



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

DEPARTMENT OF CIVIL AND BUILDING ENGINEERING

CERTIFICATE IN CONSTRUCTION TECHNICIAN I (CT 109A)

SEMESTER II EXAMINATIONS

APRIL/MAY 2010 SERIES

EB 1116 : LEVELLING SURVEYING

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination:-

- Answer Booklet
- Scientific Calculator

This paper consist of **FIVE** Questions.

Question **ONE** is **COMPULSORY**.

Answer **ANY** other **TWO** Questions.

Maximum marks for each question are as shown.

SECTION A – COMPULSORY

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Question ONE

- (a). Define the following terms as used in leveling:
- (i). Foresight
 - (ii). Change point
 - (iii). Line of collimation
 - (iv). Reduced levels **(4 Marks)**
- (b). (i). Define the term ‘temporary adjustment’ as applied to leveling. **(2 Marks)**
- (ii). Outline the procedure of centering the plate bubble of a level. **(5 Marks)**
- (c). Give the functions of the following parts of a level:
- (i). Footscrews
 - (ii). Inclined mirror
 - (iii). Slow motion screw (tangential screw) **(3 Marks)**
- (d). (i). Define the term ‘contour’. **(2 Marks)**
- (ii). State the four factors to consider when choosing contour intervals. **(4 Marks)**
- (e). Below is an extract of a leveling field notebook for a project done by some students:

Back sights	Inter sights	Fore sights	H.O.C	Reduced levels (m)	Dist.	Remarks
0.663				100.00	0	BMX
	1.946				20	A
	1.008				40	B
	1.153				60	C
2.787		1.585			80	C POINT
	2.270				100	D
	1.218				120	E
		0.646			140	BMY

From the data provided, compute the heights of collimation at each instrument station, the reduced levels of points A to E and perform the arithmetic checks. **(10 Marks)**

Question TWO

- (a). Differentiate between a level line and a horizontal line. **(2 Marks)**
- (b). (i). When the staff distance from the leveling instrument is long, the deviation between the level line and the horizontal line is magnified due to curvature and refraction. Show then, that the combined error of curvature and refraction is given by:
- $$e_{c+r} = \frac{3d^2}{7R}$$
- (8 Marks)**
- (ii). A staff is held at a distance of 200m from the level and a reading of 2.785 was obtained. Compute a value of the reading corrected for curvature and refraction. (take Radius of the earth as 6.37×10^6 m)
(3 Marks)
- (c). Outline the two – peg procedure for testing for collimation error.
(7 Marks)

Question THREE

- (a). Define the term ‘inverted sight’ as used in construction leveling.
(2 Marks)
- (b). Table 1 below show information of a leveling of task that involves inverted sights. Make the necessary reductions and checks and find the reduced levels by the rise and fall method. Apply the arithmetical checks.

Table 1

Back sights	Inter sights	Fore sights	H.O.C	Reduced levels (m)	Dist.	Remarks
0.663				100.00	0	BMX
	1.946				20	A
	1.008				40	B
	1.153				60	C
2.787		1.585			80	C POINT
	2.270				100	D
	1.218				120	E
		0.646			140	BM Y