Name_____ Index No._____

2705/104
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SURVEYING I AND WORKSHOP
TECHNOLOGY (MECHANICAL)
Oct/Nov 2013
Time: 3 hours

Candidate's Signature_____

Date _____

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN CIVIL ENGINEERING
DIPLOMA IN BUILDING CONSTRUCTION
DIPLOMA IN ARCHITECTURE
MODULE I

SURVEYING I AND WORKSHOP TECHNOLOGY (MECHANICAL)

3 hours

INSTRUCTIONS TO CANDIDATES

Write your name and index number in the spaces provided above.
Sign and write the date of the examination in the spaces provided above.
You should have a calculator and drawing instruments for this examination.
*This paper consists of **TWO** Sections: **A** and **B**.*
*Answer **FIVE** questions choosing **TWO** questions from Section **A**, **TWO** questions from Section **B** and **ONE** question from either Section in the spaces provided in this question paper.*
***All** questions carry equal marks.*
Maximum marks to each part of a question are as shown.
*Do **NOT** remove any pages from this booklet.*
Candidates should answer the questions in English.

For Examiner's Use Only

Question	1	2	3	4	5	6	7	8	TOTAL SCORE
Candidate's Score									

This paper consists of 20 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

*Answer at least **TWO** questions from this Section in the spaces provided.*

1. (a) (i) Define the term surveying.

(ii) Highlight **six** types of maps produced from ground surveying. (8 marks)

(b) Describe **four** types of surveying. (10 marks)

(c) State **two** purposes of Engineering Surveying. (2 marks)

2. (a) With the aid of a sketch, explain the process of ranging between two points separated by high ground. (5 marks)

(b) A 30 m steel tape calibrated at 25°C is used at 38°C. Coefficient of thermal linear expansion of steel is 0.01 mm per metre length.

(i) If a recorded length of 170m was made at 38°C. Determine the true length of the measured distance.

(ii) If an area of 310 m^2 was calculated from measurements taken at 38°C. Determine the true area of the piece of land covered. (7 marks)

(c) (i) State the use of each of the following surveying instruments:

I land chain;
II abney level;
III drop arrow;
IV ranging rods;
V optical square. ($2\frac{1}{2}$ marks)

(ii) Two points X and Y are situated on an evenly sloping ground. The vertical distance between the two points is 5.7 m. Distance XY along the slope is 231.72 m. Find the horizontal distance AB. ($5\frac{1}{2}$ marks)

3. (a) (i) Define the term levelling. (2 marks)

(ii) Describe the following terms used in levelling:

I horizontal line;
II bench mark;
III back sight;
IV level surface. (8 marks)

(b) A levelling exercise was performed on the first stage of an improvement scheme along a short section of road. The Engineer reduced the levels by the height of collimation method whilst on site and then accidentally dropped his field booth in a puddle, obliterating some of the figures (shown by dashes).

BS	IS	FS	HCA	RL	Distance	Remarks
-				84.03	0	
	4.27			-	30	
	2.65			85.76	60	
-		0.23	91.80	-	90	CP
	1.63			-	120	
1.69		0.52		-	150	CP
	0.97			92.00	180	
	0.72			92.25	210	
	1.02			91.95	240	
	1.10			91.87	270	
	-	-		-	300	
ΣBS		ΣFS				
9.69		0.89				

(i) Determine the missing entries and insert them in their appropriate place. (8 marks)

(ii) Calculate the mean gradient of the ground between the chainage 0 m and 300 m. (2 marks)

4. (a) Sketch and label a cross section through a dumpy level. (8 marks)

(b) Outline the procedure for carrying out temporary adjustment of a dumpy level. (5 marks)

(c) The following are staff readings taken along the centre line of a proposed sewer; 3.10, 2.56, 1.07, 3.96, 1.92, 0.67, 1.20, 4.24, 1.87, 0.22, 3.03 and 1.41. The level was shifted after the fourth, sixth and ninth readings. Reduce the readings by rise and fall method showing all the arithmetic checks. The first reading was taken with the staff held over a TBM of 190.0 m. (7 marks)

SECTION B: WORKSHOP TECHNOLOGY (MECHANICAL)

*Answer at least **TWO** questions from this Section in the spaces provided.*

5. (a) (i) State **eight** marking out tools.

(ii) Make a labelled sketch to show the marking out of a work piece using an angle plate and a surface gauge. (10 marks)

(b) Explain the use of the following hand tools:

(i) scrapers;

(ii) trammels;

(iii) parallel strips. (4½ marks)

(c) Explain the following terms:

(i) tapping;

(ii) brazing. (4 marks)

(d) List **three** uses of pumps in Construction Industry. (1½ marks)

6. (a) State **four** safety precautions to be observed when using hand tools. (4 marks)

(b) (i) State **four** classifications of fire.

(ii) Outline the procedure to be followed when administering chest compressions during first aid. (9 marks)

(c) (i) Sketch and label a carburetor.

(ii) State **two** advantages and **two** disadvantages of compression ignition engines. (7 marks)

7. (a) (i) List **four** "hand cutting tools" in a mechanical workshop.

(ii) With the aid of sketches explain the following filing procedures:

I cross filing;
II draw filing. (8 marks)

(b) Sketch and label the vernier calliper. (5 marks)

(c) Explain the following terms as used in soldering:

(i) tinning;

(ii) sweating. (4 marks)

(d) State **six** data to be furnished for purchasing pumps. (3 marks)

8. (a) (i) List **three** methods of work holding for turning on a centre lathe.

(ii) Illustrate the following procedures carries out on a centre lathe:

I drilling;
II surfacing;
III parting off. (6 marks)

(b) With the aid of sketches, explain the operation of the slotted link mechanism used in a shaper. (6 marks)

(c) Explain the following terms used in pumps:

(i) pump priming;

(ii) cavitation. (4 marks)

(d) With the aid of sketches, describe the following processes of taper turning:

(i) using the tool angle;

(ii) setting the angle on the compound slide. (4 marks)