



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

Department of BUILDING & Civil engineering

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING

TCV 4311: ANALYSIS OF STRUCTURES III

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2024

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, calculator, examination pass and student ID

This paper consists of **five** questions.

Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

QUESTION ONE - Compulsory (30 Marks)

- (a) Two beams AC and CD are hinged internally at C and simply supported at A and D. When it is subjected to transverse loading as shown in the figure Q1(a), find the reaction at third support B use the principle of virtual work. (10 Marks)

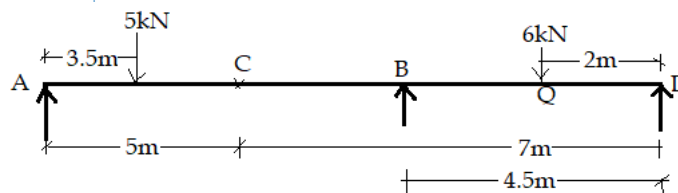


Fig. Q1(a).

- (b) Determine the deflection and the slope at C of the simply supported beam shown in figure Q1(b) using the conjugate beam method. (20 Marks)

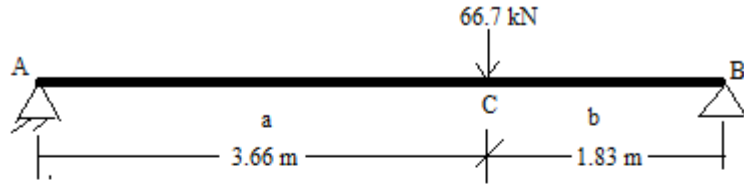


Figure Q1(b)

QUESTION TWO (20 Marks)

Using the Castigliano's theorem determine the slope at A and the deflection at C for the beam shown in Fig. Q2. Assume the beam to have a constant EI. (20 Marks)

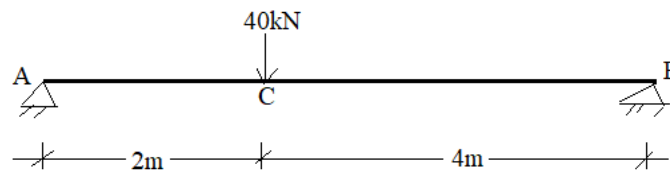


Fig. Q2.

QUESTION THREE (20 Marks)

Determine the slope at B and C and the deflection at B and C for the cantilever beam shown in Fig. Q3 using the moment area method.

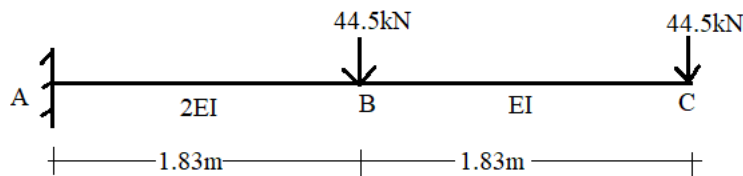


Fig. Q3.

QUESTION FOUR (20 Marks)

Determine the vertical and horizontal displacement at free end D in the frame shown in figure Q4. Take $EI = 12 \times 10^{13} \text{ Nmm}^2$. Use Castigliano's theorem.

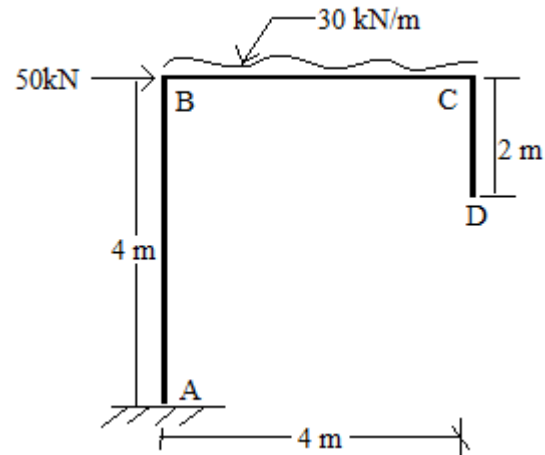


Fig. Q4

QUESTION FIVE (20 Marks)

Find the slope and deflection at B and C using the moment area method of the cantilever beam shown in figure Q5.

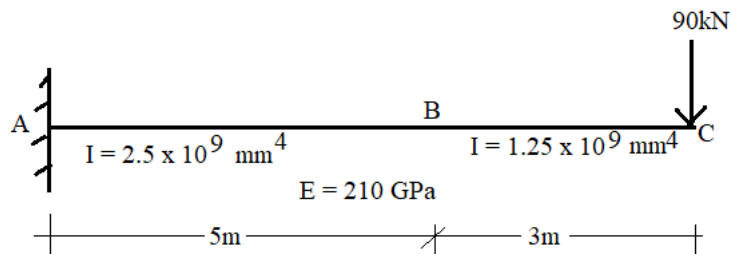


Figure Q5.