

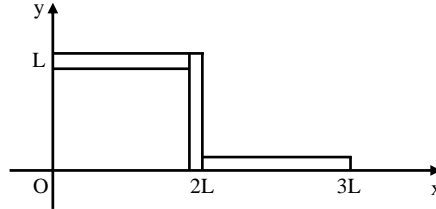


**Q.4** If the pressure of monoatomic gas filled in vessel is  $3 \times 10^6$  Pa and volume of vessel is  $2\text{m}^3$ . Find the energy of gas?

- (1)  $9 \times 10^6$  J                      (2)  $4.5 \times 10^6$  J                      (3)  $2.25 \times 10^6$  J                      (4)  $9 \times 10^5$  J

**Ans.** [1]

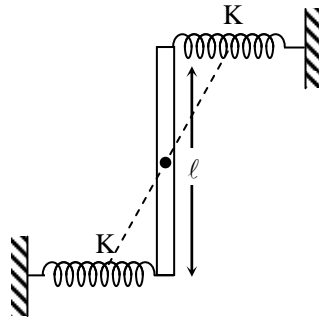
**Q.5** Find co-ordinates of centre of mass of uniform rod of mass m.



- (1)  $\frac{15L}{8}, \frac{13L}{8}$                       (2)  $\frac{11L}{8}, \frac{5L}{8}$                       (3)  $\frac{5L}{8}, \frac{13L}{8}$                       (4)  $\frac{13L}{8}, \frac{5L}{8}$

**Ans.** [4]

**Q.6** A uniform rod hinged at its centre and free to rotate in horizontal plane. There are two identical springs attached to rod as shown in fig. Initially spring are in natural lengths. If rod is slightly displaced and released find its frequency



- (1)  $\frac{1}{2\pi} \sqrt{\frac{3K}{m}}$                       (2)  $\frac{1}{2\pi} \sqrt{\frac{6k}{m}}$                       (3)  $\frac{1}{2\pi} \sqrt{\frac{K}{6m}}$                       (4)  $\frac{1}{2\pi} \sqrt{\frac{k}{m}}$

**Ans.** [2]

**Q.7** Two Bulbs of rating (25 watt/220V) and (100 watt/220 V) are connected in series and whole combination is operated on 220 volt. Determine power consumed by both bulb i.e.  $P_1$  &  $P_2$  in watt.

- (1)  $P_1 = 12$  ;  $P_2 = 8$                       (2)  $P_1 = 14$  ;  $P_2 = 8$   
(3)  $P_1 = 16$  ;  $P_2 = 4$                       (4)  $P_1 = 8$  ;  $P_2 = 10$

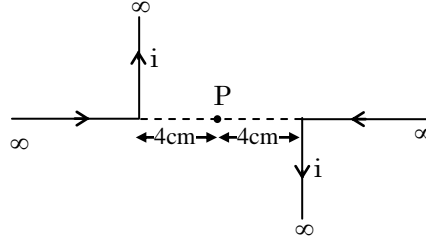
**Ans.** [3]

**Q.8** Aeroplane is coming from north at some height from ground when aeroplane is just above the person ; person hears the second coming from north making angle  $60^\circ$  with horizontal. Find speed of aeroplane

- (1)  $\frac{\sqrt{3}}{2} V$                       (2)  $\frac{V}{2}$                       (3)  $\frac{\sqrt{2}}{2} V$                       (4)  $\frac{2}{\sqrt{3}} V$

**Ans.** [2]

**Q.9** If magnetic field at point P is  $10^{-4}$  Tesla. Determine current 'i' ?



- (1) 20 Amp.                      (2) 40 Amp.                      (3) 30 Amp.                      (4) 60 Amp.

**Ans.** [2]

**Q.10** Two charges of mass ratio 1 : 4 enter in the perpendicular magnetic field. Find the ratio of their radii of circle in the magnetic field if their charges are in the ratio of 1 : 2.

- (1) 1 : 2                      (2) 2 : 1                      (3) 4 : 1                      (4) 1 : 4

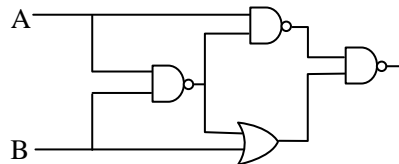
**Ans.** [1]

**Q.11** A sinusoidal progressive wave equation is given by  $y = 10^{-3} \sin(50t + 2x)$ , when t is in sec and x and y are in metre. Which of the following is correct.

