

Code: ME1T6, AE1T6

**I B.Tech - I Semester – Regular Examinations - January 2015**

**ENGINEERING MECHANICS - I**  
**(Common for ME, AE)**

Duration: 3 hours

Max. Marks: 70

**PART – A**

Answer *all* the questions. All questions carry equal marks

11 x 2 = 22 M

1. a) Define principle of Transmissibility.
- b) What is a free body diagram? Give an example.
- c) What are the properties of a couple?
- d) Define angle of friction and angle of repose.
- e) What are the various classification of friction?
- f) Define polar moment of inertia with an example.
- g) State perpendicular axis theorem.
- h) Mention the assumptions in the analysis of trusses.
- i) State the principle of virtual work.
- j) State the Pappus-Guldinus theorem's.
- k) State the laws of dry friction.

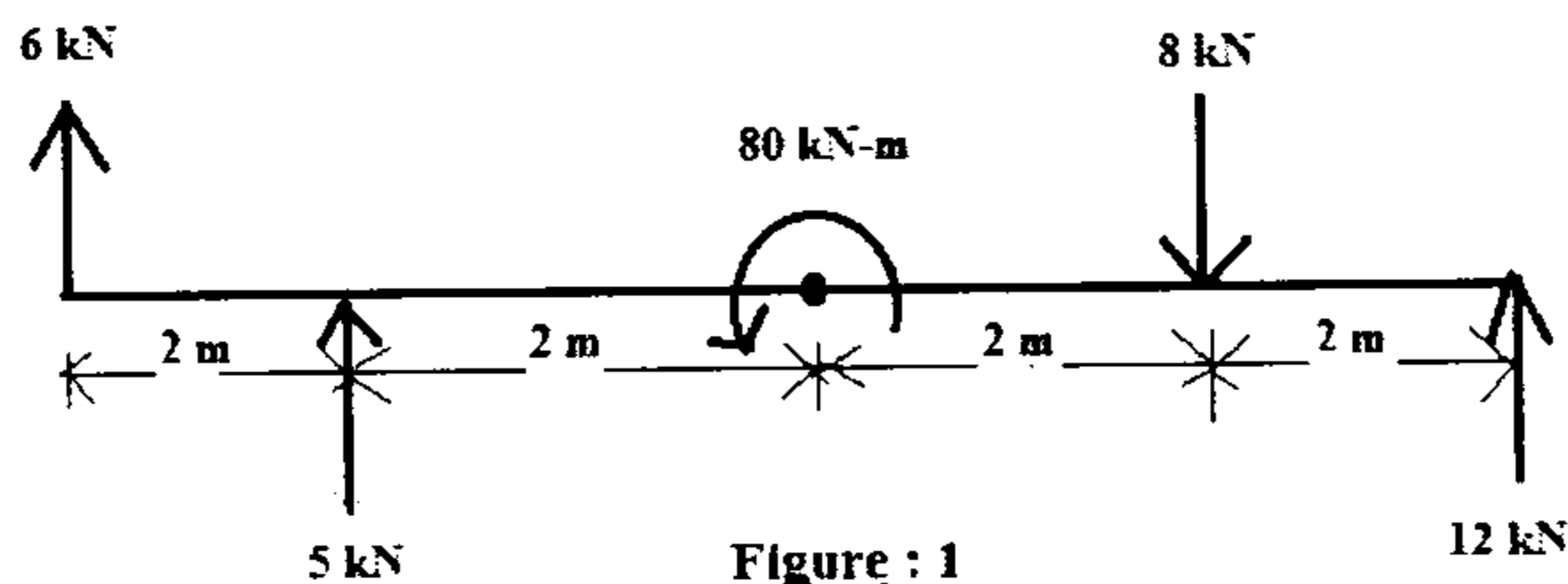
## PART – B

Answer any **THREE** questions. All questions carry equal marks. 3 x 16 = 48 M

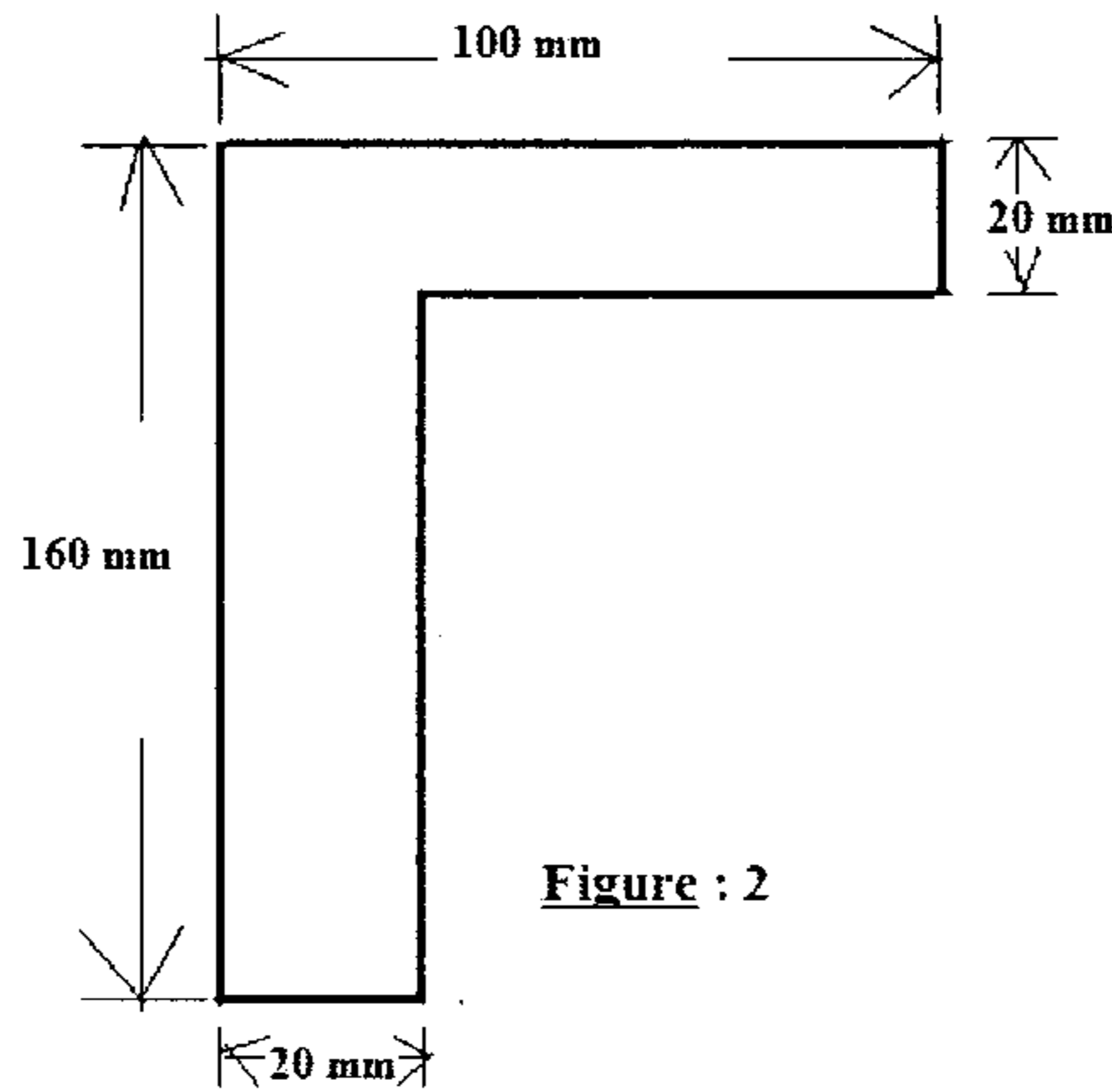
2. a) A particle is acted upon by the following forces:
- i) A pull of 8 kN due north-east,  $45^\circ$  with east.
  - ii) A pull of 10 kN due north
  - iii) A pull of 12 kN due east
  - iv) A pull of 4 kN in a direction inclined  $60^\circ$  south of west and
  - v) A pull of 6 kN in a direction inclined  $30^\circ$  east of south.

