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Daffodil International University

Department of Computer Science and Engineering

Faculty of Science & Information Technology

Midterm Examination, Fall-2023

Course Code: PHY-101, Course Title: Physics-I

Level: 1 Term: 1 Batch: 65

Time: 1 Hour and 30 Minutes **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)	What is the difference between distance and displacement?	1	CO-1
	b)	What is the time period of a complete wave? Draw a sine wave and indicate wavelength.	1	
	c)	What is the trajectory of a projectile? Show trajectory by drawing a sketch.	1	
	d)	What are the types of friction forces?	1	
	e)	When a vibration is simple harmonic?	1	
2.	a)	Pushing or pulling a box in your room, which one is easier if you consider frictional force? Explain your opinion mathematically.	3	CO-2
	b)	Prove that, the projectile takes time double to for its range than the maximum height of its trajectory.	4	
	c)	Derive the differential equation of simple harmonic motion (SHM).	3	
3.	a)	A stone is thrown at a velocity of 60 ms^{-1} making an angle of 30 degree with the ground. Calculate the magnitude of the vertical velocity of the stone after one second.	2	CO-3
	b)	A 40 kg box is pushed by 1000 N force at an angle of 45 degree with horizontal. If the coefficient of sliding friction is 0.2, find the acceleration of the box.	3	
	c)	A 2000kg car accelerates from rest to a speed of 25 m/s over a distance of 120 meters. Calculate the net work done on the car.	3	
	d)	A spring is fixed horizontally with its left. A spring balance attached to the free end and pulled toward the right, a force of 6.0 N causes a displacement of 0.030 m. We replace the spring balance with a 0.50 kg weight, pull it 0.020 m to the right along a frictionless air track, and release it from rest (a) Find the force constant k of the spring. (b) Find the mechanical energy of the oscillating body.	2	