2705/104
2707/104
2709/104
2710/104
SURVEYING I AND WORKSHOP
TECHNOLOGY I (MECHANICAL)
Oct./Nov. 2021
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN BUILDING TECHNOLOGY
DIPLOMA IN CIVIL ENGINEERING
DIPLOMA IN ARCHITECTURE

MODULE I

SURVEYING I AND WORKSHOP TECHNOLOGY I (MECHANICAL)

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
Answer booklet;
Drawing instruments;
Mathematical tables/scientific calculator.
*This paper consists of **EIGHT** questions in **TWO** sections; **A** and **B**.*
*Answer **FIVE** questions choosing at least **TWO** questions from section **A** and **B** and **ONE** other question from either section.*
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.

Turn over

SECTION A: SURVEYING I

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

1. (a) With the aid of a sketch, explain the following terminologies as used in engineering survey:

   (i) horizontal line;
   (ii) datum surface;
   (iii) level surface.

   ($7\frac{1}{2}$ marks)

   (b) Describe the following applications of levelling:

   (i) indirect contouring;
   (ii) sectioning;
   (iii) setting out.

   (9 marks)

   (c) Describe levelling as a surveying technique. ($3\frac{1}{2}$ marks)

2. With the aid of a labelled sketch, outline the procedure of levelling using a dumpy level. (20 marks)

3. (a) The following readings were taken with a level and 4 m staff. Draw up a level book page and reduce the levels by the height of collimation method.

   0.578 (BM = 58.250 m), 0.933, 1.768, 2.450, (2.005 and 0.567)C.P, 1,888, 1.181, (3.679 and 0.612)C.P., 0.705, 1.810.

   (17 marks)

   (b) Describe electromagnetic distance measuring machine. (3 marks)

4. (a) **Table 1** shows a page of level book reproduced in which some readings marked X are missing. Complete the page with all arithmetic checks. ($12\frac{1}{2}$ marks)

Table 1: Level Book

Stn	BS	IS	FS	Rise	Fall	R.L	Remarks
1	3.150					X	
2	1.170		X		0.700	X	C.P.
3		2.200			X	X	
4	X		1.850	X		X	C.P.
5		2.440			0.010	X	
6	X		X	1.100		X	C.P.
7	1.185		2.010	X		222.200	C.P.
8		-2.735		X		X	Staff held inverted
9	X		1.685		4.420	X	C.P.
10			1.525		0.805	X	
$\sum$	12.055		X	X	X		

(b) Describe the following surveying tools:

(i) surveyor's band;

(ii) surveyor's chain.

(5 marks)

(c) List **five** main sources of error in levelling. ($2\frac{1}{2}$ marks)

SECTION B: WORKSHOP TECHNOLOGY I (MECHANICAL)

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

5. (a) (i) Define an accident in a workshop.

(ii) Outline **six** safety precautions in a workshop.

(10 marks)

(b) State **five** differences between petrol and diesel engines. (10 marks)

6. (a) Describe the following operations in hand filing:

(i) roughing;
(ii) finishing.

(6 marks)

(b) (i) State the aim of marking out techniques.

(ii) Highlight the purpose of the following tools:

(I) surface plate;
(II) hand scriber;
(III) engineer's dividers;
(IV) engineer's steel rule;
(V) centre punch;
(VI) scribing block;
(VII) try-square.

(8 marks)

(c) State **three** hints which will assist in the proper use of the hacksaw. (3 marks)

(d) Sketch the following files:

(i) double cut file;
(ii) single cut file.

(3 marks)

7. (a) With the aid of sketches, explain the following lathe operations:

(i) facing;
(ii) drilling.

(12 marks)

(b) Explain **three** ram driving mechanisms in a shaper. (6 marks)

(c) List **four** factors considered in the specification of a shaper. (2 marks)

8. (a) (i) State the fundamental purpose of maintenance of a pump.

(ii) Define the term, 'preventive maintenance of a pump'.

(iii) Outline the following types of preventive maintenance:

(I) maintenance on fixed time;
(II) opportunity maintenance.

(6 marks)

(b) With the aid of a sketch, explain the worrking of a single-acting reciprocating pump. (14 marks)

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