

M.Sc. (Mathematics) (NEP Pattern) Semester-II
Major DSC-3 - Classical Mechanics

P. Pages : 2

Time : Three Hours



GUG/S/25/15395

Max. Marks : 80

- Notes : 1. Solve **all five** questions.
2. Each question carries equal marks.

UNIT – I

1. a) Find the shortest distance between two points in a plane. 8
b) Derive the Lagrange's equations from Hamilton's Principle. 8

OR

- c) Prove that the generalized momentum conjugate to a cyclic coordinate is conserved. 8
d) Show that a hoop rolls down the incline with one half the acceleration it would have slipping down a frictionless plane and the friction force of constrain is $\lambda = \frac{Mg \sin \theta}{2}$. 8

UNIT – II

2. a) Define the Routh's procedure. 8
b) State and prove the Principle of least action. 8

OR

- c) State and prove relation between δ and Δ . 8
d) If the constraint are independent of time for the equation.
 $r_1 = r_1(q_1, q_2, \dots, q_n, t)$
Do not involve time t explicitly the show that $\Delta \int 2T dt = 0$. 8

UNIT – III

3. a) If $F = F_1(q, Q, t)$ be the generating function of canonical transformation of
 $P_1 = P_1(q, p, t)$ $Q_1 = Q_1(q, p, t)$, $i = 1, \dots, n$ 8

Then prove that

$$p_1 = \frac{\partial F_1}{\partial q_1}$$

$$P_1 = -\frac{\partial F_1}{\partial Q_1}$$

$$K = H + \frac{\partial F_1}{\partial t}$$

Where K is the changed Hamiltonian in new variable P, Q .

