MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

UNIVERSITY EXAMINATIONS

2012/2013

SECOND YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE

OF

BACHELOR OF SCIENCE IN CIVIL AND STRUCTURAL ENGINEERING

COURSE CODE: CSE 212

COURSE TITLE: THEORY OF STRUCTURES II

DATE: TIME: 3 HRS.

INSTRUCTIONS TO CANDIDATES

Answer Question One and any other THREE

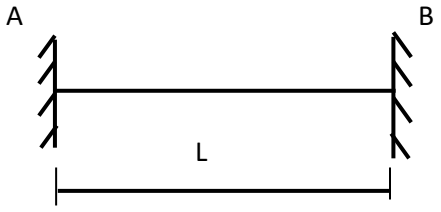
Question One (Compulsory)

(28 Marks)

(a) Illustrate how the moment area theorems can be used to analyze statically indeterminate beams (6 Marks)

(b) Derive the three-moment equation for a continuous beam with non-yielding supports (10 Marks)

(c) Find expression for influence lines for the reactions M_A, M_B, V_A and V_B in the beam shown.



(8 Marks)

(c) State the assumptions made in linear 1st order analysis of structures (4 Marks)

Question Two (14 Marks)

(a) Use three moment equation to analyze the beam shown if Figure Q2. (10 Marks)

(b) Hence draw shear force and bending moment diagrams. (4 Marks)

Question Three (14 Marks)

(a) Use slope deflection method to determine the reactions at the supports for the rigid frame shown in Figure Q3. (10 Marks)

(b) Hence draw shear force and bending moment diagrams. (4 Marks)

Question Four (14 Marks)

(a) For the beam shown in Figure Q4 determine the reactions at the supports using moment distribution method. (10 Marks)

(b) Hence draw shear force and bending moment diagrams. (4 Marks)

Question Five (14 Marks)

(a) A thin vertical strut of uniform cross-section and length L is rigidly fixed at the bottom and the top end free. At the top there is a horizontal pulling load P_1 and a vertical downward load P_2 acting through the centroid of the section. Prove that the horizontal deflection at the top is

$$\frac{P_1}{P_2}\left(\frac{\tan \mu L}{\mu} - L\right) \quad \text{where} \quad \mu^2 = \frac{P_2}{EI}$$ (10 Marks)

(b) If P_1 = 150N and P_2 = 200kN, L= 2m and EI = 2370Nm^2, find the maximum deflection and the moment at the support. (4 Marks)

Question Six (14 Marks)

(a) For the rigid frame shown in Fig Q6, determine the reactions at the supports using strain energy method. Assume that there is no yielding at the supports. (10 marks)

(b) Hence raw the shear force and bending moment diagrams. (4 Marks)

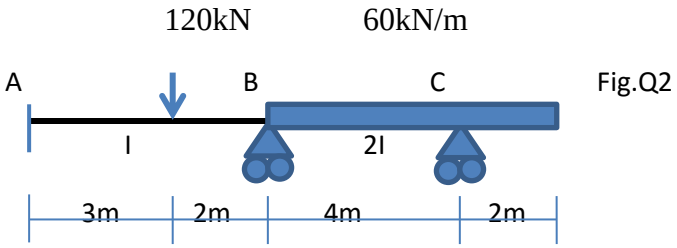


Fig.Q2

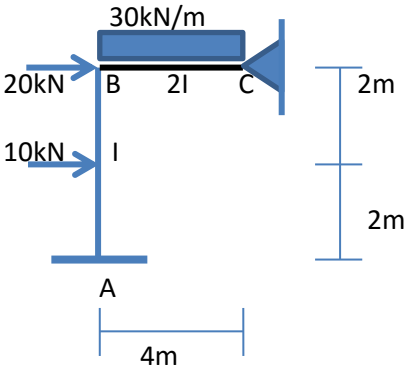


Fig.Q3

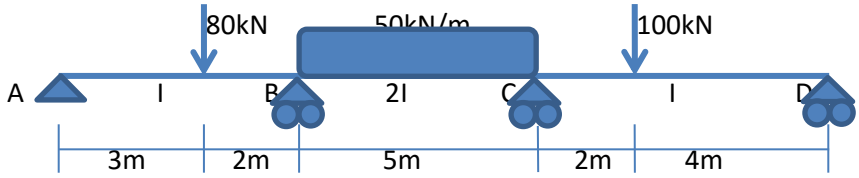


Fig.Q4

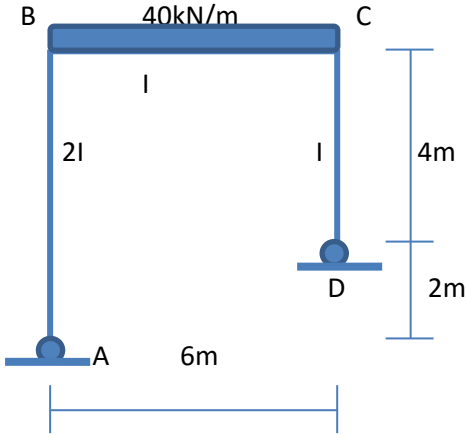


Fig.Q6