2306/302
SURVEYING
Oct./Nov. 2016
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN QUANTITY SURVEYING

SURVEYING

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
Answer booklet;
Scientific calculator.
*Answer **FIVE** of the **EIGHT** questions.*
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 5 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

1. (a) List **five** chain surveying instruments/ accessories stating the use of each. (10 marks)

(b) Describe the procedure of setting out a right angle at a given point along a survey line. (5 marks)

(c) List **five** errors encountered during chain surveying. (5 marks)

2. (a) Define the following terms as used in levelling:

(i) backsight;
(ii) intermediate sight;
(iii) datum.

(3 marks)

(b) **Table 1** shows extract from a levelling fieldnote. Given the reduced level of the benchmark MTI is 1698.76 M, use the height of collimation method to determine the reduced level of points A, B, C and D. Apply the arithmetic checks. (12 marks)

Table 1

BS	IS	FS	Remarks
1.66 m			MT1
	0.95 m		A
	- 1.01 m		B
	- 1.15 m		C
1.79 m		2.59	Change point 1
	2.27 m		D
		1.22 m	MT2

(c) Describe the procedure of reciprocal levelling. (5 marks)

3. (a) Define the term 'contour'. (1 mark)

(b) List **five** uses of contours. (5 marks)

(c) Explain the temporary adjustment of a theodolite. (9 marks)

(d) Name the **five** permanent adjustments carried out on a theodolite. (5 marks)

4. (a) **Table 2** shows extract from a traverse fieldnote where horizontal angles were measured. Carry out the reductions. (15 marks)

Table 2

@ T4	
T3	75
228° 58' 35"	45° 35' 40"
108° 45' 30"	285° 22' 25"
@ T3	
T1	T4
288° 19' 10"	48° 58' 23"
267° 24' 22"	28° 03' 33"
@ T1	
T2	T3
345° 02' 20"	108° 19' 18"
295° 27' 14"	58° 44' 16"

(b) Describe 'change face' procedure as carried out in angular measurements. (5 marks)

5. **Figure 1** is a closed traverse whose interior angles have been measured. From the information in the figure. Compute:

(a) error of closure;
(b) corrected interior angles hence, the external angles;
(c) the bearings of the legs of the traverse if the bearing of line AB is 120° 30' 50".

(20 marks)

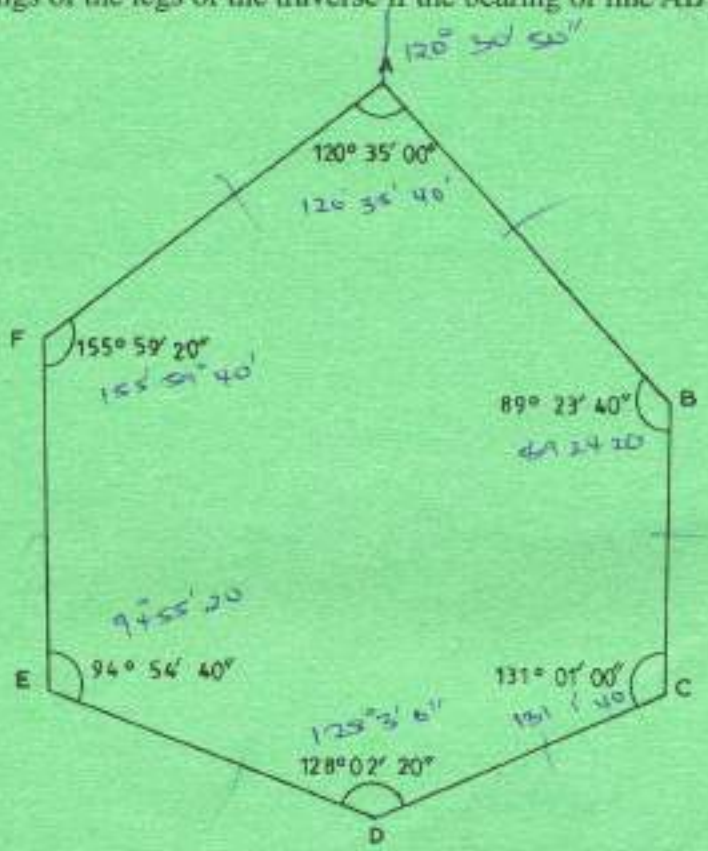


Fig. 1

6. (a) Given the following forward bearings determine the back bearings:

(i) 45° 30' 50";
(ii) 195° 50' 45";
(iii) N 45 20'15"E;
(iv) S 45 20'15" E.

(4 marks)

(b) From the data in **table 3** compute:

(i) the bearings and distances of the sides AB, BC and CA.

(ii) the area enclosed by ABCA using the coordinate method giving the area in hectares.

(16 marks)

Table 3

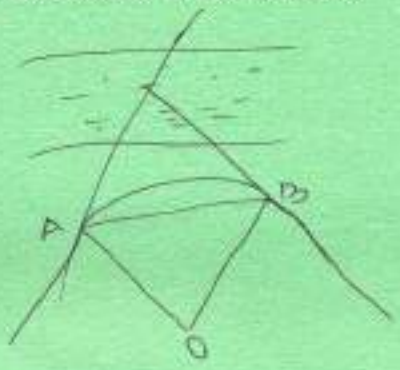
Point	North (m)	East (m)
A	4609.70	2613.52
B	4487.16	2444.39
C	4693.38	2712.06

7. (a) Based on a simple curve derive the expression for determination of:

(i) external distance;
(ii) mid-ordinate;
(iii) long chord.

(10 marks)

(b) With the aid of a diagram, describe the procedure of ranging a simple curve when the points of intersection is inaccessible. (10 marks)



This is any level surface to which the elevation of points may be referred

8. (a) Explain how the distance between the end points of a long bridge can be determined. (5 marks)

(b) **Table 4** shows data obtained for the purposes of determining the capacity of a water reservoir. Using the information, compute the proposed capacity of the reservoir upto 420 m contour, ignoring the volume below the 400 m contour using the end area method. (4 marks)

Table 4

Contour	Enclosed area m^2
420 m	1195
415 m	910
410 m	632
405 m	349
400 m	75

(c) Earthwork quantities given in **table 5** are for a new road based upon stations interval of 10 m.

(i) Draw the mass-haul diagram;
(ii) Indicate free haul distance of 300 m on the diagram.

(11 marks)

Table 5

Station	Volume (m^3) cumulative
0	0
1	- 5000 ✓
2	- 6000
3	6000 ✓
4	12,000 ✓
5	15,000 ✓
6	12,000 ✓
7	5,000 ✓
8	- 3,000
9	- 7,000
10	- 4,000
11	3,000 ✓

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