



Daffodil International University
Department of Software Engineering
Faculty of Science & Information Technology
Mid Term Examination, Fall 2024

**Course Code: PHY 101; Course Title: Physics-I: General Mechanics,
Waves and Oscillations, Optics and Atomic and Modern Physics**
Sections & Teachers: (A-K) & (SH, SAR)

Time: 1 Hour 30 Mins

Marks: 30

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. List the key concepts related to moment of inertia. [1.5] CLO-1
- b. Draw and describe a graph that represents the relationship between force and friction. [2]
- c. Retrieve how a transverse wave is different from longitudinal waves. [1.5]
2. a. Compute the expression for differential equation of a particle executing SHM [3] CLO-2
- b. Estimate mathematical expression for a standing wave. [3]
- c. Approximate the mathematical expressions for different parameters (trajectory, range, maximum height) involved in a projectile motion. [4]
3. a. A SHM is represented by the equation $y=10\sin(10t-(\pi/6))$. Calculate (i) time period (ii) maximum displacement (iii) maximum velocity and maximum acceleration (iv) displacement, velocity and acceleration at time $t=1\text{sec}$. [4] CLO-3
- b. A projectile is launched with an initial speed of 20 m/s at an angle of 30 degrees above the horizontal from a height of 40 meters. Compute: (i) The time and range it takes for the projectile to hit the ground. (ii) velocity of the ball when it reaches the ground [3]
- c. A particle moves in a circle of radius 10 m. Its linear speed is given by $v = t^2 + 2t$ (i) Compute the centripetal and tangential acceleration at $t = 3\text{s}$ (ii) Calculate the angle between the resultant acceleration and the radius vector. [3]