



**INDIAN SCHOOL MUSCAT**  
**SENIOR SECTION**  
**DEPARTMENT OF PHYSICS**  
**CLASS XI**

CLASS-XI

UNIT- X OSCILLATIONS & WAVES

WORK SHEET-10

**SECTION-A CONCEPTUAL & APPLICATION TYPE QUESTIONS**

1. list any two characteristics of simple harmonic motion.
2. On what factors does the energy of a harmonic oscillator depends ?
3. A simple pendulum is inside a space-craft. What should be its time period of vibration?
4. What is the main difference between forced oscillations & resonance?
5. Glass windows may be broken by a far away explosion. Explain why.
6. Name two important properties of a material responsible for the propagation of waves through it .
7. If the pressure of a gas at constant temperature is increased four times, how the velocity of sound in the gas will be affected?
8. What are harmonics?
9. What is difference between a tone & note?
10. What is beat frequency?

**SECTION-B NUMERICAL QUESTIONS**

1. The acceleration of a particle performing S.H.M. is  $12 \text{ c/m}^2$  at a distance of 3cm from the mean position. Calculate its time-period.
2. The displacement equation for a particle executing simple harmonic motion is  $y = 0.2 \sin 50\pi (t + 0.01)$  metre, where  $y$  is the displacement at the instant  $t$ . Calculate the amplitude, time period , maximum velocity and the displacement at the start of motion.
3. A block whose mass is 1 kg is fastened to a spring The spring has a spring constant of 50 N/m. The block is pulled to a distance  $x=10\text{cm}$  from its equilibrium position at  $x=0$  on a frictionless surface from rest at  $t=0$ . Calculate kinetic, potential & total energies of the block when it is 5 cm away from mean position.
4. A spring of force constant 1200 N /m is mounted horizontally on a horizontal table. A mass of 3.0 kg is attached to the free end of the spring, pulled sideways to a distance of 2.0 cm & released. (i) What is the frequency of oscillation of the mass ? (ii) What is the maximum acceleration of the mass ? (iii) What is the maximum speed of the mass ?

5. At what temperature will the velocity of sound in hydrogen be the same as in oxygen at  $100^{\circ}\text{C}$  ? Density of oxygen is 16 times the density of hydrogen.
6. A simple harmonic wave is expressed by equation ,  $y = 7 \times 10^{-6} \sin ( 800 \pi t - \pi x/42.5 )$  where  $y$  &  $x$  are in cm &  $t$  in seconds. Calculate the following : (i) amplitude(ii) frequency (iii) wave length (iv) wave velocity , & (v) phase difference between two particles separated by 17.0 cm.
7. A metal wire of linear mass density of 9.8g/m is stretched with a tension of 10 kgwt into between two rigid supports 1m apart. The wire passes at its middle point between the poles of a permanent magnet & it vibrates in resonance, when carrying an alternating current of frequency  $\nu$  . Find the frequency of the alternating source.
8. A pipe 20 cm long is closed at one end. Which harmonic mode of the pipe is resonantly excited by a 430 Hz source? Will this same source be in resonance with the pipe if both ends are open ? Speed of sound =340 m/s.
9. A tuning fork arrangement (pair) produces 4 beats/s with one fork of frequency 288 cps. A little wax is placed on the unknown fork and it sounded again then produces 2 beats/s.What is the frequency of the unknown fork?
10. A railway engine & a car are moving on parallel tracks in opposite directions with speed of 144 kmph 72 kmph , respectively. The engine is continuously sounding a whistle of frequency 500 Hz. The velocity of sound is 340 m/s. Calculate the frequency of sound heard in the car when (i) the car & the engine are approaching each other, (ii) the two are moving away from each other.