

Name: \_\_\_\_\_ Index No. \_\_\_\_\_

2306/302  
 SURVEYING  
 Oct./Nov. 2014  
 Time: 3 hours

Candidate's Signature: \_\_\_\_\_

Date: \_\_\_\_\_



THE KENYA NATIONAL EXAMINATIONS COUNCIL

**DIPLOMA IN QUANTITY SURVEYING**

SURVEYING

**3 hours****INSTRUCTIONS TO CANDIDATES**

*Write your name and index number in the spaces provided above.*

*Sign and write the date of examination in the spaces provided above.*

*You should have a scientific calculator for this examination.*

*Answer any FIVE of the following EIGHT questions in the spaces provided in this question paper.*

*All questions carry equal marks.*

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

*Candidates should answer the questions in English.*

**For Examiner's Use Only**

Question	1	2	3	4	5	6	7	8	TOTAL SCORE
Candidate's Score									

**This paper consists of 16 printed pages.**

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

1. (a) List **six** types of surveys in common application. (6 marks)
- (b) Explain the following procedures in chain surveying:
- (i) reconnaissance;
  - (ii) selection and measurement of chain lines;
  - (iii) details survey.
- (14 marks)
2. (a) Define the following terms as used in levelling:
- (i) reduced level;
  - (ii) intermediate sight;
  - (iii) datum surface;
  - (iv) level line;
  - (v) benchmark.
- (5 marks)
- (b) State **five** types of errors encountered in levelling. (5 marks)
- (c) Describe the procedure for carrying out TWO-PEG-TEST using a dumpy level, stating the adjustment made on the instrument after the test. (10 marks)
3. (a) State **five** permanent adjustments of an optical theodolite. (5 marks)
- (b) Describe the field procedure for determining the tacheometric constants. (10 marks)
- (c) **Table 1** shows the results of a field determination of tacheometric constants. Using the data in the table, compute the constants of the tacheometer. (5 marks)

**Table 1**

Instrument Station	Staff station	Staff readings			Measured distance to staff station
		TOP	MID	BOTTOM	
A	B	2.155	1.855	1.555	95.50 m
	C	3.275	2.665	2.050	188.75 m

4. (a) State **two** types of errors encountered in theodolite traversing. (2 marks)
- (b) **Table 2** shows reduced distances and bearings from a traverse exercise. From the following station coordinates:

	N	(m)	E
Tr 12	+25517.17		+31071.71
Tr 13	+26635.15		+31205.25

**Table 2**

Line	Distance (m)	Observed Bearing
Tr12-T <sub>1</sub>	275.05	23° 47' 55"
T <sub>1</sub> -T <sub>2</sub>	305.25	137° 25' 05"
T <sub>2</sub> -T <sub>3</sub>	150.89	88° 57' 01"
T <sub>3</sub> -T <sub>4</sub>	90.97	305° 04' 23"
T <sub>4</sub> -T <sub>5</sub>	180.38	277° 37' 19"
T <sub>5</sub> -Tr <sub>13</sub>	10.05	00° 05' 01"

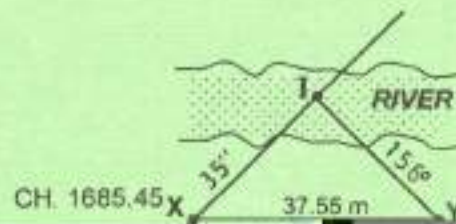
Compute:

- (i) adjusted coordinates of the new points;  
 (ii) accuracy of the traverse.

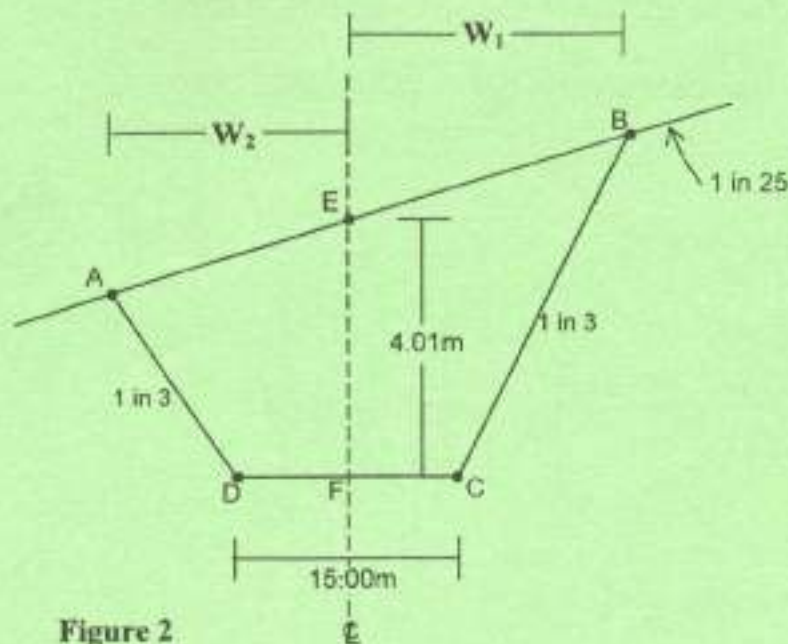
(18 marks)

