



**THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE**

**((A Constituent College of JKUAT)**

(A Centre of Excellence)

**Faculty of Engineering &  
Technology in Conjunction with  
Kenya Institute of Highways and  
Building & Technology (KIHBT)**

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

**HIGHER DIPLOMA IN BUILDING & CIVIL ENGINEERING  
(BUILDING SERVICES OPTION)**

EBE 3108: SURVEYING & SETTING OUT II

**END OF SEMESTER EXAMINATION**

**SERIES: DECEMBER 2012**

**TIME: 2 HOURS**

**Instructions to Candidates:**

You should have the following for this examination

- *Answer Booklet*
- *Scientific Calculator*

This paper consists of **FIVE** questions

Answer any **THREE** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

**Question One (20 Marks)**

a) Define the following terms as applied in theodolite work.

(i) Vertical axis

(ii) Collimation axis

(iii) Face left

(iv) Transiting

(v) Swing

(5 marks)

b) (i) State the function of the following:

(i) Centering device

(ii) Optical plummet

(iii) Low plate clamp

(iv) Telescope tangent screw

(6 marks)

c) Stat the procedure of centering and leveling of a theodolite.

(9 marks)

**Question Two (20 marks)**

a) Table 1 shows horizontal circle readings about a point.

Reduce the angles using an angular booking table and illustrate the configuration of the station

(8 marks)

Table 1

Instrument at	To Point	Face Left	Face Right
O	P	12° 16' 00"	192° 16' 40"
	Q	43° 39' 20"	223° 40' 20"
	R	141° 06' 20"	321° 07' 40"
	S	207° 53' 40"	27° 54' 20"
	P	12° 16' 20"	192° 17' 20"

b) State **THREE** systems of tacheometry.

(3 marks)

c) With the aid of a sketch, derive expressions for the horizontal distance and the difference in height for an inclined sight to a vertical staff.

(9 marks)

**Question Three (20 marks)**

a) Outline **FOUR** parts of a planimeter.

(6 marks)

b) State the uses of the following plane table survey equipment.

(i) Simple Alidade

(ii) Trough Compass

(iii) Indian Clinometers

(iv) Plumbing fork

(6 marks)

c) State any **FOUR** points to be considered in selection of stations for a theodolite traverse.

(4 marks)

d) Define the following terms as used in theodolite traversing.

- (i) Open traverse
- (ii) Closed traverse
- (iii) Traverse leg
- (iv) Traverse angle

(4 marks)

#### Question Four (20 marks)

A circular curve 208.00m radius is to be set to connect two straights deflecting at an angle of  $30^\circ$ . Given the chainage of the intersection point as 509.57m and that the curve is to be set by the theodolite and tape method, calculate the setting out data for the curve for continuous chainage.

(20 marks)

#### Question Five (20 marks)

a) An open drain is to be constructed from Y to Z. The reduced level at Y and Z are 1201.50m and 1236.00m respectively. Given the co-ordinates at Y and Z as:

	N	(m)	E
Y	+7524		+12534
Z	+7636		+12589

Determine (i) Length and bearing of line Y – Z

(ii) Mean gradient of line Y – Z

(10 marks)

b) Table 2 shows data obtained during tacheometric survey. If the multiplying and additive constants were 100 and 0 respectively.

Determine the:

- (i) Horizontal distance between the instrument and the staff stations;
- (ii) Difference in height between the two stations when the instrument is set 1.555m above the ground.

(10 marks)

**Table 2**

Vertical Angle	Stadia Readings (m)		
	TOP	MIDDLE	BOTTOM
- $4^\circ 20' 30''$	2.063	1.532	1.000