2707/205
BUILDING CONSTRUCTION II, CIVIL CONSTRUCTION II AND TRANSPORTATION ENGINEERING I
Oct./Nov. 2016
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN CIVIL ENGINEERING
MODULE II

BUILDING CONSTRUCTION II, CIVIL CONSTRUCTION II 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** in the answer booklet provided.*
All questions carry equal marks.
Maximum marks for each part of a question are as 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.

Turn over

SECTION A: BUILDING CONSTRUCTION II

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

1. (a) State any **four** functional requirements of a roof. (4 marks)

(b) Differentiate between the hip rafter and valley rafter. (4 marks)

(c) **Figure 01** shows a plan of a proposed timber roof construction.

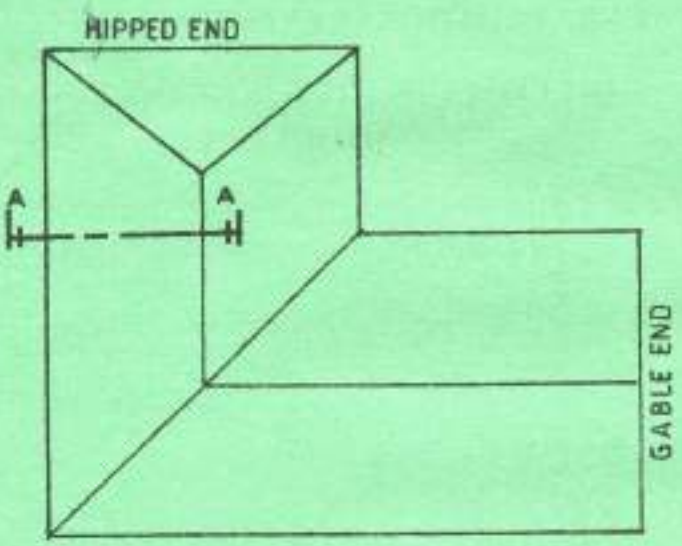

Fig. 1

- the roof is to have an overhang at the eaves and a projection at the verge.
- the roof covering is G.C.I sheets.
- wall is 200 mm thick solid concrete block wall.

Sketch the details at section A-A.

(i) Illustrating a closed eave with T and G boarding.

(ii) roof drainage, showing the following:

- Common rafter
- purlin
- half round gutter
- down pipe
- tie and strutts
- tie beam
- wall plate
- s.c.b. wall
- T & G boarding
- wall plate
- G.C.I sheets
- king post
- ring beam

(12 marks)

2. (a) Differentiate between the following terms:

(i) trimming joist;
(ii) trimmer joist.

(4 marks)

(b) Describe the method of constructing a double timber floor. (6 marks)

(c) **Figure 02** shows an upper floor plan, with the ends of the upper joist supported by the wall. Sketch the details at sections A-A and B-B. (10 marks)

