



Daffodil International University
Faculty of Science & Information Technology
Department of Computer Science and Engineering
Midterm Examination, Fall 2025
Course Code: PHY101, Course Title: Physics I
Level: 1 Term: 2 Batch: 69

Time: 1.5 Hours (90 Min.)

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)	Can you recall the key differences between transverse waves and longitudinal waves?	1	CO1
	b)	Why is the Newton's first law of motion called law of inertia.	1	
	c)	Explain the physical properties of curl.	1	
	d)	Write down the mathematical form of a general ordinary differential equation for SHM and the corresponding form of its general solution.	1	
	e)	State the work–energy theorem with mathematical expression.	1	
2.	a)	A child rolls a drum-shaped barrel down a hill. Interpret the moment of inertia of the barrel about its axis and radius of gyration.	3	CO2
	b)	Standing on a river bridge, a boy throws a stone into the air with some angle to the horizontal. Explain how the stone's trajectory is formed by the combined effect of its horizontal motion and gravity.	3	
	c)	Demonstrate using mathematical equation that the total energy of a particle engaged in Simple Harmonic Motion (SHM) remains constant at any given moment.	4	
3.	a)	Identify the divergence $\vec{A} = 4x^2yz\hat{i} + 3xy^3\hat{j} - 2x^2yz^2\hat{k}$ at position (2, -1, 1).	2.5	CO3
	b)	During a football match at Daffodil International University, a player from the CSE department kicks the ball with a speed of 28 m/s at an angle of 40° to the horizontal. The ball is aimed toward the goal defended by the Software department team. (a) How long will the ball be in the air? (b) How far will it travel before hitting the ground? (c) What is the maximum height it reaches?	2.5	
	c)	A particle performs simple harmonic motion described by the equation $Y = 12 \sin(50t + \phi)$. At time $t = 0$, the particle has a displacement of 8 cm. Determine the time period of the motion, the frequency, and the maximum velocity of the particle. Additionally, calculate the phase difference between the positions of the particle at $t = 0$ and $t = 4$ seconds.	2.5	
	d)	A 70 kg box is pulled by 400 N force at an angle 30 deg with horizontal. If the coefficient of sliding friction is 0.5, solve the acceleration of the box.	2.5	

