. 2.0 V

Answer: C

Watch Video Solution

18. A cube of side 'a' has point charges +Q located at each of its vertices except at the origin where the charge is -Q. The electric field at the centre of cube is :



A. $\dfrac{-Q}{3\sqrt{3}\pi\varepsilon_0 a^2}\left(\hat{x}+\hat{y}+\hat{z}\right)$

B. $\dfrac{-2Q}{3\sqrt{3}\pi\varepsilon_0 a^2}\left(\hat{x}+\hat{y}+\hat{z}\right)$

C. $\dfrac{2Q}{3\sqrt{3}\pi\varepsilon_0 a^2}\left(\hat{x}+\hat{y}+\hat{z}\right)$

D. $\dfrac{Q}{3\sqrt{3}\pi\varepsilon_0 a^2}\left(\hat{x}+\hat{y}+\hat{z}\right)$

Answer: B

Watch Video Solution

19. Consider two satellites S_1 and S_2 with periods of revolution 1 hr. and 8hr. respectively revolving around a planet in circular orbits. The ratio of angular velocity of satellite S_1 to the angular velocity of satellites S_2 is:

A. $8:1$

B. $1:4$

C. $2:1$

D. $1:8$

Answer: A::C

Watch Video Solution

20. The workdone by a gas molecule in an isolated system is given by, $W = \alpha\beta^2 e^{-\frac{x^2}{\alpha kT}}$, where x is the displacement, k is the Boltzmann constant and T is the temperature, α and β are constants. Then the dimension of B will be :

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

B. $\left[MLT^{-2}\right]$

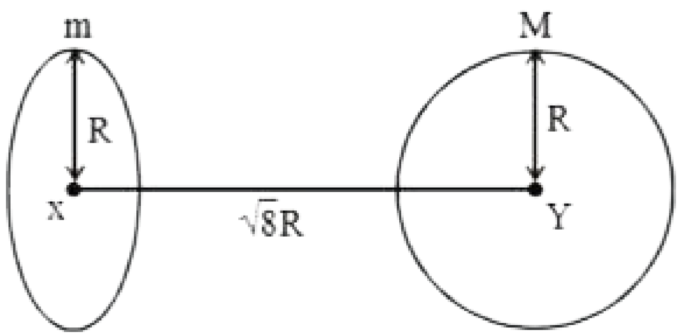
C. $M^2LT^2\right]$

D. $\left[M^0LT^0\right]$

Answer: B

Watch Video Solution

21. Find the gravitational force of attraction between the ring and sphere as shown in the diagram, where the plane of the ring is perpendicular to the line joining the centres. If $\sqrt{8}R$ is the distance between the centres of a ring (of mass 'm') and a sphere (mass "M") where both have equal radius "R'



A. $\frac{\sqrt{8}}{9} \cdot \frac{GmM}{R}$

B. $\frac{2\sqrt{2}}{3} \cdot \frac{GMm}{R^2}$

C. $\frac{1}{3\sqrt{8}} \cdot \frac{GMm}{R^2}$

D. $\frac{\sqrt{8}}{27} \cdot \frac{GmM}{R^2}$

Answer: D

22. Consider the combination of 2 capacitors C_1 and C_2 with $C_2 > C_1$, when connected in parallel, the equivalent capacitance is $\frac{15}{4}$ time the equivalent capacitance of the same connected in series. Calculate the ratio of capacitors, $\frac{C_2}{C_1}$

A. $\frac{15}{11}$

B. $\frac{111}{80}$

C. $\frac{29}{15}$

D. $\frac{15}{4}$

Answer: B

23. In a typical combustion engine the work done by a gas molecule is given $W = \alpha^2 \beta e^{\frac{-\beta x^2}{kT}}$ where x is the displacement, k is the Boltzmann constant and T is the temperature. If α and β are constants, dimensions of α will be:

A. $\left[MLT^{-2}\right]$

B. $\left[M^0 L T^0\right]$

C. $\left[M^2 L T^{-2}\right]$

D. $\left[MLT^{-1}\right]$

Answer: B

Watch Video Solution

24. If λ_1 and λ_2 , are the wavelengths of the third member of Lyman and first member of the Paschen series respectively, then the value of $\lambda_1 : \lambda_2$ is:

A. $1:9$

B. $7:108$

C. $7:135$

D. $1:3$

Answer: C

Watch Video Solution

25. A short straight object of height 100 cm lies before the central axis of a spherical mirror whose focal length has absolute value |f| = 40cm. The image of object produced by the mirror is of height 25 cm and has the same orientation of the object. One may conclude from the information:

A. Image is real, same side of concave mirror.

B. Image is virtual, opposite side of concave mirror.

C. Image is real, same side of convex mirror.

D. Image is virtual, opposite side of convex mirror.

Answer: D

Watch Video Solution

26. Assume that a tunnel is dug along a chord of the earth, at a perpendicular distance $(R/2)$ from the earth's centre, where 'R' is the radius of the Earth. The wall of the tunnel is frictionless. If a particle is released in this tunnel, it will execute a simple harmonic motion with a time period :

A. $\frac{2\pi R}{g}$

B. $\frac{g}{2\pi r}$

C. $\frac{1}{2\pi}\sqrt{\frac{g}{r}}$

D. $2\pi\sqrt{\frac{R}{g}}$

Answer: D

Watch Video Solution

27. An alternating current is given by the equation $i = i_1 \sin\omega t + i_2 \cos\omega t$.

The rms current will be

A. $\frac{1}{\sqrt{2}}\left(i_1^2 + i_2^2\right)^{\frac{1}{2}}$

B. $\frac{1}{\sqrt{2}}\left(i_1 + i_2\right)^2$

C. $\frac{1}{2}\left(i_1^2 + i_2^2\right)^{\frac{1}{2}}$

D. $\frac{1}{\sqrt{2}}\left(i_1 + i_2\right)$

Answer: A

Watch Video Solution

28. A material has normal density ρ and bulk modulus K. The increase in the density of the material when it is subjected to an external pressure P from all sides is

A. $\frac{\rho K}{P}$

B. $\frac{\rho P}{K}$

C. $\frac{K}{\rho P}$

D. $\frac{PK}{\rho}$

Answer: B

Watch Video Solution

29. A particle is moving with uniform speed along the circumference of a circle of radius R under the action of a central fictitious force F which is inversely proportional to R^3. its time period of revolution will be given by :

A. $T \propto R^2$

B. $T \propto R^{\frac{3}{2}}$

C. $T \propto R^{\frac{5}{2}}$

D. $T \propto R^{\frac{4}{3}}$

Answer: A

Watch Video Solution

30. A planet revolving in elliptical orbit has :

(A) a constant velocity of revolution.

(B) has the least velocity when it is nearest to the sun

(C) its areal velocity is directly proportional to its velocity

(D) areal velocity is inversely proportional to its velocity (E) to follow a trajectory such that the areal velocity is constant

Choose the correct answer from the options given below:

A. A only

B. D only

C. C only

D. E only

Answer: D

Watch Video Solution

31. Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A : Body "P" having mass M moving with speed 'u" has head-on collision elastically with another body 'Q' having mass 'm' initially at rest. If $M > \; > m$, body Q will have a maximum speed equal to "2u' after collision

Reason R : During elastic collision, the momentum and kinetic energy are both conserved.

In the light of the above statements, choose the most appropriate answer from the options given below:

A. A is not correct but R is correct.

B. Both A and R are correct but R is NOT the correct explanation of A.

C. Both A and R are correct and R is the correct explanation of A

D. A is correct but R is not correct.

Answer: C

Watch Video Solution

32. Four identical solid spheres each of mass 'm' and radius 'a' are placed with their centres on the four corners of a square of side 'b'. The moment of inertia of the system about one side of square where the axis of rotation is parallel to the plane of the square is :

A. $\frac{4}{5}ma^2 + 2mb^2$

B. $\frac{8}{5}ma^2 + mb^2$

C. $\frac{8}{5}ma^2 + 2mb^2$

D. $\frac{4}{5}ma^2$

Answer: C

Watch Video Solution

33. In a Young's double slit experiment two slits are separated by 2 mm and the screen is placed one meter away. When a light of wavelength 500 nm is used, the fringe separation will be:

A. 0.25 mm

B. 0.50 mm

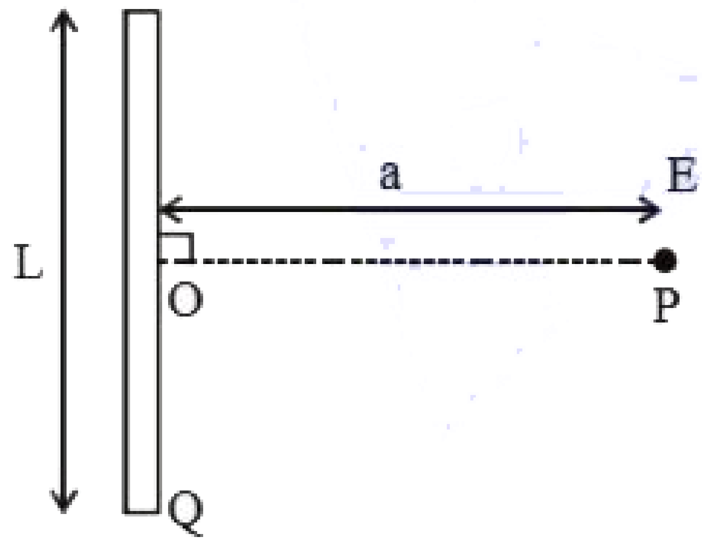
C. 0.75 mm

D. 1 mm

Answer: A

Watch Video Solution

34. Find the electric field at point P (as shown in figure) on the perpendicular bisector of a uniformly charged thin wire of length L carrying a charge Q. The distance of the point P from the centre of the rod is a $= \frac{\sqrt{3}}{2}L.$



A. $\frac{\sqrt{3}Q}{4\pi\varepsilon_0 L^2}$

B. $\frac{Q}{3\pi\varepsilon_0 L^2}$

C. $\frac{Q}{2\sqrt{3}\pi\varepsilon_0 L^2}$

D. $\frac{Q}{4\pi\varepsilon_0 L^2}$

Answer: C

Watch Video Solution

35. If two similar springs each of spring constant K_1 are joined in series, the new spring constant and time period would be changed by a factor:

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

B. $\frac{1}{4}, \sqrt{2}$

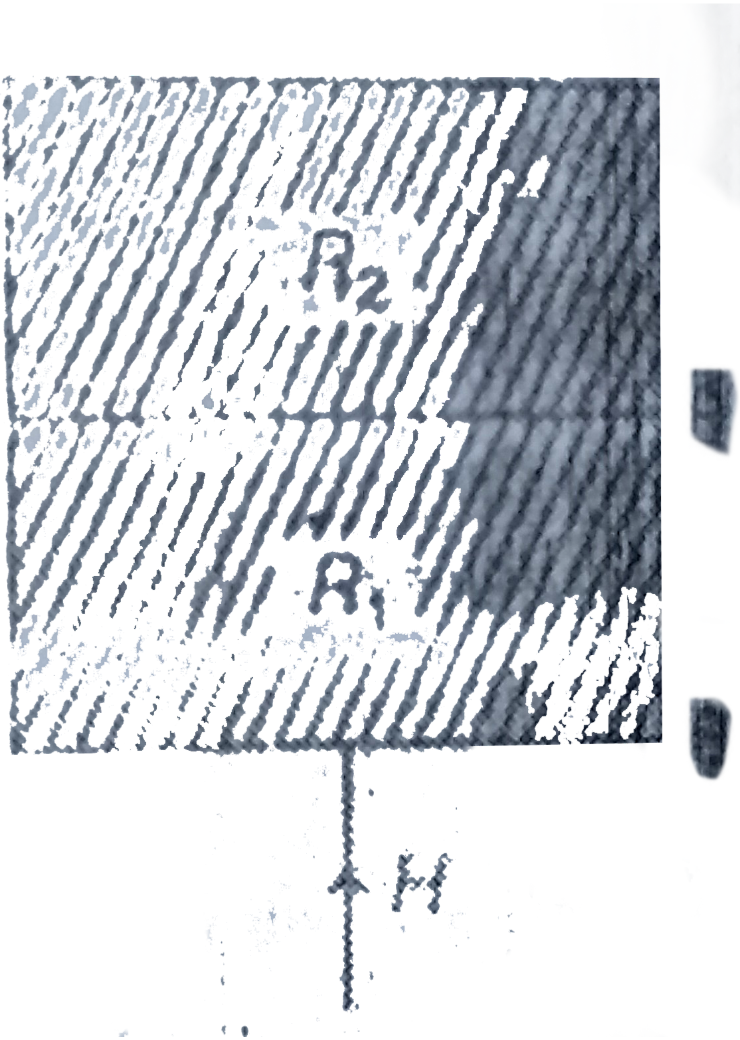
C. $\frac{1}{4}, 2\sqrt{2}$

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

Answer: A

Watch Video Solution

36. Consider the two insulating sheets with thermal resistance R_1 and R_2 as shown in figure. The temperature θ is



A. $\dfrac{\theta_2 R_2 - \theta_1 R_1}{R_2 - R_1}$

B. $\dfrac{\theta_1 R_2 - \theta_2 R_1}{R_2 - R_1}$

C. $\dfrac{\theta_1 R_2 + \theta_2 R_1}{R_1 + R_2}$

D. $\dfrac{\theta_1 R_1 + \theta_2 R_2}{R_1 + R_2}$

Answer: C

Watch Video Solution

37. Given below are two statements : one is labelled as Assertion A and the other is labelled as

Assertion A: An electron microscope can achieve better resolving power than an optical microscope.

Reason R : The de Broglie's wavelength of the electrons emitted from an electron gun is much less than wavelength of visible light. In the light of the above statements, choose the correct answer from the options given below:

A. A is true but R is false.

B. Both A and R are true and R is the correct explanation of A.

C. Both A and R are true but R is NOT the correct explanation of A.

D. A is false but Ris true.

Answer: B

Watch Video Solution

38. An LED is constructed from a p-n junction based on a certain semi-conducting material whose energy gap is 1.9 eV. Then, the wavelength of the emitted light is

A. 1046 nm and red colour

B. 654 nm and orange colour

C. 1046 nm and blue colour

D. 654 nm and red colour

Answer: D

Watch Video Solution

39. If a number of little droplets of water, each of radius r, coalesce to form a single drop of radius R, show that the rise in temperature will be given by $\frac{3T}{J}\left(\frac{1}{r}-\frac{1}{R}\right)$ where T is the surface tension of water and J is the mechanical equivalent of heat.

A. $\frac{2T}{J}\left(\frac{1}{r}-\frac{1}{R}\right)$

B. $\frac{2T}{rJ}$

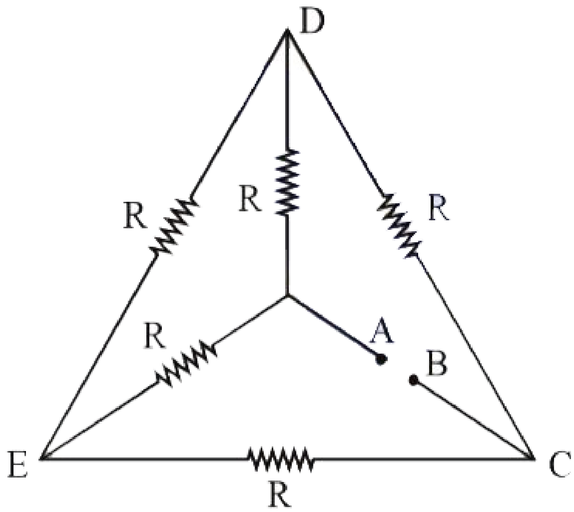
C. $\frac{3T}{rJ}$

D. $\frac{3T}{J}\left(\frac{1}{r}-\frac{1}{R}\right)$

Answer: D

Watch Video Solution

40. Five equal resistances are connected in a network as shown in figure. The net resistance between the points A and B is :



A. 2R

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

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

D. R

Answer: D

Watch Video Solution

41. For extrinsic semiconductors, when doping level is increased,

A. Fermi-level of p-type semiconductor will go upward and Fermi-level of n-type semiconductors will go downward.

B. Fermi-level of p-type semiconductors will go downward and Fermi-level of n-type semiconductor will go upward.

C. Fermi-level of both p-type and n-type semiconductros will go upward for $T > T_F$ K and downward for $T < T_F$ K, where T_F is Fermi temperature.

D. Fermi-level of p and n-type semiconductors will not be affected.

Answer: B

Watch Video Solution

42. In a ferromagnetic material, below the curie temperature, a domain is defined as :

A. a macroscopic region with zero magnetization region with zero magnetization.

B. a macroscopic region with consecutive magnetic dipoles oriented on opposite direction.

C. a macroscopic region with randomly oriented magnetic dipoles.

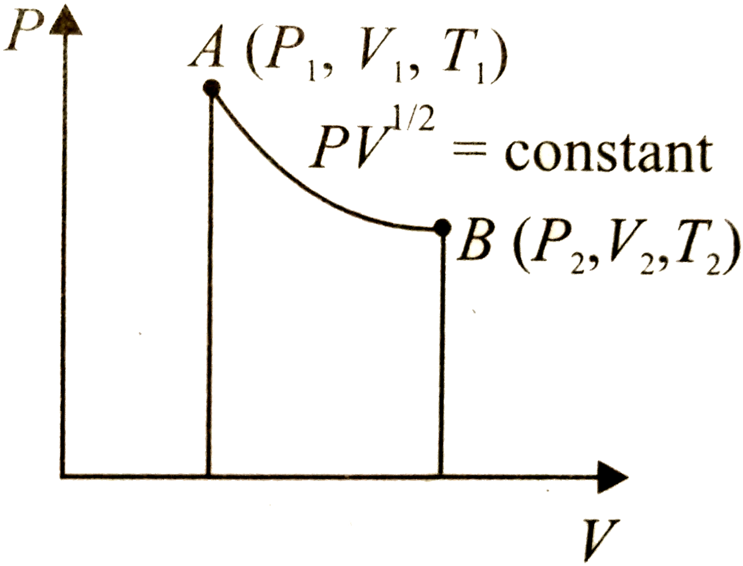
D. a macroscopic region with saturation magnetization.

Answer: D

Watch Video Solution

43. 1 mole of an ideal gas in a cylindrical container have the P-V diagram as shown in figure.If $V_2 = 4V_1$ then the ratio of temperatures

$\frac{T_1}{T_2}$ will be



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

B. 2

C. $\sqrt{2}$

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

Answer: C

Watch Video Solution

44. A stone is dropped from the top of a tower. When it crosses a point 5 m below the top, another stone is let fall from a point 25 m below the top. Both stones reach the bottom of the tower simultaneously. Find the height of the tower. Take $g = 10m/s^2$.

A. 35 m

B. 45 m

C. 50 m

D. 25 m

Answer: B

Watch Video Solution

45. Given below are two statements :

Statement I : In a diatomic molecule, the rotational energy at a given temperature obeys Maxwell's distribution.

Statement II : In a diatomic molecule, the rotational energy at a given temperature equals the translational kinetic energy for each molecule.

In the light of the above statements, choose the correct answer from the options given below :

A. Statement I is false but Statement II is true.

B. Both Statement I and Statement II are false.

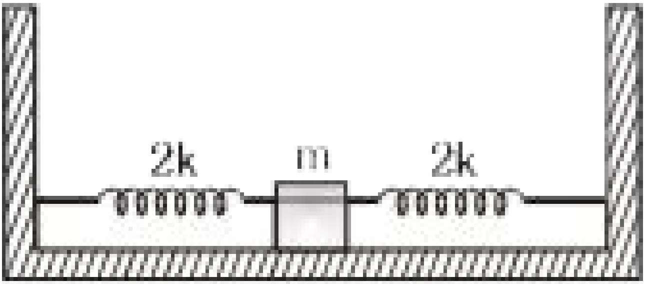
C. Both Statement I and Statement II are true.

D. Statement I is true but Statement II is false.

Answer: D

Watch Video Solution

46. Two identical springs of spring constant '2k' are attached to a block of mass m and to fixed support (see figure).When the mass is displaced from equilibrium position on either side, it executes simple harmonic motion. The time period of oscillations of this sytem is :



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

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

C. $\pi\sqrt{\frac{m}{2k}}$

D. $\pi\sqrt{\frac{m}{k}}$

Answer: D

Watch Video Solution

47. If a message signal of frequency 'f_m' is amplitude modulated with a carrier signal of frequency 'f_c' and radiated through an antenna, the wavelength of the corresponding signal in air is :

A. $\dfrac{c}{f_c - f_m}$

B. $\dfrac{c}{f_m}$

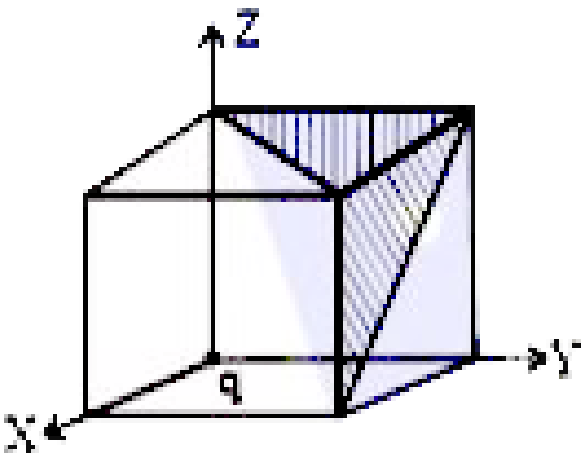
C. $\dfrac{c}{f_c + f_m}$

D. $\dfrac{c}{f_c}$

Answer: D

Watch Video Solution

48. A charge 'q' is placed at one corner of a cube as shown in figure.The flux of electrostatic field $\vec{E}$ through the shaded area is :



A. $\frac{q}{4\varepsilon_0}$

B. $\frac{q}{24\varepsilon_0}$

C. $\frac{q}{48\varepsilon_0}$

D. $\frac{q}{8\varepsilon_0}$

Answer: B

Watch Video Solution

49. The wavelength of the photon emitted by a hydrogen atom when an electron makes a transition from n = 2 to n = 1 state is :

A. 194.8 nm

B. 913.3 nm

C. 490.7 nm

D. 121.8 nm

Answer: D

Watch Video Solution

50. An LCR circuit contains resistance of 110 Ω and a supply of 220 V at 300 rad/s angular frequency. If only capacitance is removed from the circuit, current lags behind the voltage by 45°. If on the other hand, only inductor is removed the current leads by 45° with the applied voltage. The rms current flowing in the circuit will be :

A. 1A

B. 2.5A

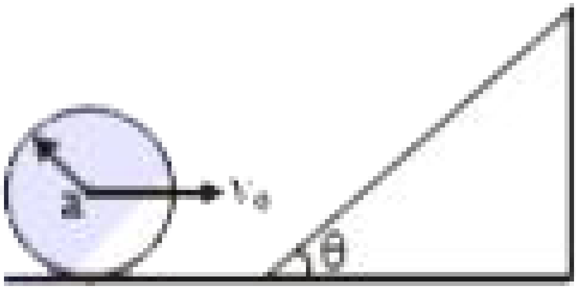
C. 1.5A

D. 2A

Answer: D

Watch Video Solution

51. A sphere of radius 'a' and mass 'm' rolls along a horizontal plane with constant speed v_0. It encounters an inclined plane at angle θ and climbs upward. Assuming that it rolls without slipping, how far up the sphere will travel ?



A. $\frac{10v_0^2}{7g\sin\theta}$

B. $\frac{v_0^2}{5g\sin\theta}$

C. $\frac{2}{5}\frac{v_0^2}{g\sin\theta}$

D. $\frac{v_0^2}{2g\sin\theta}$

Answer: A

Watch Video Solution

52. An electron of mass m_e and a proton of mass $m_p = 1836m_e$ are moving with the same speed. The ratio of their de Broglie wavelength $\frac{\lambda_{\text{electron}}}{\lambda_{\text{proton}}}$ will be :

A. 1836

B. 1

C. 918

D. $\frac{1}{1836}$

Answer: A

Watch Video Solution

53. The displecement-time equation of a particle executing SHM is $x = A\sin(\omega t + \phi)$ At time $t = 0$ position of the position is $x = A/2$ and it is moving along negative x - $direction$ .Then the angle ϕ can be

A. $\frac{\pi}{6}$

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

C. $\frac{5\pi}{6}$

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

Answer: C

Watch Video Solution

54. If e is the electronic charge, c is the speed of light in free space and h is Planck's constant, the quantity $\frac{1}{4\pi\varepsilon_0}\frac{|e|^2}{hc}$ has dimensions of :

A. $\left[M^0L^0T^0\right]$

B. $\left[LC^{-1}\right]$

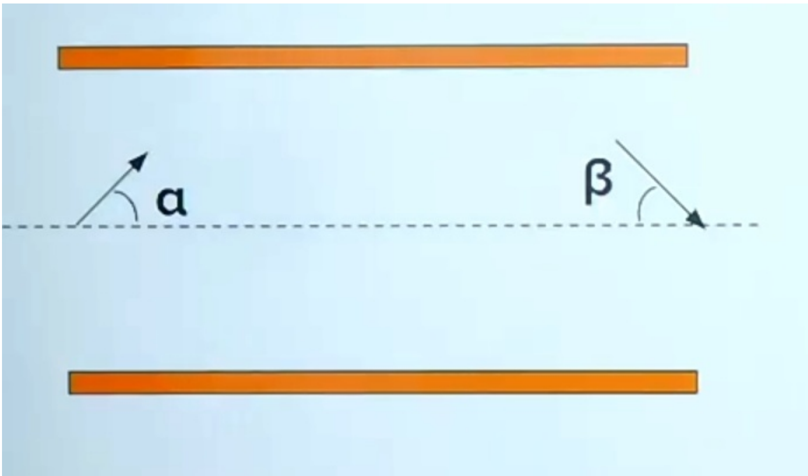
C. $\left[MLT^{-1}\right]$

D. $\left[MLT^0\right]$

Answer: A

Watch Video Solution

55. An electron enters with kinetic energy KE_1, between the plates of a capacitor with a velocity making angle α as shown and leaves with KE_2 making angle β?. Find $\frac{KE_1}{KE_2}$?



