



TECHNICAL UNIVERSITY OF MOMBASA  
**Faculty of Engineering &  
Technology**

DEPARTMENT OF BUILDING & CIVIL ENGINEERING  
UNIVERSITY EXAMINATION FOR DECREE IN:  
**BACHELOR OF SCIENCE IN CIVIL ENGINEERING (BSCE)**

ECE 2211: SURVEYING II

**END OF SEMESTER EXAMINATION**  
SERIES: DECEMBER 2014  
**TIME ALLOWED: 2 HOURS**

**Instructions to Candidates:**

You should have the following for this examination

- *Answer Booklet*

This paper consists of **SIX** questions. Answer **ONE** question in each of the **THREE** sections

Maximum marks for each part of a question are as shown

Use neat, large and well labeled diagrams where required

This paper consists of **THREE** printed pages

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**Section A**

**Question One**

a) Explain the following terms as used in surveying:

- (i) Azimuth
- (ii) Bearing
- (iii) Traversing
- (iv) Reconnaissance
- (v) Face left

**(5 marks)**

b) You are provided with the following:

Height of instrument = 1.56m

At point A  
 Multiplying constant (K) = 100  
 Additive constant (C) = 0  
 Reduced level of A = 1286.00m

	Staff Reading at	Upper Reading	Lower Reading	Vertical Angle
Bearing AC = 63° 15' 30"	C	3.457	2.567	01° 34' 56"
Bearing AB = 297° 56' 07"	B	2.895	1.321	-02° 12' 23"

Compute:

- (i) The reduced level of points B and C **(3 marks)**
- (ii) The horizontal distances AB, AC and BC **(6 marks)**

- c) Outline the TWO methods of measurement employed by EDM instruments and explain why one method is more common than the other. **(6 marks)**

**Question Two**

- a) Given the coordinates of A and the distance and bearing of line AB as below, calculate the coordinates of point B:

EA = 43964.38m  
 NA = 69866.75m  
 Bearing AB = 299° 58' 46"  
 Distance AB = 1325.64m

**(5 marks)**

- b) Three fixed points A, B and C were observed from a point X inside the triangle ABC, the measured angles being:

A x B = 106° 53' 20"  
 B x C = 112° 29' 40"

The coordinates of A, B and C are:

Point	N(m)	E(m)
A	37032.6	15050.1
B	41121.8	22984.6
C	29974.3	29538.4

Find the coordinates of X and the bearing from X to A and from B to X. **(15 marks)**

**Section B**

**Question Three**

- a) State and outline the functions of any SIX components of a theodolite. **(6 marks)**
- b) The additive constant of a theodolite employed in tacheometry is 0. The instrument was set up above datum over BM 60.000m and the height of instrument (H.I) was 61.416m above datum assuming the

multiplying constant of the instrument to be 100, calculate the reduced levels of the stations 1, 2, 3 from the following observations:

Station	Lower Stadia	Middle	Upper Stadia	Vertical Angle
1	0.45	1.035	1.620	+5° 14' 00"
2	0.861	11.269	1.680	+7° 23' 00"
3	1.185	1.788	2.400	+8° 12' 00"

- c) Outline types of equipment used in linear measurement and state the advantages and disadvantages of each. **(5 marks)**

#### Question Four

From the data given in table below, which refers to the centre point of the triangle shown in the figure below (not to scale), compute the coordinate of point P after adjusting the angles by equal ship. **(20 marks)**

Observed Angles	Observed Angles	Point	E(cm)	N(cm)
PEC 6° 07' 38"	EPC 52° 10' 11"	C	391 809.25	210 247.72
CPD 58° 27' 46"	PDC 16° 32' 22"	D	394 479.12	213 604.13
ECP 111° 41' 59"	DEC 18° 50' 25"			
DCE 143° 17' 51"				

### Section C

#### Question Five

A closed-loop traverse ABCDA was run around an area and the following observations were made:

Station		Length (m)	Included Angle	W.C.B
A		187.4	86° 31' 02"	140° 11' 40"
	B			
B		382.7	80° 59' 34"	
	C			
C		106.1	91° 31' 29"	
	D			
D		364.8	100° 59' 15"	
	A			

#### Question Six

- a) Outline layout of triangles in triangulation. **(10 marks)**
- b) The bearings of two inaccessible stations A and B taken from station C were 225° 00' and 153° 26' respectively. The coordinates of A and B were as below:

Station	Eastings (m)	Northings (m)
A	300	200
B	400	150

Compute the independent coordinates of C

**(10 marks)**