



# TECHNICAL UNIVERSITY OF MOMBASA

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

DIPLOMA IN CIVIL ENGINEERING

DCE 2207: STRUCTURES111

SPECIAL/SUPPLEMENTARY EXAMINATION

**SERIES: MARCH 2025**

**TIME: 2 HOURS**

**DATE:** March 2025

## **Instructions to Candidates**

You should have the following for this examination

- *Answer Booklet*
- *examination pass*
- *student ID*
- *Scientific Calculator*

This paper consists of five questions.

Attempt any THREE questions.

**Do not write on the question paper.**

## **QUESTION ONE(20Marks)**

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A simply supported beam, 20 m long, carries two concentrated loads of 5KN and 20 KN at distances 8m and 12m from the left end, respectively.

Calculate ;

(a) The slopes at the ends and deflection under each load.  $E = 2.0 \times 10^5 \text{ N/mm}^2$   
and  $I = 10^9 \text{ mm}^4$  **( 12 Marks)**

(b) The maximum deflection **( 8 Marks)**

### **QUESTION TWO(20Marks)**

(a) State the area-moment theorems relating to the angles of slope and displacements of points in a loaded beam **( 5 Marks)**

(b) Find the end bends, centre Moment and maximum deflection for a fixed-ended beam, span L,

with a point load W at the Centre **( 15**

**Marks)**

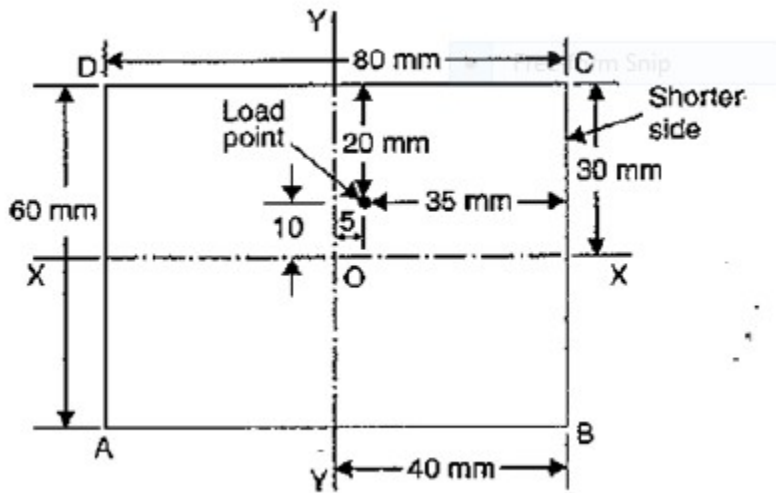
### **QUESTION THREE (20 Marks)**

(a) Draw neat sketches of Kernel of (i) rectangular section 200 x300 mm

(ii) Square with 400 cm<sup>2</sup> area **(8Marks)**

(b) A short column of rectangular cross-section 80mm by 60mm carries a load of 40 KN at a point 20mm from the longer side and 35mm from the shorter side as shown in Fig 1. Determine

the maximum compressive and tensile stresses in the section **(12Marks)**



**Figure 1**

#### **QUESTION FOUR (20 Marks)**

A concrete dam of trapezoidal section having water on the vertical face is 14m high. The base of the dam is 8 m wide and top is 3m wide.

Determine;-

- (i) The resultant thrust on the base per meter length of the dam.
- (ii) The point where the resultant thrust cuts the base
- (iii) The intensities of the maximum and minimum stresses across the base
- (iv) Draw the stress distribution at the base of the wall

#### **QUESTION FIVE ( 20 Marks)**

(a) Find expressions for: (i) Shear Force (ii) Bending moment (iii) Slope (iv) Deflection at a point distance  $x$  from left support of a simply supported beam, span  $L$ , carrying a uniformly distributed load  $w$  **( 14 Marks)**

(b) Determine maximum shear force, bending moment, slope and deflection in 2 (a) given  $w$  is 4kN, Length 10 m,  $I$  for the beam is  $10^8 \text{ mm}^4$  and  $E = 210 \text{ KN/mm}^2$  **( 6 Marks)**