A. $\frac{\sin^2\beta}{\cos^2\alpha}$

B. $\frac{\cos^2\beta}{\cos^2\alpha}$

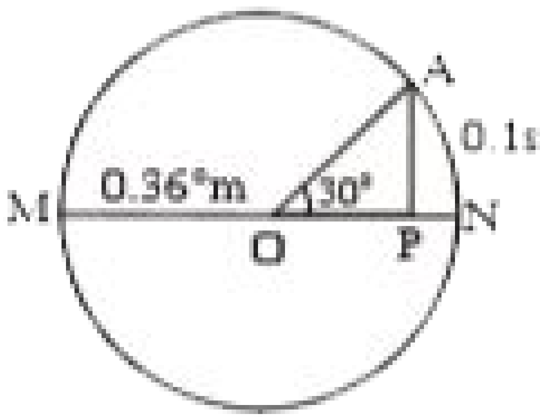
C. $\frac{\cos\beta}{\cos\alpha}$

D. $\frac{\cos\beta}{\sin\alpha}$

Answer: B

Watch Video Solution

56. The point A moves with a uniform speed along the circumference of a circle of radius 0.36 m and covers 30° in 0.1 s. The perpendicular projection 'P' from 'A' on the diameter MN represents the simple harmonic motion of 'P'. The restoration force per unit mass when P touches M will be :



A. 100 N

B. 0.49 N

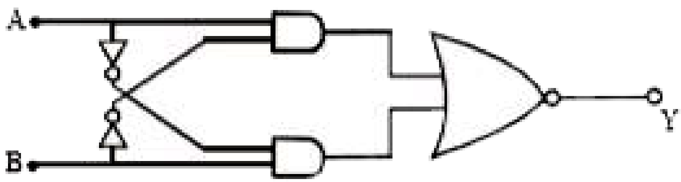
C. 50 N

D. 9.87 N

Answer: D

Watch Video Solution

57. The truth table for the followng logic circuit is:



A.

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

B.

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

C.

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

D.

A	B	Y
0	0	0
0	1	1
1	0	0
1	1	1

Answer: B

Watch Video Solution

58. The stopping potential for electrons emitted from a photosensitive surface illuminated by light of wavelength 491 nm is 0.710 V. When the incident wavelength is changed to a new value, the stopping potential is 1.43 V. The new wavelength is :

A. 329 nm

B. 309 nm

C. 382 nm

D. 400 nm

Answer: C

Watch Video Solution

59. Match List I with List II.

List I	List II
(a) Rectifier	(i) Used either for stepping up or stepping down the a.c. voltage
(b) Stabilizer	(ii) Used to convert a.c. voltage into d.c. voltage
(c) Transformer	(iii) Used to remove any ripple in the rectified output voltage
(d) Filter	(iv) Used for constant output voltage even when the input voltage or load current change

Choose the correct answer from the options given below :

A. (a)–(ii), (b)–(iv), (c)–(i), (d)–(iii)

B. (a)–(iii), (b)–(iv), (c)–(i), (d)–(ii)

C. (a)–(ii), (b)–(i), (c)–(iv), (d)–(iii)

D. (a)–(ii), (b)–(i), (c)–(iii), (d)–(iv)

Answer: A

Watch Video Solution

60. Consider the diffraction pattern obtained from the sunlight incident on a pinhole of diameter $0.1\mu m$. If the diameter of the pinhole is slightly increased, it will affect the diffraction pattern such thtat :

A. its size decreases, and intensity decreases

B. its size increases, and intensity increases

C. its size increases, but intensity decreases

D. its size decreases, but intensity increases

Answer: D

Watch Video Solution

61. If 'C' and 'V' represent capacity and voltage respectively then what are the dimensions of λ, where $\frac{C}{V} = \lambda$?

A. $\left[M^{-2}L^{-3}I^{2}T^{6}\right]$

B. $\left[M^{-3}L^{-4}L^{-4}I^{3}T^{7}\right]$

C. $\left[M^{-1}L^{-3}I^{-2}T^{-7}\right]$

D. $\left[M^{-2}L^{-4}I^{3}T^{7}\right]$

Answer: D

Watch Video Solution

62. The length of a metal wire is l_1 when the tension in it is T_1 and is l_2 when the tension is T_2. Then natural length of the wire is

A. $\frac{l_1 + l_2}{2}$

B. $\frac{T_2 l_1 + T_1 l_2}{T_1 + T_2}$

C. $\dfrac{T_2 l_1 - T_1 l_2}{T_2 - T_1}$

D. $\dfrac{T_1 l_1 - T_2 l_2}{T_2 - T_1}$

Answer: C

Watch Video Solution

63. An aeroplane with its wings spread $10m$ is flying with speed $180k\frac{m}{h}$ in horizontal direction. The total intensity of earth's field is $2.5X10^{-4}$ Tesla and angle of dip is $60°$. Then find emf induced between the tips of the plane wings.

A. 108.25 mV

B. 54.125 mV

C. 88.37 mV

D. 62.50 mV

Answer: A

Watch Video Solution

64. A tuning fork A of unknown frequency produces 5 beats/s with a fork of known frequency 340 Hz. When fork A is filed, the beat frequency decreases to 2 beats/s. What is the frequency of fork A ?

A. 342 Hz

B. 345 Hz

C. 335 Hz

D. 338 Hz

Answer: C

Watch Video Solution

65. A particle executes SHM. Then the graph of velocity as a function of displacement is

A. A circle

B. A parabola

C. An ellipse

D. A helix

Answer: C

Watch Video Solution

66. The trajectory of a projectile in a vertical plane is $y = ax - bx^2$, where a and b are constantsn and x and y are respectively horizontal and vertical distances of the projectile from the point of projection. The maximum height height attained by the particle and the angle of projection form the horizontal are:

A. $\tan^{-1}\alpha, \dfrac{\alpha^2}{4\beta}$

B. $\tan^{-1}\beta, \dfrac{\alpha^2}{2\beta}$

C. $\tan^{-1}\alpha l, \dfrac{4\alpha^2}{\beta}$

D. $\tan^{-1}\left(\dfrac{\beta}{\alpha}\right), \dfrac{\alpha^2}{\beta}$

Answer: A

Watch Video Solution

67. A cord is wound round the circumference of wheel of radius r. The axis of the wheel is horizontal and the moment of inertia about it is I. A weight mg is attached to the cord at the end. The weight falls from rest. After falling through a distance 'h', the square of angular velocity of wheel will be :-

A. $\dfrac{2mgh}{I+2mr^2}$

B. $\dfrac{2mgh}{I+mr^2}$

C. 2gh

D. $\dfrac{2gh}{I + mr^2}$

Answer: B

Watch Video Solution

68. The internal energy (U), pressure (P) and volume (V) of an ideal gas are related as $U = 3PV + 4$. The gas is :-

A. Diatomic only

B. Polyatomic only

C. Either monoatomic or diatomic

D. Either monoatomic or diatomic

Answer: B

Watch Video Solution

69. Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A : For a simple microscope, the angular size of the object equals the angular size of the image.

Reason R : Magnification is achieved as the small object can be kept much closer to the eye than 25 cm and hence it subtends a large angle.

In the light of the above statements, choose the most appropriate answer from the options given below :

A. A is true but R is false

B. Both A and R are true but R is NOT the correct explanation of A.

C. Both A and R are true and R is the correct explanation of A

D. A is false but R is true

Answer: B::C

Watch Video Solution

70. Given below are two statements :

Statement I : An electric dipole is placed at the centre of a hollow sphere. The flux of electric field through the sphere is zero but the electric field is not zero anywhere in the sphere.

Statement II : If R is the radius of a solid metallic sphere and Q be the total charge on it. The electric field at any point on the spherical surface of radius $r(< R)$ is zero but the electric flux passing through this closed spherical surface of radius r is not zero.

In the light of the above statements, choose the correct answer from the options given below :

A. Both Statement I and Statement II are true

B. Statement I is true but Statement II is false

C. Both Statement I and Statement II are false

D. Statement I is false but Statement II is true.

Answer: B

Watch Video Solution

71. The recoil speed of a hydrogen atom after it emits a photon in going from $n = 5$, state to $n = 1$ state is (in ms^{-1})

A. 4.17 m/s

B. 2.19 m/s

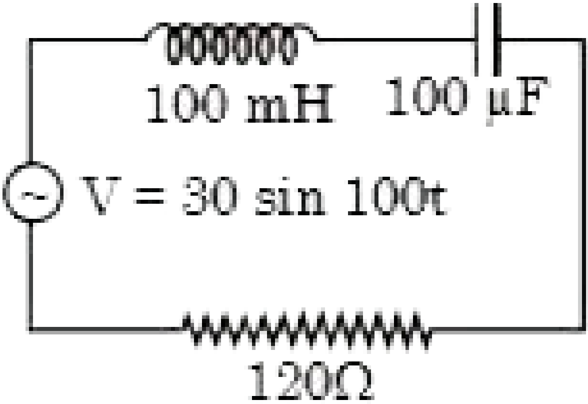
C. 3.25 m/s

D. 4.34 m/s

Answer: A

Watch Video Solution

72. Find the peak current and resonant frequency of the following circuit (as shown in figure).



A. 0.2 A and 50 Hz

B. 0.2 A and 100 Hz

C. 2 A and 100 Hz

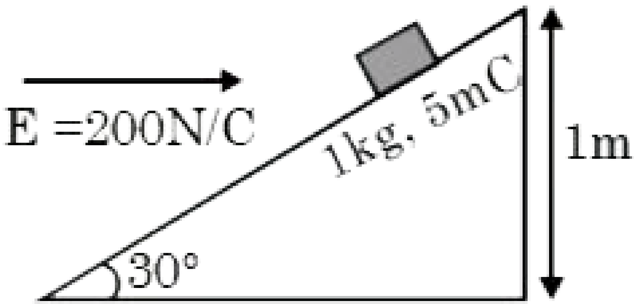
D. 2A and 50 Hz

Answer: A

Watch Video Solution

73. An inclined plane making an angle of 30° with the horizontal is placed in a uniform horizontal electric field $200\ \frac{N}{C}$ as shown in the figure. A body of mass 1kg and charge 5 mC is allowed to slide down from rest at a height of 1m. If the coefficient of friction is 0.2, find the time taken by the body to reach the bottom.

$\left[g = 9.8 m/s^{2}, \sin 30^{\circ} = \frac{1}{2}, \cos 30^{\circ} = \frac{\sqrt{3}}{2}\right]$



A. 0.92 s

B. 0.46 s

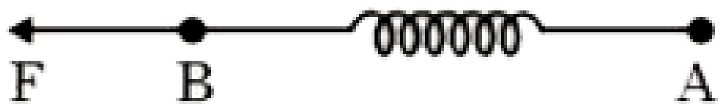
C. 2.3 s

D. 1.3 s

Answer: D

Watch Video Solution

74. Two masses A and B, each of mass M are fixed together by a massless spring. A force acts on the mass B as shown in figure. If the mass A starts moving away from mass B with acceleration 'a', then the acceleration of mass B wil be :-



A. $\dfrac{Ma - F}{M}$

B. $\dfrac{MF}{F + Ma}$

C. $\dfrac{F + Ma}{M}$

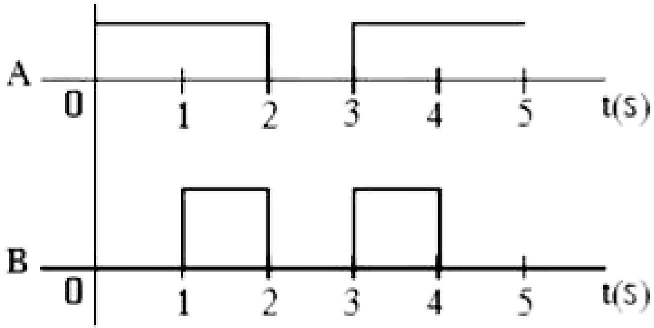
D. $\dfrac{F - Ma}{M}$

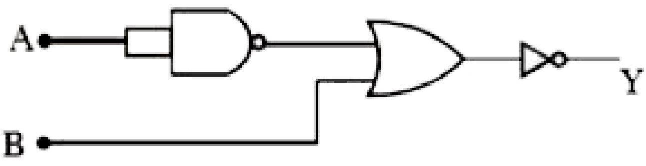
Answer: D

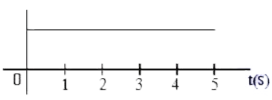
Watch Video Solution

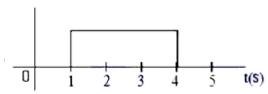
Watch Video Solution

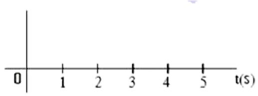
75. Draw the output signal Y in the given combination of gates :-

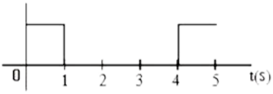




A. 

B. 

C. 

D. 

Answer: D

Watch Video Solution

76. A radioactive sample is undergoing α - decay. At time t_1, its activity is A & at A another time t_2, the activity is $\frac{A}{5}$. What is the average life time for the sample

A. $\frac{\ln 5}{t_2 - t_1}$

B. $\frac{t_1 - t_2}{\ln 5}$

C. $\frac{t_2 - t_1}{\ln 5}$

D. $\frac{\ln\left(t_2 + t_1\right)}{2}$

Answer: C

Watch Video Solution

Watch Video Solution

77. A scooter accelerates from rest for time t_1 at constant rate a_1 and then retards at constant rate a_2 for time t_2 and comes to rest. The correct value of $\frac{t_1}{t_2}$ will be :-

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

B. $\frac{a_2}{a_1}$

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

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

Answer: B

Watch Video Solution

78. Given below are two statements :

Statement I : A second's pendulum has a time period of 1 second.

Statement II : It takes precisely one second to move between the two extreme positions.

In the light of the above statements, choose the correct answer from the options given below:

A. Both Statement I and Statement II are false.

B. Statement I is false but Statement II is true

C. Statement I is true but Statement II is false

D. Both Statement I and Statement II are true.

Answer: B

Watch Video Solution

79. A wire of 1Ω has a length of 1m. It is stretched till its length increases by 25%. The percentage change in resistance to the neartest integer is:-

A. 56 %

B. 25 %

C. 12.5 %

D. 76 %

Answer: A

Watch Video Solution

80. If incident ray, refracted ray and normal ray are represented by unit vectors $\vec{a}, \vec{b}, \text{ and } \vec{c}$ then relation between them is ?

A. $\vec{b} = \vec{a} + 2\vec{c}$

B. $\vec{b} = 2\vec{a} + \vec{c}$

C. $\vec{b} = \vec{a} - 2(\vec{a}.\vec{c})\vec{c}$

D. $\vec{b} = \vec{a} - \vec{c}$

Answer: C

Watch Video Solution

SECTION-B

1. The coefficient of static friction between a wooden block of mass 0.5 kg and a vertical rough wall is 0.2. The magnitude of horizontal force that should be applied on the block to keep it adhere to the wall will be ____N.

Watch Video Solution

2. A resonance circuit having inductance and resistance 2×10^{-4} H and 6.28 Ω respectively oscillates at 10 MHz frequency. The value of quality factor of this resonator is____.

Watch Video Solution

3. A hydraulic press can lift 100 kg when a mass 'm' is placed on the smaller piston. It can lift ____kg when the diameter of the larger piston is increased by 4 times and that of the smaller piston is decreased by 4 times keeping the same mass 'm' on the smaller piston.

Watch Video Solution

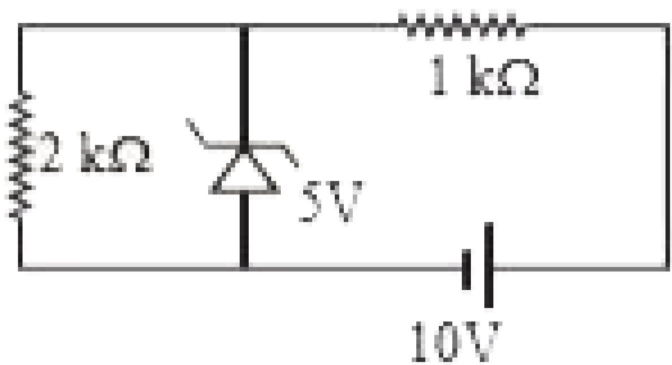
4. An inclined plane is bent in such a way that the vertical cross-section is given by y=$\frac{x^2}{4}$ where y is in vertical and x in horizontal direction. If the upper surface of this curved plane is rough with coefficient of friction μ = 0.5, the maximum height in cm at which a stationary block will not slip downward is_____cm.

Watch Video Solution

5. An electromagnetic wave of frequency 5 GHz, is travelling in a medium whose relative electric permittivity and relative magnetic permeability both are 2. Its velocity in this medium is ______ $\times 10^{7} m/s$

Watch Video Solution

6. In connection with the circuit drawn below, the value of current flowing through 2 kΩ resistor is ____ $\times 10^{-4} A$



Watch Video Solution

7. An audio signal $v_m = 20\sin 2\pi(1500t)$ amplitude modulates a carrier $v_C = 80\sin 2\pi(100, 000t)$. The value of percent modulation is ___

Watch Video Solution

8. A ball moving with a speed of $9m/s$ strikes an identical ball at rest, such that after the collision, the direction of each ball makes an angle of $30\,^{\circ}$ with the original line of motion. Find the speeds of the two balls after collision.

Watch Video Solution

9. A common transistor radio set requires 12V (D.C.) for its operation. The D.C. source is constructed by using a transformer and a rectifier circuit, which are operated at 220 V (A.C.) on standard domestic A.C. supply. The number of turns of secondary coil are 24, then the number of turns of primary are _____.

Watch Video Solution

10. An unpolarized light beam is incident on the polarizer of a polarization experiment and the intensity of light beam emerging from the analyzer is measured as 100 Lumens. Now, if the analyzer is rotated around the horizontal axis (direction of light) by 30° in clockwise direction, the intensity of emerging light will be ____ Lumens.

Watch Video Solution

11. A person standing on a spring balance inside a stationary lift measures 60 kg. The weight of that person if the lift descends with uniform downward acceleration of $1.8 m/s^2$ will be_N.

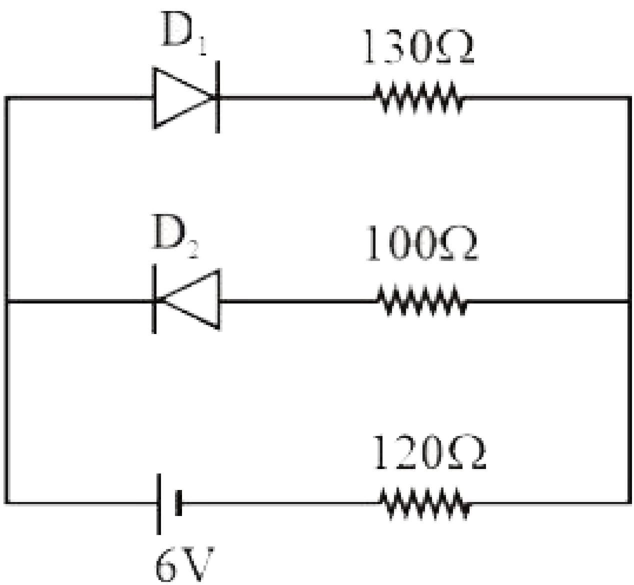
$\left[g = 10 m/s^2\right]$

Watch Video Solution

12. 20 coulomb charge flows through 15 volt battery in a certain interval. Find work done (in J) by the battery?

Watch Video Solution

13. The circuit contains two diodes each with a forward resistance of 50Ω and with infinite reverse resistance. If the battery voltage is 6V, the current through the 120Ω resistance is_ mA



Watch Video Solution

14. A radiation is emitted by 1000 W bulb and it generates an electric field and magnetic field at P, placed at a distance of 2 m. The efficiency of the bulb is 1.25%. The value of peak electric field at Pis $x \times 10^{-1} V/m$. Value of x is_

(Rounded-off to the nearest integer)

[Take $\varepsilon_0 = 8.85 \times 10^{-12} C^2 N^{-1} m^{-2}, c = 3 \times 10^8 ms^{-1}$

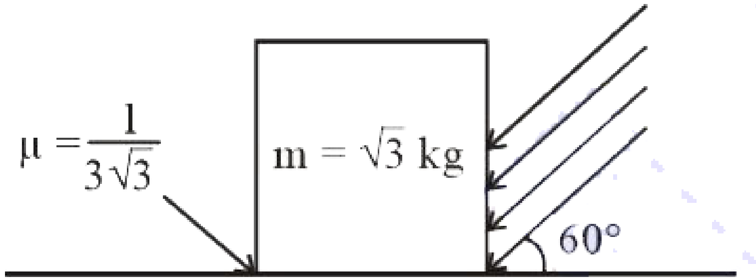
Watch Video Solution

15. A boy pushes a box of mass 2 kg with a force $\vec{F} = \left(20\hat{i} + 10\hat{j}\right)$ Non a frictionless surface. If the box was initially at rest, then ________ m is displacement along the x-axis after 10 s.

Watch Video Solution

16. As shown in the figure, a block of mass $\sqrt{3}$ kg is kept on a horizontal rough surface of coefficient of friction $\frac{1}{3\sqrt{3}}$ The critical force to be applied on the vertical surface as shown at an angle 60° with horizontal such that it does not move, will be 3x. The value of x will be

$$\left[g = 10m/s^2, \sin 60^\circ = \frac{\sqrt{3}}{2}, \cos 60^\circ = \frac{1}{2}\right]$$



Watch Video Solution

17. A container is divided into two chambers by a partition. The volume of first chamber is 4.5 litre and second chamber is 5.5 litre. The first chamber contain 3.0 moles of gas at pressure 2.0 atm and second chamber contain 4.0 moles of gas at pressure 3.0 atm. After the partition is removed and the mixture attains equilibrium, then, the common equilibrium pressure existing in the mixture is $x \times 10^{-1}$ atm. Value of x is____.

Watch Video Solution

18. A travelling wave is given by $y = -0.21\sin(x + 3t)$ where x is in m, t is in seconds, y is in mm. (mass per unit length $0.135\frac{g}{c}m$). Find the tension in the wire.

Watch Video Solution

19. In a series L-C-R circuit At resonance quality factor is 100. Now value of self inductance doubled and resistance is decreased two fold then find new value of quality factor.

Watch Video Solution

20. The maximum and minimum amplitude of an amplitude modulated wave is 16V and 8V respectively. The modulation index for this amplitude modulated wave is $x \times 10^{-2}$. The value of x is ______

Watch Video Solution

21. The peak electric field produced by the radiation coming from the 80 W bulb at a distance of 10 m is $\frac{x}{10}\sqrt{\frac{\mu_0 c}{\pi}}\frac{V}{m}$. The efficiency of the bulb is 10% and it is a point source. The value of x is__________.

Watch Video Solution

22. Two small spheres each of mass 10 mg are suspended from a point by threads 0.5 m long. They are equally charged and repel each other to a distance of 0.20 m. The charge on each of the sphere is $\frac{a}{21} \times 10^{-8} C$. The value of 'a' will be ______.

[Given $g = 10 ms^{-2}$]

Watch Video Solution

23. The initial velocity v_i required to project a body vertically upward from the surface of the earth to reach a height of 10R, where R is the radius of the earth, may be described in terms of escape velocity v_e such that $v_i = \sqrt{\frac{x}{y}} \times v_e$. The value of x will be ________ .

Watch Video Solution

24. For a x-ray if it's wavelength is $10A^{\circ}$ & mass of a particle having same energy and same wavelength as x-ray is $\frac{xh}{3}$ where h is plank's constant then value of x is

Watch Video Solution

25. A reversible heat engine converts one-fourth of the heat input into work. When the temperature of the sink is reduced by 52 K, its efficiency is doubled. The temperature in Kelvin of the source will be ________.

Watch Video Solution

26. The percentage increase in the speed of transverse waves produced in a stretched string if the tension is increased by 4%, will be ___________%.

Watch Video Solution

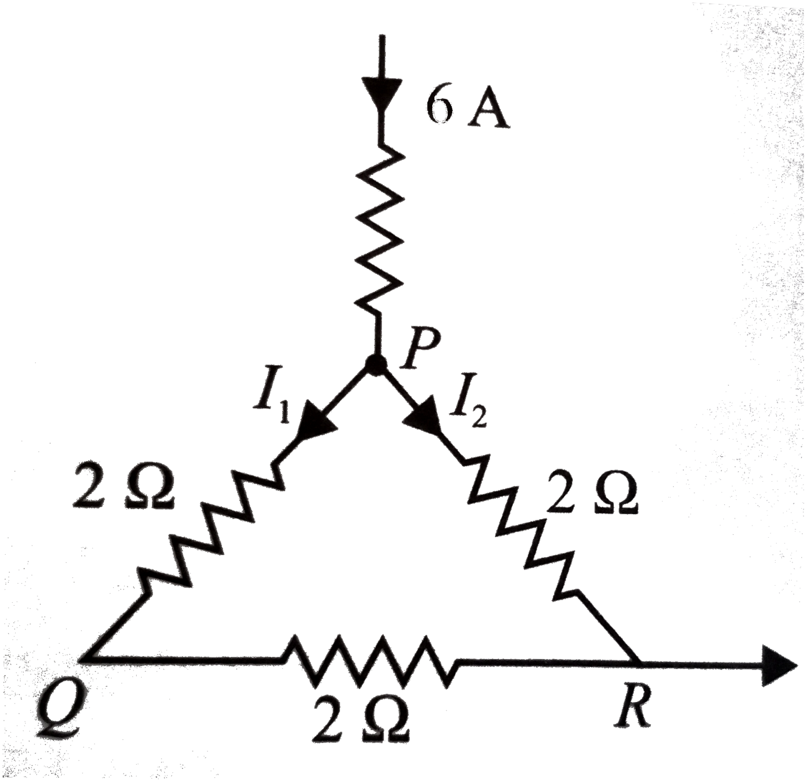
27. If $\vec{P} \times \vec{Q} = \vec{Q} \times \vec{P}$, the angle between $\vec{P}$ and $\vec{Q}$ is $\theta\left(0^{\circ} < \theta < 360^{\circ}\right)$. The value of '$\theta$' will be ________ $^{\circ}$.

Watch Video Solution

28. Two small conducting spheres have charges $2.1nC$ and -$0.1nC$are touched to each other and then separated by a distance of 0.5 m. Find the force between them

Watch Video Solution

29. A current of 6 A enters one corner P of an equilateral triangle PQR having 3 wires of resistances 2 Q each and leaves by the corner R. Then the currents I_1 and I_2 are



Watch Video Solution

30. Two particles having masses 4 g and 16 g respectively are moving with equal kinetic energies. The ratio of the magnitudes of their linear momentum is n : 2. The value of n will be __________.

Watch Video Solution

31. The volume V of a given mass of monoatomic gas changes with temperature T according to the relation $V = KT^{2/3}$. The workdone when temperature changes by 90 K will be xR. The value of x is [R = universal gas constant]

Watch Video Solution

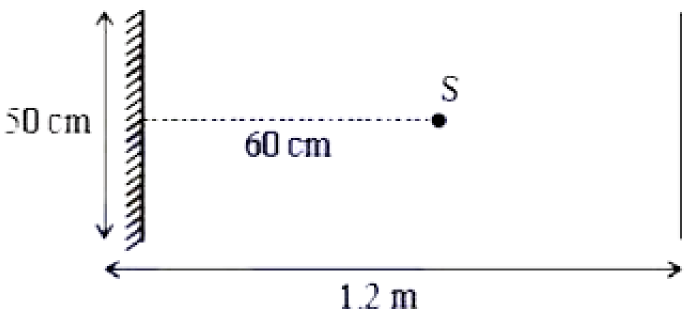
32. If the highest frequency modulating a carrier is 5 kHz, then the number of AM broadcast stations accommodated in a 90 kHz bandwidth are ....

