FINAL JEE–MAIN EXAMINATION – APRIL, 2023
Held On Tuesday 11th April, 2023
TIME : 09:00 AM to 12:00 PM

SECTION - A

31. The radii of two planets 'A' and 'B' are 'R' and '4R' and their densities are ρ and $\rho/3$ respectively. The ratio of acceleration due to gravity at their surfaces ($g_A : g_B$) will be :

(1) 1 : 16 (2) 3 : 16 (3) 3 : 4 (4) 4 : 3

Sol. **(3)**

$$g = \frac{4\pi}{3} GR\delta$$

$$g \propto \delta R$$

$$\frac{g_A}{g_B} = \frac{\delta_A R_A}{\delta_B . R_B} = \frac{\delta . R}{\frac{\delta}{3} . 4R} = \frac{3}{4}$$

32. A coin placed on a rotating table just slips when it is placed at a distance of 1 cm from the center. If the angular velocity of the table in halved, it will just slip when placed at a distance of ______ from the centre :

(1) 8 cm (2) 4 cm (3) 2 cm (4) 1 cm

Sol. **(2)**

$fr = m\omega^2 r$

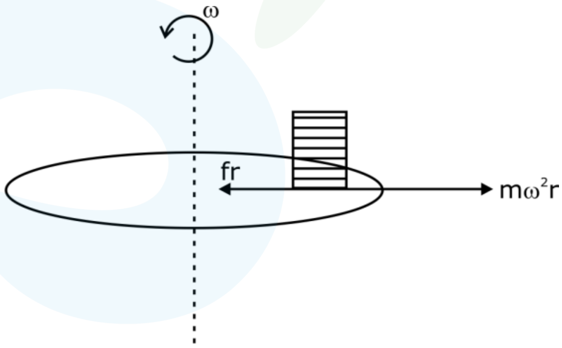
$\mu mg = m\omega^2 r = \text{const.}$

$\omega^2 r = \text{const}$

$\omega_1^2 r_1 = \omega_2^2 r_2$

$\omega^2 (1) = \left(\frac{\omega}{2}\right)^2 r_2$

$r_2 = 4\text{cm}$

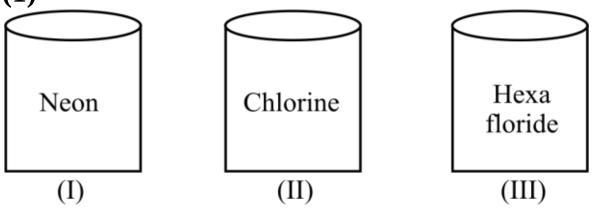


33. Three vessels of equal volume contain gases at the same temperature and pressure. The first vessel contains neon (monoatomic), the second contains chlorine (diatomic) and third contains uranium hexafluoride (polyatomic). Arrange these on the basis of their root mean square speed (v_{rms}) and choose the correct answer from the options given below :

(1) V_{rms} (mono) > v_{rms} (dia) > v_{rms} (poly) (2) V_{rms} (dia) < v_{rms} (poly) < v_{rms} (mono)

(3) V_{rms} (mono) < v_{rms} (dia) < v_{rms} (poly) (4) V_{rms} (mono) = v_{rms} (dia) = v_{rms} (poly)

Sol. **(1)**



$VRMS = \sqrt{\frac{\gamma RT}{m}}$ ....(1)

$\gamma = 1 + \frac{2}{f}$ so $r_{monochromic} > r_{diatomic} > r_{poly}$.

$V_{mono} > V_{diatomic} > V_{poly}$. Ans.(1)

34. Two radioactive elements A and B initially have same number of atoms. The half life of A is same as the average life of B. If λ_A and λ_B are decay constants of A and B respectively, then choose the correct relation from the given options.

(1) $\lambda_A = 2\lambda_B$ (2) $\lambda_A = \lambda_B$ (3) $\lambda_A \ln 2 = \lambda_B$ (4) $\lambda_A = \lambda_B \ln 2$

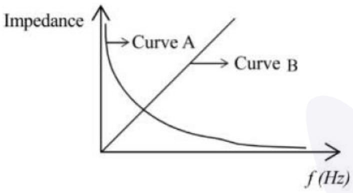
Sol. **(4)**

	A	B	
t = 0	N_0	N_0	$T \to$ half life
			$\tau \to$ ang life

$T_A = \tau_B \quad \to$ given in question

Now $\frac{\ln(2)}{\lambda_A} = \frac{1}{\lambda_B} \Rightarrow \boxed{\lambda_A = \lambda_B \cdot \ln(2)}$

35.



