



## Daffodil International University

Faculty of Engineering

Final Examination, Fall- 2024

Course Code: 0533-111

Section: A,B,C,D,E,F

Full Marks: 40

Course Title: Physics

Level-Term: L1-T1

Exam Date: December 22, 2024

Teacher's Initial: SAT

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 [2]  
(C1)
- (b) Define Quality factor and sharpness of resonance. CO-3 [2]  
(C1)
- Q2.** (a) Show that the distance between any two-consecutive bright fringes and dark fringes are same. CO-2 [4]  
(C2)
- (b) Explain damped oscillation in LCR circuit with relevant equations. CO-3 [4]  
(C2)
- (c) Show that for SHM average potential energy and kinetic energy are half of the mechanical energy. CO-3 [4]  
(C2)
- 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. CO-2 [4]  
(C3)  
Calculate the difference between diameters of 15th dark ring for air and liquid.
- (b) In a double slit experiment using sodium light of wavelength  $5.89 \times 10^{-5}$  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 [4]  
(C3)
- (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. CO-3 [4]  
(C3)  
Calculate the speed of the car if the speed of sound is  $330 \text{ ms}^{-1}$ .
- (d) For the damped oscillator  $m = 250 \text{ g}$ ,  $k = 85 \text{ Nm}^{-1}$ , and  $b = 70 \text{ gs}^{-1}$ . b. Calculate CO-3 [4]  
(C3)  
the time it takes for the mechanical energy drop to one-half of its initial value?
- (e) Calculate the frequency is received by a person sitting in a car moving at  $110 \text{ kmh}^{-1}$  listening an ambulance is coming behind his car at  $90 \text{ kmh}^{-1}$  and emitting a CO-3 [4]  
(C3)

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

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

max