Watch Video Solution

33. Two stream of photons, possessing energies equal to twice and ten times the work function of metal are incident on the metal surface successively. The value of ratio of maximum velocities of the photoelectrons emitted in the two respective cases is x : y. The value of x is ....

Watch Video Solution

34. A point source of light S, placed at a distance 60 cm infront of the centre of a plane mirror of width 50 cm, hangs vertically on a wall. A man walks infront of the mirror along a line parallel to the mirror at a distance 1.2 m from it (see in the figure). The distance between the extreme points where he can see the image of the light source in the mirror is .... cm.



Watch Video Solution

35. A particle executes S.H.M. with amplitude 'a' and time period T. The displacement of the particle when its speed is half of maximum speed is $\frac{\sqrt{x}a}{2}$. The value of x is ....

Watch Video Solution

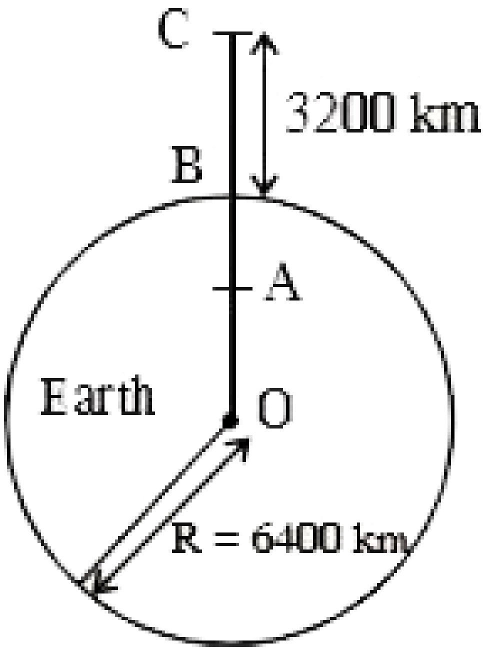
36. 27 similar drops of mercury are maintained at 10V each. All these spherical drops combine into a single big drop. The potential energy of the bigger drop is .... times that of a smaller drop.

Watch Video Solution

37. Time period of a simple pendulum is T. The time taken to complete 5/8 oscillations starting from mean position is $\frac{\alpha}{\beta}T$. The value of α is ....

Watch Video Solution

38. In the reported figure of earth, the value of acceleration due to gravity is same at point A and C but it is smaller than that of its value at point B (surface of the earth). The value of OA : AB will be x : y. The value of x is ....

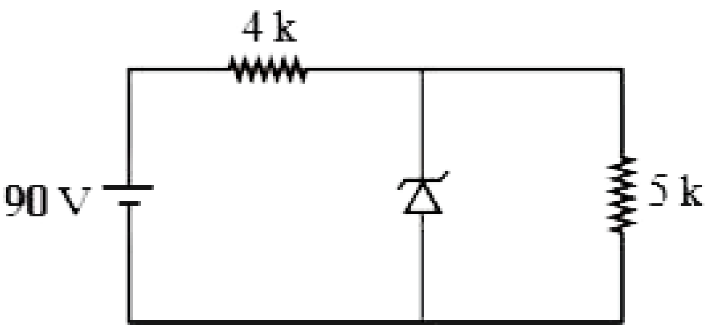


Watch Video Solution

39. 1 mole of rigid diatomic gas performs a work of Q/5 when heat Q is supplied to it. The molar heat capacity of the gas during this transformation is $\frac{xR}{8}$, The value of x is .... [K = universal gas constant]

Watch Video Solution

40. The zener diode has a $V_z = 30V$. The current passing through the diode for the following circuit is .... mA.



Watch Video Solution

PHYSICS (SECTION-A)

1. STATEMENT - 1 : When a rod lying freely is heated, no thermal stress is developed in it.

and

STATEMENT - 2 : On heating, the length of the rod increase.

A. Both A and R are true but R is NOT the correct explanation of A

B. A is false but R is true

C. A is true but Ris false

D. Both A and R are true and R is the correct explanation of A

Answer: D

Watch Video Solution

2. A student is performing the experiment of resonance column. The diameter of the column tube is 6 cm. The frequency of the tuning fork is 504 Hz. Speed of the sound at the given temperature is 336 m/s. The zero of the meter scale coincides with the top end of the resonance column tube. The reading of the water level in the column when the first resonance occurs is:

A. 13 cm

B. 16.6 cm

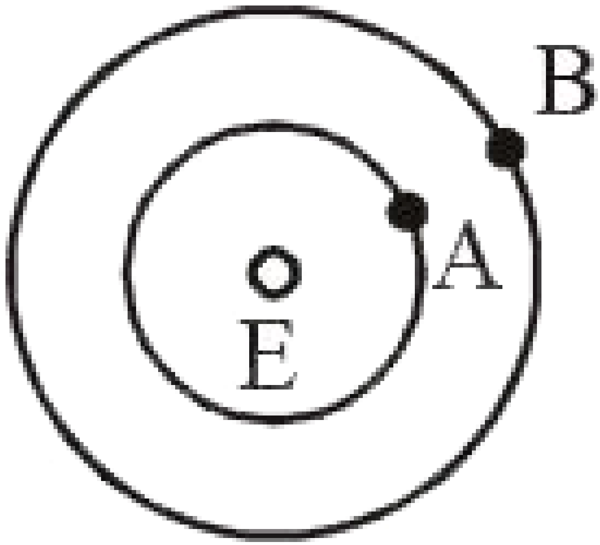
C. 18.4 cm

D. 14.8 cm

Answer: D

Watch Video Solution

3. Two satellites A and B of masses 200kg and 400kg are revolving round the earth at height of 600 km and 1600 km respectively. If T_A and T_B are the time periods of A and B respectively then the value of T_B - T_A:



[Given : radius of earth = 6400km, mass of earth = $6 \times 10^{24} kg$]

A. $1.33 \times 10^{3} s$

B. $3.33 \times 10^{2} s$

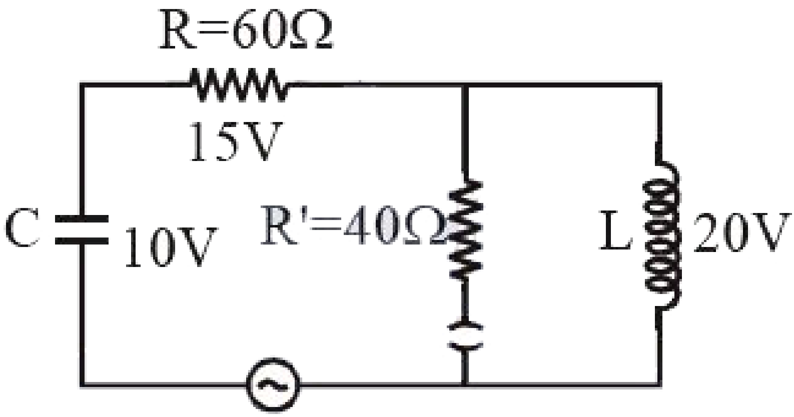
C. $4.24 \times 10^{2} s$

D. $4.24 \times 10^{2} s$

Answer: A

Watch Video Solution

4. The angular frequency of alternating current in a L-C-R circuit is 100 rad/s. The components connected are shown in the figure. Find the value of inductance of the coil and capacity of condenser.



A. $0.8H$ and $150\mu F$

B. $0.8H$ and $250\mu F$

C. $1.33H$ and $250\mu F$

D. $1.33H$ and $150\mu F$

Answer: B

Watch Video Solution

5. A proton, deutron and α particle are moving with same momentum in uniform magnetic field. The ratio of magnetic forces acting on them is__and their speed are in ratio___

A. $1:2:4$ and $2:1:1$

B. $2:1:1$ and $4:2:1$

C. $4:2:1$ and $2:1:1$

D. $1:2:4$ and $1:1:2$

Answer: B

Watch Video Solution

6. Given below are two statement :

Statement-I: A speech signal of 2 kHz is used to modulate a carrier signal of 1 MHz. The band width requirement for the signal is 4 kHz.

Statement-II : The side band frequencies are 1002 kHz. and 998 kHz. In the light of the above statements, choose the correct answer from the options given below:

A. Statement I is true but Statement II is false

B. Statement I is false but Statement II is true

C. Both Statement I and Statement II are true

D. Both Statement I and Statement II are false

Answer: C

Watch Video Solution

7. If the time period of a two meter long simple pendulum is 2s, the acceleration due to gravity at the place where pendulum is executing S.H.M. is:

A. $\pi^2 ms^{-2}$

B. $9.8 ms^{-2}$

C. $2\pi^2 ms^{-2}$

D. $16m/s^{-2}$

Answer: C

Watch Video Solution

8. The pitch of the screw gauge is 1mm and there are 100 divisions on the circular scale. When nothing is put in between the jaws, the zero of the circular scale lies 8 divisions below the reference line. When a wire is placed between the jaws, the first linear scale division is clearly visible while 72^{nd} division on circular scale coincides with the reference line. The radius of the wire is

A. $1.64mm$

B. $0.82mm$

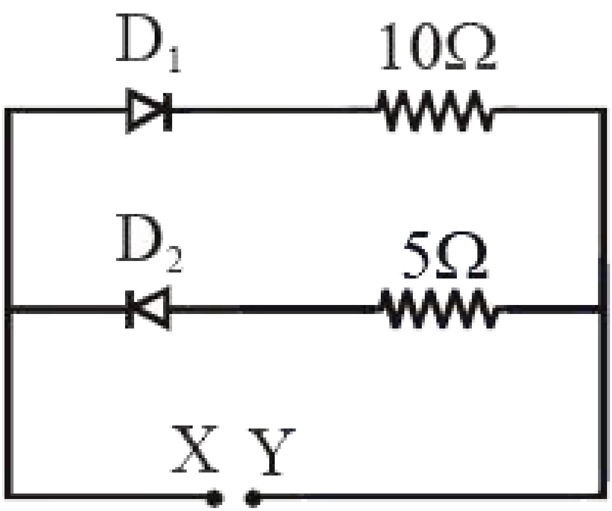
C. $1.80mm$

D. $0.90mm$

Answer: B

Watch Video Solution

9. A 5V battery is connected across the points X and Y. Assume D, and D2 to be normal silicon diodes. Find the current supplied by the battery if the +ve terminal of the battery is connected to point X



A. $\sim 0.5A$

B. $\sim 1.5A$

C. $\sim 0.86A$

D. $\sim 0.43A$

Answer: D

Watch Video Solution

10. An alpha particle and a proton are accelerated from rest by a potential difference of 200 V. After this, their de Broglie wavelengths are λ_α and λ_p respectively. The ratio $\frac{\lambda_p}{\lambda_\alpha}$ is :

A. 3.8

B. 8

C. 7.8

D. 2.8

Answer: D

Watch Video Solution

11. A diatomic gas, having $C_p = \frac{7}{2}R$ and $C_v = \frac{5}{2}R$ is heated at constant pressure. The ratio $dU : dQ : dW$

A. $5:7:3$

B. $5:7:2$

C. $3:7:2$

D. $3:5:2$

Answer: B

Watch Video Solution

12. Engine of a train that is moving with unifrom acceleration passes a pole with speed u while the last compartment passes the pole with speed 'v'. The middle point of the train passes the given pole with speed:

A. $\sqrt{\dfrac{v^2 + u^2}{2}}$

B. $\dfrac{v - u}{2}$

C. $\dfrac{u + v}{2}$

D. $\sqrt{\dfrac{v^2 - u^2}{2}}$

Answer: A

Watch Video Solution

13. Match List-I with List-II : List-I:

	List-I		List-II
(a)	h(Plank's constant)	(i)	$\left[MLT^{-1}\right]$
(b)	E(Kinetic energy)	(ii)	$\left[ML^2T^{-1}\right]$
(c)	V(elecic potential)	(iii)	$\left[ML^2T^{-2}\right]$
(d)	P(linear momentum)	(iv)	$\left[ML^2I^{-1}T^{-3}\right]$

Choose the correct answer from the options given below :

A. $(a) \rightarrow (iii), (b) \rightarrow (iv), (c) \rightarrow (ii), (d) \rightarrow (i)$

B. $(a) \rightarrow (ii), (b) \rightarrow (iii), (c) \rightarrow (iv), (d) \rightarrow (i)$

C. $(a) \rightarrow (i), (b) \rightarrow (ii), (c) \rightarrow (iv), (d) \rightarrow (iii)$

D. $(a) \rightarrow (iii), (b) \rightarrow (ii), (c) \rightarrow (iv), (d) \rightarrow (iii)$

Answer: B

Watch Video Solution

14. Magnetic fields at two points on the axis of a circular coil at a distance of $0.05m$ and $0.2m$ from the centre are in the ratio $8:1$. The radius of the coil is

A. $0.2m$

B. $0.1m$

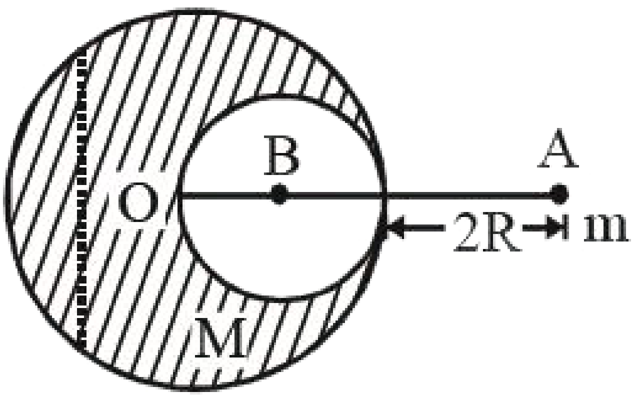
C. 0.15

D. 1.0 M

Answer: B

Watch Video Solution

15. A solid sphere of radius R gravitationally attracts a particle placed at 3R form its centre with a force F_1. Now a spherical cavity of radius $\left(\frac{R}{2}\right)$ is made in the sphere (as shown in figure) and the force becomes F_2 The value of $F_1 : F_2$ is:



A. $25 : 36$

B. $36 : 25$

C. $50 : 41$

D. $41 : 50$

Answer: C

Watch Video Solution

16. Two radioactive substances X and Y originally have N_1 and N_2 nuclei respectively. Half life of X is half of the half life of Y. After three half lives of Y, number of nuclei of both are equal. $\frac{N_1}{N_2}$ The ratio N will be equal to :

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

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

C. $\frac{8}{1}$

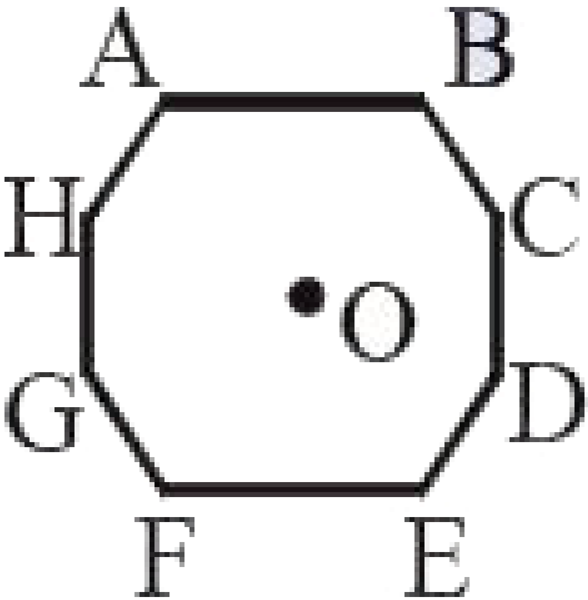
D. $\frac{1}{3}$

Answer: C

Watch Video Solution

Watch Video Solution

17. In an octagon ABCDEFGH of equal side, what is the sum of $\overline{AB} + \overline{AC} + \overline{AD} + \overline{AE} + \overline{AF} + \overline{AG} + \overline{AH}$ if $\overline{AO} = 2\hat{i} + 3\hat{j} - 4\hat{k}$



A. $-16\hat{i} - 24\hat{j} + 32\hat{k}$

B. $16\hat{i} + 24\hat{j} - 32\hat{k}$

C. $16\hat{i} + 24\hat{j} + 32\hat{k}$

D. $16\hat{i} - 24\hat{j} + 32\hat{k}$

Answer: B

Watch Video Solution

18. Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A: The escape velocities of planet A and B are same. But A and B are of unequal mass.

Reason R: The product of their mass and radius must be same, $M_1R_1 = M_2R_2$

In the light of the above statements, choose the most appropriate answer from the options given below :

A. Both A and R are true but R is NOT the correct explanation of A

B. A is true but R is false

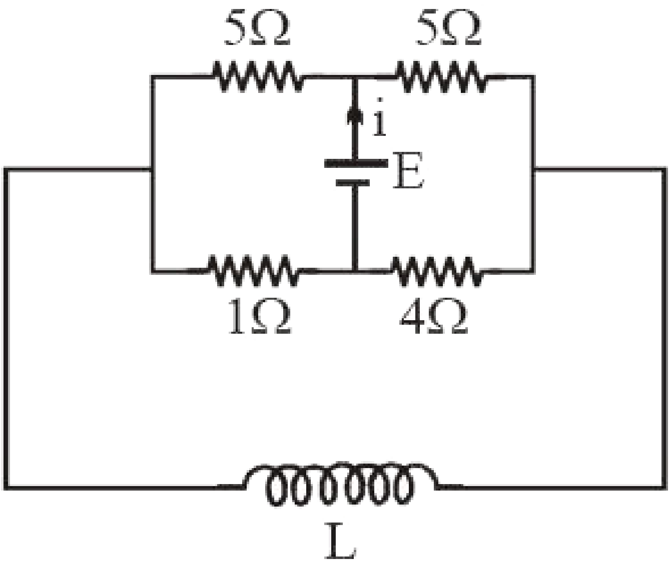
C. Both Statement I and Statement II are true

D. A is not correct but R is correct

Answer: B

Watch Video Solution

19. The current (i) at time t= 0 and $t = \infty$ respectively for the given circuit is :



A. $\frac{18E}{55}, \frac{5E}{18}$

B. $\frac{10E}{33}, \frac{5E}{18}$

C. $\frac{5E}{18}, \frac{18E}{55}$

D. $\frac{5E}{18}, \frac{10E}{33}$

Answer: D

Watch Video Solution

20. Two coherent light sources having intensity in the ratio 2x produce an interference pattern. The ratio $\frac{I_{\max} - I_{\min}}{I_{\max} + I_{\min}}$ will be :

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

B. $\frac{\sqrt{2x}}{2x+1}$

C. $\frac{\sqrt{2x}}{x+1}$

D. $\frac{2\sqrt{2x}}{2x+1}$

Answer: D

Watch Video Solution

PHYSICS (SECTION-B)

1. A transmitter circuit used for transmission of EM waves having wavelength $960m$ If capacitor used in circuit was of $2.56microF$, then the self inductance of the inductor coil used in the circuit such that resonance occurs, is $P \cdot 10^{-8}$ Find P

Watch Video Solution

2. The electric field in a region is given $\vec{E} = \left(\frac{3}{5}E_0\hat{i} + \frac{4}{5}E_0\hat{j}\right)\frac{N}{C}$. The ratio of flux of reported field through the rectangular surface of area $0.2m^2$ (parallel to y - z plane) to that of the surface of area $0.3m^2$ (parallel to x-z plane) is a:b where a= ____ [Here $\hat{i}, \hat{j}$ and $\hat{k}$ are unit vectors along x,y and z-axes respectively]

Watch Video Solution

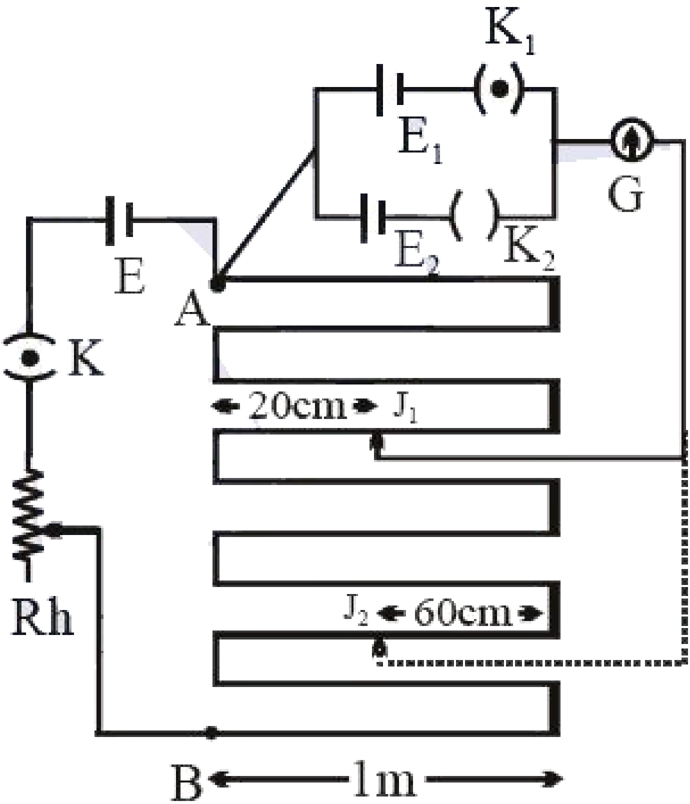
3. In a certain thermodynamical process, the pressure of a gas depends on its volume as kV^3. The work done when the temperature changes from $100\,^\circ$C to $300\,^\circ C$ will be x times nR, where n denotes number of moles of a gas. Find x.

Watch Video Solution

4. A small bob tied at one end of a thin string of length 1m is describing a vertical circle so that the maximum and minimum tension in the string are in the ratio 5: 1. The velocity of the bob at the height position is ____ m/s. (Take $g = 10m/s^2$)

Watch Video Solution

5. In the given circuit of potentiometer, the potential difference E across AB (10m length) is larger than E_1 and E_2 as well. For keyK_1 (closed), the jockey is adjusted to touch the wire at pointJ_1 so that there is no deflection in the galvanometer. Now the first battery (E_1) is replaced by second battery (E_2) for working by making K_1 open and K_2 closed. The galvanometer gives then null deflection at J_2 The value of $\frac{E_1}{E_2}$ is $\frac{a}{b}$ where a=____.



Watch Video Solution

6. The same size images are formed by a convex lens when the object is placed at 20cm or at 10cm from the lens. The focal length of convex lens is ____ cm

Watch Video Solution

7. 512 identical drops of mercury are charged to a potential of 2V each. The drops are joined to form a single drop. The potential of this drop is ___ V.

Watch Video Solution

8. A coil of inductance 2H having negligible resistance is connected to a source of supply whose voltage is given by V = 3t volt. (where t is in second). If the voltage is applied when t = 0, then the energy stored in the coil after 4s is J.

Watch Video Solution

9. A monoatomic gas of mass 4.0 u is kept in an insulated container. Container is moving with velocity 30 m/s. if container is suddenly stopped then change in temperature of the gas (R= gas contant) is $\frac{X}{3R}$ Value of x is ____

Watch Video Solution

10. The potential energy (U) of diatomic molecule is a function dependent on r (interatomic distance)as $U = \frac{\alpha}{r^{10}} - \frac{\beta}{r^5} - 3$

Where α and β are positive constants. The equilrium distance between two atoms will be $\left(\frac{2\alpha}{\beta}\right)^{\frac{a}{b}}$ where a=___

Watch Video Solution

(SECTION - A)

1. A particle executes SHM. Then the graph of velocity as a function of displacement is

A. circular

B. elliptical

C. parabolic

D. straight line

Answer: B

Watch Video Solution

2. Two electrons each are fixed at a distance '2d'. A third charge proton placed at the midpoint is displaced slightly by a distance $x(x < < d)$ perpendicular to the line joining the two fixed charges. Proton will execute simple harmonic motion having angular frequency : (m = mass of charged particle)

A. $\left(\dfrac{2q^2}{\pi\varepsilon_0 md^3}\right)^{\frac{1}{2}}$

B. $\left(\dfrac{\pi\varepsilon_0 md^3}{2q^2}\right)^{\frac{1}{2}}$

C. $\left(\dfrac{q^2}{2\pi\varepsilon_0 md^3}\right)^{\frac{1}{2}}$

D. $\left(\dfrac{2\pi\varepsilon_0 md^3}{q^2}\right)^{\frac{1}{2}}$

Answer: C

Watch Video Solution

3. Gases excert pressure on the walls of the container , because the gas molecules

A. continuously lose their energy till it reaches wall.

B. are attracted by the walls of container.

C. continuously stick to the walls of container.

D. suffer change in momentum when impinge on the walls of container.

Answer: D

Watch Video Solution

4. A ferromagnetic material is placed in an external magnetic field. The magnetic domains

A. increase in size but no change in orientation.

B. have no relation with external magnetic field.

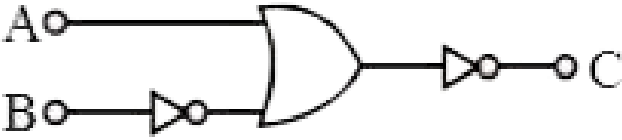
C. decrease in size and changes orientation.

D. may increase or decrease in size and change its orientation.

Answer: D

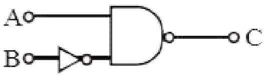
Watch Video Solution

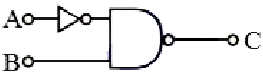
Watch Video Solution

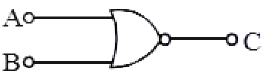


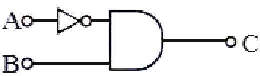
5.

The logic circuit shown above is equivalent to :

A. 

B. 

C. 

D. 

Answer: D

Watch Video Solution

6. The period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\frac{L}{g}}$. Measured value of 'L' is 1.0 m from meter scale having a minimum division of 1 mm and time of one complete oscillation is 1.95 s measured from stopwatch of 0.01 s resolution. The percentage error in the determination of 'g' will be :

A. 1.13 %

B. 1.03 %

C. 1.33 %

D. 1.30 %

Answer: A

Watch Video Solution

7. Given below are two statements :

Statement I : PN junction diodes can be used to function as transistor, simply by connecting two diodes, back to back, which acts as the base terminal.

Statement II : In the study of transistor, the amplification factor B indicates ratio of the collector current to the base current.

