JEE Main 2021 August 31, Shift 2 (Physics)

1. The number of channels broadcasted simultaneously via a radio signal of frequency 6MHz. The maximum modulation frequency is 6 kHz.

(A) 2000

(B) 1000

(C) 3000

(D) 4000

Correct option: (B)

Solution: Number of channels, $n = \frac{6\text{MHz}}{6\text{kHz}} = 1000$

2. Determine the dimension of mass in terms of Force, Time and Velocity.

(A) $[V]^1[T]^1[F]^1$

(B) $[V]^{-1}[T]^0[F]^1$

(C) $[V]^{-1}[T]^{-1}[F]^3$

(D) $[V]^{-1}[T]^1[F]^1$

Correct Option: (D)

Solution:

Let $[M]^1 = [V]^a[T]^b[F]^c$

$[M]^1 = [LT^{-1}]^a[T]^b[MLT^{-2}]^c$

$[M]^1 = [M]^c[L]^{a+c}[T]^{-a+b-2c}$

Thus, on comparing powers $c = 1, a + c = 0, \quad b - a - 2c = 0$

On solving, $a = -1 \quad b = 1 \quad c = 1$

Hence, $[M] = [V]^{-1}[T]^1[F]^1$

3. Two charge particles $q_1 = 4\pi$ coulomb and $q_2 = 2\pi$ coulomb placed at $\left(0,0,\frac{\pi}{k}\right)$ and $\left(0,0,\frac{3\pi}{k}\right)$ are in a changing magnetic field in the space given by the expression $B = B_0\left(\frac{\hat{\imath}+\hat{\jmath}}{\sqrt{2}}\right)[\cos(kz-\omega t)]$. The charge particles are moving with the velocities $0.5c\hat{\imath}$. Determine the force acting on the charge particles at $\mathrm{t} = 0$.

Correct Answer: 1

Solution: At $t = 0$,

B at $\left(0,0,\frac{\pi}{k}\right) = B_0\left(\frac{\hat{\imath}+\hat{\jmath}}{\sqrt{2}}\right)\cos(\pi)$

B at $\left(0,0,\frac{3\pi}{k}\right) = B_0\left(\frac{\hat{\imath}+\hat{\jmath}}{\sqrt{2}}\right)\cos(3\pi)$

Force on charged particle $\mathrm{q_1}$,

$\mathrm{F_2 = q_2\vec{V}_2 \times \vec{B}_2}$

$= 2\pi(0.5c\hat{\imath}) \times \left[-\mathrm{B_0}\left(\frac{\hat{\imath}+\hat{\jmath}}{\sqrt{2}}\right)\right] = \frac{2\pi \mathrm{B_0 c}}{2\sqrt{2}}(-\hat{\mathrm{k}}) \Rightarrow \frac{\mathrm{F_1}}{\mathrm{F_2}} = 2$

4. The gravitational acceleration at a depth r from the surface of planet is g and the gravitational acceleration at an altitude r from the surface is g'. Here. $r <$ radius of planet (R).

Evaluate $\frac{g}{g'}$.

(A) $1 + \frac{r^2}{R^2} + \frac{r}{R} + \left(\frac{r}{R}\right)^3$

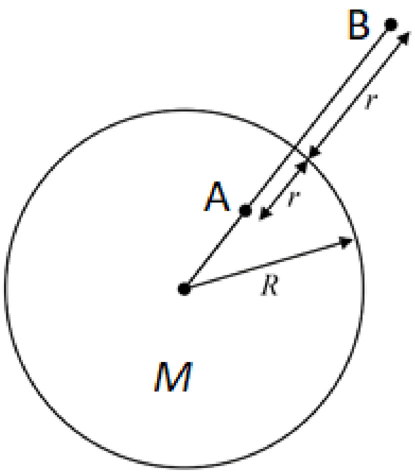
(B) $1 - \frac{r^2}{R^2} - \frac{r}{R} - \left(\frac{r}{R}\right)^3$

(C) $1 + \frac{r^2}{R^2} + \frac{r}{R} - \left(\frac{r}{R}\right)^3$

(D) $1 - \frac{r^2}{R^2} + \frac{r}{R} - \left(\frac{r}{R}\right)^3$

Correct Option: (D)

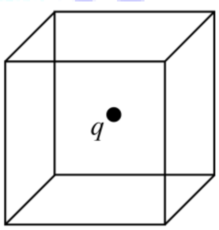
Solution:



$$\frac{g'}{g} = \frac{\frac{GM}{(R+r)^2}}{\frac{GM}{R^3}(R-r)} = \frac{R^3}{(R+r)^2(R-r)}$$

$$\frac{g}{g'} = \frac{(R+r)^2(R-r)}{R^3} = \frac{R^3 - Rr^2 + rR^2 - r^3}{R^3} = 1 - \frac{r^2}{R^2} + \frac{r}{R} - \left(\frac{r}{R}\right)^3$$

5. Find the wrong alternative among the given options.



(A) In uniform Electric field, closed surface contains zero flux.

