



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

CERTIFICATE IN CONSTRUCTION TECHNICIAN PART I

EBC 1116: LEVELLING SURVEYING

SPECIAL/SUPPLEMENTARY EXAMINATIONS

SERIES: JUNE 2011

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Question paper*
- *Answer booklet*
- *Scientific calculator*

Answer question **ONE** and any other **TWO** questions

The maximum marks for each part of a question are as shown

Question 1

- a) Define the following terms as used in leveling:
- (i) Bench mark
 - (ii) Reduced level
 - (iii) Line of collimation line
 - (iv) Temporary bench mark (4 marks)
- b) State the function of the following parts of a level:
- (i) Telescope
 - (ii) Foot screws
 - (iii) Eye-piece (3 marks)
- c) With the aid of sketch, describe the dumpy level. (12 marks)

Question 2

- a) State the aim of the following types of permanent adjustments of a level:
- (i) Tube Bubble axis error
 - (ii) Collimation error (2 marks)
- b) In order to test a dumpy level for collimation error the level was set up midway between two point A and B 80m apart and staff readings of 3.205m and 2.495m obtained at A and B respectively. The level was then shifted to another point C 10m from B and in line with A B produced and staff readings of 3.750m and 2.907m obtained at A and B respectively, Calculate:
- (i) The collimation error
 - (ii) The angle of the collimation error
 - (iii) The true readings at A and B with the instrument at C
 - (iv) Explain the adjustment procedure of the level for the collimation error. (8 marks)
- c) Explain the Tube Bubble Error test and adjustment of a Dumpy level (10 marks)

Question 3

- a) (i) Differentiate between temporary and permanent adjustments of level.
- (ii) State the essential difference between a dumpy level and a tilting level. (6 marks)
- b) The data given in table 1 is a field record of a leveling exercise. Reduce the readings by the height of collimation method, applying the necessary arithmetical checks. (14 marks)

TABLE 1

BS	IS	FS	Chainages (m)	Remarks
2.572				BM NO 1 (RL = 1 87.291m)
	3.560		0.00	Point A
	4.570		20.00	“ B
	2.110		40.00	“ C
2.775		3.570	60.00	“ D
	3.583		80.00	“ E
	2.560		100.00	“ F
	2.820		120.00	“ G
4.507		3.050	140.00	“ H (CP)
	-0.580		160.00	“ J
	-0.955		180.00	“ K
	1.238		200.00	“ L
1.567		2.500	220.00	“ M (CP)
	1.345		240.00	“ N
	1.897		260.00	“ P
	2.787		280.00	“ Q
	1.556		300.00	“ R
		0.987	320.00	“ S

Question 4

- a) State the factors that govern the choice of vertical interval in contouring (4 marks)
- b) The information shown in table 2 was taken in a leveling exercise:

TABLE 2

BS	IS	FS	Chainages (m)	Remarks
1.670				BM NO. 1 (RL =67.89m)
	2.600		0.00	Point A
	3.600		20.00	“ B
	1.110		40.00	“ C
1.815		2.570	60.00	“ D(CP)
	2.653		80.00	“ E
	1.667		100.00	“ F
	1.990		120.00	“ G
3.600		2.050	140.00	“ H
	-1.600		160.00	“ J
	1.000		180.00	“ K
	1.334		200.00	“ L
		1.600		BM No 2 (68.550m)

- a) Reduce the above readings by the rise and fall method applying the necessary arithmetical checks.
- b) State the error, if any in millimeters. (16 marks)

Question 5

- a) Distinguish between longitudinal sections and cross-sections. (4 marks)
- b) State any FOUR uses of contour maps (6 marks)
- c) Describe the radial lines methods of contouring (10 marks)