

2705/104    2709/104  
2707/104    2710/104  
SURVEYING I AND WORKSHOP  
TECHNOLOGY I (MECHANICAL)  
June/July 2016  
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

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

SURVEYING I AND WORKSUOP TECHNOLOGY I (MECHANICAL)

**3 hours**

**INSTRUCTIONS TO CANDIDATES**

*You should have the following for this examination:*

*Drawing instruments;*

*Scientific calculator;*

*Answer booklet.*

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

*Answer FIVE questions choosing at least TWO questions from section A,*

*TWO questions from section B and ONE question from either sections.*

*All questions carry equal marks.*

*Maximum marks for each part of a question are as shown.*

*Candidates should answer the questions in English.*

**This question paper consists of 4 printed pages.**

**Candidates must check the question paper to ascertain that all  
the pages are printed and that no questions are missing.**

## SECTION A: SURVEYING I

*Answer at least TWO questions from this section.*

1. (a) Define the following terms:
- (i) contour interval;
  - (ii) horizontal equivalent;
  - (iii) contour line. (6 marks)
- (b) Outline **two** uses of contours. (4 marks)
- (c) With the aid of sketches, discuss the **two** methods of contouring. (10 marks)
2. (a) Differentiate between ordinary spirit levelling and precise levelling in terms of the staffs used. (6 marks)
- (b) With the aid of a sketch, explain the procedure in reciprocal levelling. (9 marks)
- (c) During a reciprocal levelling exercise the following observations were made at either sides of the river bank at point X, 1.470 and 3.52 and at point Y, 0.516 and 2.620 for point A and B respectively.  
Calculate the true difference in level between A and B. (5 marks)
3. During fly levelling, the following notes were taken
- B.S = 0.62, 2.05, 1.42, 2.63 and 2.42 metres  
I.S = 2.44, 1.35, 0.53 and 2.41 metres
- The first back sight was taken on a benchmark of reduce level 100.00 metres. From the last B.S it is required to set 4 pegs each at distance of 30 metres on a rising gradient 1 in 200.
- (i) Reduce the levels using the rise and fall methods.
  - (ii) Determine the staff readings on the pegs.
  - (iii) Apply the arithmetic check. (20 marks)
4. (a) Outline **four** types of surveys. (8 marks)
- (b) **Table 1** shows a record of staff readings taken during a levelling exercise. The first reading was taken on a benchmark of reduced level 100 metres.
- (i) Reduce the staff readings using the height of collimation method.
  - (ii) Apply all the arithmetic checks. (12 marks)

**Table 1**

B.S.	I.S	F.S	Remarks
1.663	2.946		BM 100.00
	2.008		
	2.153		
3.787		2.585	
	3.270		
	2.218		
		1.646	

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

*Answer at least TWO questions from this section.*

5. (a) Outline **four** personal safety measures to be observed in a workshop. (8 marks)
- (b) Sketch and label a vernier calliper. (4 marks)
- (c) List:
- (i) **two** causes of fire in a workshop;
- (ii) **two** house keeping precautions taken in a workshop. (4 marks)
- (d) Explain **two** disadvantages of using carburettor in a petrol engine. (4 marks)
6. (a) State **four** advantages of centrifugal pump. (4 marks)
- (b) Define the term priming as used in pumps. (2 marks)
- (c) Explain the working principle of a centrifugal pump. (6 marks)
- (d) State **four** advantages of indirect injection for diesel engines. (4 marks)
- (e) State any **four** advantages of indirect injection for diesel engines. (4 marks)

7. (a) Describe the following hand tools, stating where each one is used:
- (i) ball peen hammer;
  - (ii) claw hammer;
  - (iii) mallet;
  - (iv) body hammer. (8 marks)
- (b) State the basic purpose of a file. (1 mark)
- (c) Explain the use of the following punches:
- (i) centre;
  - (ii) prick;
  - (iii) pin. (6 marks)
- (d) State **five** factors to be considered when determining the correct speed and feed rates in a lathe machine. (5 marks)
8. (a) Differentiate petrol engine from diesel engine. (4 marks)
- (b) State **four** components of a reciprocating pump. (4 marks)
- (c) Discuss the **four** stroke petrol engine. (12 marks)

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