

M.Sc. F.Y. (Physics) (CBCS Pattern) Semester-II
PSCPHYT07 - Core Paper-VII - Classical Mechanics

P. Pages : 2

Time : Three Hours



GUG/S/25/11222

Max. Marks : 80

Either:

1. a) Explain D'Alembert's principle and its applications. 8
- b) What are constraints applied to system? Give detailed classification of constraints with suitable examples. 8

OR

- e) Derive Lagrange's equation of motion from D'Alembert's principle. 8
- f) Discuss- 8
- i) Dynamical system and
- ii) Phase space dynamics in classical mechanics.

Either:

2. a) Explain Hamilton-Jacobi theory and its applications. 8
- b) Discuss Routh's procedure for cyclic co-ordinates and conservation laws. 8

OR

- e) Define Hamiltonian principle and obtain Hamilton's canonical equation of motion. 8
- f) Define Poisson bracket and state the different proportion of Poisson bracket. 8
- Further show that- $[x, y+z] = [x, y] + [x, z]$.

Either:

3. a) Obtain a relation between scattering angles in laboratory system and C.M. System. 8
- b) Obtain an expression for the reduced mass of the one body system. 8

OR

- e) Show that the total energy and angular momentum of a particle under a central force is conservative. Also show that rate at which the area swept out by the radius vector is constant. 8
- f) Discuss classification of orbit for inverse square central forces. 8

Either:

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| 4. | a) | Explain periodic motion in small oscillations and normal modes. | 8 |
| | b) | Explain moment of inertia tensor and eigen values. | 8 |

OR

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| | e) | Explain non-inertial frames and pseudo forces. | 8 |
| | f) | What is Euler's angle? State and prove Euler's theorem. | 8 |
| 5. | | Attempt all of the followings- | |
| | a) | Explain variational principle. | 4 |
| | b) | Discuss in brief conservation theorem and symmetry properties. | 4 |
| | c) | Explain stability of orbit. | 4 |
| | d) | Discuss Rigid body dynamics and its applications. | 4 |
