Q-1 - NEET 2019 - PHYSICS

The displacement of a particle executing simple harmonic motion is given by $y = A_0 + A\sin\omega t + B\cos\omega t$. Then the amplitude of its oscillation is given by

(A) $A + B$

(B) $A_0 + \sqrt{A^2 + B^2}$

(C) $\sqrt{A^2 + B^2}$

(D) $\sqrt{A_0^2 + (A + B)^2}$

Correct Option : C

SOLUTION

$y = A_0 + A\sin\omega t + B\cos\omega t$

Hence 2 SHM's are super imposed with phase diference of $\frac{\pi}{2}$

$$\text{Amplitude } = \sqrt{A^2 + B^2 + 2AB\cos\Delta\phi}$$

$$\Delta\phi = \frac{\pi}{2} = \sqrt{A^2 + B^2}$$

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Q-2 - NEET 2019 - PHYSICS

In which of the following devices, the eddy current effect is not used ?

(A) electric heater

(B) induction furnace

(C) magnetic braking in train

(D) electromagnet

Correct Option : A

SOLUTION

Electric heater

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Q-3 - NEET 2019 - PHYSICS

Average velocity of a particle executing SHM in one complete vibration is :

(A) zero

(B) $\frac{A\omega}{2}$

(C) $A\omega$

(D) $\frac{A\omega^2}{2}$

Correct Option : A

SOLUTION

As displacement in are complete vibration is zero, Therefore average velocity is zero

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Q-4 - NEET 2019 - PHYSICS

The speed of a swimmer in still water is 20 m//s. The speed of river water of river water is 10 m//s and due east. If he is standing on the south bank and wishes to cross the river along the shortest path the angle at which he should make his stroke w.r.t. noth is given by :-

(A) 45° west

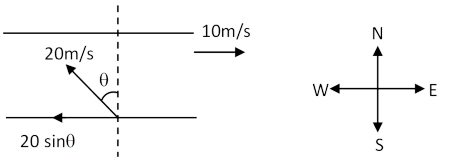
(B) 30° west

(C) 0°

(D) 60° west

Correct Option : B

SOLUTION



For shortest path, velocity along river flow is zero.

$$20 \sin\theta = 10 \Rightarrow \sin\theta = \frac{10}{20} = \frac{1}{2}$$

$\theta = 30$ west

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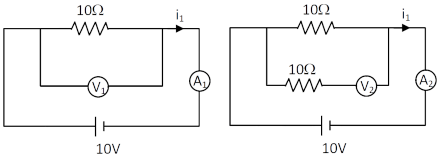
Q-5 - NEET 2019 - PHYSICS

In the circuits shown below, the readings of the voltmeters and the ammeters will be:



(A) $V_2 > V_1$ and $i_1 > i_2$

(B) $V_2 > V_1$ and $i_1 = i_2$

(C) $V_1 = V_2$ and $i_1 > i_2$

(D) $V_1 = V_2$ and $i_1 = i_2$

Correct Option : D

SOLUTION

Resistance for ideal voltemeter $= \infty$

Resistance for ideal ammeter =0

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2}$$
$$\frac{1}{R_{eq}} = \frac{1}{10} + \frac{1}{\infty}$$
$$\frac{1}{R_{eq}} = \frac{1}{10} + 0$$

$$R_{eq} = 10\Omega$$

$$i_1 = \frac{V}{R} = \frac{10}{10} = 1A$$

$$v_1 = 10V$$

In II^{nd} circuit

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2}$$
$$\frac{1}{R_{eq}} = \frac{1}{10} + \frac{1}{10+\infty}$$
$$\frac{1}{R_{eq}} = \frac{1}{10} + 0$$

$$R_{eq} = 10\Omega$$

$$i_2 = \frac{1-0}{10} = 1A$$
$$v_2 = 10V$$

Q-6 - NEET 2019 - PHYSICS

A copper rod of 88 cm and an aluminium rod of unknown length have their increase in length independent of increase in temperature. The length of aluminium rod is
$\left(\alpha cu = 1.7 \times 10^{-5} K^{-1} \text{ and } \alpha Al = 2.2 \times 10^{-5} K^{-1}\right)$

(A) 68 cm

(B) 6.8cm

(C) 113.9cm

(D) 88 cm

Correct Option : A

SOLUTION

$l^1_{CU} = l_{CU}(1 + \alpha_{CU}\Delta T)$ ... (i)

$l^1_{Al} = l_{Al}(1 + \alpha_{Al}\Delta T)$ ....(ii)

Equation (2) - equation (1)

$l_{Al}^{1} - l_{cu}^{1} = l_{Al} + l_{Al}\alpha_{Al}\Delta T - (l_{cu} + l_{cu}\alpha_{Ci}\Delta T)$

$l_{Al}^{1} - l_{cu}^{1} = l_{Al} - l_{cu} + (l_{Al}\alpha_{Al} - l_{cu}\alpha_{cu}\Delta T)$

