



# MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (CIVIL ENGINEERING)

ECV 204: THEORY OF STRUCTURES I

DATE:

TIME:

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## INSTRUCTIONS

- This paper comprises of *FIVE* questions. Answer **THREE** questions
- Question one is **compulsory** and carry 30 marks
- Answer any other **TWO** questions
- All symbols have their usual meaning

## QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Calculate the shear force and bending moment for the beam shown in figure 1. Draw the shear force and bending moment diagrams (6mks)

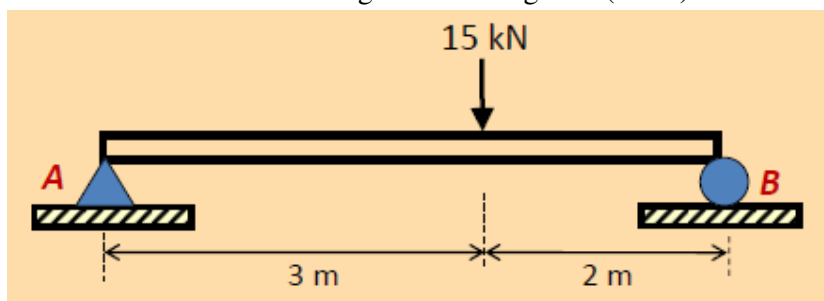


Figure 1

- b) Determine the degree of indeterminacy of the following structural elements (6 marks)

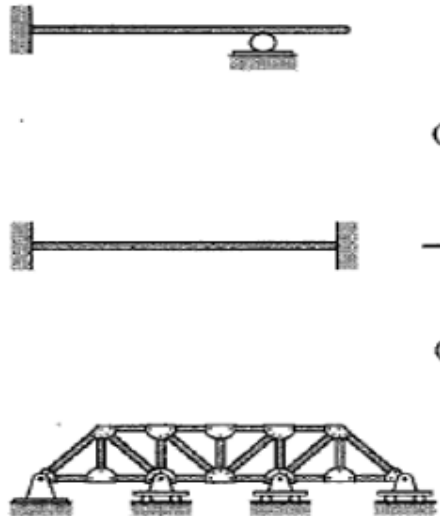


Figure 2

- c) Using method of joints, calculate the force in each member of the loaded truss in figure 3 and state whether each member is in tension or compression. Calculate the reaction forces at A and C (10 marks)

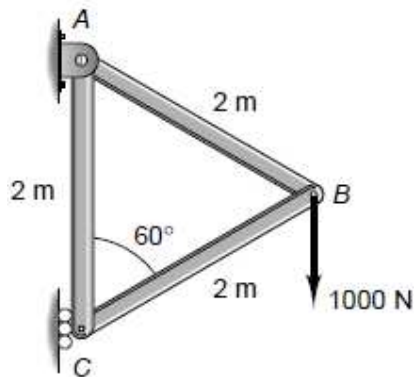


Figure 3

- d) With the aid of illustrations, discuss FOUR types of supports in structures (4 marks)
- e) State FOUR types of loads applicable in structures (4 marks)

## QUESTION TWO (20 MARKS)

Compute the forces in all the members of the truss shown in figure 4. Use method of joints

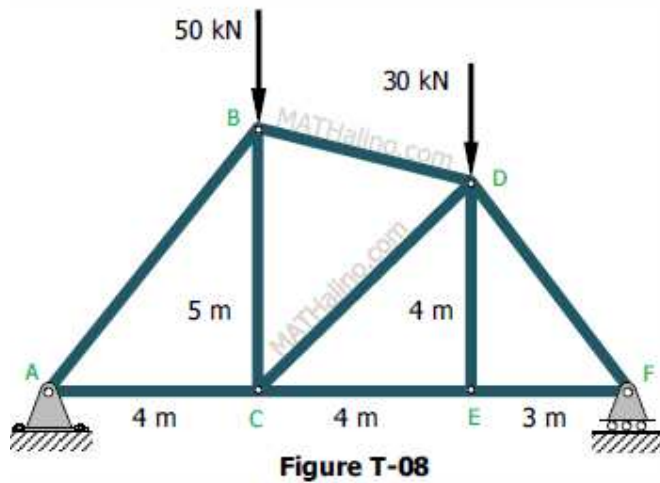


Figure 4

## QUESTION THREE (20 MARKS)

- a) Calculate the shear force and bending moment for the beam shown in figure 5. Draw the shear force and bending moment diagram (10 marks)

