Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 11

M.Sc.(Physics) (2018 Batch) (Sem.-1)

CLASSICAL MECHANICS

Subject Code : MSPH-412-18

Paper ID : [75123]

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SEVEN questions carrying FIVE marks each and students have to attempt any SIX questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1) Answer briefly :

a) How do the constraints affect the motion of a mechanical system?

b) What is Hamilton's principle?

c) Write down the Lagrange's equation of motion for a particle of mass m falling freely under gravity.

d) If the Lagrangian is invariant under rotation and translation, then what are the quantities that are conserved?

e) Define Poisson bracket of two dynamical variables.

f) What are 'Cyclic Coordinates'?

g) Define the term 'Coriolis force'.

h) What do you mean by degree of freedom?

i) Define action angle variable in one dimension.

j) Define 'Central Force'.

SECTION-B

2) Deduce Hamilton's principle from D' Alembert's principle.

3) What are generalized coordinates? What is the advantage of using them?

4) State and discuss the principle of least action.

5) Obtain Euler's equations of motion for a rotating rigid body.

6) Find the condition that a symmetrical top may continue rotating in a vertical position for an indefinite time.

7) Find the equations of motion of a pendulum bob suspended by a spring and allowed to swing in a vertical plane.

8) Obtain Lagrangian for a charged particle moving in an electromagnetic field.

SECTION-C

9) State and discuss the Hamilton's equations of motion of a system and explain fully with examples what is meant by canonical transformations.

10) Define Euler angles and derive the Euler's equations of motion in terms of Euler's angles.

11) Give an account of Hamilton Jacobi theory and illustrate it by applying it to the problem of simple harmonic oscillator.