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Daffodil International University

Department of Software Engineering
Faculty of Science & Information Technology
Mid Term Examination, Fall 2023
Course Code: PHY 101; Course Title: Physics-I: General Mechanics, Waves and Oscillations, Optics and Atom and Modern Physics
Sections & Teachers: (A, B, C, D, E, F): (G, H, I, J); Shahina Haque (SHA): Md. Suzauddulah (SDH)

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.	Describe what distinguishes the propagation of transverse waves from that of longitudinal waves?	[01]	CLO-Level-1
	b.	Interpret the practical importance of moment of inertia in our daily experiences.	[01]	
	c.	If two projectiles are launched with the same initial velocity but at different angles, identify which one will travel the farthest horizontally, and why?	[01]	
	d.	Check whether the equation $y = A \sin \omega t + B \cos 2\omega t$ represents a simple harmonic motion or not.	[01]	
	e.	Compare the distinctions between damping and resonance in their application to waves.	[01]	
2.	a.	Derive expression for moment of inertia of a circular disc.	[3]	CLO-Level-2
	b.	Analyze the graph that represents the relationship between force and friction.	[3]	
	c.	Demonstrate that the total energy of a particle engaged in Simple Harmonic Motion (SHM) remains constant at any given moment.	[4]	
3.	a.	A particle moves in a circle of radius 10 m. Its linear speed is given by $v = 3t$. (i) Predict the centripetal and tangential acceleration at $t = 2$ s (ii) Calculate the angle between the resultant acceleration and the radius vector.	[2.5]	CLO-Level-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. Measure: a) The time and range it takes for the projectile to hit the ground. b) velocity of the ball when it reaches the ground	[2.5]	
	c.	The position of a particle is $y=20\sin(\omega t+\alpha)$. Time period is 30sec and displacement is 10cm at t=0 Measure (i) epoch (ii) phase at t=5sec iii) phase difference between two positions of the particle 15 sec apart.	[2.5]	
	d.	A plane surface is inclined at an angle of 60degree. A body of mass 10 kg is placed on it. If the value of coefficient of friction μ_k, between the body and the inclined surface is 0.2, Find the downward acceleration of the body, along the inclined plane surface. (Take $g=10ms^{-2}$)	[2.5]	