GUJARAT TECHNOLOGICAL UNIVERSITY
CIVIL (TRANSPORTATION ENGINEERING) (13)

GEO-SPATIAL TECHNIQUES

SUBJECT CODE: 2721311

M.E. 2nd SEMESTER

Type of course : Open Elective

Prerequisite : Nil

Rationale :

Geographic Information Systems (GIS) and Remote Sensing are a new and growing concept in complexity and utility in Civil Engineering. Remote Sensing also plays an important role in the development of GIS application. It is compulsory for students to update the advanced knowledge of growing technologies. The course includes the study of principles of GIS and Remote Sensing. The method of data capturing and interpretation are also included in the course. The study of Global Positioning System (GPS) is necessary for tracking of any transportation vehicle. The component parts of GPS, factor affecting GPS and its applications are covered in the course.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks		Practical Marks				
				ESE (E)	PA(M)	PA (V)		PA (I)		
						ESE	OEP	PA	RP	
3	2#	2	5	70	30	20	10	10	10	150

Content:

Sr.No.	Topics	Teaching Hrs.	Module Weightage
1	Geo-informatics: Remote Sensing-Principles, Concepts, air-photo interpretation, Data acquisition, Basic concepts of GIS & GPS.	5	10%
2	Structure of GIS: Cartography, Geographic mapping process, transformations, map projections, Geographic Data Representation, Storage, Quality and Standards, database management systems, Raster data representation, Vector data representation, Assessment of data quality, Managing data errors, Geographic data standards.	20	50%
3	GIS Data Processing, Analysis and Modeling: Raster based GIS data processing – Vector based GIS data processing – Queries – Spatial analysis – Descriptive statistics – Spatial autocorrelation–Quadrant counts, and nearest neighbor analysis – Network analysis – Surface modeling – DTM. GIS Applications: Case studies.	15	30%
4	GPS: Basic concepts, components, factors affecting, GPS setup, accessories, segments- satellites & receivers, GPS applications, Case studies	5	10%

References:

1. Lo, C.P. & Yeung A.K.W., Concepts and Techniques of Geographic Information Systems, Prentice Hall of India, New Delhi, 2002.
2. Anji Reddy, M., Remote Sensing and Geographical Information Systems, B.S.Publications, Hyderabad, 2001.
3. Burrough, P.A., Principles of Geographical Information Systems, Oxford Publication, 1998.
4. Clarke, K., Getting Started with Geographic Information Systems, Prentice Hall, New Jersy, 2001.
5. DeMers, M.N., Fundamentals of Geographic Information Systems, John Wiley & Sons, New York, 2000.
6. Kennedy M., The Global Positioning System & GIS: An Introduction, Ann Arbor Press,1996

Course Outcomes:

1. To provide the basic understanding of GIS and GPS.
2. To make the students conversant with geographic mapping process with data representation techniques in GIS.
3. To give the know-how of various applications of GIS in Civil Engineering.
4. To make the students familiar with GPS accessories and its applications.

Practical work:

1. Map generation in GIS. Vectorization, Geo-referencing of map.
2. Creating point, line, polygon layers and removal of errors.
3. Attaching Raster based and Vector based data with map.
4. Queries and Spatial analysis.
5. Network analysis.
6. Surface modeling, generation of DTM, its applications.
7. Survey with GPS receivers, collection of data and its analysis.

Open Ended Problems:

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website