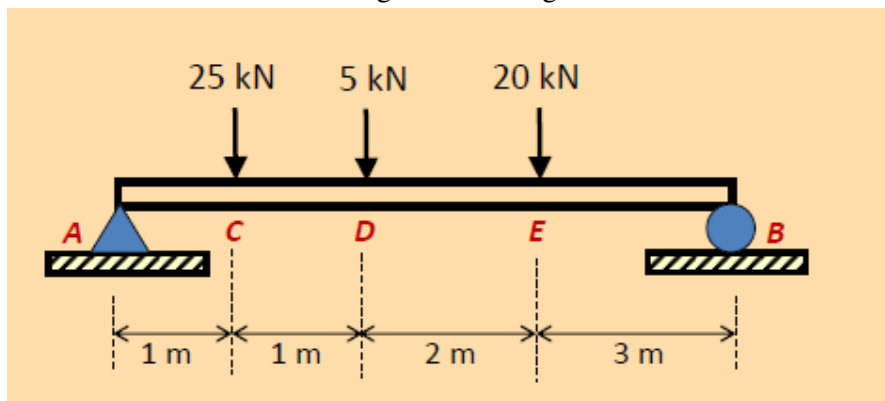


Figure 5

- b) Calculate the shear force and bending moment for the beam shown in figure 6. Draw the shear force and bending moment diagram (10 marks)

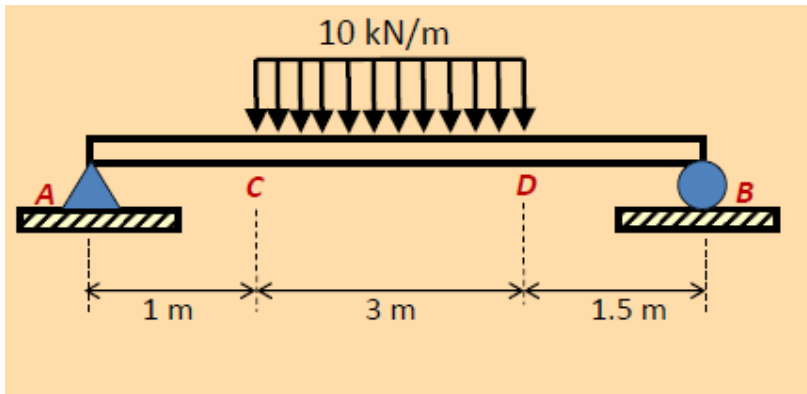


Figure 6

#### QUESTION FOUR (20 MARKS)

Draw the shear and bending moment diagrams for the frame shown in figure 7)

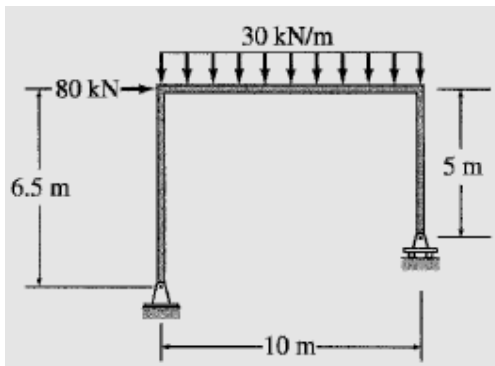


Figure 7

#### QUESTION FIVE (20 MARKS)

Draw the shear and bending moment diagrams for the beam shown in figure 8.

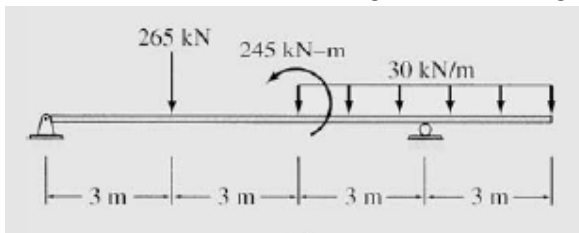


Figure 8