BHARATI VIDYAPEETH INSTITUTE OF TECHNOLOGY

Question Bank (K-Scheme)

Name of subject: Engineering Mechanics **Unit Test: II**

Subject code: 312312 **Course: ME/CE**

Semester-II

CHAPTER 3 (Equilibrium of Forces)

Questions for 2 marks

1. State two limitations of Lami's theorem.
2. Define free body diagram.
3. State analytical conditions of equilibrium of coplanar concurrent system.
4. Differentiate between equilibrant and resultant force.
5. State Lami's theorem.
6. Write analytical conditions of equilibrium for concurrent force system.
7. State any two types of beam along with sketch.

Questions for 4 marks

1. A weight of 1.25 kN is attached by two ropes as shown in Figure No. 2. Calculate the tension in the ropes.

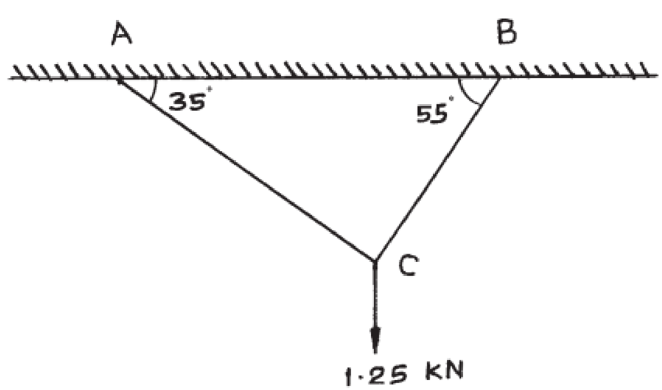
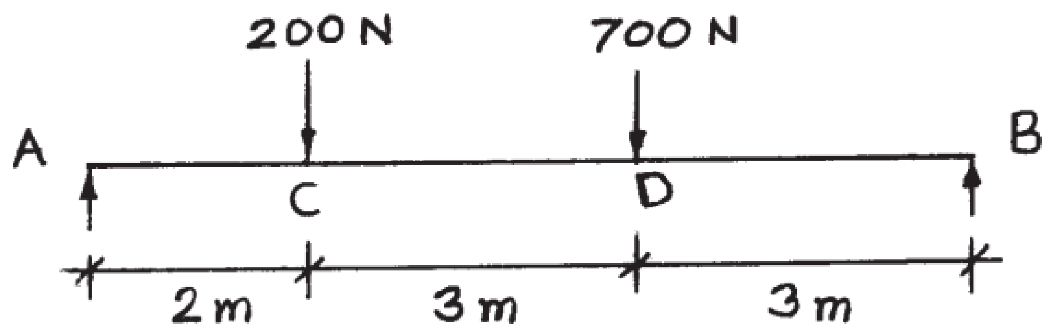
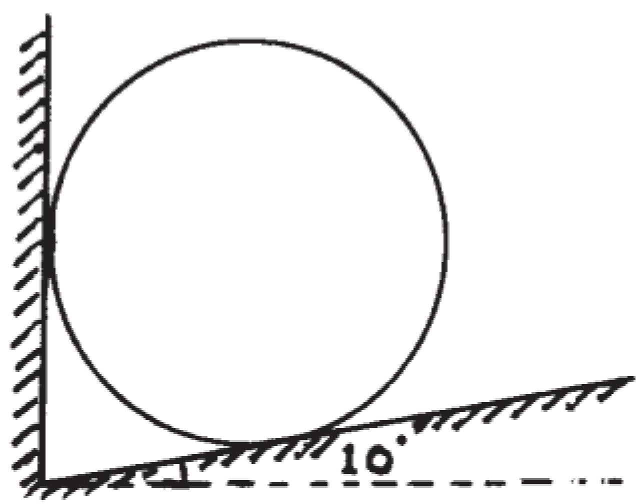