5. (a) Draw a diagram of a simple circular curve indicating its elements. (5 marks)
- (b) **Figure 1** shows two straights of a major sewer line intersecting at I. The straights are to be joined by a circular curve of radius R. Using the information on the figure. Calculate:
- (i) the radius of the circular curve given chainages of A and X as 1545.50 m and 1685.45 m respectively;
- (ii) the initial and the last deflection angles if the curve is to be set out on a through chainage basis with standard chords of 20 m.

(15 marks)



6. (a) Outline six characteristics of a Mass Haul Diagram (MHD). (12 marks)
- (b) Using the information shown in figure 2. Calculate:
- (i) side widths  $W_1$  and  $W_2$ ;
  - (ii) cross-sectional area ABCD.
- (8 marks)



7. (a) Explain the control of verticality of multistorey structure using the centre-line axes method. (7 marks)
- (b) A pipeline, 100 m long is to be laid down in three different falling ground gradients as shown in table 3. Given the following information:

Level of the intake: 1545.05

Backsight reading at the intake: 2.475 m

Compute the required staff readings at points  $P_1$ ,  $P_2$  and  $P_3$ . (13 marks)

**Table 3**

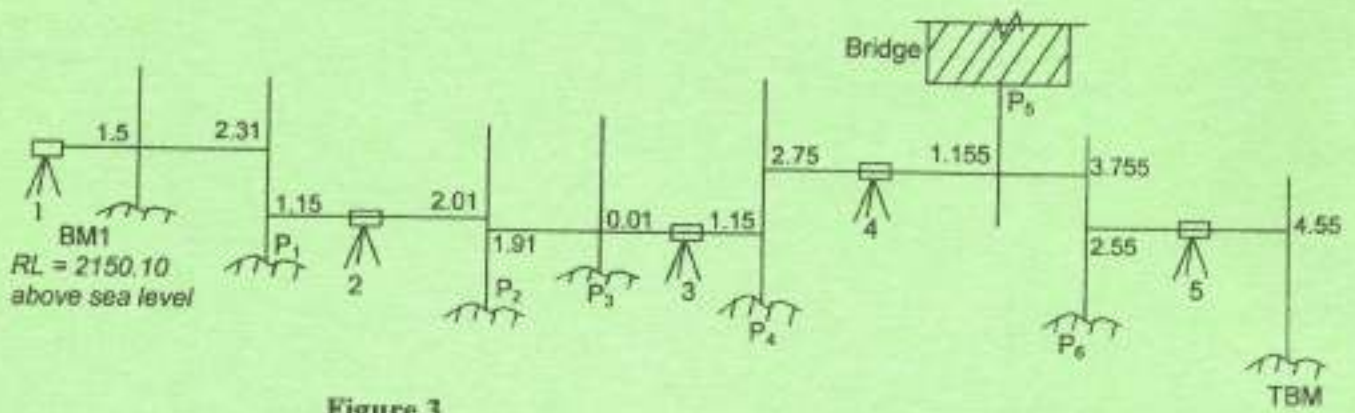
Segment	Gradient	Horizontal Distance
intake - $P_1$	1 in 200	60 m
$P_2$	1 in 100	50 m
$P_3$	1 in 200	40 m

8. **Figure 3** shows a levelling procedure. Using the information in the figure:

- (a) book the readings in a typical height of collimation field note book;
- (b) reduce the readings using height of collimation method;
- (c) carryout the necessary arithmetic checks;
- (d) determine the gradient of a straight line BM1 - TBM.

Note: Horizontal distance BM1 - TBM = 127.525 m.

(20 marks)



**Figure 3**

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