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**STRUCTURES I AND
CONSTRUCTION MATERIALS I**

Oct./Nov. 2017

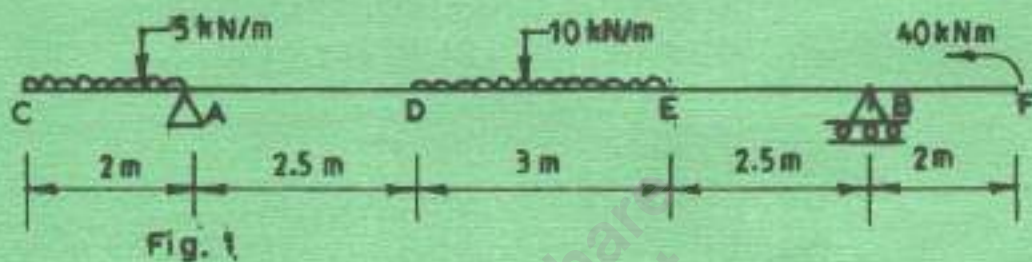
Time: 3 hours

**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.**

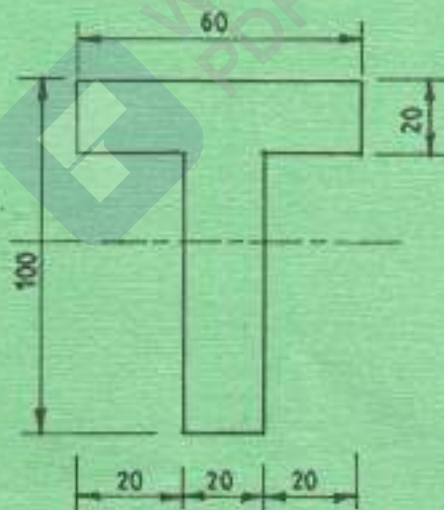
SECTION A : STRUCTURES I

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 contraflexure from left hand end. (17 marks)



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)

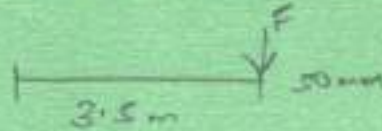


- (b) Calculate the moment of resistance of the beam section if the stresses in upper and lower sections are limited to 10 N/mm^2 and 25 N/mm^2 respectively. (5 marks)



- (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'. *this is the extraction of stone from the earth surface*
- (ii) Describe **two** methods of quarrying. *1) blasting - use of explosives* (5 marks)
2) quarrying - this is done by digging out stones using the crane
- (b) Describe the **three** geological classifications of stones giving one example of each. (9 marks)
1) igneous - granite
2) metamorphic
3) sedimentary - sandstone

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Plasticize

- (c) (i) State four properties of a good brick. *1. good appearance*
2. durable
3. strong
4. soundness
5. healthy
- (ii) outline the procedure for the manufacture of bricks. (6 marks)

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

- (i) seasoning; - the extraction of water sap from the timber that has been cut
- (ii) live knot; - this are defects that can grow back given good amount of time
- (iii) dead knot; - this are defects that cannot regrow back within the tree
- (iv) dry rot. - this is a defect occurring due to the normal growth of the part of a tree (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:

Hardwood - wood found in dry areas that does not contain latex and oil (4 marks)

Softwood - wood found in wet areas with latex and oil

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

1) beauty purpose 2) hygiene

(ii) Describe four main ingredients of paint. - *inert filler - 1* (6 marks)

1) oil 2) water 3) colour pigment

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

(i) native asphalt;

(ii) cut back asphalt;

(iii) asphaltite.

- dust prevention
- prevent moulding
- sound proof insulator
- shock insulator

(6 marks)

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

(ii) State four uses of bitumen.

1) road construction

2) construction of gutters

3)

Types of bitumen
1) natural bit

(4 marks)



(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)

more carbon
to darken it

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