2705/104 2709/104
2707/104 2710/104
SURVEYING I AND WORKSHOP TECHNOLOGY I (MECHANICAL)
June/July 2023
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;
Scientific calculator.
*This paper consists of **TWO** sections; **A** and **B**.*
*Answer **FIVE** questions choosing at least **TWO** questions from section **A** and **B** and **ONE** 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 3 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) Define the following terms as used in contouring:

(i) contour line;
(ii) contour interval;
(iii) horizontal equivalent. (6 marks)

(b) State **six** uses of contours. (6 marks)

(c) Outline the procedure of grid square as a method of contouring. (8 marks)

2. (a) Using a suitable sketch, show that curvature of the earth is given by:

$\frac{D^2}{2R}$, where D = measured distance

R = radius of the earth. (8 marks)

(b) The following data were obtained after performing a reciprocal levelling:

- Level at A reading on staff C = x = 2.46 m
- Level at A reading on staff D = x' = 1.28 m
- Level at B reading on staff D = y = 2.23 m
- Level at B reading on staff C = y' = 3.45 m

Determine the true difference in height between C and D. (12 marks)

3. (a) P and Q are two points 517 m a part on the same bank of a river. The bearings of a tree on the other bank observed from P and Q are $N33^\circ40'E$ and $N43^\circ20'W$ respectively. Find the width of a river if the bearing of PQ is $N78^\circ E$. (12 marks)

(b) State **four** ways through which perpendicular offsets may be taken in chain surveying. (4 marks)

(c) List **four** types of tapes. (4 marks)

4. **Table 1** shows observations taken during a levelling exercise. Reduce the observations by the rise and fall method, given the R.L of 6th point as 101.665 m and calculate the gradient between point 2 and 7 assuming the ground to be level. (20 marks)

Table 1

Chainage	B.S	I.S	F.S
165	3.150		
180		2.245	
195		1.125	
210	3.125		0.860
225		2.760	
240		1.835	
255		1.470	
270	1.225		1.965
285		2.390	
300			3.035

SECTION B: WORKSHOP TECHNOLOGY I (MECHANICAL)

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

5. (a) State **five** safety precautions relating to power hand tools. (5 marks)

   (b) Explain **four** safety precautions observed when using a machine. (8 marks)

   (c) Outline the procedure for carrying out facing using a lathe machine. (7 marks)

6. (a) State **five** comparisons between 'up-milling' and 'down-milling' machine. (10 marks)

   (b) With the aid of sketches, differentiate between a 'hand vice' and a 'pipe vice'. (10 marks)

7. (a) Explain **four** methods of caring and maintaining cutting hand tools. (8 marks)

   (b) With the aid of a labeled vertical cross-sectional sketch outline the operation of a hand water pump. (12 marks)

8. (a) Distinguish 'cross filling' from 'draw filling'. (4 marks)

   (b) Explain **three** classifications of hand tools. (6 marks)

   (c) With the aid of a labelled longitudinal sketch, describe the operation of a carburetor. (10 marks)

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