

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech I Year I Semester Supplementary Examinations June-2024**  
**ENGINEERING MECHANICS**  
(Common to CE, ME & AGE)

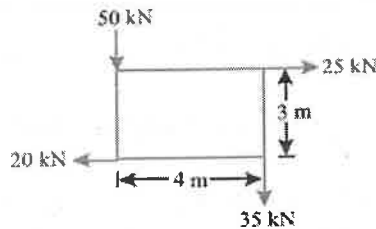
Time: 3 Hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

- 1 a A system of forces are acting at the corners of a rectangular block as shown in Figure. Determine the magnitude and direction of the resultant force. CO1 L4 6M



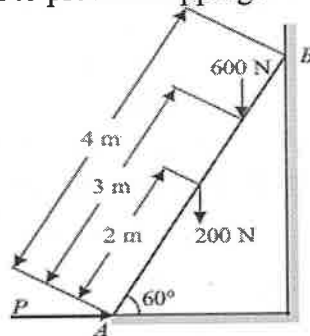
- b State and prove parallelogram law of forces. CO1 L1 6M

**OR**

- 2 a Explain free-body diagram with example. CO1 L2 4M  
b State and prove Lami's theorem. CO1 L1 8M

**UNIT-II**

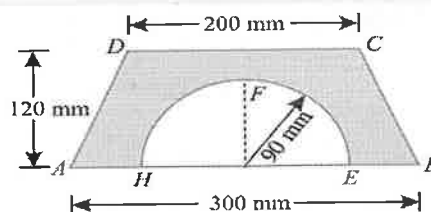
- 3 A ladder of length 4 m, weighing 200 N is placed against a vertical wall as shown in Figure. The coefficient of friction between the wall and the ladder is 0.2 and that between floor and the ladder is 0.3. The ladder, in addition to its own weight, has to support a man weighing 600 N at a distance of 3 m from A. Calculate the minimum horizontal force to be applied at A to prevent slipping. CO2 L4 12M

**OR**

- 4 a State laws of friction. CO2 L1 8M  
b Explain Cone of Friction with a neat sketch. CO2 L2 4M

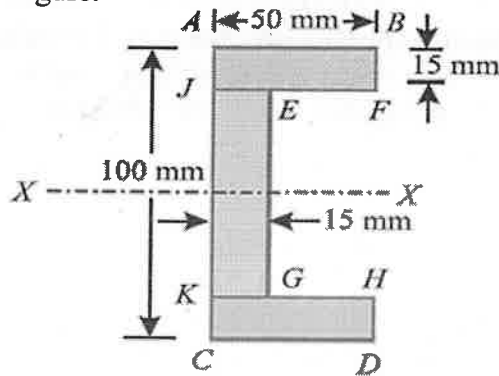
**UNIT-III**

- 5 A semicircle of 90 mm radius is cut out from a trapezium as shown in Figure. Find the position of the centre of gravity of the figure. CO3 L4 12M



OR

- 6 Find the centre of gravity of a channel section  $100 \text{ mm} \times 50 \text{ mm} \times 15 \text{ mm}$  as shown in Figure. CO3 L4 12M



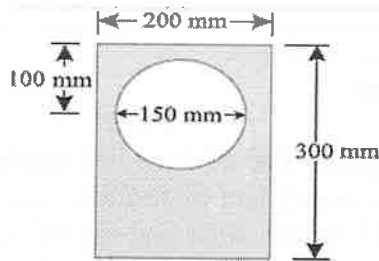
UNIT-IV

- 7 Derive an equation for moment of inertia of the following sections about centroidal axis: CO4 L3 12M

a) A rectangular section                      b) A triangular section from its base

OR

- 8 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. CO4 L1 12M

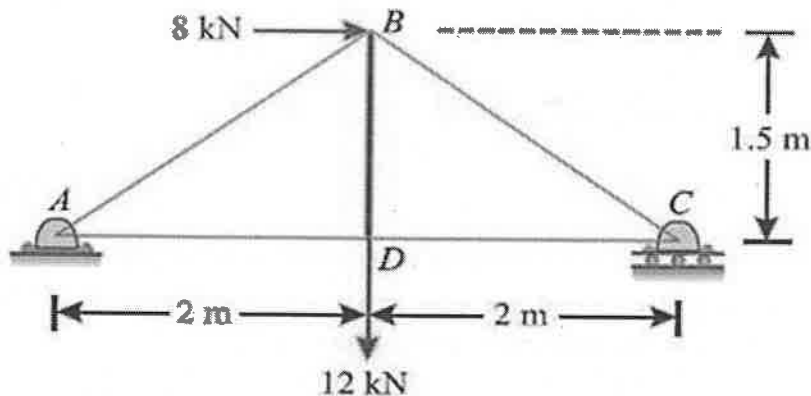


UNIT-V

- 9 Explain the procedure to find forces in members of truss by using method of joints. CO5 L5 12M

OR

- 10 Figure shows a framed structure of 4 m span and 1.5 m height subjected to two point loads at B and D. Find the forces in the members. CO5 L4 12M



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