Reg. No. : .....

Name : .....

K19P 1499

I Semester M.Sc. Degree (CBSS-Reg./Suppl./Imp.)
Examination, October - 2019
(2014 ADMISSION ONWARDS)
PHYSICS
PHY1C02: CLASSICAL MECHANICS

Time : 3 Hours Max. Marks : 60

SECTION-A

Answer both questions (either a or b) (2×12=24)

1. (a) Derive Lagrange's equation of motion from Hamiltonian principle

(OR)

(b) Obtain Lagrange's equation of motion for small oscillations.

2. (a) Derive Hamilton Jacobi differential equation. Work out Harmonic oscillator problem as an example of Hamilton Jacobi method.

(OR)

(b) Solve Kepler problem by Hamilton Jacobi method.

SECTION-B

Answer any **Four** questions (**1** mark for a , **3** marks for b, **5** marks for c) (4×9=36)

3. (a) What are cyclic coordinates?
   (b) Discuss the superiority of Lagrangean approach over Newtonian approach.
   (c) Show that generalized momentum conjugate to a cyclic coordinate is conserved.

4. (a) Define degrees of freedom.
   (b) Derive Hamilton's canonical equations of motion.
   (c) Find the Lagrangean of a spherical pendulum and obtain the equations of motion.

P.T.O.

5. (a) Define Poisson's bracket.
   (b) Give the fundamental Poisson bracket.
   (c) For what values of m and n, do the transformation equations $Q=q^m$ Cos np and $P = q^m$ Sin np represent a canonical transformation.

6. (a) Define moment of inertial tensor.
   (b) Derive Euler's equation of motion for a rigid body.
   (c) Solve Euler's equation for force free motion of a symmetric top.

7. (a) What are normal coordinates?
   (b) Explain conditions for stable and unstable equilibrium during small oscillations.
   (c) Account for the free vibrations of a linear triatomic molecule.

8. (a) State Hamiltons principle for a conservative system.
   (b) Explain principle of least action.
   (c) Derive Jacobi's identity.
