

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 WORKSHOP 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
 F.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. T.B.M
- (iii) Apply the arithmetic check. $\sum R_s - \sum F_s = \sum R_{10} - \sum F_{10} = R_{1st} - F_{1st}$ (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)

Handwritten notes and diagrams:

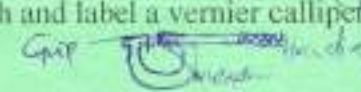
- Diagram showing a benchmark (B.M.) with a reduced level of 100.00. A series of points are marked with staff readings: 0, 30, 60, 90, 120, 150, 180, 210, 240. A rising gradient of 1 in 200 is indicated.
- Equation: $R_s + R_L = H.I.$
- Equation: $H.I. - R_s = R_L$
- Equation: $H.I. - F_s = R_L$
- Equation: $R_{B_1} + R_L = H.I.$
- Handwritten text: "contouring", "Topographical", "Field levelling", "Arithmetic", "T.B.M", "17 AUG 2016", "K. J. Somayaji Institute of Science & Technology, P.O. Box 414 - 00900, K. J. Somayaji".

Table 1

B.S.	I.S.	F.S.	Remarks
1.663			BM 100.00
	2.946		
	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)
 - No Smoking
 - not use machinery if over powered
 - tools kept in toolbox
 - no flammable material
 - direct & fastness
 - (b) Sketch and label a vernier calliper. (4 marks)
 - do wearing loose clothing
 - (c) List:
 - (i) **two** causes of fire in a workshop; - Smoking
 - (ii) **two** house keeping precautions taken in a workshop. (4 marks)
 - tools in tool boxes
 - keep tools clean
 - (d) Explain **two** disadvantages of using carburettor in a petrol engine. (4 marks)
 - choke not
 - sputter the engine
- 6.
- (a) State **four** advantages of centrifugal pump. (4 marks)
 - high durability
 - compactness
 - less maintenance cost
 - low initial cost
 - simplicity in operation
 - (b) Define the term priming as used in pumps. (2 marks)
 - (c) Explain the working principle of a centrifugal pump. (6 marks)
 - not start without H₂O
 - (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)

- Delivery valve
 - suction "
 - High Pressure
 - Frictioning tools

Stroke	Direction	Intake	Release of	Events
Intake	down	open	close	Intake
Compression	UP	close	"	Compression
Power	down	"	"	Power
Exhaust	UP	"	open	Exhaust

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