Find the magnitude and direction of the resultant force. 8 M

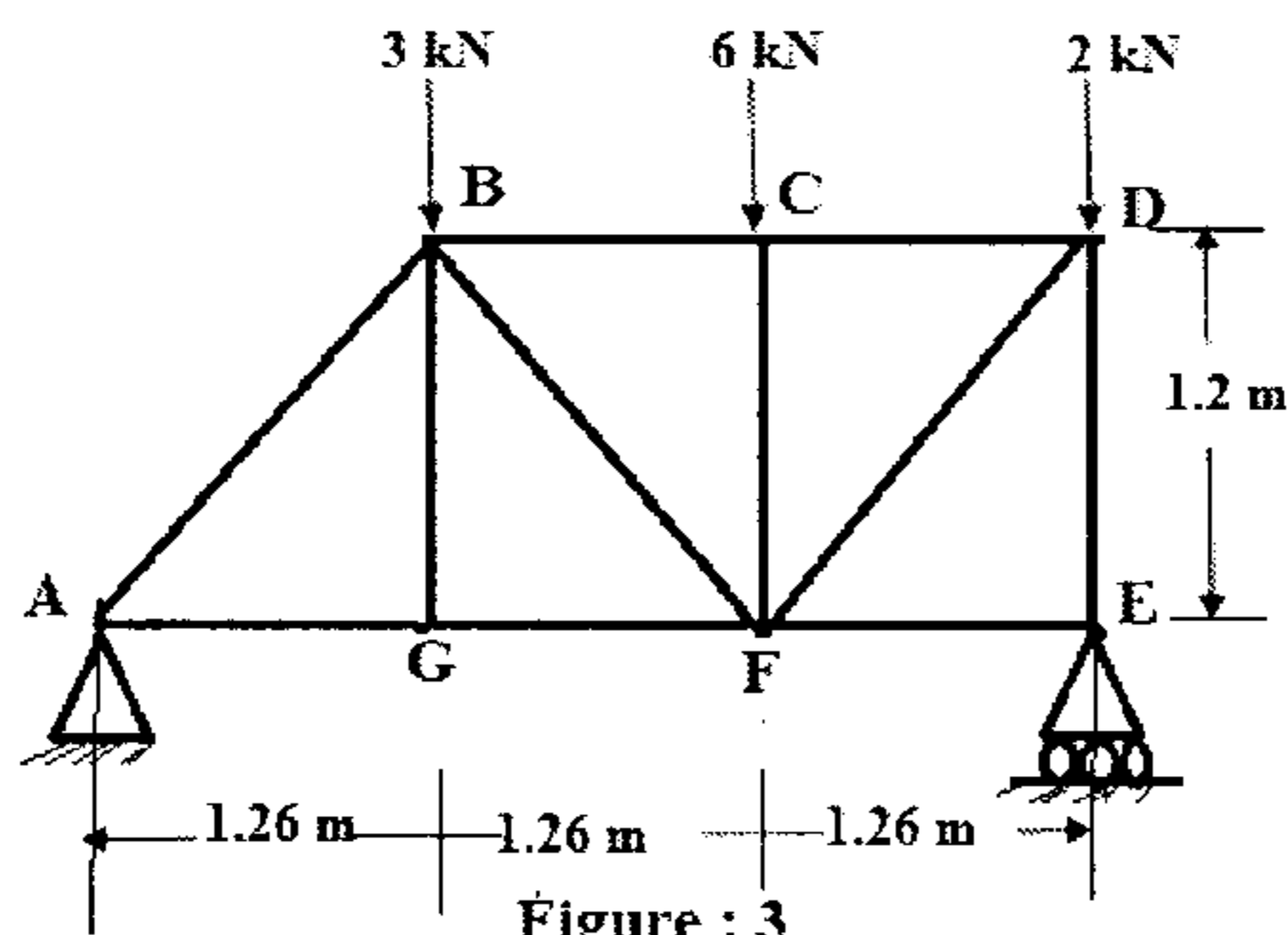
- b) Determine and locate the resultant of the forces and one moment acting on the beam as shown in Figure:1. 8 M



3. a) Find the position of centroid of an unequal angle section as shown in Figure:2. 8 M



- b) Find the moment of inertia of a triangle about its base. Also find the moment of inertia about an axis passing through the centre of gravity and parallel to the base. 8 M
4. Determine the forces induced in the members of the pin-jointed truss shown in Figure:3. Show the values on a neat diagram of the truss. Mention clearly the nature of the forces (tension or compression) in each member. 8 M



- 5) Two blocks A and B are resting against a wall and the floor as shown in Figure:4. Find the value of the horizontal force P applied to the lower block that will hold the system in equilibrium. Coefficients of friction are: 0.25 at the floor, 0.3 at the wall and 0.2 between the blocks.

