2307/306
CIVIL ENGINEERING CONSTRUCTION
AND DRAWING
Oct./Nov. 2010
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN CIVIL ENGINEERING

CIVIL ENGINEERING CONSTRUCTION AND DRAWING

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;
Drawing instruments;
Drawing paper size A2.

*This paper consists of **EIGHT** questions in **TWO** section **A** and **B**.*
*Answer any **FIVE** questions choosing **FOUR** questions from section **A** and **ONE** question from section **B**.*
*Questions in section **A** carry 15 marks each while questions in section **B** carry 40 marks each*
Maximum marks for each part of a question are as shown.

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: CIVIL ENGINEERING CONSTRUCTION

*Answer any **FOUR** questions from this section.*

1. (a) Outline **four** objectives achieved through water purification. (6 marks)

   (b) With the aid of a sketch, explain what happens in the four zones of a rectangular sedimentation basin. (9 marks)

2. (a) With the aid of sketches, describe the following water distribution systems:
   (i) grid iron;
   (ii) radial. (8 marks)

   (b) (i) Describe the term 'well development';
   (ii) Explain backwash and surging actions in well development. (7 marks)

3. (a) State **three** classifications of sewerage drainage systems. (3 marks)

   (b) With the aid of a sketch, explain sewage treatment by a septic tank. (6 marks)

   (c) Explain the following processes in the preliminary conventional sewage treatment:
   (i) screening;
   (ii) grit chamber;
   (iii) sedimentation. (6 marks)

4. (a) With the aid of a sketch, explain the use of the following rail components:
   (i) chair;
   (ii) fish plate. (10 marks)

   (b) State **five** requirements of a rail track. (5 marks)

5. (a) Describe the following water front structures:
   (i) wharves;
   (ii) fenders;
   (iii) jetties. (6 marks)

   (b) With the aid of a sketch, explain the use of a compressed air caisson. (5 marks)

   (c) State **four** factors considered when selecting cofferdams. (4 marks)

6. (a) Describe the following methods of tunnelling:
   (i) open-cut method;
   (ii) immersed-tube system. (4 marks)

   (b) Explain each of the following actions when tunnelling:
   (i) control of water;
   (ii) removal of debris. (4 marks)

   (c) With the aid of sketches, describe the following joints used in rigid pavements:
   (i) expansion joint;
   (ii) contraction joint. (7 marks)

SECTION B: CIVIL ENGINEERING DRAWING

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

7. (a) (i) To a scale of 1:50, draw a section through a conterfort retaining wall given the following information:

height of wall 8600mm
length of the base 5850mm
length of toe 1300mm
thickness of the base slab 400mm
height from base to the start of the sloping counterfort 1000mm
top width of the wall 350mm
key at the end of the toe 400 x 300mm
reinforcement on the stem Y16 @ 300c/c
all round concrete cover 25mm
blinding below the base 50mm.

   (ii) Draw a sectional plan at a height of 3500mm above the base, excluding the toe. Show the reinforcement bars. (30 marks)

   (b) To a scale of 1:25, draw a section of a permanent way on embankment given the following information:

width of the embankment on formation level 6500mm
top width of the embankment 5000mm
side slopes of the embankment 1.5:1 (H:V)
height of the embankment 500mm
width of ballast layer 4000mm
top width of ballast layer 2500mm
wooden sleeper 2100 x 200 x 150mm
bull head (BH) rail gauge 1400mm. (10 marks)

8. To a scale of 1:20 draw a sectional plan and a vertical section through a masonry cesspool 2500mm x 2500mm given the following information:

liquid depth in the cesspool	1750mm
freeboard	300mm
engineering brick wall	200mm thick
puddled clay sorround	225mm
concrete floor slab	150mm
hardcore thickness	200mm
concrete slab cover for the cesspool	100mm thick
access manhole cover	600 x 600 x 50mm
fresh air inlet pipe of diameter	80mm
timber support post for fresh air pipe	hard wood 50 x 75mm
vent pipe with baloon grating diameter	100mm
C.I. inlet pipe of diameter	100mm

Inside of the cesspool is painted with asphalt.

Apply correct notations and assume any other relevant information.

(40 marks)