



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

DEPARTMENT OF BUILDING & CIVIL ENGINEERING
DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE)

EBC 2106: ENGINEERING SURVEYING II

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: JULY 2014

TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

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 **FOUR** printed pages

Question One

a) Define the following terms as used in compass traversing:

- (i) Magnetic meridian
- (ii) Local attraction
- (iii) Diurnal variation
- (iv) Agonic line
- (v) Magnetic declination

(5 marks)

b) (i) State any **TWO** uses of a compass traverse

(ii) State any **TWO** merits and **ONE** demerit of a compass traverse survey as compared to other methods of survey. (5 marks)

c) Table 1 shows the data obtained in a compass traverse A, B, C, D, E surveying A. Adjust the traverse for local attraction (10 marks)

Table 1

Line	Back bearing	Forward bearing	Length
AB	231½°	51°	31.91
BC	302°	123°	45.18
CD	15°	195°	26.20
DE	80°	259°	36.40
EA	152°	331°	41.89

Question Two

The information shown in table 2 is for a stadia tacheometric survey with the staff held vertically. The theodolite had anallatic telescope with a multiplying constant of 100. Calculate:

- a) Distance KL, KM and LM
- b) Area KLM in hectares
- c) The reduced levels of points K and M given that of L as 215.050m
- d) The gradient KM

(20 marks)

Table 2

Inst Stn	To Stn	Staff Reading (m)			Vertical circle readings o ' "	Height of instrument	Horizontal Circle reading o ' "
		Upper	Mid	Lower			
K	L	3.200	2.100	1.000	-2 00 00	1.53	23 50 30
	R	3.050	2.153	1.255	+3 15 10	1.48	97 20 15

Question Three

a) Define the following terms as used in a co-ordinate system:

- (i) Polar co-ordinates
- (ii) Whole circle bearing
- (iii) Reduced bearings
- (iv) Rectangular co-ordinates (4 marks)

b) The data shown in table 3 and figure 1 is for a closed polygonal traverse P Q R S T P. Given the whole circle bearing of line PQ as $150^{\circ} 54' 54''$ calculate, using a table the following:

- (i) The corrected internal angles
- (ii) The whole circle bearings of lines QR, RS, TP and ST (10 marks)

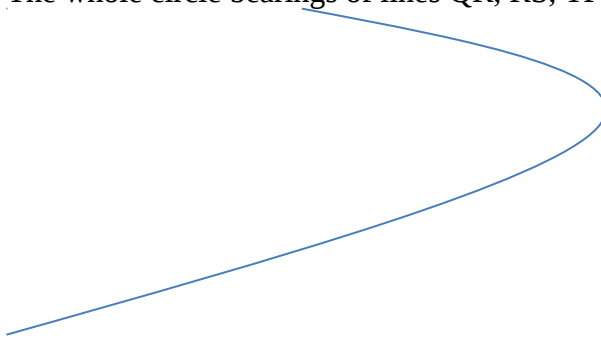


Table 3

Line	Length (m)	Uncorrected	Internal	Angle
PQ	31.91	99°	$30'$	$40''$
QR	45.18	108°	$36'$	$00''$
RS	26.20	107°	$48'$	$20''$
ST	36.40	115°	$38'$	$20''$
TU	41.89	108°	$26'$	$50''$

c) Given the total co-ordinates of points J and K as:
 J: 258.57mE – 871.53mN
 K: 0.00mE – 1587.00mN

Calculate, using a join computation table, the length and bearing of lien JK (6 marks)

Question Four

- a) Derive expressions for horizontal distance and vertical difference in height in tangential tacheometry with the line of sight inclined upwards. (8 marks)
- b) The data shown in table 4 was obtained during a tacheometric exercise of a piece of land calculate:
 - (i) Distances DE, DF and FG
 - (ii) Area DEF in hectares
 - (iii) Differences in height DE, EF and FG (12 marks)

Table 4

Inst Stn	To Stn	Vertical circle readings	Staff Reading	Height of instrument	Horizontal Circle reading
					o ' "
D	E	$2^{\circ} 30' 4^{\circ} 45'$	2.781, 3.115	1.50	275 00 00

	F	4°	20'	7°	18'	1.575, 2.072	1.48	223 00 00
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Question Five

a) Differentiate between the following pair of terms:

(i) Transiting and swinging

(ii) Changing faces and face left

(iii) Line of collimation and horizontal axis

(6 marks)

b) Table 5 shows angular observations in the measurement of vertical angles for different types of theodolites. State the type of theodolite used in each case and calculate the vertical angles.

Table 5

(6 marks)

Inst Stn	To Stn	Face Left			Face Right		
		o	'	“	o	'	“
P	Q	5	7	25	174	52	35
Z	X	87	5	15	272	54	46
Q	S	4	20	30	4	20	40