M.Sc. DEGREE EXAMINATION,NOVEMBER 2019
II Year III Semester
Classical Mechanics

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

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

Answer any **TEN** questions

1. Define a linear momentum.
2. Define degrees of freedom.
3. Define integral principle.
4. Define Rigid body.
5. State Euler's Theorem.
6. Define Characteristic equation of the matrix.
7. Define Tensor.
8. Define Legendre Transformation.
9. Define identity transformation.
10. Define Hamiltons equation.
11. Define Lagrange bracket.
12. Define nonion form of the dyad.

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

Answer any **FIVE** questions

13. Obtain the Lagrangian form of D'Alembert principle .
14. Prove that the shortest distance between two points in space is a straight line.
15. Explain Coriolis force.
16. Explain the Moment of Inertia.
17. Show that the transformation Q = log($\frac{sinp}{q}$), $P = qcotp$ is canonical.
18. Define the poisson bracket (u,v). If u(q,p) and v(q,p) are integrals of a hamiltonian system Prove that (u,v) is an integral..
19. Explain Euler's lagrange equation.

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

Answer any **THREE** questions

20. Obtain the Lagrange's equation for a holonomic system .
21. State and prove Hamilton's principle.
22. Show that the components of the angular velocity along the space setoff axes are given in terms of the Euler angles by

    ω x' $=\dot{\emptyset}$ sin$\theta sin\varphi + \theta \dot{cos}\varphi$, ω y' $=\dot{\emptyset}$ sin$\theta cos\varphi - \dot{\theta} sin\varphi$,ω z' $=\dot{\emptyset}$ cos$\theta + \varphi$
23. Derive Euler's equation of motion for a rigid body.
24. State and prove the principle of least action for a conservative holonomic system.

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