TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

CERTIFICATE IN BUILDING & CIVIL ENGINEERING (CBCE 13M)

EBC 1204: ENGINEERING SURVEYING II

END OF SEMESTER EXAMINATION
SERIES: APRIL 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 of the **FIVE** questions
All questions carry equal marks

Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

Question One

a) (I) Differentiate between the following pair of terms as used in theodolite work:
- **(i)** Swinging and transiting
- **(ii)** Face left and face right

(II) State the function of the following parts of a theodolite:

(i) Plumb-bob
(ii) Plate clumb
(iii) Telescope
(iv) Slow motion screws **(8 marks)**

b) Explain the reiteration method of measuring small angles accurately. **(4 marks)**

c) The readings shown in table 1 were recorded during the measurement of several angles about a point. Calculate the angles using an angular booking and reduction table and hence illustrate the configuration of the angles. **(8 marks)**

Table 1

Inst Stn	To Stn	Face Left			Face Right		
		o	‘	“	o	‘	“
A	B	07	15	20	100	15	18
	C	70	50	20	250	50	21
	D	190	24	25	10	24	26
	E	296	21	22	112	11	12
	F	300	05	08	120	05	10
	A	371	10	24	191	10	26

Question Two

a) Describe the following temporary adjustments of a theodolite:
- Levelling
- Focusing and elimination of **(12 marks)**

b) Explain the repetition method of measuring horizontal angles. **(8 marks)**

Question Three

a) Derive equations for horizontal distance and difference in height in tangential tacheometry. **(7 marks)**

b) The information for a tangential tacheometric survey is as shown in table 1. Given the height of the instrument as 1.52m and the reduced level of point T as 20.40m AMSL, calculate:
- **(i)** Distances Tu, Tv and Uv
- **(ii)** Area TUV
- **(iii)** The reduced levels of point U and V

Table 2

Inst Stn	To Stn	Vertical Angles	Stat Readings	Horizontal Circle Readings
T	U	2° 30’ , 4° 10’	2.751, 3.225	51° 20’ 30”
	V	-5° 00’ 7° 40’	2.334, 3.571	107° 15’ 20”

(13 marks)

Question Four

Table 2 shows the information of a stadia tacheometric survey with the staff held vertically. The multiplying and additive constants of the instrument was 100 and zero respectively. Given the reduced level of point A as 73.00m AMSL. Calculate:

a) Distance AB, BC and AC
b) Area ABC in hectares
c) The reduced levels of points B and C
d) The gradient of line BC

Table 2

Inst Stn	To Stn	Vertical Angles	Staff Readings (m)	Height of Instrument (m)	Whole Circle Readings
A	B	4° 00’ 00”	2.600 2.100 3.600	1.48	80° 00’ 00”
B	C	-2° 00’ 00’	1.850 2.950 3.050	1.45	55° 00’ 00”

Question Five

a) Given the co-ordinates of points P and Q as P:715.224mE, 100.00mN Q: 225.150mE, 480.00mN

Calculate, using a join computation table the length and bearing of line QP **(6 marks)**

b) Differentiate between the following terms:
- **(i)** Agonic line and isogonals
- **(ii)** Magnetic bearing
- **(iii)** Secular variation and periodic variation **(6 marks)**

c) Figure 1 shows a link tranverse P Q R S T U Y. Given the whole circle bearing of lines PQ and UV as 33° 41’ 24” and 61° 27’ 36” respectively, calculate the corrected whole circle bearings of the other lines. **(8 marks)**