Daffodil International University

Department of Electrical and Electronic Engineering

Faculty of Engineering

Final Examination, Summer–2026

Course Code: 0533-111 | Course Title: Physics

Section: A, B, C, D, E, F | Level-Term: L1-T1 | Teacher's Initial: SAT, MMR

Full Marks: 40 | Exam Date: 22 August 2026 | Time: 2 Hours

Note: There are three sets of questions in total. Answer all of them. Right hand margin indicates full marks.

Q1.	(a) **Describe** sharpness of resonance.	**CO-1 (C2)**	**[2]**
	(b) **Differentiate** between wave and oscillation.	**CO-1 (C2)**	**[3]**
Q2.	(a) **Express** the general differential equation of progressive wave motion.	**CO-3 (C2)**	**[3]**
	(b) **Show** that simple harmonic motion average potential energy is half of the total mechanical energy for a complete cycle.	**CO-3 (C2)**	**[4]**
	(c) **Estimate** the velocity of sound in air using Laplace's correction.	**CO-3 (C2)**	**[4]**
	(d) **Describe** the shape of the Lissajous figure formed when the frequency ratio of the two oscillations is 1:1. Explain how the phase difference between the two oscillations affects the shape.	**CO-3 (C2)**	**[4]**
Q3.	(a) The sound intensity level of a machine is 100 dB at a distance of 5 m. At what distance from the machine will the intensity level decrease to 80 dB?	**CO-2 (C3)**	**[4]**
	(b) A progressive wave has the equation $y(x,t)=0.04\sin[2\pi(40t-4x)]$. **Calculate** the amplitude, wavelength, frequency, wave velocity, angular frequency, and time period.	**CO-2 (C3)**	**[4]**
	(c) For damped oscillator mass of object 0.35 kg, spring constant K=87 Nm^{-1} and damping constant b= 0.07 kgs^{-1}. , **Calculate** after how many complete oscillations does the amplitude become half of its initial value?	**CO-2 (C3)**	**[4]**
	(d) A police car is approaching a stationary observer at 90 kmh^{-1} while its siren emits a sound of frequency 750 s^{-1}. If the speed of sound is 340 ms^{-1}, **Calculate** the frequency does the observer hear? Also the frequency will be heard after the police car passes the observer?	**CO-2 (C3)**	**[4]**
	(e) A sinusoidal wave of amplitude 10 cm travels along the positive -axis. At a particular instant, the displacement of a particle 20 cm from the origin is +5 cm, while that of another particle 50 cm from the origin is −5 cm. **Calculate** the wavelength of the wave.	**CO-2 (C3)**	**[4]**