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2707/104 2710/104

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

Oct./Nov. 2016

Time: 3 hours



**THE KENYA NATIONAL EXAMINATIONS COUNCIL**

**DIPLOMA IN CIVIL ENGINEERING  
DIPLOMA IN BUILDING CONSTRUCTION  
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;*

*calculator;*

*drawing instruments.*

*This paper consists of EIGHT questions in 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.*

*All questions carry equal marks.*

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

*Candidates should answer the questions in English.*

**This paper consists of 6 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) Distinguish between plane surveying and geodetic surveying. (5 marks)
- (b) Describe five types of surveys in common use. (15 marks)
2. (a) Define the term 'ranging' as used in chain surveying. (1 mark)
- (b) Outline the ranging process when chaining a line. (6 marks)
- (c) Explain three classes of errors encountered in chain surveying giving one example in each case. (6 marks)
- (d) **Figure 1** shows the layout of chain links used in the survey of a site. If the 30 M chain used was later found to be two links longer, calculate the correct area enclosed by the chain line in hectares. One link equal 0.3 m. (7 marks)

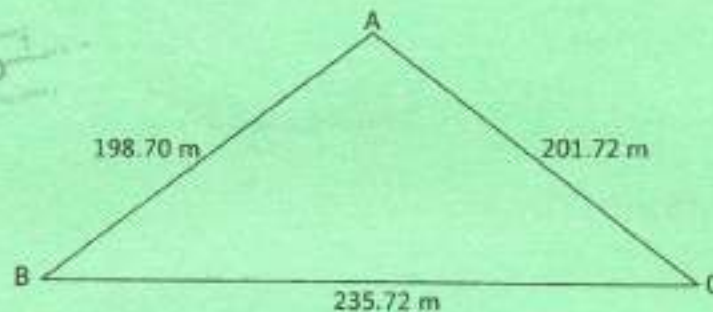


Figure 1

3. (a) Define the following terms as used in levelling:
    - (i) line of collimation;
    - (ii) foresight;
    - (iii) reduced level;
    - (iv) vertical line;
    - (v) staff station.
- (5 marks)

(b) Figure 2 shows level readings taken from BM1 along a proposed road centre-line through points  $P_1, P_2, P_3, \dots, P_9$  closing at BM2. Book the readings in a standard format and reduce them by rise and fall method and apply arithmetic checks.

(15 marks)

