

JEE Main Online Exam 2019

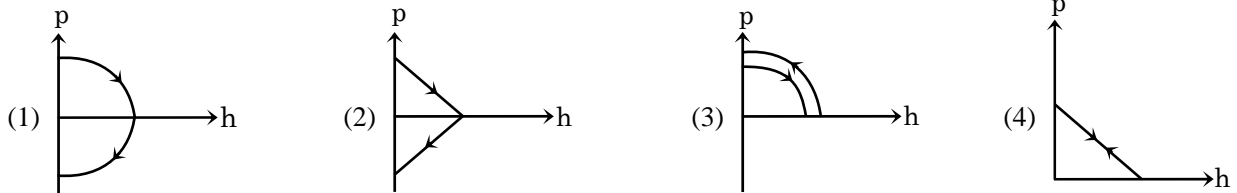
Questions & Solutions

9th April 2019 | Shift - I

(Memory Based)

PHYSICS

Q.1 A particle is thrown upward the graph between momentum & height.



Ans. [1]

Q.2 How will the inductance of a solenoid varies with length keeping no. of turns and area constant

- (1) $L \propto \frac{1}{\ell^2}$ (2) $L \propto \ell^2$ (3) $L \propto \ell$ (4) $L \propto \frac{1}{\ell}$

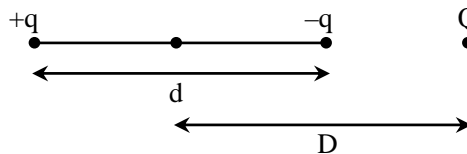
Ans. [3]

Q.3 A particle of mass 2kg moving with velocity 'v' collide with another particle. After collision first particle travel with velocity v/4 in same direction. Find mass of second particle.

- (1) 2 kg (2) 5/6 kg (3) 6/5 kg (4) 1/2 kg

Ans. [3]

Q.4 A dipole and a charge Q are placed as shown in figure. ($D \gg d$)

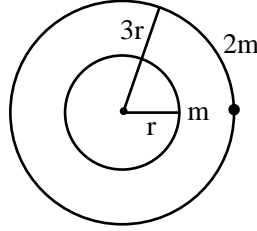


potential energy of the system is :

- (1) $\frac{kq^2}{d} + \frac{kQqd}{D^2}$ (2) $-\frac{kq^2}{d} - \frac{kQqd}{D^2}$ (3) $\frac{kq^2}{d} - \frac{kQqd}{D^2}$ (4) $-\frac{kq^2}{d} + \frac{kQqd}{D^2}$

Ans. [2]

- Q.5** A spherical object of mass 'm' & radius r is placed inside a spherical shell of mass 2m & radius 3r concentrically. Find potential energy of particle of mass m at surface of shell.



- (1) $-\frac{Gmm}{r}$ (2) $-\frac{2}{3}\frac{Gmm}{r}$ (3) $-\frac{1}{3}\frac{Gmm}{r}$ (4) $-\frac{Gmm}{2r}$

Ans. [1]

- Q.6** A pendulum is oscillate with time period T in air. It is immersed in liquid the time period will become.
 (If $\rho_l = \frac{\rho_s}{16}$) $\rho_l \rightarrow$ density of liquid ; $\rho_s \rightarrow$ density of solid.

- (1) $T' = \sqrt{\frac{16}{15}} T$ (2) $T' = \sqrt{\frac{15}{16}} T$ (3) $T' = \sqrt{16} T$ (4) $T' = \sqrt{\frac{1}{16}} T$

Ans. [1]

- Q.7** A ring of radius r, a cylinder of radius r/2 & a sphere is radius r/4 are moving in horizontal plane with same velocity. Ratio of maximum height they can reach on an inclined plane for pure rolling

- (1) 14 : 15 : 70 (2) 1 : 2 : 3 (3) 3 : 2 : 1 (4) 20 : 15 : 14

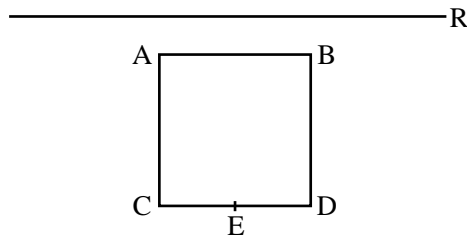
Ans. [4]

- Q.8** Light ray incident on slits normally in YDSE experiment with wave length λ . After placing a thin transparent glass slab of refractive index μ in front of one slit central maxima shift by distance n times of fringe width. Thickness of slab is

- (1) $\frac{n\lambda}{\mu + 1}$ (2) $\frac{n\lambda}{2(\mu - 1)}$ (3) $\frac{n\lambda}{\mu - 1}$ (4) $\frac{n\lambda}{2\mu - 1}$

Ans. [3]

- Q.9** A wire of resistance R is bend in form of a square form ABCD as shown in figure where E is midpoint of CD. Find effective resistance across 'ED'



- (1) $\frac{7R}{8}$ (2) $\frac{7R}{16}$ (3) $\frac{7R}{64}$ (4) $\frac{7R}{32}$

Ans. [3]

- Q.10** A capillary tube of radius r is dipped inside a large vessel of water. The mass of water raised above water level is M. If the radius of capillary is doubled, the mass of water inside capillary will be

- (1) 5M (2) 2M (3) M/4 (4) M

Ans. [2]