When increases in lenght is not depend on temperature

$\alpha culcu - \alpha_{Al} l_{Al}$

$1.7 \times 10^{-5} \times 88 = 2.2 \times 10^{-5} \times l_{Al}$

$l_{Al} = 68cm$

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Q-7 - NEET 2019 - PHYSICS

The unit of thermal conductivity is :

(A) $Wm^{-1}K^{-1}$

(B) $Jm^{-1}K^{-1}$

(C) $Jm^{-1}K^{-1}$

(D) WmK^{-1}

Correct Option : A

SOLUTION

$$H = \frac{(k)A(T_2 - T_1)}{l}$$

$$(k) = (H)\left(\frac{l}{A}\right)\frac{1}{[T_2 - T_1]}$$

$$k = w\frac{1}{m}\frac{1}{k}$$

$$K = wm^{-1}k^{-1}$$

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Q-8 - NEET 2019 - PHYSICS

For a p-type semiconductor, which of the following statements is true?

(A) Electrons are the majority carriers and pentavalent atoms are the dopants.

(B) Electrons are the majority carriers and trivalent atoms are the dopants.

(C) Holes are the majority carriers and trivalent atoms are the dopants.

(D) Holes are the majority carriers and pentavalent atoms are the dopants.

Correct Option : C

SOLUTION

P type semiconductor holes are majority for creating holes al, ga, B in trivalent imporitcs are added

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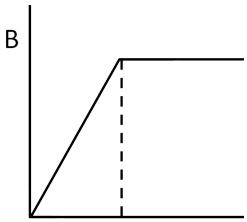
Q-9 - NEET 2019 - PHYSICS

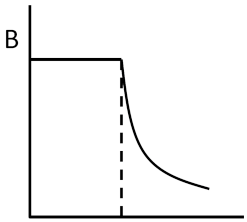
A cylinderical conductor of radius R is carrying constant current. The plot of the magnitude of the magnetic field, B with the distance, d from the centre of the conductor , is correctly represented by the figure:

(1)



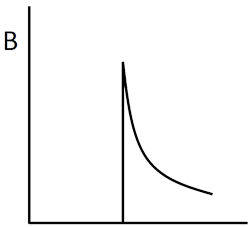
(A)

(2)



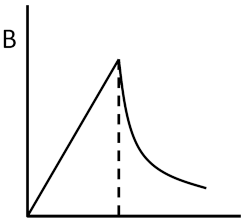
(B)

(3)



(C)

(4)



(D)

Correct Option : D

SOLUTION

From ampere circuital law

$$\oint B.\,dl \equiv \mu_0 I' \Rightarrow \; = \frac{1}{\pi R^2} \times \pi r^2$$

$$B2\pi r = \mu_0 \frac{I}{\pi R^2} \times \pi r^2$$

$$B = \frac{\mu_0 I}{2\pi R^2} r$$

$$B_{\text{inside}} \alpha r$$

$$B_{\text{outside}}$$

$$\oint B.\,dl = \mu_0 I$$

$$B2\pi r = \mu_0 I$$

$$B = \frac{\mu_0 I}{2\pi r}$$

$$B\alpha \frac{1}{r}$$

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Q-10 - NEET 2019 - PHYSICS

Body A of mass 4m moving with speed u collides with another body B of mass 2m at rest the collision is head on and elastic in nature. After the collision the fraction of energy lost by colliding body A is :

(A) $\frac{5}{9}$

(B) $\frac{1}{9}$

(C) $\frac{8}{9}$

(D) $\frac{4}{9}$

Correct Option : C

SOLUTION

Energy transferred to B initial energy of B=zero

Final velocity of

$$v_0 = \left(\frac{M_2 - M_1}{M_1 + M_2}\right)u_2 + \frac{2M_1u_1}{M_1 + M_2}$$

$$M_1 = 4Mu_1 = u$$

$$M_2 = 2Mu_2 = 0$$

$$V_B = \frac{2(4M)u}{6M} = (4)(3)u$$

$$\frac{\frac{1}{2}M_2V_B^2}{\frac{1}{2}M_1u_1^2} = \frac{\frac{1}{2}2M\left(\frac{4}{3}\right)^2u_2}{\frac{1}{2}4Mu^2}$$

Fraction of energy lost $= \frac{8}{9}$

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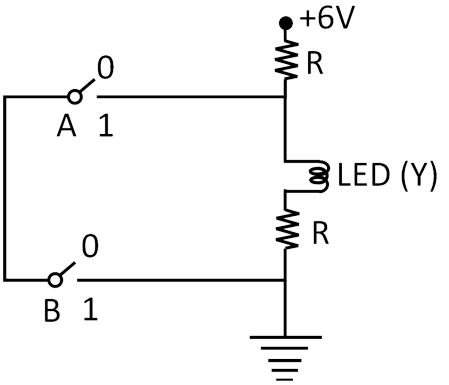
Q-11 - NEET 2019 - PHYSICS