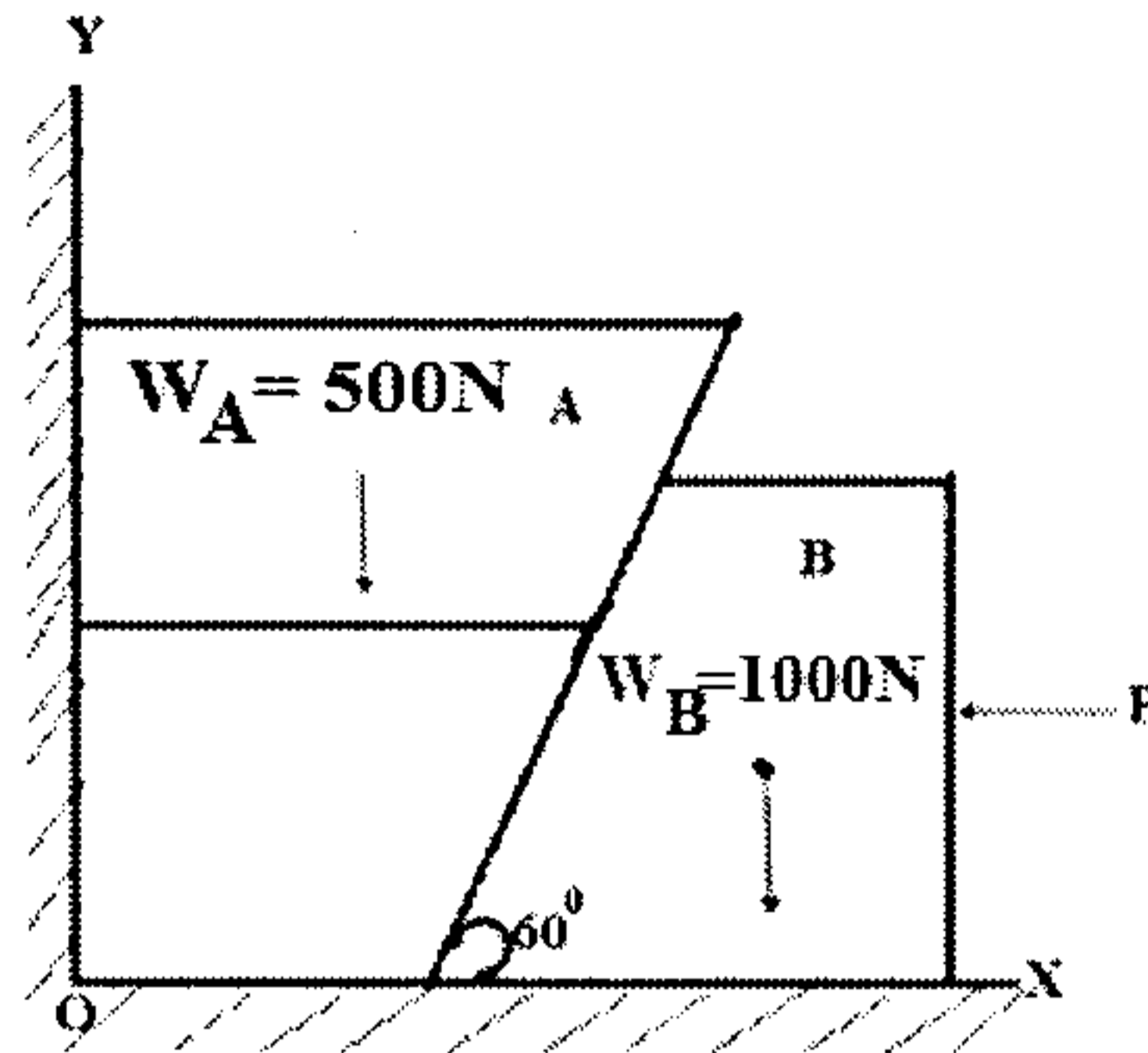


Figure : 4

6. A uniform ladder of 5 m long weighing 200 N rests on a smooth floor at A and against a smooth wall at B as shown in Figure:5. A horizontal rope PQ prevents the ladder from slipping. Using the method of virtual work, determine the tension in the rope.

