



Daffodil International University
Faculty of Engineering
Final Examination, Spring 2025

Course Code: 0533-111
Section: A,B,C,D,E
Full Marks: 40

Course Title: Physics
Level-Term: L1-T1
Exam Date: June 24, 2025

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) Explain the formation of Newton's rings.** CO-1 [2]
(C2)
- (b) Explain Quality factor and sharpness of resonance.** CO-1 [2]
(C2)
- Q2. (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 [4]
(C3)
- (b) For the damped oscillator $m = 250$ g, $k = 85$ Nm^{-1} , and $b = 70$ gs^{-1} . Calculate after how many periods will the mechanical energy be half of the initial energy?** CO-2 [4]
(C3)
- (c) A block has mass $m = 2.72 \times 10^5$ kg and is designed to oscillate at frequency $f = 10.0$ Hz and with amplitude $x_m = 20.0$ cm. Calculate the block's speed as it passes through the point 7cm away from the equilibrium position and also compute the kinetic energy and potential energy of the system at that point.** CO-2 [4]
(C3)
- (d) Light containing two wavelengths λ_1 and λ_2 fall normally on the convex lens of radius of curvature R , resting on a glass plate. Now n th dark ring of λ_1 coincides with $(n+1)$ th dark ring of λ_2 . Then prove that radius of n th dark ring due to λ_2 is $\sqrt{\frac{\lambda_2^2 R}{\lambda_1 - \lambda_2}}$.** CO-2 [4]
(C3)
- (e) Explain the occurrence of damped oscillations in an LCR circuit and support your explanation with the appropriate differential equation.** CO-2 [4]
(C2)
- (f) 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-2 [4]
(C2)
- (g) Show that for Simple harmonic motion average potential energy and kinetic energy are half of the total mechanical energy.** CO-2 [4]
(C2)

Q3. (a) When a simple harmonic wave is propagated through a medium, the displacement of a particle (in m) at any instant of time is given by $y(x,t) = 0.08\sin(120\pi t - 4\pi x)$. (C3) CO-3
Calculate the amplitude of the vibrating particle, wave velocity, wavelength, frequency, angular frequency and time period.

(b) **Show** that the distance between two successive nodes and antinodes are same in a standing wave formed on a string. [4] (C3) CO-3