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| Seat<br>No. |  |
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**B.Sc. (Part - III) (Semester - V) (CBCS) Examination, January - 2023****PHYSICS****Classical Mechanics and Classical Electrodynamics (Paper-XI)****Sub. Code: 79679****Day and Date : Thursday, 5 - 01 - 2023****Total Marks : 40****Time : 2.30 p.m. to 4.30 p.m.**

- Instructions :**
- 1) All questions are compulsory.
  - 2) Figures to the right indicates full marks.
  - 3) Draw neat labeled diagrams wherever necessary.
  - 4) Use of scientific calculator is allowed.

**Q1) Select the correct alternative. [8]**

- a) If constraints are introduced into the system, number of degrees of freedom \_\_\_\_\_.
- |                   |                     |
|-------------------|---------------------|
| i) increases      | ii) decreases       |
| iii) remains same | iv) become infinite |
- b) The Principle of virtual work deals with \_\_\_\_\_ of the system.
- |                 |               |
|-----------------|---------------|
| i) statics      | ii) dynamics  |
| iii) kinematics | iv) mechanics |
- c) \_\_\_\_\_ principle is an integral principle.
- |                 |                  |
|-----------------|------------------|
| i) D'Alembert   | ii) Euler's      |
| iii) Hamilton's | iv) Heisenberg's |
- d) Brachistochrone problem is a shortest \_\_\_\_\_ problem.
- |               |          |
|---------------|----------|
| i) distance   | ii) time |
| iii) velocity | iv) path |
- e) All accelerated frames are \_\_\_\_\_ frames.
- |             |                  |
|-------------|------------------|
| i) inertial | ii) non-inertial |
| iii) rest   | iv) absolute     |

- f) The negative result of Michelson-Morley experiment was satisfactorily explained by \_\_\_\_\_ hypothesis.
- i) emission
  - ii) ether drag
  - iii) partial ether drag
  - iv) length contraction
- g) Force experienced by charge in electric and magnetic fields is essentially \_\_\_\_\_.
- i) Coulomb's force
  - ii) Yukawa force
  - iii) Newton's force
  - iv) Lorentz's force
- h) If a charged particle's velocity is parallel to the magnetic field then particle moves in a \_\_\_\_\_.
- i) straight line
  - ii) circular path
  - iii) cycloid path
  - iv) spiral path

**Q2) Attempt any TWO. [16]**

- a) Derive Lagrange's equations of motion from Hamilton's principle.
- b) Describe Michelson-Morley experiment. Obtain an expression for the fringe shift.
- c) Show that path followed by charged particle moving in uniform magnetic field is circle.

**Q3) Attempt any FOUR. [16]**

- a) Explain the term 'Degrees of freedom'.
- b) Obtain Newton's equation of motion from Lagrange's equations.
- c) Write a note on 'Atwoods machine'.
- d) State and explain Hamilton's principle.
- e) Show that shortest distance between any two points in a plane is a straight line.
- f) Derive integral form of Gauss law in electrostatics.

