(r) Discuss the classification of orbits under inverse square forces. 5

5. (a) State and prove Poisson's Theorem. 5

(b) Derive an expression for Lagrangian density for Longitudinal Oscillation in elastic rod. 6

(c) Explain Poisson's bracket and show that they obey distributive law of algebra. 5

OR

(p) Enlist the conditions to be satisified by the function to become Generating function of a Cannonical Transformation. 6

(q) Explain the utility of Canonical Transformation. 5

(r) How can one convert Discrete System to the continious ? 5

AQ – 812

First Semester M. Sc. I (Physics) Examination

1 PHY – 2

CLASSICAL MECHANICS

P. Pages : 4

Time : Three Hours] [Max. Marks : 80
Credit : 4

Note : (1) All questions are compulsory.
(2) All questions carry equal marks.

1. (a) What are conservative forces ? Show that for conservative force field, the total energy of a system is always constant. 6

(b) State and prove the work – energy relation. What advantages does it have in understanding physical world ? 6

(c) What are the limitations of Newtonian Mechanics ? 4

OR

(p) State D'Alembert's principle. 2

(q) A block of mass 'm' slides down an inclined frinctionless plane.

Obtain its equation of motion using D'Alembert's principle. 4

(r) State and explain the principle of virtual work. 6

(s) State and prove the conservation theorem of linear momentum for the motion of a particle. 4

2. (a) Define the term constraint. Explain the types of constraints. Give suitable examples of each. 10

(b) What are generalised coordinates ? Explain their advantages. How these could be obtained ? 6

OR

(p) Using D'Alembert's principle obtain Lagrange's equation of motion for a non – conservative system. 12

(q) Show that Lagrangian's equations are invariant under Gauge transformation. 4

3. (a) Explain Homogeneity of space and time, Isotropy of space. 6

(b) Define cyclic co – ordinate. Illustrate the symmetry property related with angular co – ordinate (cyclic). 4

(c) State Hamilton's principle and obtain Lagrangian equations of motion. 6

OR

(p) What are Galilean transformations ? Show that Lagrangian equations are invariant under Galilean transformations. 6

(q) Deduce Hamilton – Jacobi equation. 5

(r) Explain principle of least action. 5

4. (a) State the features of central force motion. 4

(b) State Kepler's 2nd law and justify that motion under Harmonic central force is always bounded. 8

(c) State and prove varial theorem. 4

OR

(p) How two body problem can be reduced to Equivalent one body problem. 6

(q) Illustrate stability and closure property of circular orbit under central force. 5