**Exam. Code : 103201**
**Subject Code : 1279**

**B.A./B.Sc. 1st Semester**

**PHYSICS**

**Paper–A (Mechanics)**

Time Allowed—3 Hours] [Maximum Marks—35

**Note :**—Attempt **five** questions, selecting at least **one** question from each Section. **Fifth** question may be attempted from any Section.

## SECTION—A

I. (a) Derive expression for acceleration in spherical polar coordinates. 5

(b) Is area scalar or vector ? What do you know about volume ? 2

II. (a) How rotational invariance of space leads to conservation of angular momentum ? 5

(b) Show that the force $\vec{F} = 3x^2y^2\hat{i} + 2yx^3\hat{j} + 6z\hat{k}$ is conservative. 2

## SECTION—B

III. (a) Derive the differential equation of motion under the central forces. 5

(b) What is reduced mass of a two body system ? 2



IV. (a) Determine the turning points in the tragectory of a particle moving under a central force. How the total energy is related to the shape ? 6

(b) State Kepler's third law of planetary motion. 1

## SECTION—C

V. (a) Derive an expression for Coriollis force acting on a particle moving in vertical direction. 5

(b) Why is earth flattened at poles ? 2

VI. Discuss Focault's Pendulum in detail. 7

## SECTION—D

VII. What is Rutherford scattering ? Derive an expression for differential scattering cross section. 7

VIII. (a) Derive Euler's equation of rotation of a rigid body about a fixed point. 5

(b) What is a gyroscope ? Give example. 2



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