(B) If Electric field is parallel to Gaussian surface, then flux is finite & nonzero.

(C) Flux through the surface is negative if the field lines are entering into the Gaussian surface.

(D) If Q is at center in the figure, then electric flux passing through each face will be equal.

Correct Option: (B)

Solution: Electric flux is dot product of electric field vector and area vector.

In uniform electric field, flux entering through the closed surface is equal to flux leaving. Hence, flux through closed surface will be zero in this case.

If electric field is parallel to Gaussian surface, then area vector is perpendicular to electric field and no filed lines cross the surface. Hence, flux will be zero in that case.

6. If the time period of oscillation of simple pendulum in air is T. What would be its new time period when it is placed inside a liquid of density one-fourth of that of its density of bob. New length of pendulum is $\frac{4}{3}$ times of its initial length.

(A) $\frac{2}{3}\text{T}$

(B) $\frac{5}{3}\text{T}$

(C) $\frac{4}{3}\text{T}$

(D) $\frac{4}{5}\text{T}$

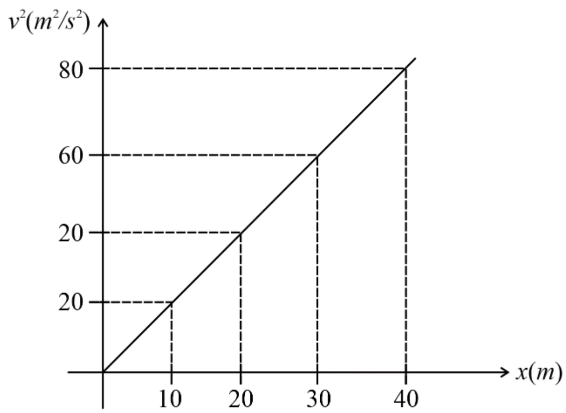
Correct Option: (C)

Solution: Time period of oscillation of simple pendulum in air is given as $\text{T} = 2\pi\sqrt{\frac{\ell}{g}}$

Effective gravity acting on the pendulum in liquid is $\text{g}_{\text{eff}} = \text{g} - \frac{\text{g}}{4} = \frac{3\text{g}}{4}$ $\therefore \text{T} = 2\pi\sqrt{\frac{4\ell/3}{3\text{g}/4}} = 2\pi\sqrt{\frac{16\ell}{9\text{g}}}$

$\text{T}' = \frac{4}{3}\text{T}$

7. Evaluate the acceleration of particle executing motion as per following graph.



(A) 4.5m/s^2

(B) 10m/s^2

(C) 1m/s^2

(D) 6m/s^2

Correct option: (A)

Solution: The equation of straight line in the graph is given as $v^2 = 2x$

$$\Rightarrow 2v\frac{dv}{dx} = 2 \Rightarrow v\frac{dv}{dx} = 1$$

$$\Rightarrow a = 1\text{m/s}^2$$

8. In a Young's Double Slit Experiment, the screen is 1.5m away from the slits and the slits are 0.3mm away from each other. If the distance between the fourth bright fringe on both sides of central maxima is 2.4cm. Then the frequency of light used in the experiment is $P \times 10^{14}$ Hz Find P?

(A) 4

(B) 5

(C) 7

(D) 2

Correct Option. (B)

Sol. The distance between 4^{th} bright fridge on both side of central maxima is 2.4cm.

$$\Delta y = \frac{D\lambda}{d} \times 8$$

$$\lambda = \frac{d\Delta y}{8D}$$

$$= \frac{0.3\times10^{-3}\times2.4\times10^{-2}}{8\times1.5} = \frac{0.12\times10^{-5}}{2} = 0.06 \times 10^{-5} \text{ m}$$

$$\lambda = 6 \times 10^{-7}\text{m}$$

$$f = \frac{C}{6\times10^{-7}} = 0.5 \times 10^{15} \text{ Hz}$$

$$\text{f} = 5 \times 10^{14}\text{Hz}$$

On comparing, $P = 5$

9. 192J of heat is produced in a resistance when 4A of current is passed through it for 1 second. What will be the heat produced in the same resistance in 5 seconds, if the current passed through it is two time of initial value?