The correct Boolean operation represented by the circuit diagram drawn is



(A) NOR

(B) AND

(C) OR

(D) NAND

Correct Option : D

SOLUTION

When swithch $A \rightarrow$ on LED light up

so $\begin{array}{|c|c|c|} A & B & \text{output} \\ 1 & 0 & 1 \end{array}$

when swithch B is switch on a is off

then Led light up $\begin{array}{|c|c|c|} A & B & \text{output} \\ 0 & 1 & 0 \end{array}$

when switch of A and B both on short circuit full current flous through

switch led $\rightarrow$ switch off

$\begin{array}{|c|c|c|} A & B & \text{output} \\ 1 & 1 & 0 \end{array}$

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Q-12 - NEET 2019 - PHYSICS

When an object is shot from the bottom of a long smooth inclined plane kept at an angle 60 with horizontal, it can travel a distance x_1 along the plane. But when the inclination is decreased to 30 and the same object is shot with the same velocity, it can travel x_2 distance. Then $x_1 : x_2$ will be :

(A) $1 : 2\sqrt{3}$

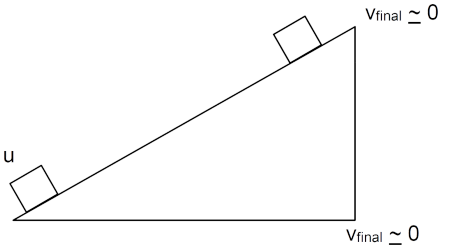
(B) $1:\sqrt{2}$

(C) $\sqrt{2}:1$

(D) $1:\sqrt{3}$

Correct Option : D

SOLUTION



$$V_{\text{final}}^2 = u^2 - 2(g\sin\theta)x$$

$$x_1 = \frac{u^2}{2g\sin\theta_1}$$

$$x_2 = \frac{u^2}{2g\sin\theta_2}$$

$$\frac{x_1}{x_2} = \frac{\sin\theta_2}{\sin\theta_1} = \frac{\sin 30}{\sin 60} = \frac{1}{\sqrt{3}}$$

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The work done to raise a mass m from the surface of the earth to a height h, which is equal to the radius of the earth, is :

(A) $\frac{3}{2}mgR$

(B) mgR

(C) $2mgR$

(D) $\frac{1}{2}mgR$

Correct Option : D

SOLUTION

work done $= u_f - u_i \Rightarrow \frac{-GmM}{(R+h)} - \frac{-GmM}{R}$

Now h=R

$w = \frac{-GmM}{2R} + \frac{GmM}{R} = \frac{GmM}{2R}$

Now $g = \frac{Gm}{R^2}$

so $W = \frac{mgR^2}{2R} = \frac{mgR}{2}$

Q-14 - NEET 2019 - PHYSICS

The total energy of an electron in an atom in an orbit is $-3.4eV$. Its kinetic and potential energies are, respectively:

(A) 3.4eV,3.4eV

(B) $-3.4eV,\ -3.4ev$

(C) $-3.4eV,\ -6.8eV$

(D) $3.4eV,\ -6.8eV$

Correct Option : D

SOLUTION

Total energy $= -3.4ev$

K.E. $= -(T.E.) = 3.4eV$

$P.E. = 2(T.E) = 2 \times (-3.4eV) = -6.8eV$

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Q-15 - NEET 2019 - PHYSICS

In which of the following processes, heat is neither absorbed nor released by a system?

(A) isochoric

(B) isothermal

(C) adiabatic

(D) isobaric

Correct Option : C

SOLUTION

In adiabatic process $\Delta Q = 0$

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Q-16 - NEET 2019 - PHYSICS

A hallow metal sphere of radius R is uniformly charged. The electric field due to the sphere at a distance r from the centre:

(A) decreases as r increases for $r < R$ and $r > R$

(B) increases as r increases for $r < R$ and $r > R$

(C) zero as r increases for $r < R$, decreases as r increases for $r > R$

(D) zero as r increases for $r < R$, increases for $r > R$

Correct Option : C

SOLUTION

For hollow conducting sphere

For $r < R$, $E = 0$

For $r > R \Rightarrow E = \frac{Keq}{r^2}$ so e decreases

Pick the wrong answer in the context with rainbow.

(A) Rainbow is combined effect of dispersion, refraction and reflection of sunlight

(B) When the light rays undergo two internal reflections in a water drop, a secondary rainbow is formed

(C) The order of colours is reversed in the secondary rainbow.

(D) An observer can see a rainbow when his front is towards the sun.

Correct Option : D

SOLUTION

To see the rainbow the sun should be his backside

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Q-18 - NEET 2019 - PHYSICS

A small hole of area of cross-section 2 mm^2 present near the bottom of a fully filled open tank of height 2. Taking g=10m/s^2, the rate of flow of water through the open hole would be nearly

(A) $6.4 \times 10^{-6} m^3/s$

(B) $12.6 \times 10^{-6} m^3/s$

(C) $8.9 \times 10^{-6} m^3/s$

(D) $2.23 \times 10^{-6} m^3/s$

Correct Option : B

SOLUTION

$$V = \sqrt{2gh} = \sqrt{2 \times 10 \times 2} = 2 \times 3.14 = 6.25 m/\text{sec}$$

$$\frac{d(vol)}{dt} = AV = \left(2 \times 10^{6}\right) \times 6.25 = 12.6 \times 10^{-6}$$

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Q-19 - NEET 2019 - PHYSICS

which of the following acts as a circuit protection device?

