THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DIPLOMA IN CIVIL ENGINEERING

DIPLOMA IN BUILDING & CIVIL ENGINEERING

EBC 2303: ENGINEERING SURVEYING II

END OF SEMESTER EXAMINATION

SERIES: APRIL 2012

TIME: 2 HOURS

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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 clearly shown
This paper consists of **FOUR** printed pages

Question 1 (20 marks)

a) (i) Define the term tacheometry. (1 mark)

(ii) State the **TWO** basic quantities from which horizontal distance is derived in tacheometry (1½ marks)

(iii) Differentiate between stadia and tangential systems of tacheometry (2 marks)

b) Table 1 shows the information of stadia tachometric exercise with the staff held vertically. Given the reduced level of the bench mark as 270.00m. Calculate:
(i) Distance PQ, PR and QR
(ii) The difference in height PQ
(iii) Area PQR in hectares

Table 1

Inst	To	Staff Readings (m)			Vertical angle	Height of Inst (m)	Whole circle bearing
		Upper	Mid	Lower			
P	Q	2.750	2.160	1.570	2° 45’	1.47	60° 30’
	R	3.050	2.153	1.255	-1° 30’	1.47	140° 20’
	Bench Mark	1.580	1.015	0.450	2° 00’	1.47	

(15½ marks)

Question 2 (20 marks)

a) Given the o-ordinates of points R and S as:
- R: 125.45m E, - 234.67m N
- S: 376.19E, 242.87m N

Calculate the length and bearing of line RS using a join computation table (5 marks)

b) Figure 1 shows the whole circle bearings of a polygonal traverse A, B, C, D, E, A. Calculate the internal angles A, B, C and D of the traverse.

c) The data shown in table 2 is for a closed loop traverse A, B, C, A. Given the whole circle bearing of line AB as 128° 22’ 20’’. Calculate:
(i) The corrected internal angles
(ii) The whole circle bearing of the lines
(iii) The partial co-ordinates of the lines

figure 1

Table 2

Line	Uncorrected Angle	Length (m)
AB	57° 33'36''	322.43
BC	92° 07' 20''	539.22
CA	30° 18' 26''	638.47

Question 3 (20 marks)

a) (i) Define the following terms as used in compass traversing
- Magnetic merdian
- Angle of declination
- Agonic line (3 marks)

(ii) State **TWO** merits and **ONE** demerit of a compass traverse as compared to other methods of Surveying. (3 marks)

(iii) State any **TWO** uses of a compass traverse (2 marks)

b) The bearings of a compass traverse P, Q, R, S, T, R are shown in table 3. Adjust the traverse for local attraction (12 marks)

Table 3

Line	Length (m)	Forward bearing (FB)	Back bearing (BB)
QP	210.86	207° 45'	
PQ			29° 00'
PT	14.59	135° 00'	
TP			315° 00'
TS	161.62	62° 00'	
ST			242° 25'
SR	152.73	12° 00'	
RS			192° 25'
RQ	202.23	292° 00'	

QR			112º 25’

Question 4 (20 marks)

With the aid of sketche(s) where necessary, explain the following theodolite operations:

a) Repetition method of measuring angles (6 marks)
b) Measurement of vertical angles (7 marks)
c) Trunnion axis adjustment (7 marks)

Question 5 (20 marks)

a) Differentiate between temporary and permanent adjustments of a theodolite (2 marks)

b) State the function of the following parts of a theodolite
   (i) Centering clump
   (ii) Optical plummet
   (iii) Vernier
   (iv) Slow motion screws (4 marks)

c) Describe the zero index error adjustments of a theodolite (8 marks)

d) Table 4 shows horizontal circle readings about a point. Reduce the angles using an angular booking table and illustrate the configuration of the station on a sketch. (6 marks)

Table 4

Inst at	To point	Face right			Face left		
		º	‘	“	º	‘	“
A	B	21	41	30	201	41	35
	C	90	30	55	270	30	50
	D	177	29	05	357	29	10
	E	208	18	50	28	18	45
	F	265	17	10	85	17	08
	G	381	41	30	201	41	35