



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

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: JULY 2025

TIME: 2 HOURS

Instructions to Candidates

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

QUESTION ONE (30 Marks)

- (a) Determine the slope and deflection at point B of the cantilever beam shown in figure Q1(a) by the double integration method. Assume that EI is constant and $E = 200\text{GPa}$ and $I = 315 \times 10^6 \text{mm}^4$. (15 Marks)

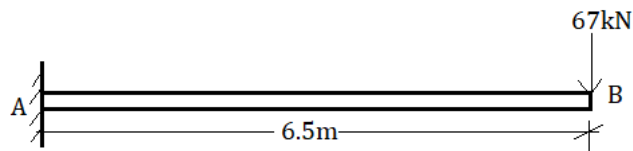


Figure Q1(a)

- (b) Using the method of virtual work, determine the reaction at supports A and B of the transversely loaded beam shown in figure Q1(b). (15 Marks)

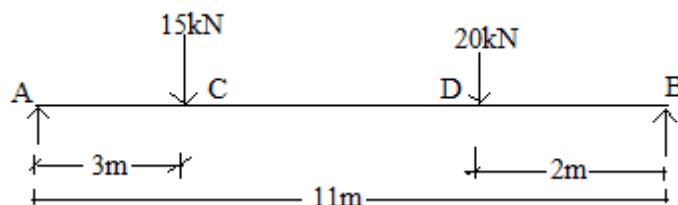


Figure Q1(b)

QUESTION TWO (20 Marks)

Draw the influence lines for the vertical reaction at supports A and C, and the shear and bending moment at point B, of the simply supported beam shown in figure Q2. (20 Marks)

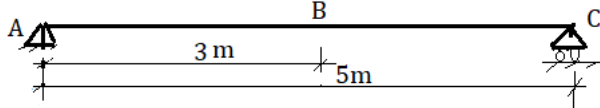


Figure Q2

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.

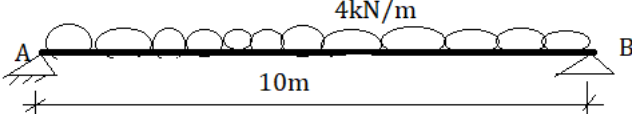


Figure Q3

QUESTION FOUR (20Marks)

A crane shown in figure below has cross-sectional areas of the tie and jib as 3000mm^2 and 7000mm^2 respectively. Determine the vertical deflection of the joint C when a load of 400kN is suspended from it. Take E as 200GPa.

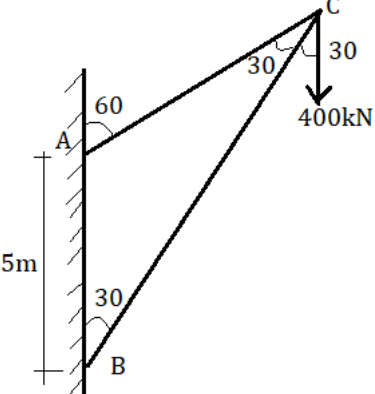


Figure Q4

QUESTION FIVE (20 Marks)

Two beams AC and CD are hinged internally at C and simply supported at A and D (figure Q5). When it is subjected to transverse loading as shown in the figure, find the reaction at third support B. Use the principle of virtual work.

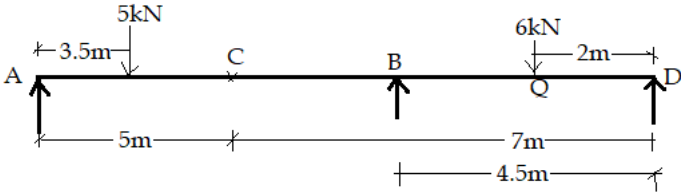


Figure Q5