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

(ii) Questions : 7 Sub. Code : 0 1 4 8

Exam. Code : 0 0 0 2

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

(2053)

PHYSICS

Paper–A : Mechanics–II

Time Allowed : Three Hours] [Maximum Marks : 44

Note :—Attempt FIVE questions in all, including Q. No. 7 (Unit–III) which is compulsory and selecting TWO questions each from Unit–I and Unit–II. Use of non-programmable scientific calculator is allowed.

UNIT—I

1. (a) What are principal moments and principal axes ? Find the expression for angular momentum of a rigid body about the principal axes.

(b) Calculate the fringe-shift in Michelson-Morley experiment. Given that d = 11 m; v = 30 km/sec, $\lambda = 6 \times 10^{-5}$ cm. 6,3

2. (a) What is Coriolis force ? Derive the expression for it. Discuss the effect of Coriolis force.

(b) What is gyroscope ? Write its applications. 6,3

3. (a) Derive the Euler's equations of rotation of a rigid body about a fixed point.

(b) Distinguish between inertial and Non-inertial frame of references. 6,3

UNIT—II

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

(b) The half life of a particle at rest is 2×10^{-9} sec. What will be its half life in a beam moving with a speed of 0.8 C ? 6,3

5. (a) What do you understand by time dilation ? What is proper time interval ? Derive the expression for it.

(b) At what speed should a particle move, so that its kinetic energy becomes 1.3 times its rest energy. 6,3

6. (a) Derive the transformation equations for relativistic momentum and energy.

(b) Prove that $\left(p^2 - \frac{E^2}{C^2}\right)$ is invariant under Lorentz Transformations. 6,3

UNIT—III

7. (a) Are Newton's Law invariant under Galilean transformation ?

(b) What do you understand by precession ?

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

(d) What was the aim of Michelson–Morely experiment ?

(e) What do you mean by four vector formulation ?

(f) Two photons are moving towards each other. What is their relative velocity ?

(g) What is twin paradox ?

(h) Show that rest mass of photon is zero. 8×1