In the light of the above statements, choose the correct answer from the options given below:

A. Statement I is false but Statement II is true

B. Both Statement I and Statement II are true

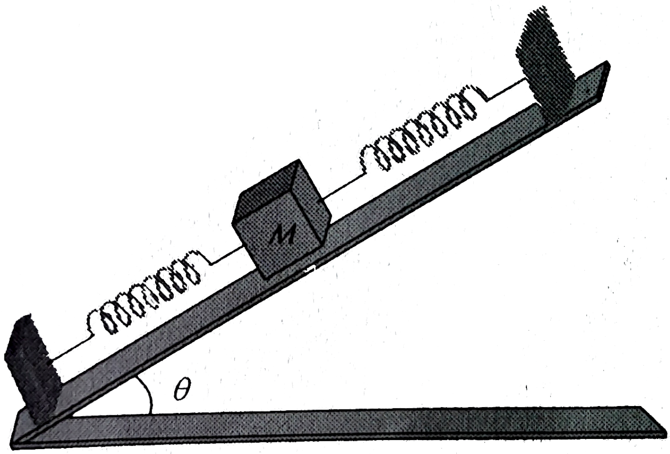
C. Both Statement I and Statement II are false

D. Statement I is true but Statement II is false

Answer: A

Watch Video Solution

8. On a smooth inclined plane, a body of mass M is attached between two springs. The other ends of the springs are fixed to firm supports. If each spring has force constant K , the period of oscillation of the body (assuming the springs as massless) is



A. $\frac{1}{2\pi}\sqrt{\frac{k}{2M}}$

B. $\frac{1}{2\pi}\sqrt{\frac{2k}{Mg\sin\alpha}}$

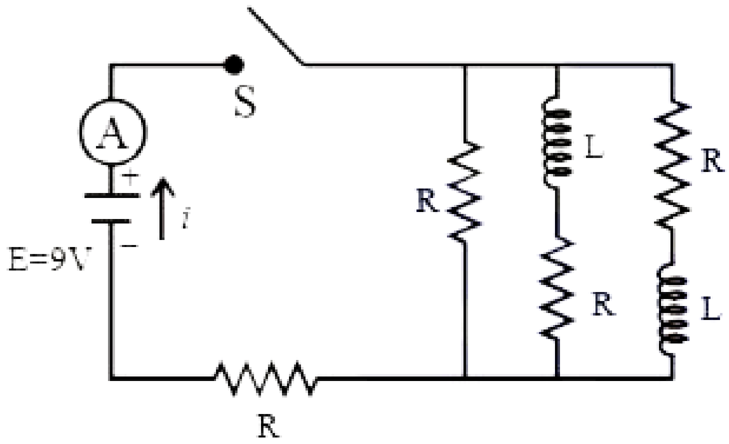
C. $\frac{1}{2k}\sqrt{\frac{k2}{M}}$

D. $\frac{1}{2\pi}\sqrt{\frac{k}{Mg\sin\alpha}}$

Answer: C

Watch Video Solution

9. Figure shows a circuit that contains four identical resistors with resistance R = 2.0 Ω, two identical inductors with inductance L = 2.0 mH and an ideal battery with emf E = 9 V. The current 'i' just after the switch 'S' is closed will be :



A. 2.25 A

B. 3.0 A

C. 3.37 A

D. $9A$

Answer: A

Watch Video Solution

10. If the de - Broglie wavelengths for a proton and for an α - particle is equal , then what is the ratio of velocities for proton and alpha particle?

A. $4:3$

B. $4:1$

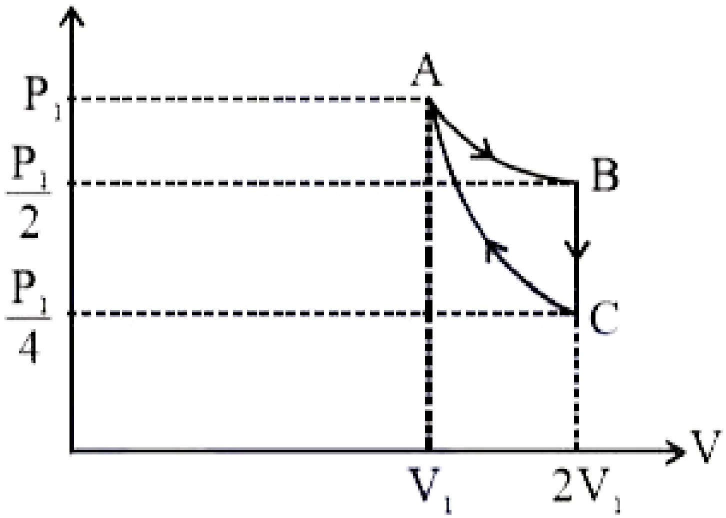
C. $4:2$

D. $1:4$

Answer: B

Watch Video Solution

11. If one mole of an ideal gas at (P_1, V_1) is allowed to expand reversibly and isothermally (A to B) its pressure is reduced to one-half of the original pressure (see figure). This is followed by a constant volume cooling till its pressure is reduced to one-fourth of the initial value $(B \rightarrow C)$. Then it is restored to its initial state by a reversible adiabatic compression (C to A). The net workdone by the gas is equal to :



A. $RT\left(\ln 2 - \frac{1}{2(\gamma - 1)}\right)$

B. $-\frac{RT}{2(\gamma - 1)}$

C. 0

D. RT ln 2

Answer: A

Watch Video Solution

12. An X-ray tube is operated at 1.24 million volt. The shortest wavelength of the produced photon will be :

A. 10^{-3} nm

B. 10^{-1} nm

C. 10^{-2} nm

D. 10^{-4} nm

Answer: A

Watch Video Solution

13. Which of the following equations represents a travelling wave?

A. $y = A\sin(15x - 2t)$

B. $y = Ae^{-x^2}(vt + \theta)$

C. $y = Ae^{x}\cos(\omega t - \theta)$

D. $y = A\sin x \cos \omega t$

Answer: A

Watch Video Solution

14. According to Bohr's model which of the following transition will be having maximum frequency?

A. n = 4 to n = 3

B. n = 2 to n = 1

C. n = 5 to n = 4

D. n = 3 to n = 2

Answer: B

Watch Video Solution

Watch Video Solution

15. If the source of light used in a young's double slit experiment is changed from red to violet

A. consecutive fringe lines will come closer.

B. the central bright fringe will become a dark fringe.

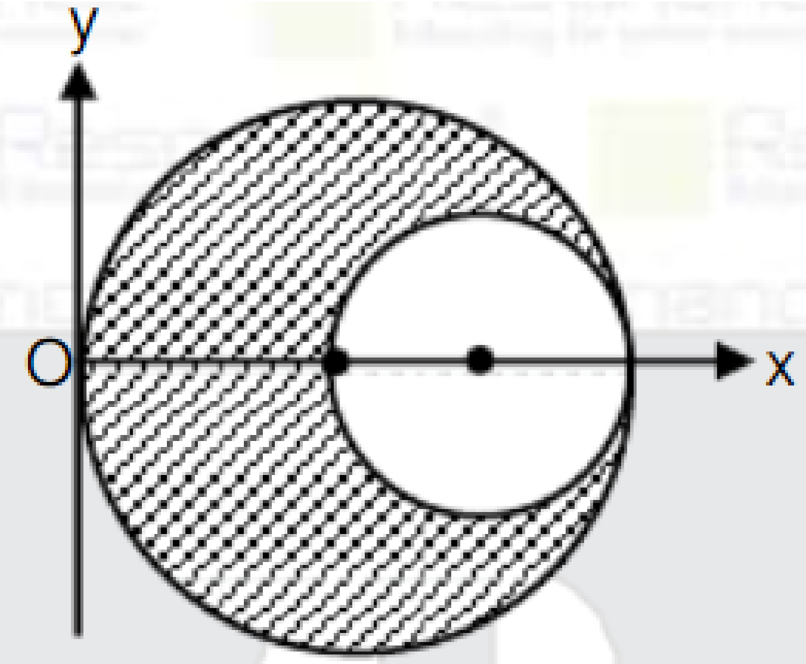
C. the fringes will become brighter.

D. the intensity of mini ma will increase.

Answer: A

Watch Video Solution

16. A disc of radius $\frac{a}{2}$ is cut out from a uniform disc of radius a as shown in figure . Find the X Coordinate of centre of mass of remaining portion



A. $\frac{1}{6}a$

B. $\frac{10}{11}a$

C. $\frac{5}{6}a$

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

Answer: C

Watch Video Solution

17. Zener breakdown occurs in a p-n junction having p and n both :

A. lightly doped and have wide depletion layer.

B. heavily doped and have narrow depletion layer.

C. lightly doped and have narrow depletion layer.

D. heavily doped and have wide depletion layer.

Answer: B

Watch Video Solution

18. Match List - I with List - II.

List - I	List - II
(a) Source of microwave frequency	(i) Radioactive decay on nucleus
(b) Source of infrared frequency	(ii) Magnetron
(c) Source of Gamma Rays	(iii) Inner shell electrons
(d) Source of X-rays	(iv) Vibration of atoms and molecules
	(v) LASER
	(vi) RC circuit

Choose the correct answer from the options given below:

A. (*a*) - (*vi*), (*b*) - (*iv*), (*c*) - (*i*), (*d*) - (*v*)

B. (*a*) - (*vi*), (*b*) - (*v*), (*c*) - (*i*), (*d*) - (*iv*)

C. (*a*) - (*ii*), (*b*) - (*iv*), (*C*) - (*vi*), (*d*) - (*iii*)

D. (*a*) - (*ii*), (*b*) - (*iv*), (*c*) - (*i*), (*d*) - (*iii*)

Answer: D

Watch Video Solution

19. A particle is projected with velocity V_0along axis x . The deceleration on the particle is proportional to the square of the distance from the origin i.e., $a = \omega x^2$. distance at which the particle stops is

A. $\left(\frac{3v_0^2}{2\alpha}\right)^{\frac{1}{2}}$

B. $\left(\frac{2v_0}{3\alpha}\right)^{\frac{1}{2}}$

C. $\left(\frac{2v_0^2}{3\alpha}\right)^{\frac{1}{2}}$

D. $\left(\frac{3v_0^2}{2\alpha}\right)^{\frac{1}{3}}$

Answer: D

Watch Video Solution

20. A body weighs 49 N on a spring balance at the north pole. What will be its weight recorded on the same weighing machine, if it is shifted to the equator ?

(Use $g = \frac{GM}{R^2} = 9.8ms^{-2}$ and radius of earth, R = 6400 km.]

A. 49 N

B. 49.83 N

C. 48.83 N

D. 49.17 N

Answer: c

Watch Video Solution

(SECTION - B)

1. A uniform metallic wire is elongated by 0.04 m when subjected to a linear force F. The elongation, if its length and diameter is doubled and subjected to the same force will be _____ cm.

Watch Video Solution

2. A cylindrical wire of radius 0.5 mm and conductivity 5×10^{7} S/m is subjected to an electric field of 10 mV/m. The expected value of current in the wire will be $x^{3}\pi$ mA. The value of x is ____ .

Watch Video Solution

3. A uniform thin bar of mass 6 kg and length 2.4 meter is bent to make an equilateral hexagon. The moment of inertia about an axis passing through the centre of mass and perpendicular to the plane of hexagon is _____ $\times 10^{-1} kgm^{2}$

Watch Video Solution

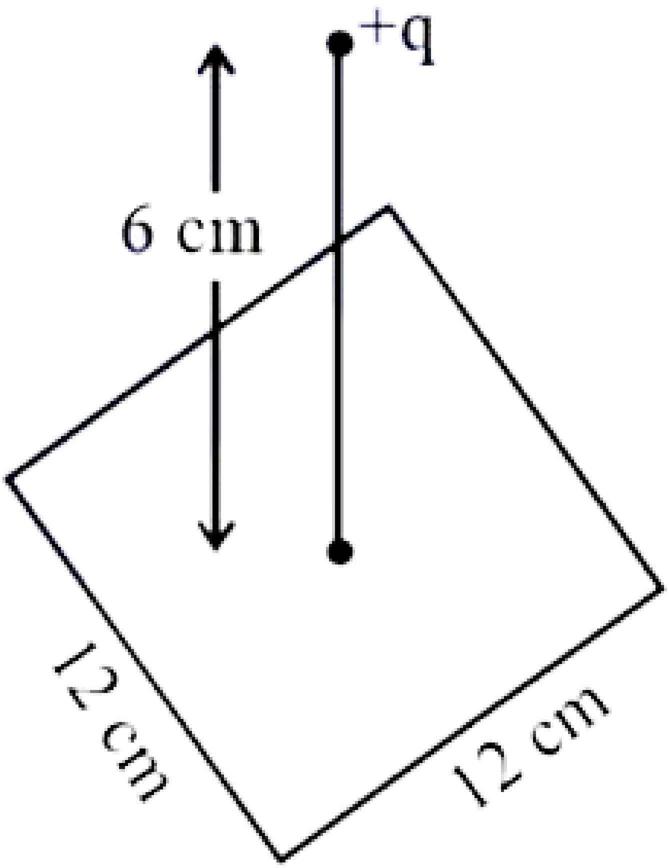
4. Two solids A and B of mass 1 kg and 2 kg respectively are moving with equal linear momentum. The ratio of their kinetic energies $(K.E.)_A : (K.E.)_B$ will be $\frac{A}{1}$, so the value of A will be _____ .

Watch Video Solution

5. The molecules of a given mass of gas have root mean square speeds of $100ms^{-1} at 27^{\circ} C$ and 1.00 atmospheric pressure. What will be the root mean square speeds of the molecules of the gas at $127^{\circ} C$ and 2.0 atmospheric pressure?

Watch Video Solution

6. A point charge of $+12\mu C$ is at a distance 6 cm vertically above the centre of a square of side 12 cm as shown in figure. The magnitude of the electric flux through the square will be ______ $\times 10^3 Nm^2/C$.



Watch Video Solution

7. A signal of 0.1 kW is transmitted in a cable. The attenuation of cable is -5 dB per km and cable length is 20 km. The power received at receiver is 10^{-x} W. The value of x is _____ . [Gain in $10\log_{10}\left(\frac{P_0}{P_i}\right)$]

Watch Video Solution

8. A series LCR circuit is designed to resonate at an angular frequency $\omega_0 = 10^5$ rad/s. The circuit draws 16 W power from 120 V source at resonance. The value of resistance 'R' in the circuit is ______ Ω.

Watch Video Solution

9. Two cars are approaching each other at an equal speed of 7.2 km/hr. When they see each other, both blow horns having frequency of 676 Hz. The beat frequency heard by each driver will be _____ Hz. [Velocity of sound in air is 340 m/s.]

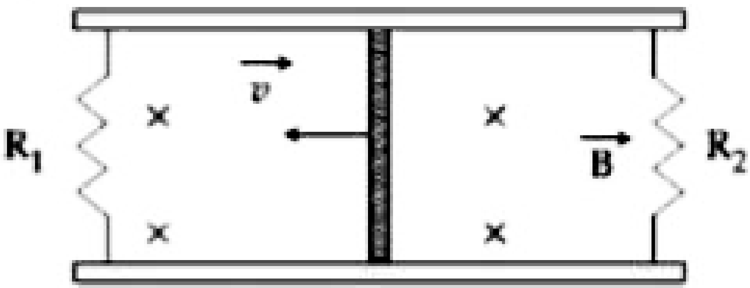
Watch Video Solution

10. An electromagnetic wave of frequency 3 GHz enters a dielectric medium of relative electric permittivity 2.25 from vacuum. The wavelength of this wave in that medium will be ______ $\times 10^{-2}$ cm.

Watch Video Solution

PHYSICS (SECTION A)

1. A conducting bar of length L is free to slide on two parallel conducting rails as shown in the figure



Two resistors R_1 and R_2 are connected across the ends of the rails. There is a uniform magnetic field $\vec{B}$ pointing into the page. An external agent pulls the bar to the left at a constant speed v.

The correct statement about the directions of induced currents I_1 and l_2 flowing through R_1 and R_2 respectively is:

A. Both I_1 and I_2 are in anticlockwise direction

B. I_1 is in anticlockwise direction and I_2 is in clockwise direction

C. Both I_1 and I_2 are in clockwise direction

D. I_1 is in clockwise direction and I_2 is in anticlockwise direction

Watch Video Solution

2. One main scale division of a vernier callipers is 'a cm and n^{th} division of the vemier scale coincide with $(n - 1)^{th}$ division of the main scale. The least count of the callipers in mm is :

A. $\left(\frac{n - 1}{10n}\right)a$

B. $\frac{10na}{(n - 1)}$

C. $\frac{10a}{n}$

D. $\frac{10a}{(n - 1)}$

Watch Video Solution

3. For changing the capacitance of a given parallel plate capacitor, a dielectric material of dielectric constant K is used, which has the same area is the plates of the capacitor. The thick of the directrie slab is $\frac{3}{4}d$, where 'd' is the separation between the plates of parallel plate capacite. The new capacitance (C') in terms of original capacitance$\left(C_0\right)$ is given by the following relation:

A. $C = \frac{4K}{K+3}C_0$

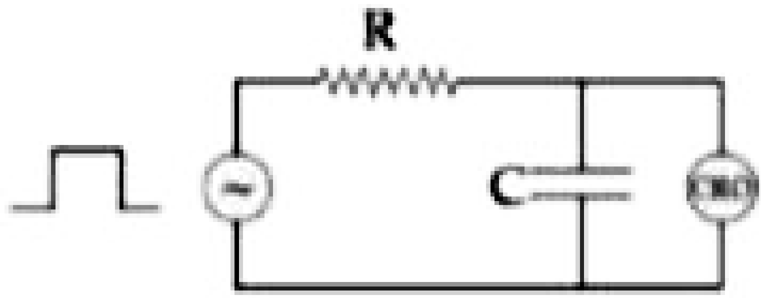
B. $C' = \frac{3+K}{4K}C_0$

C. $C' = \frac{4+K}{3}C_0$

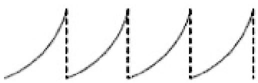
D. $C' = \frac{4}{3+K}C_0$

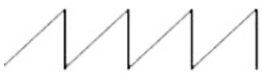
Watch Video Solution

4. An RC circuit as shown in the figure is driven by a AC source generating a quare wave. The output wave pattern monitored by CRO would look close to :



A. 

B. 

C. 

D. 

Watch Video Solution

5. The pressure acting on a submarine is 3×10^5 at a certain depth. If the depth is doubled the percentage increase in the pressure acting on the submarine would be :

(Assume that atmospheric pressure is 1×10^5 Pa density of water is $10^3 kgm^{-3}, g - 10ms^{-2}$)

A. $\frac{3}{200}\%$

B. $\frac{200}{3}\%$

C. $\frac{200}{5}\%$

D. $\frac{5}{200}\%$

Watch Video Solution

6. A 25m long antenna is mounted on an antenna towe. The height of the ancora towels 75 m The wavelength (in meter) of the signal transmitted by this antenna would be

A. 100

B. 300

C. 400

D. 200

Watch Video Solution

7. Time period of a simple pendulum is T inside a lift when the lift is stationary. If the lift moves upwards with an acceleration g/2, the time period of pendulum will be:

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

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

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

D. $\sqrt{3}T$

Watch Video Solution

8. A bar magnet of length 14 cm is placed in the magnetic meridian with its north pole pointing towards the geographic north pole. A neutral point is obtained at a distance of 18 cm from the center of the magnet. If $B_H = 0.4G$, the magnetic moment of the magnet is $\left(1G = 10^{-4}T\right)$

A. $2.880JT^{-1}$

B. $2.880 \times 10^3 JT^{-1}$

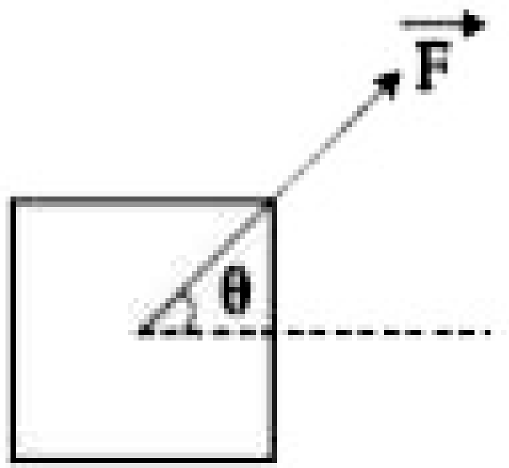
C. $28.80JT^{-1}$

D. $2.880 \times 10^2 JT^{-1}$

Watch Video Solution

9. A block of mass m slides along a floor while a force of magnitude F is applied to it at an angle θ as shown in figure. The coefficient of kinetic friction is μr. Then, the block's acceleration 'a' is given by:

(g is acceleration due to gravity)



A. $\frac{F}{m}\cos\theta - \mu K\left(g - \frac{F}{m}\sin\theta\right)$

B. $\frac{F}{m}\cos\theta + \mu K\left(g - \frac{F}{m}\sin\theta\right)$

C. $-\frac{F}{m}\cos\theta - \mu K\left(g - \frac{F}{m}\sin\theta\right)$

D. $\frac{F}{m}\cos\theta - \mu K\left(g + \frac{F}{m}\sin\theta\right)$

Watch Video Solution

10. A conducting wire of length 'I', area of cross-section A and electric resistivity ρ is connected between the terminals of a battery. A potential difference V is developed between its ends, causing an electric current.

If the length of the wire of the same material is doubled and the area of cross-section is halved, the resultant current would be:

A. $\frac{1}{4}\frac{\rho l}{VA}$

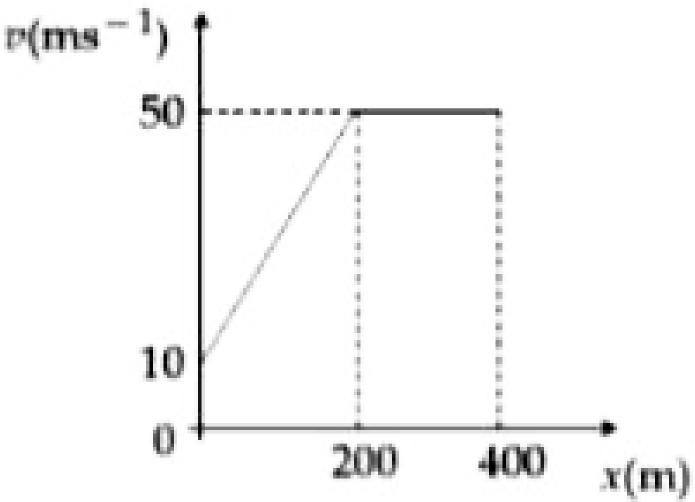
B. $\frac{3}{4}\frac{VA}{\rho l}$

C. $\frac{1}{4}\frac{VA}{\rho l}$

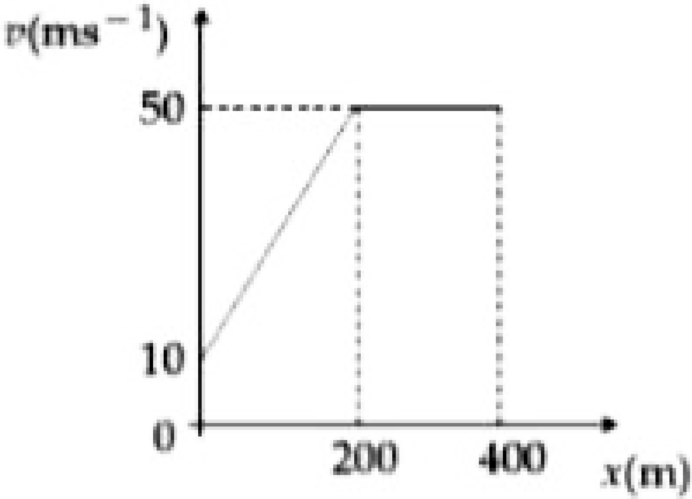
D. $4\frac{VA}{\rho l}$

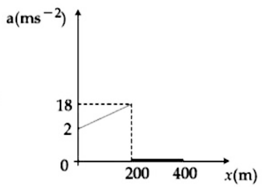
Watch Video Solution

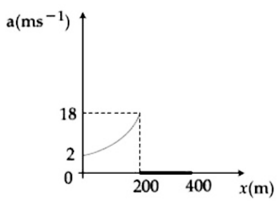
11. The velocity-displacement graph describing the motion of a bicycle is shown in the figure.

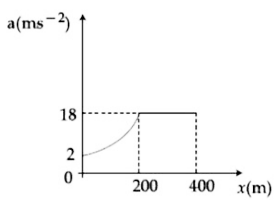


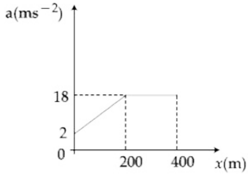
The acceleration-displacement graph of the bicycle's motion is best described by:



A. 

B. 

C. 

D. 

Watch Video Solution

12. The stopping potential in the context of photoelectric effect depends on the following property of incident electromagnetic radiation :

A. Phase

B. Intensity

C. Frequency

D. Amplitude

Watch Video Solution

13. A plane electromagnetic wave of frequency 500 MHz is travelling in vacuum along y-direction At a particular point in space and time, $\vec{B} = 8.0 \times 10^{-8} \hat{z} T$. The value of electric field at this point is:

(speed of light $= 3 \times 10^8 ms^{-1}$)

$\hat{x}, \hat{y}, \hat{z}$ are unit vectors along x, y and a directions.

