M.Sc. DEGREE EXAMINATION,APRIL 2020
I Year I Semester
Classical Mechanics And Relativity

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. State Hamilton's variational principle.
2. Define canonical momentum.
3. Write short notes of infinitesimal rotations.
4. Write the Euler's equations for a torque free motion of a rigid body.
5. State the condition for a transformation to be canonical.
6. Write any two properties of Poisson bracket.
7. Define the normal modes of vibration of the system.
8. Obtain the Lagrangian of the small oscillation.
9. Define a four vector.
10. What is Lorentz condition? Express it in covariant form.
11. State Kepler's laws of planetary motion.
12. Write an expression for the kinetic energy of a rotating rigid body.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Derive the Lagrange's equation from the Hamilton's variational principles.
14. Give an account on Coriolis force.
15. Define the Poisson bracket and derive the equation of motion in terms of Poisson bracket.
16. Write a short note on normal coordinates.
17. State Maxwell's equation and show that they are invariant under Lorentz transformation.
18. How will you reduce the two body central force problem into one-body problem?
19. Show that the transformation is canonical.
    $P = \frac{1}{2}(p^2+q^2)$, $Q = \tan^{-1}(\frac{q}{p})$

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Use Hamilton's equation to find the differential equation for planetary motion and prove that the areal velocity is constant.
21. Define Euler's angles and obtain an expression for the complete transformation matrix.
22. Deduce the solution of harmonic oscillator using Hamilton Jacobi method.
23. Discuss the frequencies of the normal modes of linear triatomic molecule.
24. Derive relativistic Lagrangian and Hamiltonian for a free particle.

M.Sc. DEGREE EXAMINATION,APRIL 2020
I Year I Semester
Classical Mechanics And Relativity

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. State Hamilton's variational principle.
2. Define canonical momentum.
3. Write short notes of infinitesimal rotations.
4. Write the Euler's equations for a torque free motion of a rigid body.
5. State the condition for a transformation to be canonical.
6. Write any two properties of Poisson bracket.
7. Define the normal modes of vibration of the system.
8. Obtain the Lagrangian of the small oscillation.
9. Define a four vector.
10. What is Lorentz condition? Express it in covariant form.
11. State Kepler's laws of planetary motion.
12. Write an expression for the kinetic energy of a rotating rigid body.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Derive the Lagrange's equation from the Hamilton's variational principles.
14. Give an account on Coriolis force.
15. Define the Poisson bracket and derive the equation of motion in terms of Poisson bracket.
16. Write a short note on normal coordinates.
17. State Maxwell's equation and show that they are invariant under Lorentz transformation.
18. How will you reduce the two body central force problem into one-body problem?
19. Show that the transformation is canonical.
    $P = \frac{1}{2}(p^2+q^2)$, $Q = \tan^{-1}(\frac{q}{p})$

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Use Hamilton's equation to find the differential equation for planetary motion and prove that the areal velocity is constant.
21. Define Euler's angles and obtain an expression for the complete transformation matrix.
22. Deduce the solution of harmonic oscillator using Hamilton Jacobi method.
23. Discuss the frequencies of the normal modes of linear triatomic molecule.
24. Derive relativistic Lagrangian and Hamiltonian for a free particle.