2705/104 2709/104
2707/104 2710/104
SURVEYING I AND WORKSHOP
TECHNOLOGY I (MECHANICAL)
June/July 2017
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN CIVIL ENGINEERING
DIPLOMA IN BUILDING TECHNOLOGY
DIPLOMA IN ARCHITECTURE

MODULE II

SURVEYING I AND WORKSHOP TECHNOLOGY I
(MECHANICAL)

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
Answer booklet;
Scientific 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** other question from either section.*
All questions carry equal marks.
Maximum marks for each part of a question are indicated.
Candidates should answer the questions in English.

This paper consists of 3 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

Turn over

SECTION A: SURVEYING I

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

1. (a) With the aid of a sketch, explain the procedure used in reciprocal levelling. (9 marks)

   (b) Explain the temporary adjustments carried out to a level machine before it is ready for use. (9 marks)

   (c) List **two** precautions when handling a level. (2 marks)

2. (a) Define levelling. (2 marks)

   (b) Explain the branches of survey. (4 marks)

   (c) Outline **five** categories of survey by purpose or use. (5 marks)

   (d) Discuss the errors encountered in levelling. (9 marks)

3. The following staff readings were observed at a road bridge over a railway for the purpose of measuring the clearance between the rail and the girder on the side at which the rail is higher. The readings marked (-ve) were taken with the staff held inverted on the underside of the girder. Reduce the levels using rise and fall method and state the vertical distance between the girder above and the rail at each point. Apply arithmetic check. (20 marks)

Table 1

BS	IS	FS	RL	Remarks
1.22			68.40	BM
0.54		11.45		
	7.92			Rail a
	-5.99			Girder above a
	8.07			Rail b
	-5.94			Girder above b
	7.94			Rail c
	-5.88			Girder above c
	8.06			Rail d
	-5.83			Girder above d
12.16		0.32		
		2.15		

4. The following readings were taken using a level and a 4 m levelling staff on a continuously sloping ground at 30 m intervals: 0.680, 1.455, 1.855, 2.330, 2.885, 3.380, 1.055, 1.860, 2.265, 3.540, 0.835, 0.845, 1.530 and 2.250. The reduced level of the starting point was 80.750 m. Using the information provided:

(i) identify the change points;
(ii) use the height of collimation method to reduce the levels;
(iii) apply arithmetic checks;
(iv) determine the gradient of the line joining the first and the last point. (20 marks)

SECTION B: WORKSHOP TECHNOLOGY I - MECHANICAL

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

5. (a) Define feed as used in a drill machine. (2 marks)

(b) With the aid of a sketch, describe the working principle of a lathe machine. (5 marks)

(c) Sketch and label a fixed frame hacksaw. (5 marks)

(d) Outline **four** functions of cutting fluids. (8 marks)

6. (a) With the aid of a sketch, explain the working principle of a reciprocating pump. (10 marks)

(b) Explain the use of the following in centrifugal pumps:

(i) impeller;
(ii) volute. (4 marks)

(c) Explain **two** functions of air filters. (4 marks)

(d) Outline the sue of triangular file. (2 marks)

7. (a) Explain the disadvantage of using a carburettor in an engine. (4 marks)

(b) Outline **four** personal safety measures to be observed in a workshop. (8 marks)

(c) List **five** uses of a lathe machine. (5 marks)

(d) Outline **three** causes of fire in a workshop. (3 marks)

8. With the aid of sketches, describe the four stroke petrol engine cycle. (20 marks)

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