Fig. No. 2

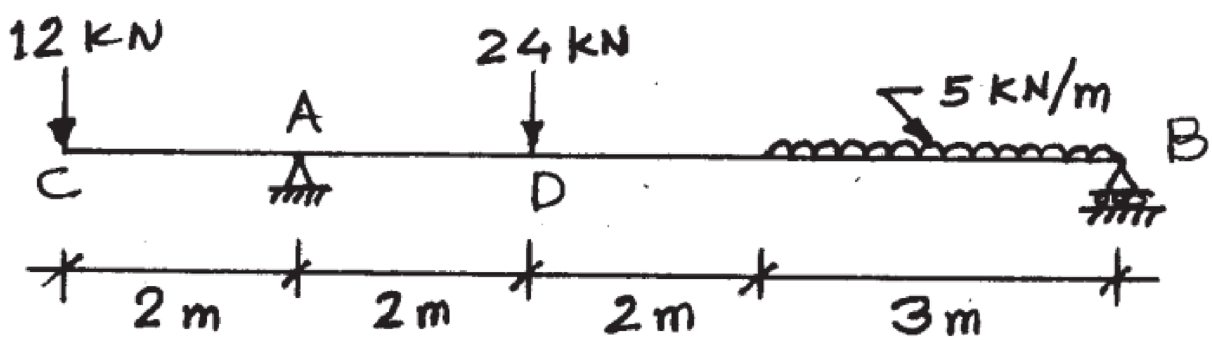
2. A beam is loaded as shown in Figure. Calculate its support reactions.



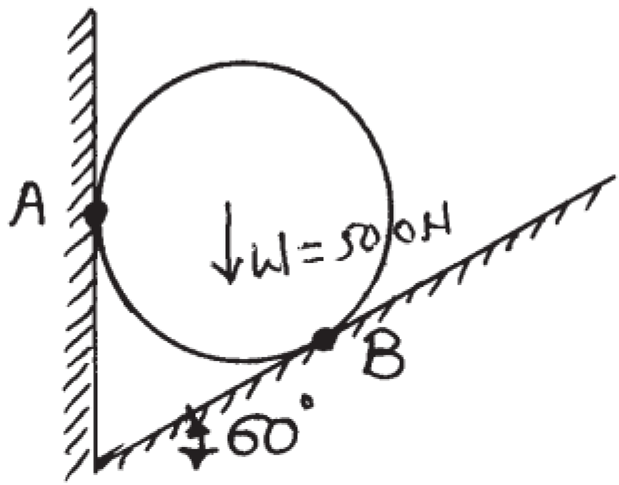
3. A sphere having diameter 350 mm and 750 kN as weight is placed as shown in Figure. Calculate the reaction at point of contacts.



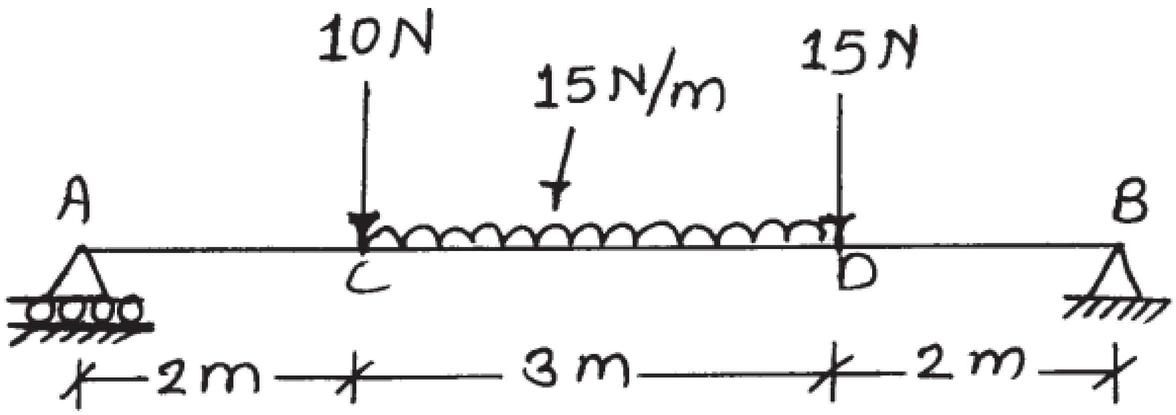
4. Calculate the support reactions of beam loaded as shown in Figure.



