



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING & CIVIL ENGINEERING
UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING
TCV 4426: STRUCTURAL TIMBER DESIGN

END OF SEMESTER EXAMINATION
SERIES: AUGUST 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)

- (a) Briefly describe methods of timber preservation [**12 marks**]
(b) Discuss the following factors which influence the strength of timber:
- Moisture Content, K_2
 - Notched Ends, K_5
 - Load-Sharing Systems, K_8
 - Duration of Loading, K_3
- [**8 marks**]

Question Two (20 marks)

- (a) Describe any **TWO** disadvantages of using timber as a structural material [**4 marks**]

(b) A solid timber beam, 75 mm wide, 250 mm deep in strength class C16, 3.5 m simply supported, supports uniformly distributed permanent including self-weight of beam and variable actions of 0.1kN/m and 2.1kN/m respectively as shown in figure Q2.



Assuming the beam is torsionally restrained at supports and the exposure is service class 2 check it's bending capacity. [16 marks]

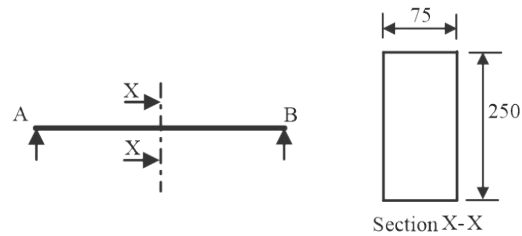


Figure Q2

Question Three (20 marks)

The column shown in figure Q3 has a cross-section $200\text{ mm} \times 300\text{ mm}$, is of strength class C18 to BS EN 338:2003, and functions under service class 2 conditions. It supports a characteristic permanent compressive axial action (including its self-weight) of 40 kN and a characteristic variable medium-term compressive axial action of 60 kN. The column is 4 m high and at each end is effectively held in position but not in direction about the z - z and the y - y axes. Check that the column will meet the ultimate limit state requirements of EC5.

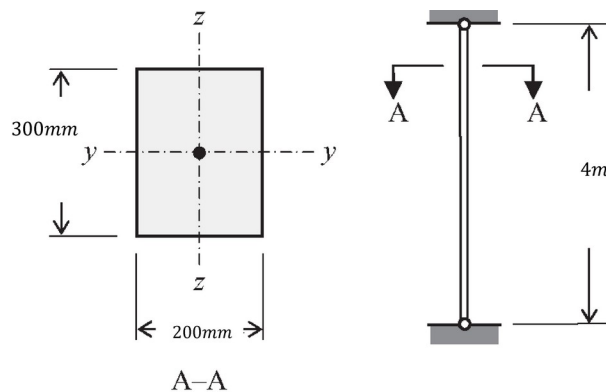


Figure Q3

Question Four (20 marks)

The stud wall shown in figure Q4 has an overall height of 3.75 m and the studs are spaced at 600 mm centre to centre with braced battens at mid-height. Sawn timber of 47 mm by 125 mm is used for the studs and the header and sole plates are 50 mm by 100 mm sawn timber, all class C16. The wall functions in service class 2 conditions and supports a characteristic permanent action of 0.6 kN (inclusive of the panel self-weight) and a characteristic variable long-term action of 2.5 kN per stud. There is wall sheathing on both faces and the fixings provide lateral support to the studs about the z - z axis.

Check that the wall will meet the ULS requirements of EC5

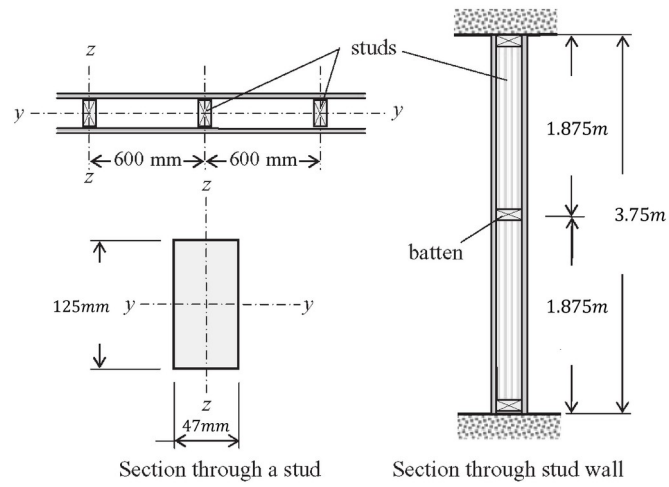


Figure Q4