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Total No. of Pages : 02

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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 :

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) What are three unit vectors in spherical polar coordinate system?

(b) The spherical polar coordinates of a point are (8, 30°, 45°). Find the Cartesian coordinates of this point.

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

(d) State the principle of conservation of angular momentum.

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

(f) Why is earth flattened at the poles?

(g) What are Galelian transformations?

(h) What are different types of fictitious forces in a uniformly rotating frame of reference?

(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 20% of its rest mass?

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SECTION-B

2. Starting from the expression for velocity $v = \dot{r}\hat{r} + r\dot{\theta}\hat{\theta} + r\sin\theta\dot{\varphi}\hat{\varphi}$ obtain an expression for acceleration in spherical polar coordinates.

3. Discuss various conservations laws in terms of symmetries of space and time.

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 the formula for relativistic variation of mass with velocity.

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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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