(A) fuse

(B) conductor

(C) inductor

(D) switch

Correct Option : A

SOLUTION

Fuse is used as circuit protector

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Q-20 - NEET 2019 - PHYSICS

Two point charges A and B, having charges +Q and -Q respectively, are placed at certain distance apart and force acting between them is F, if 25 % charge of A is transferred to B, then force between the charges becomes:

(A) $\frac{4F}{3}$

(B) F

(C) $\frac{9F}{16}$

(D) $\frac{16F}{9}$

Correct Option : C

SOLUTION

$$Q_1 = Q - \frac{Q}{4}, Q_2 = -Q + \frac{Q}{4}$$

$$F_1 = \frac{kQ^2}{r^2} F_2 = \frac{k\left(\frac{3}{4}Q\right)\left(\frac{3}{4}Q\right)}{r^2}$$

$$\frac{F_2}{F_1} = \frac{9}{16}$$

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Q-21 - NEET 2019 - PHYSICS

Which colour of the light has the longest wavelength?

(A) violet

(B) red

(C) blue

(D) green

Correct Option : B

SOLUTION

Wavelength is maximum for red

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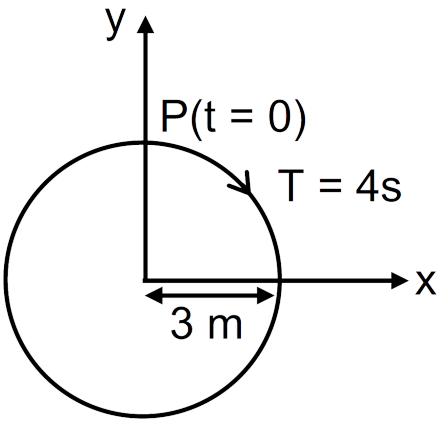
Q-22 - NEET 2019 - PHYSICS

The radius of cirlcue, the period of revolution, initial position and sense of revolution are indicated in the figure.



y-projection of the radius vector of rotating particle P is :

(A) $y(t) = 3\cos\left(\frac{\pi t}{2}\right)$, where y in m

(B) $y(t) = -3\cos 2\pi t$, where y in m

(C) $y(t) = 4\sin\left(\frac{\pi t}{2}\right)$, where y in m

(D) $y(t) = 3\cos\left(\frac{3\pi t}{2}\right)$, where y in m

---

Correct Option : A

SOLUTION

$T = \frac{2\pi}{\omega} = 4, \omega = \frac{\pi}{2}$

y co-ordinate starts from maximum

So $y = A\cos(\omega t)$

$Y = 3\cos\left(\frac{\pi}{2}t\right)$

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Q-23 - NEET 2019 - PHYSICS

α-particle consists of

(A) 2 protons only

(B) 2 protons and 2 neutrons only

(C) 2 electrons, 2 protons and 2 neutrons

(D) 2 electrons and 4 protons only

Correct Option : B

SOLUTION

α particle is nucleus of He, so it contains 2 protons and 2 neutrons

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Q-24 - NEET 2019 - PHYSICS

A solid cylinder of mass 2 kg and radius 4 cm rotating about its axis at the rate of 3 rpm. The torque required to stop after 2π revolutions is :

(A) $2 \times 10^{6} Nm$

(B) $2 \times 10^{-6} Nm$

(C) $2 \times 10^{-3} Nm$

(D) $12 \times 10^{-4} Nm$

Correct Option : B

SOLUTION

$$\omega_0 = 3r \pm = 3 \times \frac{2\pi}{60} rad/\sec = \frac{\pi}{10}$$

$$\omega^2 = \omega_0^2 + 2 \propto \theta$$

$$0^2 = \left(\frac{\pi}{10}\right)^2 + 2(\alpha)(2\pi \times 2\pi)$$

$$\alpha = -\frac{1}{800} rad/\sec^2$$

$$I = \frac{mR^2}{2} = \frac{(2)\left(\frac{4}{100}\right)^2}{2} = \frac{16}{10^4}$$

$$\tau = I\alpha = \left(\frac{16}{10^4}\right) \times \left(-\frac{1}{800}\right) = -2 \times 10^{-6} N.m$$

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Q-25 - NEET 2019 - PHYSICS

In a double slit experiment, when light of wavelength 400 nm was used, the angular width of the first minima formed on a screen placed 1 m away, was found to be 0.2, what will be the angular width of the first minima, if the entire experimental apparatus is immersed in water ? ($\mu_{\text{water}} = 4/3$)

(A) 0.1°

(B) 0.266°

(C) 0.15°

(D) 0.05°

Correct Option : C

SOLUTION

For double slit experiment

$$\text{Angular width for first minima } = \frac{\lambda}{2d} \propto \lambda$$

$$\frac{\theta}{\theta'} = \frac{\lambda}{\lambda'} = \frac{\lambda}{\left(\frac{\lambda}{\mu}\right)} = \mu$$

$$\theta' = \frac{\theta}{\mu} = \frac{0.2}{\frac{4}{3}} = 0.15$$

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Q-26 - NEET 2019 - PHYSICS

At a point A on the earth's surface of angle of dip, $\delta = +25$. At a point B on the earth's surface the angle of dip, $\delta = -25$. We can interpret that.

