

Mansoura University
 Faculty of Engineering
 Course Name: (Topographic Survey
 Course Code: (7116)
 Date of Exam: 23 / 6 / 2010

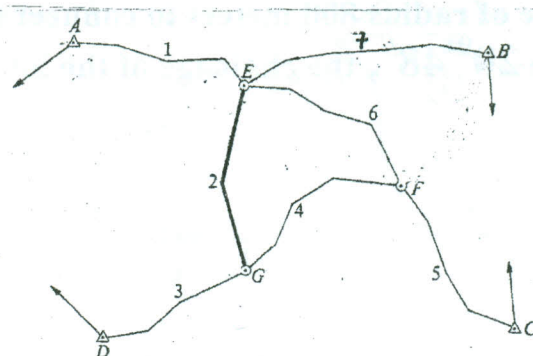
2nd Semester
 Academic year 2010
 Time allowed: 2 hours
 Level: 2nd year civil
 Department: (Public Works)

Answer all questions and please illustrate your answer with figures:

First Question:

(marks)

- 1-1. Balance the following interior angles (angles-to-the-right) of a five-sided closed polygon traverse. If the azimuth of side AB is fixed at $48^{\circ} 31' 43''$, calculate the azimuths of the remaining sides. $A = 41^{\circ} 09' 44''$; $B = 200^{\circ} 52' 14''$; $C = 124^{\circ} 57' 26''$; $D = 64^{\circ} 28' 16''$; $E = 108^{\circ} 32' 10''$. (Note: Line BC bears NE.)
- 1-2. Compute departures and latitudes, linear misclosure, and relative precision for the traverse of Problem 1-1 if the lengths of the sides (in feet) are as follows: $AB = 150.50$; $BC = 610.39$; $CD = 485.14$; $DE = 735.35$; and $EA = 647.34$. (Note: Assume unites of feet for all distances).
- 1-3. Using the compass (Bowditch) rule, adjust the departures and latitudes of the traverse in Problem 1-2. If the coordinates of station A are $X = 20,000.000$ ft and $Y = 15,000.000$ ft, calculate coordinates for te other stations and then the lengths and azimuths of lines AD and EB.
- 1-4. Using the least square-method, adjust the traverse net shown in figure to determine the adjusted three junction points at E,F and G.



Given The fixed coordinates of the four control points A, B, C, D

Second Question:

(marks)

1. A camera with a focal length of 152.35 mm and a picture size of 230 X 230 mm is used to photograph an area from an altitude of 7000 ft above sea level. The average ground elevation is 1200 ft above sea level. What is the average scale of the photography: (a) as an engineer's scale 1 in. = so many ft. (b) as a representative fraction?
2. In Problem 1 what ground area is covered by a single photograph?
3. Overlap and side lap of the photography in Problem 1 are 60% and 30%, respectively. What is the ground spacing, in feet, between exposures? What is the ground spacing, in feet, between flight lines.
4. The flight lines in Problem 3 are to be plotted on a map that is drawn to a scale of 1:24,000. What is the flight spacing on the map, in inches?
5. If the aircraft flies at ground speed of 160 mph along the flight line in Problem 3, what is the time interval, to the nearest 0.1 sec, between exposures?
6. Two points lying at elevation 895 ft appear on a photograph taken as described in Problem 1. The distance e between these points scales 26.178 mm on the photograph. What is the ground distance, in feet, between the two points?

Third Question: (marks)

Tabulate data needed to set out by theodolite ($20'$) and chain.
A circular curve of radius 800 meters to connect two straights having a deflection angle $20^{\circ} 48''$, the chainage of the intersection point being 2342 meter.

