UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESI 2011/2012

COURSE NAME	:	SURVEYING
COURSE CODE	:	BPE 20703
PROGRAMME	:	2 BPD
EXAMINATION DATE	:	JANUARY 2012
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS
		THIS EXAMINATION PAPER MUST BE RETURNED WITH THE FINAL CALCULATION RESULTS PLACED IN THE APPENDIX PROVIDED

THIS QUESTION PAPER CONSISTS OF **EIGHT (8)** PAGES

Q1　An angle was measured ten times using a total station. The list of angle measurements are shown in rows 1 to 10, columns 2 to 4 in **Error! Reference source not found.**.

(a) Calculate the average value of the measured angle in row 11, columns 2 to 4 (put the calculation results in the shaded cells in **Table Q1**).

(4 marks)

(b) Calculate the residuals errors in column 5, and squared residual errors in column 6 (put the calculation results in the shaded cells in **Table Q1**).

(4 marks)

(c) Calculate the standard deviation of the measured angle in row 12, column 4 (put the calculation results in the shaded cells in **Table Q1**).

(5 marks)

(d) It was realized later that one of your measurement in **Table Q1** might contain gross error (blunder). Identify which one and then remove this suspicious observation. Try to recalculate the standard deviation after removing the blunder. Prepare your own table using **Table Q1** as a model. (put the calculation results in the shaded cells in **Table Q1**)

(7 marks)

Q2　A precise leveling survey for drainage design of a real estate project was prepared by a surveyor team. Survey data of the existing profile is shown in **Table Q2** with its corresponding diagram in **Figure Q2**.

The followings are basic information of the survey.

1. BM 0231 has elevation of 16.254 m above mean sea level (MSL).
2. When the surveyor set up a level instrument close to points G and H, staff reading at BM 0231 was 0951 mm (see also **Figure Q2**).

The staff readings at these points are given in **Table Q2**. Now, you are required to calculate the elevation of points as given in the shaded cells in **Table Q2**.

(a) Calculate the elevation of collimation line in row 2, column 3.

(5 marks)

(b) Based on the collimation line elevation, calculate the elevation of points A to L in rows 3 to 14, column 3.

(15 marks)

Note:
IMPORTANT: Be careful with the unit. Height of BM-0231 is in meter above MSL, whilst the staff reading is in mm.

Q3   A five angled closed traverse is given in a diagram in
      Q3. Data of the known coordinates, azimuth, and all measured internal angles and distances are given in **Error! Reference source not found.Q3**. The following details are given:

1. All internal angles are given in column 2 of **Error! Reference source not found.Q3**;
2. Distances between adjacent points are given in column 4 of the table;
3. Azimuth of line AB of **280 degrees** is given in row 2, column 6 of the table;
4. Coordinates of point A are given in row 1, columns 15 and 16 of the table.

You are now required to calculate intermediate and end results (all in grayed cells of **Error! Reference source not found. Q3**):

(a)   Total internal angles and corrections due to error in the observed angles in rows 13, 14, and 15, column 2.

                                                                (2 marks)

(b)   Corrected internal angles including their sum for check in column 3.

                                                                (3 marks)

(c)   Sum of measured distances in row 12, column 4.

                                                                (2 marks)

(d)   Azimuth of lines BC, CD, DE, and EA in column 6.

                                                                (6 marks)

(e)   Direction and the value of bearings in columns 7 and 8.

                                                                (5 marks)

(f)   Coordinate differences (dX and dY) and their sums in columns 9 and 10.

                                                                (5 marks)

(g)   Correction to dX and dY in columns 11 and 12.

                                                                (6 marks)

(h)   Corrected dX and dY in columns 13 and 14 and their sums for check.

                                                                (6 marks)

(i)   Final coordinates of points B through E in columns 15 and 16 given coordinates of point A are **X=240 m, Y=-160 m**.

                                                                (5 marks)

Q4   The area of your real estate project is not exactly boud by your closed traverse in Q3. Rather, it is somewhat irregular form between point A and E as shown in shaded area in **Figure Q4**. Later a surveyor subdivided the area into a series of trapezoids of the same interval of **38 meters**.

(a) Calculate the area bound by the closed traverse in Q3.

(5 marks)

(b) Calculate the net area of your project (shaded area) if the trapezoids data is given in **Figure Q4**.
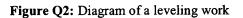
(15 marks)

END OF QUESTION PAPER

APPENDIX

Table Q1: Angle measurement results

	1	2	3	4	5	6
	No	Angle			v	v^2
		deg	min	sec	(sec)	(sec^2)
1	1	55	45	20		
2	2	55	45	19		
3	3	55	45	17		
4	4	55	45	19		
5	5	55	45	21		
6	6	55	46	18		
7	7	55	45	19		
8	8	55	45	17		
9	9	55	45	21		
10	10	55	45	18		
11	Average:					
12	Standard Deviation (sec):					

Table Q2: Survey data of the existing profile

	1	2	3
	Point ID	Staff Reading (mm)	Elevation (m)
1	BM 0231	0951	16.254
2	Collimation Line		
3	A	1305	
4	B	1158	
5	C	1207	
6	D	1109	
7	E	1405	
8	F	1556	
9	G	1353	
10	H	1407	
11	I	1108	
12	J	0902	
13	K	0601	
14	L	0552	

Figure Q2: Diagram of a leveling work

Table Q3: A five angled closed traverse

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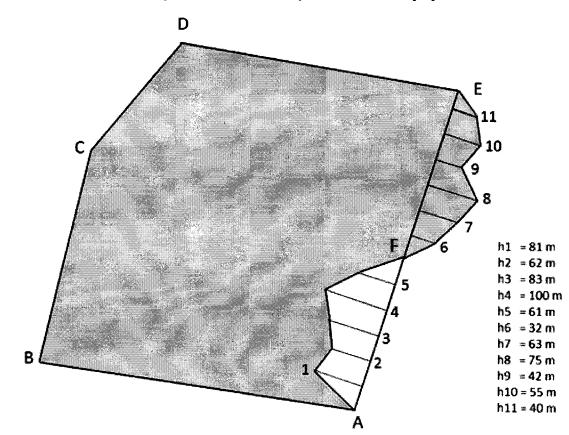| 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Point	Int Angles (degree)	Corrected IA (degree)	Distance		Azimuth (degree)	Bearing		Coordinate Difference		Correction		Corrected Coord Diff		Final Coord		Point ID
			(m)	direction		N/S	(deg)	dX (m)	dY (m)	dX (m)	dY (m)	dX (m)	dY (m)	X (m)	Y (m)	
A	98													240	-160	A
			486	A-B	280											
B	85															B
			329	B-C												
C	152															C
			212	C-D												
D	120															D
			427	D-E												
E	82															E
			505	E-A												
A																A
		Total distance:														
	Total IA:															
	Ideal Total IA:															
	Correction/IA:															

Azimuth AE = 280°

Figure Q4: The boundary of the real estate project

h1 = 81 m
h2 = 62 m
h3 = 83 m
h4 = 100 m
h5 = 61 m
h6 = 32 m
h7 = 63 m
h8 = 75 m
h9 = 42 m
h10 = 55 m
h11 = 40 m