(A) A and B are both located in the southern hemisphere.

(B) A and B are both located in the northern hemisphere.

(C) A is located in the southern hemisphere and B is located in the northern hemisphere.

(D) A is located in the northern hemisphere and B is located in the southern hemisphere.

Correct Option : C

SOLUTION

$\because$ At point A, angle of dip is positve and earth's magnet north pole is in southern hemisphere so angle of dip is positive in southern hemisphere

A is located in southern hemisphere

B is located in northern hemisphere

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Q-27 - NEET 2019 - PHYSICS

A force $F = 20 + 10y$ acts on a particle in y-direction where F is in Newton and y in meter. Wrok done by this force to move the particle from $y = 0$ to $y = 1m$ is:

(A) 20 J

(B) 30J

(C) 5J

(D) 25J

Correct Option : D

SOLUTION

Work done by variable force $= \int F.\, dy$

work done

$$= \int_{y=0}^{y=1} F.\, dy = \int_0^1 (20 + 10y) dy = \left[20y + \frac{10}{2} y^2\right]_0^1 = 20 + \frac{10}{2}$$

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Q-28 - NEET 2019 - PHYSICS

When a block of mass M is suspended by a long wire of length L, the length of the wire becomes (L+l). The elastic potential energy stored in the extended wire is

(A) $\frac{1}{2} MgL$

(B) Mgl

(C) MgL

(D) $\frac{1}{2} Mgl$

Correct Option : D

SOLUTION

$$\text{Strain } = \frac{l}{L}, \text{ stress } = \frac{Mg}{A}$$

$$\text{Energy } = \frac{1}{2} \times \text{stress} \times \text{strain} \times \text{volume}$$

$$= \frac{1}{2} \times \frac{Mg}{A} \times \frac{l}{L} \times A \times L$$

$$= \frac{1}{2} Mgl$$

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Q-29 - NEET 2019 - PHYSICS

A parallel plate capacitor 20 μF is being charged by a voltage source whose potential is changing at the rate of 3 V/s. The conduction current through the connecting wires, and the displacement current through the plates of the capacitor, would be, respectively:

(A) zero,zero

(B) zero, $60 \mu A$

(C) $60\mu A$, $60\mu A$

(D) $60\mu A$, zero

Correct Option : C

SOLUTION

$$Q = CV$$

$$\frac{dQ}{dt} = i = C\frac{dv}{dt}$$

$$= 20\mu F \times \frac{3V}{s}$$

$$= 60\mu A$$

For circuit to be completed displacement current should be equal to conduction current.

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Q-30 - NEET 2019 - PHYSICS

A mass m is attached to a thin wire and whirled in a vertical circle.

The wire is most likely to break when:

(A) inclined at a angle of 60° from vertical

(B) the mass is at the highest point

(C) the wire is horizontal

(D) the mass is at the lowest point

Correct Option : D

SOLUTION

In vertical circular motion, tension in wire will be maximum at lower most point, so the wire is most likely to break at lower most point.

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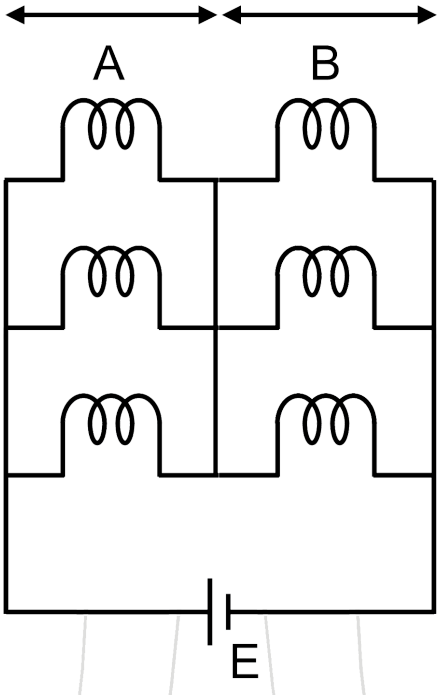
Q-31 - NEET 2019 - PHYSICS

Six similar bulbs are connected as shown in the figure with a DC source of emf E, and zero intermal resistance.

