OSCILLATIONS AND WAVES

- A particle executes SHM of type x=asinωt. It takes time t_1 from x=0 to x=a/2 and time t_2 from x=a/2 to x=a .the ratio of t_1 to t_2 will be
  1)1:1 2)1:2 3) 1:3 4) 2:1
  Ans : 2

- A particle is executing SHM. Its maximum acceleration is α and maximum velocity is β. then its time period of oscillation will be
  1) α/β 2)β^2/α 3)2πβ/α 4)β^2/α^2
  Ans :

- When a body of mass 1 kg is suspended from a light spring hanging vertically its length increases by 5cm.By suspending 2kg block to the spring and if the block is pulled through 10cm and released, then maximum velocity in it in m/s is ($g=10m/s^2$)
  1)0.5 2)1 3)2 4)4
  Ans :

- A 15g ball is shot from a spring gun of force constant 600N/m. If the spring is compressed by 5cm.The greatest possible horizontal range of the ball for this compression is ($g=10m/s^2$)
  1)6m 2)10m 3)12m 4)8m
  Ans :

- A solid cylinder of mass 3kg is rolling on horizontal surface with velocity 4m/s. It collides with a horizontal spring of force constant 200n/m. The maximum compression produced by the spring will be
  1)0.5m 2)0.6m 3)0.7m 4)0.2m
  Ans :

- A cylindrical piston of mass M is slides smoothly inside a long cylinder closed at one end enclosing a certain mass of gas . The cylinder is kept with axis horizontal. If the piston is disturbed from its mean position, it oscillate simple harmonically .The period of oscillation will be
  1) $T = 2\pi\sqrt{\frac{Mh}{pA}}$ 2) $T = 2\pi\sqrt{\frac{MA}{ph}}$ 3) $T = 2\pi\sqrt{\frac{MhA}{p}}$ 4) $T = 2\pi\sqrt{\frac{M}{pAh}}$
  Ans :

- Simple pendulum with a metal bob has time period of T. Now the bob is immersed in a non-viscus liquid and time period is 3T.The ratio of density of metal bob to that of the liquid is

1)4:3 2)8:3 3)9:4 4)9:8

Ans :

- The equation of a progressive wave is given by y=A sin $2\pi\left[\frac{t}{T}-\frac{x}{\lambda}\right]$. If maximum velocity of the particle is six times the wave velocity .Then its wave length is

  1) 3πA 2)2πA 3)πa/3 4)πa/6

  Ans :

- If two tuning forks a and B are sounded together they produce 4beats per second. Now A is slightly loaded with wax. They produce 2beats when sounded again. the frequency of A is 256Hz.Then the frequency of B will be

  1)250Hz 2)252Hz 3)269Hz 4)262Hz

  Ans :

- The wave impulses are sent to the bottom of a sea from a ship and the echo is heard after 2seconds .If the bulk modulus of water is $2X10^9 N/m^2$ and density of water is $1000kg/m^3$.The the depth the sea is

  1)1414m 2)707m 3)2828m 4)2000m

  Ans :

- If the temperature of the gas is raised by 1K from 300K the percentage change in the speed of sound in the gaseous mixture is (R=8.31J/mol/K)

  1)0.167% 2)0.334% 3)1% 4)2%

  Ans :

- A closed organ pipe of length L and an open organ pipe contain gases of densities ρ_1 and ρ_2 respectively ,the compressibility's of gasses are equal in both the pipes. Both the pipes are vibrating in their first overtone with the frequency .The length of the open organ pipe is

  1)L/3 2)4L/3 3) $\frac{4L}{3}\sqrt{\frac{\rho_1}{\rho_2}}$ 4) $\frac{4L}{3}\sqrt{\frac{\rho_2}{\rho_1}}$

  Ans :

- The equation of the wave on the string of linear mass density $0.04kgm^{-1}$ is given by y=0.02 $\sin 2\pi\left[\frac{t}{0.04}-\frac{x}{0.5}\right]$ where x and y are m and time in second the tension in the string is

  1)12.5N 2) 0.5N 3) 6.25N 4)4.0N

  Ans :

- The stretched sonometer wire is unison with a tuning fork. when the length of the wire is increased by 1% the number of beats heard per second is 5 Then the frequency of the tuning fork is
  1)500Hz 2)505Hz 3) 255Hz 4) 250Hz
  Ans :

- A source of sound is falling under gravity at some time t=0 ,the detector lies vertically bellow source at a depth 100m.if the velocity and frequency of sound are 350m/s and 1000Hz respectively. Then the apparent frequency recorded after t=2.5s is ($g=10m/s^2$)
  1)1000Hz 2)933Hz 3)500Hz 4)1100Hz
  Ans :

- A circular table is rotating on its axis at 5rps.A souse of sound of frequency 1000Hz is fixed on the table at 70cm from the axis. The minimum frequency heard by the listener standing at a distance from the will be (speed of sound is 352m/s)
  1)1000Hz 2)1066Hz 3)941Hz 4)352Hz
  Ans :

- Ten tuning forks are arranged in increasing order of frequency in such a way that any two nearest tuning forks produce 4beats per second. The highest frequency is twice of the lowest. The highest and lowest frequencies are
  1)40Hz and 80Hz 2)50Hz and 100Hz 3)22Hz and 44Hz 4)36Hz and 72Hz
  Ans :

- An open pipe is in resonance in its second harmonic with a tuning fork of frequency f_1 .Now it is closed at one end .If the frequency of the tuning fork is increased slowly from f_1,then again resonance is obtained with a frequency f_2. If in this case the pipe vibrates with nth harmonic then
  1)$n=3,f_2=3f_1/4$ 2) $n=3,f_2=5f_1/4$ 3)$n=5,f_2=5f_1/4$ 4)$n=5,f_2=3f_1/4$
  Ans :

- The total energy of the body executing SHM is E. Then the kinetic energy when the displacement is half of the amplitude is
  1)E/2 2)E/4 3)3E/4 4)$\sqrt{}$3E/4 .
  Ans :

- A particle of mass m is executing oscillations about the origin on the x-axis. Its potential energy is U(x)=k$|x|^3$ where k is proportionality constant .if the amplitude of oscillation is a. Then its time period T proportional to

  1)1/$\sqrt{a}$ 2) a 3) $\sqrt{a}$ 4)$a^{3/2}$

  Ans :