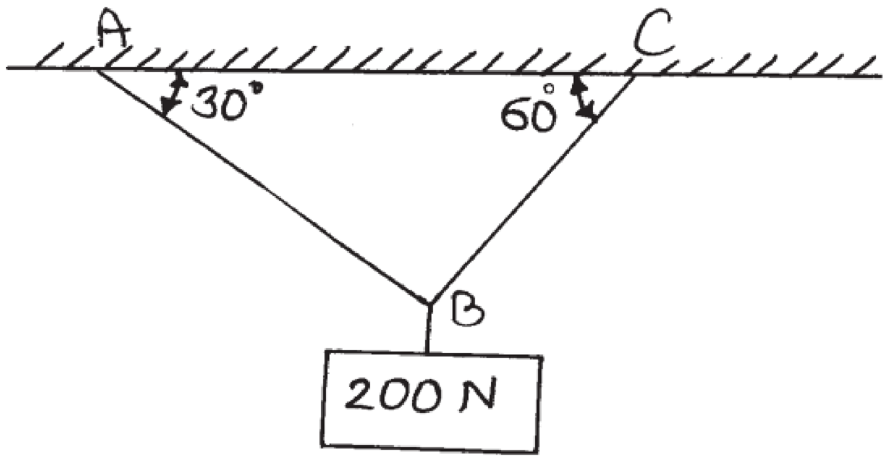
5. Calculate the reactions offered by planes. Refer Fig. No. 3. A sphere weighs 500N is supported by two planes, One plane is vertical and other is inclined at 60° to the horizontal.



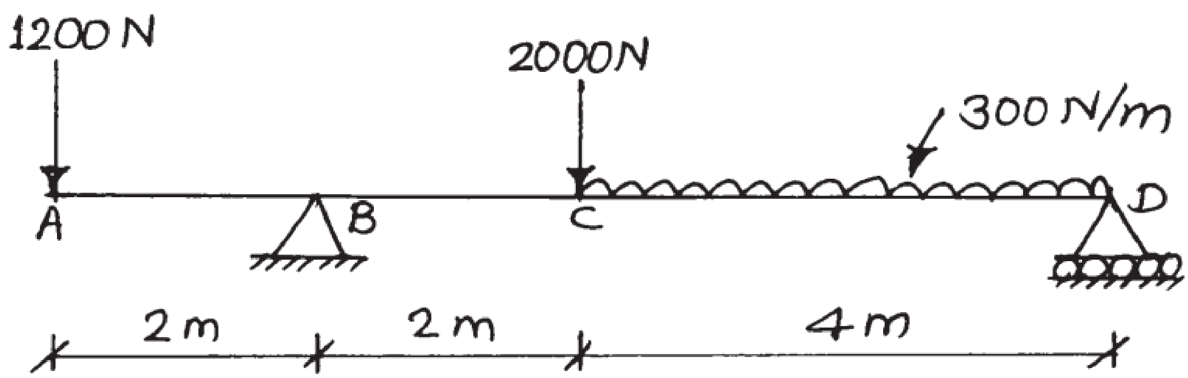
6. Calculate the support reactions of beam loaded as shown in Figure