As per the given graph, choose the correct representation for curve A and curve B.
{Where X_C = reactance of pure capacitive circuit connected with A.C. source
X_L = reactance of pure inductive circuit connected with A.C. source
R = impedance of pure resistive circuit connected with A.C. source.
Z = impedance of the LCR series circuit}

(1) A = X_L, B = R (2) A = X_L, B = Z (3) A = X_C, B = R (4) A = X_C, B = X_L

Sol. **(4)**

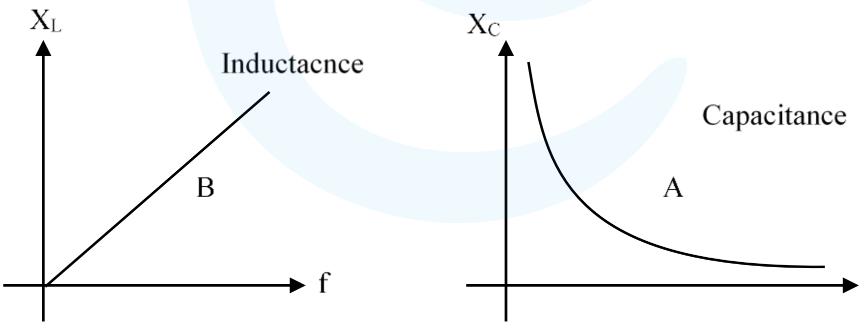
$X_L = W_L = 2\pi fL$

$X_C = \frac{1}{Wc} = \frac{1}{2\pi fc}$

R = const.

A $\to$ X_C

B $\to$ X_L



36. A transmitting antenna is kept on the surface of the earth. The minimum height of receiving antenna required to receive the signal in line of sight at 4 km distance from it is $x \times 10^{-2}$ m. The value of x is _______.
(Let, radius of earth R = 6400 km)

(1) 125 (2) 12.5 (3) 1250 (4) 1.25

Sol. **(1)**

$d = \sqrt{2R \cdot h}$

$d^2 = 2Rh$

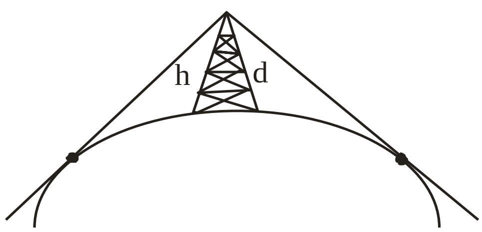
$(4)^2 = 2 \times 6400 \times h$

$\frac{16}{2 \times 6400} = h = \frac{1}{800}$ km

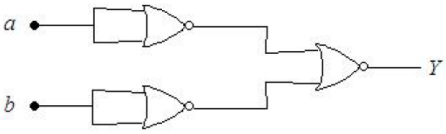
$h = \frac{1000}{800} = \frac{5}{4}$ m

$x \times 10^{-2} = \frac{5}{4}$

$x = \frac{500}{4} = 125$ Ans. Option $\to$ (1)



37. The logic performed by the circuit shown in figure is equivalent to :



(1) NAND (2) NOR (3) AND (4) OR

Sol. **(3)**

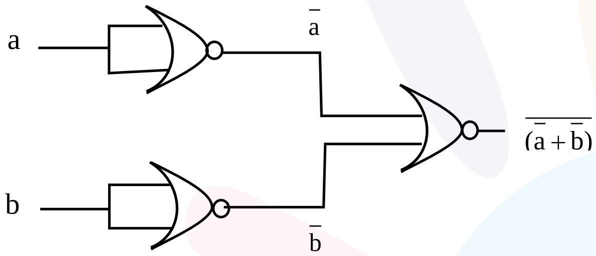
$Y = \ Y = \overline{(\bar{a} + \bar{b})}$

