TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING AND CIVIL ENGINEERING
UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING
TCV 4224 : ANALYSIS OF STRUCTURES II
SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: MARCH 2025
TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination
-Answer Booklet, 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) Analyse the two span continuous beam shown in **Figure Q1** by slope deflection method and draw the bending moment and shear force diagrams. Young's modulus is the same throughout.

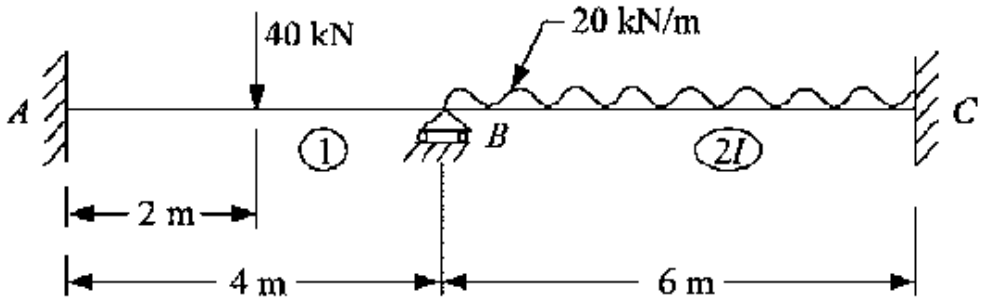

Figure Q1

(16 Marks)

b) Discuss force and displacement methods of analysis of indeterminate structures giving two examples for each.

(4 Marks)

QUESTION TWO (20 Marks)

Analyse the continuous beam shown in **Figure Q2** below using three moments equation and draw the shear force and bending moment diagrams.

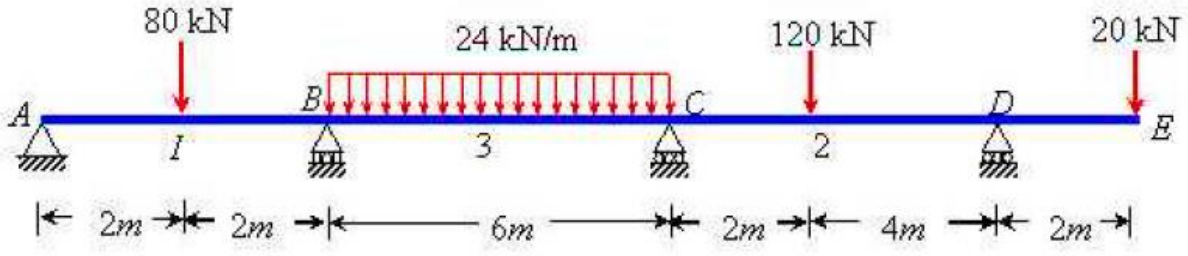

Figure Q2

(20 Marks)

QUESTION THREE (20 Marks)

Analyse the three span beam shown in **Figure Q3** below using moment distribution method and draw the shear force and bending moment diagrams. EI is constant.

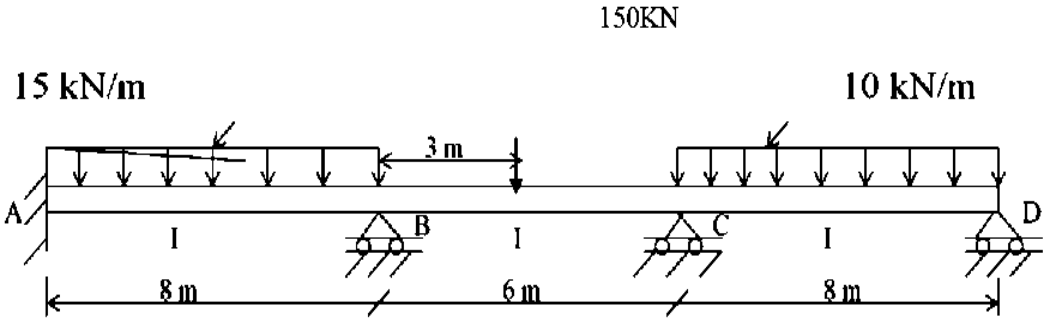

Figure Q3

(20 Marks)

QUESTION FOUR (20 Marks)

Figure Q4 below shows an indeterminate beam simply supported at A and fixed at B. Using moment distribution;

i. Construct the influence lines for the reactions at supports A and B of the beam by placing the unit load at five points (distance of 0.25 L apart)

ii. Construct the influence lines for the moment at B.

iii. Given that L= 40m, determine the moment created at support B by 25 KN and 35 KN set of wheel loads, when they are positioned at points 2 and 4.

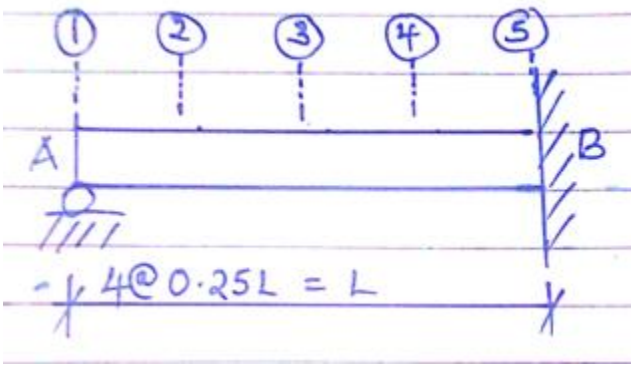

Figure Q4

(20 Marks)

QUESTION FIVE (20 Marks)

a) Derive Eulers critical load for columns with both ends hinged and give the relationship between equivalent length (le) and actual length (l) for the following end conditions, giving the crippling load (P) for each case.

i. Both ends hinged

ii. One end fixed and other free

iii. Both ends fixed

iv. One end fixed and the other hinged

(10 Marks)

b) Figure Q5b is an I joist 400 mm by 200 mm by 20 mm and 6 m long used as a strut with both ends fixed. What is the Eulers crrippling load for the column? Take Youngs modulus for the joist as 200 Gpa.

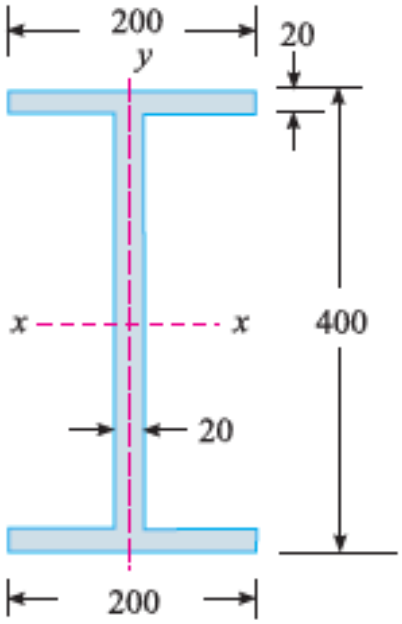

Figure Q5b

(10 Marks)