

Total No. of Questions: 07

B.Sc.(CS) (2013 & Onwards) (Sem.-1)
CLASSICAL MECHANICS
Subject Code: BCS-103

M.Code: 70880

Time: 3 Hrs. Max. Marks: 60

## **INSTRUCTIONS TO CANDIDATES:**

- 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) Determine the area of a circle of radius 'a' by using plane polar coordinates.
- (b) The cartesian coordinates of a point are (1,0,0). Find the spherical polar coordinates of this point.
- (c) Define and explain the term Solid Angle.
- (d) What are central and non-central forces?
- (e) Can a particle rotate without experiencing any torque? Explain.
- (f) Give one example each of inertial and non-inertial frames of reference.
- (g) Show that the distance between two points is invariant under Galelian transformation.
- (h) What will be the direction of Coriolis force in Northern and Southern Hemispheres?
- (i) State the postulates of special theory of relativity.
- (j) At what speed must a particle move for its mass to be four times its rest mass.

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## **SECTION-B**

- 2. What is spherical polar coordinate system? What are the limits of r,  $\theta$ ,  $\phi$ ? 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 either does not exist, in what medium does light travel?
- 5. Discuss the effect of Coriolis force due to rotation of the earth on the setting up of cyclones, trade winds and describe other geographical effects of this force. Cyclones do not occur at equator. Explain.
- 6. Discuss relativistic Doppler effect and derive relations for longitudinal and transverse Doppler effect. What is meant by the terms red shift and blue shift?
- 7. Establish mathematically Einstein's mass energy relationship. Explain physical significance of this relation. Mention two nuclear phenomena supporting this relation.

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.

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