A. $24\hat{x}V/m$

B. $-2.6\hat{y}V/m$

C. $-24\hat{x}V/m$

D. $2.6\hat{x}V/m$

Watch Video Solution

14. In thermodynamics, heat and work are :

A. Point functions

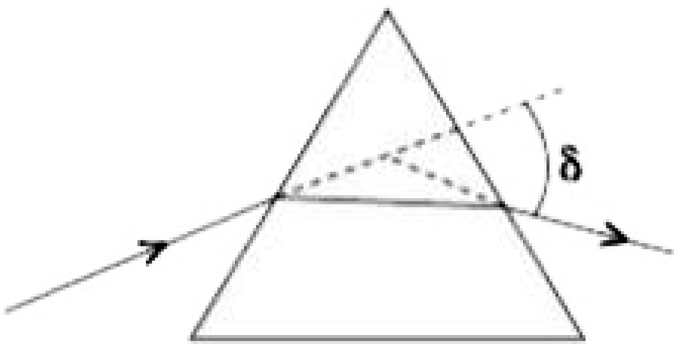
B. Path functions

C. Extensive thermodynamic state variables

D. Intensive thermodynamic state variables

Watch Video Solution

15. The angle of deviation through a prism is minimum when



(A) Incident ray and emergent ray are symmetric to the prism

(B) The refracted ray inside the prism becomes parallel to its base

(C) Angle of incidence is equal to that of the angle of emergence

(D) When angle of emergence is double the angle of incidence

Choose the correct answer from the options given below :

A. Only statements (A) and (B) are true

B. Statement (A), (B) and (C) are treu

C. Statement (B) and (C) are treu

D. Only statement (D) is true

Watch Video Solution

16. The maximum and minimum distances of a comet from the Sun are 1.6×10^{12}m and $8.0 \times 10^{10} m$respectively. If the speed of the comet at the nearest point is $6 \times 10^{4} ms^{-1}$, the speed at the farthest point is:

A. $4.5 \times 10^{3} m/s$

B. $3.0 \times 10^{3} m/s$

C. $6.0 \times 10^{3} m/s$

D. $1.5 \times 10^3 m/s$

Watch Video Solution

17. A block of 200 g mass moves with a uniform speed in a horizontal circular groove, with vertical side walls of radius 20 cm. If the block takes 40 s to complete one round, the normal force by the side walls of the groove is :

A. $0.0314N$

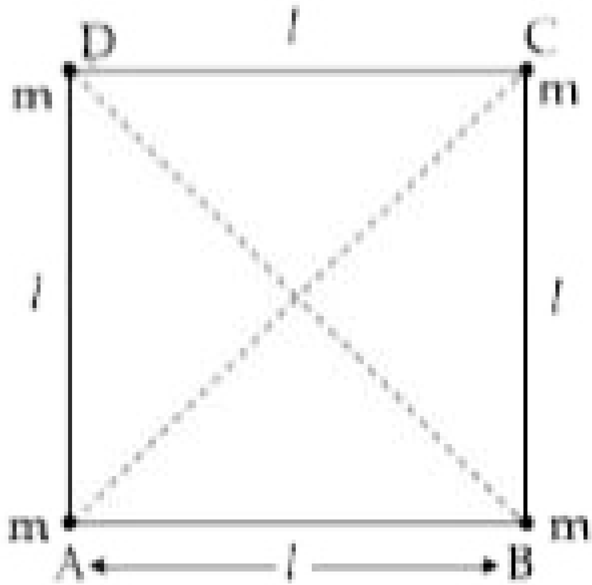
B. $6.28 \times 10^{-3}N$

C. $9.859 \times 10^{-2}N$

D. $9.859 \times 10^{-4}N$

Watch Video Solution

18. Four equal masses, m each are placed at the corners of a square of length (l) as shown in the figure. The moment of inertia of the system about an axis passing through A and parallel to DB would be:



A. $\sqrt{3}ml^2$

B. $2ml^2$

C. $3ml^2$

D. ml^2

Watch Video Solution

Watch Video Solution

19. The volume V of an enclosure contains a mixture of three gases, 16 g of oxygen, 28 g of nitrogen and 44 g of carbon dioxide at absolute temperature T. Consider Ras universal gas constant. The pressure of the mixture of gases is:

A. $\frac{88RT}{V}$

B. $\frac{3RT}{V}$

C. $\frac{4RT}{V}$

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

Watch Video Solution

20. For an electromagnetic wave travelling in free space, the relation between average energy densities due to electric $\left(\mu_e\right)$ and magnetic

$\left(\mu_m\right)$ fields is:

A. $U_e \neq U_m$

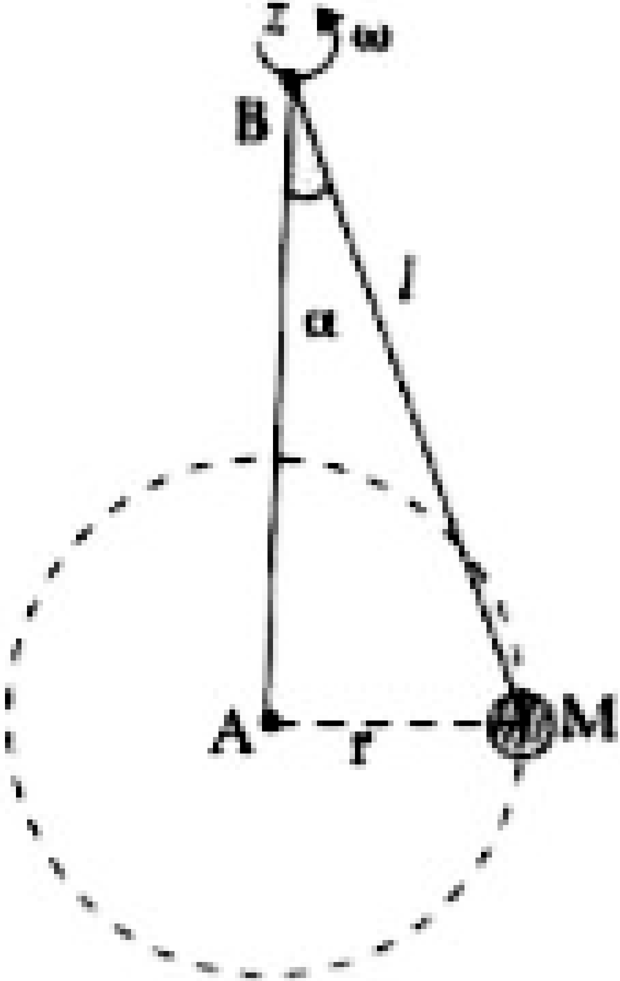
B. $U_e = U_m$

C. $U_e < U_m$

D. $U_e > U_m$

Watch Video Solution

21. A mass M hangs on a massless rod of length l which rotates at a constant angular frequency. The mass M moves with steady speed in a circuilar path of constant radius. Assume that the system is in steady circular motion with constant angular velocity ω. The angular momentum of M about point A is L_A, which lies in the positive z direction and the angular momentum of M about point B is L_B. The correct statement for this system is :



A. L_B is constant in direction with varying magnitude

B. L_A and L_B are both constant in magnitude and direction

C. L_A is constant, both in magnitude and direction

D. L_B is constant, both in magnitude and direction

Watch Video Solution

22. If an electron is moving in the n^{th} orbit of the hydrogen atom, then its velocity (v_n) for the n^{th} orbit is given as :

A. $v_n \propto \frac{1}{n^2}$

B. $v_n \propto n^2$

C. $v_n \propto n$

D. $v_n \propto \frac{1}{n}$

Watch Video Solution

23. Two identical metal wires of thermal conductivities K_1 and K_2 respectively are connected in series. The effective thermal conductivity of the combination is :

A. $\dfrac{K_1 + K_2}{K_1 K_2}$

B. $\dfrac{K_1 K_2}{K_1 + K_2}$

C. $\dfrac{2K_1 K_2}{K_1 + K_2}$

D. $\dfrac{K_1 + K_2}{2K_1 K_2}$

Watch Video Solution

24. A polyatomic ideal gas has 24 vibrational modes. What is the value of γ

A. 1.37

B. 1.06

C. 1.30

D. 10.3

Watch Video Solution

25. A car accelerates from rest at a constant rate α for some time, after which it decelerates at a constant rate β, to come to rest. If the total time elapsed is t seconds. Then evalute (a) the maximum velocity reached and (b) the total distance travelled.

A. $\dfrac{2\alpha\beta}{(\alpha+\beta)}t^2$

B. $\dfrac{\alpha\beta}{2(\alpha+\beta)}t^2$

C. $\dfrac{\alpha\beta}{4(\alpha+\beta)}t^2$

D. $\dfrac{4\alpha\beta}{(\alpha+\beta)}t^2$

Watch Video Solution

26. A particle excutes SHM, at what value of displacement are the kinetic and potential energies equal?

A. $x = \frac{A}{2}$

B. $x = \pm \frac{A}{\sqrt{2}}$

C. $x = 0$

D. $x = \pm A$

Watch Video Solution

27. A Carnot's engine working between 400K and 800 K has a work output of 1200J per cycle. The amount of heat energy supplied to the engine from the source in each cycle is :

A. 1800J

B. 2400J

C. 1600J

D. 3200J

Watch Video Solution

28. The vernier scale used for measurement has a positive zero error of 0.2 mm. If while taking a measurement it was noted that '0' on the vernier scale lies between 8.5 cm and 8.6 cm, vernier coincidence is 6, then the correct value of measurement is ____________ cm. (least count = 0.01 cm)

A. 8.54 cm

B. 8.56 cm

C. 8.36 cm

D. 8.58cm

Watch Video Solution

29. An AC current is given by $I = I_1 \sin\omega t + I_2 \cos\omega t$ A hot wire ammeter will give a reading :

A. $\dfrac{I_1 + I_2}{\sqrt{2}}$

B. $\sqrt{\dfrac{I_1^2 - I_2^2}{2}}$

C. $\sqrt{\dfrac{I_1^2 + I_2^2}{2}}$

D. $\dfrac{I_1 + I_2}{2\sqrt{2}}$

Watch Video Solution

30. Two ideal polyatomic gases at temperature T_1 and T_2 are mixed so that there is no loss of energy . If F_1 and F_2, m_1 and m_2, n_1 and n_2 be the degrees of freedom, masses, number of molecules of the firest and second gas respectively, the temperature of mixture of these two gases is :

A. $\dfrac{n_1F_1T_1 + n_2F_2T_2}{n_1 + n_2}$

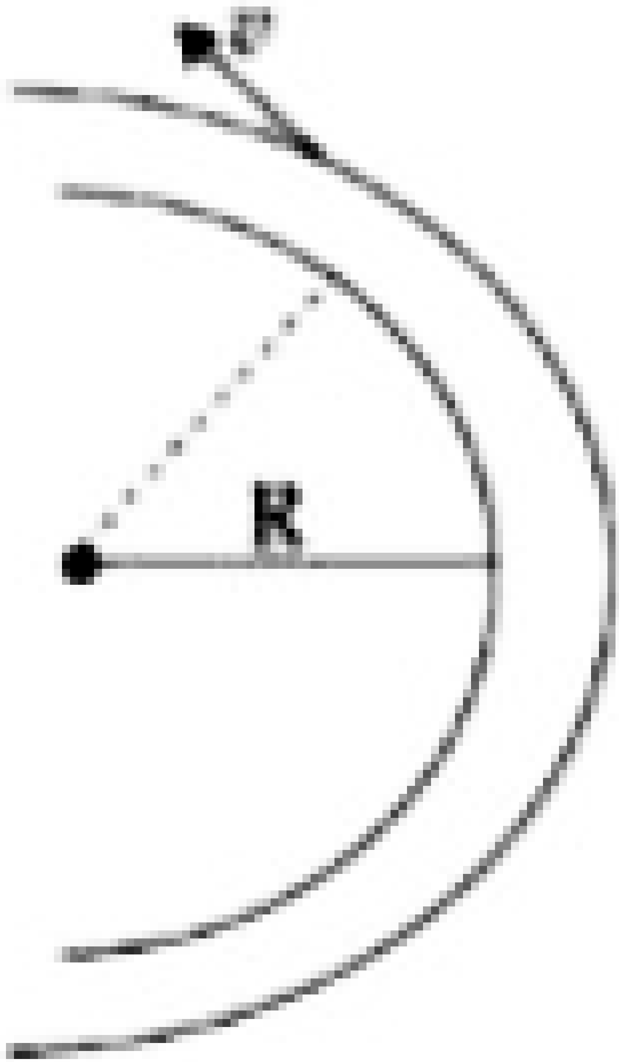
B. $\dfrac{n_1F_1T_1 + n_2F_2T_2}{F_1 + F_2}$

C. $\dfrac{n_1F_1T_1 + n_2F_2T_2}{n_1F_1 + n_2F_2}$

D. $\dfrac{n_1T_1 + n_2T_2}{n_1 + n_2}$

Watch Video Solution

31. A modern gran -prix racing car of masses m is travelling on a flat track in a circular arc of radius R with a speed v. If the coefficient of static friction between the tyres and the track is μ_s, then the magnitude of negative lift F_L acting downwards on the car is : (Assume forces on the four tyres are identical and g = acceleration due to gravity)



A. $m\left(\frac{v^2}{\mu_S R} - g\right)$

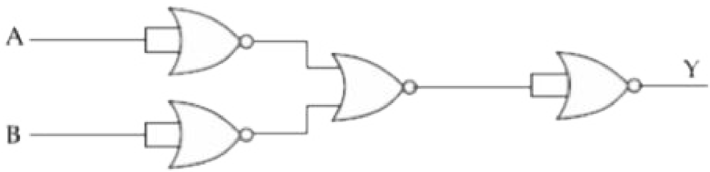
B. $m\left(\frac{v^2}{\mu_S R} + g\right)$

C. $m\left(g - \frac{v^2}{\mu_S R}\right)$

D. $-m\left(g + \frac{v^2}{\mu_S R}\right)$

Watch Video Solution

32. The output of the given combination gates represents :



A. NOR Gate

B. XOR Gate

C. AND Gate

D. NAND Gate

Watch Video Solution

33. The diameter of a plano convex lens is $6cm$ and thickness at the centre is $3mm$. If the speed of light in the material of the lens is $2 \times 10^8 m/s$, what is the focal length of the lens ?

A. .15 cm

B. 30 cm

C. 0.30 cm

D. 1.5 cm

Watch Video Solution

34. An electron of mass m and a photon have same energy E. The ratio of wavelength of electron to that of photon is : (c being the velocity of light)

A. $\frac{1}{c}\left(\frac{2m}{E}\right)^{1/2}$

B. $\left(\frac{E}{2m}\right)^{1/2}$

C. $\frac{1}{c}\left(\frac{E}{2m}\right)^{1/2}$

D. $c(2mE)^{\frac{1}{2}}$

Watch Video Solution

35. A current of 10 A exists in a wire of crossectional area of 5 mm^2 with a drift velocity of $2 \times 10^{-3} ms^{-1}$. The number of free electrons in each cubic meter of the wire is ____________

A. 1×10^{23}

B. 625×10^{25}

C. 2×10^{25}

D. 2×10^{6}

Watch Video Solution

36. When two soap bubbles of radii a and b $(b > a)$ coalesce, the radius of curvature of common surface is :

A. $\frac{a+b}{ab}$

B. $\frac{ab}{a+b}$

C. $\frac{b-a}{ab}$

D. $\frac{ab}{b-a}$

Watch Video Solution

37. A solenoid of 1000 turns per metre has a core with relative permeability 500. Insulated windings of the solenoid carry an electric current jof 5A. The magnetic flux density produced by the solenoid is :

(permeability of free space $= 4\pi \times 10^{-7} H/m$)

A. $\frac{\pi}{5}T$

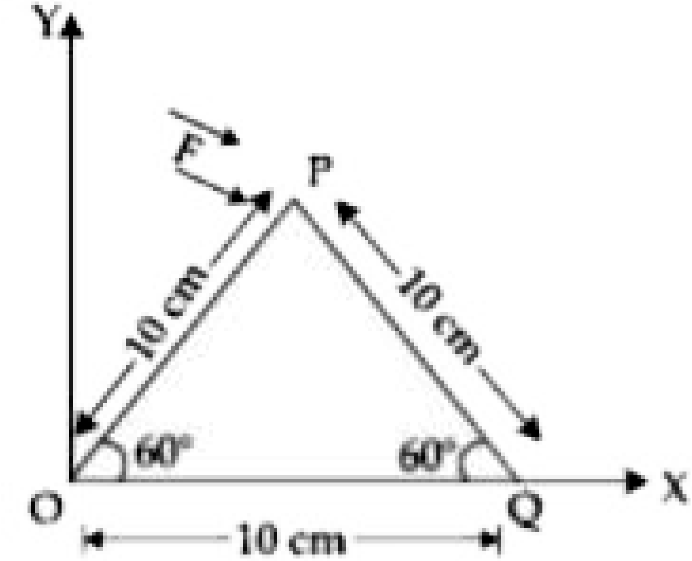
B. $10^{-4}\pi T$

C. πT

D. $2 \times 10^{-3}\pi T$

Watch Video Solution

38. A triangular plate is shown. A force $\vec{F} = 4\hat{i} - 3\hat{j}$ is applied at point P. The torque at point P with respect to point 'O' and 'Q ' are :



A. $-15 + 20\sqrt{3}, 15 + 20\sqrt{3}$

B. $-15 - 20\sqrt{3}, 15 - 20\sqrt{3}$

C. $15 + 20\sqrt{3}, 15 - 20\sqrt{3}$

D. $15 - 20\sqrt{3}, 15 + 20\sqrt{3}$

Watch Video Solution

39. Which level of the single ionized carbon has the same energy as the ground state energy of hydrogen atom ?

A. 8

B. 1

C. 6

D. 4

Watch Video Solution

40. A boy is rolling a 0.5 kg ball on the frictionless floor with the speed of $20ms^{-1}$. The ball gets deflected by an obstacle on the way. After deflection it moves with 5% of its initial kinetic eneryg. What is the speed of the ball now ?

A. $1.00ms^{-1}$

B. $4.47ms^{-1}$

C. $14.41ms^{-1}$

D. $19.0ms-^{1}$

Watch Video Solution

41. In a seris LCR circuit, the inductive reactance $\left(X_L\right)$ is 10Ω and the capacitive reactance $\left(X_C\right)$ is 4Ω. The resistance (R) in the circuit is 6Ω. The power factor of the circuit is :

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

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

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

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

Watch Video Solution

Watch Video Solution

42. For an adiabatic expansion of an ideal gas, the fractional change in its pressure is equal to (where γ is the ratio of specific heats):

A. $-\gamma \frac{dV}{V}$

B. $-\gamma \frac{V}{dV}$

C. $-\frac{1}{\gamma} \frac{dV}{V}$

D. $\frac{dV}{V}$

Watch Video Solution

43. If the angular velocity of earth's spin is increased such that the bodies at the equator start floating, the duration of the day would be approximately:

$\left[\text{Take } g = 10ms^{-2}, \text{ the radius of the earth } R = 6400 \times 10^3 m, \text{ Take } \pi = 3.14\right]$

A. does not change

B. 1200 minutes

C. 60 minutes

D. 84 minutes

Watch Video Solution

44. An object of mass m_1 collides with another object of mass m_2, which is at rest. After the collision the objects move with equal speed in opposite direction. The ratio of the masses $m_2 : m_1$ is

A. $3 : 1$

B. $2 : 1$

C. $1 : 1$

D. $1 : 2$

Watch Video Solution

45. A plane electromagnetic wave propagating along y-direction can have the following pair of electric field $\left(\vec{E}\right)$ and magnetic field $\left(\vec{B}\right)$ components.

A. E_y, B_x or E_x, B_y

B. E_x, B_z or E_z, B_x

C. E_y, B_y or E_z, B_z

D. E_z, B_y or E_y, B_x

Watch Video Solution

46. Which of the following statements are correct?

(A) Electric monopoles do not exist whereas magnetic monopoles exist.

(B) Magnetic field lines due to solenoid at its ends and outside cannot be completely straight and confined.

(C) Magnetic field lines are completely confined within a toroid.

(D) Magnetic field lines inside a bar magnet are not paralle.

(E) x=-1 is the condition for a perfect diamagnetic material, where x is its magnetic susceptiblity.

Choose the correct answer from the option given below:

A. A and B only

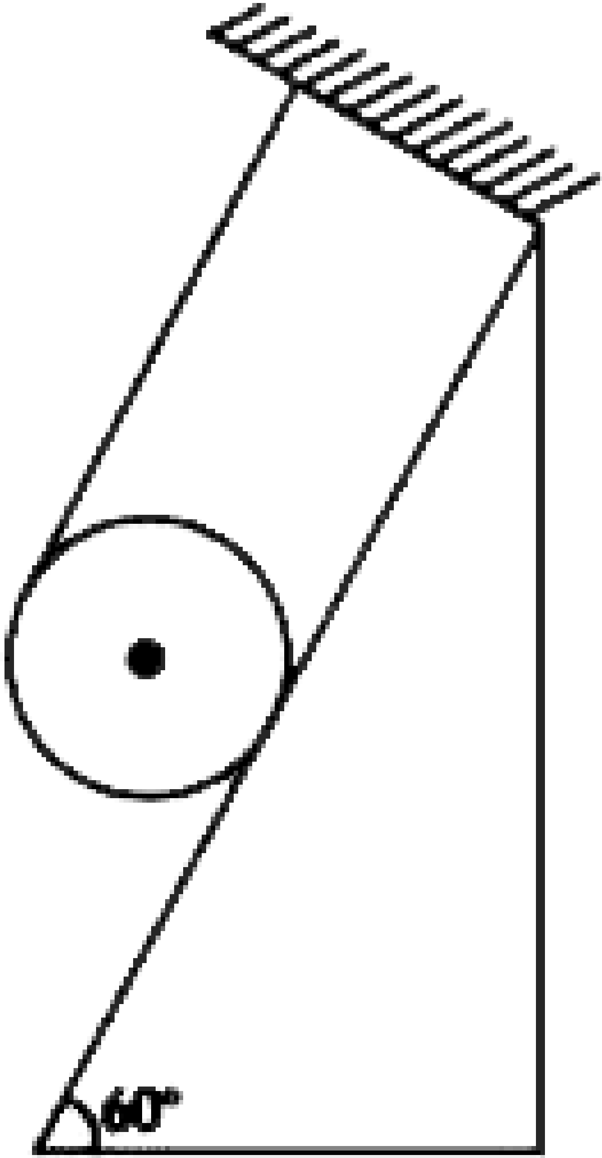
B. C and E only

C. B and D only

D. B and C only

Watch Video Solution

47. A solid cylinder of mass m is wrapped with an inextensible light string and, is placed on a rough inclined plane as shown in the figure. The frictional force acting between the cylinder and the inclined plane



is : [The

coefficient of static friction, μ_s is 0.4]

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

B. 5mg

C. $\frac{7}{2}mg$

D. 0

Watch Video Solution

48. The correct relation between α (ratio of collector current to emitter current) and β (ratio of collector current to base current) of a transistor is :

A. $\alpha = \frac{\beta}{1 + \beta}$

B. $\alpha = \frac{\beta}{1 - \alpha}$

C. $\beta = \frac{1}{1 - \alpha}$

D. $\beta = \frac{\alpha}{1 + \alpha}$

Watch Video Solution

49. The velocity -displacement graph of a particle is shown in the

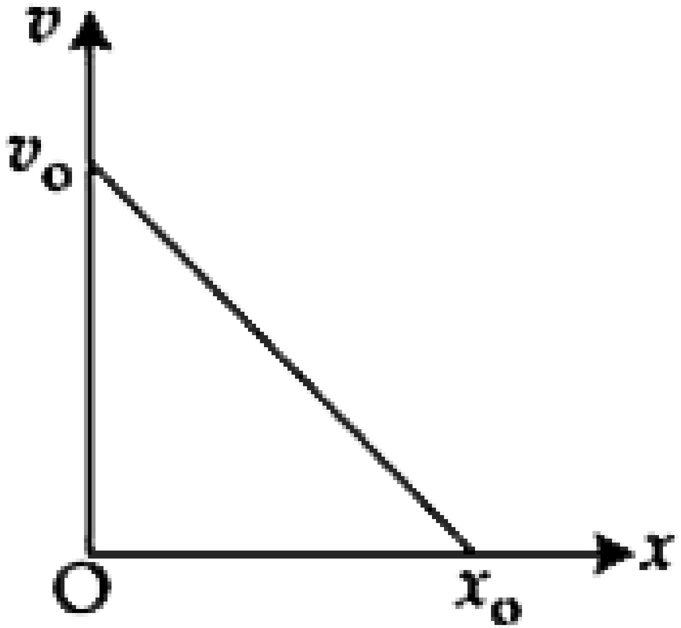
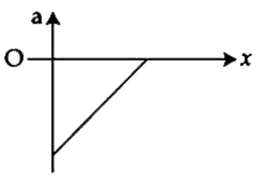
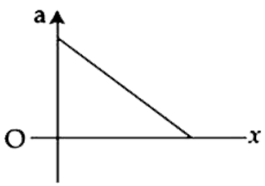
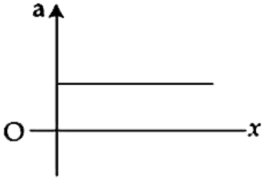


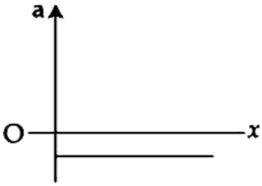
figure.

The acceleration- displacement graph of the same particle is represented by :

A.


B.


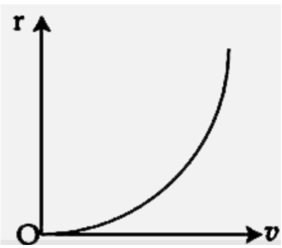
C. 

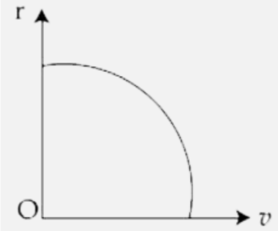
D. 

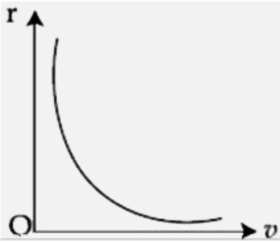
Watch Video Solution

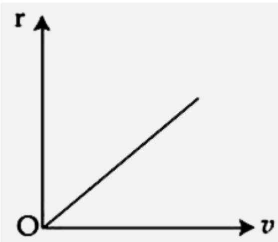
50. A particle of mass m moves in a circular orbit under the central potential field, $U(r) = \; = \; - \frac{C}{r},$ where C is a positive constant.

The correct radius -velocity graph of the particle's motion is.

A. 

B. 

C. 

D. 

Watch Video Solution

51. The funtion of time representing a simple harmonic motion with a period of $\frac{\pi}{\omega}$ is :

A. $\sin^2(\omega t)$

B. $\cos(\omega t) + \cos(2\omega t) + \cos(3\omega t)$

C. $3\cos\left(\frac{\pi}{4} - 2\omega t\right)$

D. $\sin(\omega t) + \cos(\omega t)$

Watch Video Solution

52. Consider a sample of oxygen behaving like an ideal gas, At 300K, the ratio of root mean sqaure (rms) velocity of gas molecule to average velocity would be : (Molecular weight of oxygen is 32 g/mol , $R = 8.3JK^{-1}mol^{-1}$)

A. $\sqrt{\frac{8\pi}{3}}$

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

C. $\sqrt{\frac{3\pi}{8}}$

D. $\sqrt{\frac{8}{3}}$

Watch Video Solution

53. The decay of a proton to neutron is :

A. always possible as it is associated only with β^+ decay

B. not possible but neutron to proton conversion is possible

C. possible only inside the necleus

D. not possible as proton mass is less than neutron mass

Watch Video Solution

54. The speed of electron in a scanning electron microscope is $1 \times 10^7 ms^{-1}$. If the protons having the same speed are used instead of electrons, then resolving power of scanning proton microscope will be changed by a factor of:

A. 1837

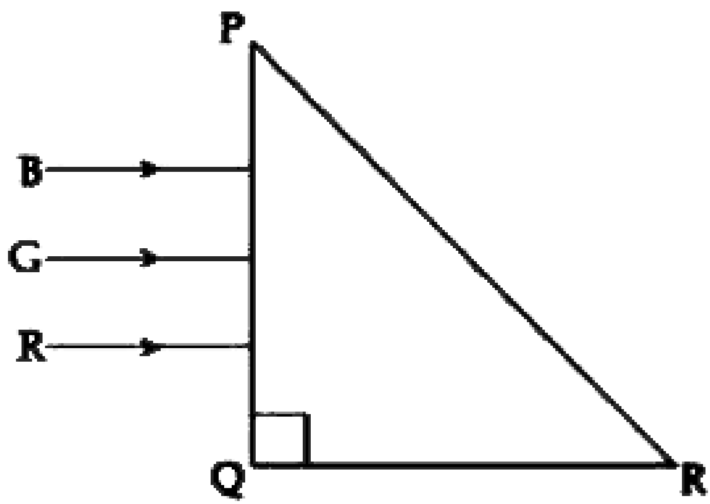
B. $\frac{1}{1837}$

C. $\sqrt{1837}$

D. $\frac{1}{\sqrt{1837}}$

Watch Video Solution

55. Three rays of light, namely red (R), green (G) and blue (B) are incident on the face PQ of a right angled prism PQR as showns in the figure.



