Exam. Code : 103201
Subject Code : 1280

B.A./B.Sc. Ist Semester

PHYSICS

Paper—A (Mechanics)

Time Allowed—Three Hours] [Maximum Marks—35

Note :— Attempt **FIVE** questions selecting **ONE** question from each Section. **Fifth** question may be attempted from any section.

SECTION—A

I. (a) Express area element, volume element and solid angle in spherical polar coordinates. 5

(b) The spherical polar coordinates of a point are (10, 30°, 45°). Find the Cartesian coordinates of the same point. 2

II. (a) Derive the relation between Cartesian and Spherical polar coordinates. 5

(b) Define solid angle and give its units. 2

SECTION—B

III. Discuss Michelson Marley experiment and give its implications. 7

IV. (a) Obtain equation of motion for equivalent one body problem for two masses. 5

(b) What are turning points ? What is the number of turning points in an ellipse. 2

SECTION—C

V. (a) Discuss the variation of g with Latitude. 5

(b) Determine the Latitude at which the plane of vibration of Focault's pendulum does not rotate at all. 2

VI. Derive Gallilean transformation equations and show that the length of a body is Gallilean invariant. 7

SECTION—D

VII. Derive a relation between scattering angles in CM and Lab systems. How the two angles are related, when target and incident particles are of equal masses ? 7

VIII. Show that the angular momentum $\vec{L}$ of a rigid body is given by :

$$\vec{L} = \overset{(-)}{I}\,\vec{W}$$

where $\vec{W}$ is angular velocity. Show that the operator $\overset{(-)}{I}$ is a tensor of second rank. 7