



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology
Department of BUILDING & Civil engineering

UNIVERSITY EXAMINATION FOR: BACHELOR OF ARCHITECTURE EAR 4306: STRUCTURES FOR ARCHITECTS II

END OF SEMESTER EXAMINATION
SERIES: JANUARY 2025
TIME: 2 HOURS

Instructions to Candidates

- This paper consists of five questions.
- Attempt **QUESTION ONE** and any other **TWO (2)** questions
- All symbols have their usual meaning

QUESTION ONE (30 Marks)

- (a) Using first principle, derive the expression for maximum deflection and slope for the simply supported beam shown in figure Q1(a) using the method of double integration. (15 Marks)

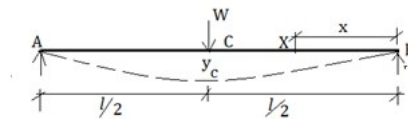


Figure Q1(a)

- (b) Draw the influence lines for the vertical reaction at supports A and point C, and the shear and bending moment at point B, of the simply supported beam shown in figure Q1(b). (15 Marks)

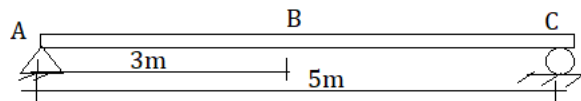


Figure Q1(b)

QUESTION TWO (20 Marks)

A simply supported beam is loaded as shown in figure Q2. Determine the reaction at C using the virtual work method. (20 Marks)

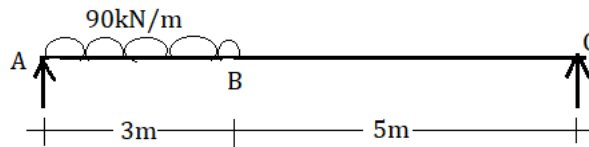


Figure Q2

QUESTION THREE (20 Marks)

The beam shown in figure Q3 is simply supported at joint A and B. Determine the maximum deflection of the joist shown in figure below. EI is constant.

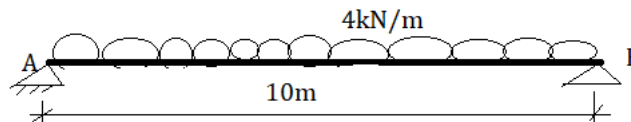


Figure Q3

QUESTION FOUR (20Marks)

A symmetrical frame of 1.5 m span is hinged at A and is supported on rollers at C. The frame is carrying a load of 100 kN at B as shown in figure Q4. The cross-sectional area of members AB and BC is 100 mm^2 while that of members AD, BD and CD is 500 mm^2 . Determine the horizontal deflection of the joint C. Take E for the frame materials as 200 GPa .

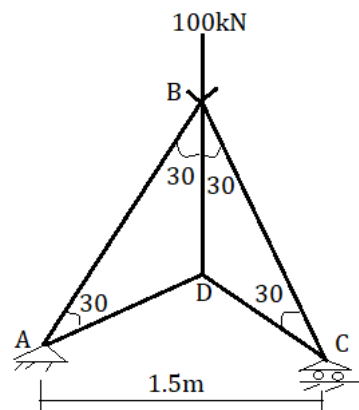


Figure Q4

QUESTION FIVE (20 Marks)

Using the method of virtual work, determine the reaction at supports A and B of the transversely loaded beam shown in figure Q5.

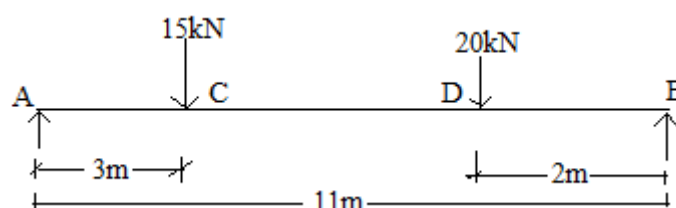


Figure Q5