
B.E (FULL TIME) DEGREE END SEMESTER EXAMINATION, APRIL/MAY - 2011

GEO INFORMATICS

IV SEMESTER

5

GI 285 – HYDROLOGY AND WATER RESOURCES ENGINEERING

Time: 3 hr **REGULATION 2004** **Marks: 100**

Part – A **10 x 2 = 20**

Answer ALL questions

1. Define hydrology.
2. List the various types of precipitations.
3. Define Φ - Index.
4. Define Unit Hydrograph.
5. What is meant by secondary yield of a reservoir?
6. Distinguish between spillway and surplus weir.
7. State Darcy's law and its limitation.
8. What are the advantages of rainwater harvesting?
9. Define hydrologic drought.
10. Under what circumstances can ring levee be more suitable for flood management?

Part - B **5 x 16 = 80**

11. (i) An unconfined aquifer with a specific yield of 0.20 is used as a water supply for the irrigation of farm land. The recharge area of the aquifer is same as the irrigated area. The recharge is limited to 76 mm per year. The saturated thickness of the aquifer is 15.2 m. How many years will the water supply last if 254 mm of water per year is pumped from the aquifer for irrigation? **(8)**

    (ii) With neat sketch explain the importance and it's significant of rainwater harvesting in rural and urban areas. **(8)**

12. (a) (i) A square ABCD of side 20 km records a rainfall value of 60, 81, 73 and 59 mm respectively. To the side CD an equilateral triangle is attached which records a rainfall value of 45 mm at its apex E. Determine the average rainfall over a basin using Arithmetic and Thiessen polygon methods. Compare the results and comment on it. **(8)**

    (ii) The normal annual precipitation of five raingauge stations P, Q, R, S and T are respectively 125, 102, 76, 113, and 137 cm. During a particular storm the precipitation recorded by Stations P, Q, R, R and S are 13.2, 9.2, 6.8 and 10.2 cm respectively. The instrument at station T was inoperative during that storm. Estimate the rainfall at station T during that storm. **(8)**

(OR)

(b) Describe the working principle of a non-recording type rain gauge with neat sketch, mentioning its advantages and disadvantages. **(16)**

13. (a). (i) Explain briefly about Strange's table and SCS method of runoff estimation. **(8)**

(ii) List the various types of flood discharge formulae applicable for Indian catchments and give your comment on each one. **(8)**

(OR)

(b) The ordinates of a 6-h unit hydrograph are given

Time (hrs)	0	3	6	9	12	18	24
6-h UH ordinate (m^3/s)	0	150	250	450	600	800	700
Time (hrs)	30	36	42	48	54	60	66
6-h UH ordinate (m^3/s)	600	450	320	200	100	50	0

A storm had three successive 6-h intervals of rainfall magnitude of 3.0, 5.0 and 4.0 cm respectively. Assuming a Ø index of 0.20 cm/h and a base flow of 30 m^3/s, determine and plot the resulting hydrograph. **(16)**

14. (a) (i) Explain the different zones of reservoir with a neat sketch. **(8)**

(ii) What are the measures to be adopted for control of sediment inflow into a reservoir? **(8)**

(OR)

(b) (i) Explain the methods of generating relationship between elevation Vs water spread area and elevation Vs storage of a reservoir. **(8)**

(ii) Draw the different cross drainage works, stating their functions. **(8)**

15. (a) (i) A basin is divided by 1-h isochrones into four-sub areas of size 200, 250,350 and 170 hectares from the upstream end of the outlet respectively. A rainfall event of 5-h duration with intensities of 1.7 cm/h for the first 2h and 1.25 cm/h for the next 3 occurs uniformly over the basin. Assuming a constant runoff coefficient of 0.5, estimate the peak rate of runoff. **(8)**

(ii) Describe the various structural and non structural methods adopted for control of floods. **(8)**

(OR)

(b) Drought – an integrated approach is needed – why? Write a note on the various drought mitigation / management measures. **(8)**

(ii) Write short note on NDVI analysis **(8)**

B.E.(Full Time) Degree End Semester Examination April 2011
Geoinformatics Branch
V Semester
GI 372 Survey Adjustment I (Regulation R2004)

