



TECHNICAL UNIVERSITY OF MOMBASA
FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING & CIVIL ENGINEERING
UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN CIVIL ENGINEERING
ECE 2408 : THEORY OF STRUCTURES V
END OF SEMESTER EXAMINATION
SERIES: JUNE/JULY 2017
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** and **ANY OTHER TWO** questions.

Do not write on the question paper.

QUESTION ONE (COMPULSORY)

- (a) Discuss any four classes of framed structures that may be utilized in construction
(8 marks)
- (b) The structure shown in Figure Q1 consists of three springs and supported at nodes A and D. If axial loads of 4 kN and 18 kN are applied at nodes B and C respectively, determine the displacements at nodes B and C and the reaction forces at A and D. (12 marks)

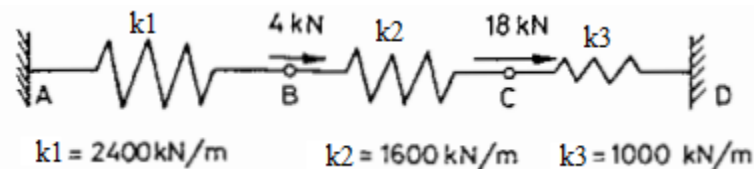


Figure Q1(b)

- (c) A simple plane truss is made of two identical bars (with E, A and L), and loaded as shown in Figure Q1(c). Find:
- i. Horizontal and vertical displacement of node 2 (5 Marks)
 - ii. Stress in each bar (5 marks)

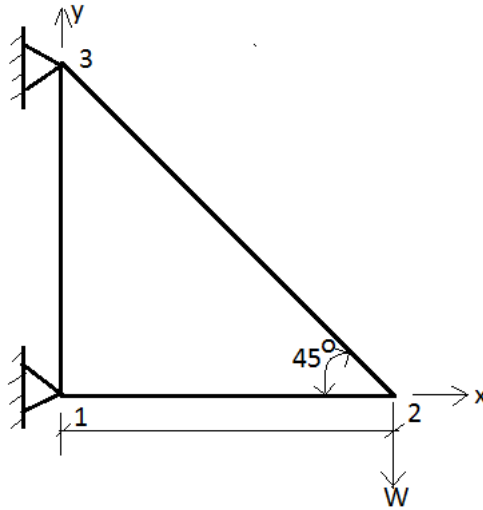


Figure Q1(c)

ANSWER ANY TWO QUESTIONS

QUESTION TWO

- a. For the beam shown in Figure Q2, use the stiffness matrix method to determine:
- The deflection and rotation at (10 Marks)
 - The reactions at the supports (5 Marks)
 - Draw the shear and bending moment diagrams (5 Marks)

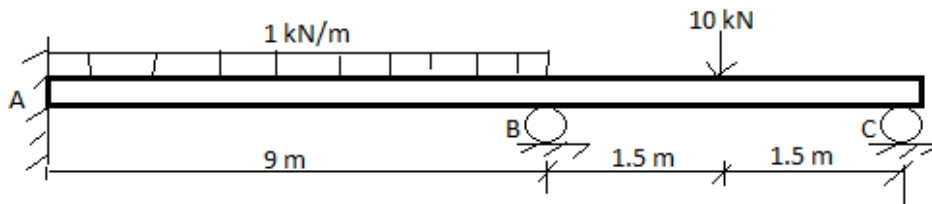


Figure Q2

QUESTION THREE

The plane pin-jointed truss shown in Figure Q3 is composed of uniform section members, with the same material properties. If the truss is subjected to the load as shown, determine the displacements at node 1 and the forces in the members of the truss using the matrix method of analysis. (20 Marks)

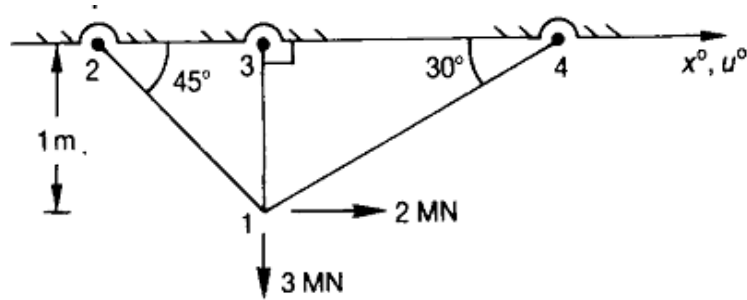


Figure Q3

QUESTION FOUR

- Briefly discuss the three fundamental relationships applied in matrix structural analysis of structures. (12 Marks)
- Determine the global stiffness matrix for the frame system shown in figure Q4(b) (8 Marks)

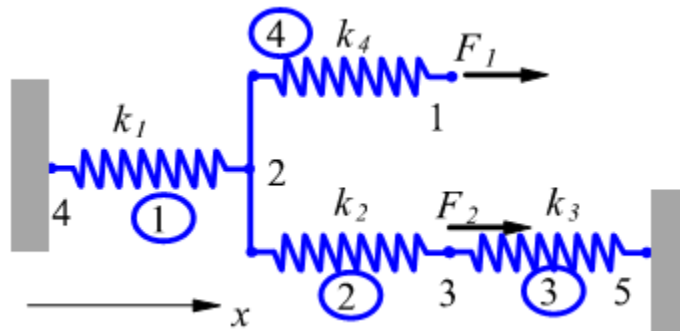


Figure Q4(b)

QUESTION FIVE

For the frame shown in figure 5, use the stiffness matrix method to determine:

- The deflection and rotation at B (10 Marks)
- All the reactions at supports (10 Marks)

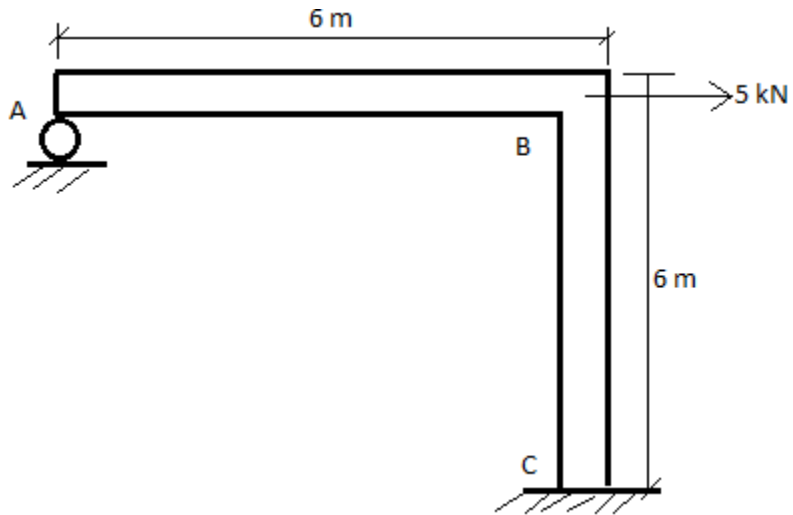


Figure Q5