THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

DEPARTMENT OF CIVIL AND BUILDING ENGINEERING

BRIDGING TO HIGHER DIPLOMA

END OF SEMESTER EXAMINATIONS

APRIL/MAY 2010 SERIES

EB 2212 - THEORY OF STRUCTURES II

TIME: 2 HOURS

Instructions to Candidates

You should have the following:

- Answer booklet
- Scientific calculation

This paper consists of **FIVE** Questions in Section **A** and **B.**
Answer Question **ONE** in Section A and choose any other **TWO** from Section **B.**
Maximum marks for each part of a question are as shown.

Question ONE

(a). Define the following as applied to loaded beams;

(i). Shear force at a point
(ii). Bending moment at a point **(3 Marks)**

(b). Fig. 1 shows a loaded beam. Sketch shear force and bending moment diagrams indicating values at all critical points. **(17 Marks)**

(c). Determine points of inflection from supports. **(10 Marks)**

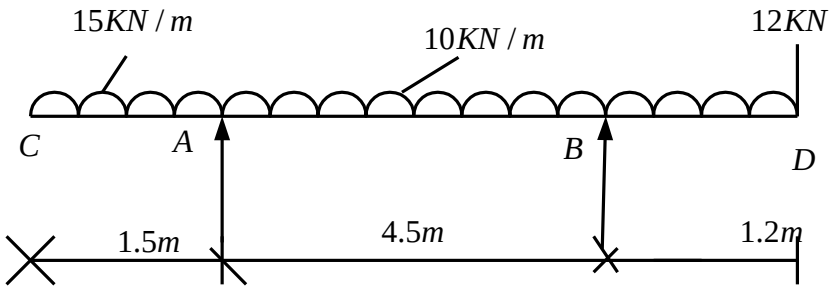

Fig. 1

Question TWO

(a). Fig. 2 shows a composite beam in steel and timber subjected to a bending moment of 30KN/m. Determine the maximum bending stresses in steel and in timber given the following information.

$E_{steel} = 210KN/mm^2$ $E_{timber} = 10.5KN/mm^2$ **(12 Marks)**

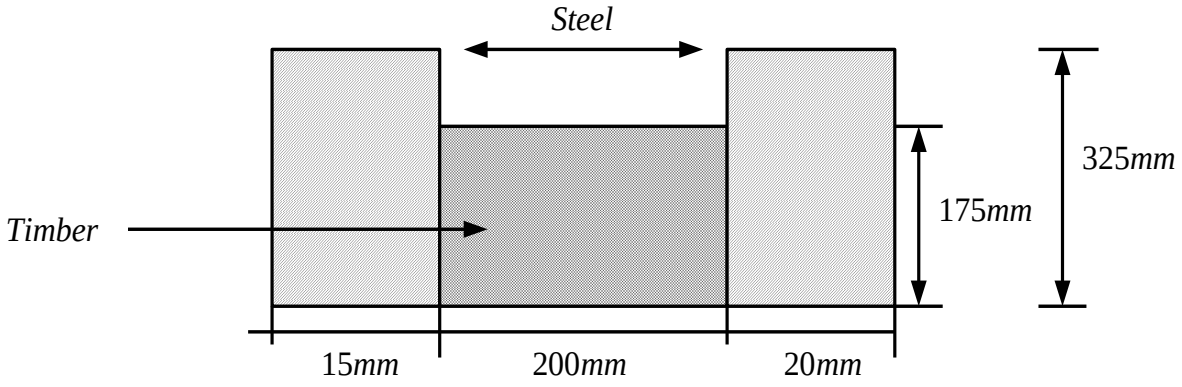

Fig. 2

(b). Sketch the shear stress distribution diagram for the beam section shown in Fig.3 if subjected to a maximum shear force of 20KN.

(8 Marks)

