

2707/205

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

June/July 2019

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN CIVIL ENGINEERING

MODULE II

**BUILDING CONSTRUCTION II, CIVIL CONSTRUCTION AND TRANSPORT
ENGINEERING 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 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 4 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 any **five** factors to be considered when selecting the type of roof covering for a pitched roof. (5 marks)
- (b) Sketch and label a ridge detail using plain tiles. (5 marks)
- (c) Describe the following roof functional requirements:
- (i) weather resistance;
- (ii) insulation. (4 marks)
- (d) With the aid of sketches, distinguish between ~~double~~ roof and trussed roof. (6 marks)
2. (a) State **three** advantages and **three** disadvantages of using precast concrete panels in upper floors. (6 marks)
- (b) With the aid of a sketch, explain the construction of hollow pot in upper floors. (10 marks)
- (c) Sketch and label the method of sound proofing wood joists upper floors adjoining thin walls. (4 marks)
3. (a) (i) State **three** advantages of steel trusses over timber trusses. (3 marks)
- (ii) Sketch the following steel roof trusses:
- I. Belgian roof truss;
- II. Howe steel roof truss. (3 marks)
- (b) Describe the following roof coverings:
- (i) wood shingles;
- (ii) bitumen felt. (4 marks)
- (c) State the steps of laying interlocking tiles onto a roof. (3 marks)
- (d) Outline the procedure of installing a timber roof truss. (7 marks)



SECTION B: CIVIL CONSTRUCTION

Answer **TWO** questions from this section.



4. (a) State:
- (i) any **two** advantages of tunnels;
 - (ii) any **two** reasons for the need of ventilation during tunnel operations. (4 marks)

(b) Describe the drift method in rock tunnel excavation. (4 marks)

(c) State **four** methods of excavation in the construction of basements. (4 marks)

Handwritten notes:
 1. Rammed aggregate
 2. Precast concrete
 3. Shotcrete
 4. Cast in situ

- (d) With aid of sketches, describe the following modes of failure of retaining walls:
- (i) tension in joints;
 - (ii) rotational slips. (8 marks)



5. (a) (i) State any **three** factors considered when selecting a dam site.
- (ii) With the aid of a sketch, describe an upstream protection and cut-off membrane for a rockfill dam. (7 marks)

(b) With the aid of a sketch, describe the function of the side channel spillway. (5 marks)

- (c) (i) State any **two** functions of the following railway components:
- I. ballast;
 - II. sleepers.
- (ii) Sketch and label a fish plate. (8 marks)

6. (a) (i) State **two** advantages of ground water.
- (ii) Sketch a section through a dug well with an impervious lining. (6 marks)

- (b) With the aid of sketches, describe the following water front structures:
- (i) dry dock;
 - (ii) sea wall. (8 marks)



(c) State any **six** factors which affect the choice of a foundation. (6 marks)

SECTION C: TRANSPORT ENGINEERING I

Answer *ONE* question from this section.

7. (a) Describe **three** types of maps used in road planning. (6 marks)
- (b) Sketch and label the following ancient roads:
- (i) Telford road;
- (ii) Roman road. (8 marks)
- (c) Explain the procedure of the auger boring test. (6 marks)
8. (a) State any **three** functions of the following in a flexible pavement:
- (i) wearing course;
- (ii) sub-base. (6 marks)
- (b) **Table 1** show traffic composition of a road and the respective equivalent factors. Determine the cumulative standard axles if the traffic growth rate and design life are 7.5% and 25 years respectively. (6 marks)

Table 1

| Vehicle type | Number | Equivalent factor |
|-----------------------|--------|-------------------|
| Cars | 250 | 1.0 |
| Buses | 80 | 1.5 |
| Medium goods vehicles | 200 | 2.0 |
| Heavy goods vehicles | 40 | 4.0 |

- (c) With the aid of sketches, describe the following grade separated intersections:
- (i) diamond intersections;
- (ii) triumphet intersections. (8 marks)

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