

2707/205

**BUILDING CONSTRUCTION II, CIVIL ENGINEERING
CONSTRUCTION AND TRANSPORTATION
ENGINEERING I**

Oct./Nov. 2022

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN CIVIL ENGINEERING

MODULE II

**BUILDING CONSTRUCTION II, CIVIL ENGINEERING CONSTRUCTION AND
TRANSPORTATION ENGINEERING I**

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Drawing instruments.

This paper consists of EIGHT questions in THREE sections; A, B and C.

Answer FIVE questions choosing TWO questions from section A, TWO questions from section B and ONE question from section C.

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 5 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: BUILDING CONSTRUCTION II

Answer **TWO** questions from this section.

1. (a) State six functional requirements of roofs. (6 marks)
- (b) Explain the difference between a purlin roof and a trussed roof. (4 marks)
- (c) With aid of a sectional sketch, describe the construction details of formwork for a concrete flat roof. (10 marks)
2. (a) Make a detailed sketch of a plain tile. (6 marks)
- (b) Outline the procedure for applying grass thatch on a roof. (10 marks)
- (c) Sketch the following details in G.C.I roof construction:
- (i) end lap;
 - (ii) side lap.
- (4 marks)
3. (a) State three common materials used in roof construction. (3 marks)
- (b) Define each of the following as used in roof construction:
- (i) span;
 - (ii) rise;
 - (iii) pitch;
 - (iv) rafter.
- (4 marks)
- (c) With the aid of a sketch, explain how rain water is drained off from a double roof with open eaves. (13 marks)

SECTION B: CIVIL ENGINEERING CONSTRUCTION

Answer **TWO** questions from this section.

4. (a) (i) With the aid of sketches, describe any **two** major types of foundations. (6 marks)
- (ii) Describe **three** conditions in which timbering to trenches may be necessary. (3 marks)
- (iii) State any **four** uses of sheet piles. (4 marks)
- (b) (i) With the aid of a schematic diagram, explain the occurrence of ground water. (4 marks)
- (ii) Define an aquifer. (1 mark)
- (iii) Explain the difference between shallow and deep wells. (2 marks)
5. (a) (i) State **three** factors that influence the selection of a dam site. (3 marks)
- (ii) Explain **four** causes of a dam failure. (6 marks)
- (iii) With the aid of sketches, describe an arch dam. (5 marks)
- (b) Use sketches to describe the following water front structures:
- (i) jetty;
- (ii) rubble slopping breakwaters. (6 marks)
6. (a) (i) With the aid of sketches, describe any **two** types of rails. (4 marks)
- (ii) State **four** requirements of an ideal rail joint. (2 marks)
- (iii) Explain why coning of wheels and tilting of rails is done in railways. (4 marks)
- (b) Explain the following methods of tunnelling in hard rock:-
- (i) full face method;
- (ii) drift method;
- (iii) heading and bench method. (6 marks)

(c) Describe the following discharge regulating structures:

- (i) sluice way;
- (ii) chute spillway.

(4 marks)

SECTION C: TRANSPORTATION ENGINEERING I

Answer ONE question from this section.

7. (a) (i) Describe the early Roman roads. (3 marks)
- (ii) Explain **four** reasons for extra widening of roads on horizontal curves. (6 marks)

(b) Draw a cross-section of a road in embankment and indicate the following parts:

- (i) carriageway;
- (ii) shoulder;
- (iii) roadway;
- (iv) berm;
- (v) side drain;
- (vi) land width.

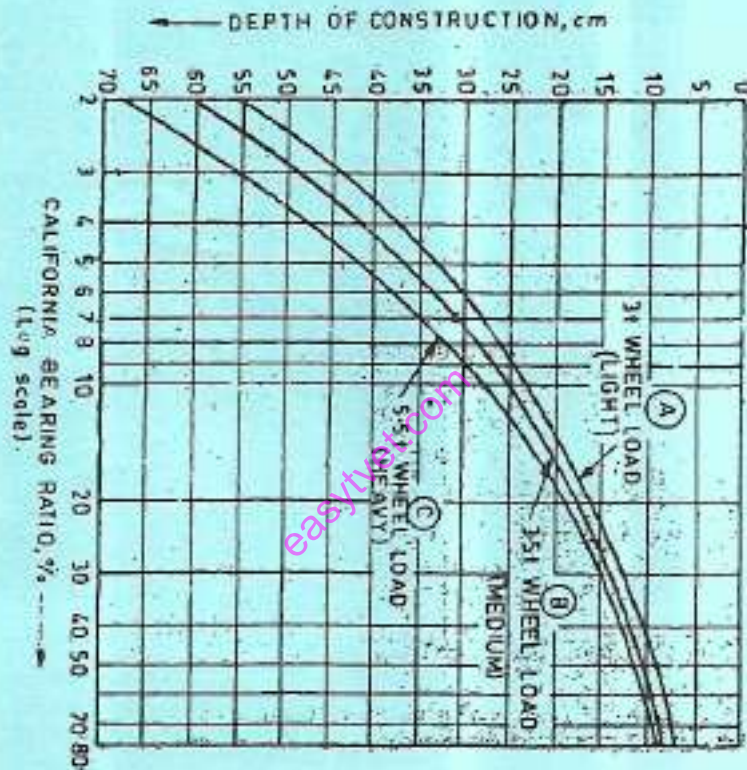
(6 marks)

(c) Define the following terms as used in geometric design of roads:

- (i) right of way;
- (ii) camber;
- (iii) ruling gradient;
- (iv) design speed;
- (v) super elevation.

(5 marks)

8. (a) (i) Explain the four main phases of site investigation. (6 marks)
- (ii) Explain the use of trial pits in site investigation. (3 marks)
- (b) (i) Explain four functions of soil as a highway sub-grade. (4 marks)
- (ii) Explain C.B.R test on sub-grade soil giving its significance. (4 marks)
- (c) The C.B.R values adopted for a design for the sub-grade sub-base and base materials are 7%, 25% and 60% respectively. Design the pavement section for medium traffic using the standard curves provided. (3 marks)



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