$Y = \ Y = \overline{\overline{(a \cdot b)}}$

$\boxed{Y = a \cdot b}$

Ans. $\rightarrow$ AND gate

Option $\rightarrow$ 3



38. The electric field in an electromagnetic wave is given as

$\vec{E} = 20 \sin \omega \left(t - \frac{x}{c} \right) \vec{j} \, NC^{-1}$

where ω and c are angular frequency and velocity of electromagnetic wave respectively. the energy contained in a volume of 5×10^{-4} m^3 will be (Given $\varepsilon_0 = 8.85 \times 10^{-12} c^2 / Nm^2$)

(1) 88.5×10^{-13} J (2) 17.7×10^{-13} J (3) 8.85×10^{-13} J (4) 28.5×10^{-13} J

Sol. **(3)**

$\vec{E} = 20 \sin w \left[t - \frac{x}{c} \right]$

E_o 2_o

Energy density $= \frac{1}{2} \varepsilon_o E_o^2$

$= \frac{1}{2} \times 8.85 \times 10^{-12} \times 400$

$= 200 \times 8.85 \times 10^{-12} \times 5 \times 10^{-4}$

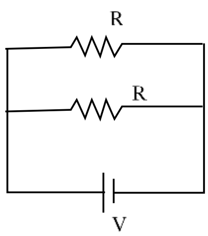
$= 8.85 \times 10^{-12} \times 10^{-4} \times 1000$

Energy $= 8.85 \times 10^{-13}$ J option $\rightarrow$ (1)

39. Two identical heater filaments are connected first in parallel and then in series. At the same applied voltage, the ratio of heat produced in same time for parallel to series will be :

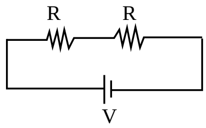
(1) 1 : 2 (2) 4 : 1 (3) 1 : 4 (4) 2 : 1

Sol. **(2)**



$H_1 = \frac{V^2}{(R/2)} t = \frac{2V^2}{R}$ .... (1)

$H_2 = \frac{V^2}{2R}t$ .... (2)



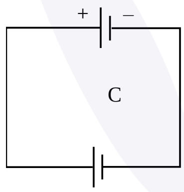
$\frac{H_1}{H_2} = \left(\frac{2V^2t}{R}\right) \times \frac{2R}{V^2t} = \frac{4}{1}$

40. A parallel plate capacitor of capacitance 2 F is charged to a potential V, The energy stored in the capacitor is E_1. The capacitor is now connected to another uncharged identical capacitor in parallel combination. The energy stored in the combination is E_2. The ratio E_2/E_1 is :

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

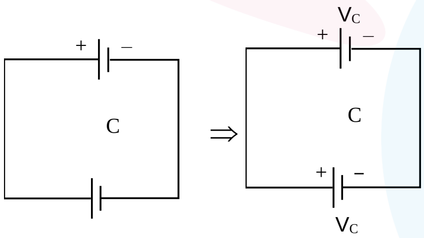
Sol. **(4)**

C = 2F



$E1 = \frac{1}{2}CV^2$ .... (1)

Now



$V_C = \frac{C_1V_1 + C_2V_2}{C_1 + C_2}$

$V_C = \frac{CV + O}{2C} = \frac{V}{2}$

$E_2 = CV_C{}^2 = C \cdot \frac{V^2}{4}$ .... (2)

$\frac{E_2}{E_1} = \frac{\left(\frac{CV^2}{4}\right)}{\left(\frac{CV^2}{2}\right)} = \frac{2}{1}$ option $\rightarrow$ (4)

41. An average force of 125 N is applied on a machine gun firing bullets each of mass 10 g at the speed of 250 m/s to keep it in position. The number of bullets fired per second by the machine gun is :

(1) 25 (2) 5 (3) 100 (4) 50

Sol. **(4)**

F = 125N

$F = \frac{dp}{dt}$ n $\rightarrow$ No. of bullets

$F = \frac{d(nmv)}{dt} = mv\frac{dn}{dt}$

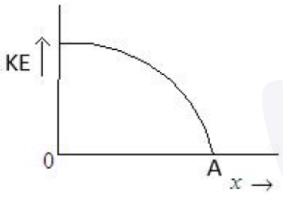
$125 = \frac{10n}{1000} \times 250 \times \frac{dn}{dt}$

