

# **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**

**Last date of submission: January 08, 2021**

**1.** A particle with a mass of  $1.00 \times 10^{-20}$  kg is oscillating with simple harmonic motion with a period of  $1.00 \times 10^{-5}$  s and a maximum speed of  $1.00 \times 10^{-3}$  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]