



RAN-1047

T. Y. B.Sc. Sem-V Examination

March / April - 2019

Mathematics (E.G.)

Mechanics - I

Time: 2 Hours]

[Total Marks: 50

सूचना : / Instructions

नीचे दशविले निशानीवाणी विगतो उत्तरवही पर अवश्य लभवी.
Fill up strictly the details of signs on your answer book

Name of the Examination:

T.Y. B.Sc. Sem-V

Name of the Subject :

Mathematics (E.G.)

Subject Code No.: **1 0 4 7**

Seat No.:

<input type="text"/>					
----------------------	----------------------	----------------------	----------------------	----------------------	----------------------

Student's Signature

1. First question is compulsory.
2. Figures to the right indicate marks of corresponding question.
3. Follow usual notations.
4. Use of non-programmable scientific calculator is allowed.

Que1. Answer any Three of the following

(05)

- a) Explain: Axis of symmetry.
- b) State : Lamy's theorem.
- c) Explain : Cone of friction.
- d) What happens when the force acting on a particle is perpendicular to its velocity?
- e) State the condition for the field of force (X, Y) to be conservative.
- f) State Newton's law of gravitation.
- g) Explain the forces which do not work.
- h) State the Principle of Decomposition.

Que2. Answer any Three of the following (15)

- a) Obtain the necessary condition for the equilibrium of system of particles.
- b) Define : Couple and obtain moment of a couple.
- c) State and prove the principle of Virtual work.
- d) A light rigid rod of length 10, terminated by heavy particles of weights w and W is placed inside a smooth hemispherical bowl of radius 6, which is fixed with its rim horizontal. If the particle of weight W rests below the rim of the bowl, then obtain the relation between w and W .

Que 3 : Answer any THREE of the following: (15)

- (a) Define Mass centre. Prove that mass centre of the system always exists.
- (b) Define Potential energy. Also prove that in conservative system, the increment in potential energy equals the work done with sign changed.
- (c) A light lever in the form a letter L with arms a and b is pivoted at the angle, so that it can turn freely in a vertical plane. Weights w and W are suspended from the ends. Show that there are just two positions of equilibrium.
- (d) A framework ABCD consists of four equal rods smoothly joined together to form a square. It is suspended at a peg at A and a weight W is attached at C. Framework being kept in shape by a light rod connecting B and D. Determine the thrust in this rod.

Que 4 : Answer any THREE of the following: (15)

- (a) Show that the force of attraction is the gradient of the potential energy with sign reversed.
- (b) In usual notations, obtain the equation of common catenary in the form $y = \frac{H}{W}(\cosh \frac{wx}{H} - 1)$
- (c) Explain the following terms:
 - (i) Limiting friction, (ii) Laws of kinetic of friction.
- (d) A rod of length $2a$ rests on a rough floor against a smooth edge of a table of length 3 ft. If the rod is on the point of slipping when inclined at an angle of 60° to the horizontal, find the coefficient of friction.