B.E. Degree End Semester Examination Nov/Dec 2012
B.E. (Geoinformatics) VI Semester, R2008
GI 9352 Survey Adjustment

Time: 3 hours **Max marks 100**

Part A (10x2=20 marks)

1. What do you mean by significant numbers?
2. What do you mean by Random errors?
3. Explain the need of study error propagation.
4. Explain the least square adjustment.
5. How will you assign weight of an observation in Survey?
6. Explain the advantage of adjustment of indirect observation.
7. What do you mean by Expectation?
8. Explain how will you asses precision and accuracy by statistical observation.
9. Explain the importance of variance and co-variance propagation.
10. Write a short note on normal distribution.

Part B (5x16=80 marks)

11. The triangular parcel of land ABC shown in **Figure 1**, has dimensions AB = 150.00m BC = 80.00 m and CA = 110.00 m. the parcel is divided into two parts. I and II as shown, by setting D on AB at a distance x from B. Evaluate the resulting error in the area of I if x has an error of 0.020 m. **(16)**

12. (a) Use the principle of least squares to estimate the parameters of straight line, $y = ax+b$, that fits the following data.

x	1	2	3	4	5
y	9.60	8.85	8.05	7.50	7.15

Assume the x coordinates are error-free constants and the y – coordinates are uncorrelated observations with equal precision. **(16)**

(OR)

(b) Figure 2, shows a level net connecting three bench marks A, B, and C. The arrows indicate the directions of higher elevations. The observed differences in elevation are l_1=20.410 m, l_2=10.100 m, l_3= 10.300 m and l_4 = 10.315 m. All observations are uncorrelated and have equal precision. Use the principle of least squares to find adjusted values for the four elevation differences. **(16)**

13. (a) The following angels are measured about survey station (**Figure 3**) α=110°15'20" β=130°40'08" γ=119°04'42" and δ=240°55'43". All observations are uncorrelated and have the same precision. Find least square estimates for the angles using the method of adjustment of indirect observations. If the measured angles α β, γ and δ have weights 1, 1, 1, and 3 respectively, rework the least squares solution and compare residuals with those obtained earlier. **(16)**

(OR)

(b) The following are mean values observed in the measurement of three angles α, β and γ at one station:

α = 76° 42' 46.2" with weight 4
$\alpha + \beta$ = 134° 36' 32.6" with weight 3
$\beta + \gamma$ = 185° 35' 24.8" with weight 2
$\alpha + \beta + \gamma$ = 262° 18' 10.4" with weight 1

Calculate the most probable value of each angle. (16)

14. (a) The position of a survey station is given by an angle θ and distance S. The standard deviations of θ and S are 20" and 0.10 m, respectively. And the correlation coefficient is 0.50. (i) Evaluate the covariance matrix for θ and S, using radians as the units for θ. (ii) select a reference variance of 0.0010 m^2. And evaluate the cofactor and weight matrices for θ and S. assign appropriate units to all elements. **(16)**

(OR)

(b) The two measurements are independent and having the standard deviations $\sigma_1 = 0.20$ m and $\sigma_2 = 0.15$ m. respectively. Evaluate the standard deviations of the sum and difference of the two measurements. Also evaluate the correlation between the sum and difference. **(16)**

15. (a) Six independent determinations of the elevations of a point are made. These values and their corresponding weights are shown below.

Elevation (m)	214.151	214.213	214.114	214.167	214.130	214.189
Weight	2	1	2	3	5	3

Compute the weighted mean of the six elevations and evaluate the standard deviations of this weighted mean if a weight of 2 corresponds to a standard deviation of 0.030 m. **(16)**

(OR)

(b) The area of trapezoidal parcel of land is computed as follows: Area = $\left(\frac{a_1+a_2}{2}\right) b$

Where a_1, a_2 and b are independently measured dimensions. If measured values for a_1, a_2 and b are 319.414m, 481.112m and 502.307m respectively. And their standard deviations are 0.030m, 0.042m and 0.020m, respectively. Compute the area of parcel and the standard deviations of this computed area. **(16)**

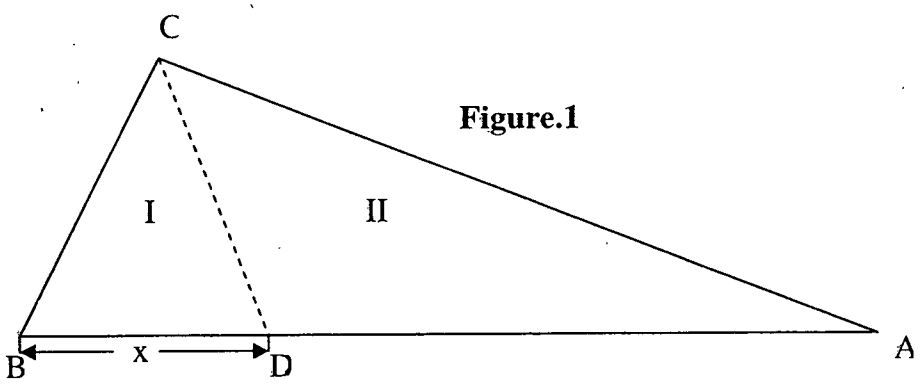

Figure.1

Figure.2

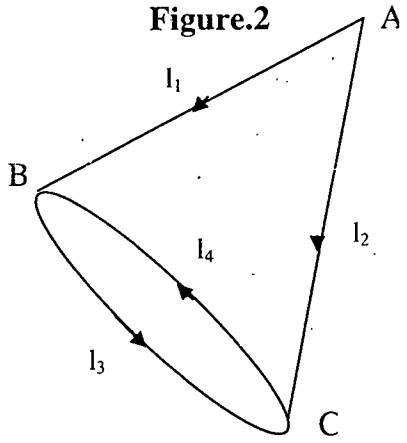

Figure.3