

Roll No.

91527

B. Sc. (Hons.) Physics 2nd Sem. Latest Examination – April, 2018

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* questions from each Unit. All questions carry equal marks.

UNIT – I

1. (a) State law of universal gravitation and describe :
method of determining the Gravitationa
Constant.

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(b) Calculate mass of earth using following **data**

Radius of earth = 6×10^8 cm.

Acceleration due to gravity = 980cm/sec^2

Gravitational Const. = $6.6 \times 10^{-8} \text{cm}^2 \text{gm}^{-1} \text{sec}^2$

2. Derive an expression for gravitational potential and field due to solid sphere : 4, 4

(a) Point P outside the sphere

(b) Point P inside the sphere

3. (a) Define central force. Give two examples of central force and also discuss the general features of the motion of particle under central force : 4

(i) Conservation of energy.

(ii) Conservation of momentum.

(b) A particle describe a circular orbit under the influence of an attractive force directed towards a point on the circle. Show that the force varies as the inverse of fifth power of the distance. 4

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4. What are Kepler's law of planetary motion ? What is inverse square law force ? Derive Kepler's laws with its help. 4

UNIT - II

5. (a) What are fictitious forces ? Illustrate with examples. Find out the fictitious acceleration of the sun in a frame fixed with earth and rotating about its axis.
- (b) A rocket is moving upward with acceleration $3g$. Calculate the effective weight of a man sitting in it if his actual weight is 75 Kg. 6, 2

6. Explain inertial frame of reference. Frame of reference R rotates about its origin fixed in an inertial frame of reference I find out velocities and accelerations in the two reference frames are related to each other. What are Pseudo forces ? Explain. 8

7. Derive an expression for the Lorentz space-time transformations and also discuss the consequences of Lorentz Transformation.

- (i) Length Contraction
- (ii) Simultaneity 4, 4

8. (a) Obtain an expression for relativistic Doppler's effect.
- (b) What is relativistic energy ? Obtain the relativistic energy and momentum transformation equations. 4, 4
