Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. / B. Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, NOV / DEC 2024

B.E. GEOINFORMATICS
5th Semester
GI5501 Spatial Data Adjustment
(Regulation 2019)

Time: 3hrs

Max. Marks: 100

CO 1	Imparts concepts of error, error distribution and error adjustment procedures.
CO 2	Understand the procedure involved in error adjustment using least square adjustment.
CO 3	Convey an idea about the quality of infinite size data by Variance and Covariance.
CO 4	Choose the suitable accuracy of instruments for their projects by pre analysis.
CO 5	Create database by collecting quality data sets.

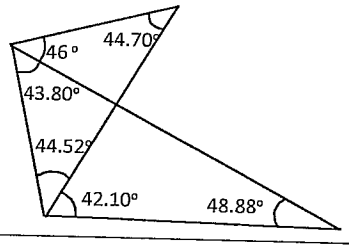
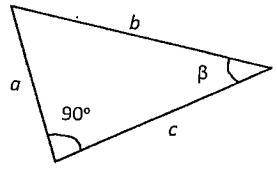
BL – Bloom's Taxonomy Levels
(L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysing, L5 - Evaluating, L6 - Creating)

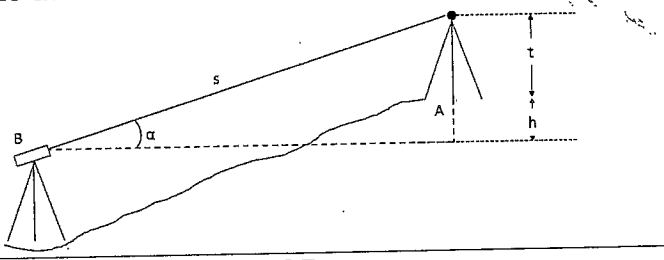
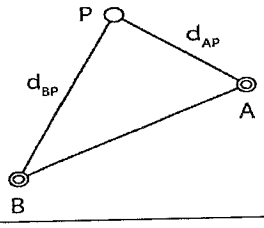
PART- A (10 x 2 = 20 Marks)
(Answer all Questions)

Q. No	Questions	Marks	CO	BL
1	List out the different types of histograms with a neat sketch.	2	1	1
2	What is the maximum and probable error of a distance measurement with a mean value of 2 m and a standard deviation of 3 cm?	2	1	1
3	Describe the concept of Weight in error adjustment techniques and discuss its advantages and disadvantages.	2	2	2
4	A distance is measured 4 times with the following results: $L1$=32.52 m, $L2$=32.48 m, $L3$=32.52 m and $L4$=32.53 m. Explain how the error incurred in the measurements is minimized through the least square adjustment method.	2	2	2
5	What is the covariance of X and Y coordinates of the survey point, given the correlation coefficient of XY is 0.50 cm and the standard deviation of X and Y is 1.25 cm and 1.30 cm, respectively?	2	3	1
6	List three primary empirical rules that define the perfect normal distribution curve.	2	3	2
7	What are the disadvantages of the raster data model?	2	4	1
8	A spirit bubble in the survey equipment is centered with a standard deviation of 1". The instrument and accompanying rod are designed to be read with a standard deviation of 0.015 mm per meter of sight distance. If sight differences of 20 m are used, explain how the pre-analysis survey would help find the expected standard deviation in determining a difference in elevation with this level and rod for a level line that is 5 km long.	2	4	2
9	Differentiate Spherical and Cartesian coordinate systems.	2	5	2
10	What are the steps to be followed in the Intersection to determine the location of an unknown point?	2	5	1

PART- B (5 x 13 = 65 Marks)
(Restrict to a maximum of 2 subdivisions)