(A) 3040J

(B) 3840J

(C) 4800J

(D) 3600J

Correct Option. (B)

Solution: Heat produced in electrical resistance is given as $\mathrm{H}=\mathrm{i}^2\mathrm{Rt}$

$192=4\times4\times R\times1$

Hence, value of resistance is $\mathrm{R}=12\Omega$

Heat produced in the second case is $\mathrm{H}'=\mathrm{i}'^2\mathrm{Rt}'$

$\mathrm{H}'=8\times8\times12\times5=3840\mathrm{J}$

10. Calculate the work done by the gas during adiabatic compression. Initial volume of gas is $1200\times10^{-6}\mathrm{m}^3$ and final volume of gas is $300\times10^{-6}\mathrm{m}^3$. Initial pressure of gas is 200 KPa. The adiabatic ratio γ for the process is 1.5.

(A) 480J

(B) 200J

(C) -480J

(D) -200J

Correct Option. (C)

Solution:

$\mathrm{V_i}=1200\times10^{-6}\mathrm{m}^3,\mathrm{P_i}=200\mathrm{KPa}$

$\mathrm{V_f}=300\times10^{-6}\mathrm{m}^3,\mathrm{P_f}=\ ?$

$\gamma=1.5$

$P_iV_i^\gamma=P_fV_f^\gamma$

$200\times10^3\left(\frac{1200\times10^{-6}}{300\times10^{-6}}\right)^\gamma=\mathrm{P_f}$

$\mathrm{P_f}=200\times10^3\times4^{3/2}$

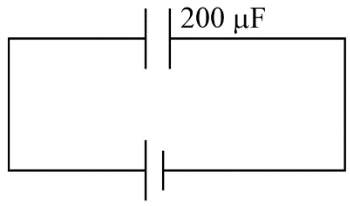
$\mathrm{P_f}=200\times10^3\times8$

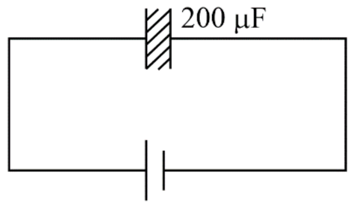
$\mathrm{P_f}=1600\times10^3=16\times10^5\mathrm{Pa}$

$\mathrm{W}=\frac{\mathrm{P_iV_i-P_iV_f}}{\gamma-1}$

$W=\frac{2\times10^5\times1200\times10^{-6}-16\times10^5\times300\times10^{-6}}{1.5-1}=\frac{240-480}{0.5}=-240\times2=-480\mathrm{J}$

11. Calculate the change in electrical energy stored in the capacitor, when a medium of dielectric constant $K = 2$ is introduced between the plates of capacitor. Capacitance of capacitor is $200\mu\text{F}$ and is connected across 200V.





(A) 0.4J

(B) 10J

(C) 6J

(D) 4J

Correct option: (D)

Solution:

Initially $\text{C} = 200\mu\text{F}$

Energy stored in the capacitor is given as $\text{E}_\text{i} = \frac{1}{2}\text{CV}^2 = \frac{1}{2} \times 200 \times 10^{-6} \times (200)^2$

Finally $\text{C}' = \text{KC} = 400\mu\text{F}$

Energy stored in the capacitor is given as $\text{E}_\text{f} = \frac{1}{2}\text{C}'\text{V}^2 = \frac{1}{2} \times 400 \times 10^{-6} \times (200)^2$

Change in energy stored in capacitor, $\Delta\text{E} = \frac{1}{2} \times (400 - 200) \times 10^{-6} \times 4 \times 10^4 = 4\text{J}$

12. A mass of $50 \times 10^3\text{kg}$ is placed at the centre of a table which has four legs in the shape of a hollow cylinder. The inner and outer radius of cylindrical legs are 50cm and 100cm respectively. If the Young's modulus of elasticity for the material of legs of table is $\text{Y} = 2 \times 10^{11}$, then calculate the strain in each leg.

(A) 2.65×10^{-9} m

(B) 2.65×10^{-8} m

(C) 2.65×10^{-7} m

(D) 2.65×10^{-10} m

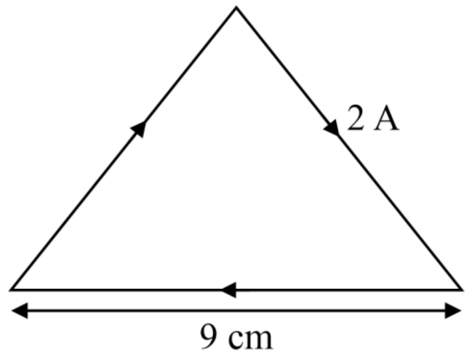
Correct option: (C)

Solution: Strain is given as $\frac{\Delta L}{L}=\frac{F}{AY}$, where F is load on each leg, A is are of cross section of each leg.

$$\frac{\Delta L}{L}=\frac{50\times10^{3}\times10/4}{\pi(100^{2}-50^{2})\times10^{-4}\times2\times10^{11}}=\frac{5\times10^{5}}{4\times\pi\times150\times50\times10^{-4}\times2\times10^{11}}$$

$$\frac{\Delta L}{L}=\frac{1}{12\pi}\times10^{-5}=2.65\times10^{-7}\ \text{m}$$

13. Diagram given below is an equilateral triangle of side length 9cm. If current flowing through the wire is 2A, find the magnetic field at the center.