The ratio of power consumption by the bulbs when (i) all are glowing

and (ii) in the situation when two from section A and one from section B are glowing, will be:



(A) $2:1$

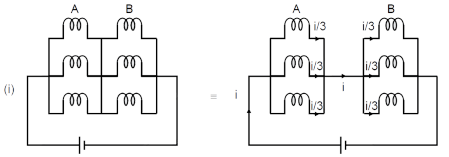
(B) $4:9$

(C) $9:4$

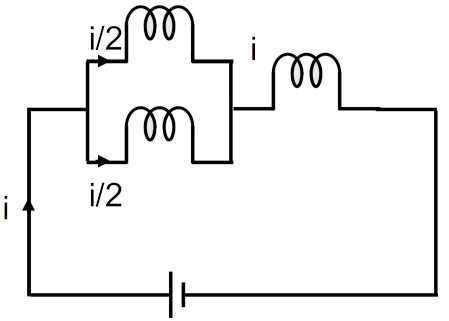
(D) $1:2$

Correct Option : C

SOLUTION



$$(P_{eq}) = (i/3)^2 \times 3R + (i/3)^2 \times 3R = \frac{2}{3} i^2 R$$



(ii) $P_{eq}2 = (i/2)^2 \times R + (i/2)^2 + i^2 R = \frac{2}{3} i^2 R$

$$\frac{P_{eq_1}}{P_{eq_2}} = \frac{2/3 i^2 R}{3/2 i^2 R} = \frac{4}{9}$$

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Q-32 - NEET 2019 - PHYSICS

In total internal reflection when the angle of incidence is equal to the critical angle for the pair of medium in contact, what will be angle of refraction? In total internal reflection when the angle of incidence is

equal to the critical angle for the pair of medium in contact, what will be angle of refraction? In total internal reflection when the angle of incidence is equal to the critical angle for the pair of medium in contact, what will be angle of refraction?

(A) 90°

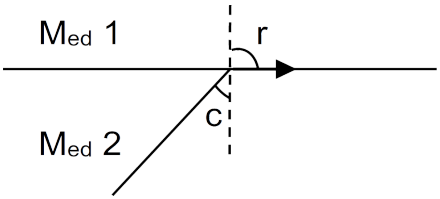
(B) 180°

(C) 0°

(D) equal to angle of incidence

Correct Option : A

SOLUTION



Angle of reflection 90

Q-33 - NEET 2019 - PHYSICS

Two similar thin equi-convex lenses, of focal f each, are kept coaxially in contact with each other such that the focal length of the combination is F_1, When the space between the two lens is filled with glycerin (which has the same refractive index $(\mu = 1.5)$ as that of glass) then the equivlent focal length is F_2, The ratio $F_1 : F_2$ will be

(A) $3:2$

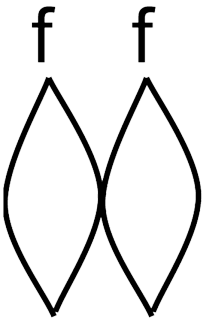
(B) $2:1$

(C) $1:2$

(D) $2:3$

Correct Option : C

SOLUTION



$f_{eq} = f_1 \quad f_{eq} = f_1 | \frac{1}{f} = (1.5 - 1)2/R$

$$\frac{1}{f_1} = \frac{1}{f} + \frac{1}{f} = \frac{2}{f} \; | \; = \frac{1}{2} \times \frac{2}{R} = \frac{1}{R}$$

$$f_1 = \frac{f}{2} = \frac{R}{2} \; | \; \frac{1}{f_2} = \frac{1}{R} - \frac{1}{R} + \frac{1}{R} = \frac{1}{R}$$

$$f_2 = R$$

with glycerin: focal lenght of concave lens is formed

$$\frac{1}{f} = (m-1)\left(-\frac{1}{R} - \frac{1}{R}\right) = \frac{1}{2}\left(-\frac{2}{R}\right) = \frac{-1}{R}\frac{f_1}{f_2} = \frac{R/2}{R} =$$

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Q-34 - NEET 2019 - PHYSICS

Ionized hydrogen atoms and $\alpha -$ particle with moments enters perpendicular to a constant megnetic field. B. The ratio of their radii of their paths $r_H : r_\alpha$ be :

(A) $1:4$

(B) $2:1$

(C) $1:2$

(D) $4:1$

Correct Option : B

SOLUTION

$$r = \frac{mv}{qB} = \frac{p}{qB} \Rightarrow r\alpha\frac{1}{q}$$

$$\frac{r_n}{r} = \frac{q_\alpha}{q_n} = \frac{2}{1} = 2:1$$

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Q-35 - NEET 2019 - PHYSICS

In an experiment, the percentage of error occurred in the in the measurement of physical quantities A,B,C and D are $1\ \%$, $2\ \%$, $3\ \%$

and 4 % respectively. Then the maximum percentage of error in the measurement X, where $X = \frac{A^2 B^{1/2}}{C^{1/3} D^3}$, will be

(A) 10 %

(B) $\left(\frac{3}{13}\right)$ %

(C) 16 %

(D) -10 %

Correct Option : C

SOLUTION

$$x = \frac{A^2 B^{1/2}}{C^{1/3} D^3}$$

$$\ln x = 2 \ln A + \frac{1}{2} \ln B - \frac{1}{3} \ln C - 2 \ln D$$

Differenting

$$\left(\frac{dx}{x}\right)_{\max} = 2\frac{dA}{A} + \frac{1}{2}\frac{dB}{B} + \frac{1}{3}\frac{dC}{C} + \frac{3dD}{D}$$

$$\text{error xmas } = 2 \times 1 + \frac{2}{2} + \frac{1}{3} \times 3 + 3 \times 4 = +16\ \%$$