7. Calculate tension in the strings AB and BC if a weight of 200 N is attached by two strings as shown in Fig.

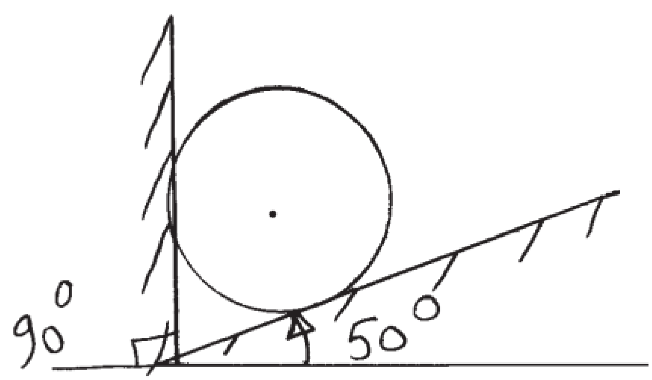


8. Calculate the reactions using analytical method for a beam shown in Fig.

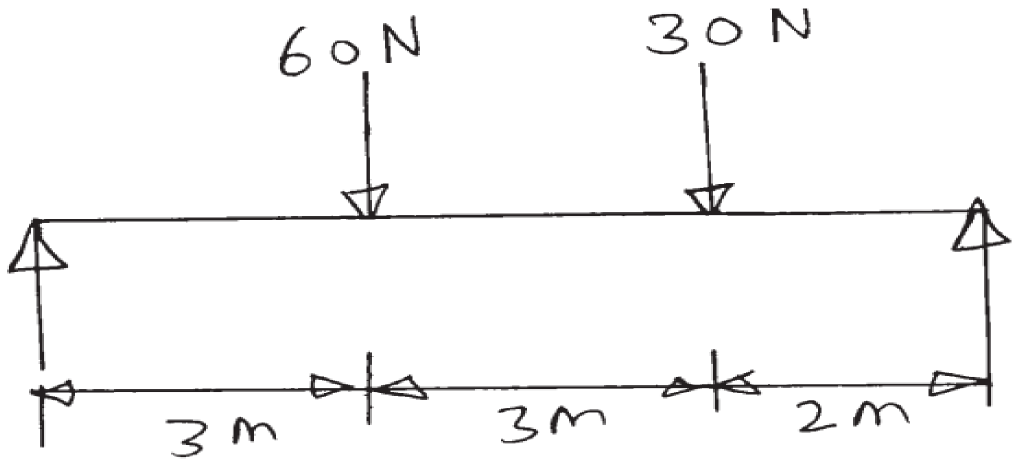


9. State and explain Lami's theorem with sketch.

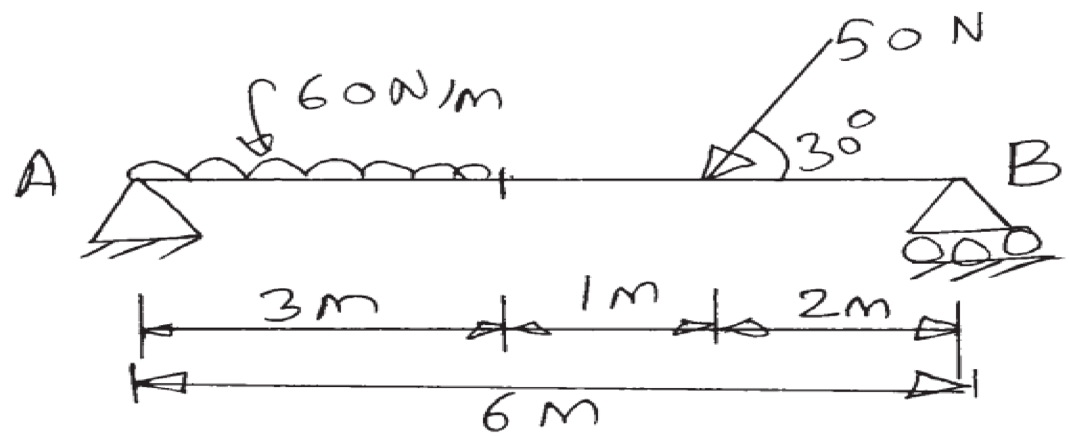
10. Calculate reactions offered by surface as shown in Figure No. 2, if a cylinder weighing 1000N is resting on inclined surfaces at 90° and 50° with horizontal.