- (1) wave is propagating in +x direction with 25 m/s  
 (2) wave is propagating in +x direction with 100 m/s  
 (3) wave is propagating in -x direction with 25 m/s  
 (4) wave is propagating in -x direction with 100 m/s

**Ans.** [3]

**Q.12** Which Boolean expression is represented by this logic gate system-



- (1)  $AB + \bar{A}\bar{B}$                       (2)  $\bar{A}\bar{B}$                       (3)  $AB + \bar{A}\bar{B}$                       (4)  $\bar{A}\bar{B}$

**Ans.** [2]

**Q.13** The potential energy of  $e^-$  revolving in hypothetical atom whose potential energy is given by  $u = \frac{1}{2}kr^2$ . If radius and energy of  $e^-$  in  $n^{\text{th}}$  orbit are  $r_n$  &  $E_n$  then which option is correct

- (1)  $r_n \propto \sqrt{n}, E_n \propto \sqrt{n}$                       (2)  $r_n \propto \sqrt{n}, E_n \propto n$                       (3)  $r_n \propto n, E_n \propto n$                       (4)  $r_n \propto n, E_n \propto \sqrt{n}$

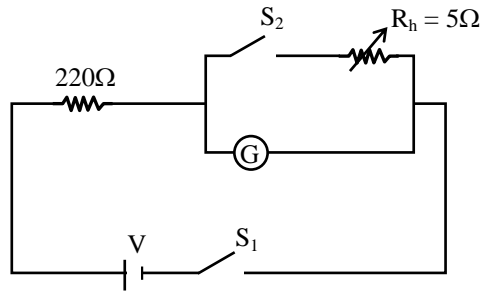
**Ans.** [2]

**Q.14** Amplitude of carrier wave  $A_c = 100$  unit maximum amplitude of modulated wave = 160 unit and minimum amplitude of modulated wave is 40 unit. Determine modulating Index.

- (1) 0.2                      (2) 0.3                      (3) 0.6                      (4) 0.4

**Ans.** [3]

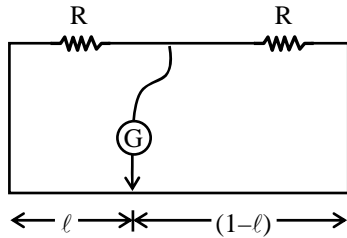
**Q.15** When only  $S_1$  was closed deflection in galvanometer was  $\theta_0$ . When both  $S_1$  &  $S_2$  are closed then deflection in galvanometer becomes  $\frac{\theta_0}{5}$ . Determine resistance of galvanometer.



- (1)  $2\Omega$                       (2)  $4\Omega$                       (3)  $3\Omega$                       (4)  $6\Omega$

**Ans.** [1]

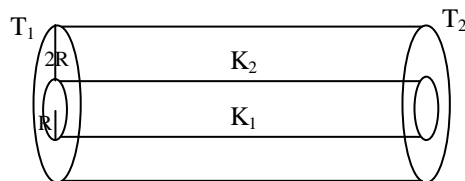
**Q.16** Determine balance length  $\ell$  if deflection in G is zero. If resistance of meter bridge wire is increasing and the rate of increase of resistance  $\frac{dR}{d\ell} \propto \frac{1}{\sqrt{\ell}}$ . Where  $\ell$  is the distance from left end of wire.



- (1) 0.25                      (2) 0.3                      (3) 0.4                      (4) 0.5

**Ans.** [1]

**Q.17** In a composite cylinder heat is transferred along the axis of cylinder, find equivalent thermal conductivity of cylinder ?



- (1)  $\frac{K_2 + 3K_1}{4}$                       (2)  $\frac{K_1 + K_2}{2}$                       (3)  $\frac{K_1 + 3K_2}{4}$                       (4)  $4(K_1 + 3K_2)$

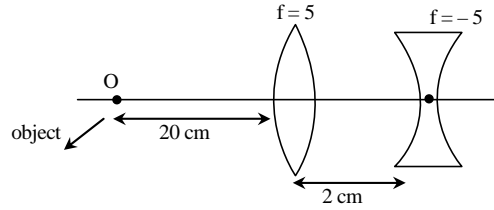
**Ans.** [3]

**Q.18** Wavelength of incident radiation is  $4000 \text{ \AA}$  and maximum speed of emitted  $e^-$  is  $5 \times 10^5 \text{ m/s}$ . Find work function of material

- (1) 1.8 eV                      (2) 2.4 eV                      (3) 2.7 eV                      (4) 2.1 eV

**Ans.** [2]

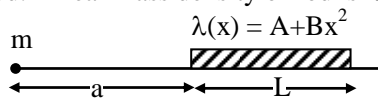
**Q.19** Find position and nature of image formed in shown arrangement ?



