

(i) Printed Pages: 3

Roll No.

(ii) Questions : 7

Sub. Code :

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Exam. Code :

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**B.A./B.Sc. (General) 2nd Semester
(2042)**

PHYSICS

Paper-A : (Mechanics-II)

Time Allowed : Three Hours]

[Maximum Marks : 44

Note :— (1) Attempt **five** questions in all, selecting **two** questions each from Unit I and Unit II. Unit III is compulsory.

(2) Use of non-programmable calculator is allowed.

UNIT-I

1. (a) Define rigid body. How many co-ordinates are required to specify its configuration ? 3
(b) Derive Euler's equations of rotation of rigid body about a fixed point. 6
2. (a) Explain the physical significance of Michelson Morley experiment. 3
(b) What is Coriolis force ? Discuss its effect on a particle of mass m moving with linear velocity \vec{v} on the surface of earth at latitude λ . 6

3. (a) What do you mean by Galilean invariance ? Show that law of conservation of energy remains invariant under these transformations. 6
- (b) How will you conclude that earth behaves like a non-inertial frame ? 3

UNIT-II

4. (a) Give two postulates of special theory of relativity. 3
- (b) Derive Lorentz space time transformation equations for two inertial frames. 6
5. (a) A rod of rest length 14 m has direction cosines $\frac{3}{7}, \frac{-2}{7}$ and $\frac{6}{7}$ in certain frame S. What is its length as observed from a frame S' moving with a speed 0.6 C along the axis of S ? 3
- (b) What is relativistic Doppler's effect ? Derive an expression for apparent frequency detected by an observer which is moving directly away from the source of light. 6
6. Obtain Lorentz transformation equations for energy and momentum. Also write its inverse transformation equations. 9

UNIT-III

7. Attempt any **eight** parts. Each part is of 1 mark.
- (a) What is twin paradox ?
- (b) What is gyroscope ?
- (c) What do you mean by time dilation ?

- (d) Show that a particle with zero rest mass can never be at rest in an inertial frame.
- (e) Write relativistic mass formula.
- (f) How will you say that Galilean transformations is the special case of Lorentz transformations ?
- (g) At what latitude will the plane of vibration of Foucault pendulum not rotate at all ?
- (h) What is a fictitious force ?
- (i) Why are there no cyclones on places at the equator of earth ?
- (j) What is a pseudo force ?

1×8=8