THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE

IN CIVIL ENGINEERING

ECE 2211: ENGINEERING SURVEYING II

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2011
TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination
  • *Answer booklet*
This paper consists of **FIVE** questions
Answer question **ONE (COMPULSORY)** from **SECTION A** and any other **TWO** questions from **SECTION B**
Maximum marks for each part of a question are clearly shown
This paper consists of **FIVE** printed pages

SECTION A (COMPULSORY)

Question 1 (20 marks)

a) The coordinates of S, A and L were given as N_S = 1200.55 m, E_S = 1310.22 m; N_A = 960m, E_A = 1530.45 m, N_L =580.82 m, E_L = 1240.22 m respectively. Compute the coordinates of B which are located by the intersection from stations S, A and L by observing the following angles: BSA (α)

α = 85º40'50'', SAB (δ) = 55º45'54'', BAL (λ) = 41º42'50'' and ALB (β) = 70º10'33 '' (10 marks)

b) A traverse was run between Pussy and Puppy to fix new points N_6, N_7, N_8, N_9, N_{10} and N_{11}.   The bearings were provided.   Given the following information, compute the final corrected coordinates for the new points. The data was as follows:

Pussy : +26594.36; +686431.52
Puppy: +28162.86: +685828.56

Other details included:

Pussy to N_6
251º44'01''and 340.55m

N_6 to N_7

254º03'22'' and 272.321 m

N_7 to N_8

43º08'09'' and 480.508 m

N_8 to N_9

05º20'53'' and 206.399 m

N_9 to N_{10}

326º19'50'' and 364.981 m

N_{10} to N_{11}

338º06'50'' and 335.418 m

N_{11} to Puppy

298º32'40'' and 443.924 m   (14 marks)

c) With an aid of a sketch, show that when α and β are angles depression horizontal distance H is
    given by the equation below:

$$H = \frac{S}{\tan \alpha + \tan \beta}$$

              where S = staff intercept   (6 marks)

SECTION B (Answer any TWO questions from this section)

Question 2 (20 marks)

a) Define teacheometry. A theodilite whose height of the instrument level is 1.85 m has a
    multiplying constant of 100 and additive constant of 1.0. If the angle of elevation is 8º and the
    upper, middle and lower stadia readings are 4.99 m, 3.5 m and 2.1 m respectively. What is the
    distance of the staff from the station and what would be the reduced level at the staff?   (4 marks)

b) Define triangulation. The filed abstract from a triangulation scheme established for a small construction site shown in figure 1 had the following dat. By employing equal shift method, adjust the angles.

Angle	Observed value
1	26°10'48"
2	27°37'16"
3	35°46'10"
4	32°57'52"
5	28°23'17"
6	29°04'37"
7	126°11'59"
8	111°15'52"
9	122°32'02"

(16 marks)

Fig I

Question 3 (20 marks)

a) Using sketches, differentiate between FACE LEFT and FACE RIGHT (4 marks)

b) Discuss the **TWO** main methods of error distribution in traversing citing the assumptions made by each method (6 marks)

c) Make short notes on the following
    (i)   Primary triangulation
    (ii)   Secondary triangulation

(iii)   Tertiary triangulation   (3 marks)

d) An open traverse was run from A to E, given using the sketch and the information provided, computer the partial coordinates of each line   (7 marks)

W.C.B

Question 4 (20 marks)

The figure below (fig 3) shows observed angles of braced quadrilateral PQRS. Given the observed values below, adjust the values of ALL the angles of this quadrilateral   (20 marks)

Angle   Observed value

1	30°20'50"
2	54°10'45"
3	55°44'38"
4	39°43'39"
5	41°53'49"
6	42°37'47"
7	54°54'56"
8	40°33'30"

Question 5 (20 marks)

a) Given the following coordinates of M and N, compare the table by using BODWITCH METHOD

Std	Bearing	Dist.	Calculated		Adjustments		adjusted		Final Coordinates	
			ΔE	ΔN	δE	δN	ΔE	ΔN	E	N
MB	356º20'30"	110.41								
BC	19º53'00"	120.41								
CD	24º32'30"	150.22								
DN	350º22'30	98.16								

The coordinates are provided as follows:

Coordinates   **Northings (M)**   **Eastings (M)**
M   +502.39   209.42
N   +959.29   +129.63   (10 marks)

b) The adjusted angles of a triangle ABC are as given below:

$\beta_A = 74^o04'25''$

$\beta_B = 43^o35'49''$

$\beta_C = 62^o19'49''$

Given the datum coordinates of A and B as follows, compute the provisional coordinates C

	N(M)	**E(M)**
A	+ 643 649.19	+ 409 577.46
B	+ 641 668.40	+ 412 600.36

(10 marks)