Assignment 01

(Substitute of Mid Term Exam)

Trimester: Summer 2024

Course code: PHY 2105

Course Title: Physics

Full Marks: 10

1	a.	What is the condition for the motion of an object to become simple harmonic motion in nature?	1
	b.	Can we observe simple harmonic motion in our real life? Briefly Explain.	1
2.	a.	The equation of displacement of a mass-spring system with mass 500 g is, $$y = 7Sin(6\pi t + \frac{\pi}{9})$$ Calculate i) calculate the acceleration at t = 0.5 s ii) compare the kinetic energy at, t = **L** s. Here **L** is the last one digit of your student ID. If the last digit of your ID is 0 then use **L**= 8.	2
	b.	A motorbike can be mounted on four identical springs as far as vertical oscillations are concerned. The springs of a certain car are adjusted so that the oscillations have a frequency of 2 Hz. (i) What is the spring constant of each spring if the mass of the motorbike is 500 kg and the mass is evenly distributed over the springs? (ii) What will be the oscillation frequency if five passengers, averaging 73.0 kg each, ride in the car with an even distribution of mass?	2
	c.	A body of mass 24 gm is attached with a spring of spring constant 890 dyns/cm. The body is displaced by 5 cm from its equilibrium position and released. Then the body executes simple harmonic motion. Calculate (i) angular frequency (ii) maximum velocity	2
3.		Show that, for a mass spring system with the equation of displacement x = 5cost, the potential and kinetic energy depends on time while total energy is time independent. [Use equations and graphical figures to justify your answer]	2