

UNIT – IV

8. Derive a relation for the velocity and direction of motion of a projectile : (a) after a given interval of time  $t$  from the instant of projection. (b) at a given height  $h$  above the point of projection. 15
9. A beam  $AB$  6 m long rests on two supports 4 m apart, the right hand end is overhanging by 2 m. The beam carries a uniformly distributed load of 10 kN/m over the entire length of the beam. Draw shear force and bending moment diagrams. 15

Roll No. ....

3073

B. Tech. (ME) 3rd Semester  
Examination – February, 2022

ENGINEERING MECHANICS

Paper : ESC-ME-209-G

Time : Three Hours ]

[ Maximum Marks : 75

*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 *one* from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Answer the following questions :  $2.5 \times 6 = 15$
- (a) State clearly the law of moments.
  - (b) State triangle law of forces and polygon law of forces.
  - (c) State and prove Lami's Theorem.

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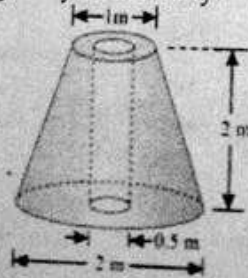
- (d) Define the terms : velocity of projection and angle of projection.
- (e) Perpendicular axis theorem.
- (f) Perfect truss.

### UNIT - I

2. How would you find out the equilibrium of non-coplaner forces ? Explain the conditions of equilibrium. Discuss the various types of equilibrium. 15
3. Two equal heavy spheres of 50 mm radius are in equilibrium within a smooth cup of 150 mm radius. Show that the reaction between the cup of one sphere is double than that between the two spheres. 15

### UNIT - II

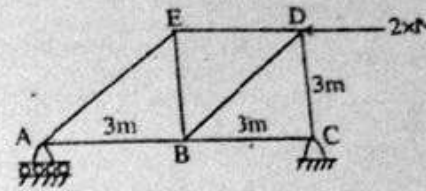
4. A frustum of a solid right circular cone has an axial hole of 50 cm diameter as shown in Figure. Determine the centre of gravity of the body. 15



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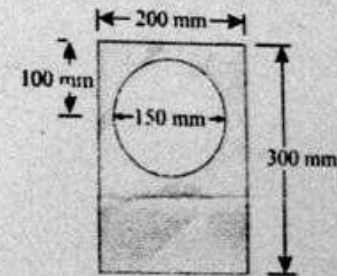
(2)

5. Calculate the force in each member of loaded truss. 15



### UNIT - III

6. Find the moment of inertia of a hollow section shown in Figure about an axis passing through its centre of gravity or parallel X-X axis. 15



7. Explain the concept of rigid body. Derive the equations of motion for translation and rotation for a rigid body. 15

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(3)

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