PHYSICS

Q.1 Dimensional formula of $\frac{L}{RCV}$ is -

(1) $[M^0L^0T^0A^{-1}]$  (2) $[M^0L^0T^0A^{-1}]$  (3) $[M^1L^0T^0A^{-1}]$  (4) $[M^1L^1T^{-1}A^{-1}]$

Ans. [1]

Q.2 There is a thorium ($^{90}_{232}$Th) nucleus which emits 4$\alpha$ and 6$\beta$ particles. Find the atomic number and atomic mass of daughter nuclei.

(1) 88, 216  (2) 82, 216  (3) 96, 232  (4) 90, 216

Ans. [1]

Q.3 Find focal length of combination of two lenses of equal radius of curvature:

(1) $\frac{1}{R} (\mu_1 - \mu_2 + 1)$  (2) $\frac{1}{R} (\mu_1 + \mu_2 - 2)$  (3) $\frac{1}{R} (\mu_1 + \mu_2 - 1)$  (4) $\frac{1}{R} (\mu_1 + \mu_2 - 3)$

Ans. [2]

Q.4 Graph of charge on capacitor with time is given. Determine current in the circuit at $t = 4$ sec.

(1) 0  (2) 1  (3) 2  (4) 3

Ans. [1]
Q.5 Variation of moment of inertia of a solid sphere about axis which is parallel to axis passing through the centre with the distance from the centre is:

(1) \( I \propto r \)  
(2) \( I \propto r \)  
(3) \( I \propto r \)  
(4) \( I \propto r \)

Ans. [2]

Q.6 Minimum force required to slide down is 2N. Minimum force required to slide up is 10 N. Find coefficient of friction:

\[ \tan \theta = \frac{F_{up}}{F_{down}} \]

(1) \( \frac{1}{2} \)  
(2) \( \frac{\sqrt{3}}{2} \)  
(3) \( \sqrt{3} \)  
(4) \( \sqrt{2} \)

Ans. [2]

Q.7 For antenna of height 5, the range of LOS is d. On the surface of planet and for antenna of height h₂, the range of LOS is 2d, when radius of planet is double. The ratio of height h₁ & h₂ is

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

Ans. [1]

Q.8 A rod length 10 m falls in vertical orientation in horizontal magnetic field \( B_H = 5 \times 10^{-4} \) T with velocity \( v = 10 \) m/s, find potential across rod

(1) 10 mV  
(2) 50 mV  
(3) 0  
(4) 5 mV

Ans. [3]

Q.9 If Ceq. of the circuit is 0.5 find value of C

(1) 2\( \mu \)F  
(2) \( \frac{2}{3} \mu \)F  
(3) \( \frac{3}{2} \mu \)F  
(4) \( \frac{1}{2} \mu \)F

Ans. [2]
Q.10 Two particles A and B are orbiting around the earth in radius R and 2R. Find the ratio of their orbital speed.

(1) $\sqrt{2} : 1$  
(2) $2 : 1$  
(3) $1 : \sqrt{2}$  
(4) $1 : 2$

Ans. [1]

Q.11 Two particles revolving with same angular velocity $\omega$ on a circular path of radius $R_1$ and radius $R_2$. Find relative angular velocity after time $t = \frac{\pi}{2\omega}$

(1) $\omega(R_2 - R_1)$  
(2) $\frac{\omega(R_2 - R_1)}{R_1 + R_2}$  
(3) $\frac{\omega(R_2 + R_1)}{R_2 - R_1}$  
(4) Zero

Ans. [2]

Q.12 Wavelength correspond to maximum spectral radiancy at 300 K temperature is $10^{-4}$ m. Find wavelength correspond to maximum spectral radiancy at 350 K temperature.

(1) $2 \times 10^{-4}$ m  
(2) $1.5 \times 10^{-4}$ m  
(3) $2.2 \times 10^{-4}$ m  
(4) $1.16 \times 10^{-4}$ m

Ans. [4]

Q.13 A block is suspended with the help of a wire through a rigid support vertically. The extension in length of wire is 4 mm. Now the whole system is dipped in liquid of relative density 2, then find new extension in string if relative density of block is 8.

(1) 1 mm  
(2) 2 mm  
(3) 3 mm  
(4) 4 mm

Ans. [3]

Q.14 Determine phase difference between current $I_1$ & $I_2$ in AC circuit

(1) 0  
(2) 30°  
(3) 60°  
(4) 75°

Ans. [4]
Equation of SHM of a particle is given by \( y = 5 \left( \sin 3\pi t + \sqrt{3} \cos 3\pi t \right) \) determine time period and amplitude of SHM. (Where \( y \) is in cm and \( t \) is in second).

(1) \( T = \frac{4}{3} \) sec, \( A=20 \) cm  
(2) \( T = \frac{2}{3} \) sec, \( A=10 \) cm  
(3) \( T = \frac{4}{3} \) sec, \( A=40 \) cm  
(4) \( T = \frac{2}{3} \) sec, \( A=60 \) cm

Ans. [2]

If air in the soap bubble is being injected with constant rate \( r \). Find the graph of pressure versus time

Ans. [1]

A galvanometer has 25 divisions and its resistance is 50\( \Omega \). One division of galvanometer corresponds to \( 4 \times 10^{-4} \) amp. current. Find the minimum value of resistance to be added to the galvanometer so that it can measure a value of 2.5 volt?

(1) 200\( \Omega \)  
(2) 6200 \( \Omega \)  
(3) 6250 \( \Omega \)  
(4) 250 \( \Omega \)

Ans. [1]

If a particle of mass 20gm is moving with speed 5m/s as shown in the figure

Find the angular moment of particle about point \( X \) when it reaches at point \( A \)

(1) \( 4 \times 10^{-3} \)  
(2) \( 4\sqrt{3} \times 10^{-3} \)  
(3) \( 12\sqrt{3} \times 10^{-3} \)  
(4) \( 3\sqrt{2} \times 10^{-3} \)

Ans. [3]
Q.19 A closed container having two gases of same number of mole at same temperature \( T \) are separated by piston of certain mass. Length of gas column of upper part is \( L_2 \) & length of gas column of lower part is \( L_1 \). \( L_2 > L_1 \). Determine mass of piston

\[
(1) \quad \frac{nRT}{g} \left( \frac{L_2 + L_1}{L_2 L_1} \right) \\
(2) \quad \frac{nRT}{g} \left( \frac{(L_2 L_1)^2}{L_2 + L_1} \right) \\
(3) \quad \frac{nRT}{g} \left( \frac{L_2 - L_1}{L_2 L_1} \right) \\
(4) \quad \frac{nRT}{g} \left( \frac{L_2 - L_1}{2L_2 L_1} \right)
\]

Ans. [3]

Q.20 An alpha particle of mass \( m \) collides with a stationary nucleus and recoils back with 64% loss of its kinetic energy find mass of nucleus. (assume elastic collision)

(1) 3m \hspace{1cm} (2) 4m \hspace{1cm} (3) 9m \hspace{1cm} (4) 16m

Ans. [3]