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PRN:		Course Code:	PHS301

Third Year B.Sc. End Semester Summer 2023

Classical Mechanics

Day and Date: Monday, 12/06/2023 Max Marks: 100

Time: 10.30 to 1.30pm Duration: 03 hrs

Instructions: 1) All questions are compulsory

			Marks	Bloom level	CO
Q.1	**Attempt any two of the following:**		**25**		
	a)	State and explain Kepler's laws of planetary motion?	**8**	**L1**	**CO1**
	b)	What is the concept of reducing the two-body problem into a one-body problem in celestial mechanics?	**8**	**L4**	**CO1**
	c)	Discuss the concept of motion in a central force field. How does the presence of a central force influence the dynamics of a particle and its trajectory?	**9**	**L2**	**CO1**
		OR			
	c)	What is the equation of motion under a central force? Explain the variables and terms involved in this equation and their significance in describing the particle's motion.		**L2**	
Q.2	**Attempt any two of the following:**		**25**		
	a)	Explain the origin and role of pseudo forces in non-inertial reference frames, with examples.	**8**	**L4**	**CO2**
	b)	What is the Coriolis force and how does it influence the dynamics of objects in a rotating frame? Provide examples.	**8**	**L4**	
	c)	Explore the effects of the Coriolis force in the flight of missiles and the formation of cyclones.	**9**	**L3**	**CO2**
		OR			
	c)	Explain the concept of normal modes and normal coordinates in the context of coupled oscillations.	**9**	**L3**	

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Q.3	**Attempt any three of the following:**	**25**		
a)	Explain the concept of scattering in the context of collisions between particles. What are the key characteristics of scattering events?	**8**	**L4**	**CO3**
b)	Discuss the differences between elastic and inelastic scattering. How do these types of scattering differ in terms of energy transfer and particle interactions?	**8**	**L2**	**CO3**
c)	Explain the concept of elastic scattering in both the laboratory system and the center of mass system. How does the choice of reference frame affect the analysis of elastic scattering?	**8**	**L5**	**CO3**
	OR			
c)	Explain the concept of cross-section in scattering. What does the cross-section represent, and how is it related to the probability of a scattering event occurring?	**8**	**L5**	**CO3**
Q.4	**Attempt any three of the following:**	**25**		
a)	Explain Galilean transformations and their role in classical mechanics.	**8**	**L4**	**CO4**
b)	Discuss the significance of the Michelson-Morley experiment and its impact on our understanding of the ether.	**8**	**L2**	**CO4**
c)	Explore the addition of velocities in special relativity and how it differs from classical mechanics.	**9**	**L4**	**CO4**
	OR			
c)	Evaluate the concept of mass-energy equivalence and the significance of the equation $E=mc^2$.	**9**	**L4**	**CO4**

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