

Attempt any **FOUR** Questions, selecting at least one from each section.
All questions carry equal marks

SECTION A

- 1- a) What is Generalized Co-ordinate System? 6
b) Derive an expression for Generalized Force in terms of Generalized Co-ordinates. 6.5
- 2- a) Define and Explain Lagrange. 6
b) Obtain the Lagrangian and equation of motion for double Pendulum system where the lengths of pendulums are L_1 and L_2 and the corresponding masses are m_1 and m_2 . 6.5
- 3- a) Define Cyclic Co-ordinates. 6
b) Particles of mass m is moving in XY-plane under the influence of central force. Set up Lagrangian and derive its equation of motion. 6.5
- 4- a) Define Scattering Angle. 6
b) Discuss in detail Laboratory and Center of Mass Co-ordinate Systems. 6.5

SECTION B

- 5- a) State Hamiltonian Principal for monogenic system. 6
b) Prove that the shortest distance between two points in space is a straight line. 6.5
- 6- a) Poisson's Brackets are canonically invariant, explain. 6
b) Using the Poisson Bracket prove the following identity $[aU + bV, W] = a[U, W] + b[V, W]$ 6.5
- 7- a) Define and explain Poisson's Brackets. 6
b) Discuss in detail Jacobi Identity in Poisson's brackets. 6.5