The refractive indices of the material of the prism for red green and blue wavelength are 1.27, 1.42 and 1.49 respectively. The colour of the ray(s) emerging out of the face PR is:

A. red

B. green

C. blue and green

D. blue

Watch Video Solution

56. A proton and an α- particle, having kinetic energies K_P and K_a respectively enter into a magnetic field at right angles. The ratio of the radii of trajectory of proton to that of α - particle is 2:1. The ratio of $K_p : K_a$ is :

A. $1 : 8$

B. $8:1$

C. $1:4$

D. $4:1$

Watch Video Solution

57. The time taken for the magnetic energy to reach 25% of its maximum value, when a solenoid of resistance R, inductance L is connected to a battery, is :

A. $\frac{L}{R}\ln 10$

B. $\frac{L}{R}\ln 5$

C. $\frac{L}{R}\ln 2$

D. infinite

Watch Video Solution

58. The angular momentum of a planet of mass M moving around the sun in an elliptical orbitis $\vec{L}$. The magnitude of the areal velocity of the planet is :

A. $\frac{2L}{M}$

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

C. $\frac{L}{M}$

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

Watch Video Solution

59. An ideal gas in a cylinder is separated by a piston in such a way the entropy of one part is S_1 and that of the other part is S_2. Given that $S_1 > S_2$. If the piston is removed then the total entropy of the system will be:

A. $S_1 + S_2$

B. $S_1 \times S_2$

C. S_1 - S_2

D. $\frac{S_1}{S_2}$

Watch Video Solution

60. Consider a uniform rod of mas M and length L. It is bent into a semicircle. Its moment of inertia about a line perpendicular to the plane wire passing through the centre is

A. $\frac{1}{4}\frac{ML^2}{\pi^2}$

B. $\frac{2}{5}\frac{ML^2}{\pi^2}$

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

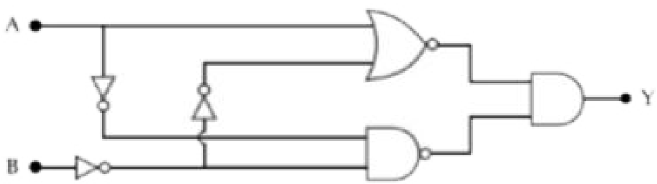
D. $\frac{1}{2}\frac{ML^2}{\pi^2}$

Watch Video Solution

PHYSICS (SECTION B)

1. In the logic circuit shown in the figure, if input A and B are 0 to 1 respectively, the output at Y would be 'x'

The value of x is ________



Watch Video Solution

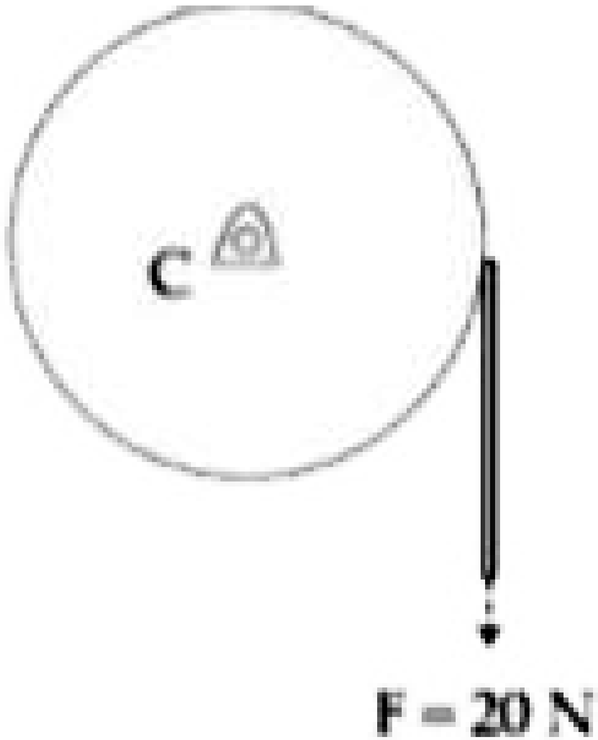
2. The resistance $R = \frac{V}{i}$, where $V = (50 \pm 2.0)V$ and $I = (20 \pm 0.2)A$.

The percentage error in R is $'x'$ %

The value of 'x' to the nearest integer is __________

Watch Video Solution

3. Consider a 20 kg uniform circular disk of radius 0.2 m. It is pin supported at its center and is at rest initially. The disk is acted upon by a constant force F= 20 N through a massless string wrapped around its periphery as shown in the figure



Suppose the disk makes n number of revolutions to attain an angular speed of 50 rad s^{-1}. The value of n, to the nearest integer, is

[Given : In one complete revolution, the disk rotates by 6.28 rad]

Watch Video Solution

4. A sinusoidal voltage of peak value 250 V is applied to a series LCR circuit, in which $R = 8ohmL = 24mH$ and $C = 60\mu F$. The value of power dissipated at resonant condition is 'x' kW. The value of x to the nearest integer is________

Watch Video Solution

5. The first three spectral lines of H-atom in the Balmer series are given $\lambda_1, \lambda_2, \lambda_3$ considering the

Bohr atomic model, the wave lengths of first and third spectral line $\left(\frac{\lambda_1}{\lambda_3}\right)$ are related by a factor of approximately $'x' \times 10^{-1}$

The value of x, to the nearest integer, is__________

Watch Video Solution

6. A fringe width of 6 mm was produced for two slits separated by 1 mm apart. The screen is placed 10 m away. The wavelength of light used is 'x' nm.

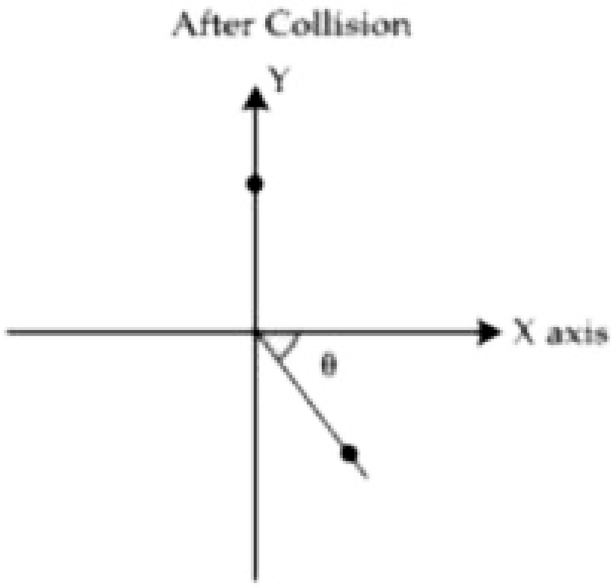
The value of 'x to the nearest integer is ________

Watch Video Solution

7. A ball of mass 10 kg moving with a velocity $10\sqrt{3}ms^{-1}$ along X-axis, hits another ball of mass 20 kg which is at rest. After collision, the first ball comes to rest and the second one disintegrates into two equal pieces. One of the pieces starts moving along Y-axis at a speed of 10 m/s. The second piece starts moving at a speed of 20 m/s at an angle θ (degree) with respect to the X-axis.

The configuration of pieces after collision is shown in the figure.

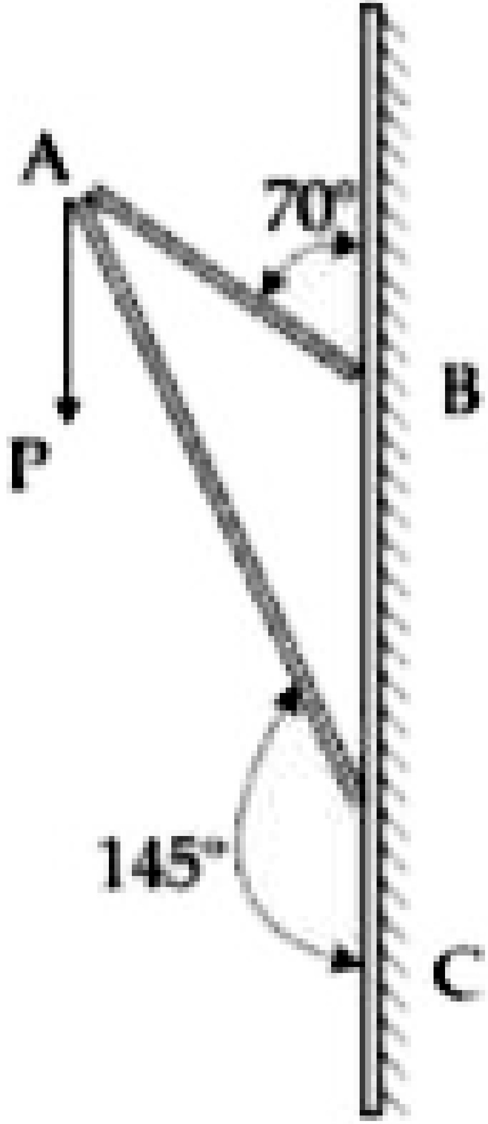
The value of θ to the nearest integer is________



Watch Video Solution

8. Consider a frame that is made up of two thin massless rods AB and AC as shown in the figure. A vertical force $\vec{P}$ of magnitude 100 N is applied at point A of the frame.

Suppose the force is $\vec{P}$ resolved parallel to the arms AB and AC of the frame.



The magnitude of the resolved component along the arm AC is xN.

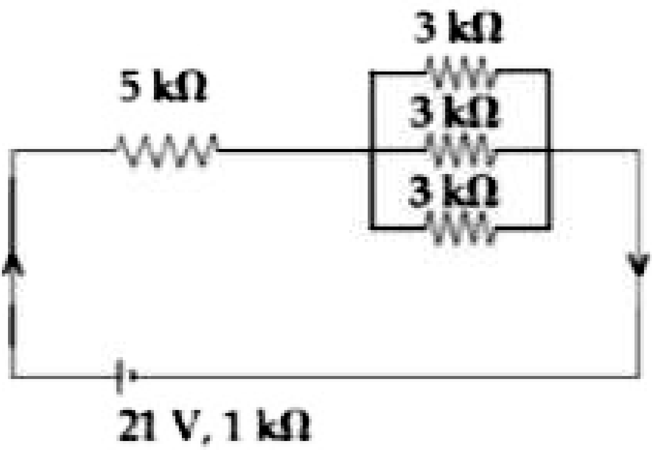
The value of x, to the nearest integer, is

[Given : $\sin\left(35^\circ\right) = 0.573, \cos\left(35^\circ\right) = 0.819$

$\sin\left(110^\circ\right) = 0.939, \cos\left(110^\circ\right) = -0.342$]

Watch Video Solution

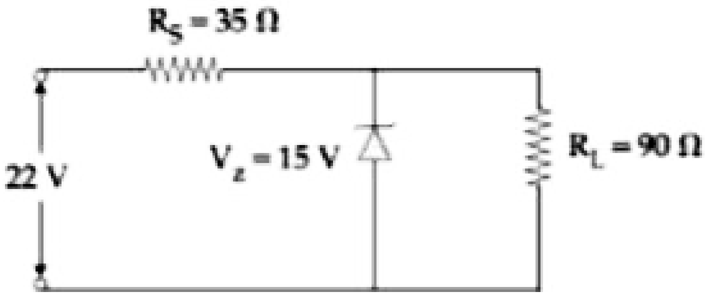
9. In the figure given, the electric current flowing through the 5 kn resistor is 'x’ mA.



The value of x to the nearest integer is ________

Watch Video Solution

10. The value of power dissipated across the zener diode $\left(V_z = 15V\right)$ connected in the circuit as shown in the figure is $x \times 10^{-1}$ watt.



The value of x, to the nearest integer, is ________

Watch Video Solution

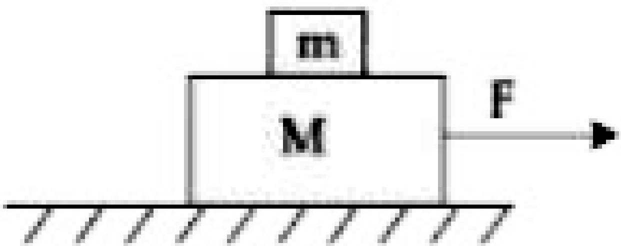
11. A parallel plate capacitor whose capacitance C is 14 pF is charged by a battery to a potential difference V = 12 V between its plates. The charging battery is now disconnected and a porceline plate with k = 7 is inserted between the plates, then the plate would oscillate back and forth between the plates with a constant mechanical energy of ____________ pJ (Assume no friction)

Watch Video Solution

12. The angular speed of truck wheel is increased from 900rpm to 2460 rpm in 26 seconds.The number of revolutions by the truck engine during this time is ____________. (Assuming the acceleration to be uniform)

Watch Video Solution

13. Two blocks (m = 0.5 kg and M = 4.5 kg) are arranged on a horizontal frictionless table as shown in figure. The coefficient of static friction between the two blocks is $\frac{3}{7}$. Then the maximum horizontal force that can be applied on the larger block move together is ______________ N. (Round off to the Nearest Integer) [Take as $9.8ms^{-2}$]



Watch Video Solution

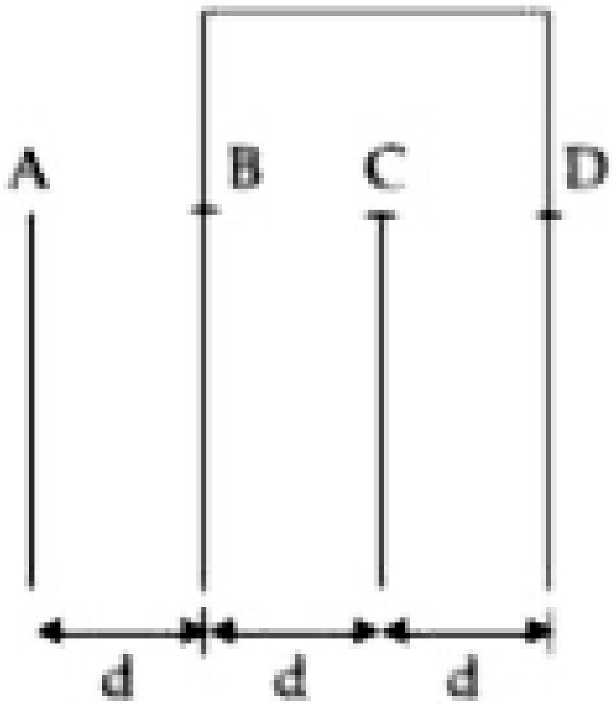
14. The resistance of the series combination of two resistances is S. When they are joined in parallel the total resistance is P. If S= nP then the minimum possible value of n is

Watch Video Solution

15. The radius in kilometers, to which the present radius of the earth (R = 6400 km) is to be compressed so that the escape velocity velocity is increased ten times is

Watch Video Solution

16. Four identical rectangular plates with length, l = 2 cm and breadth , $b = \frac{3}{2}$ cm are arranged as shown in figure. The equivalent capacitance between A and C is $\frac{x\varepsilon_0}{d}$. The value of x is ______________ . (Round off to the Nearest Integer)



Watch Video Solution

17. Consider two identical springs each of spring cosntant k and negligible mass compared to the mass M as shown. Fig. 1 shows one of them and Fig. 2 shows their series combination . The ratios of time perios of oscialltion of the two SHM is $\frac{T_b}{T_a} = \sqrt{x}$, where value of x is

______________ . (Round off to the Nearest Integer)

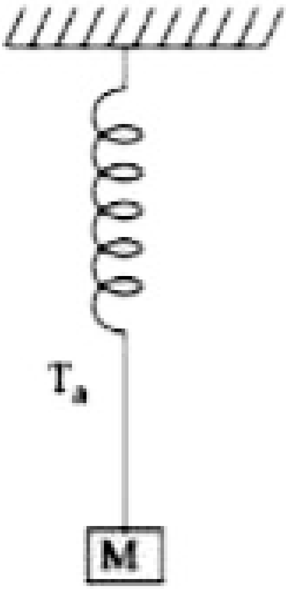


Fig 1

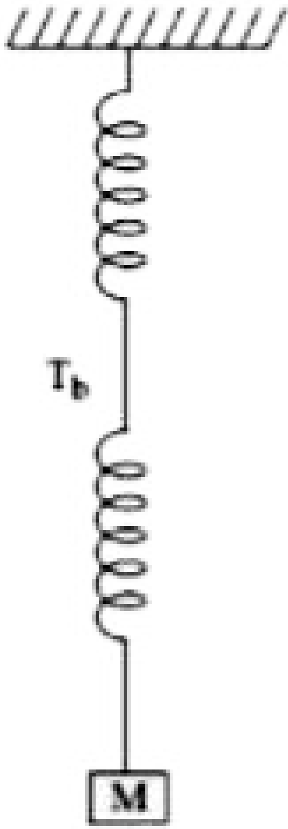


Fig 2

Watch Video Solution

18. If $2.5 \times 10^{-6} N$ average force is exerted by a light wave on a non-reflecting surface of $30 cm^2$ area during 40 minutes of time span, the energy flux of light just before it falls on the surface is ______________W/cm^2. (Round off to the Nearest Integer)

(Assume complete absorption and normal incidence conditions are there)

Watch Video Solution

19. For VHF signal broadcasting ________________km^2 of maximum service area will be covered by an antenna tower of height 30m, if the receiving antenna is placed at ground. Let radius of the earth be 6400 km. (Round off to the Neareest Integer) (Take π as 3.14)

Watch Video Solution

20. The following bodies,

(1) a ring

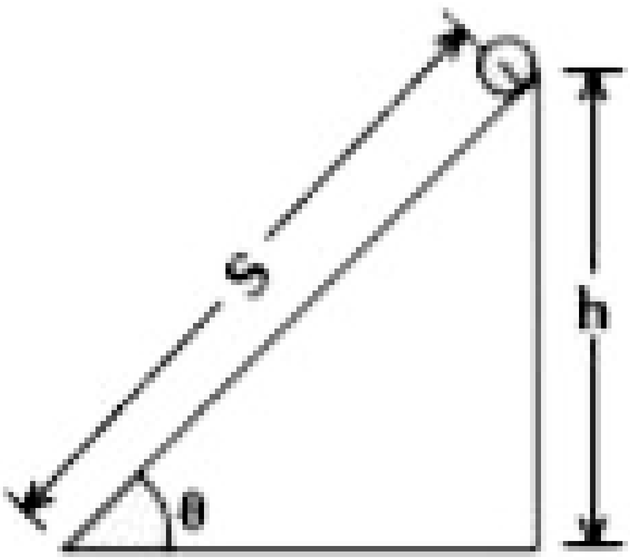
(2) a disc

(3) a solid cylinder

(4) a solid sphere,

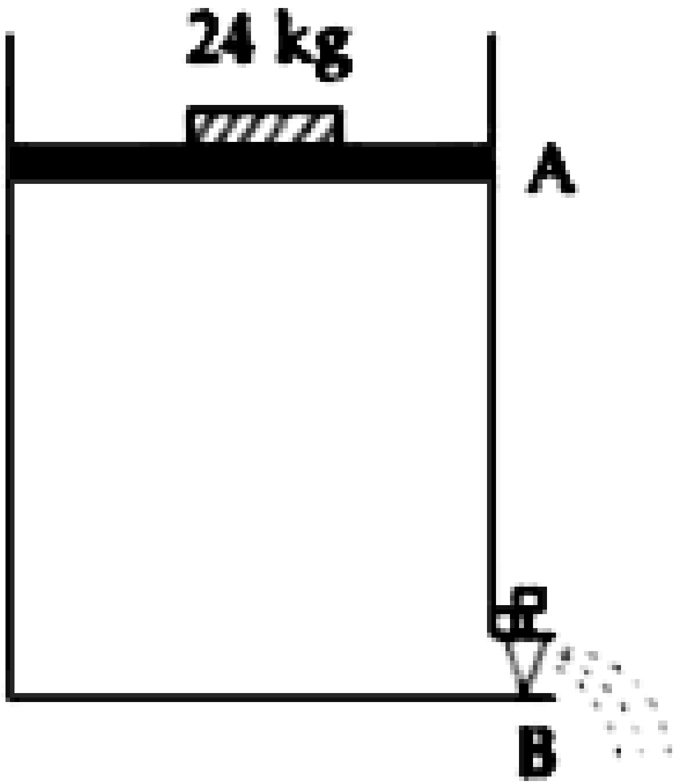
of same mass 'm' and radius 'R' are allowed to roll down without sipping simultaneously from the top of the inclined plane. The body which will reach first at the bottom of the inclined plane is ______________.

[Mark the body as per their respectively numbering given in the question]



Watch Video Solution

21. Consider a water tank as shown in the figre. It's cross-sectional area is $0.4m^2$. The tank has an opening B near the bottom whose cross-section area is $1cm^2$. A load of 24kg is applied on the water at the top when the height of the water level is 40 cm above the bottom, the velocity of water combing out the opening B is v ms^{-1}. The value of v, to be nearest integer, is [Take value of g to be $10ms^{-2}$]

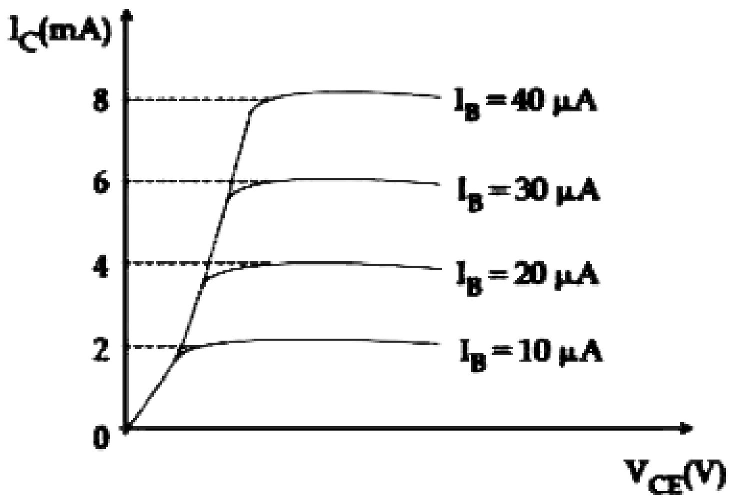


Watch Video Solution

22. A galaxy is moving away from the earth at a speed of $286 kms^{-1}$. The shift in the wavelength of a red line at 630 nm is $x \times 10^{-10} m$. The value of x, to be the nearest integer, is .... [Take the value of speed of light c, as $3 \times 10^{8} ms^{-1}$]

Watch Video Solution

23. The typical output characteristics curve for a transistor working in the common-emitter configuration is shown in the figure.

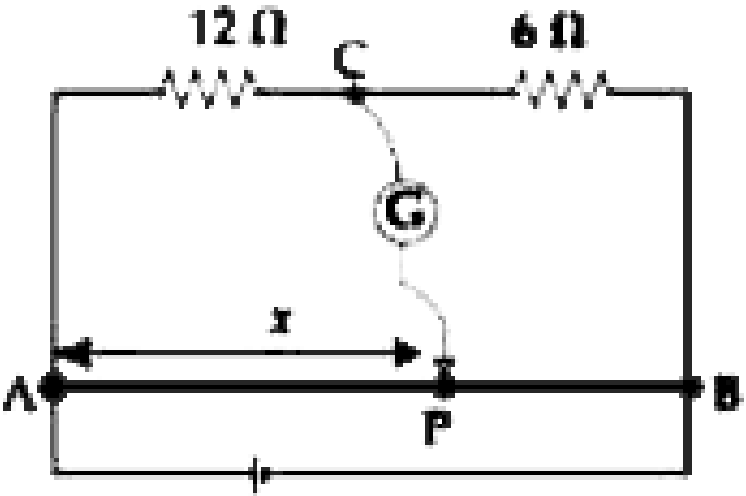


Watch Video Solution

24. An infinte number of point charges, each caryying $1\mu C$ charge, are placed along the y-axis at y=1, 2m, 4m 8m.......... The total force on a 1 C point charge, placed at the origin is $x \times 10^3 N$. The value of x, to the nearest integer, is .... $\left[Take \frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 Nm^2/C^2\right]$

Watch Video Solution

25. Consider a 72 cm long wire AB as shown in the figure. The galvonometer jockey is placed at P on AB at a distance x cm from A. The galvanometer shows zero deflectinN.



The value of x, to the nearest integer, is ....

Watch Video Solution

26. A ball of mass 4kg, moving with a velocity of $10ms^{-1}$, collides with a spring of length 8m and force constant $100Nm^{-1}$. The length of the compressed spring is x m. The value of x, to the nearest integer, is ....

Watch Video Solution

27. Two wires of same length and thickness having specific resistance 6Ω and 3Ω cm respectively are connected in parallel. The effective resistivity is $p\Omega cm$. The value of p, to the nearest integer, is ....

Watch Video Solution

28. A TV transmission tower antenna is at a height of 20m. Suppose that the receiveing antenna is at.

(i) ground level

(ii) a height of 5m

The increase in antenna range in case (ii) relative to case (i) is n%.

The value of n, to the nearest integer, is.........

Watch Video Solution

29. The radius of a sphere is measured to be (7.50 + 0.85) cm. Suppose the percentage error in its volume is x.

The value of x, to the nearest x is..........

Watch Video Solution

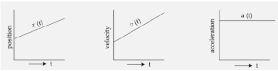
30. The projectile motion of a particle of mass 5g is shown in the figure

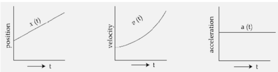
The initial velocity of the particle is $5\sqrt{2}ms^{-1}$ and the air resistance is assumed to be negligible. The magnitude of the change in momentum the points A and B is $x \times 10^{-2}kgms^{-1}$. The value of x, to the nearest integer is..

