Roll No. .....

91527

B. Sc. 2nd Semester Physics (Hons.)

(New Scheme)

Examination – May, 2016

MECHANICS - II

Paper : Phy-202

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.

UNIT – I

1. What are Central and non-central forces ? When a particle moves under a central force, prove that the angular momentum of a particle is conserved. 8

2. (a) How Newton's law of gravitation can be derived from Kepler's law of planetery motion ? 5

(b) Taking moon's period of revolution about the earth as 30 days (neglecting the effect of Sun and other planets on its motion). Calculate its distance r from the earth. $G = 6.67 \times 10^{-11} Nm^2/kg^2$ $M_e = 6 \times 10^{24}$ kg. 3

3. (a) Derive expression for gravitational potential at a point inside and outside of a thin spherical shell. 6

(b) Why nuclear forces are non-central forces ? 2

4. (a) What do you mean by energy equation and draw & explain energy diagram for one dimensional system. 6

(b) Calculate the period of an artificial Satellite of the earth in circular orbit at a height of 300 km above the surface of the earth. Radius of earth = 6371 km Mass of earth = 6×10^{24}kg. 2

$G = 6.67 \times 10^{-11} Nm^2/kg^2$

UNIT – II

5. (a) What are Galilean transformations ? Derive Galilean transformation equations for two inertial frames. State and prove Galilean invariance. 5

(b) If 1000 kg of water is heated from 0°C to 100°C, calculate the increase in mass of water. 3

6. (a) Discuss the effect of centrifugal force on a particle at rest and in motion respectively, relative to rotating frame of reference. 5

(b) A pendulum is oscillating along N-S direction at a place in latitude 30°N. How long will it take to start oscillating along NE-SW direction ? 3

7. What was the objective of conducting the Michelson-Morley experiment ? Describe the experiment. How is the negative result of the exp. interpreted ? 8

8. (a) State Doppler's effect. Derive expressions for longitudinal and transverse Doppler effect. 6

(b) The mass of a moving electron is 11 times of its rest mass. Find its Kinetic energy and momentum. 2