(A) 4×10^{-5}T

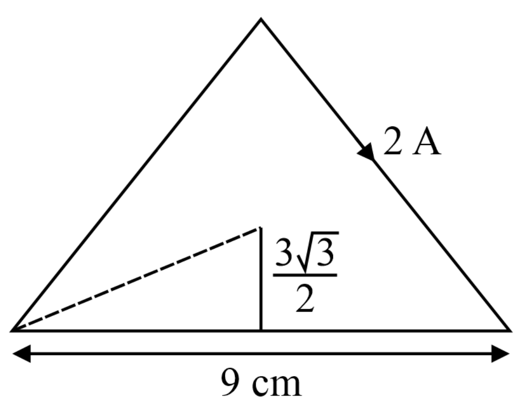
(B) 6×10^{-5}T

(C) 8×10^{-5}T

(D) 2×10^{-5}T

Correct option: (A)

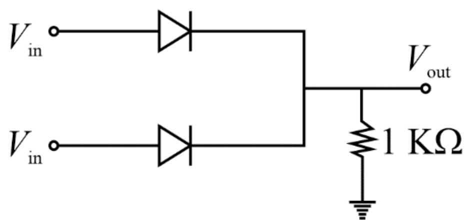
Solution:

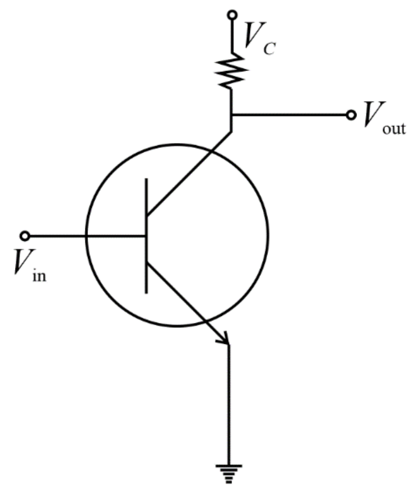


Magnetic field at the centre by one side of triangle, $B_1 = \frac{\mu_0 I}{4\pi R}(2\sin\frac{\pi}{3}) = \frac{4\pi\times10^{-7}\times2}{4\pi\left(\frac{3\sqrt{3}}{2}\right)\times10^{-2}} \times 2 \times \frac{\sqrt{3}}{2} = \frac{4}{3}\times10^{-5}$

$B_{\text{net}} = 3B_1 = 4\times10^{-5}\text{T}$

14.





Identify the type of gates represented by the above diagrams.

(A) NAND, NOT

(B) NOR, NOT

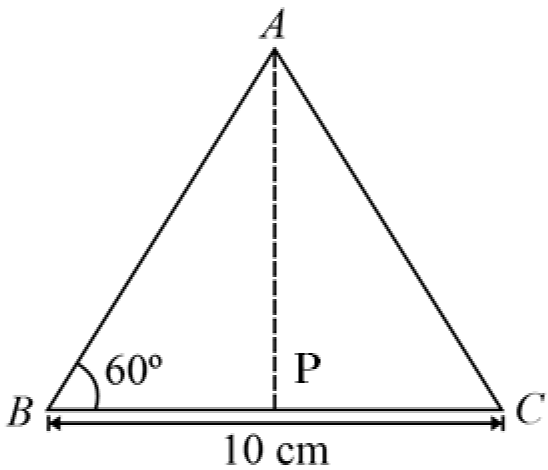
(C) AND, OR

(D) OR, NOT

Correct Answer: (D)

Solution: OR, NOT

15. Minimum deviation and angle of prism is same for an equilateral prism of side length 10cm. Light takes $X\times10^{-10}$ s to travel from P to A. Find the value of X.



(A) 4

(B) 5

(C) 6

(D) 7

Correct option: (B)

Solution: Minimum angle of deviation is given as $\delta_{min} = 2\text{i} - \text{A}$, where i is angle of incidence and A is angle of prism.

