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:**

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)

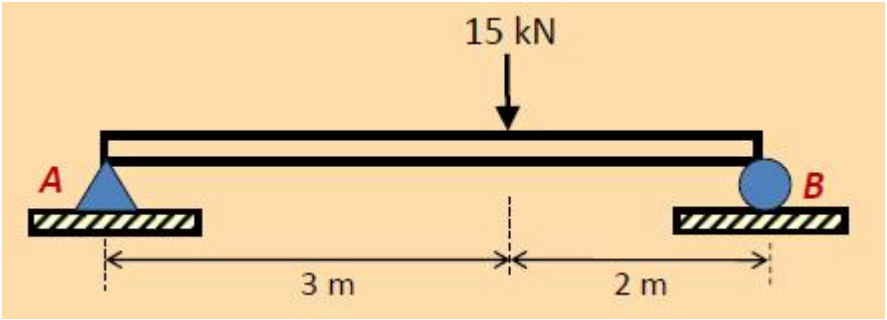

Figure 1

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

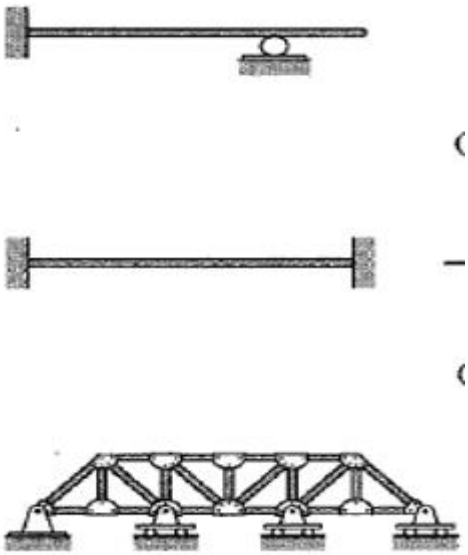

Figure 2

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)

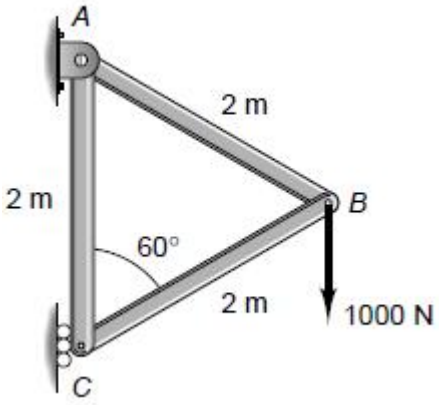

Figure 3

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

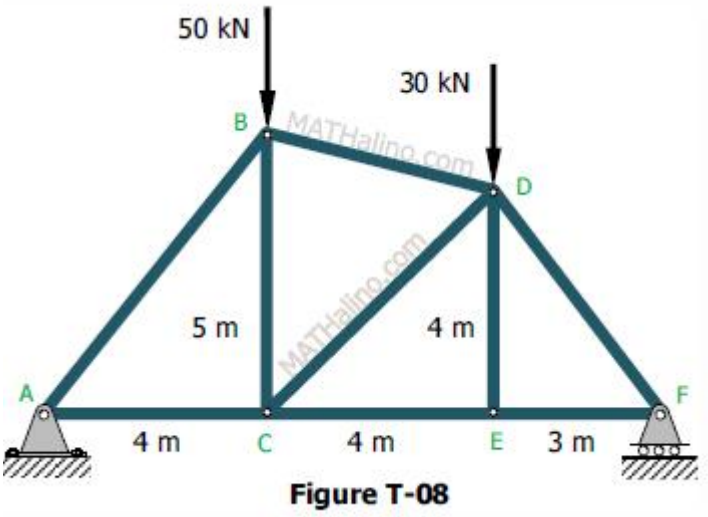

Figure 4

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)

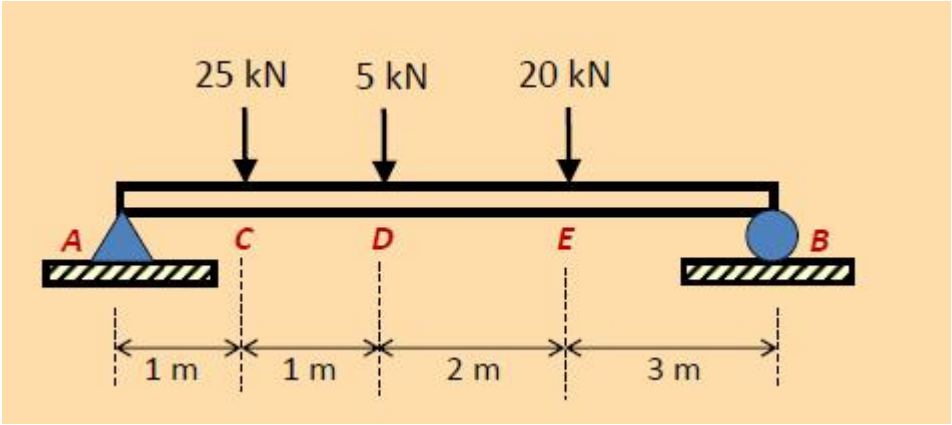

Figure 5

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)

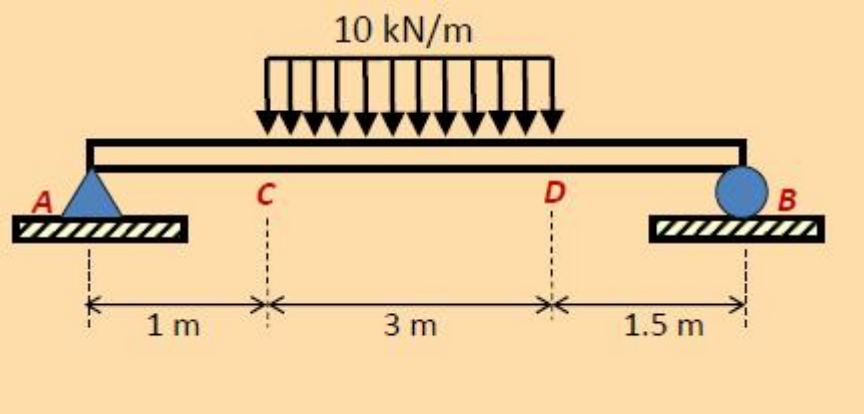

Figure 6

QUESTION FOUR (20 MARKS)

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

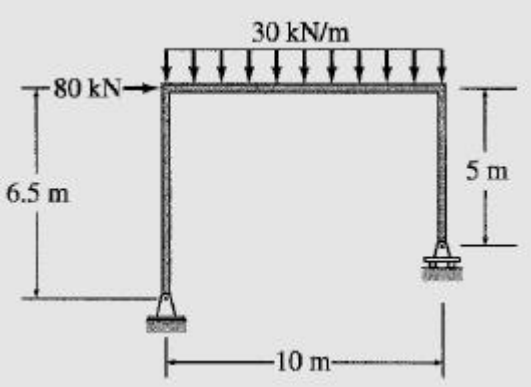

Figure 7

QUESTION FIVE (20 MARKS)

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

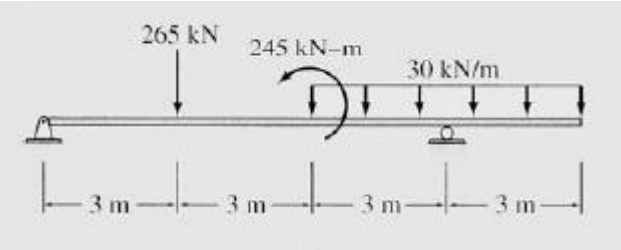

Figure 8