



Daffodil International University
Faculty of Science & Information Technology
Department of Software Engineering
Mid Term Examination, Spring 2025

Course Code: PHY 101; Course Title: Physics-I: General Mechanics, Waves and Oscillations, Optics and Atomic and Modern Physics
Sections & Teachers: (A-D, (E-H,Q), I-L, M-P) & (SH, MRI, MOR, JB)

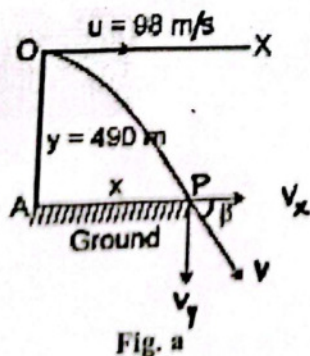
Time: 1:30 Hrs

Marks: 25

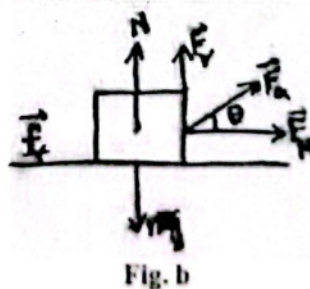
Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1. a. Define with examples damped vibrations and oscillations. [1.5] CLO-Level -1
- b. Draw and describe a graph that represents the relationship between force and friction. [2]
- c. Define with real-life examples transverse and longitudinal waves. [1.5]
2. a. Imagine the leaves of a coconut tree swaying in the wind, at the highest bend, they pause for a moment, and in the middle, they move the fastest. Estimate the total energy of the leaves to show that it remains constant at any given moment. [3] CLO-Level -2
- b. Microwave ovens naturally create uneven heating. The microwaves bounce around and form standing waves, creating hot spots where food heats up quickly and cold spots where it doesn't. Approximate expression how two traveling waves, like those in a microwave, combine to form a standing wave? [3]
- c. Imagine a camera drone capturing a cricket match, following a curved flight path through the sky just like the trajectory of a cricket ball. Using the basic equations of projectile motion and gravity, approximate its peak height and range, confirming that its flight path is a parabola. [4]
3. a. A particle performs simple harmonic motion given by the equation $y = 20\sin[\omega t + \alpha]$. If the time period is 30 seconds and the particle have a displacement of 10 cm at ($t = 0$), calculate (i) epoch; (ii) the phase angle at ($t = 5$) seconds and (iii) the phase difference between two positions of the particle 15 seconds apart. [3] CLO-Level -3
- b. A Projectile fired horizontally as shown in Fig. a with a speed 98 m/s horizontal from top of a hill of 490m height. Calculate: time to reach ground, distance of the target from hill and impact velocity. ($g=9.8$). [4]



$$s = vt$$



- c. A 70 kg box is pulled by 400 N force at an angle 30 deg with horizontal Fig. b. If the coefficient of sliding friction is 0.5, Calculate the acceleration of the box [3]