

**FACULTY OF SCIENCE**  
**B.Sc. I-Semester (CBCS) Examination, December 2016**

**Subject : Physics**

**Paper – I : Mechanics**

**Time : 3 Hours**

**Max. Marks: 80**

**PART – A (5 x 4 = 20 Marks)**  
**(Short Answer Type)**

**Note : Answer any FIVE of the following questions.**

- 1 Define gradient of a scalar field. Obtain an expression for it.
- 2 Prove that  $\vec{F} = a(x\hat{i} + y\hat{j})$  is a conservative force.
- 3 Define Torque. Prove that the rate of change of angular momentum is equal to Torque.
- 4 State Newton's Laws of motions and give their applications.
- 5 What are the characteristics of central forces?
- 6 Explain the coriolis force.
- 7 What are inertial and non-inertial frames. Give examples.
- 8 What is velocity of the particle if its KE is equal to rest energy?

**PART – B (4 x 15 = 60 Marks)**  
**(Essay Answer Type)**

**Note: Attempt ALL the questions.**

- 9 (a) State and prove stokes theorem. **OR**  
 (b) State and prove Green's theorem.
- 10 (a) Derive the equations of motion of system of variable mass. **OR**  
 (b) Obtain an expression for angular momentum of a rigid body rotating about a fixed axis. A wheel is rotating with 500 revolutions per minute about an axis. Another similar wheel which is at rest is added to the axis of first wheel and if the both wheels rotate with uniform velocity find their uniform velocity.
- 11 (a) Obtain the equation of motion of a particle moving under the influence of central force. Find the central force due to potential energy function  $U = -Kr^2$ . **OR**  
 (b) State and obtain Kepler's laws of planetary motion.
- 12 (a) Describe Michelson Morley experiment. What is its significance? **OR**  
 (b) Explain the Lorentz transformations.

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