



A Centre of Excellence

TECHNICAL UNIVERSITY OF MOMBASA (TUM)

UNIVERSITY SPECIAL/SUPPLEMENTARY EXAMINATIONS FOR:

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING

TCV 4426: STRUCTURAL TIMBER DESIGN
SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: NOVEMBER 2024

TIME: 2 HOURS

Instructions to Candidates:

1. You should have answer booklet for this examination.
 2. This paper contains **FOUR** questions
 3. Answer question **ONE** any **TWO** questions.
 4. Marks for each question are indicated in the parenthesis.
 5. Examination duration is **2 Hours**
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Question One (20 marks)

TCV 4426: STRUCTURAL TIMBER DESIGN

- (a) Describe the advantages and disadvantages of using timber as a structural material [12 marks]
 (b) Discuss the fire safety and resistance of timber [8 marks]

Question Two (20 marks)

A simply supported rectangular joist is subjected to a design load of $q_{\text{dim}} = 4 \text{ kN/m}^2$ consisting of permanent and medium-term loads. The clear span l is 5 m and the joists are spaced at 0.6 m centres. The joist is part of an indoor floor assume Service class 1. Design the joist in structural timber of strength class C24, for:

- bending moment
- Shear load.
- Check the bearing strength at the end supports if the bearing length is restricted to 70 mm at each end.

Question Three (20 marks)

The timber column shown in figure Q3 has a cross-section $100 \text{ mm} \times 200 \text{ mm}$ is of strength class C24 and functions under service class 2 conditions. It supports a characteristic permanent compressive action of 8 kN and a characteristic variable short-term compressive action of 20 kN. The loading is applied 70 mm eccentric from the y - y axis as shown in the figure and the permanent action includes an allowance to cover for the effect of the self-weight of the column. The column is 4 m high and at each end is effectively held in position but not in direction about the z - z axis and the y - y axis. Check that the column will meet the ULS requirements of EC5.

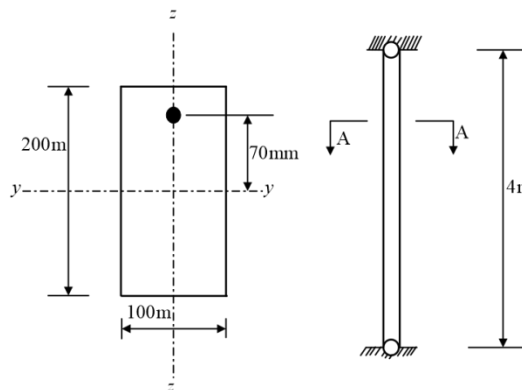


Figure Q3

Question Four (20 marks)

A 63 mm by 150 mm sawn timber section of strength class C27 functioning under service class 2 conditions is shown in figure Q4 and is subjected to a characteristic permanent tensile action of 1.2 kN and a characteristic variable tensile medium term action of 3 kN along the direction of the x - x axis of the member. The variable tensile action also induces a variable medium-term moment of 1.1 kNm about the y - y axis and 0.10 kNm about the z - z axis. There is no loss of area in the member at each end connection. Check that the member will meet the ULS requirements of EC5.

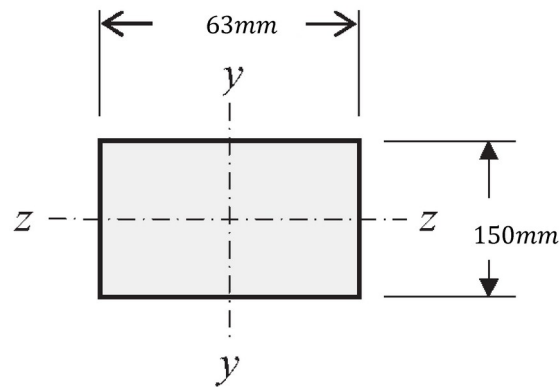


Figure Q4