

To Scan

2306/302  
SURVEYING  
Oct./Nov. 2018  
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;*
- Drawing instruments;*
- Scientific calculator.*

*Answer any FIVE of the following EIGHT questions.*

*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 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.**



**Figure 1** shows a circular curve to be set out using 30 m standard chord on a through chainage basis between two straights deflecting at an angle of  $56^\circ$ . Calculate the:

- radius of the curve; (4 marks)
- chainage  $T_1$ ; (5 marks)
- sub-chord lengths; (5 marks)
- deflection angles for the first sub-chord, standard chord and last chord. (6 marks)

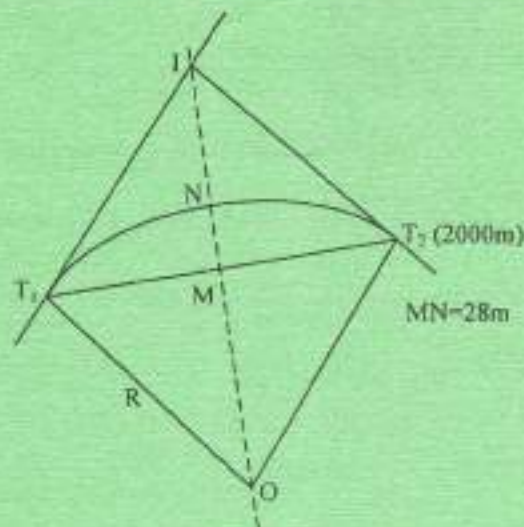


Fig. 1



- Define each of the following terms as used in levelling:

- reduced level;
- temporary bench mark;
- horizontal line;
- intermediate sight.

(8 marks)

- Figure 2** shows a field procedure involved in reciprocal levelling:

Compute the:

- difference in height between S and R;
- reduced levels of T and R;
- difference in height between T and R.

(12 marks)



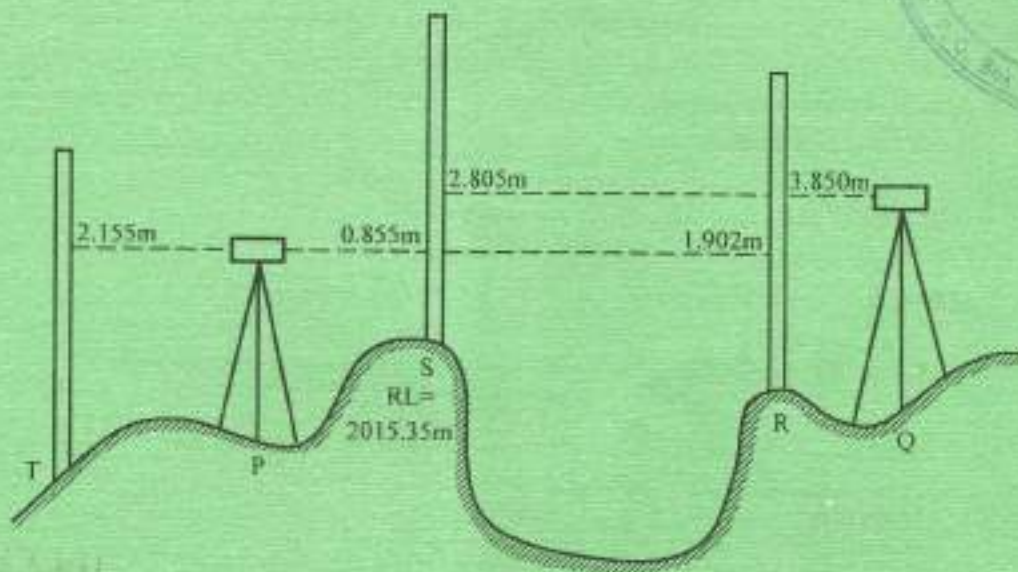


Fig. 2

Table 1(a) shows the adjusted bearings and reduced distances for a traverse run between Y and Z through new points Tr1, Tr2 and Tr3. Table 1(b) shows the datum co-ordinates of Y and Z. Compute the final co-ordinates for the new points using transit method of adjustment. (20 marks)

Table 1(a)

Line	Distance (m)	Bearing
Y - Tr1	122.98	125° 05' 54"
Tr1 - Tr2	205.68	105° 30' 24"
Tr2 - Tr3	96.85	37° 49' 58"
Tr3 - Z	65.37	45° 30' 42"

Table 1(b)

Point	-N	-E
Y	2315.51	3311.02
Z	2450.01	3192.56



4. (a) State six characteristics of Mass-haul diagrams. (6 marks)

(b) (i) with the aid of a sketch, show that the area of a three sided polygon whose corner co-ordinates are:

$(N_A, E_A), (N_B, E_B), (N_C, E_C)$  is given by

$$A = \frac{1}{2} [N_A(E_B - E_C) + N_B(E_C - E_A) + N_C(E_A - E_B)]$$

(ii) The coordinates of a three sided polygon ABC are given in table 2:

Table 2

Northings (m)	Eastings (m)
A: +5276.95	-6495.85
B: +5308.82	-5037.83
C: +4347.39	-4887.67



Compute the area of the polygon in hectares. (14 marks)

5. (a) Convert the following quadrantal bearings to whole circle bearing.

(i) N 55° 33' E

(ii) S 64° 18' E

(iii) N 79° 45' W

(iv) S 38° 19' W

(2 marks)

(b) Table 3 shows observations made using a tacheometer fitted with an anallactic lens. Calculate:

(i) distance PQ;

(ii) the reduced levels of P and Q.

(18 marks)

Table 3

Instrument station	Staff station	Bearing	Vertical angle	Hair readings	
				Bottom	Mid
R	P	50° 30' 25"	-05° 32'	2.265	2.868
	Q	85° 45' 15"	-12° 13'	2.450	3.065



6. (a) State **three** classification of chain survey equipment giving an example for each. (3 marks)
- (b) With the aid of sketches, explain **two** obstacles encountered in chain surveying and outline the remedy for each. (9 marks)
- (c) Explain **two** classes of errors encountered in chain surveying giving an example in each case. (5 marks)
- (d) Define each of the following types of survey:
- (i) cadastral surveying;
  - (ii) topographical surveying.
- (3 marks)

7. (a) Outline the procedure of levelling a theodolite that has been centred over a ground mark. (5 marks)
- (b) A sewer line 180 m long is to be laid at a falling gradient of 1 in 200 from manhole Y to manhole Z. The ground reduced level and the invert level of Z are 2218.315 m and 2216.475 m above mean sea level respectively. The ground reduced level of Y is 2218.565 m above mean sea level. If a 2.5 m traveller is to be used. Calculate the:
- (i) invert level at Y;
  - (ii) height of sight rails at Y and Z;
  - (iii) depth of cut at Y and Z.
- (15 marks)



8. (a) With the aid of a sketch, outline the procedure of setting out the corner points of a rectangular building by use of a theodolite and a tape. (9 marks)
- (b) A point K lies midway of line AB. Find the bearing and distance between K and B given the datum co-ordinates in **table 4**:

**Table 4**

Station	N (m)	E (m)
A	-7734.63	-12635.78
B	-7945.35	-12637.96

(11 marks)

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