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

Oct./Nov. 2018

Time: 3 hours



**THE KENYA NATIONAL EXAMINATIONS COUNCIL**

**DIPLOMA IN BUILDING CONSTRUCTION  
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 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 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: SURVEYING I

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

1. (a) Define each of the following terms used in levelling:

- (i) horizontal line;
- (ii) line of collimation;
- (iii) datum surface;
- (iv) staff station.

(6 marks)

(b) The following readings were taken on a levelling staff at 20 m intervals:

0.968, 1.578, 2.157, 2.736, 3.598, 4.236, 0.929, 1.852, (BM RL = 1850.786),  
2.431, 3.163, 3.996.

If the instrument was shifted after the sixth reading:

- (i) rule-out a level note book and enter the readings;
- (ii) reduce the levels using "Height of Collimation: method (apply necessary check)
- (iii) calculate the gradient of the ground between chainage 40 and chainage 180.

(14 marks)

2. (a) Sketch and label a dumpy level.

(6 marks)

(b) State **four** properties of contours.

(4 marks)

(c) In running fly levels from a benchmark of reduced level 1000 m, the following readings were obtained:

Backsight: 1.252, 3.853, 2.657, 2.027

Foresight: 2.417, 2.437, 2.382,

From the last position of the instrument levels of three points whose reduced levels are 1002.165, 1001.365 and 1000.565. Determine the staff readings at the points.

(10 marks)

3. (a) Explain each of the following types of survey:

- (i) topographical surveying;
- (ii) cadastral surveying;
- (iii) engineering surveying;
- (iv) aerial surveying.



(6 marks)

- (b) With the aid of a labelled sketch, outline the field procedure for carrying out "indirect alignment" in chain surveying. (7 marks)
- (c) Outline the procedure of the direct method of contouring. (7 marks)

4. The following is an extract for a levelling field note book in which the entries were made and levels reduced. The gaps indicate figures which were obliterated by rain after reducing the levels. Determine the missing entries and carry out the necessary arithmetic checks. (20 marks)

BS	IS	FS	Rise	Fall	Reduced level	Remarks
--					182.85	BM
	5.50			2.08	180.77	Peg1
	--			3.38	177.39	Peg2
4.16		--		3.59	--	Peg3
	--		2.21		--	Peg4
	--			4.60	171.41	Peg5
		11.97		--	165.99	Peg6
	3.90		--		166.74	Peg7
	6.32			--	164.32	Peg8
	2.34		3.98		--	Peg9
8.16		1.62	--		169.02	Peg10
	5.20		--		171.98	Peg11
	6.13			--	--	Peg12
		--	3.63		174.68	Peg13

### SECTION B: WORKSHOP TECHNOLOGY (MECHANICAL)

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

5. (a) With the aid of a sketch, outline the drilling procedure of a metal plate using a drilling machine. (11 marks)
- (b) State **three** precautions taken when using each of the following hand tools:
- hacksaw;
  - file;
  - chisel.

(9 marks)



Turn over

6. (a) State **five** considerations when selecting a water pump. (5 marks)
- (b) Illustrate a typical accident reporting form. (7 marks)
- (c) Highlight **four** health and safety obligations for each of the following:
- (i) employer.
  - (ii) employee.
- (8 marks)
7. (a) Describe each of the following types of fire extinguishers:
- (i) water jet;
  - (ii) water spray;
  - (iii) water extinguishers with additives;
  - (iv) water mist.
- (8 marks)
- (b) Differentiate petrol engine from diesel engine in respect to each of the following:
- (i) compression;
  - (ii) combustion;
  - (iii) running cost.
- (6 marks)
- (c) With the aid of a labelled sketch, describe an adjustable frame hacksaw. (6 marks)
8. (a) Explain each of the following fire extinguishing principles:
- (i) smothering;
  - (ii) starving;
  - (iii) cooling.
- (6 marks)
- (b) Illustrate each of the following signs used in warning hazards:
- (i) risk of fire;
  - (ii) general warning risk of danger;
  - (iii) do not extinguish with water.
- (6 marks)
- (c) Explain **four** advantages of preventive maintenance. (8 marks)

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