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2705/104      2709/104

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**SURVEYING I AND WORKSHOP  
TECHNOLOGY I (MECHANICAL)**

Oct./Nov. 2014

Time: 3 hours



Candidate's Signature: \_\_\_\_\_

Date \_\_\_\_\_

**THE KENYA NATIONAL EXAMINATIONS COUNCIL**

**DIPLOMA IN BUILDING TECHNOLOGY  
DIPLOMA IN CIVIL ENGINEERING  
DIPLOMA IN ARCHITECTURE**

**SURVEYING I AND WORKSHOP TECHNOLOGY I (MECHANICAL)**

**3 hours**

**INSTRUCTIONS TO CANDIDATES**

*Write your name and index number in the spaces provided above.*

*Sign and write the date of examination in the spaces provided above.*

*You should have a scientific calculator for this examination.*

*This paper consists of **EIGHT** questions in **TWO** sections; **A** and **B**.*

*Answer a total of **FIVE** questions as shown below in the spaces provided in this question paper:*

*any **TWO** questions from section **A**;*

*any **TWO** questions from section **B**;*

*any other **ONE** question from either section **A** or **B**.*

*All questions carry equal marks.*

*Candidates should answer the questions in English.*

**For Examiner's Use Only**

Section	Question	Maximum Score	Candidate's Score
<b>A</b>	1	20	
	2	20	
	3	20	
	4	20	
<b>B</b>	5	20	
	6	20	
	7	20	
	8	20	
<b>TOTAL SCORE</b>			

**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.**

## SECTION A: SURVEYING I

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

1. (a) Reciprocal levelling between points X and Y on opposite sides of a river gave the following results for staffs held vertically from level stations A and B on each bank respectively.

Staff reading of X from A	=	1.753 m
Staff reading of X from B	=	2.080 m
Staff reading of Y from A	=	2.550 m
Staff reading of Y from B	=	2.895 m

If the reduced level of X is 90.37 AOD, obtain that of Y. (10 marks)

- (b) Differentiate between ordinary spirit levelling and precise levelling in terms of 'staves' used in each case. (4 marks)
- (c) Explain **four** components of instrument's error in levelling. (6 marks)
2. (a) Define the following terms used in contouring:
- (i) contour line;
  - (ii) spot height;
  - (iii) contour interval;
  - (iv) horizontal equivalent;
  - (v) gradient. (5 marks)
- (b) With the use of a diagram, describe the procedure of reciprocal levelling stating its application. (12 marks)
- (c) Differentiate between plane and geodetic survey. (3 marks)
3. (a) Describe how the following tasks are carried out before a dumpy level is ready for use:
- (i) setting up and centring over ground mark;
  - (ii) levelling;
  - (iii) removal of parallex. (12 marks)
- (b) Outline at least **three** branches of surveying. (6 marks)
- (c) List any **two** errors encountered in levelling. (2 marks)

4. (a) Level pegs are to be set out on a building site for the following levels.

Point	Reduced level (m)
A	130.687
B	130.760
C	130.523
D	130.895
E	130.730

A temporary bench mark whose height above sea level of 130.480 m was sighted and a backsight reading of 0.835 m was taken on it. Using the information determine, the staff readings required to set up the points A, B, C, D and E. (10 marks)

- (b) Outline **four** uses of levels. (4 marks)

- (c) Write the following in full

- (i) A.O.D.
- (ii) T.B.M.
- (iii) M.S.L.

(3 marks)

- (d) State the role of the following components of an EDM instrument.

- (i) Emitter;
- (ii) Reflector.

(3 marks)

### SECTION B: WORKSHOP TECHNOLOGY I (MECHANICAL)

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

5. (a) With the aid of a sketch, explain the **four** main components of a reciprocating engine. (12 marks)

- (b) Explain the following terms as used in engines:

- (i) induction stroke;
- (ii) compression stroke;
- (iii) the power stroke;
- (iv) the exhaust stroke.

(8 marks)

6. (a) Sketch and label a cross sectional view of a simple centrifugal pump. (6 marks)
- (b) Explain the working principles of a centrifugal pump. (8 marks)
- (c) Define the following terms as used in pumps:
- (i) specific gravity;
  - (ii) capacity. (6 marks)
7. (a) Outline any **two** non-mechanical accidents in a workshop. (4 marks)
- (b) Outline any **two** ways of avoiding electrical shocks in a workshop. (4 marks)
- (c) Outline any **three** ways in which files are taken care of during the process of working. (6 marks)
- (d) Sketch and label the following:
- (i) file;
  - (ii) hack saw. (6 marks)
8. (a) Sketch and label:
- (i) ball pen hammer;
  - (ii) mallet. (8 marks)
- (b) Outline the **two** factors governing the pitch of a hacksaw blade. (4 marks)
- (c) Outline any **eight** precautions to be taken when using a hand hack saw. (8 marks)