According to question, $\text{A} = 2\text{i} - \text{A}$

$\text{A} = \text{i}$

For a prism, $\mu = \frac{\sin\left(\frac{\delta_{min}+\text{A}}{2}\right)}{\sin\left(\frac{\text{A}}{2}\right)} = \frac{\sin(\text{A})}{\sin\left(\frac{\text{A}}{2}\right)} = \frac{\sin 60°}{\sin 30°}$

$\mu = \sqrt{3}$

Speed of light in prism, $v = \frac{c}{\mu} = \frac{3\times10^8}{\sqrt{3}}\,\text{m/s}$

Time taken, $\text{t} = \frac{\text{AP}}{v} = \frac{5\sqrt{3}\times10^{-2}}{\left(\frac{3\times10^8}{\sqrt{3}}\right)} = 5\times10^{-10}\text{sec}$

So, $X = 5$

16. Number of turns in the solenoid is 1000. Length of solenoid is 30 cm and its volume is $2\times10^{-2}\text{m}^3$. Magnetic moment of solenoid changes from 780Am^2 to 380Am^2, then current changes by?

Correct Answer: 6

Solution: $I_1 = \frac{M_1}{NA} = \frac{M_1}{\sqrt{\ell})}$

$H = \frac{M_1 \ell}{NV} = \frac{780 \times 30 \times 10^{-2}}{1000 \times 2 \times 10^{-2}} = 11.7A$

$l_2 = \frac{M_2 \ell}{NV} = \frac{380 \times 30 \times 10^{-2}}{1000 \times 2 \times 10^{-2}} = 5.7A$

$l_1 - l_2 = 6A$

17. The moment of inertia of the system of two identical spheres of mass 1.5kg and radius 50 cm kept at 5 m apart from each other along an axis passing through centre of mass of the system. The axis of rotation is perpendicular to the line joining the centres of two spheres.

(A) 21.45

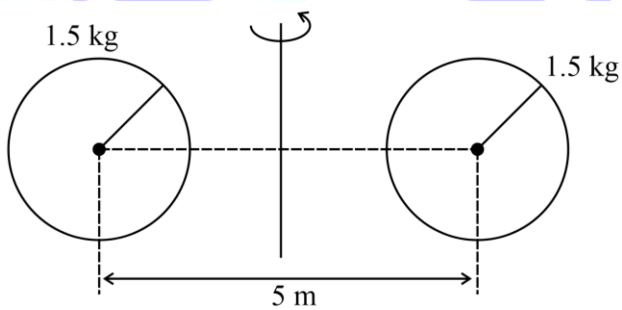
(B) 56.11

(C) 19.04

(D) 44.34

Correct Option. (C)

Solution:

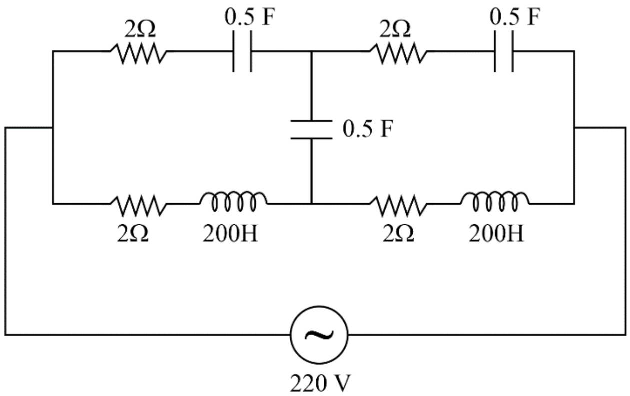


Applying parallel axis theorem for both spheres, we can write

$I = \left(\frac{2}{5}MR^2 + Mx^2\right) \times 2$, here x is distance between axis of rotation and parallel axis passing through centre of mass of sphere.

$= \left[\frac{2}{5} \times 1.5 \times (0.5)^2 + 1.5 \times (2.5)^2\right)\right] \times 2 = [0.15 + 9.37] \times 2 = 19.04$

18. Calculate the impedance of the circuit shown below at very high frequency.



(A) 4Ω

(B) 40Ω

(C) 0.4Ω

(D) 400Ω

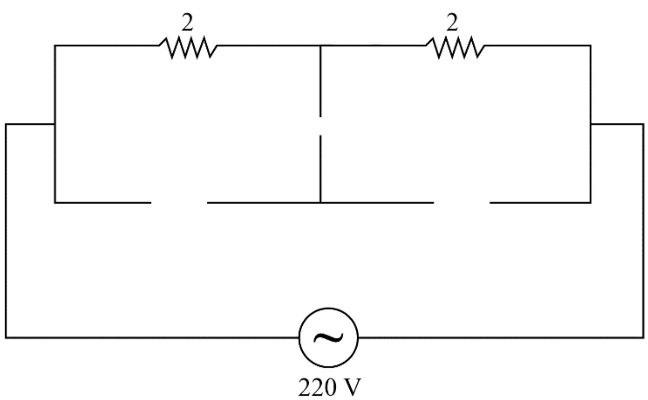
Correct Option: (A)

Solution:

For (i) $\rightarrow \infty$

$\frac{1}{\alpha C} \rightarrow 0 \Rightarrow$ capacitance acts as short circuit

& $\omega L \rightarrow \infty$ Inductance acts as open circuit



$Z = 4$ Ohm

19. $\vec{F}_1 = \vec{P} + \vec{Q}$ and $\vec{F}_2 = \vec{P} - \vec{Q}$, where $\vec{P}$ and $\vec{Q}$ are perpendicular to each other.