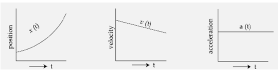
Watch Video Solution

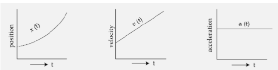
PHYSICS SECTION A

1. The position, velocity and acceleration of a particle moving with a constant acceleration can be represented by :

A. 

B. 

C. 

D. 

Watch Video Solution

2. A radiactive sample decays by two different processes .Half - life for the first process is t_1 and for the second process is t_2 . The effective half-life is

A. $T_{1/2} = \dfrac{T_{1/2}^{(1)} + T_{1/2}^{(2)}}{T_{1/2}^{(1)} - T_{1/2}^{(2)}}$

B. $T_{1/2} = T_{1/2}^{(1)} + T_{1/2}^{(2)}$

C. $T_{1/2} = \dfrac{T_{1/2}^{(1)} T_{1/2}^{(2)}}{T_{1/2}^{(1)} - T_{1/2}^{(2)}}$

D. None of the above

Watch Video Solution

3. Imagine that the electron in a hydrogen atom is replaced by a muon (μ). The mass of Muon particle is 207 times that of an electon and charge is equal to the charge of an electron. The ionization potential of this hydrogen atom will be:

A. 27.2 Ev

B. 2815.2 ev

C. 331.2 Ev

D. 13.6 Ev

Watch Video Solution

4. What will be the average value of energy along one degree of freedom for an ideal gas in thermal equilibrium at a temperature T ? $\left(k_B\right.$ is Boltzmann constant)

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

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

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

D. k_BT

Watch Video Solution

5. The time period of a satellite in a circular orbit of radius R is T. The period of another satellite in a circular orbit of radius 9R is :

A. 27 T

B. 9T

C. 12 T

D. 3 T

Watch Video Solution

6. A loop of flexible wire of irregular shape carrying current is placed in an external magnetic field. Identify the effect of the field on the wire.

A. wire gets stretched to become straight

B. loop assumes circular shape with its plane parallel to the field

C. shape of the loop remains unchanged

D. loop assumes circular shape with its plane normal to the field

Watch Video Solution

Watch Video Solution

7. An oil drop of radius 2 mm with a density 3 g cm^{-3} is held stationary under a constant electric field $3.55 \times 10^5 Vm^{-1}$ in the Millikan's oil drop experiment. What is the number of excess electrons that the oil drop will possess ? Consider $g = 9.81 m/s^2$

A. 1.73×10^{12}

B. 17.3×10^{10}

C. 1.73×10^{10}

D. 48.8×10^{11}

Watch Video Solution

8. A thin circular ring of mass M and radius r is rotating about its ais with an angular speed ω. Two particles having mas m each are now attached at diametrically opposite points. The angular speed of the ring will become

A. $\omega \frac{M}{M+2m}$

B. $\omega \frac{M}{M+m}$

C. $\omega \frac{M+2m}{M}$

D. $\omega \frac{M-2m}{M+2m}$

Watch Video Solution

9. In Young's double slit arrangement, slits are separated by a gap of 0.5 mm, and the screen is placed at a distance of 0.5 m from them. The distance between the first and the third bright fringe formed when the slits are illuminated by a monochromatic light of 5890 X is :

A. $1178 \times 10^{-9} m$

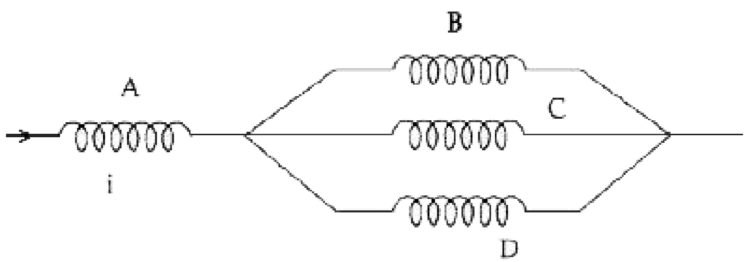
B. $1178 \times 10^{-12} m$

C. $1178 \times 10^{-6} m$

D. $5890 \times 10^{-7} m$

Watch Video Solution

10. Four identical long solenoids A, B, C and D are connected to each other as shown in the figure. If the magnetic field at the center of A is 3 T, the field at the center of C would be: (Assume that the magnetic field is confined with in the volume of respective solenoid).



A. 9 T

B. 6 T

C. 1 T

D. 12 T

Watch Video Solution

11. The time period of a simple pendulum is given by $T = 2\pi\sqrt{\frac{l}{g}}$. The measured value of the length of pendulum is 10 cm known to a 1 mm accuracy. The time for 200 oscillations of the pendulum is found to be 100 second using a clock of 1 s resolution. The percentage accuracy in the determination of 'g' using this pendulum is 'x'. The value of 'x' to the nearest integer is,

A. 0.03

B. 0.05

C. 0.04

D. 0.02

Watch Video Solution

12. Your friend is having eye sight problem. She is not able to see clearly a distant uniform window mesh and it appears to her as non-uniform and distorted. The doctor diagnosed the problem as :

A. Astigmatism

B. Presbyopia with Astigmatism

C. Myopia and hypermetropia

D. Myopia with Astigmatism

Watch Video Solution

13. In the experiment of Ohm's law, a potential difference of 5.0 V is applied across the end of a conductor of length 10.0 cm and diameter of 5.00 mm. The measured current in the conductor is 2.00 A. The maximum permissible percentage error in the resistivity of the conductor is :

A. 3.9

B. 7.5

C. 3.0

D. 8.4

Watch Video Solution

14. A plane electromagnetic wave of frequency 100 MHz is travelling in vacuum along the x-direction. At a particular point in space and time, $\vec{B} = 2.0 \times 10^{-8}\hat{k}T$. (where, $\hat{k}$ is unit vector along z-direction) What is $\vec{E}$ at this point ? (speed of light $c = 3 \times 10^8 m/s$)

A. $6.0\hat{k}V/m$

B. $6.0\hat{j}V/m$

C. $0.6\hat{k}V/m$

D. $0.6\hat{j}V/m$

Watch Video Solution

15. Match List - I with List - II

	List - I		List - II
(a)	10 km height over earth's surface	(i)	Thermosphere
(b)	70 km height over earth's surface	(ii)	Mesosphere
(c)	180 km height over earth's surface	(iii)	Stratosphere
(d)	270 km height over earth's surface	(iv)	Troposphere

A. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

B. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

C. (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)

D. (a)-(i), (b)-(iv), (C)-(iii), (d)-(ii)

Watch Video Solution

16. An AC source rated 220 V, 50 Hz is connected to a resistor. The time taken by the current to change from its maximum to the rms value is :

A. 2.5 s

B. 0.25 ms

C. 2.5 ms

D. 25 ms

Watch Video Solution

17. A constant power delivering machine has towed a box, which was initially at rest, along a horizontal straight line. The distance moved by the box in time't is proportional to :

A. $t^{1/2}$

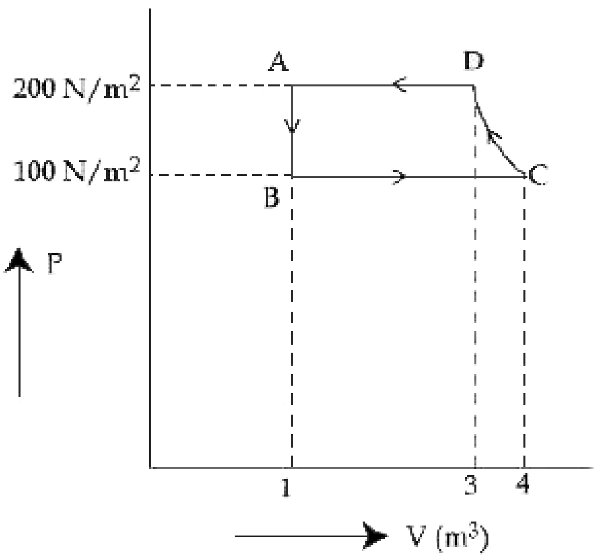
B. $t^{2/3}$

C. t

D. $t^{3/2}$

Watch Video Solution

18. The P-V diagram of a diatomic ideal gas system going under cyclic process as shown in figure. The work done during an adiabatic process CD is (use $\gamma = 1.4$):



A. 200 J

B. 400 J

C. $-500J$

D. $-400J$

Watch Video Solution

19. In a series LCR resonance circuit, if we change the resistance only, from a lower to higher value :

A. The resonance frequency will increase

B. The bandwidth of resonance circuit will increase

C. The quality factor and the resonance frequency will remain constant

D. The quality factor will increase

Watch Video Solution

20. A particle is travelling 4 times as fast as an electron. Assuming the ratio of de-Broglie wavelength of a particle to that of electron is 2:1, the mass of the particle is:

A. $\frac{1}{16}$ times the mass of e^{-}

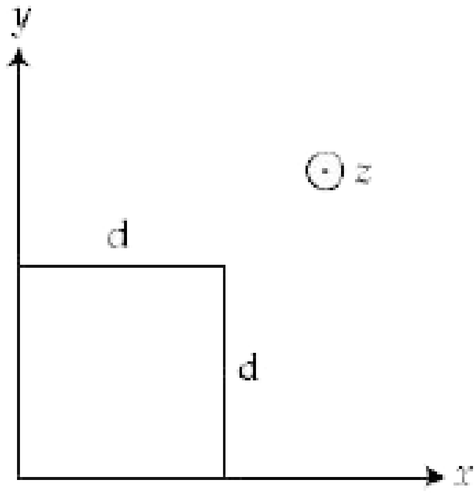
B. 16 times the mass of e^{-}

C. 8 times the mass of e^{-}

D. $\frac{1}{8}$ times the mass of e^{-}

Watch Video Solution

21. The magnetic field in a region is given by $\vec{B} = B_0\left(\frac{x}{a}\right)\hat{k}$. A square loop of side d is placed with its edges along the x and y axes. The loop is moved with a constant velocity $\vec{v} = v_0\hat{i}$ The emf induced in the loop is :



A. $\dfrac{B_o v_o d^2}{a}$

B. $\dfrac{B_o v_o d^2}{2a}$

C. $\dfrac{B_o v_o d}{2a}$

D. $\dfrac{B_o v_o^2 d}{2a}$

Watch Video Solution

22. What will be the nature of flow of water from a circular tap, when its flow rate increased from 0.18 L/min to 0.48 L/min? The radius of the tap and viscosity of water are 0.5 cm and 10^{-3} Pa s, respectively. (Density of water : $10^3 kg/m^2$)

A. Remains steady flow

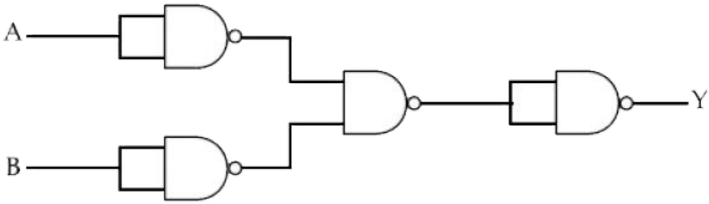
B. Unsteady to steady flow

C. Steady flow to unsteady flow

D. Remains turbulent flow

Watch Video Solution

23. The following logic gate is equivalent to :



A. NOR Gate

B. AND Gate

C. NAND Gate

D. OR Gate

Watch Video Solution

24. Two identical antennas mounted on identical towers are separated from each other by a distance of 45 km. What should nearly be the minimum height of receiving antenna to receive the signals in line of sight? (Assume radius of earth is 6400 km)

A. $19.77m$

B. $39.55m$

C. $158.8m$

D. $79.1m$

Watch Video Solution

25. In order to determine the Young's Modulus of a wire of radius 0.2 cm (measured using a scale of least count = 0.001 cm) and length 1m (measured using a scale of least count=1 mm), a weight of mass 1 kg (measured using a scale of least count=1 g) was hanged to get the elongation of 0.5 cm (measured using a scale of least count 0.001 cm). What will be the fractional error in the value of Young's Modulus determined by this experiment?

A. 0.9%

B. 1.4%

C. 9%

D. 0.14%

Watch Video Solution

26. Statement I: A cyclist is moving on an unbanked road with a speed of $7kmh^{-1}$ and takes a sharp circular turn along a path of radius of 2m without reducing the speed. The static friction coefficient is 0.2. The cyclist will not slip and pass the curve. $\left(g = 9.8m/s^2\right)$.

Statement II: If the road is banked at an angle of 45° cyclist can cross the curve of 2m radius with the speed of $18.5kmh^{-1}$ without slipping.

In the light of the above statements, choose the correct answer from the options given below.

A. Statement I is correct and statement II is incorrect

B. Both statement I and statement II are false

C. Both statement I and statement II are true

D. Statement I is incorrect and statement II is correct

Watch Video Solution

27. Red light differs from blue light as they have :

A. Different frequencies and same wavelengths

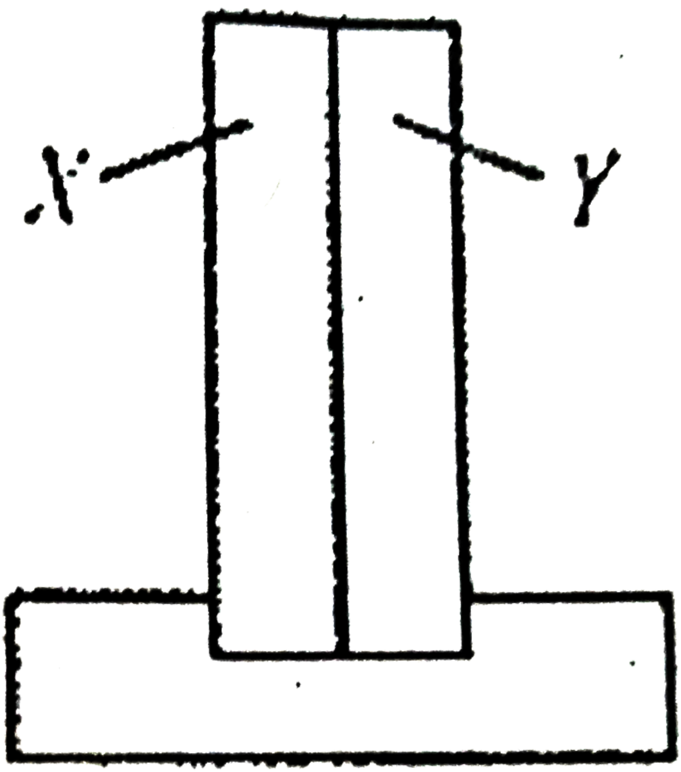
B. Same frequencies and same wavelengths

C. Different frequencies and different wavelengths

D. Same frequencies and different wavelengths

Watch Video Solution

28. A bimetallic strip consists of metals X and Y. It mounted rigidly at the base as shown. The metal X has a higher coefficient of expansion compared to that for metal Y. When the bimetallic strip is placed in a cold bath



A. Not bend but shrink

B. Bend towards the left

C. Neither bend nor shrink

D. Bend towards the right

Watch Video Solution

29. The half-life of Au^{198} is 2.7 days. The activity of 1.50 mg of Au^{198} if its atomic weight is $198 g mol^{-1}$ is $\left(N_A = 6 \times 10^{23} / mol\right)$

A. 240 Ci

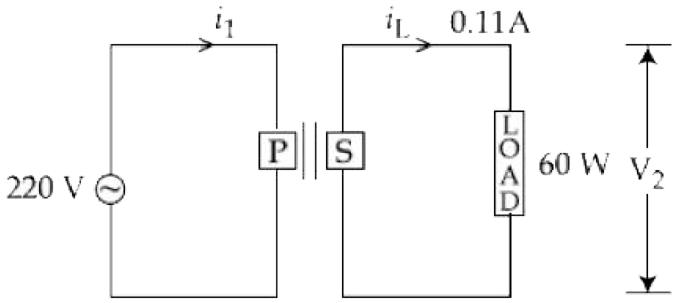
B. 357 Ci

C. 252 Ci

D. 235 Ci

Watch Video Solution

30. For the given circuit, comment on the type of transformer used.



A. Auxilliary transformer

B. Step down transformer

C. Auto transformer

D. Step-up transformer

Watch Video Solution

31. Calculate the time interval between 33% decay and 67% decay if half-life of a substance is 20 minutes.

A. 60 minutes

B. 13 minutes

C. 40 minutes

D. 20 minutes

Watch Video Solution

32. A charge Q is moving $\overrightarrow{di}$ distance in the magnetic field $\vec{B}$. Find the value of work done by $\vec{B}$

A. Zero

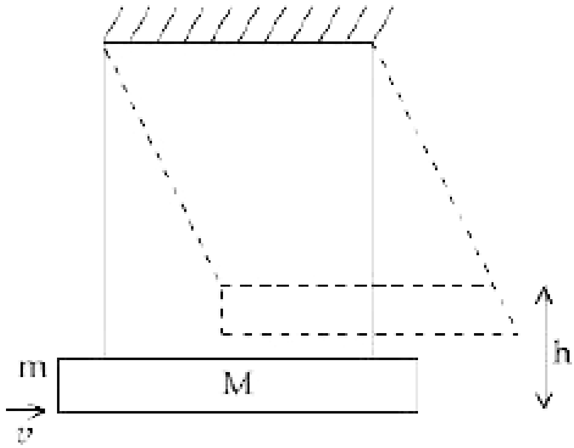
B. 1

C. Infinite

D. - 1

Watch Video Solution

33. A large block of wood of mass M=5.99 kg is hanging from two long massless cords. A bullet of mass m=10 g is fired into the block and gets embedded in it. The (block + bullet) then swing upwards, their centre of mass rising a vertical distance -9.8 cm before the (block+bullet) pendulum comes momentarily to rest at the end of its arc. The speed of the bullet just before collision is : (take $g = 9.8ms^{-2}$)



A. $841.4 m/s$

B. $831.4 m/s$

C. $821.4 m/s$

D. $811.4 m/s$

Watch Video Solution

34. Calculate the value of mean free path (λ) for oxygen molecules at temperature $27^\circ C$ and pressure 1.01×10^5 Pa. Assume the molecular diameter 0.3 nm and the gas is ideal. $\left(k = 1.38 \times 10^{-23} JK^{-1}\right)$

A. 86 nm

B. 102 nm

C. 58 nm

D. 32 nm

Watch Video Solution

35. A resistor develops 500 J of thermal energy in 20 s when a current of 1.5A is passed through it. If the current is increased from 1.5 A to 3 A, what will be the energy developed in 20 s.

A. 500 J

B. 2000 J

C. 1500 J

D. 1000 J

Watch Video Solution

36. The refractive index of a converging lens is 1.4. What will be the focal length of this lens if it is placed in a medium of same refractive index? Assume the radii of curvature of the faces of lens are R_1 and R_2 respectively.

A. Zero

B. 1

C. Infinite

D. $\left(\frac{R_1R_2}{R_1 - R_2}\right)$

Watch Video Solution

37. A mosquito is moving with a velocity $\vec{v} = 0.52t^2\hat{i} + 3t\hat{j} + 9\hat{k}m/s$ and accelerating in uniform conditions. What will be the direction of mosquito after 2 s?

A. $\tan^{-1}\left(\frac{2}{3}\right)$ from y-axis

B. $\tan^{-1}\left(\frac{5}{2}\right)$ from y-axis

C. $\tan^{-1}\left(\frac{5}{2}\right)$ from x- axis

D. $\tan^{-1}\left(\frac{2}{3}\right)$ from x- axis

Watch Video Solution

38. Find out the surface charge density at the intersection of point x=3 m plane and x-axis, in the region of uniform line charge of 8 nC/m lying along the z-axis in free space.

A. $47.88C/m$

B. $4.0nCm^{-2}$

C. $0.07nCm^{-2}$

D. $0.424nCm^{-2}$

Watch Video Solution

39. Amplitude of a mass-spring system, which is executing simple harmonic motion decreases with time. If mass=500g, Decay constant=20 g/s then how much time is required for the amplitude of the system to drop to half of its initial value ? (In 2=0.693)

A. $17.32s$

B. $0.034s$

C. 34.65s

D. $15.01s$

Watch Video Solution

40. The de-Broglie wavelength associated with an electron and a proton were calculated by accelerating them through same potential of 100 V. What should nearly be the ratio of their wavelengths ? $\left(m_p = 1.00727um_e = 0.00055u\right)$

A. $43 : 1$

B. $41.4 : 1$

C. $1860 : 1$

D. $(1860)^2 : 1$

Watch Video Solution

41. The velocity of a particle is $v = v_0 + gt + Ft^2$. Its position is x=0 at t=0, then its displacement after time (t=1) is :

A. $v_0 + \frac{g}{2} + \frac{F}{3}$

B. $v_0 + 2g + 3F$

C. $v_0 + \frac{g}{2} + F$

D. $v_0 + g + F$

Watch Video Solution

Watch Video Solution

42. A sound wave of frequency 245 Hz travels with the speed of 300 ms^{-1} along the positive x-axis. Each point of the wave moves to and fro through a total distance of 6 cm. What will be the mathematical expression of this travelling wave ?

A. $Y(x, t) = 0.03\left[\sin 5.1x - \left(1.5 \times 10^3\right)t\right]$

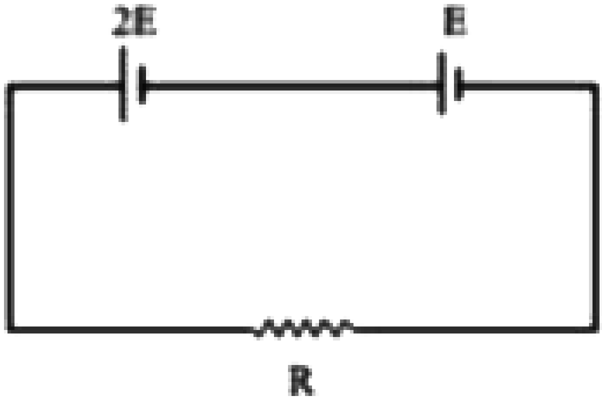
B. $Y(x, t) = 0.03\left[\sin 5.1x - \left(0.2 \times 10^3\right)t\right]$

C. $Y(x, t) = 0.06\left[\sin 0.8x - \left(0.5 \times 10^3\right)t\right]$

D. $Y(x, t) = 0.06\left[\sin 5.1x - \left(1.5 \times 10^3\right)t\right]$

Watch Video Solution

43. Two cells of emf 2E and E with internal resistance r_1 and r_2 respectively are connected in series to an external resistor R (see figure). The value of R, at which the potential difference across the terminals of the first cell becomes zero is



A. $\frac{r_1}{2} - r_2$

B. $r_1 + r_2$

C. $\frac{r_1}{2} + r_2$

D. $r_1 - r_2$

Watch Video Solution

44. If one mole of the polyatomic gas is having two vibrational modes and β is the ratio of molar specific heats for polyatomic gas $\left(\beta = \frac{C_p}{C_V}\right)$ then the value of β is :

A. 1.2

B. 1.02

C. 1.25

D. 1.35

Watch Video Solution

45. An object is located at 2 km beneath the surface of the water. If the fractional compression $\frac{\Delta V}{V}$ is 1.36%, the ratio of hydraulic stress to the corresponding hydraulic strain will be ________.

[Given : density of water is $1000kgm^{-3}$ and $g = 9.8ms^{-2}$.]

A. $1.96 \times 10^7 Nm^{-2}$

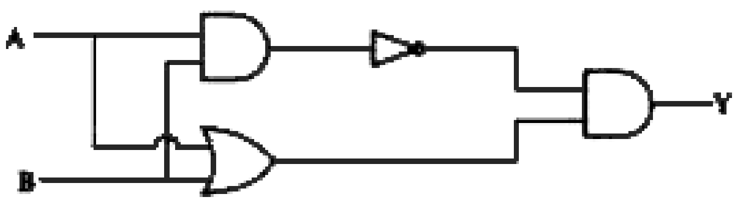
B. $1.44 \times 10^9 Nm^{-2}$

C. $2.26 \times 10^9 Nm^{-2}$

D. $1.44 \times 10^7 Nm^{-2}$

Watch Video Solution

46. Which one of the following will be the output of the given circuit?



A. NOR Gate

B. XOR Gate

C. AND Gate

D. NAND Gate

Watch Video Solution

47. A rubber ball is released from a height of 5 m above the floor. It bounces hack repeatedly. always rising to $\frac{81}{100}$ of the height through which it falls. Find the average speed of the ball.

(Take $g = 10ms^{-2}$)

A. $2.50ms^{-1}$

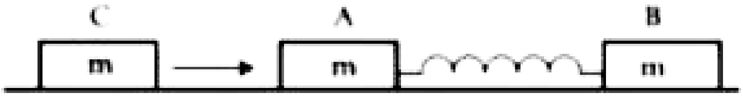
B. $2.0ms^{-1}$

C. $3.50ms^{-1}$

D. $3.0ms^{-1}$

Watch Video Solution

48. Two identical blocks A and B each of mass m resting on the smooth horizontal floor are connected by a light spring of natural length L and spring constant K. A third block Cof mass m moving with a speed v along the line joining A and B collides with A. The maximum compression in the spring is



A. $\sqrt{\dfrac{mv}{K}}$

B. $v\sqrt{\dfrac{m}{2K}}$

C. $\sqrt{\dfrac{mv}{2K}}$

D. $\sqrt{\dfrac{m}{2K}}$

Watch Video Solution

49. Match List-I with List -II

	List-I		List-II
(a)	Phase difference between current and voltage in a purely resistive AC circuit	(i)	$\frac{\pi}{2}$; current leads voltage
(b)	Phase difference between current and voltage in a pure inductive AC circuit	(ii)	zero
(c)	Phase difference between current and voltage in a pure capacitive AC circuit	(iii)	$\frac{\pi}{2}$; current lags voltage
(d)	Phase difference between current and voltage in	(iv)	$\tan^{-1}\left(\frac{X_C - X_L}{R}\right)$

Choose the most appropriate answer from the options given below:

A. (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)

B. (a)-(ii), (b)-(iii), (C)-(iv), (d)-(i)

C. (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)

D. (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)

Watch Video Solution

50. Two identical photocathodes receive the light of frequencies f_1 and f_2 respectively. If the velocities of the photo-electrons coming out are v_1 and v_2 respectively, then

A. $v_1^2 - v_2^2 = \frac{2h}{m}[f_1 - f_2]$

B. $v_1 + v_2 = \left[\frac{2h}{m}(f_1 + f_2)\right]^{\frac{1}{2}}$

C. $v_0 - v_2 = \left[\frac{2h}{m}(f_1 - f_2)\right]^{\frac{1}{2}}$

D. $v_1^2 + v_2^2 = \frac{2h}{m}[f_1 + f_2]$

Watch Video Solution

51. A carrier signal $C(t) = 25\sin\left(2.512 \times 10^{10}t\right)$ is amplitude modulated by a message signal $m(t) = 5\sin\left(1.57 \times 10^8 t\right)$ and transmitted through an antenna. What will be the bandwidth of the modulated signal ?