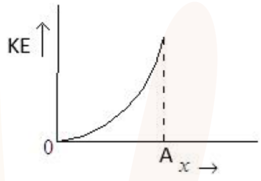
$$\frac{125\times1000}{2500}=\frac{dn}{dt}$$

$$\boxed{\frac{dn}{dt}=50}$$

option $\rightarrow$ (4)

42. The variation of kinetic energy (KE) of a particle executing simple harmonic motion with the displacement (x) starting from mean position to extreme position (A) is given by

(1)


(2)


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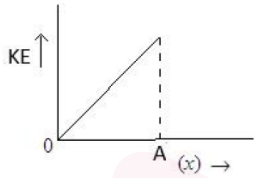
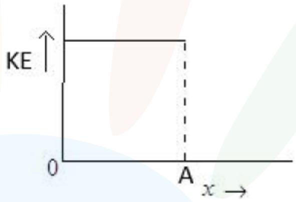


(4)


Sol. **(1)**

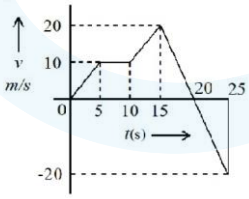
$K\cdot E = T\cdot E - P\cdot E$

$K\cdot E = \frac{1}{2}KA2 - \frac{1}{2}Kx^2$

Graph b/w $K\cdot E$ and x will be parabola

Option $\rightarrow$ (1)

43. From the v – t graph shown, the ratio of distance to displacement in 25 s of motion is :



(1) $\frac{3}{5}$ (2) $\frac{1}{2}$ (3) $\frac{5}{3}$ (4) 1

Sol. **(3)**

Displacement = Area of graph with sign

$$\text{Displacement} = \left(\frac{1}{2}\times10\times5\right) + (10\times5) + \left(\frac{1}{2}\times5\times30\right) + \left(\frac{1}{2}\times5\times20\right) - \frac{1}{2}(5)(20)$$

= 25 + 50 + 75 + 50 – 50

= 150 m

Distance $\rightarrow$ Area of graph with positive value

Distance = 25 + 50 + 75 + 50 = 250

$$\frac{\text{Distance}}{\text{Displacement}} = \frac{250}{150} = \frac{5}{3}$$

option $\rightarrow$ (3)

44. On a temperature scale 'X', the boiling point of water is 65^o X and the freezing point is -15^o X. Assume that the X scale is linear. The equivalent temperature corresponding to -95^o X on the Farenheit scale would be :

(1) -63^o F (2) -148^o F (3) -48^o F (4) -112^o F

Sol. **(3)**

$$\frac{X_T - X_L}{X_H - X_L} = \frac{T_F - 32}{212 - 32}$$

$$\frac{-95^\circ - (-15^\circ)}{65^\circ - (-15^\circ)} = \frac{T_F - 32}{180}$$

$$\frac{-80^\circ}{80^\circ} = \frac{T_F - 32}{180^\circ}$$

$-180 = T_F - 32$

$T_F = -180 + 32 = -148^\circ$ F   Ans. option → (2)

45. The free space inside a current carrying toroid is filled with a material of susceptibility 2×10^{-2}. The percentage increase in the value of magnetic field inside the toroid will be

(1) 0.2%   (2) 1%   (3) 2%   (4) 0.1%

Sol. **(3)**

$X = 2 \times 10^{-2}$

$\mu r = 1 + x = 1 + 0.02 = 1.02$

Bo → magnetic field due to magnetic material

B_m → magnetic field due to magnetic material

$B_m = \mu_r B_0$

$$\Delta B = \frac{B_m - B_0}{B_0} \times 100 = \frac{\mu_r B_0 - B_0}{B_0} \times 100$$

$$\Delta B\% = \frac{(X+1)-1}{1} \times 100 = X \times 100$$

$\Delta B\% = 2\times10^{-2} \times 100 = 2\%$ Ans. Option (3)

46. The critical angle for a denser-rarer interface is 45°. The speed of light in rarer medium is 3×10^8 m/s. The speed of light in the denser medium is :

(1) 2.12×10^8 m/s   (2) 5×10^7 m/s   (3) 3.12×10^7 m/s   (4) $\sqrt{2} \times 10^8$ m / s

