



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology
Department of BUILDING & Civil engineering
UNIVERSITY EXAMINATION FOR:

DIPLOMA IN CIVIL ENGINEERING

DCE 2110: STRUCTURES I

END OF SEMESTER EXAMINATION

SERIES: AUG 2024 Pick year

TIME: 2 HOURS

DATE: Pick DateAug 2024

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass , student ID and Scientific Calculator

This paper consists of five questions.

Attempt any THREE questions.

Do not write on the question paper.

QUESTION ONE (20 Marks)

- (a) (i) State the Hooke's law
(ii) Differentiate between the following pair of terms, with respect to direct stress and strain:
- Proof stress and permissible stress
 - Limit of proportionality and ultimate stress

(8 Marks)

(b) A hollow cylinder 4.0m long has an outside diameter of 80mm and an inside diameter of 60mm. The cylinder is to carry an axial compressive load of 100 kN. Given the Young's modulus of the cylinder as 110 kN/mm^2 calculate the following for the cylinder:

- i. The stress in the cylinder



ii. The elongation of the cylinder

(4 Marks)

c)(i) A copper rod 70mm diameter and 5m long is subjected to a tensile force of 250 kN. Given the Young's modulus of elasticity as 110 kN/mm^2 , calculate the increase in length of the bar.

(2 Marks)

ii) A timber specimen $100 \times 50 \text{ mm}$ cross-section and 400mm long parallel to the grain was subjected to a compressive force of 70kN and shortened by 0.43mm. Calculate the elastic modulus of the specimen and hence determine the corresponding compressive stress.

(4 Marks)

QUESTION TWO (20 Marks)

a) A reinforced concrete rectangular column $400 \times 300 \text{ mm}$ is reinforced with 8 No 20mm diameter steel bars on the outer face. Calculate:

i) the load carrying capacity of the column if the stresses in steel and concrete are not to exceed 150 N/mm^2 and 7 N/mm^2 respectively. Take the modular ratio of steel versus concrete as 20.

(10 Marks)

b) Two wires, one of steel and the other of copper are of the same length and are subjected to the same tension. The copper wire is 3mm diameter, calculate the diameter of the steel wire, given that they are subjected to the same elongation. Take the Young's modulus of elasticity for steel and copper as 210Gpa and 100Gpa respectively.

(10 Marks)

QUESTION THREE (20 Marks)

(10 Marks)

Draw the bending moment and shearforce diagrams for the beam shown in figure 1 showing values at important points. Hence calculate the maximum bending moment.

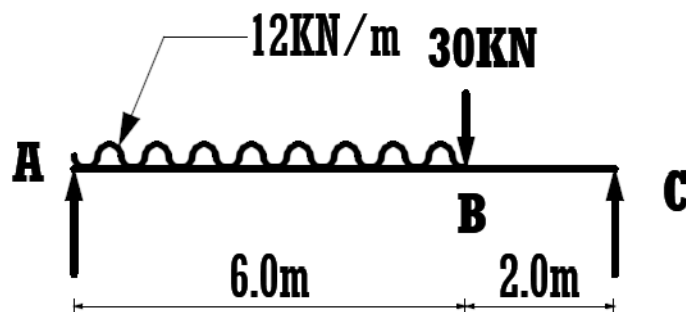


fig 1

(10 Marks)

QUESTION FOUR (20 Marks)

Fig 2 shows a simply supported beam loaded with a system of loads. Draw the bending moment and shear force diagrams for the beam, showing values at salient points.

(20 Marks)

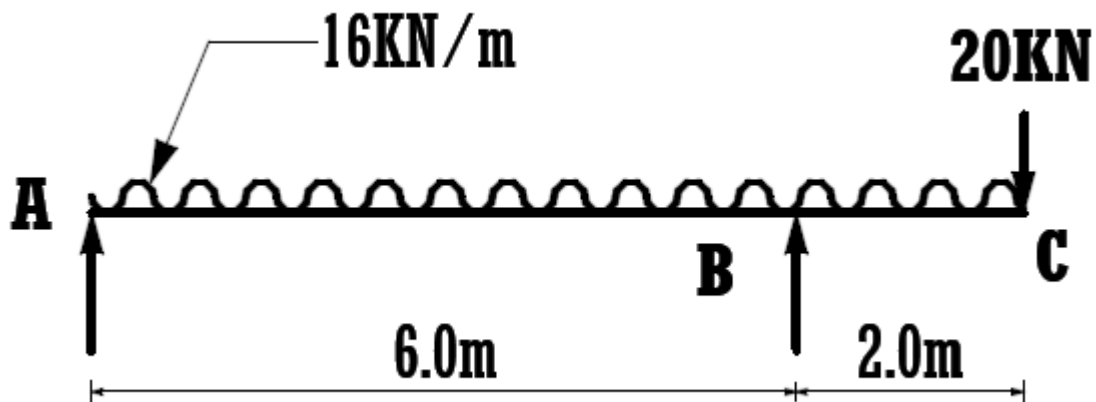


Fig 2

QUESTION FIVE (20 Marks)

Draw the bending moment and shearforce diagrams for the beam shown in figure 3, showing values at important .

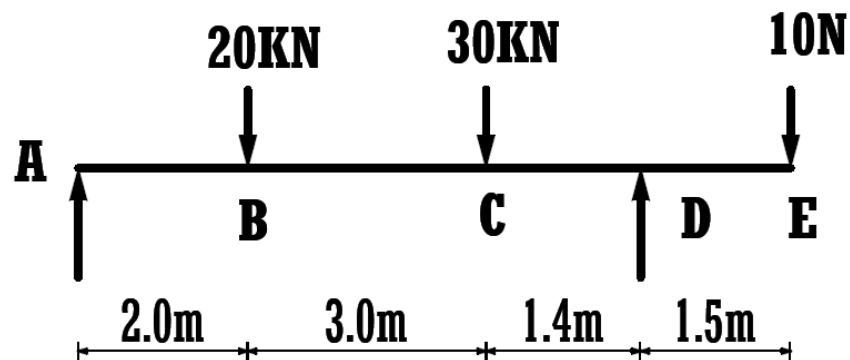


Fig 3

(20 Marks)