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

　　　　　　　　　　　Exam. Code : | 0 | 0 | 0 | 2 |

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

1047

PHYSICS

(Machanics-II)

Paper : A

Time : 3 Hours]　　　　　　　　　[Max. Marks : 22

Note :– (i) Attempt *five* questions in all, selecting at least *two* from each Unit I and Unit II. Unit III is compulsory.

(ii) All questions carry equal marks.

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

Unit–I　　　　　　　　　4½×2=9

1. (a) What is Coriolis force ? Discuss its effect on freely falling body.

(b) A person drops an apple while in an elevator which is accelerating upwards at 4 m/s². Find the acceleration of apple relative to elevator and the time taken by the apple to fall on the floor if it was dropped at a point 3 metres above the floor.

2. (a) What is a Gyroscope ? Give examples.

(b) Obtain Euler's equations for the motion of a rigid body in principal axes.

3. What was the need of introducing the ether concept ? Discuss Michelson Morley's experiment and conclusions drawn from it.

Unit–II   4½×2=9

4. (a) Derive an expression for relativistic law of addition of velocities in two inertial frames.

(b) The real length of the rod is 100 metres. If this rod length is measured by an observer moving parallel to its length is 51 metres, find the speed of the observer.

5. (a) Establish Einstein's mass energy equivalence relation.

(b) Prove that proper time is Lorentz invariant.

6. (a) Give postulates of special theory of relativity. What are its consequences ?

(b) What is a twin paradox ? How is it resolved ?

(c) What are simultaneous events ?

Unit–III   ½×8=4
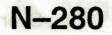
7. Attempt any *eight* parts, each part carries ½ mark.

(a) A cricle and square are moving along x-axis. How will they appear to a stationary observer ?

(b) With what velocity should a particle move so that relativistic rest mass is equal to 25% of its rest mass.

(c) Is Newton's second law of motion $\vec{F} = m\vec{a}$ always valid in special theory of relativity.

(d) What is Minkowski space ?

(e) No cyclone are set up at equator. Explain.

(f) What do you understand by centre of mass ?

(g) How many co-ordinates are required to specify the configuration of a rigid body ?

(h) When is the rigid body said to be undergoing pure translation ?

(i) How Galilean transformations are special case of Lorentz transformation ?

(j) What is Length contraction ?