Sol. **(1)**

$$\text{Sin ic} = \frac{\mu_r}{\mu_d} \quad \Rightarrow \sin 45^\circ = \frac{\mu_r}{\mu_d}$$

$$\Rightarrow \frac{\mu_r}{\mu_d} = \sqrt{2} \qquad ....(1)$$

We know

$$V \propto \frac{1}{\mu} \quad \Rightarrow \frac{V_d}{V_r} = \frac{\mu_r}{\mu_d}$$

$$= \frac{V_d}{3\times10^8} = \frac{1}{\sqrt{2}}$$

$$V_d = \frac{3}{\sqrt{2}} \times 10^8 = 3 \times 0.7 \times 10^8$$

$\boxed{V_d = 2.12 \times 10^8 \text{ m/sec}}$ Ans. Option (1)

47. Given below are two statements :

Statements I : Astronomical unit (Au), Parsec (Pc) and Light year (ly) are units for measuring astronomical distances.

Statements II : Au < Parsec (Pc) < ly

In the light of the above statements, choose the most appropriate answer from the options given below :

(1) Both Statements I and Statements II are incorrect.

(2) Both Statements I and Statements II are correct.

(3) Statements I is incorrect but Statements II are correct.

(4) Statements I is correct but Statements II are incorrect.

Sol. **(4)**

A.V., Par sec and light year are the unit of distance

Light year $\rightarrow$ distance travelled by light in one year

$1\ ly = 9.5 \times 10^{15}$ m

parcec = 3.262 light year

A.V. = 1.58×10^{-5} light year

A.V. < 1y < Parsec.

Statement I correct and statement II incorrect.

48. The current sensitivity of moving coil galvanometer is increased by 25%.This increase is achieved only by changing in the number of turns of coils and area of cross section of the wire while keeping the resistance of galvanometer coil constant. The percentage change in the voltage sensitivity will be :

(1) +25% (2) -25% (3) -50% (4) Zero

Sol. **(1)**

$\tau = mB$ — A = area of coil

$K\theta = IANB$ — B = magnetic field

$\frac{\theta}{I} = \frac{ANB}{K}$ — Currect senstivity

$1.25\left(\frac{\theta}{I}\right)_2 = \left(\frac{\theta}{I}\right)_1$ .... (1)

$1.25\left[\frac{AN_2B}{K}\right] = \left[\frac{AN_1B}{K}\right]$

$1.25 = \frac{N_1}{N_2} = \frac{5}{4}$ ...... (2)

$\Rightarrow R = \frac{\delta\ell}{a} = \text{const.}$

$\Rightarrow \ell = a$

Voltage sensitivity $= \frac{\theta}{V} = \frac{\theta}{IR} = \frac{\text{Current sensitivity}}{R}$

R = constant

Voltage sensitivity $\propto$ current sensitivity — Ans. option $\rightarrow$ (A)

49. A metallic surface is illuminated with radiation of wavelength λ, the stopping potential is V_o. If the same surface is illuminated with radiation of wavelength 2λ, the stopping potential becomes $\frac{V_0}{4}$. The threshold wavelength for this metallic surface will be

(1) $\frac{3}{2}\lambda$ (2) 4λ (3) 3λ (4) $\frac{\lambda}{4}$

Sol. **(3)**

$E = K.E + \phi_0$

Now

$$\frac{hc}{\lambda} = ev_0 + \phi_0 \quad \text{....... (1)}$$

And $$\frac{hc}{2\lambda} = \frac{eV_0}{4} + \phi_0 \quad \text{........ (2)}$$

(2) × 4 .... (1)

$$\frac{2hc}{\lambda} - \frac{hc}{\lambda} = 0 + (4\phi_0 - \phi_0)$$

$\frac{hc}{\lambda} = 3\phi_0$

$\frac{hc}{\lambda} = 3\frac{hc}{\lambda_0}$

$\lambda_0 = 3\lambda$

50. 1 kg of water at 100ºC is converted into steam at 100ºC by boiling at atmospheric pressure. The volume of water changes from 1.00×10^{-3} m^3 as a liquid to 1.671 m^3 as steam. The change in internal energy of the system during the process will be
(Given latent heat of vaporisation = 2257 kJ/kg, Atmospheric pressure = 1×10^5 Pa)
(1) + 2476 kJ (2) -2426 kJ (3) -2090 kJ (4) +2090 kJ