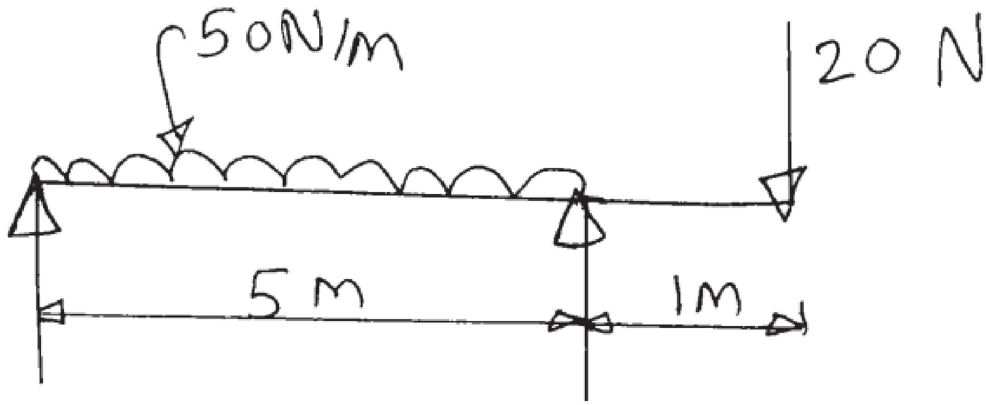
11. Calculate the reactions of a beam loaded as shown in Figure.



12. A simply supported beam of 6m span has subjected to loading as shown in Figure No. 4. Find support reactions by analytical method.



13. Calculate the reactions of beam loaded as shown in Figure No. 5 by analytical method.



CHAPTER 4 (Friction)

Questions for 2 marks

1. Define coefficient of friction and angle of repose.
2. Define coefficient of friction.
3. State the relation between Angle of friction, coefficient of friction and angle of repose.
4. State uses of friction.

Questions for 4 marks

1. State four laws of static friction.
2. A body weighing 250 N is resting on a rough horizontal plane and is just moved by a horizontal force of 100 N. Calculate coefficient of friction. Also calculate magnitude and direction of the resultant reaction.
3. A block is resting on a rough inclined plane whose inclination to the horizontal is 15°. The force of 11 N applied parallel to the plane on which block is resting will just move it down. If the coefficient of friction between the block and the plane is 0.40, estimate the weight of the block.
4. Draw FBD of ladder in friction.
5. Calculate coefficient of friction if a block weighing 600 N resting on a rough horizontal plane can be moved by a force of 150 N applied at an angle of 60° with the horizontal.
6. Calculate the force ‘P’ applied parallel to the plane, just to move the block up the plane, if the block weighing 500N is placed on an inclined plane at an angle of 20° with the horizontal. Coefficient of friction is 0.14
7. Write two advantages and two disadvantages of friction.
8. A block weighing 40kN resting on a rough horizontal plane can be moved by a force 20kN applied at angle 40° with horizontal. Find the coefficient of friction.
9. A block weighing 100N on a 30° inclined rough plane. If coefficient of friction is 0.25. Calculate force required to be applied parallel to plane to make the block slide downward.

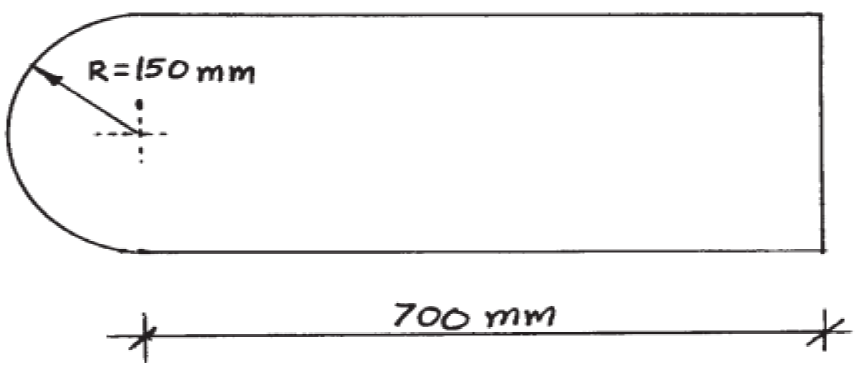
CHAPTER 5 (Centroid and Center of gravity)

