

Programme:	BSc Civil Engineering		
Module:	Engineering Mathematics and Structure		
Module code:	ACBA 4007	Contribution to Overall Module Assessment (%):	50%
Lecturer:	Dr Jamiu A. Dauda	Internal Verifier:	Dr Deborah Hughes
Assessment Title:	Examination	Word count (or equivalent):	N/A
Date:	2 nd March 2022	Time:	12:00 pm – 2:00 pm (2 Hours)
Instructions to Candidates	Answer all questions in SECTION A and two questions from SECTION B		

SECTION A

Answer all questions from section A

Question 1 (40 Marks)

Referring to the quadrilateral shown in Figure 1

- a) Find all the unknown sides and the angles
- b) Find the area of triangle ABC

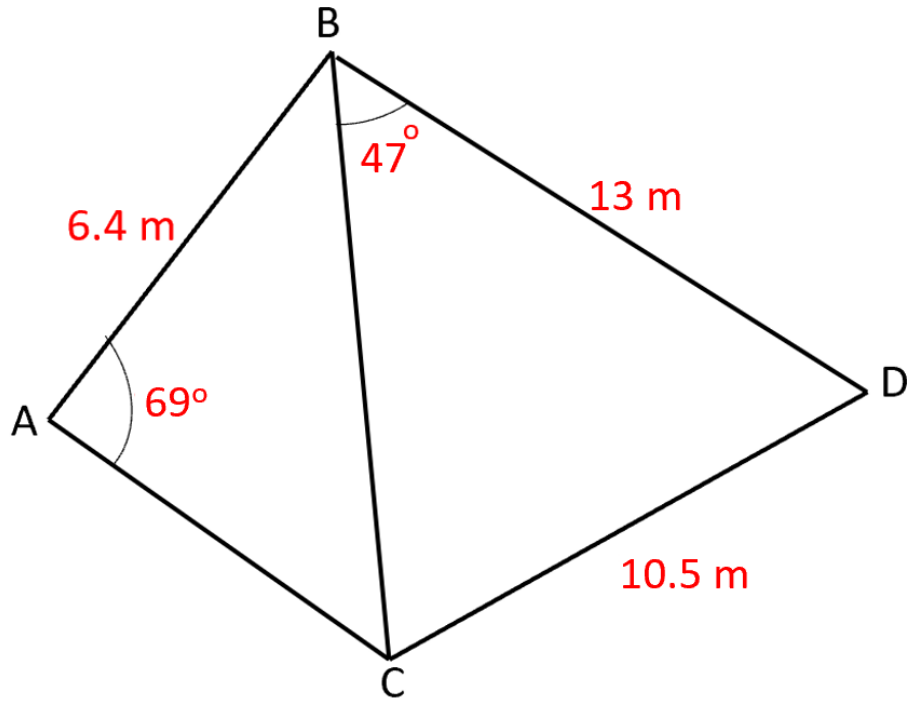


Figure 1

SECTION B

Answer question 2 and one from questions 3 and 4: All questions carry equal marks.

Question 2 (30 Marks)

- Name and illustrate with diagram, the three most common types of supports used in beam (6 marks)
- Identify with diagram the reactions forces associated with each support type mentioned in question 2 (a) above (3 marks)
- Calculate the support reaction for the beam shown in figure 2. (6 marks)
- Using the support reaction calculated in question 2(c), draw the shear force and bending moment diagrams for the beam in figure 2. (15 marks)

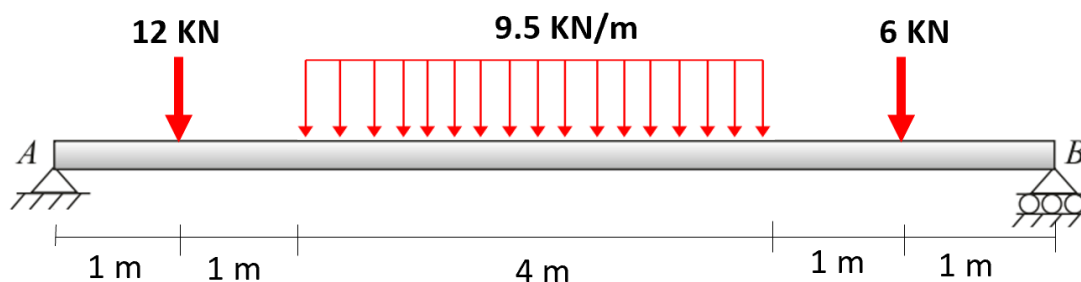


Figure 2

Question 3 (30 Marks)

