Mansoura University		**Surveying Exam for**
Faculty Of Engineering	**Final Exam.**	**2nd Year Civil Eng.**
Public Works Department		**Time : Allowed 120 Min**

A- Photogrammetry

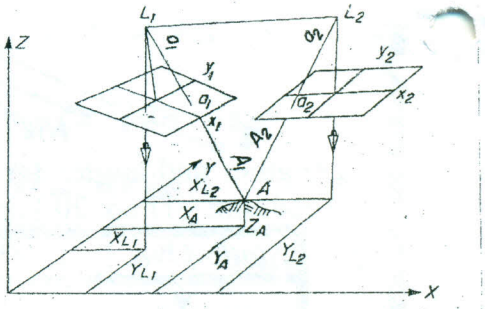
Answer all questions and plaease illustrate your answer with figures :

Question No. 1

1- Represent a schematic representation of Exterior orientation of an oblique photograph .

2- What is the primary function of the large overlap between successive exposures .

3- Since a photograph is a two-dimensional representation of a three-dimensional object, one dimension is lost at the instant of photography . Derive the principal mathematical model to compute the three coordinates of point A shown in figure of overlapping vertical photographs .



4- Derive the fundamental relationship of the **collinearity equations** .

5- Determine the metrical characteristics for the **camera calibration data** .

6- Required the **modofied** collinearity condition equation for a vertical aerial photograph when the photographic x-and y-axes are paralled respectively with the ground coordinate X-and Y-axes and if it is assumed that the principal point of the photograph coincides with the center of collimation or the fiducial center, and the origin of the ground coordinate system lies directly beneath the exposure station .

7- What is other photograpic system that produce an image of the object sensed, which may be used either for metric or interpretive purpose .

Question No. 2

1- An area of terrain 150 km. Wide and 280 km long with very little relief is to be photographed in long direction from south-north with a focal length is 147.3 mm. for the purpose of atopograpic map.
The photograph size is 23 by 23 cm.
The photograpic scale is to be 1 : 12,500 effective at an elevation of 220 m above sea level . Overlap is to be at least 65% and sidelap is to be at least 35 % . An intervalometer will be used to control the interval between exposures. The ground speed of the aircraft will be maintained at 280 km/houre. The flight lines are carefully drawn on the flight map having a scale of 1 : 10, 000 Compute the data for the flight plan .

B- Topographic surveying

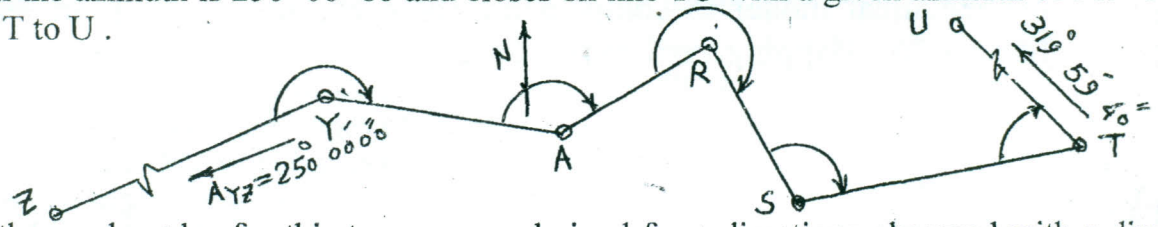
Question No. 1

Using data of a closed traverse given below, calculate the lengths of the lines BC and CD .

Line	*Length*	Whole circle bearing *From N*	*Reduced Bearing*	*Latitude*	*Departure*
AB	104.85 m	14° 31′	N 14° 31′ E	+ 101.50	+ 26.29
BC		319° 42′	N 40° 18′ W		
CD		347° 15′	N 12° 45′ W		
DE	91.44	5° 16′	N 5° 16′ E	+ 91.06	+ 8.39
EA	597.80	168° 12′	S 11° 48′ E	- 584.21	+ 122.05

Question No. 2

A traverse by angles to the right is shown in Fig. This traverse originates at line Yz for which the azimuth is 250° 00′ 00″ and closes on line TU with a given azimuth of 319° 59′ 45″ from T to U .



Lengthes and angles for this traverse are derived from directions observed with a direction theodolite (Theo. 20″) are tabulated in the following table .