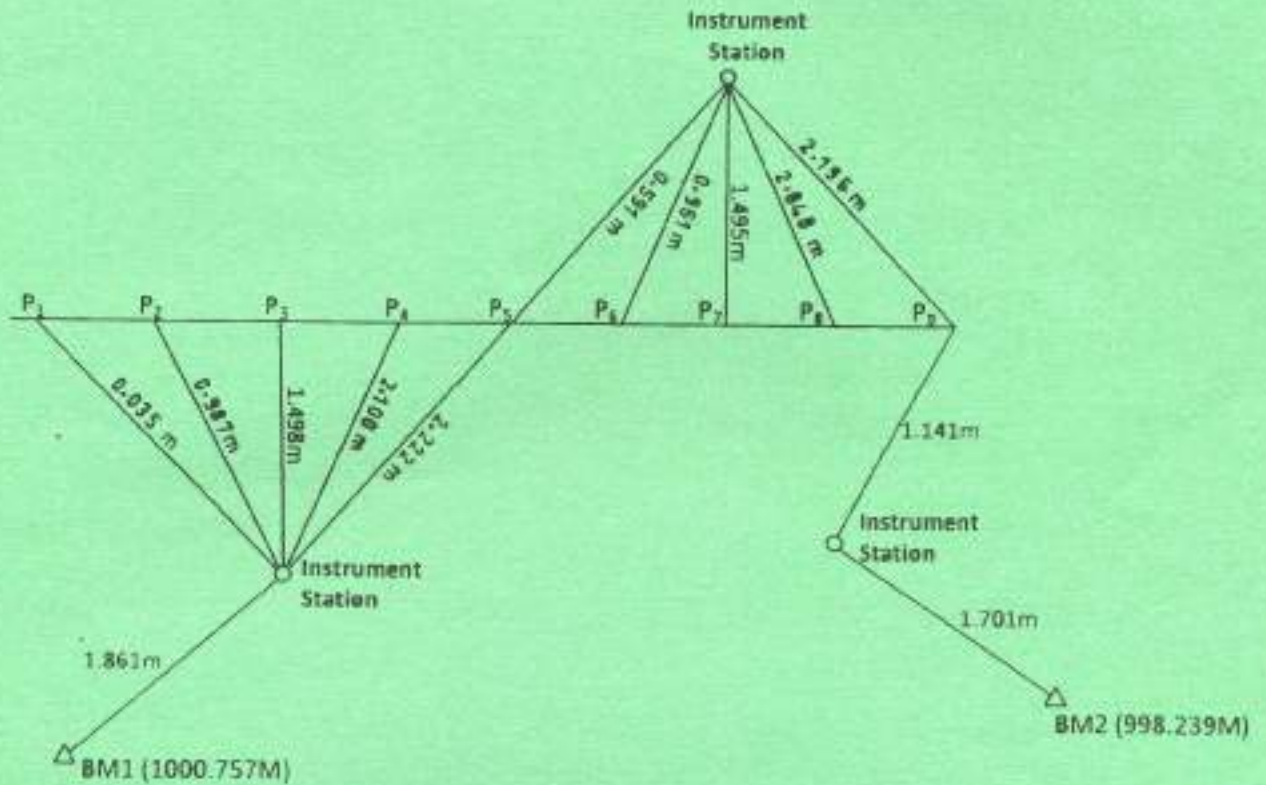


Figure 2

4. (a) List the **three** steps involved in temporary adjustment of a levelling machine. (3 marks)
- (b) **Figure 3** shows a piece of land to be used in constructing a community dispensary. The reduced levels of intersection points are as shown. Using a scale of 1:500, interpolate the contours at the intervals of 0.5 M. (17 marks)

