SHRI RAMSWAROOP MEMORIAL UNIVERSITY

End Semester Examination (2021-22)-Odd Semester

M.Sc. (Mathematics) I YEAR (I Sem)	
Course Name: Mechanics	**Code: MMA1005**
Time: 02 Hours	**Max Marks: 60**

University Roll No.															
(To be filled by the Student)															

Note: Please read instructions carefully:

a) *The question paper has 03 sections and it is compulsory to attempt all sections.*

b) *All questions of Section A are compulsory; questions in Section B and C contain choice.*

Section A: Very Short Answer type Questions **Attempt all the questions.**		**BL**	**CLO**	**Marks (10)**
1.	Give expressions for radial and transverse velocity.	BL2	CLO 4	02
2.	What is non-inertial reference frame?	BL1	CLO 3	02
3.	What is Hamilton Jacobi theorem?	BL2	CLO 4	02
4.	What do you understand by nonholonomic constraints.	BL1	CLO 4	02
5.	Define phase space.	BL2	CLO 4	02
Section B: Short Answer Type Questions **Attempt any 03 out of 05 questions.**		**BL**	**CLO**	**Marks (30)**
1.	Prove that the change of magnitude of unit vector does not exists.	BL5	CLO 1	10
2.	Show that the constraints in a rigid body are conservative.	BL5	CLO 3	10
3.	What are principal axes and principal moments of inertia of a rigid body?	BL1	CLO 2	10
4.	What are the Hamiltonian equation of motion in polar coordinate system?	BL1	CLO 4	10
5.	Give an example of canonical transformation.	BL2	CLO 4	10
Section C: Long Answer Type Questions/Case Study **Attempt any 01 out of 03 questions.**		**BL**	**CLO**	**Marks (20)**
1.	Derive expression for tangential and normal velocity and acceleration.	BL6	CLO4	20
2.	Consider a homogeneous cube of density ρ, mass M and side a. Taking origin O at one corner and axes along the edges of the cube, determine the inertia tensor, the principal axes and their associated moments of inertia.	BL3	CLO2	20
3.	Prove that canonical transformation form a group.	BL4	CLO4	2