Resultant of $\vec{F}_1$ and $\vec{F}_2$ is $\mathrm{F}_{\text{resultant}} = \sqrt{3(\mathrm{P}^2 + \mathrm{Q}^2)}$, when angle between $\vec{F}_1$ and $\vec{F}_2$ is θ_1

Resultant of $\vec{F}_1$ and $\vec{F}_2$ is $\mathrm{F}_{\text{resultant}} = \sqrt{2(\mathrm{P}^2 + \mathrm{Q}^2)}$, when angle between $\vec{F}_1$ and $\vec{F}_2$ is θ_2

Statement -1: θ_2 is more than θ_1

Statement -2: $\theta_1 = 60^\circ$ and $F_{\text{resultant}} = \sqrt{2(P^2 + Q^2)}$

(A) Statement -1 is incorrect and Statement -2 is correct

(B) Statement -1 and Statement -2 both are incorrect

(C) Statement -1 and Statement -2 both are correct

(D) Statement -1 is correct and Statement -2 is incorrect

Ans. (C)

Sol. $\vec{F}_1$ "and" $\vec{F}_2$ at θ_1

$F_{\text{net 1}} = \sqrt{P^2 + Q^2 + P^2 + Q^2 + 2(P^2 + Q^2)\cos\ \theta_1}$

$F_{\text{net2}} = \sqrt{P^2 + Q^2 + P^2 + Q^2 + 2(P^2 + Q^2)\cos\ 0_2}$

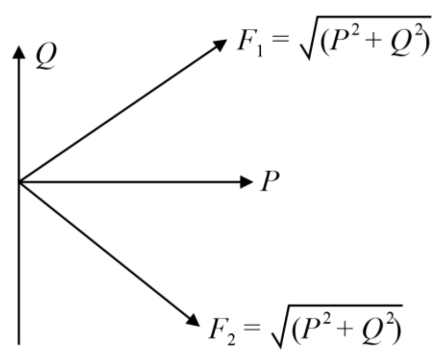
If $F_{\text{net1}} = \sqrt{3(P^2 + Q^2)} = \sqrt{2(P^2 + Q^2) + 2(P^2 + Q^2)\cos\ \theta_1}$

$\Rightarrow \cos\ \theta_1 = \frac{P^2+Q^2}{2(P^2+Q^2)}$

$\Rightarrow \theta_1 = 60^\circ$

$F_{\text{net2}} = \sqrt{2(P^2 + Q^2)} = \sqrt{2(P^2 + Q^2) + 2(P^2 + Q^2)\cos\ \theta_2}$

$\Rightarrow \cos\ \theta_2 = 0 \Rightarrow \theta_2 = 90^\circ$



20. A spherical shell of inner r_1 and outer radius r_2 have thermal conductivity K. Find the rate of heat flow in radial direction, if inside temperature is θ_2 and outside temperature is θ_1. Here $\theta_2 > \theta_1$.

(A) $\frac{4\pi K(r_1 r_2)(\theta_2+\theta_1)}{(r_2+r_1)}$

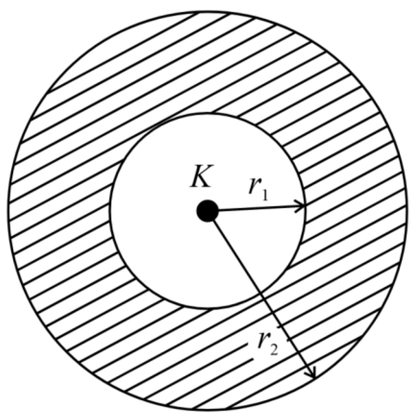
(B) $\frac{(\mathrm{r}_1\mathrm{r}_2)(\theta_1-\theta_2)}{4\pi\mathrm{K}(r_2-r_1)}$

(C$\frac{(r_1 r_2)(\theta_2-\theta_1)}{4\pi K(r_2-r_1)}$

(D) $\frac{4\pi K(r_1 r_2)(\theta_2-\theta_1)}{(r_2-r_1)}$

Correct option: (D)

Solution:



Equivalent thermal resistance of spherical shell is given as $R=\frac{r_2-r_1}{4\pi K r_2 r_1}$

Thus, heat flow $=\frac{(\theta_2-\theta_1)}{R}=\frac{4\pi\mathrm{K}(\mathrm{r}_1\mathrm{r}_2)(\theta_2-\theta_1)}{(\mathrm{r}_2-\mathrm{r}_1)}$

21. Find the correct option for a SHM for which potential energy is zero at equilibrium position.

(a) Total energy (kinetic + potential) is always conserved

(b) Avg. K.E. and Avg. P.E. is same for a time period

(c) Average P.E. and Avg. K.E. for any time interval is same.

