Ex./ARCH/CE/T/113/2019

BACHELOR OF ARCHITECTURE EXAMINATION, 2019

(1st Year, 1st Semester)

Structural Mechanics - I

Time : Three hours Full Marks : 100

Use separate Answer-Scripts for each part.

PART - I (60 marks)
Answer ***all*** questions.

1. (a) Find the resultant of the following forces shown in the figure 1. Also find the inclination of R with horizontal axis. 10

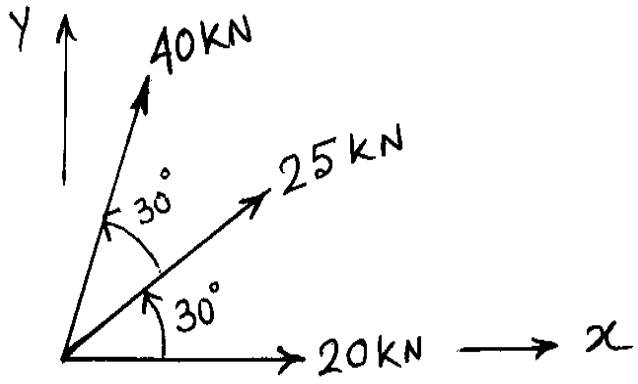


Figure - 1

(b) Calculate the magnitude of moment about the base point of the 600N force as shown in figure 2. 10

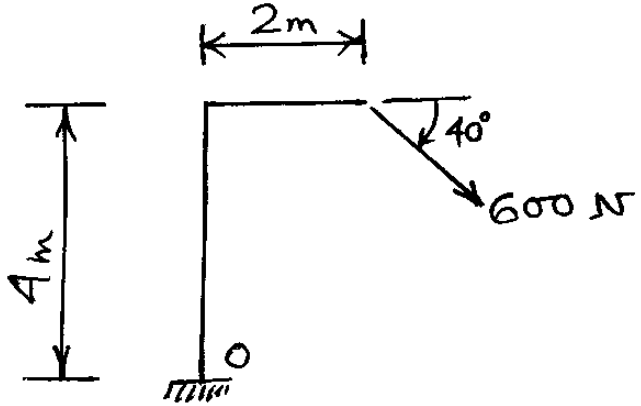


Figure - 2

2. Determine the support reaction of the following beam with the loading as shown in figure 3. 20

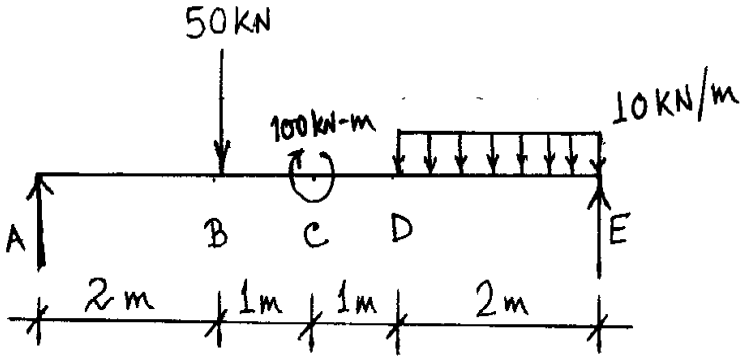
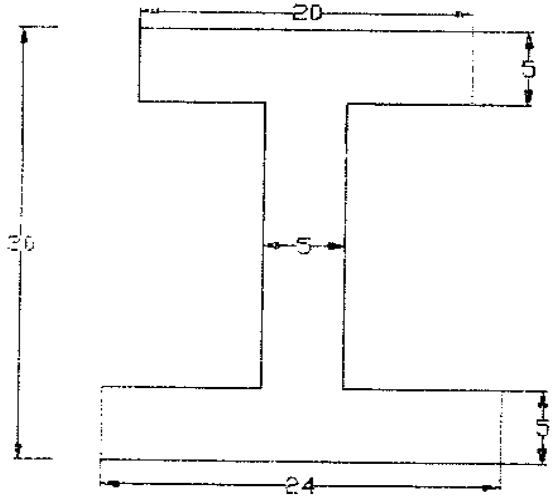


Figure - 3

8. Derive an expression for obtaining the centroid of a semicircle of radius 'r' from its base. 10

9. Find the moment of inertia of the figure shown below about its c.g. 10



All dimensions are in mm

10. What do you mean by section modulus ? Find an expression for section modulus for a hollow circular section. 10

—— X ——

3. Calculate the member forces of the truss with the loading as shown in figure 4. Use any method of analysis. 20

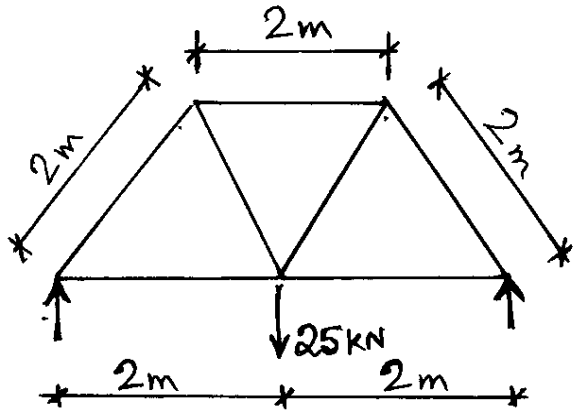


Figure - 4

PART - II (40 marks)

Answer any ***four*** questions.

Assume reasonable values of data, if not supplied.

4. Define the terms

   (i) moment of inertia, (ii) radius of gyration. State and prove "Theorem of parallel axis". 5+5

5. Find an expression for the moment of inertia of a rectangular section :

   (i) about an horizontal axis passing through the c.g of the rectangular section, and

   (ii) about an horizontal axis passing through the base of the rectangular section. 5+5

6. Define the terms

   (i) centre of gravity, (ii) centroid.

   Derive an expression for the centre of gravity of a plane area using method of moments. 5+5

7. A thin homogenous wire is bent into a triangular shape ABC such that AB = 240 mm, BC = 260 mm and AC = 100 mm. Locate the C.G. of the wire with respect to the coordinate axes. Angle at A is right angle. 10