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**STRUCTURES I AND
CONSTRUCTION MATERIALS I**
Oct./Nov. 2017
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

**DIPLOMA IN BUILDING CONSTRUCTION
DIPLOMA IN CIVIL ENGINEERING
DIPLOMA IN ARCHITECTURE**

MODULE I

STRUCTURES I AND CONSTRUCTION MATERIALS I

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
        Answer booklet;
        Scientific calculator.
This paper consists of EIGHT questions in TWO sections: A and B.
*Answer FIVE questions TWO from section A and TWO from section B and ONE other question from
either section.*
All questions carry equal marks.
Maximum marks for each part of a question are indicated.
**Candidates should answer the questions in English.**

This paper consists of 6 printed pages.

**Candidates should check the question paper to ascertain that all the
pages are printed as indicated and that no questions are missing.**

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SECTION A : STRUCTURES I

*Answer at least **TWO** questions from this section.*

1. (a) Show that the maximum uniformly distributed load for a simply supported beam is given by $WC^2/8$. (3 marks)

    (b) **Figure 1** shows a loaded beam:

    (i) plot the shear force diagram and bending moment diagram;

    (ii) calculate the point of contraflecture from left hand end. (17 marks)

Fig. 1
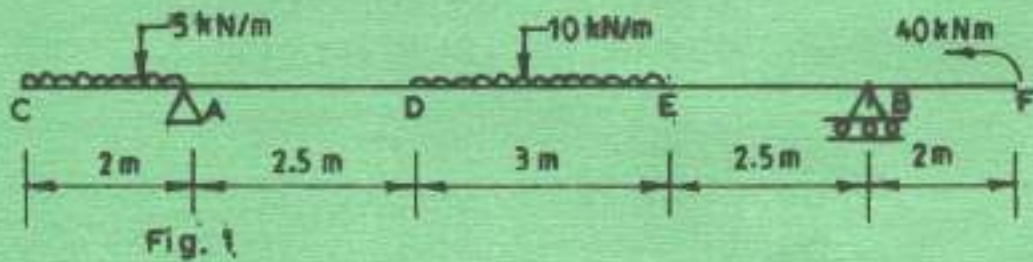
2. (a) **Figure 2** shows the cross section of a beam. Plot the horizontal shear stress distribution diagram given a shear force of 35 kN. (15 marks)

Fig. 2
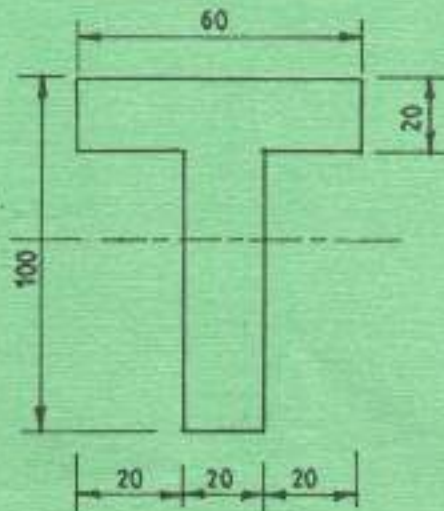
    (b) Calculate the moment of resistance of the beam section if the stresses in upper and lower sections are limited to 10 N/mm² and 25 N/mm² respectively. (5 marks)
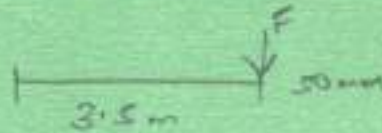
(d)   (i)   State **four** assumptions made in Eulers formula.

     (ii)   Calculate the load on a column 50 mm diameter that is fixed on one end and free in the other using Eulers formula. The column is 3.5 m long.

$$E = 210 \text{ kN/mm}^2$$

(8 marks)

SECTION B : CONSTRUCTION MATERIALS

Answer at least TWO questions from this section.

5.   (a)   Describe the following methods of fabricating plastics:

     (i)   transfer moulding;

     (ii)   calendering.   (4 marks)

  (b)   Differentiate between the following types of plastics:

     (i)   thermoplastics;

     (ii)   thermosetting plastics.   (4 marks)

  (c)   Explain the uses of the following types of cement;

     (i)   rapid hardening;

     (ii)   high alumina cement;

     (iii)   pozzolana;

     (iv)   coloured.   (4 marks)

  (d)   With the aid of a sketch, outline the procedure of manufacture of cement using the dry process.   (8 marks)
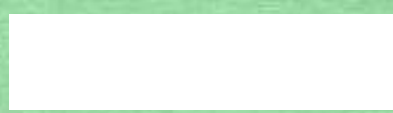
6.   (a)   (i)   Define the term 'quarrying'.

     (ii)   Describe **two** methods of quarrying.   (5 marks)

  (b)   Describe the **three** geological classifications of stones giving one example of each.   (9 marks)

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(c) (i) State **four** properties of a good brick.

(ii) outline the procedure for the manufacture of bricks. (6 marks)

7. (a) Define the listed terms as used in timber:

(i) seasoning;

(ii) live knot;

(iii) dead knot;

(iv) dry rot. (4 marks)

(b) With the aid of sketches, describe the stated defects in timber:

(i) star shake;

(ii) twisting;

(iii) cupping. (6 marks)

(c) Differentiate between the hard wood and soft wood timber giving **one** example of each: (4 marks)

(d) (i) Explain **two** functions of paint.

(ii) Describe **four** main ingredients of paint. (6 marks)

8. (a) Explain the following types of bituminous materials:

(i) native asphalt;

(ii) cut back asphalt;

(iii) asphalite. (6 marks)

(b) (i) State **four** properties of glass;

(ii) State **four** uses of bitumen. (4 marks)

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(c)   Describe the following forms of glass:

       (i)   pressed;

       (ii   laminated;

       (iii)   glass fibre.   (6 marks)

(d)   Differentiate between natural and synthetic rubber.   (4 marks)

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