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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.

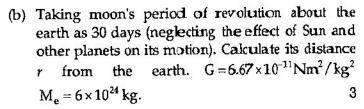
Note: Attempt five questions in all, selecting at least two from each Unit.

UNIT-

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

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

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

UNIT - I

- 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.
- 6. (a) Discuss the effect of centrifugal force on a particle at rest and in motion respectively, relative to rotating frame of reference.
 - (b) A pendulum is oscillating along N-5 direction at a place in latitude 30°N. How long will it take to start oscillating along NE-SW direction?
- 91527- -(P-3)(Q-8)(16) (2)

- 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.

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