Sol. **(4)**

$\mathbf{V_1}$ $\mathbf{V_2}$

Water ⟶ Steam
1kg 100°C
100°C

Change in volume at constant pressure and temp →

$\Delta V = V_2 - V_1 = 1.671 - 0.001$

$\Delta V = 1.67\ m^3$ ...... (1)

$\Delta Q = \Delta U + w$

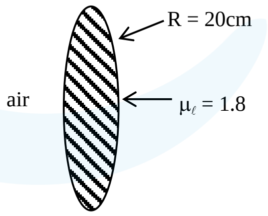
$mL_v = \Delta U + (1.013 \times 10^5)(1.67)$

$\Delta U = (2257 - 170)10^3$

$\Delta U = 2090$ kJ (approx.) Ans. Option → 4

51. The radius of curvature of each surface of a convex lens having refractive index 1.8 is 20 cm. The lens is now immersed in a liquid of refractive index 1.5. The ratio of power of lens in air to its power in the liquid will be x : 1. The value of x is __________

Sol. **(4)**



$\frac{1}{f} = \left(\frac{\mu_\ell}{\mu_m} - 1\right)\left(\frac{1}{R} - \frac{1}{-R}\right)$

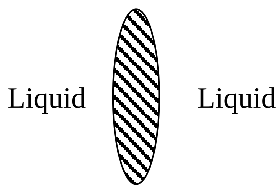
$P_1 = \frac{2}{R}\left(\frac{1.8}{1} - 1\right]$

$P_1 = \frac{2}{R}(0.8) = \frac{1.6}{R}$ .... (1)

Now,

$P_2 = \frac{2}{R}\left[\frac{1.8}{1.5} - 1\right]$

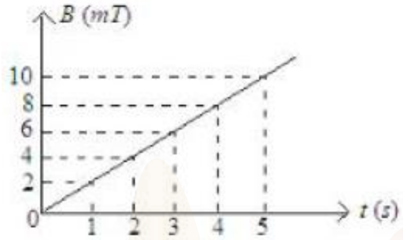
$P_2 = \frac{2}{R}\left[\frac{0.3}{1.5}\right] = \frac{2}{R} \times \frac{1}{5} = \frac{2}{5R}$



$\frac{P_{air}}{P_{liquid}} = \frac{P_1}{P_2} = \frac{\left(\frac{1.6}{R}\right)}{\left(\frac{0.4}{R}\right)} = \frac{4}{1}$

Ans. → 4

52. The magnetic field B crossing normally a square metallic plate of area 4 m^2 is changing with time as shown in figure. The magnitude of induced emf in the plate during t = 2s to t = 4s, is __________ mV.



Sol. **(8)**

$$\text{emf} = \frac{d\phi}{dt}$$

$$\text{Emf} = \frac{dBA}{dt} = \frac{AdB}{dt}$$

Emf = 4 · Slope of B.t curve

$$= 4 \cdot \left[\frac{8-4}{4-2}\right] = 4 \times 2$$

$$\boxed{\text{Emf} = 8 \text{ Volt}}$$

53. The length of a wire becomes l_1 and l_2 when 100 N and 120 N tensions are applied respectively. If 10 l_2 = 11 l_1, the natural length of wire will be $\frac{1}{x}l_1$. Here the value of x is _______ .

Sol. **(2)**

F = kx

ℓ_0 = natural length

$$F = \frac{yA}{\ell_0} \cdot x.$$

Sol when F = 100 N

$100 = k(\ell_1 - \ell_0)$ ..... (1)

When F = 120N

$120 = K((\ell_1 - \ell_0)$

Given that $10\ell_2 = 11\ell_1$

$\ell_2 = 1.1\ \ell_1$

So $120 = K(1.1\ell_1 - \ell_0)$ .... (2)

Now (2)\(1)

$$\frac{120}{100} = \frac{K(1.1\ell_1 - \ell_0)}{K(\ell_1 - \ell_0)}$$

$$1.2 = \frac{1.1\ell_1 - \ell_0}{\ell_1 - \ell_0}$$

$1.2\ell_1 - 1.2\ell_0 = 1.1\ell_1 - \ell_0$

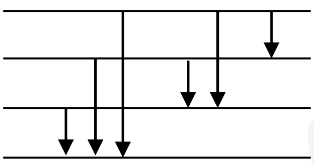
$0.1\ell_1 = 0.2\ell_0$

$\ell_0 = \frac{\ell_1}{2}$ So $\boxed{x = 2}$ Ans.