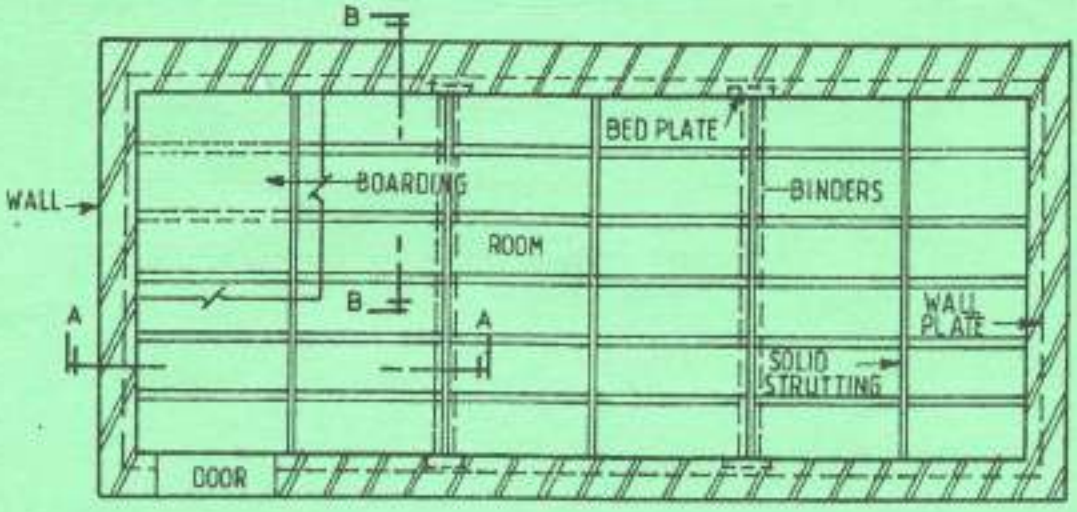

Fig. 2

3. (a) State any **four** factors that influence the choice of roof covering materials. (4 marks)

(b) Use the data to determine:

(i) the number of G.C.I sheets;
(ii) the total cost of G.C.I sheets and nails in (b) (i) above.

Data:

- G.C.I gauge 28 150 mm end laps and 125 mm side laps fixed with m.s roofing nails.
- Cost of 3 m long G.C.I gauge 28 @ 1500/= per sheet.
- Cost of m.s. roofing nails 2 kg @ 200/= per kg.
- Area of roof to be covered = 30 m^2.
- Allow for 5% waste for G.C.I sheet.

Assume any other necessary information not given. (10 marks)

(c) State any **three**:

(i) advantages of a flat concrete roof over a pitched concrete roof;

(ii) disadvantages of a flat concrete roof over a pitched concrete roof.

(6 marks)

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SECTION B: CIVIL ENGINEERING CONSTRUCTION II

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

4. (a) Define the following terms as used in railways:

   (i) ruling gradient;
   (ii) momentum gradient.

   (4 marks)

   (b) With the aid of a sketch, describe the method of fixing a bull head rail chair to a railway timber sleeper. (7 marks)

   (c) (i) Outline the construction of a railway tunnel through hard rock.

   (ii) State any **three** disadvantages of a tunnel. (9 marks)

5. (a) State any **three** factors to consider in design and choice of a particular foundation. (3 marks)

   (b) With the aid of sketches, describe the following types of foundations:

   (i) wide strip foundation;
   (ii) deep strip foundation.

   (10 marks)

   (c) With the aid of sketches, explain the **two** types of aquifers as used in wells. (7 marks)

6. (a) Define the term discharge. (2 marks)

   (b) State any **three**

   (i) factors that affect the intake of a water treatment plant;

   (ii) advantages of plain sedimentation process of water treatment.

   (6 marks)

   (c) With the aid of sketches, describe the construction of the following:

   (i) sea walls;
   (ii) lock gates.

   (12 marks)

SECTION C: TRANSPORTATION ENGINEERING I

*Answer **ONE** question from this section.*

7. (a) State any **three** roles played by transportation systems. (3 marks)

(b) Describe the history of an ancient Roman road transportation system. (7 marks)

(c) With the aid of a sketch, outline the construction method of a macadam road. (6 marks)

(d) State any **four** objectives of soil investigations. (4 marks)

8. (a) State any **three** factors that influence the following geometric design of a road

(i) design speed;
(ii) design capacity.

(6 marks)

(b) Determine the capacity of a single lane pavement on a rural road for speed of 50 km/hr. The average length of vehicle is 5 m, the perception and brake reaction time is 2.5 seconds and coefficient of friction is 0.5. (5 marks)

(c) Draw a cross-section of a single lane flexible pavement and show the following road elements:

(i) carriage way;
(ii) shoulder;
(iii) foot path;
(iv) wearing course;
(v) base;
(vi) subbase;
(vii) sub grade;
(viii) formation level.

(9 marks)

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