Daffodil International University

Faculty of Engineering

Final Examination, Fall– 2024

Course Code: 0533-111 | Course Title: Physics
Section: A,B,C,D,E,F | Level-Term: L1-T1 | Teacher's Initial: SAT
Full Marks: 40 | Exam Date: December 22, 2024 | Time: 2 Hours

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

Q1	(a) **What** are the conditions for interference to occur?	CO-1 (C1)	[2]
	(b) **Define** Quality factor and sharpness of resonance.	CO-3 (C1)	[2]
Q2.	(a) **Show** that the distance between any two-consecutive bright fringes and dark fringes are same.	CO-2 (C2)	[4]
	(b) **Explain** damped oscillation in LCR circuit with relevant equations.	CO-3 (C2)	[4]
	(c) **Show** that for SHM average potential energy and kinetic energy are half of the mechanical energy.	CO-3 (C2)	[4]
Q3.	(a) In newton's ring experiment the diameter of 12th dark ring is 1.8 cm and it is changed by 0.43 cm when a liquid is introduced between lens and the plate. **Calculate** the difference between diameters of 15th dark ring for air and liquid.	CO-2 (C3)	[4]
	(b) In a double slit experiment using sodium light of wavelength 5.89×10^{-5} cm an interference pattern is obtained in which 20 equally spaced fringes occupied a distance of 2 cm on a screen. On replacing the sodium lamp with another monochromatic light source but making no other changes, 30 fringes are found to occupy a distance of 2.4 cm, on the screen. **Calculate** the wavelength of the light.	CO-2 (C3)	[4]
	(c) A car is approaching a mountain observes that the frequency of his car horn changes from 450 Hz to 490 Hz when it gets reflected from the mountain. **Calculate** the speed of the car if the speed of sound is 330 ms^{-1}.	CO-3 (C3)	[4]
	(d) For the damped oscillator m = 250 g, k = 85 Nm^{-1}, and b = 70 gs^{-1}. b. **Calculate** the time it takes for the mechanical energy drop to one-half of its initial value?	CO-3 (C3)	[4]
	(e) **Calculate** the frequency is received by a person sitting in a car moving at 110 kmh^{-1} listening an ambulance is coming behind his car at 90 kmh^{-1} and emitting a	CO-3 (C3)	[4]

steady 800 Hz sound from the siren? The speed of the sound on this day is 345 ms^{-1}.

(f) A block has mass m = 2.72 × 10^5 kg and is designed to oscillate at frequency f =10.0 Hz and with amplitude x_m = 20.0 cm. **Calculate** the the block's speed as it passes through the point 7cm away from the equilibrium position? CO-3 (C3) [4]