Q. No	Questions	Marks	CO	BL
11 (a) (i)	An EDM instrument and reflector are set at the ends of a baseline that is 400.781 m long. Its length is measured 24 times, with the	8	1	3

	following results: 400.787 400.796 400.792 400.787 400.787 400.786 400.792 400.794 400.790 400.788 400.797 400.794 400.789 400.785 400.791 400.791 400.793 400.791 400.792 400.787 400.788 400.790 400.798 400.789 Determine the mean, mode, median, and standard deviation of the data. How many observations are between $\bar{x} \pm \sigma$, and what percentage of observations does this represent?			
(ii)	Construct a histogram of the data with five intervals and describe its properties. On the histogram, lay off the standard deviation from both sides of the mean.	**5**	1	3
	OR			
11 (b) (i)	Two sides and the included angle of a triangular land parcel were measured with the following results: a=45.12±0.05 m, b=38.64± 0.03 m and theta=52°15'±30". Calculate the area of the land parcel and its standard error.	**8**	1	3
(ii)	The area of land is rectangular, measuring 50.170 m by 61.090 m. If the 30 m tape (0.030m too short) is used to make the measurements, calculate the error in the calculated area of the tract.	**5**	1	3
12 (a)	Calculate the adjusted value of the six angles mentioned in the figure using the least square method. 	**13**	2	3
	OR			
12 (b)	***A*** is a benchmark with a known elevation of 300 m. The following differences in elevation are observed using a direct levelling procedure. Compute and analyze B, C, and D elevations by applying the least square method. Draw the level net diagram with the given and computed values. From (lower) / To (higher) / Difference in Elevation (m) B / A / L1= 11.973 D / B / L2= 10.940 D / A / L3= 22.932 B / C / L4= 21.040 D / C / L5= 31.891 A / C / L6= 8.983	**13**	2	3
13 (a)	The sides *a* and *b* are measured, and the measurements are 416.050 m and 202.118 m, respectively. The measurements are independent, the standard deviation of *a* is 0.020 m, and the standard deviation of *b* is 0.012 m. Examine the elements c and β of the triangle and their standard deviations. Also, determine the correlation between c and β. 	**13**	3	3
	OR			
13 (b)	Examine the various types of sampling strategies with a neat sketch.	**13**	3	3

14 (a)	The height (h) of a survey station as shown in figure is to be determined with the standard deviation of 0.010 m from measurements of the slope distances s (400 m), the vertical angle α (30°), and the target height t. i) Analyze the standard deviation in measuring s, α, and t assuming balanced accuracies. ii) If the standard deviation in measuring α is limited by the instrument to 5", reanalyze the standard deviations in measuring s and t to accommodate this limitation in α. **Summarize the results in the table and analyze them.** 	**13**	4	4
	OR			
14 (b)	Analyze the significance of RDBMS in storing and analyzing raster and vector data models.	**13**	4	4
15 (a)	Examine the significance of the Arc-Section method over the Intersection method in finding the coordinates of the new point P with the given inputs.  Point / E (m) / N (m): A / 654653.23 / 232456.39; B / 654234.92 / 232167.47	**13**	5	3
	OR			
15 (b)	Examine the various coordinate transformation parameters and demonstrate how these parameters are effectively resolved through the similarity transformation method.	**13**	5	3

PART- C (1 x 15 = 15 Marks)

(Q.No.16 is compulsory)

Q. No	Questions	Marks	CO	BL
16.	Given the NDVI and Soil Moisture data in raster format, determine the mean, standard deviation, and correlation between these datasets. Evaluate the statistical significance of the correlation, analyze the type of crops prevailing under the observed conditions, and identify the necessary pre-analysis survey to be conducted before further analysis. ***NDVI (Normalized)*** 0.2 / 0.3 / 0.7 / 0.8 0.1 / 0.4 / 0.6 / 0.9 0.5 / 0.7 / 0.8 / 0.7 0.4 / 0.2 / 0.6 / 0.7 ***Soil Moisture (Normalized)*** 0.9 / 0.8 / 0.2 / 0.3 0.8 / 0.5 / 0.3 / 0.2 0.5 / 0.4 / 0.3 / 0.3 0.7 / 0.6 / 0.6 / 0.2	**15**	3	5