GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Engineering (Part Time)
Subject Code: 2970603
Semester – VII
Subject Name: Application of GIS in Civil Engineering

Type of course: Professional Elective Course-IV

Prerequisite: NIL

Rationale:
1. To impart knowledge of data sciences and geo-spatial techniques in analysis of Civil Engineering issues.
2. To build the Civil Engineering projects on Geo-Spatial tools for better decision making.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	GIS and civil engineering projects – Urban planning, Hydrology and floods, Soil management, Water supply, Water distribution, Storm water, Solid and hazardous waste management, Transportation and utility system.	**8**
2	Introduction to ArcGIS / QGIS Desktop GIS - Exploring for spatial and non-spatial data operations, analysis and management.	**8**
3	GIS and data science – Spatial data structure and topology, Raster and vector data models, Map projections, Coordinate systems, Map scales, Selecting and editing features, Non-spatial database models, Data query, Displaying and editing tables, Joining and linking tables, GIS spatial data sources on the Internet, Creating new data sets, Data accuracy, Data redundancy.	**14**
4	GIS modeling approaches in project management – TIN and DEM analysis, Analytical modeling in GIS, GIS interfaces, GIS post-processing, dynamic visualization, Decision making.	**12**

Suggested Specification table with Marks (For BE only):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10%	10%	40%	10%	10%	20%

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Ian Heywood et al., Geographical Information System, Pearson, 2019
2. Bhatta B., Remote Sensing and GIS, Oxford University Press, New Delhi, 2008
3. Lo C.P. and Yeung Albert K.W., Concepts and Techniques of Geographical Information Systems, Prentice-Hall of India Pvt. Ltd. New Delhi, 2006
4. Burrrough P.A and McDonnell R.A., Principles of Geographic Information Systems, Oxford university press, 1998
5. Stan Aronoff, "Geographical Information Systems", WDL Publications, Ottawa, Canada, 1989.

Course Outcomes: The students will be able to;

Sr. No.	CO statement	weightage
CO-1	Apply knowledge of GIS to different fields of civil engineering.	20%
CO-2	Implement ArcGIS / QGIS in civil engineering projects.	25%
CO-3	Create new datasets for geospatial analysis.	30%
CO-4	Perform modeling on GIS platforms	25%

List of Tutorials/Activities:

1. Mini-project on soil geospatial data mapping and management
2. Mini-project on Land use/cover geospatial data mapping and management
3. Mini-project on site selection for major infrastructure with geospatial data
4. Mini-projects on natural disaster mitigation with geospatial data

List of Open Source Software/learning website:

1. QGIS (Free) https://qgis.org/en/site/forusers/download.html
2. SRTM 90m Digital Elevation Data (Free) http://srtm.csi.cgiar.org/
3. Commercial ERDAS Imagine http://gi.leica-geosystems.com/LGISub1x33x0.aspx
4. ER Mapper http://www.ermapper.com/
5. IDRISI http://www.clarklabs.org/
6. Freeware Multi Spectral (A Multispectral Image Data Analysis System) http://cobweb.ecn.purdue.edu/~biehl/MultiSpec/