

BRAIN INTERNATIONAL SCHOOL

PHYSICS ASSIGNMENT

CLASS- XI

OCT'2018

CH- SIMPLE HARMONIC MOTION

1. Distinguish between Periodic and Simple harmonic motion.
2. Prove that the equation for displacement of a particle $X = a \cos \omega t + b \sin \omega t$. Determine its amplitude and phase constant.
3. A simple harmonic motion has amplitude A and time period T . What is the time taken to travel from $X = A$ to $X = A/2$.
4. Derive expression for instantaneous velocity and acceleration of a particle executing SHM.
5. Show that the total energy is constant and independent of time for SHM.
6. Show that if a particle is moving in SHM, its velocity at a distance $3/2$ of its amplitude from the mean position is half of its velocity at mean position.
7. Derive an expression for the time period of oscillation of simple pendulum.
8. A spring of force constant 1200 N/m is mounted on a horizontal table. A mass of 3 kg is attached to the force end of the spring pulled sideways to a distance of 2 cm and released. What is the frequency of oscillation of the mass . Also find its maximum acceleration.
9. A 2 kg object attached to a spring is driven by a external force $F = 3 \cos \pi t/4$ newton. If the force constant of the spring is 20 N/m . Determine time period and amplitude of the motion.

10. Write the equation for the displacement of a particle executing SHM with $A = 2$ cm, $\omega = 100\pi$ radian initially at $t = 0$, when particle is at extreme position and mean position.