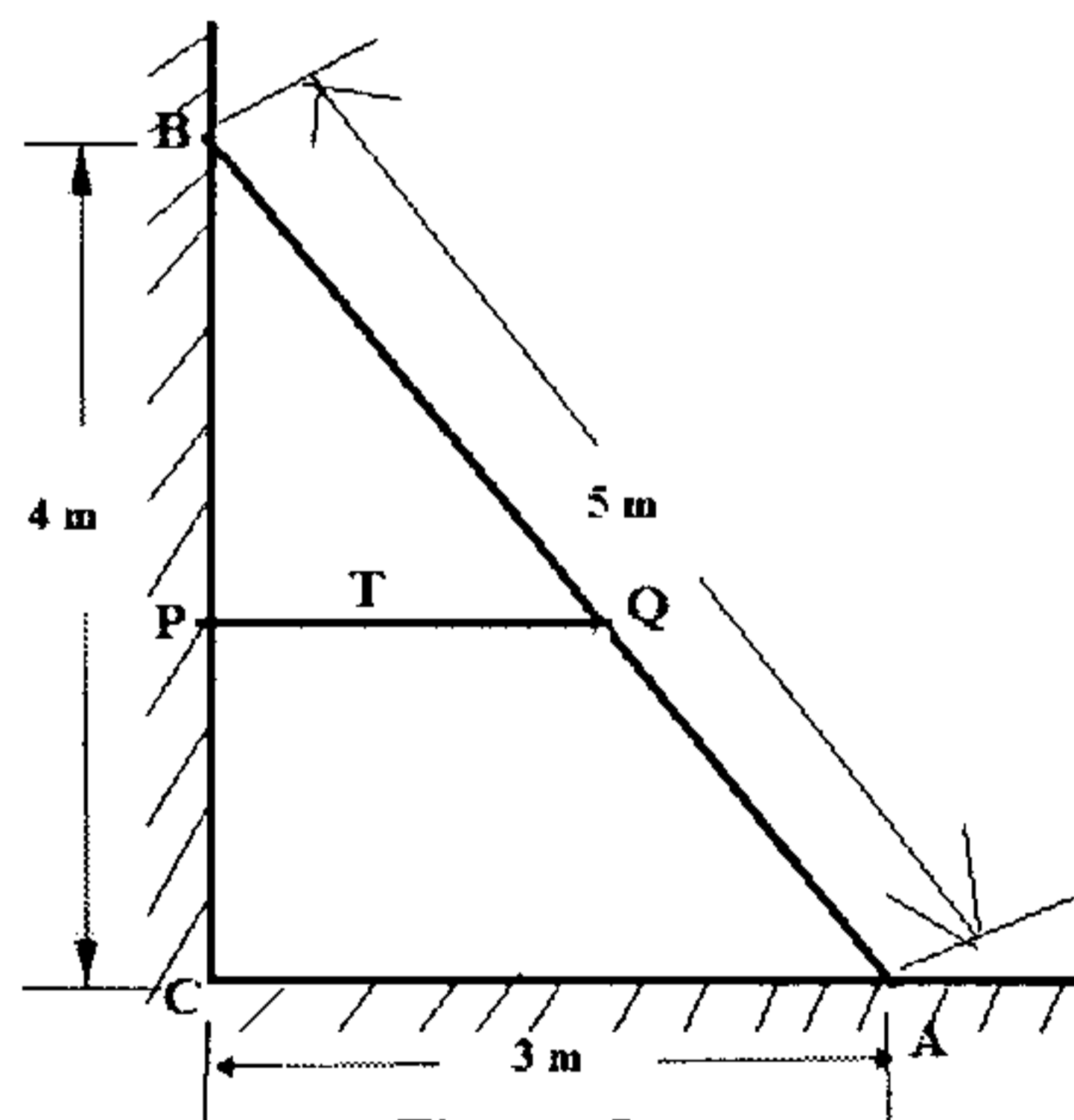


Figure : 5