Duration 3 hours **Max marks 100**

Answer all questions

Part A (10x2=20marks)

1. Explain Systematic and random errors
2. What do you mean by Reliability of measurement
3. Explain the use of Linearization in error propagation study
4. Explain random Errors
5. Explain Adjustment of Indirect observation
6. Explain Adjustment of observation only
7. Explain Normal distribution
8. Explain Measures of precision and accuracy
9. Explain the construction and use of Error ellipses
10. Explain Importance of redundant measurement

Part B (16x5=80 marks)

11.A straight-line y=ax +b must be fitted through three points. The following data are given

Point	X (cm)	Y (cm)	σ_x^2	σ_y^2
1	2.00	3.20	0.04	0.10
2	4.00	4.00	0.04	0.08
3	6.00	5.00	0.04	0.08

All measured coordinates are assumed to be uncorrelated. Find least squares estimate of the two parameter a and b.

12 (a) For the levelling network shown in Figure 1, calculate the most probable elevations for X, Y and Z. The observe values and line lengths are given in the table. Apply appropriate weights in the computations.

Line	Length km	ΔElev m	Line	Length km	ΔElev m
1	4	+1.05	4	2	-1.95
2	4	-0.95	5	1	+0.10
3	2	+2.10	6	3	+0.05

(OR)

12. (b) Six independent determination of the elevation of a point are made. These values and their corresponding weights are shown below.

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

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

13. a) Suppose the angles in an equilateral triangle ABC were each measured by the same observer using the same instruments, but the number of repetetions for each angle varied. The results were A = 45° 15' 25'', n = 4, B= 83 ° 37' 22'', n = 8, and C = 51 ° 07' 39'', n = 6. Adjust the angles.

(OR)

b) While measuring angles at a station, the horizon was closed. The following measurements and their standard deviations were obtained.

No.	Angle	S
a_1	134 ° 38' 56''	6.7''
a_2	83 ° 17' 35''	9.9''
a_3	142 ° 03' 14''	4.3''

What are the most probable values for the observation above?

14. a) Interior angles A, B, C of a plane triangle are known and fixed. The area of the triangle is computed from these angles and the measured value of side a (opposite angle A). Show that the relative error (If dx is the error in x, then dx/x is the relative error in x.) in the computed area is twice the relative error in the measured side.

(OR)

b) The stadia levelling, the difference in elevation V is computed from the rod intercept r and vertical angle α using the function $V = (1/2)\, kr \sin 2\alpha$, where k is the stadia constant. If k = 100 (assumed errorless) and the error in r and α are 0.005m and 60 seconds of arc (Angular error should be expressed in radians when used in functions that contain derivatives) respectively, evaluate V and the error in V for: (a) r = 1.500m, $\alpha = 0°$; (b)) r = 1.500m, $\alpha = 15°$

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

(OR)

b) The angles shown in Figure 3. are measured: α_1 = 40° 00' 00'', α_2 = 100° 00' 30'', α_3 = 50° 00' 20'', α_4 = 120° 00' 00'', α_5 = 50° 00' 20''. All the measurements are uncorrelated and have the same precision. The angles at A is held fixed at 90° 00' 00''. Adjust the measured angles according to the principle of least squares.

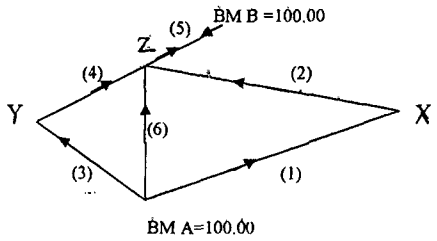

Figure 1

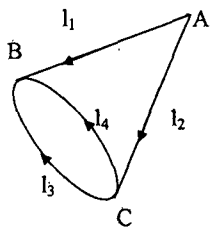

Figure 2

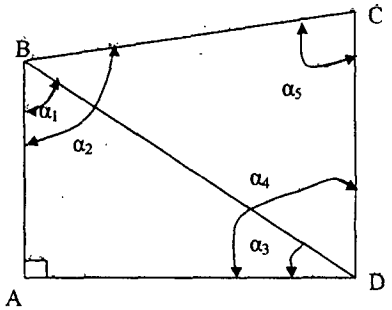

Figure 3