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Q-36 - NEET 2019 - PHYSICS

A block of mass 10 kg in contact against the inner wall of a hollow cylindrical drum of radius 1m. The coefficient of friction between the block and the inner wall of the cylinder is 0.1. The minimum angular velocity needed for the cylinder to keep the block stationary when the cylinder is vertical and rotating about its axis, will be $\left(g = 10m/s^2\right)$

(A) $10\pi rad/s$

(B) $\sqrt{10} rad/s$

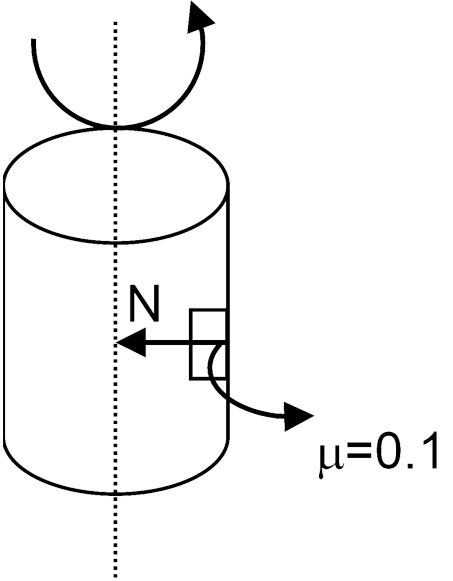
(C) $\frac{10}{2\pi} rad/s$

(D) $10 rad/s$

Correct Option : D

SOLUTION

To keep the block stationary



$\mu N = mg$

$N = \frac{mg}{\mu} = \frac{10 \times 10}{0.1} = 1000$

Block is rotating about its axis

$\therefore N = \frac{mv^2}{R} \Rightarrow V = \sqrt{\frac{NR}{m}} = \sqrt{\frac{1000 \times 1}{10}} = 10 rad/\sec$

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Q-37 - NEET 2019 - PHYSICS

A 800 turn coil of effective area $0.05 m^2$ is kept perpendicular to a magnetic field 5×10^{-5} T. When the plane of the coil is rotated by 90

around any of its coplanar axis in 0.1 s, the emf induced in the coil will be:

(A) 0.02V

(B) 2V

(C) 0.2V

(D) $2 \times 10^{-3} V$

Correct Option : A

SOLUTION

$$e_{\text{induced}} = \frac{-d\phi}{dt} = \frac{-\Delta\phi}{dt}$$

$$\phi_i = N\left(\vec{B} . \vec{A}\right)\phi f = 0$$

$$\phi_i = 800 \times 5 \times 10^{-5} \times 5 \times 10^{-2}$$

$$\Delta t = 0.15$$

$$E_{\text{induced}} = -\frac{\left(0 - 800 \times 5 \times 10^{-5} 5 \times 10^{-2}\right)}{0.1}$$

$$e_{\text{induced}} = 0.02V$$

Q-38 - NEET 2019 - PHYSICS

Two particles A and B are moving in uniform circular motion in concentric circles of radii r_A and r_B with speed u_A and u_B respectively. Their time period of rotation is the same. The ratio of angular speed of a to that of B will be:

(A) $1:1$

(B) $r_A : r_B$

(C) $v_A : v_B$

(D) $r_B : r_A$

Correct Option : A

SOLUTION

Time period (T) $= \dfrac{2\pi}{\omega}$

$\omega =$ angular speed

$T_1 = T_2$ (given)

$$\frac{2\pi}{\omega_1} = \frac{2\pi}{\omega_2}$$

$$\omega_1 = \omega_2$$

$$\omega_1 : \omega_2 = 1:1$$

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Q-39 - NEET 2019 - PHYSICS

A soap bubble, having radius of 1 mm, is blown from a detergent solution having radius of 1 mm is blown from a detergent solution having a surface tension of $2.5 \times 10^{-2} N/m$. The pressure inside the bubble equals at a point Z_0 below the free surface of water in a container. Taking $g = 10m/s^2$, density of water $= 10^3 kg/m^3$, the value of Z_0 is :

(A) 0.5cm

(B) 100 cm

(C) 10 cm

(D) 1 cm

Correct Option : D

SOLUTION

Pressure inside soap bubble $= P_0 + \frac{4T}{R}$

Pressure at a point Z_0 below surface of water $= P_0 + \rho g Z_0$

P_0= atomospheric pressure

$$\frac{4T}{R} = \rho g Z_0$$

$$Z_0 = \frac{4T}{\rho g R}$$

$$Z_0 = \frac{4 \times 2.5 \times 10^{-2}}{10^3 \times 10 \times 1 \times 10^{-3}}$$

$$Z_0 = 1cm$$

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Q-40 - NEET 2019 - PHYSICS

A body weighs 200N on the surface of the earth. How much will it weigh half way down to the center of the earth ?

(A) 100M

(B) 150N

(C) 200N

(D) 250N

Correct Option : A

SOLUTION

g at a depth d $= g\left(1 - \frac{d}{R}\right)$

$d = \frac{R}{2}$

$g = \frac{g}{2}$

$w' = \frac{w}{2}$

$w' = 100N$

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Q-41 - NEET 2019 - PHYSICS

An electron is accelerated through a potential difference of $10,000V$.