- What is the difference between the centroid and centre of gravity of a body (4 marks)
- Illustrate with diagram the centroid and centre of gravity of object with uniform material (3 marks)
- Illustrate with diagram the centroid and centre of gravity of object with 2 different materials (3 marks)
- Find the centroid of the section shown in Figure 3. (20 marks)

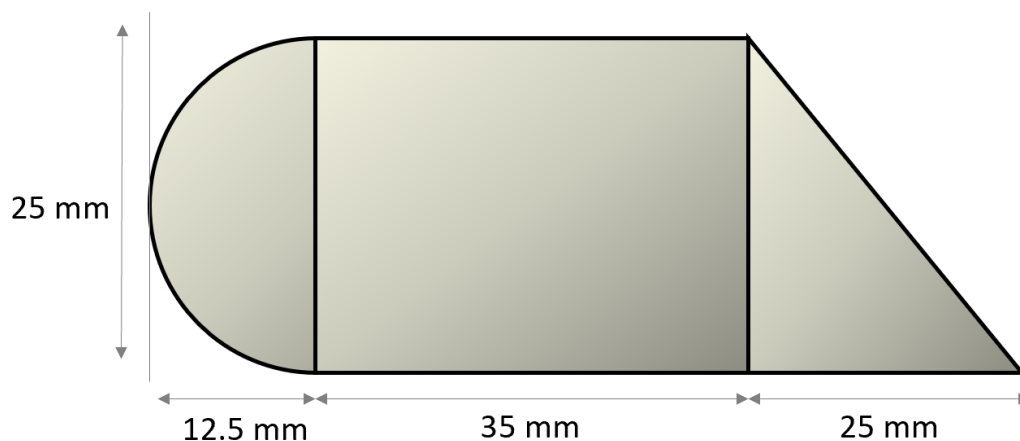


Figure 3

Question 4 (30 Marks)

- a) Find the centroid of the Z- section shown in Figure 4 (**10 marks**)
- b) Using the result from question 4 (a), find the second moment of area of the section about the centroidal axes XX and YY (**20 marks**)

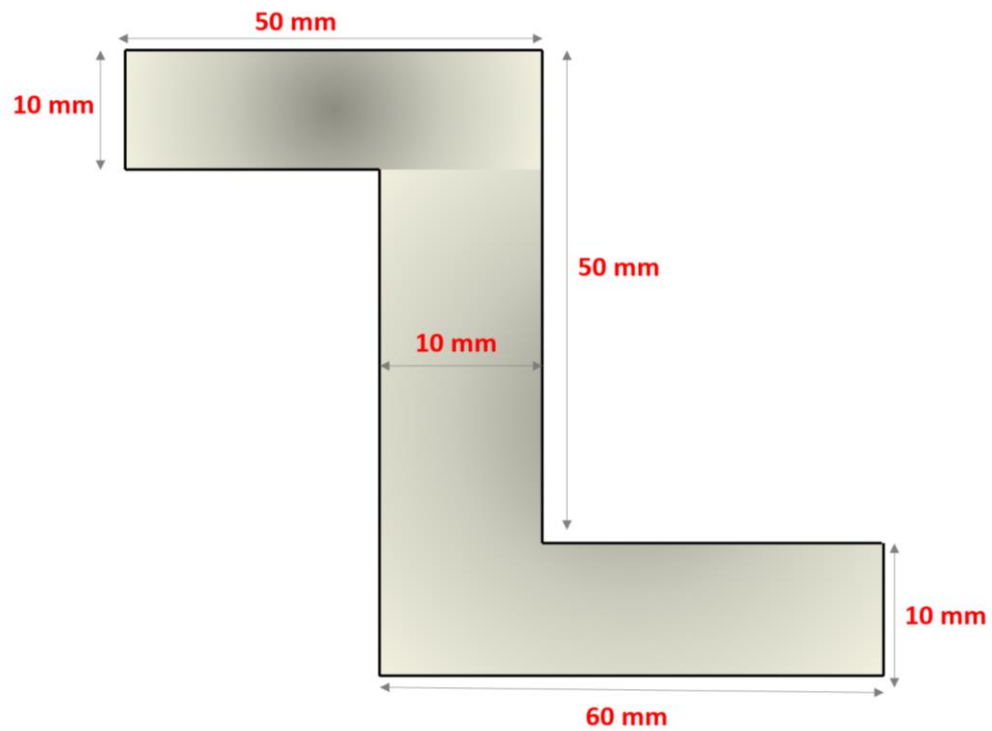


Figure 4