54. A monochromatic light is incident on a hydrogen sample in ground state. Hydrogen atoms absorb a fraction of light and subsequently emit radiation of six different wavelengths. The frequency of incident light is $x \times 10^{15}$ Hz. The value of x is _______.

(Given $h = 4.25 \times 10^{-15}$ eVs)

Sol. **(3)**



Total emission lines = 6 (given)

So electron absorbed energy and jump from n = 1 to n = 4

$\Delta E\ 13.6\left[\frac{\ell}{\ell^2}-\frac{1}{4^2}\right]$ ev

$= 13.6\left[1-\frac{1}{16}\right]$ ev

$\Delta E = hf$

$12.75 = 4.5 \times 10^{-15}$,

$f = \frac{12.75}{4.25} \times 10^{15} = 3\times10^{15}$ Hz

$\boxed{x = 3}$ Ans.

55. A force $\vec{F} = (2+3x)\hat{i}$ acts on a particle in the x direction where F is in newton and x is in meter. The work done by this force during a displacement from x = 0 to x = 4 m, is ______ J.

Sol. **(32)**

$\vec{F} = (2 + 3x)i$

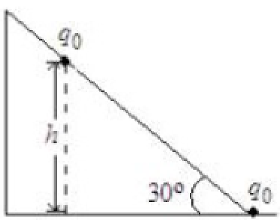
$w = \int_0^4 F.dx = \int_0^4 (2+3x).dx$

$w = \left(2x+\frac{3x^2}{2}\right)_0^4 = (8 + 24)$

$\boxed{w = 32J}$

56. As shown in the figure, a configuration of two equal point charges ($q_0 = +2\,\mu$ C) is placed on an inclined plane. Mass of each point charge is 20 g. Assume that there is no friction between charge and plane. For the system of two point charges to be in equilibrium (at rest) the height $h = x \times 10^{-3}$ m. The value of x is _________.

(Take $\frac{1}{4\pi\varepsilon_0} = 9\times10^9\,N\,m^2C^{-2}, g = 10ms^{-2}$)



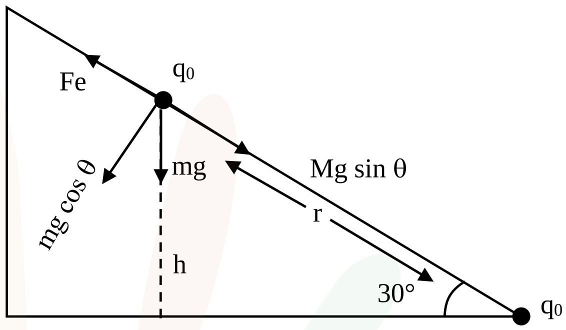
Sol. **(300)**

Point charge on equilibrium is at rest.

So $F_e = mg\sin\theta$

$$\frac{kq_0 \cdot q_0}{r^2} = mg\sin 30°$$

$$\frac{kq_0^2}{\left(\frac{h}{\sin 30°}\right)^2} = \frac{mg}{2}$$



$$\frac{9\times10^9\times(2\times10^{-6})^2}{4h^2} = \frac{20\times10^{-3}\times10}{2}$$

$$\frac{9\times4\times10^9\times10^{-12}}{4h^2} = 10^{-1}$$

$h^2 = 9\times10^{-2}$

$h = 0.3$ m $= 300 \times 10^{-3}$ m

$\boxed{x = 300}$ Ans.

57. A solid sphere of mass 500 g and radius 5 cm is rotated about one of its diameter with angular speed of 10 rad s^{-1}. If the moment of inertia of the sphere about its tangent is $x \times 10^{-2}$ times its angular momentum about the diameter. Then the value of x will be _____________ .

