GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering
Level: PG
Subject Code: ME03065011
Subject Name: Data Acquisition for Geoinformatics

w. e. f. Academic Year:	2024-2025
Semester:	III
Category of the Course:	Open Elective

Prerequisite:	Surveying
Rationale:	In Civil Engineering it is of prime importance to collect measurement data od distance, direction, coordinates in order to plot the plan and to integrate this data in Geographical Information system. This data collection can be Acquired by modern Instruments

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Collect data from modern digital surveying Instruments	U, R
02	Carryout data collection with Global Positioning system	E
03	apply various GPS Data processing technique	A, E
04	Classify various Map preparation technique	N, C
05	Apply drone technology in Data acquisition	A

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
2	0	2	3	70	30	20	30	150

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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	MODULE I Use of automatic and digital levels, electronic Theodolite, total stations, Data acquisition and transfer of data from machine to the field. Use of total station for collecting GIS compatible data-file formats- File transfer	**5**	**20**
2.	MODULE 2 GPS time; GPS Errors and biases; GPS orbital Geometry and Navigational solution; Surveying with GPS; Planning and field observations; Data post-processing; GIS and GPS integration, Digital Elevation Model (DEM), Digital Terrain Model (DTM), Triangular Irregular Networks (TIN)	**7**	**25**
3.	MODULE 3 Map concepts, co-ordinates and Map projection Control surveys using GPS, Total station and triangulation methods (adjustment and computations of coordinates); Cartography and report writing.	**7**	**25**
4.	MODULE 4 Drone technology in data acquisition Introduction to Drones, payload, battery life, Specs for good results, Regulations of DGCA and Drone license, Pre and Post Flight planning- Flight execution and photography, data collection- Image Format, GSD, Scale and Resolution. Consideration for hardware selections, comparison on surveying drone and its accuracy, Techniques of controlling errors, Consideration of GCP in vertical and horizontal accuracies, Planning and estimation of drone surveying jobs, Autonomous flight vs. manual and hybrid flight profiles.	**9**	**30**
	Total	**28**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	**20**	**20**	**20**	**20**	**10**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Hoffman-Willendorf B., GPS theory and Practice, Springer Wien, New York,
2. Wells D.E., Guide to GPS Positioning, Canadian GPS Association, New Brunswick, Canada,
3. Anderle R., *The Global Positioning System,* Royal Society of London, U.K.
4. Kennedy M., *The Global Positioning System and GIS: an Introduction,* Ann Arbor Press, Chelsea,
5. Sickle J.V., *GPS for Land Surveyors,* Ann Arbor Press, Chelsea,

(b) Open source software and website:

1. Indian geo platform of ISRO BHUVAN.nrsc.gov.in
2. QGIS

Suggested Course Practical List:

1. Total station utilization
2. Traverse survey with Total station
3. Locating positions with GPS
4. Data transfer from Total station and GPS
5. Map Preparation with Modern technique

List of Laboratory/Learning Resources Required:

Total Station, GPS, ArcGIS

Suggested Project List:

Data collection and analysis with modern surveying instruments.

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