PHY 2105
Physics

1. A body of mass 25gm is attached with a spring of spring constant 400dyns/cm. The body is displaced by 10cm from its equilibrium position and released. Then the body executes simple harmonic motion. Calculate (i) the time period, (ii) frequency, (iii) angular frequency and (iv) maximum velocity.
2. In an electric shaver, the blade moves back and forth over a distance of 2.0mm in simple harmonic motion, with a frequency 120Hz. Find (a) the amplitude, (b) the maximum blade speed and (c) the magnitude of the maximum acceleration of blade.
3. A 0.12kg body undergoes simple harmonic motion of amplitude 8.5cm and period 0.20s. (a) What is the magnitude of the maximum force acting on it? (b) If the oscillations are produced by a spring what is the spring constant?
4. A hydrogen atom has a mass of 1.68×10^{-27}kg, when it attach to a certain massive molecule, it oscillate as classical oscillator with frequency of 10^{14} Hz and with amplitude of 10^{-10}m. Calculate force acting on the hydrogen atom.
5. A body executes SHM such that its velocity at mean position is 1m/s and acceleration at one extremity is 1.57m/s^2. Calculate time period of oscillation.
6. A particle executes SHM of amplitude 5m when the particle is 3m from its mean position, its acceleration is found to be 48m/s^2. Find (i) velocity (ii) time period (iii) Maximum velocity
7. Particle executes harmonic motion about the point x= 0; at t= 0 it has displacement x= 0.37cm and zero velocity. The frequency of the motion is 0.25Hz, determine, (i) the period, (ii) the angular frequency, (iii) the amplitude, iv) the displacement at t= 3.0s and v) the velocity at t= 3.0s.
8. A mass oscillates with an amplitude of 4.00 m, a frequency of 0.5 Hz and a phase angle of p/4.
   (i)What is the period T?
   (i)Write an equation for the displacement of the particle.
   (iii)Calculate the velocity and acceleration of the object at time t=5s..
9. A 2.00 kg block is attached to a spring and force constant of the spring is $\boldsymbol{k}$ = 196 N/m.The block is held a distance of 5.00 cm from equilibrium and released at $\boldsymbol{t}$ = 0.
   (a) Find the angular frequency $\boldsymbol{w}$, the frequency $\boldsymbol{f}$, and the period $\boldsymbol{T}$.
   (b) Write an equation for $\boldsymbol{x}$ vs. time.

10. An oscillating block has kinetic energy equal to potential energy of (last two digit of your ID)J when the block is at x =+0.50 m. (a) what is the amplitude of oscillation? (b) What is the potential energy when the block is at x = 0?
11. An oscillating block has a potential energy of (last two digits of your ID)J and a kinetic energy of (sum of last two digits your ID)J when the block is at x =0.03m. (a)What is the amplitude of oscillation? (b) What is the kinetic energy when the block is at x = 0? What is the potential energy when the block is at (b) x= -2.0 cm and (c) x =0?

12. An oscillating block has PE= (last two digit of your ID)J when the block is at x =(last digit of your ID)cm. If amplitude of oscillation is 10cm. (a) what is total energy of the oscillation? (b) Find the position where PE=KE?

13. Suppose the block has mass m =(last two digits of your ID) kg and is designed to oscillate at frequency f=10.0 Hz and with amplitude A= (Sum of two digits of you ID) cm. (a) What is the total energy E of the spring–block system? (b) What is the block's speed at the equilibrium point?