Its de Broglie wavelength is, (nearly): $\left(me = 9 \times 10^{-31} kg\right)$

(A) 12.2nm

(B) $12.2 \times 10^{-13} m$

(C) $12.2 \times 10^{-12} m$

(D) $12.2 \times 10^{-14} m$

Correct Option : C

SOLUTION

be Broglie wave length of electron $(\lambda_e) = (12.27)\sqrt{v}A$

$v =$ accelerating voltage

$$\lambda_e = \frac{12.27}{\sqrt{10000}} \times 10^{-10} m$$

$$\lambda_e = 12.2 \times 10^{-12} m$$

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Q-42 - NEET 2019 - PHYSICS

Two parallel infinite line charges with linear charge densities

$+\lambda C/m$ and $-\lambda$ C/m are placed at a distance of 2R in free space.

What is the electric field mid-way between the two line charges?

(A) $\frac{\lambda}{2\pi\varepsilon_0 R} N/C$

(B) zero

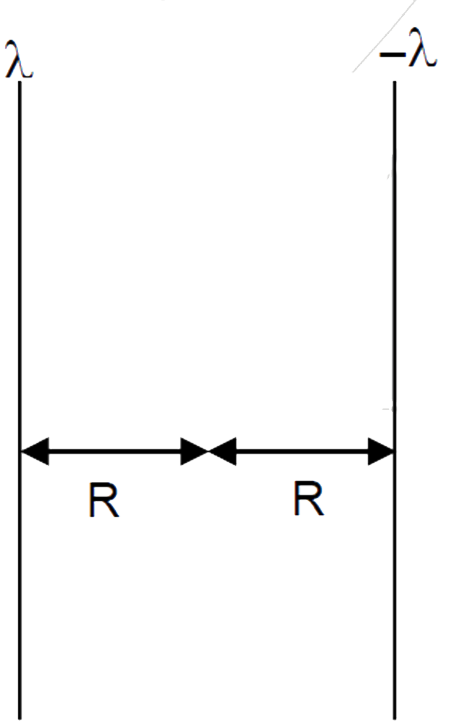
(C) $\frac{2\lambda}{\pi\varepsilon_0 R} N/C$

(D) $\frac{\lambda}{\pi\varepsilon_0 R} N/C$

Correct Option : D

SOLUTION

$\vec{E}$ due to infinite line charge $= \frac{2k\lambda}{R}$



$\lambda =$ charge density

$$\overrightarrow{E} = \overrightarrow{E}_1 + \overrightarrow{E}_2 = \frac{2k\lambda}{R} + \frac{2k\lambda}{R} = \frac{\lambda}{\pi\varepsilon_0 R} N/C$$

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Q-43 - NEET 2019 - PHYSICS

Increase in temperature of a gas filled in a container would lead to :

(A) decrease in intermolecular distance

(B) increase in its mass

(C) increase in its kinetic energy

(D) decrease in its pressure

Correct Option : C

SOLUTION

$KE \approx$ Temp

i.e. increasing temperature, increases KE of gas filled in container

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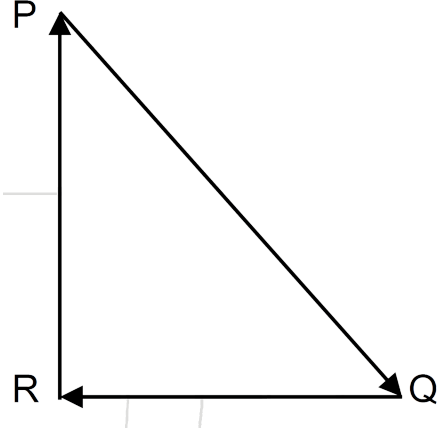
Q-44 - NEET 2019 - PHYSICS

A particle moving with velocity $\vec{V}$ is acted by the three forces shown by the vector triangle PQR. The velocity of the particle will :



(A) change according to the smallest force $\overrightarrow{Q}\,R$

(B) increase

(C) decrease

(D) remain constant

Correct Option : D

SOLUTION

Net force on the particle is zero

$\therefore\ \overrightarrow{a}\ -\ 0$

$\overrightarrow{v}$ = remains constant

Q-45 - NEET 2019 - PHYSICS

A disc of radius 2 m and mass 100kg rolls on a horizontal floor, its centre of mass has speed of $20cm/s$. How much work is needed to stop it ?

(A) 1J

(B) 3J

(C) 30 KJ

(D) 2J

Correct Option : B

SOLUTION

work done $= \Delta KE$

$$(KE)_i = \frac{1}{2}1\omega^2 + \frac{1}{2}1\omega^2 + \frac{1}{2}mv^2 = \frac{3}{4}mv^2$$

$$= \frac{3}{4} \times 100 \times \left(20 \times 10^{-2}\right)^2 = \frac{3}{4} \times 100 \times 400 \times 10^{-4} = 3J$$