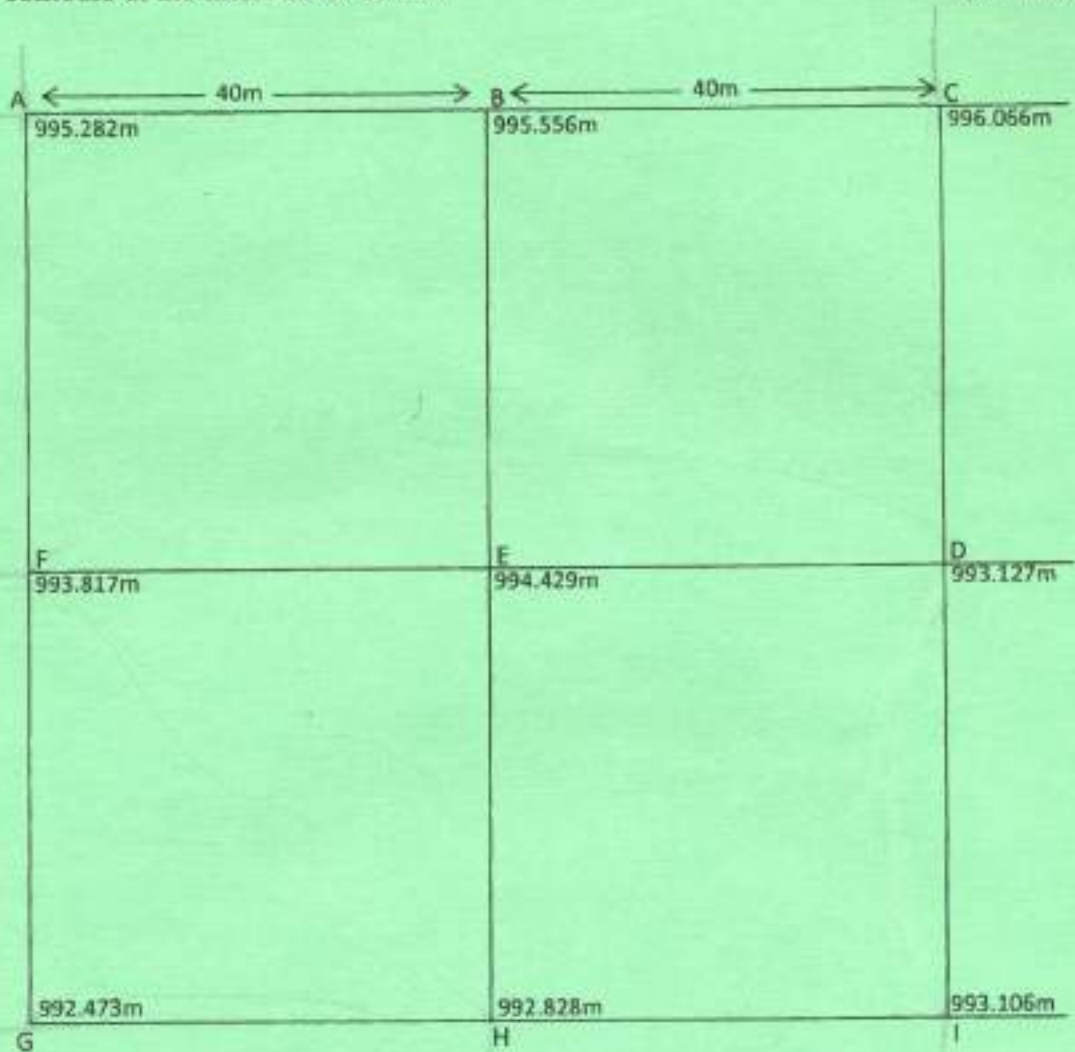
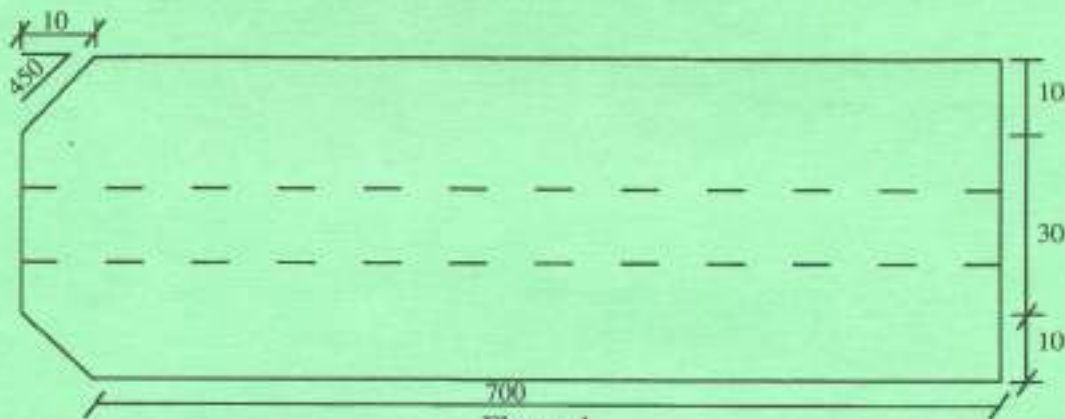


Figure 3

## SECTION B: WORKSHOP TECHNOLOGY I (MECHANICAL)

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

5. (a) State **three** responsibilities of an employee as stipulated in the Occupational Health and Safety Act. (3 marks)
- (b) Outline **four** factors to be considered in ensuring proper selection of personal protective equipment. (4 marks)
- (c) Outline how class **B** and class **C** fires occur and state how each can be extinguished. (4 marks)
- (d) Name **three** parts of a milling machine and state the function of each. (3 marks)
- (e) **Figure 4** shows a cross-section of a shaft machined from a steel rod 700 mm long and 50 mm diameter.



Outline the procedure of machining the shaft. (6 marks)

6. (a) Outline **four** classifications of hand tools. (6 marks)
- (b) With the aid of labelled sketches, outline the operation of a four stroke petrol engine. (10 marks)
- (c) Outline **two** practices adopted to ensure proper care and maintenance when using each of the following tools:
- (i) metal file; -
  - (ii) hacksaw. -

(4 marks)

7. (a) With the aid of a labelled sketch, outline the procedure of brazing. (6 marks)
- (b) With the aid of a labelled sketch, explain the working principle of a hand pump. (7 marks)
- (c) Distinguish between maintenance and servicing. (4 marks)
- (d) Outline **two** factors that influence the selection of a pump. (3 marks)
8. (a) Sketch and describe each of the following tools:
- (i) cold chisel;
- (ii) rubber mallet. (6 marks)
- (b) Explain the parts of an ignition system. (8 marks)
- (c) State **three** advantages and **three** disadvantages of each of the following systems:
- (i) direct injection;
- (ii) indirect injection. (6 marks)

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