Premier University
Department of Computer Science & Engineering
1ˢᵗ Semester Final Examination, October 2020

Course Code: PHY 101	Course Title: Engineering Physics -I
Time: 1 Hour 45 Minutes	Full Marks: 37.5

Instructions:
a. Answer any four questions.
b. Each question carries equal marks.

Q-1 a. Give graphical representation of displacement, velocity and acceleration of a particle executing S.H.M.   03

b. From conservation of energy, show that the total energy of a particle executing S.H.M is $\frac{1}{2}KA^2$ 05
(where, the symbols have their usual meanings).

c. A particle executes simple harmonic motion is given by the equation Y=25 sin (ωt + α). If the time   4.5
period is 35 seconds and the particle has a displacement of 12cm at t=0.
Find the following :
(i) Angular frequency
(ii) Epoch
(iii) The phase angle at t=10 seconds
(iv) The phase difference between two positions of the particle 25 second apart.

Q-2 a. What are Lissajous figures? Write two importance of Lissajous figure.   03

b. Obtain an expression for the Lissajous figure when two simple harmonic vibrations of equal time   5.5
periods acting right angles to each other's.

c. Discuss the special cases when the phase difference between the waves   04
(i) $\alpha = 0$ or 2π and   (ii) $\alpha = \pi/2$ or $3\pi/2$ (a $\neq$ b) and (a = b)
Hence, draw the corresponding diagrams.

Q-3 a. What is Doppler effect?   1.5

b.   According to Doppler effect, derive an expression for the change in frequency of a note when the   05
observer at rest and the source in motion.

c. Two trains travelling in opposite directions at 120 km/hr each, cross each other while one of them is   06
whistling. If the frequency of the note is 1200 Hz, find the apparent pitch as heard by an observer in the
other train:
(i) Before the trains cross each other
(ii) After the trains have crossed each other

Q-4 a. State 1ˢᵗ law of thermodynamics?   01

b. Find the expression for the work done during a isothermal and an adiabatic.   08

c. A certain mass of gas at NTP is expanded to three times its volume under adiabatic conditions.   3.5
Calculate the resulting temperature and pressure. (γ for the gas is 1.40).

Q-5 a.   Distinguish between constructive and destructive interference.   2.5

b. Find an expression the interference of sound wave is $y = A \sin\left[\frac{2\pi}{\lambda}(vt - x) + \theta\right]$, where the symbols   05
have their usual meaning

c. For the interference of sound wave obtain the condition for maximum and minimum intensity.   05