Roll No. | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 07

B.Sc.(CS) (Sem.–1)

CLASSICAL MECHANICS

Subject Code : BCS-103

M.Code : 70880

Date of Examination : 14-01-2023

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and a student has to attempt any FOUR questions.**

SECTION-A

1. Answer briefly :

a) Calculate the area of a circle of radius 'a' by using plane polar coordinates.

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

c) Define the term solid angle. What are its units?

d) Distinguish between central and non-central forces.

e) Can a particle rotate without experiencing any torque? Explain.

f) Why is earth flattened at the poles?

g) Write the postulates of special theory of relativity.

h) What will be the direction of Coriolis force northern and southern hemispheres?

i) Why length contraction is not observed in daily life?

j) With what velocity a particle should move so that its mass appears to increase by 40% of its rest mass?

SECTION-B

2. What is spherical polar coordinate system? What are the limits of r, θ, ϕ)? Derive the relationship between spherical polar coordinates and three dimensional Cartesian coordinates.

3. State and prove Kepler's laws of planetary motion using the concept of reduced mass.

4. Describe Michelson-Morley experiment. What do you conclude from Michelson-Morley experiment? If ether does not exist, in what medium does light travel?

5. Describe the construction of Foucault's pendulum. Show that the rotation of the plane of oscillation of the Foucault's pendulum is a direct proof of the rotation of the earth about its own axis.

6. Starting from Lorentz's transformation equations for space and time coordinates; derive equations for relativistic addition of velocities.

7. Derive Einstein's mass energy relationship. Discuss the physical significance of this relation. Describe two phenomena supporting this relationship.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.