



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING
CONSTRUCTION TECHNICIAN CERTIFICATE PART I

EBC 1116: LEVELLING SURVEYING
END OF SEMESTER EXAMINATION
SERIES: DECEMBER 2011
TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Scientific Calculator*
- *Drawing paper size A2*

This paper consists of **FIVE** questions in two sections **A & B**
Answer question **ONE (COMPULSORY)** and any other **TWO** questions.
Maximum marks for each part of a question are clearly shown
This paper consists of **FOUR** printed pages

SECTION A (COMPULSORY)

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 a sketch, describe the dumpy level
- (12 marks)

SECTION B (Answer any TWO questions from this section)

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 shifted to another point C 10m behind B and in line with AB produced and staff readings of 3.205 and 2.495 obtained at A and B respectively. The level was then shifted to another point C 10m behind B and in line with AB produced and staff readings of 3.750 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 bubble error test and adjustment of a Dumpy level
- (10 marks)

Question 3

- a) (i) Differentiate between temporary and permanent adjustments of a 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

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

(14 marks)

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	Point B
	1.110		40.00	Point C
1.815		2.570	60.00	Point D (CP)
	2.653		80.00	Point E
	1.667		100.00	Point F
	1.990		120.00	Point G
3.600		2.050	140.00	Point H (CP)
	-1.600		160.00	Point J
	-1.000		180.00	Point K
	1.334		200.00	Point L
		1.600		BM No 2 68.550m

- (i) Reduce the above readings by the rise and fall method applying the necessary arithmetical checks
- (ii) 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 method of contouring (10 marks)