(d) Potential energy and kinetic energy in a S.H.M. is always equal.

(A) (a) and (d) are correct

(B) (d)

(C) (b) and (a)

(D) (c) and (a)

Correct option: (C)

22. 0.76 gram of mixture of O_2 and H_2 is introduced in container whose temperature is $300K$. If the volume of container is $1000cm^3$ and pressure inside container is $200kPa$, evaluate the ratio of mass of O_2 and H_2 in the mixture.

Correct Answer: 2

Solution. Number of moles of $O_2 = \frac{m_1}{32}$

Number of moles of $H_2 = \frac{m_2}{2}$

Using ideal gas equation $PV = \left[\frac{m_1}{32} + \frac{m_2}{2}\right]\frac{25}{3} \times 300$

$$200 \times 10^3 \times 1000 \times 10^{-6} = \left[\frac{m_1}{32} + \frac{m_2}{2}\right] 25 \times 100$$

$$2 \times 10^2 = \left[\frac{m_1}{m_2} \times \frac{1}{32} + \frac{1}{2}\right] m_2 \times 25 \times 100$$

$$\frac{2}{25} = \left[\frac{m_1}{m_2} \times \frac{1}{32} + \frac{1}{2}\right] m_2 \ldots\ldots\ldots\ldots (1)$$

$$m_1 + m_2 = 0.76$$

$$m_2\left[1 + \frac{m_1}{m_2}\right] = \frac{76}{100} \ldots\ldots\ldots (2)$$

(1) divided by (2); $\frac{\left[\frac{m_1}{m_2} \times \frac{1}{32} + \frac{1}{2}\right]}{\left[\frac{m_1}{m_2} + 1\right]} = \frac{2}{25} \times \frac{100}{76}$

Let assume $\frac{m_1}{m_2} = x; \frac{X+16}{32[X+1]} = \frac{8}{76}; 76X + 76 \times 16 = 8 \times 32X + 8 \times 32; 76X + 1216 = 256X + 256$

$$960 = 180X \Rightarrow x = \frac{96}{18} \Rightarrow \frac{16}{3}$$

23. When H^+ atom at rest absorbs an electron moving with energy 2.6eV it goes into first excited state of H-atom. Determine the frequency of the photon released in this process.

(A) 2.4×10^{15}Hz

(B) 1.7×10^{15}Hz

(C) 1.45×10^{15}Hz

(D) 1.2×10^{15}Hz

Correct Option: (C)

Solution:

By Energy conservation

$$(\mathrm{K.E})e = (\mathrm{T.E.})\mathrm{H}^{+} + E_{\mathrm{Photon}}$$

$$2.6 = \frac{-13.6}{4} + \mathrm{hv}$$

$$\mathrm{hv} = 6\mathrm{eV}$$

$$\mathrm{v} = \frac{6\times1.6\times10^{-19}}{6.626\times10^{-34}}$$

$$\mathrm{v} = 1.45\times10^{15}\mathrm{Hz}$$

24. A ball of mass ‘m’ suddenly breaks into two pieces. The mass of one piece is twice that of the other piece. The ball of was initially moving with $40\mathrm{m}/s$. If the velocity of smaller piece is $60\mathrm{m}/s$ and is moving along the same direction as that of the ball was moving initially, then calculate the percentage loss in kinetic energy of the system.

(A) 50

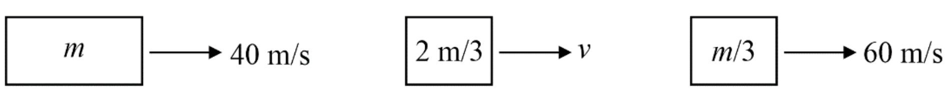
(B) 35

(C) 40

(D) 12.5

Correct Option. (D)

Solution:



Applying conservation of linear momentum

$$\mathrm{m}\times40 = \frac{2}{3}\mathrm{mv} + \frac{\mathrm{m}}{3}\times60$$

$$120 = 2v + 60$$

$$\mathrm{v} = 30\mathrm{m/s}$$

Now, initial kinetic energy of the system $\mathrm{K_i} = \frac{1}{2}\times\mathrm{m}\times40^2 = 800\mathrm{m}$

