

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSc/SAP
BRANCH: PHYSICS

SEMESTER : VII / I
SESSION : MO/2022

SUBJECT: PH403 CLASSICAL MECHANICS

TIME: 3:00 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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		CO	BL
Q.1(a)	What does cyclic coordinates mean?	[2]	1 1,2
Q.1(b)	Prove the Noether's theorem.	[3]	1 3
Q.1(c)	Derive the equation of motion of orbits in central force problem.	[5]	1 2
Q.2(a)	What are the physical significances of a phase space?	[2]	2 3
Q.2(b)	Derive Hamilton's equations of motion using variational principle.	[3]	2 2
Q.2(c)	Derive the equation of motion of a charged particle in an electromagnetic field.	[5]	2 3
Q.3(a)	Define the Poisson bracket and state its properties.	[2]	3 2
Q.3(b)	Prove the Jacobi identity.	[3]	3 2
Q.3(c)	Derive the condition a canonical transformation must satisfy. Give an example.	[5]	3 2
Q.4(a)	Graphically show how a set of Euler angles represent rotation in space.	[2]	4 1,2
Q.4(b)	Derive the formula for inertia tensor components.	[3]	4 2
Q.4(c)	Briefly discuss effect of Coriolis force on surface of earth.	[5]	4 3
Q.5(a)	Derive the equation of motion of two coupled spring-mass systems.	[2]	5 2
Q.5(b)	Show that a 1-dim system near equilibrium behaves like a harmonic oscillator.	[3]	5 2
Q.5(c)	Derive and solve the equation of motion for two coupled spring mass systems.	[5]	5 3

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