



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 5.89×10^5 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 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 kmh^{-1} listening an ambulance is coming behind his car at 90 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 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 block's speed as it passes through the point 7 cm away from the equilibrium position?

CO-3 [4]
(C3)

m2mx