Station No.	*Observed angles*	*Line*	*Length (m)*	*Azimuth*	
Y	210° 01′ 20″				
A	140° 00′ 20″	YA	500	YZ	250° 00′ 00″
R	290° 01′ 40″	AR	650	TU	319° 59′ 40″
S	90° 01′ 20″	RS	700		
T	59° 54′ 40″	ST	950		

Coordinates (m.)		
	X	Y
B	250	150

Compute :-

1- The Angular misclosure .
2- The allowable misclosure
3- The corrected Azimuths of all sides AY , RA , SR , TS

Question No. 3

a- Derive the mathematical model of the least square theory

$$\phi = V^T.W.V \longrightarrow \min$$

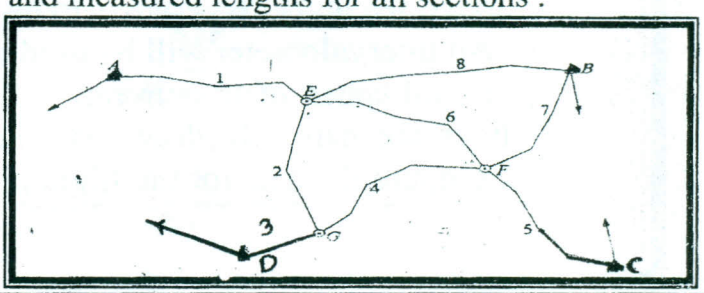
Where :

V = residuals , W = weight matrix

b- In a small traverse – net shown in Figure given :-

2- The coordinates of the four control points
3- All computed latitudes, departures, and measured lengths for all sections .

Required by least-square thecnices the best estimate coordinates for the three junction points E , F and G.



Good Luck

Examinar

Dr. Abdel Moniem Elorabie

Mansura University — Faculty of Engineering

second year civil (2008-2009) — Final Exam. surveying

Ex.(1) An angle measured 10 times by a surveyor(A) with mean $60^\circ 15' 20''$, $\Sigma v^2 = 121$ sec^2, and measured 5 times by another surveyor (B) with mean $60^\circ 15' 19''$, $\Sigma v^2 = 65$ sec^2. Find the most probable value of angle 25%

Ex.(2) Two lines and included angle were measured in triangle with the following results: $a = 47.00$ ms, $\sigma_a = \pm 0.10$ ms

$b = 215.00$ ms, $\sigma_b = \pm 0.05$ ms

$c = 37^\circ 15'$, $\sigma_c = \pm 30$ sec

Calculate the most probable value of the area. 25%

Ex.(3) A baseline AC is divided by point B and three measurements have been made:

$L_1 = 205.60 \pm 0.02$ ms

$L_2 = 215.65 \pm 0.03$ ms

$L_3 = 421.35 \pm 0.05$ ms 25%

what is the least square estimate of the distances.

Ex.(4). Levels were run from B.M. "E" to points A, B, C, D. as shown

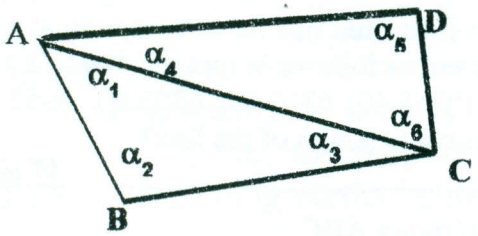
From	To	Length	diff. in level.
A	E	25	-2.348
B	E	15	-2.049
C	E	30	+4.220
D	E	25	-1.835

what is the most probable difference in elevation. 25%

Good luck

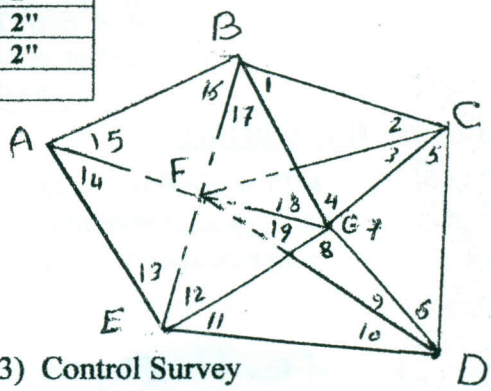
Dr. Ahmed Awad

b) A simple triangulation scheme where the six angles are measured and have the following values: α_1 =48.07°, α_2=92.010°, α_3 =44.02°, α_4 =43.75°, α_5 =96.05° and α_6 = 43.05°. Using the method of least square, calculate the adjusted coordinates of C and D. when (X_A = 0.00, Y_A = 0.0) and (XB = 782.820 m, YB = 460.901m)



C) Find the used matrices to evaluate the corrected angles by using least squares condition equations of the shown figure. [5 Marks]

