TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN CIVIL ENGINEERING
(BSCE – Y2 S2)

ECE 2212: FLUID MECHANICS 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*
- *Scientific Calculator*

This paper consists of **FIVE** questions.
Answer question **ONE (COMPULSORY)** and any other **TWO** 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 (COMPULSORY)

a) Given the following whole circle bearing (WCB) of three sides of a triangle as:

Side	WCB
AB	93º 24' 22"
BC	31º 12' 16"
CA	239º 58' 35"

Determine the internal angles of the triangle. **(5 marks)**

b) The following co-ordinates of M and N were provided as follows:

Coordinates	Northings (m)	Eastings (m)

N		959.29					209.42	
N		502.39					129.63	

Using BOWDITCH method, complete the table below:

Std	Bearing	Distance	Calculated		Adjustment		Adjusted		Final Coordinates
			ΔE	ΔN	δE	δN	ΔE	ΔN	
MB	356º 19' 06"	110.41							
BC	19º 55' 00"	120.41							
CD	24º 32' 30"	150.22							
DN	350º 22' 30"	98.16							

c) The following angles were adjusted for triangle ABC which were provided as:

$\phi_A = 75° \ 04' \ 25''$

$\phi_B = 42° \ 35' \ 47''$

$\phi_C = 62° \ 19' \ 48''$

The datum co-ordinates of A and B were

   N(m)   E(m)

   A: +643649.19   +409577.46

   B: +641 668.40   +412 600.36

Using the first principle, derive the coordinates of C from points A and B.   **(10 marks)**

d) Discuss any TWO methods employed during a traverse adjustment   **(5 marks)**

Question Two

a) Explain the TWO basic methods used in angle adjustments in a triangular scheme.   **(4 marks)**

b) The field abstractions of figure 1 below shows the observed angles of a braced quadrilateral PQRS. Using the equal shift method, calculate the adjusted values of the angles.

figure 1.0 Braced Quadrilateral

Angle	**Observed value**
1	31º 20' 50"
2	53º 10' 45"
3	56º 44' 38"
4	38º 43' 39"
5	41º 53' 49"
6	42º 37' 47"
7	54º 54' 56"

	8	40° 33' 30"	

(16 marks)

Question Three

a) Define tacheometry. **(3 marks)**

b) Using a sketch, derive the expression for the horizontal distance, H, given β and α as angles of depression and differences in level L between points A and B. **(6 marks)**

c) A tacheometer has a multiplying constant of 100 and an additional constant 1. When set up for use, the trunion axis had a reduced set up for use, the trunion axis had a reduced level of 15.2m and when sighted a vertically held leveling staff, the horizontal centre line read 1.8m and the lower and upper stadia lines 1.4m and 2.3m respectively. If the angle of elevation of the instrument was 9°, calculate:
    (i) Horizontal distance (H) of the staff from the instrument. **(3 marks)**
    (ii) The reduced level of the ground at the staff position. **(3 marks)**

d) Using a sketch, differentiate between face left observation (FL) and face right observation (FR) in a theodilite. **(5 marks)**

Question Four

The field abstract for a triangulation scheme to establish a small construction site had the following observations.

Angle	Observed value
1	26° 10' 48"
2	27° 37' 16"
3	35° 46' 10"
4	32° 57' 52"
5	28° 23' 12"
6	29° 04' 37"
7	126° 15' 59"
8	111° 32' 32"
9	122° 32' 02"

W

Abstract for centre point triangle

Given the following stations F and B below adjust the angles:

	N(m)	E(m)
F	+250.00	+719.37
A	+447.15	+250.00

(20 marks)

Question Five

a) The coordinates of S.A and L were provided as NS = 1200.55m, E3 = 1310.22m, NA = 960m, EA = 1530.45m, NL =580.82m, EL = 1240.22m respectively. Determine the coordinates of B by intersection method given the angles of S, A and L as BSA$^{(\alpha)}$ = 85° 40' 55"; SAB$^{(\sigma)}$ = 55° 45' 54" BAL$^{(\sigma)}$ = 41° 42' 50" and ALB$^{(\beta)}$ = 70° 10' 03" **(6 marks)**

b) An open traverse was run from A to E as shown below, determine its partial coordinates.

(14 marks)

N