Questions for 2 marks

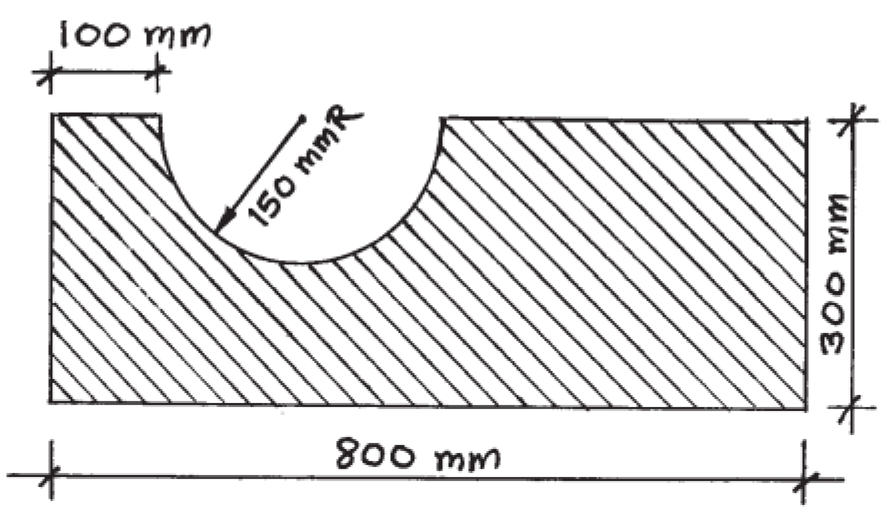
1. State the centroid of semi-circle and show it on the sketch.
2. Define centroid and centre of gravity.
3. Locate the centriod of a right angle triangle having base and height 100 mm.
4. Locate the centriod of semicircle having radius 50mm.

Questions for 4 marks

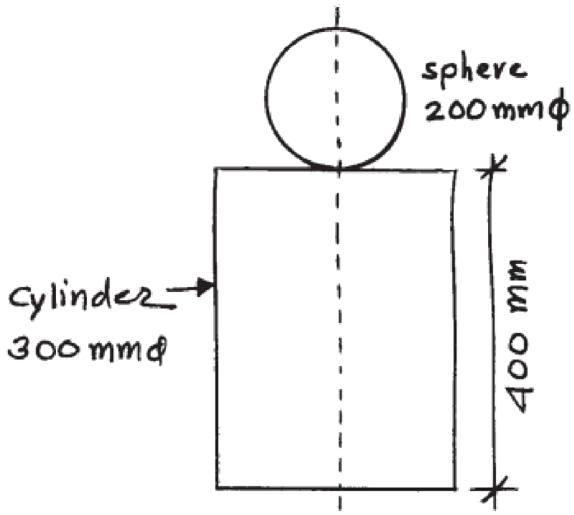
1. Locate the centroid of a lamina as shown in Figure.



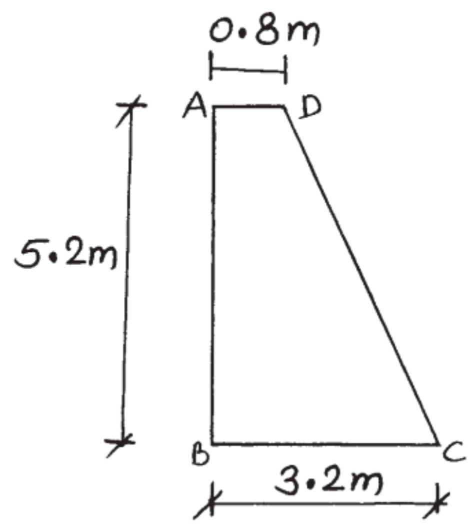
2. Locate the centroid of a shaded portion of a lamina as shown in Figure.