Final kinetic energy of the system $\mathrm{K_f} = \frac{1}{2}\times\frac{2\mathrm{m}}{3}(30)^2 + \frac{1}{2}\times\frac{\mathrm{m}}{3}\times(60)^2 = \frac{1}{6}\{\mathrm{m}(1800+3600)\} = \frac{\mathrm{m}(5400)}{6} = 900\mathrm{m}$

$$\frac{\Delta\mathrm{KE}}{\mathrm{K_i}} = \frac{900\mathrm{m}-800\mathrm{m}}{800\mathrm{m}} = \frac{1}{8}$$

$\frac{\Delta KE}{K_i} \times 100\% = 12.5\%$

25. While measuring the diameter of sphere, it is found that after 8 division of main scale, 7^{th} vernier scale division coincides with exact one division of main scale. If 10 vernier scale division is equal to 9 main scale division and 1 MSD is 1mm. What is the exact value of diameter?

(A) 6.4mm

(B) 5.7mm

(C) 8.7mm

(D) 5.1mm

Ans. (C)

Solution. $L.C. = \frac{MSD - VSD}{M\ SD}$

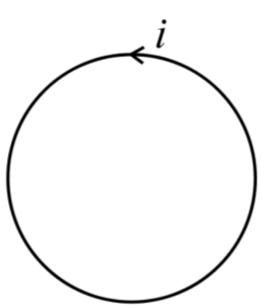
$L.C. = 0.1mm$

Reading $=$ main scale reading $+$ L. C. X vernier scale reading

$= 8 + 0.1 \times 7 = 8.7mm$

26. Choose the right option for the induced current in a conducting loop which is placed in a magnetic field as shown in the diagram below.

Current is induced in a conducting loop placed in a magnetic field as shown in figure. Choose the correct option:



(A) Uniform Magnetic field perpendicular to plane of ring

(B) Magnetic field outward and increasing

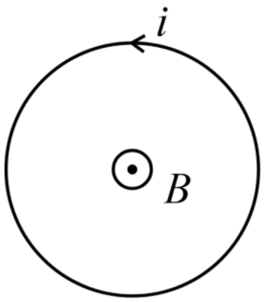
(C) Uniform Magnetic field parallel to plane of ring

(D) Magnetic field outward and decreasing

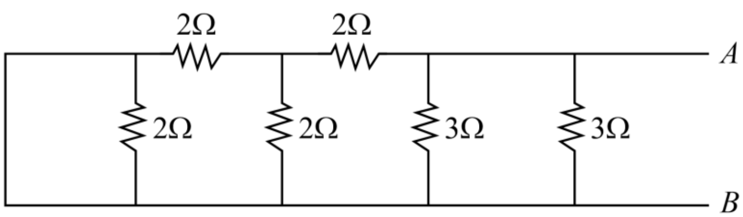
Correct Option (D)

Solution:

Using the concept of Lenz law, the direction of magnetic field should be out of the plane of the loop and decreasing in magnitude.



27. In the given circuit, calculate equivalent resistance between points A and B.



(A) 5Ω

(B) 7Ω

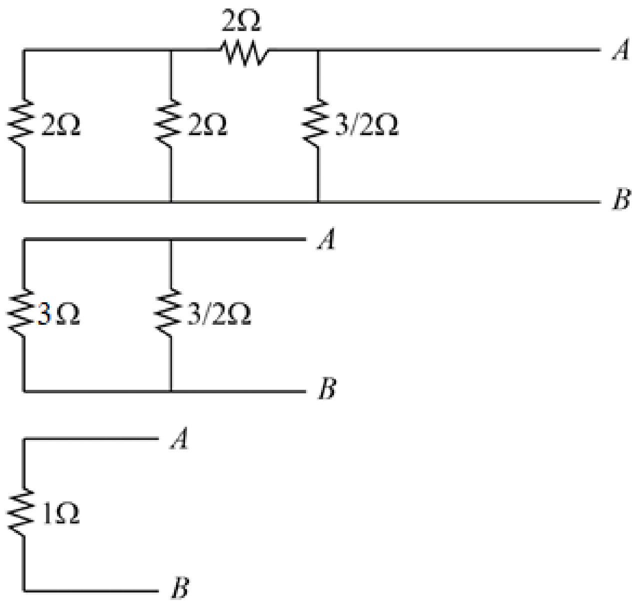
(C) 1Ω

(D) 2.5Ω

Correct option: (C)

Solution:

In the given circuit, the left most resistance is of no use as it is short circuited. After this we can the series and parallel combinations of resistances.



$$R_{AB}=\frac{3\times\frac{3}{2}}{3+\frac{3}{2}}=1\Omega$$