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	To	Face Left			Face Right		
Stn.	Stn.	º	‘	“	º	‘	“
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 skrews
- 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 tachecheometric 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:
   (i) Holding the staff
   (ii) Reduction formulae
   (iii) 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:

   (i) Distances ST, SU and TU
   (ii) Area STU
   (iii) The reduced level of points T and U given that of S as 127.00m
   (iv) The difference in height TU
   (v) 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		2 4 0 5	3.510	0°
			3 4 0	4.000	

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