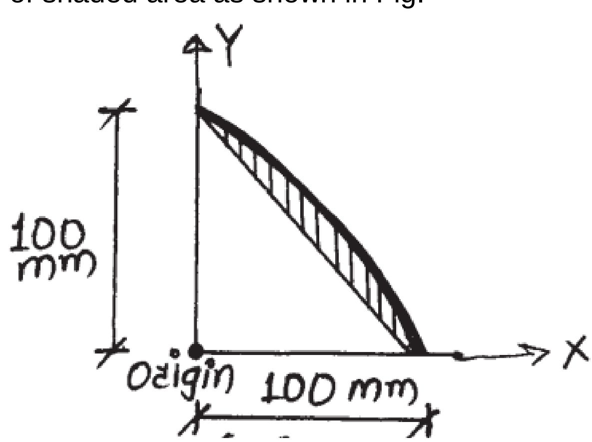
3. Locate the center of gravity for the solid as shown in Figure.



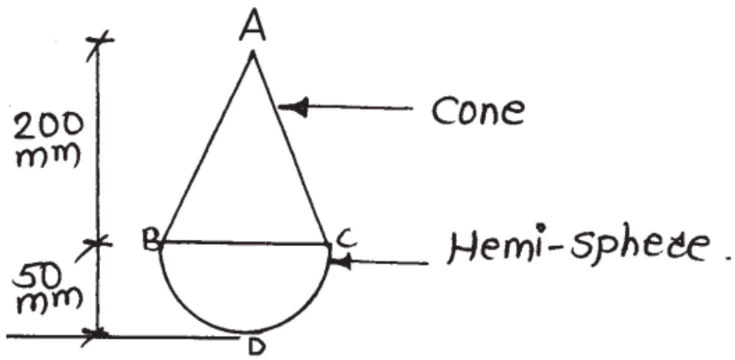
4. Calculate the position of centroid from bottom left corner ‘B’ for a retaining wall as shown in Fig.



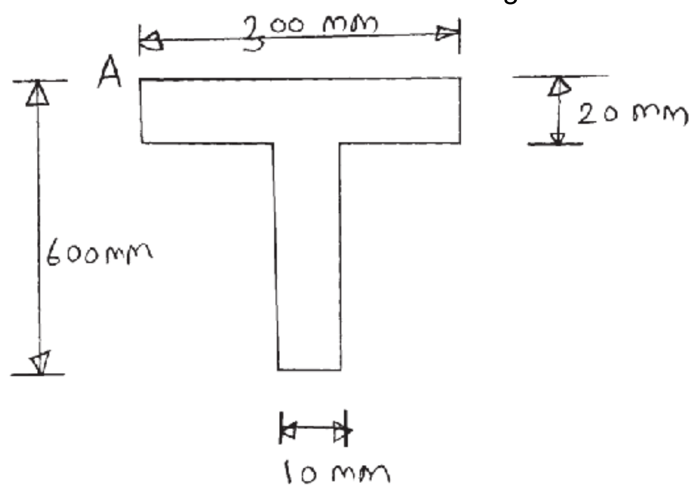
5. Locate the centroid of shaded area as shown in Fig.



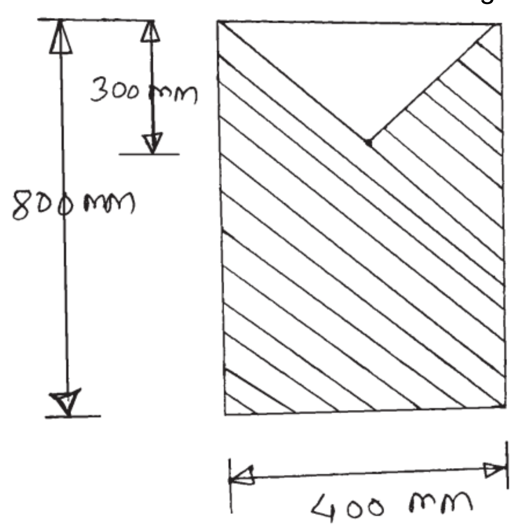
6. Locate centre of gravity of a composite solid body from tip ‘A’ of the cone as shown in Fig.



7. Calculate position of centroid for T section as shown in Figure No. 7 with respect to ‘A’.



8. Calculate position of centroid of shaded area as shown in Figure.



9. A solid cone of 500mm height and 200mm base diameter. The portion above half of its height is removed. Locate the point at which remaining body can be balanced.