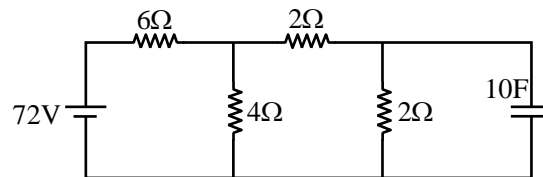
- Q.11** RMS speed of gas at 127°C temperature is 200 m/sec. Find RMS speed at 227° will be
(1) $100\sqrt{5}$ (2) $50\sqrt{5}$ (3) $200\sqrt{5}$ (4) 200

Ans. [1]

- Q.12** Longitudinal sound wave given by :
 $S = S_0 \sin (1000 t - 3x)$ at 0°C temperature. Find the temperature when the speed of sound wave becomes 336 m/s.
(1) 14°C (2) 15°C (3) 5°C (4) 4°C

Ans. [4]

- Q.13** In the circuit shown in figure, find charge on capacitor in steady state :



- (1) 10 C (2) 50 C (3) 90 C (4) 100 C

Ans. [3]

- Q.14** The equation of an electromagnetic wave is given $\vec{E} = E_0 \sin\left(\frac{2\pi}{5 \times 10^{-7}} x - \omega t\right)$, which is incident upon a metal having work function $\phi = 2\text{eV}$. Find the maximum kinetic energy which an electron can have undergoing photoelectric emission. [Given : $E = \frac{12375\text{eV}}{\lambda_{(\text{Å})}}$, $1\text{Å} = 10^{-10}\text{m}$]

- (1) 3.48 eV (2) 4.48 eV (3) 1.47 eV (4) 0.48 eV

Ans. [4]

- Q.15** A river is flowing with velocity 2 km/hr & a man can swim with velocity 4 km/hr. Find angle with river flow in which he should swim to cross the river in shortest distance approach.

- (1) 30° (2) 120° (3) 90° (4) 60°

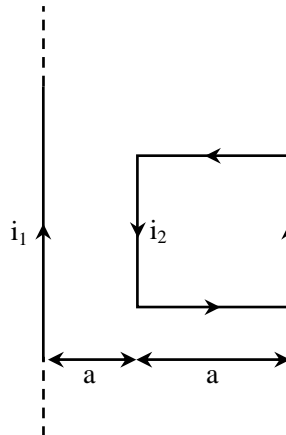
Ans. [2]

- Q.16** For a concave mirror of focal length $f = 0.4\text{m}$, magnification is 5. Find object distance from the pole of mirror

- (1) 40 cm (2) 32 cm (3) 60 cm (4) 70 cm

Ans. [2]

- Q.17** A square current loop (side = a , current = i_2) is placed at a distance ' a ' from straight wire in which current i_1 is flowing through it. Net magnetic force on square loop is



- (1) $\frac{\mu_0 i_1 i_2}{2\pi}$, Repulsive (2) $\frac{\mu_0 i_1 i_2}{4\pi}$, Repulsive
(3) $\frac{\mu_0 i_1 i_2}{\pi}$, Attractive (4) $\frac{\mu_0 i_1 i_2}{8\pi}$, Attractive

Ans. [2]

- Q.18** Rotational energy of particle of moment of inertia is 'I' is given by $E = K\theta^2$ then find relation between angular acceleration and θ in terms I & K.

- (1) $\frac{K}{I}\theta$ (2) $\frac{2K}{I}\theta$ (3) $K\theta$ (4) $KI\theta$

Ans. [2]

- Q.19** Find work done by external agent to change capacitance from $5 \mu\text{F}$ to $2 \mu\text{F}$, given charge on the capacitor plates is $Q = 5 \mu\text{C}$

- (1) 0 (2) $3.75 \mu\text{J}$ (3) $-3.75 \mu\text{J}$ (4) $2 \mu\text{J}$

Ans. [2]

- Q.20** A rectangular loop of no. of turns 100 of side 2 cm and 2.5 cm is placed in a magnetic field of 1 Tesla such that the plane of loop is at 45° with field. Current in loop is 2 amp. find torque.

- (1) $\frac{1}{10\sqrt{2}} \text{Nm}$ (2) 10 Nm (3) $\sqrt{2} \times 10^{-2} \text{Nm}$ (4) $\sqrt{2} \text{Nm}$

Ans. [1]

- Q.21** A string of length ℓ is placed on a table such that ℓ/n part is hanging over the table. Find work done to displace this part on table.

- (1) $\frac{mg\ell}{2n^2}$ (2) $\frac{mg\ell}{n^2}$ (3) $\frac{mg\ell}{n}$ (4) $mg\ell$

Ans. [1]



Q.22 Wavelength of first Balmer line of hydrogen spectrum ($n = 3$ to $n = 2$) is 660 nm. Wavelength of second Balmer line ($n = 4$ to $n = 2$) will be -

- (1) 489 nm (2) 400 nm (3) 729 nm (4) 324 nm

Ans. [1]

Q.23 The equation of carrier wave is $A_C = A_0 \sin(\omega_0 t)$ and the equation of modulating wave is $A_m = A_0 \cos(\omega t)$. Find the equation of resultant modulated wave

- (1) $A_0 \sin(\omega t) \cos(\omega_0 t)$ (2) $A_0 \cos(\omega t) \sin(\omega_0 t)$
(3) $A_0 \sin(\omega t) + \frac{A}{2} \sin[(\omega_0 - \omega)t] + \sin[(\omega_0 + \omega)t]$ (4) $A_0 \cos(\omega_0 t) + \frac{A}{2} (\sin[(\omega - \omega_0)t])$

Ans. [3]

Q.24 A string fixed at both end is vibrating in 4th harmonic. Equation of wave is given by $y = 10 \sin 5\pi x \cos 100\pi t$ then find length of string

- (1) 20 cm (2) 40 cm (3) 80 cm (4) 60 cm

Ans. [3]