- (1)  $\frac{20}{3}$  left, virtual (2)  $\frac{40}{3}$  right, real  
 (3)  $\frac{40}{3}$  right, virtual (4) 70 cm towards right, real image

**Ans.** [4]

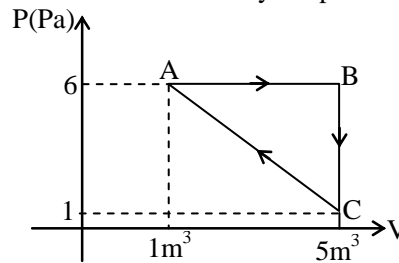
**Q.20** If a rod of length  $L$  and a point mass is placed on  $x$ -axis as shown in figure given below. Find the net gravitational force on  $m$  due to rod. Linear mass density of rod is  $\lambda(x)$ .



- (1)  $Gm \left[ \left( \frac{1}{a} - \frac{1}{a+L} \right) A - BL \right]$  (2)  $Gm \left[ \left( \frac{1}{a} + \frac{1}{a+L} \right) A + BL \right]$   
 (3)  $Gm \left[ \left( \frac{1}{a} - \frac{1}{a+L} \right) A + BL \right]$  (4)  $Gm \left[ \left( \frac{1}{a} + \frac{1}{a+L} \right) A - BL \right]$

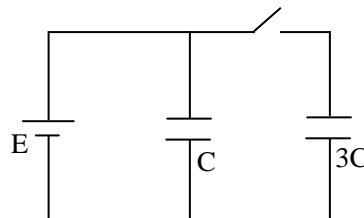
**Ans.** [3]

**Q.21** A cyclic process shown in figure. Find work done in cyclic process ABCA.



- (1) 20 J (2) 10 J (3) 5 J (4) 1 J
- Ans.** [2]

**Q.22** Initially capacitor  $C$  is connected to battery and switch is opened. Now battery is removed and switch is closed. Find loss in energy.



- (1)  $\frac{CE^2}{4}$  (2)  $\frac{2CE^2}{3}$  (3)  $\frac{3CE^2}{8}$  (4)  $CE^2$

**Ans.** [3]

**Q.23** There is particle of mass  $m$  revolving around earth with velocity  $v$ . Another particle of mass  $m$  come from space radially towards the earth with velocity  $v$  and collides inelastically with revolving particle. What will be the path of both stuck particles-

- (1) circular
- (2) tend to move to infinity
- (3) elliptical
- (4) parabola

**Ans.** [3]

**Q.24** Length of two trains 120m and 60m and their speeds are 80 km/h and 30 km/h. Find ratio of time on crossing the train in same direction and opposite direction.

- (1)  $\frac{5}{22}$
- (2)  $\frac{11}{5}$
- (3)  $\frac{22}{5}$
- (4)  $\frac{25}{11}$

**Ans.** [2]

**Q.25** A wire of diameter  $5\mu\text{m}$  is to be measured with the help of a screw gauge which has its main scale least count as 1 mm. The minimum number of circular scale divisions is-

- (1) 100
- (2) 200
- (3) 50
- (4) 500

**Ans.** [2]

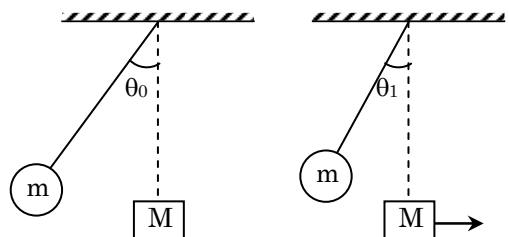
**Q.26** An electromagnetic wave having amplitude of electric field component is 30 V/m enters in a glass slab which has refractive index 1.5. If 4% of the incident light is reflected from glass-air interface, then find amplitude of electric field component of refracted wave.

- (1) 30 V/m
- (2) 36 V/m
- (3) 40 V/m
- (4) 44 V/m

**Ans.** [2]

**Q.27** A block of mass  $M$  placed on a smooth horizontal surface. A bob of mass  $m$  released at angle  $\theta_0$  from vertical, it collides with block and goes back till to angular position  $\theta_1$  as shown in figure. Find the ratio of

$$\frac{M}{m}$$



- (1)  $\frac{\theta_0 - \theta_1}{\theta_0 + \theta_1}$
- (2)  $\frac{\theta_0 + \theta_1}{\theta_0 - \theta_1}$
- (3)  $\frac{2\theta_1}{\theta_0 + \theta_1}$
- (4)  $\frac{2\theta_0}{\theta_1 + \theta_0}$

**Ans.** [1]