Sol. **(35)**

$I_1 = \frac{2}{5}mR^2$

$I_2 = \frac{2}{5}mR^2 + mR^2 = \frac{7}{5}mR^2$

Angular moment about diameter is

$L_{com} = I_1 w = \frac{2}{5}mR^2 w$

Now,

$$\frac{I_2}{L_{com}} = \frac{\frac{7}{5}mR^2}{\frac{2}{5}mR^2 w} = \frac{7}{2}w$$

$$\frac{I_2}{L_{com}} = \frac{7}{2\times10} = \frac{7}{20}$$

Now $\frac{7}{20} = x \times 10^{-2}$

$x = \frac{7}{20} \times 100$

$\boxed{x = 35}$ Ans.

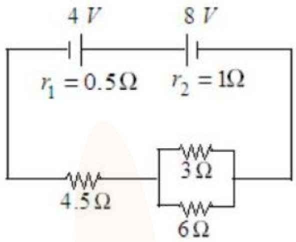
58. The equation of wave is given by $Y = 10^{-2}\sin 2\pi(160t - 0.5x + \pi/4)$ where x and Y are in m and t in s. The speed of the wave is __________ km h^{-1}.

Sol. **(1152)**

$Y = 10^{-2}\sin 2\pi(160t - 0.5x + \pi/4)$

Speed of wave $= \frac{w}{k} = \frac{160}{0.5} = 320$ m/sec $= 320 \times \frac{18}{5} = 1152$ km/h Ans.

59. In the circuit diagram shown in figure given below, the current flowing through resistance 3 Ω is $\frac{x}{3}$ A. The value of x is ________

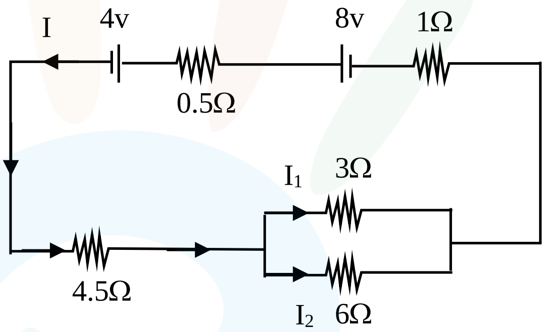


Sol. **(1)**

$$Req. = 0.5 + 1 + 4.5 + \left(\frac{3.6}{9}\right)$$

$$Req. = 6 + 2 = 8\Omega$$

$$I = \frac{8-4}{8} = \frac{1}{2} A = 0.5A$$



$$I_1 : I_2 = \frac{1}{3} : \frac{1}{6}$$

$$I_1 : I_2 = 2 : 1$$

and $I_1 + I_2 = 0.5$ A

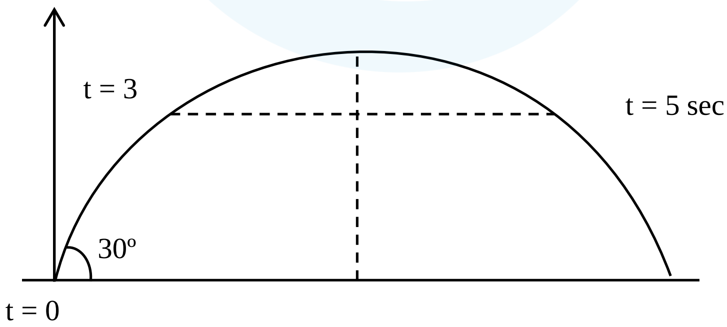
$$I_1 = \frac{2}{3} \times 0.5 = \frac{1}{3} A$$

So $\frac{1}{3} = \frac{x}{3} \Rightarrow \boxed{x = 1}$

60. A projectile fired at 30° to the ground is observed to be at same height at time 3s and 5s after projection, during its flight. The speed of projection of the projectile is ________ ms^{-1}.
(Given $g = 10\ ms^{-2}$)

Sol. **(80)**

Time of flight = 5 + 3 = 8 sec.



Now, $T = \frac{2u\sin\theta}{g}$

$$8 = \frac{2u \cdot \sin 30°}{10}$$

$\Rightarrow \boxed{u = 80\ m/sec}$ Ans.