No	Observed angle	S.D	No	Observed angle	S.D
1	50° 00' 03"	2"	12	40° 00' 03"	2"
2	50° 00' 01"	2"	13	40° 00' 01"	2"
3	40° 00' 02"	2"	14	50° 00' 02"	2"
4	40° 00' 03"	2"	15	50° 00' 03"	2"
Σ	180° 00' 09"		16	50° 00' 03"	2"
5	40° 00' 01"	3"	17	50° 00' 01"	2"
6	40° 00' 01"	3"	18	40° 00' 01"	2"
7	100° 00' 01"	3"	19	40° 00' 02"	2"
Σ	180° 00' 03"		Σ	360° 00' 16"	
8	40° 00' 02"	1"			
9	40° 00' 01"	1"			
10	50° 00' 02"	1"			
11	50° 00' 01"	1"			
Σ	180° 00' 06"				



Question (3) :

a) Give a short notes on the following:

1) Geoid undulation 2) Deflection of the vertical 3) Control Survey

b) Compute the cartesian coordinates of the following Points from known geodetic coordinates when all data are observed in WGS84

Point	Φ	λ	h
G8	28° 25' 32.790"	30° 53' 20.955'	78.773m
G20	24° 51' 59.607"	34° 58' 48.891"	48.616m

The WGS84 ellipsoid parameters are:
Semi- Major Axis (a) = 6378137 ms, Semi- Minor Axis (b) = 6356752.3142 ms
[2 marks]

c) In order to survey the building ABCD the following observations were taken: APQ = 80° 40' 30", AQP = 30° 40' 30", BPQ = 20° 40' 30", and BQP = 70° 40' 30", m. If the co-ordinates of two points P and Q are (30.00, 86.59) and (309.10, 0.00) respectively, calculate the length and bearing of building side AB .
[3 marks]

Good luck

Prof. Dr. Mahmoud El Mewafi, Dr. Abd El-menim Baker

Mansoura University
Faculty of Engineering ورقة اولي
Public works Depart.

2 nd year Civil
Surveying Exam
Fall, 2009

Time : 2 hours

Question (1) :

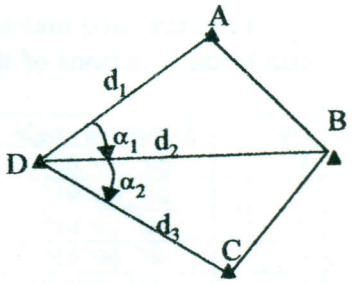
a-1) What is the main segments of the GPS ?
a-2) what are the GPS errors? What are the errors types in GPS Measurements?
a-3) what are the different signals that are transmitted by GPS satellites?
a-4) Compare between the different GPS observation modes.

[3 marks]

b) A center line of the road in problem 1 is measured in four sections. Most probable length and standard error for each section were as follows in meters: 4961.22 ± 0.044, 5433.12 ± 0.031, 1545.90 ± 0.060, and (6355.40, 6355.60, 6355.80, 6355.90 m). What are the standard error and the most probable length of the line?

[3 marks]

c) The opposite figure shows a triangulation figure ABCD, which the horizontal directions d1, d2, and d3 and distances DA, DB, and DC were measured to the three stations A, B, and C respectively with:



d1 = 45° 15' 25" ± 2" DA = 200 m ± .02 m
d2 = 75° 25' 35" ± 2" DB = 300 m ± .03 m
d3 = 115o 35' 45" ± 2" DC = 250 m ± .025 m .

Calculate:

The values of two horizontal angels α_1 and α_2 and their precision.

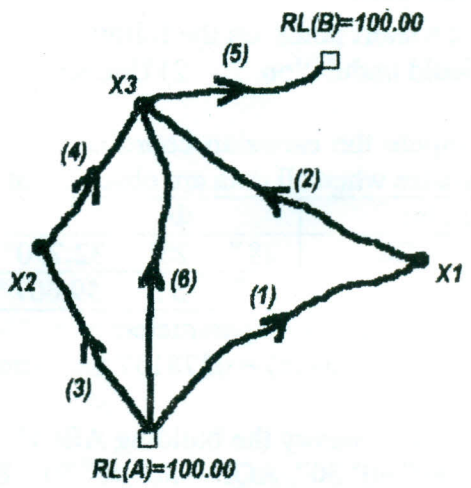
1. The values of two Distances AB and BC and their precision.
2. The area of figure ABCD and their precision.

[4 marks]

Question (2) :

a-1) Write down in matrix form of the condition equations for the following precise leveling networks. [2 marks]
a-2) calculate the final levels of x_1, x_2, and x_3. [3 marks]

line	Length (km)	Elevation Difference (m)
1	4	1.05
2	4	-0.95
3	2	2.1
4	2	-1.95
5	1	.10
6	3	.05



Good luck

Prof. Dr. Mahmoud El Mewafi, Dr. Abd El-menim Baker