



# THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

*Faculty of Engineering and Technology*

## DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

### UNIVERSITY EXAMINATIONS FOR DEGREE IN BACHELOR OF BUILDING & CIVIL ENGINEERING

#### ECE 2202 : ENGINEERING SURVEYING I

**SPECIAL/SUPPLEMENTARY 2012**

**SERIES: FEBRUARY/MARCH 2012**

**TIME: 2 HOURS**

#### **Instructions to Candidates:**

You should have the following for this examination

- *Answer booklet*

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 as shown

This paper consists of **THREE** printed pages

#### **SECTION A (COMPULSORY – 30 MARKS)**

##### **Question 1**

a) A steel tape that had a tension of 65N was used to measure a distance between two fixed marks.

The readings on the tape were 0.130m and 29.942m and the differences in level of the tape was

0.835m and the temperature measurement was 22°C. The other details were as follows:

- |      |  |                                 |
|------|--|---------------------------------|
| i)   | Nominal length of the tape               | = 33m                           |
| ii)  | The cross-sectional area of the tape     | = 4.9mm <sup>2</sup>            |
| iii) | The co-efficient of the linear expansion | = 11.30*10 <sup>-6</sup> per °C |
| iv)  | The mass of the steel                    | = 0.45kg                        |
| v)   | Young Modules                            | = 300 KN/mm <sup>2</sup>        |

- vi) Nominal interval = 0 – 30m
- vii) Length of interval = 35.0050m
- viii) Tension 45.0N at 16°C

Calculate the distance between the two marks (12 marks)

- b) With an aid of a diagram, show that the combined correction of Curvature and Refraction is given

$$\frac{1}{7}$$

$$C \ \& \ L = 0.0785 L^2 - (0.0785 L^2) \quad (7 \text{ marks})$$

- c) Define horizontal equivalent. Explain factors that are considered in selection of contour intervals (6 marks)
- d) The following figures were extracted from a level field book, some entries being illegible owing to exposure to rain. Insert the missing figures and check your results (6 marks)

B.S	I.S	F.S	H.P.C	R.L	Distance	Remarks
?			279.08	277.65	0	OBM
	2.01			?	20	
	?			278.07	40	
3.37		0.40	?	278.68	60	
	2.98			?	80	
	1.41			280.64	100	
		?		281.38	120	TBM

- e) Outline any TWO types of obstacles encountered in chain surveying giving remedial measured that must be employed to overcome them in each case (6 marks)

**SECTION B** (Answer any TWO questions from this section. Each question carries 20 marks)

**Question 2**

- a) Define horizontal equivalent. What factors does one consider in the selection of the vertical interval (5 marks)
- b) Explain the procedures of producing a contour map by the use of grids through indirect method (15 marks)

**Question 3**

- a) Describe the procedure of the reciprocal leveling (10marks)
- b) Outline characteristics of contours (10 marks)

**Question 4**

- a) Discuss any **FIVE** sources of errors in leveling (5 marks)
- b) The following data was obtained for small site where a channel is required for irrigation from a river to a farm, using the scale of 1:50 for vertical scale and horizontal scale of 1 : 500 plot the longitudinal section. The proposed gradient of the profile is 1 in 100. (15 marks)

B.S	I.S	F.S	Rise	Fall	R.L	Distance	Remarks
1.672					82.200	0.0	
	0.894					0.0	A on centre line
	1.047					20.0	No. 1 on centre line
	1.391					40.0	No. 2 on centre line
	1.605					60.0	No. 3 on centre line
	1.872					80.0	No. 4 on centre line
1.439		1.872				100.0	No. 5 on centre line
	1.532					120.0	No. 6 on centre line
	1.758					140.0	No. 7 on centre line
	2.182					160.0	No. 8 on centre line
	2.429					180.0	No. 9 on centre line
	2.507					187.0	B on centre line
1.587		1.435					
		1.368					

### Question 5

- a) What factors should one consider in the selection of survey stations (5 marks)
- b) With the aid of a sketch, describe various parts of a dumpy level (10 marks)
- c) It was required to determine the accurate difference of levels between two points A and B on opposite banks of a river. The level was set up very near to point A and the staff reading of point A and B was read as 1.705 and 0.970m respectively. The instrument was then set up at point B and the observed staff readings on point A and B were read as 1.850m and 1.205m respectively. What was the true difference of the level between the two points? (5 marks)