A. 8 GHz

B. 1987.5 MHz

C. 50 MHz

D. 2.01 GHz

Watch Video Solution

52. A block of mass 1 kg attached to a spring is made to oscillate with an initial amplitude of 12 cm. After 2 minutes the amplitude decreases to 6 cm. Determine the value of the damping constant for this motion. (take In 2 =0.693)

A. $3.3 \times 10^{2} kgs^{-1}$

B. $1.16 \times 10^{2} kgs^{-1}$

C. $5.7 \times 10^{-3} kgs^{-1}$

D. $0.69 \times 10^{2} kgs^{-1}$

Watch Video Solution

53. A geostationary satellite is orbiting around an arbitary planet ‘P at a height of 11 R above the surface of 'P, R being the radius of 'P'. The time period of another satellite in hours at a height of 2R from the surface of 'P' is ____. 'P' has the time period of 24 hours.

A. 5

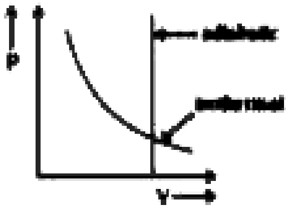
B. $\frac{6}{\sqrt{2}}$

C. 3

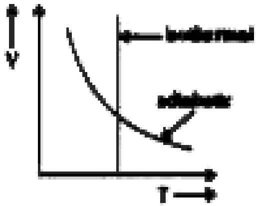
D. $6\sqrt{2}$

Watch Video Solution

54. Which one is the correct option for the two different thermodynamic process?



(b)



(d)

A. (b) and (c)

B. (a) only

C. (c) and (a)

D. (c) and (d)

Watch Video Solution

55. The atomic hydrogen emits a line spectrum consisting of various series. Which series of hydrogen atomic spectra is lying in the visible region ?

A. Lyman series

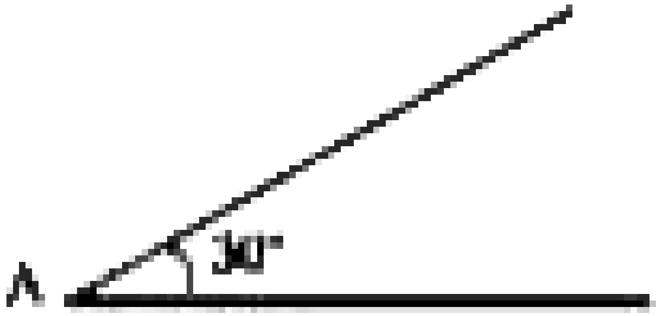
B. Paschen series

C. Balmer series

D. Brackett series

Watch Video Solution

56. A sphere of mass 2 kg and radius 0.5 m is rolling with an initial speed of 1 ms^{-1} goes up an inclined plane which makes an angle of 30° with the horizontal plane, without slipping, How long will the sphere take to return to the starting point A ?



A. 0.52 s

B. 0.80 s

C. 0.60 s

D. 0.57 s

Watch Video Solution

57. Two particles A and B of equal masses are suspended from two massless springs of spring constants K_1 and K_2 respectively. If the maximum velocities during oscillations are equal. the ratio of the amplitude of A and B is

A. $\sqrt{\frac{K_2}{K_1}}$

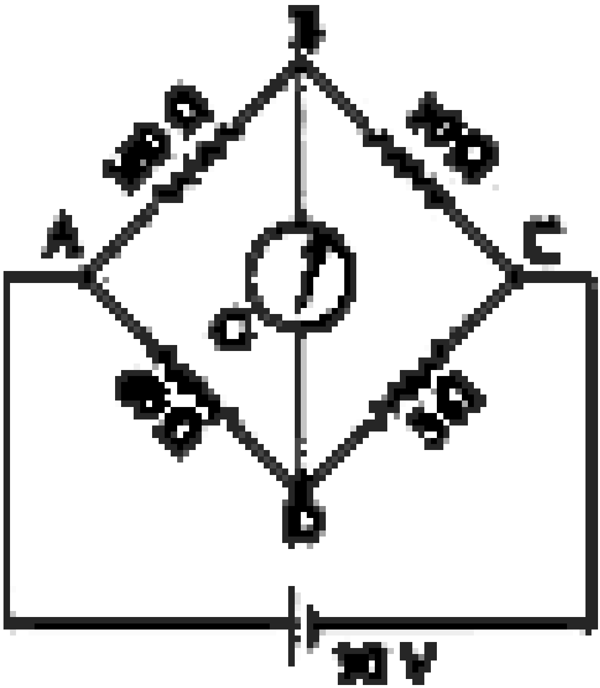
B. $\sqrt{\frac{K_1}{K_2}}$

C. $\frac{K_1}{K_2}$

D. $\frac{K_2}{K_1}$

Watch Video Solution

58. The four arms of a Wheatstone bridge have resistances as shown in the figure. A galvanometer of 15Ω resistance is connected across BD. Calculate the current through the galvanometer when a potential difference of 10 V is maintained across AC.



A. 4.87 mA

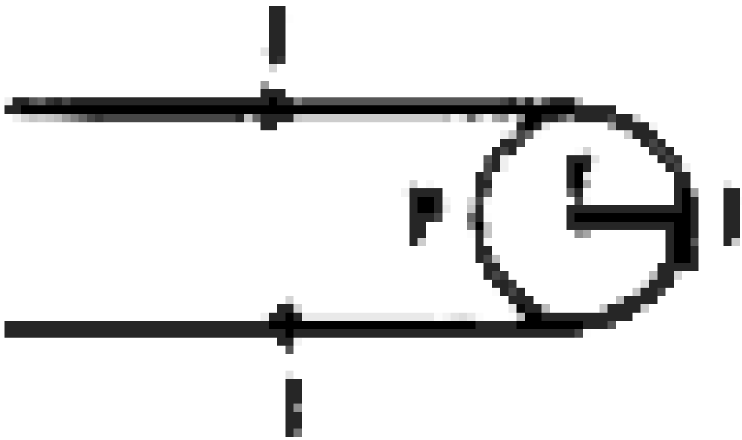
B. $2.44 \mu A$

C. $4.87 \mu A$

D. $2.44 mA$

Watch Video Solution

59. A hairpin like shape as shown in figure is made by bending a long current carrying wire. What is the magnitude of a magnetic field at point P which lies on the centre of the semicircle ?



A. $\frac{\mu_0 I}{2\pi r}(2 - \pi)$

B. $\frac{\mu_0 I}{4\pi r}(2 + \pi)$

C. $\frac{\mu_0 I}{4\pi r}(2 - \pi)$

D. $\frac{\mu_0 I}{2\pi r}(2 + \pi)$

Watch Video Solution

60. What happens to the inductive reactance and the current in a purely inductive circuit if the frequency is halved ?

A. nductive reactance will be doubled and current will be halved.

B. Both, inductive reactance and current will be halved.

C. Inductive reactance will be halved and current will be doubled.

D. Both, inducting reactance and current will be doubled.

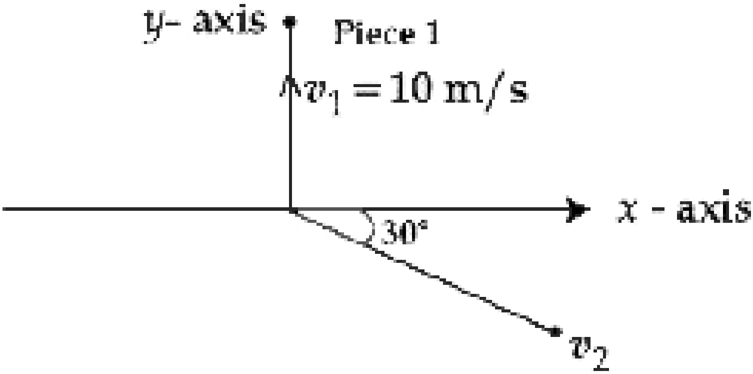
Watch Video Solution

PHYSICS SECTION B

1. A ball of mass 10 kg moving with a velocity $10\sqrt{3}m/s$ along the x-axis, hits another ball of mass 20 kg which is at rest. After the collision, first ball comes to rest while the second ball disintegrates into two equal pieces. One piece starts moving along y-axis with a speed of 10 m/s.

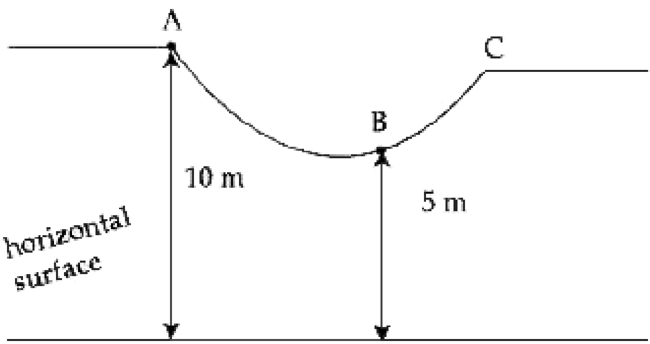
The second piece starts moving at an angle of 30 with respect to the x-axis. The velocity of the ball moving at $30\,^{\circ}$ with X-axis is x m/s. The configuration of pieces after collision is shown in the figure below.

The value of x to the nearest integer is _____



Watch Video Solution

2.



As shown in the figure, a particle of mass 10 kg is placed at a point A.

When the particle is slightly displaced to its right, it starts moving and reaches the point B. The speed of the particle at B is x m/s. (Take $g = 10m/s^2$) The value of 'x to the nearest integer is

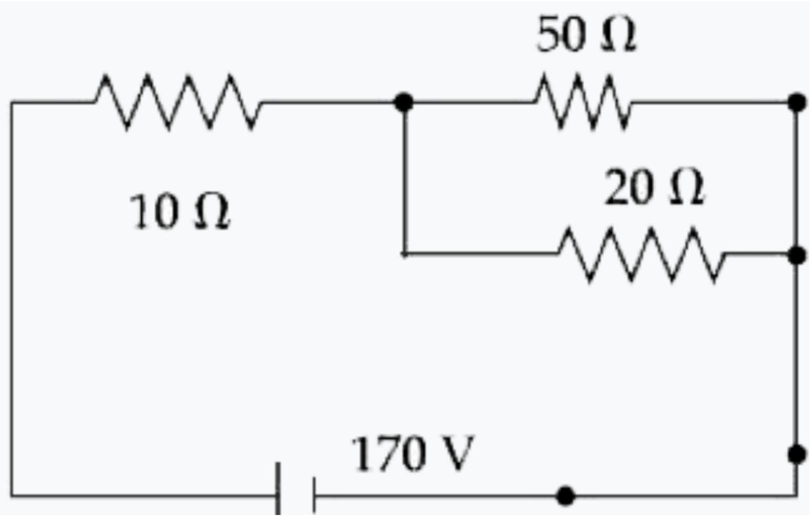
Watch Video Solution

3. A particle performs simple harmonic motion with a period of 2 second. The time taken by the particle to cover a displacement equal to half of its amplitude from the mean position is $\frac{1}{a}s$.

The value of 'a' to the nearest integer is__________ .

Watch Video Solution

4. The voltage across the 10 resistor in the given circuit is x volt.



The value of 'x' to the nearest integer is_______.

Watch Video Solution

5. A bullet of mass 0.1 kg is fired on a wooden block to pierce through it, but it stops after moving a distance of 50 cm into it. If the velocity of bullet before hitting the wood is 10 m/s and it slows down with uniform deceleration, then the magnitude of effective retarding force on the bullet is 'x N.

The value of 'x to the nearest integer is_________

Watch Video Solution

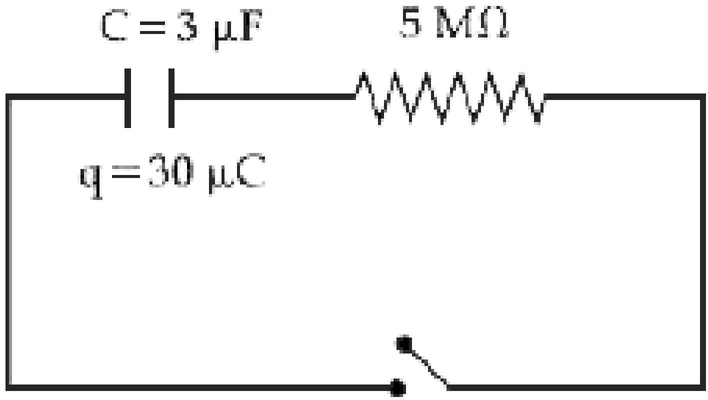
6. Two separate wires A and B are stretched by 2 mm and 4 mm respectively, when they are subjected to a force of 2 N. Assume that both the wires are made up of same material and the radius of wire B is 4 times that of the radius of wire A. The length of the wires A and B are in the ratio of a : b. Then $\frac{a}{b}$ can be expressed as $\frac{1}{x}$ where x is______

Watch Video Solution

7. A parallel plate capacitor has plate area 100 m^2 and plate separation of 10 m. The space between the plates is filled up to a thickness 5 m with a material of dielectric constant of 10. The resultant capacitance of the system is 'x' p^F. The value of $\varepsilon = 8.85 \times 10^{-12} F.m^{-1}$

The value of 'x' to the nearest integer is__________.

Watch Video Solution



8. The circuit shown in the figure consists of a charged capacitor of capacity 3 μF and a charge of 30 μC. At time t=0, when the key is closed, the value of current flowing through the 5 $M\Omega$ resistor is 'r' μA.

The value of 'x' to the nearest integer is__________.

Watch Video Solution

9. An npn transistor operates as a common emitter amplifier with a power gain of 10^6. The input circuit resistance is 100Ω and the output load resistance is $10k\Omega$. The common emitter

current gain 'β' will be (Round off to the Nearest Integer)

Watch Video Solution

10. A person is swimming with a speed of 10 m/s at an angle of 120° with the flow and reaches to a point directly opposite on the other side of the river. The speed of the flow is 'x m/s.

The value of 'x to the nearest integer is_______.

Watch Video Solution

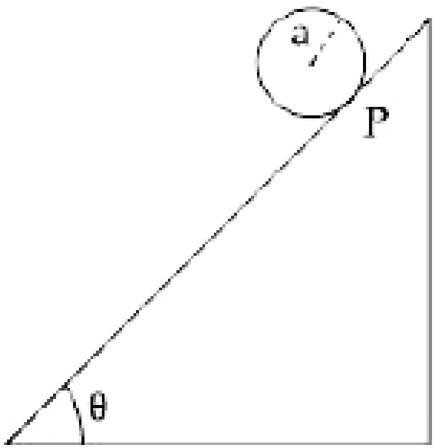
11. A body of mass 2 kg moves under a force of $\left(2\hat{i} + 3\hat{j} + 5\hat{k}\right)$ N. It starts from rest and was at the origin initially. After 4 s, its new coordinates are (8, b, 20). The value of b is (Round off to the Nearest Integer)

Watch Video Solution

12. A solid disc of radius 'a' and mass 'm' rolls down without slipping on an inclined plane making an angle with the horizontal. The acceleration of the dise will be $\frac{2}{b}g\sin\theta$ where b is....... (Round off to the Nearest Integer)

(g=acceleration due to gravity)

$thta$ =angle as shown in figure)



Watch Video Solution

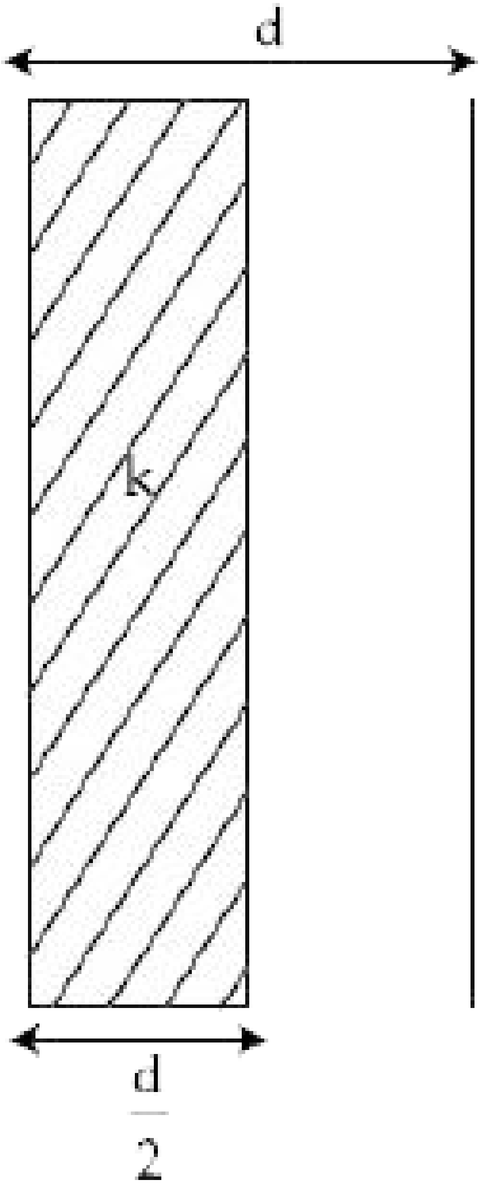
13. The energy dissipated by a resistor is 10 mj in 1 s when an electric current of 2 mA flows through it. The resistance is ______Ω (Round off to the Nearest Integer)

Watch Video Solution

14. For an ideal heat engine, the temperature of the source is $127^{\circ} C$. In order to have 60% efficiency the temperature of the sink should be _____ $^{\circ} C$. (Round off to the Nearest Integer)

Watch Video Solution

15. In a parallel plate capacitor set up, the plate area of capacitor is $2m^2$ and the plates are separated by 1 m. If the space between the plates are filled with a dielectric material of thickness 0.5 m and area $2m^2$ (see fig) the capacitance of the set-up will be ...... ε_0 (Dielectric constant of the material =3.2) (Round off to the Nearest Integer)



Watch Video Solution

16. A deviation of 2° is produced in the yellow ray when prism of crown and flint glass are achromatically combined. Taking dispersive powers of crown and flint glass as 0.02 and 0.03 respectively and refractive index for yellow light for these glasses are 1.5 and 1.6 respectively. The refracting angles for crown glass prism will be .... $^{\circ}$ (in degree). (Round off to the Nearest Integer)

Watch Video Solution

17. If one wants to remove all the mass of the earth to infinity in order to break it up completely. The amount of energy that needs to be supplied will be $\frac{x}{5}\frac{GM^2}{R}$ where x is ...... (Round off to the Nearest Integer)

(M is the mass of earth, R is the radius of earth, G is the gravitational constant)

Watch Video Solution

18. A force $\vec{F} = 4\hat{i} + 3\hat{j} + 4\hat{k}$ is applied on an intersection point of x=2 plane and x-axis. The magnitude of torque of this force about a point (2, 3, 4) is...... (Round off to the Nearest Integer)

Watch Video Solution

19. A closed organ pipe of length L and an open organ pipe contain gases of densities ρ_1 and ρ_2 respectively. The compressibility of gases are equal in both the pipes. Both the pipes are vibrating in their first overtone with same frequency. The length of the open pipe is $\frac{x}{3}L\sqrt{\frac{\rho_1}{\rho_2}}$ where x is ...... (Round off to the Nearest Integer)

Watch Video Solution

20. A swimmer can swim with velocity of 12 km/h in still water. Water flowing in a river has velocity 6 km/h. The direction with respect to the direction of flow of river water he should swim in order to reach the point on the other bank just opposite to his starting point is. (Round off to the Nearest Integer)

(Find the angle in degrees)

Watch Video Solution

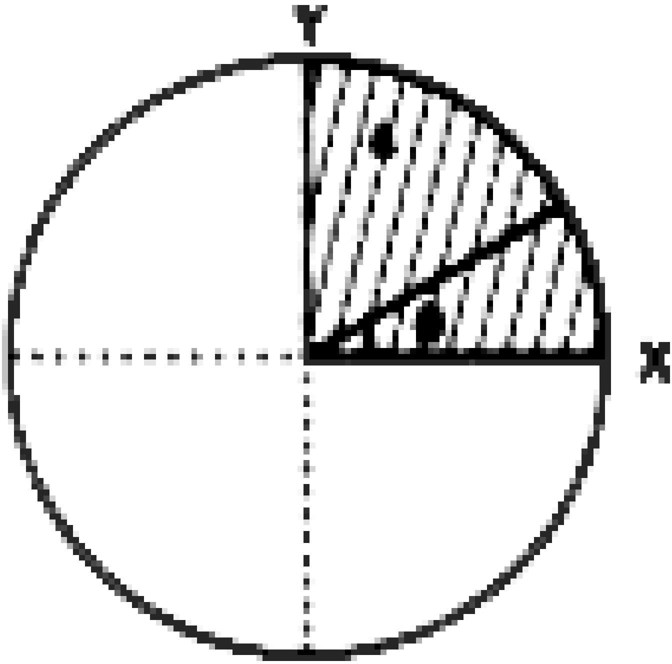
21. The electric field intensity produced by the radiation coming from a 100 W bulb at a distance of 3 m is E. The electric field intensity produced by the radiation coming from 60 W at the same distance is $\sqrt{\frac{x}{5}}E$. Where the value of x = ________.

Watch Video Solution

22. The disc of mass M with uniform surface mass density σ is shown in the figure. The centre of mass of the quarter disc (the shaded area) is at the position $\frac{x}{3}\frac{a}{\pi}, \frac{x}{3}\frac{a}{\pi}$ where x is ______. (Round off to the Nearest

Integer)

[a is an area as shown in the figure]



Watch Video Solution

23. The electric field in a region is given by $\vec{E} = \frac{2}{5}E_0\hat{i} + \frac{3}{5}E_0\hat{j}$ with $E_0 = 4.0 \times 10^3 \frac{N}{C}$. The flux of this field through a rectangular surface area $0.4m^2$ parallel to the Y-Z plane is ________Nm^2C^{-1}.

Watch Video Solution

24. A particle of mass m moves in a circular orbit in a central potential field $U(r) = U_0 r^4$. If Bohr's quantization conditions are applied, radü of possible orbitals r_n vary with $n^{\frac{1}{\alpha}}$, where α is ________.

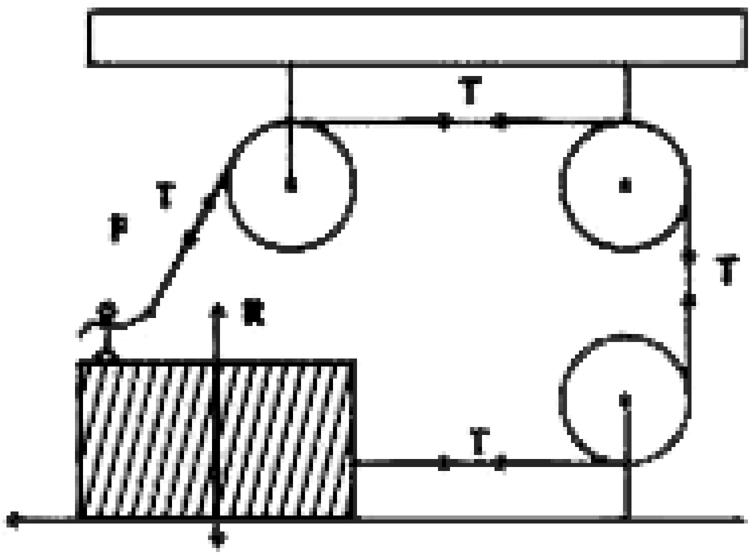
Watch Video Solution

25. The image of an object placed in air formed by a convex refracting surface is at a distance of 10 m behind the surface. The image is real and is at $\frac{2^{rd}}{3}$ of the distance of the object from the surface. The wavelength of light inside the surface is $\frac{2}{3}$ times the wavelength in air. The radius of the curved surface is $\frac{x}{13}m$. The value of 'x' is ________.

Watch Video Solution

26. A boy of mass 4 kg is standing on a piece of wood having mass 5 kg. If the coefficient of friction between the wood and the floor is 0.5, the maximum force that the boy can exert on the rope so that the piece of wood does not move from its place is _______N. (Round off to the Nearest Integer)

[Take $g = 10 ms^{-2}$]

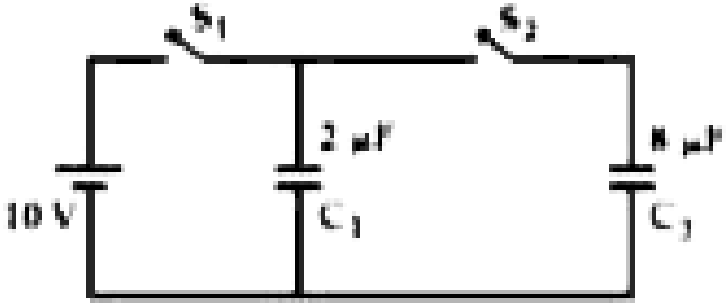


Watch Video Solution

27. Suppose you have taken a dilute solution of oleic acid in such a way that its concentration becomes $0.01 cm^3$ of oleic acid per cm^3 of the solution. Then you make a thin film of this solution (monomolecular thickness) of area 4 cm^2 by considering 100 spherical drops of radius $\left(\frac{3}{40\pi}\right)^{\frac{1}{3}} \times 10^{-3}$ cm. Then the thickness of oleic acid layer will be $x \times 10^{-14}$ m. Where x is _________.

Watch Video Solution

28. A $2\mu F$ capacitor C_1 is first charged to a potential difference of 10 V using a battery. Then the battery is removed and the capacitor is connected to an uncharged capacitor C_2 of 8μF. The charge in C_2 on equilibrium condition is ______μC. (Round off to the Nearest Integer)



Watch Video Solution

29. Sea water at a frequency $f = 9 \times 10^2$ Hz, has permittivity $\varepsilon = 80\varepsilon_0$, and resistivity $\rho = 0.25\Omega m$. Imagine a parallel plate capacitor is immersed in seawater and is driven by an alternating voltage source $V(t) = V_0 \sin(2\pi ft)$. Then the conduction current density becomes 10^x times the displacement current density after time $t = \dfrac{1}{800}s$. The value of x is ________

(Given : $\dfrac{1}{4\pi\varepsilon_0} = 9 \times 10^9 Nm^2C^{-2}$)

Watch Video Solution

30. A body of mass 1 kg rests on a horizontal floor with which it has a coefficient of static friction $\frac{1}{\sqrt{3}}$. It is desired to make the body move by applying the minimum possible force FN. The value of F will be _______.

(Round off to the Nearest Integer)

[Take $g = 10ms^{-2}$]

Watch Video Solution