((GOOD LUCK))

DR. ABD EL-MENEEM BAKR

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ورقة اولى الفرقة الثانية مدنى (حديث)

Answer all questions and please illustrate your answer with figures. Max. Grids 55 degrees

| Q1 | Idea (30) % | Steps (30)% | Calculations (30)% | Final Result (10)% | Marks(15) |
|----|-------------|-------------|--------------------|--------------------|-------------|
|----|-------------|-------------|--------------------|--------------------|-------------|

- a) A center line of the road is measured in three sections. Most probable length and standard error for each section were as follows in meters: 5433.12 ± 0.031 , 1545.90 ± 0.060 , and $(6355.40, 6355.60, 6355.80, 6355.90 \text{ m})$. What are the standard error and the most probable length of the line? [5 marks]
- b) The lines of a triangle ABC are measured 3 times and results are listed in the following table:

| No. | Line (AB) | Line (BC) | Line (CA) |
|-----|-----------|-----------|-----------|
| 1 | 400.42 m | 200.55m | 300.25m |
| 2 | 400.43 m | 200.56 m | 300.20 m |
| 3 | 400.44 m | 200.54 m | 300.24 m |

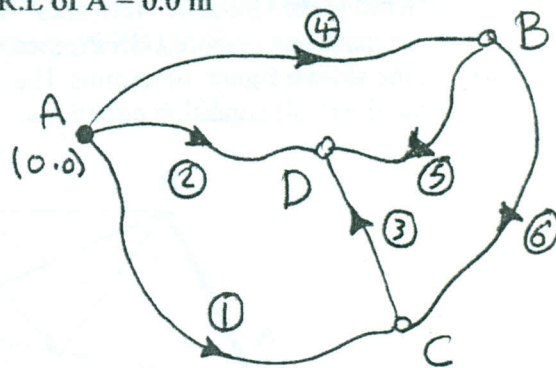
What is the perimeter of the triangle ABC and its precision ? ($P = a + b + c$) [5 marks]

- c) 1. What is the main segments of the GPS ?
 2. What are the sources of GPS errors?
 3. Carry out the different signals that are transmitted by GPS satellites?

| Q2 | Idea (30) % | Steps (30)% | Calculations (10)% | Final Result (30)% | Marks(15) |
|----|-------------|-------------|--------------------|--------------------|-------------|
|----|-------------|-------------|--------------------|--------------------|-------------|

- a) Write down in matrix form of the condition equations for the following precise leveling networks, and find levels of B, C, and D. when R.L of A = 0.0 m

| Route | Leveling station | | Distance (km) | Elev. Diff. (m) |
|-------|------------------|----|---------------|-----------------|
| | From | To | | |
| 1 | A | C | 4 | 6.16 |
| 2 | A | D | 2 | 12.57 |
| 3 | C | D | 2 | 6.41 |
| 4 | A | B | 4 | 1.09 |
| 5 | B | D | 2 | 11.58 |
| 6 | B | C | 4 | 5.07 |



[7 marks]

- b) Find the used matrices to evaluate the corrected angles by using least squares condition equations of the shown figure.

[8 Marks]

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| Angle | Observed value | Std. Error | Station | Coordinates | |
|-------|----------------|------------|---------|-------------|------|
| | | | | E | N |
| 1 | 22° 01' 42" | 2" | A | 2000 | 500 |
| 2 | 16 44 31 | 3" | B | 4000 | 2000 |
| 3 | 57 08 57 | 2.6" | | | |
| 4 | 19 33 14 | 2.3" | | | |
| 5 | 86 33 14 | 2" | | | |
| 6 | 58 46 54 | 2.1" | | | |
| 7 | 15 06 42 | 1.5" | | | |
| 8 | 84 04 50 | 2.5" | | | |
| Σ | 360 00 04 | | | | |

| Q3 | Idea (30) % | Steps (30)% | Calculations (10)% | Final Result (30)% | Marks(25) |
|----|-------------|-------------|--------------------|--------------------|-------------|
|----|-------------|-------------|--------------------|--------------------|-------------|

- a) Compute the geodetic coordinates of the following Points from known Cartesian coordinates when all data are observed in WGS84. [5 marks]

| Point | X | Y | Z |
|-------|---------|---------|---------|
| P | 2026120 | 1094900 | 2509200 |

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

- b) In order to survey the building ABCD the following observations were taken PA = 272.81m, QA = 244.37 m, PB = 173.07 m, and BPQ = 36° 13' 50". 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. [5 marks]
- c) 1. What is the Geodetic Networks? What are the types of it?
 2. Prepare and present GIS Project Steps for your Faculty. [5 marks]
- d) In the shown figure, determine The number and type of condition equations, and write down all condition equations. [10 marks]

