



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

University Examination 2010

SECOND YEAR/FIRST SEMESTER EXAMINATION
FOR THE DEGREE IN BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2202: SURVEYING I

SERIES: APRIL/MAY 2010

TIME: 2 HOURS

Instructions:

You should have the following for this examination:

- Answer booklet
- Mathematical table/pocket calculator

Question **ONE** is Compulsory. Answer any other **TWO** questions from the remaining FOUR questions.

QUESTION ONE

(a) Explain the following clearly stating the objectives to be achieved in their use:

- (i) Control
- (ii) Revision
- (iii) Safeguarding
- (iv) Systematic errors

(20 mark)

(b) Define the following terms:

- (i) Level surface
- (ii) Level line
- (iii) Horizontal surface
- (iv) Horizontal line
- (v) Contour line
- (vi) Contour interval
- (vii) Vertical line
- (viii) Datum surface
- (ix) Reduced level
- (x) Bench mark.

(10 marks)

QUESTION TWO

- (a) Describe stating the use, the various lines used in chain surveying.(10 marks)
- (b) Outline the methods of chaining and taping on sloping ground. (10 marks)

QUESTION THREE

- (a) Briefly explain the following terms:
- (i) Height of collimation
 - (ii) Foresight
 - (iii) Back sight
 - (iv) Change point (8 marks)
- (b) Using the method of rise and fall reduce the leveling field notes below and apply the necessary checks.

| STN | B.S. | I.S. | F.S. | R.L. | REMARKS |
|------------|-------------|-------------|-------------|-------------|-----------------|
| 1 | 3.786 | | | 36.642 | BM ₁ |
| 2 | | 1.312 | | | |
| 3 | | 1.960 | | | |
| 4 | 0.892 | | 3.560 | | CP ₁ |
| 5 | | | | | |
| 6 | | | | | |
| 7 | 2.238 | | 1.180 | | CP ₂ |
| 8 | | | | | |
| 9 | | | 2.806 | 34.992 | BM ₂ |

QUESTION FOUR

- (a) Derive expressions for the difference in level and the collimation error to be for the transfer of reduced levels across a wide river on which a bridge is to be built to join the alignment of a proposed road. (10 marks)
- (b) Reciprocal leveling across a wide river using a single level and staff gave the following results between points A and B. The horizontal distance AB was measured as 54.36m.

| INSTRUMENT POSITION | STAFF POSITION | STAFF READING (m) |
|----------------------------|-----------------------|--------------------------|
| X | A | 1.564 |
| X | B | 2.382 |
| Y | A | 2.247 |
| Y | B | 3.101 |

- (i) Determine the reduced level of B is that of A is 1705.790m above MSL.
- (ii) Calculate the collimation error in the level per 60m of sight. (10 marks)

QUESTION FIVE

- (a) Briefly explain the basic principles of Electronic Distance Measurement (EDM). (6 marks)
- (b) A slope distance AB was measured during a short-range EDM as 561.216m with the instrument being 1.820m above station A and the prism and optical target 1.986m above station B. The vertical angle to target was $-6^{\circ}21'38''$. Compute both the horizontal distance AB and elevation of station B given elevation at A as 186.275m, stating the expected standard error in the measurement. (14 marks)