(i) **Printed Pages : 3** **Roll No. .....**

(ii) **Questions : 7**

Sub. Code : 0148

Exam. Code: 0002

B.A./B.Sc. (General) 2nd Semester
1048
PHYSICS
Paper : A - Mechanics-II

Time : 3 Hours] **[Max. Marks : 44**

Note :- Attempt five questions in all, selecting at least two each from Unit—I and UnitIL Unit-II is compulsory. Use of log tables and non-programmable calculator is allowed.

UNIT-I

1. (a) What do you understand by fictitious force ? Show that the expression for $\vec{F}_R$ in rotating frame is given by :

$$\vec{F}_R = \vec{F}_S - m\vec{w} \times (\vec{w} \times \vec{r}) - 2m(\vec{w} \times \vec{u}_R)$$

where the letters have their usual meanings. 6

(b) Find the horizontal component of the Coriolis force acting on a body of mass 0.5 mg moving northward with a horizontal velocity of 100 m/s at 30°N latitude of earth. 3

2. (a) Describe Michelson-Morley experiment and explain physical significance of the results. 7

(b) Calculate the time it will take the plane of oscillation of Foucault's pendulum to turn through 90° at a place where the latitude is 30°. 2

3. (a) Obtain Euler's equations for the motion of arigid body about a fixed point. 6

(b) What do you iinderstand by precession and mutation in case of gyroscope ? 3

UNIT-II

4. (a) Starting from Lorentz's transformations for space co-ordinate derive the equations for transformations of velocity ? Under what conditions do these equations reduce to Galilean Transformations for velocity ? 6

(b) The half life of a particle at rest is 2.18×10^{-8} sec. What will be its half life in a beam moving with a speed of 0.8 c ? 3

5. (a) Obtain the relativistic energy relation :

$$E = \sqrt{p^2c^2 + m^2c^4}.$$ 3

(b) Explain relativistic Doppler effect. 3

(c) What do you mean by Minkowski space ? Why the time co-ordinate is multiplied by c ? 2+1

6. (a) Derive an expression for the relativistic increase in the mass of a body. 7

(b) Calculate the decrease in mass of 1 gm of water at 0°C, when it turns into ice at 0°C. 2

UNIT-III

7. Attempt any eight parts, each part carries 1 mark :

(a) What is twin paradox ?

(b) Is earth an inertial frame of reference ?

(c) How the Coriolis force affects the weather ?

(d) At what latitude will the plane of vibration of Foucault's pendulum not rotate at all ?

(e) Give two postulates of special theory of relativity.

(f) Why length contraction is not observed in daily life ?

(g) "Inertia tensor is symmetric". Explain.

(h) What are Gaiilean transformations ?

(i) How the rotation of earth affects the value of 'g' ?

(j) What do you mean by asymmetric top ?

8x1=8