



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

DEPARTMENT OF BUILDING & CIVIL ENGINEERING
CONSTRUCTION TECHNICIAN CERTIFICATE PART II

EBC 1106: THEODOLITE & TACHEOMETRIC SURVEYING

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: FEBRUARY 2013

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

- a) Describe the following temporary adjustments of a theodolite:
 (i) Leveling
 (ii) Focusing and elimination of parallex (10 marks)
- b) Differentiate between reiteration and repetition methods of measuring angles. (10 marks)

Question Two

- a) Table 1 shows four booking in the measurement of vertical angles using different types theodolites. Using an angular booking and reduction table, calculate the angles stating the type of theodolite used.

Table 1

Inst Stn.	To Stn.	Face Left			Face Right		
		°	'	“	°	'	“
B	C	18	00	20	275	00	22
			5				
D	E	0	00	40	180	00	43
J	K	17	50	15	264	50	17
			6				
L	N	2	05	05	2	05	05

(6 marks)

- b) (i) State the function of the following parts of a theodolite:
 - Vertical circle
 - Footscrews
 - Slow motion skews
 - Telescope clamp (4 marks)
- (ii) With the aid of a sketch, explain the measurement procedure of vertical angles with a theodolite.

(10 marks)

Question Three

In a tacheometric exercise of which the staff was held normally the information shown in table 2 mol recorded. The instrument constants were 100 and zero and the height of the instrument was 1.47m. Given the reduced level of point W as 62.54m, calculate:

- (a) distance WX, WY and XY
 (b) Area WXY
 (c) The reduced levels of points X and Y
 (d) The difference in height XY and its gradient. (20 marks)

Table 2

Inst At	To	Vertical Circle Reading	Staff Readings	Whole Circle Bearing
W	X	5° 20'	2.553 1.975 1.397	37° 50' 10"
W	Y	-3° 40'	3.894 2.922 1.950	89° 40' 20"

Question Four

- a) Compare vertical staff holding and normal staff holding under the following headings:
- Holding the staff
 - Reduction formulae
 - Speed of operation **(6 marks)**
- b) Given in table 3 is the information for a tangential tacheometric survey. The height of the instrument was 1.42m, calculate:
- Distances ST, SU and TU
 - Area STU
 - The reduced level of points T and U given that of S as 127.00m
 - The difference in height TU
 - The gradient of line TU **(14 marks)**

Question Five

- a) (i) Define the term tacheometry. **(2 marks)**
- (ii) Explain the procedure of determining the tacheometric constants of a theodolite. **(5 marks)**
- b) Derive expressions for horizontal distance and vertical difference in height in normal staff holding when the telescope is elevated. **(13 marks)**

Table 3 (for question 4b)

Inst	To Stn	Height of Inst (HI)	Vertical Angel	Staff Reading	Whole Circle Bearing
S	T		0° 4' 0"	3.510	0°
			3° 4' 0"	4.000	

	U		4 0 00	1.552	70°
			0		
			1 0 50	2.015	
			5 0		