Jashore University of Science and Technology

B.Sc. Engineering in Petroleum and Mining
Second semester of First year
Course no.: PHY 1201
Course title: Physics (Properties of Matters)
Assignment no.: 02
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1. A particle with a mass of 1.00×10^{-20} kg is oscillating with simple harmonic motion with a period of 1.00×10^{-5} s and a maximum speed of 1.00×10^{-3} m/s. Calculate (a) the angular frequency and (b) the maximum displacement of the particle. [5]

2. A simple harmonic oscillator consists of a block of mass 2.00 kg attached to a spring of spring constant 100 N/m. When $t = 1.00$ s, the position and velocity of the block are $x = 0.129$ m and $v = 3.415$ m/s. (a) What is the amplitude of the oscillations? What were the (b) position and (c) velocity of the block at $t = 0$ s? [5]

3. An oscillating block–spring system has a mechanical energy of 1.00 J, an amplitude of 10.0 cm, and a maximum speed of 1.20 m/s. Find (a) the spring constant, (b) the mass of the block, and (c) the frequency of oscillation. [5]

4. If the phase angle for a block–spring system in SHM is $\pi/6$ rad and the block's position is given by $x = x_m cos(\omega t + \phi)$, what is the ratio of the kinetic energy to the potential energy at time $t = 0$? [5]