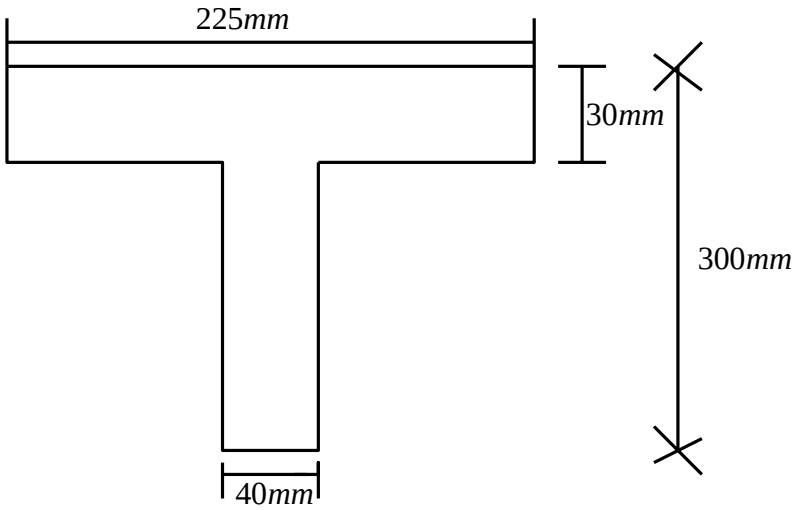

Fig. 3

Question THREE

(a). Define the following as applied to structural frames;

(i). Tie
(ii). Strut **(3 Marks)**

(b). Determine the nature and magnitude of the member forces of the frame shown in fig.4 using the method of joint resolution.**(17 Marks)**

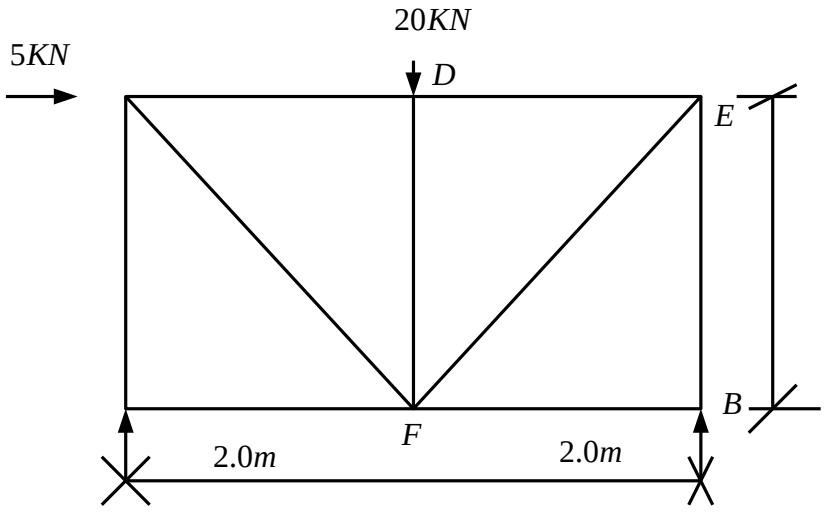

Fig. 4

Question FOUR

Fig. 5 shows a concrete retaining wall containing a non-cohesive soil. Using the data below, determine the stability of the wall for;

(a). Overturning
(b). Sliding
(c). Tension cracks occurring in the base
(d). Actual stresses at the base. **(20 Marks)**

Data:

- Density of soil = $18KN/m^3$
- Density of concrete = $24KN/m^3$
- Angle of shearing resistance, Ø = 30^o
- Coefficient of friction, μ = 0.3
-

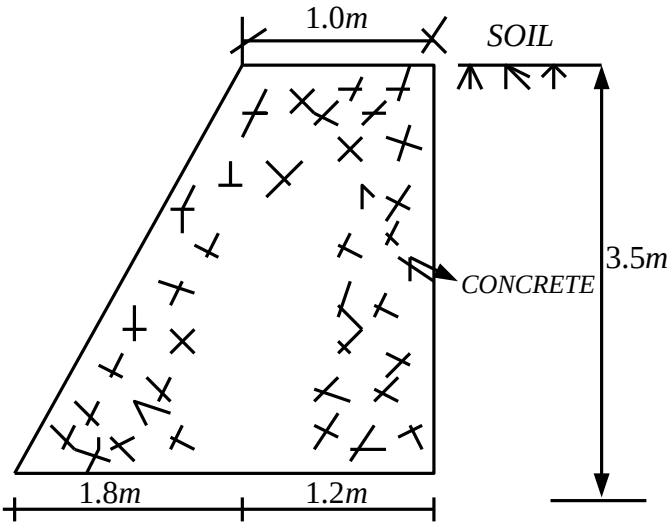

Fig. 5

Question FIVE

(a). State Mohr's Theorems on slope and deflection. **(4 Marks)**

(b). Derive the expressions for maximum slope and deflection for a simply supported beam. Covering a uniformly distributed load over the entire span. Use Mohr's mount-area method. **(10 Marks)**

(c). A timber beam 50mm wide by 100mm deep is required to support a uniformly distributed load, over a span of 3.0m. Determine the safe local the beam would carry over its entire span if maximum deflection is limited to $\frac{Span}{300}$. Take: $E_{timber} = 10.5KN/mm^2$ **(6 Marks)**