

2705/104 2709/104  
2707/104 2710/104  
SURVEYING I AND WORKSHOP  
TECHNOLOGY I (MECHANICAL)  
June/July 2018  
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;*

*Drawing instruments;*

*Scientific calculator.*

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

*Answer FIVE questions; choosing at least TWO questions from each 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) Distinguish between 'plane surveying' and 'geodetic surveying'. (4 marks)
- (b) With the aid of a labelled sketch outline the procedure of chaining on a sloping ground using breaking chain method. (6 marks)
- (c) Describe the 'grid method' of contouring. (6 marks)
- (d) Differentiate between a Benchmark and a datum surface. (4 marks)
2. (a) Define each of the following terms used in levelling:
  - (i) line of collimation;
  - (ii) fore sight;
  - (iii) intermediate sight;
  - (iv) reduced level.
 (6 marks)

- (b) **Table 1** shows staff readings obtained during a levelling:

| BS     | IS    | FS     |
|--------|-------|--------|
| 2.475  |       |        |
|        | 1.667 |        |
|        | 2.070 |        |
| -2.538 |       | -3.375 |
| 2.960  |       | 2.350  |
|        |       | 3.105  |

- (i) Rule out a level field book page and enter the readings.
  - (ii) Reduce the levels by height of instrument method, if the last reading was taken on a benchmark of reduced level 1345.835 m above mean sea level.
  - (iii) Carry out the necessary arithmetic checks. (10 marks)
- (c) A bench mark of reduced level 50 m exists close to a site to be contoured. Explain how contour lines 48 m and 52 m will be obtained directly, if the staff reading to bench mark is 1.51 m. (4 marks)

3. Table 2 shows staff readings from a level book. Determine the reduced level of the points using the 'rise and fall' method. (apply the necessary arithmetic checks). (20 marks)

| BS    | IS    | FS    | Remarks       |
|-------|-------|-------|---------------|
| 2.663 |       |       | A             |
|       | 3.946 |       | B             |
|       | 3.108 |       | C             |
|       | 3.153 |       | D             |
| 4.787 |       | 3.585 | E             |
|       | 4.270 |       | BM (578.96 m) |
|       | 3.218 |       | F             |
|       |       | 2.646 | G             |

4. Figure 1 shows staff readings taken along a proposed road centre-line. Book the readings in a standard format and reduce them by 'rise and fall' method (apply necessary arithmetic checks). (20 marks)

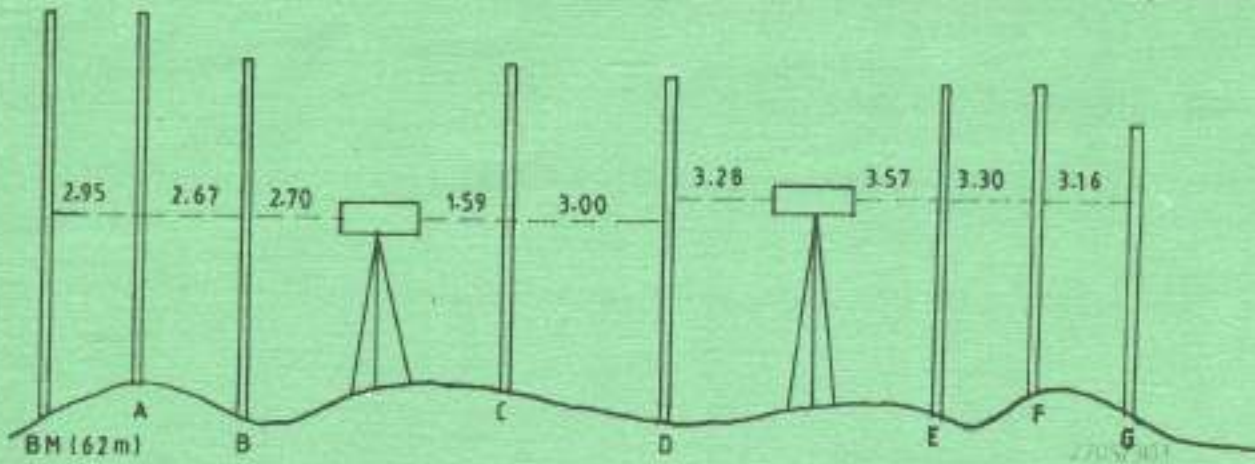


Fig. 1

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

*Answer at least TWO questions from this section.*

5. (a) Explain **three** types of workshop machine maintenance. (6 marks)
- (b) Explain **four** considerations when selecting water pumps. (8 marks)
- (c) Explain each of the following pumping terminologies:
- (i) strainer;
  - (ii) self priming;
  - (iii) static suction lift. (6 marks)
6. (a) With the aid of a labelled sketch, describe a vernier calliper. (8 marks)
- (b) State **four**:
- (i) precautions while hammering.
  - (ii) workshop safety rules. (8 marks)
- (c) Sketch and label a hand vice. (4 marks)
7. (a) With the aid of a labelled sketch, explain the operation of a two cycle petrol engine. (8 marks)
- (b) Explain each of the following lathe machine operations:
- (i) facing;
  - (ii) tapering;
  - (iii) parallel turning;
  - (iv) parting. (8 marks)
- (c) State **four** requirements of personal protective equipment. (4 marks)
8. (a) Explain **three** methods of caring for cutting hand tools. (6 marks)
- (b) Sketch and label a breaker-point ignition system. (6 marks)
- (c) Sketch and label each of the following hand tools:
- (i) depth gauge;
  - (ii) fixed frame hacksaw. (8 marks)

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