

Roll No.

91027

**B. Sc. (Hons.) Physics 1st Semester
Examination – December, 2015**

MECHANICS - I

Paper : Phy - 102

Time : Three Hours]

[Maximum Marks : 40

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting at least two from each Unit. All questions carry equal marks.

UNIT - I

1. (a) Discuss the motion of a charged particle in a uniform and constant magnetic field. Prove that when an electric charge moves in a magnetic field, no work is done. 3, 3
- (b) What is the shape of the trajectory of an positively charged particle which is projected along a

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- (b) Define torque τ acting on a particle about an axis and its angular momentum L . Show that time rate of change of angular momentum of a particle is equal to the torque acting on it. 6
6. (a) Define moment of inertia of a body about an axis of rotation. 2
- (b) Evaluate the moment of inertia of a uniform circular disc about (i) its own axis (ii) the line tangent to its surface parallel to its axis. 3,3
7. (a) Why do you call periodic motion a harmonic motion? 2
- (b) Define a compound pendulum. 2
- (c) Explain energy equation and energy diagram. 2,2
8. (a) Prove that all the periodic motions are not simple harmonic even if the amplitude is small. 3
- (b) What are forced harmonic oscillator? 2
- (c) Define the term (i) amplitude (ii) frequency and (iii) angular frequency in case of the oscillations of a harmonic oscillator. 3

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uniform electric field and a parallel magnetic field. 2

2. (a) Write work energy theorem. 2

(b) A particle is under the influence of a central force F . Show that this force F is the negative gradient of potential energy U . 4

(c) The rate of change of potential energy is a measure of conservative force – is it true or false. 2

3. (a) If the centre of mass of three particles of masses 10, 20 and 30 gm be at point (1, -2, 3), then where should a fourth particle of 40 gm mass be placed so that the combined centre of mass be (1, 1, 1)? 4

(b) Show that the total linear momentum of a system of particles about the centre of mass is zero. 4

4. (a) Explain the motion of ROCKET in gravitational field. 4

(b) What do you understand by the impulse of a force? Show that the change in the momentum of a body acted on by a force is equal to the impulse. 2,2

UNIT - II

5. (a) Write Newton's second law in angular form. 2

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