

Roll No.

21272

**B. Sc. (Physics) (Hons.) 2nd Semester
Examination – May, 2019**

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 : (i) Each Unit have **four** questions, student have to attempt at least **two** questions from each Unit. A student has to attempt five questions in all.

(ii) Use of scientific (Non-programmable) calculator is allowed.

UNIT – I

1. Derive expressions for gravitational potential at a point inside and outside a thin uniform spherical shell. **8**

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2. (a) State the Newton's Law of gravitation and hence define the gravitational constant G. **5**
- (b) Explain the term gravitational self energy. **3**
3. (a) State and deduce an expression for Kepler's first law. **5**
- (b) The eccentricity of earth's orbit is 0.0167. Calculate the ratio of maximum and minimum speeds of the earth in its orbit. **3**
4. How will you reduce two body problem into one body problem ? And hence explain the concept of reduced mass. Give its two examples. **8**

UNIT – II

5. (a) What are Galilean transformations ? Show that under Galilean transformation velocity is variant and acceleration is invariant. **5**
- (b) Define the following terms : **3**
- (i) Centrifugal force
- (ii) Coriolis force

(2)

6. Describe Michelson and Morley experiment. What important conclusions are drawn from it?

7. State the basic postulates of special theory of relativity and hence obtain the Lorentz transformation.

8. (a) Discuss :

(i) Length contraction

(ii) Time dilation, on the basis of Lorentz transformation

(b) Calculate the apparent length of a meter rod if it is carried in a rocket at a speed of 2.4×10^8 m/s.

Take $C = 3 \times 10^8$ m/s.