GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3150617
Semester –V
Subject Name:Remote Sensing and GIS

Type of course: Open Elective-I

Prerequisite:NIL

Rationale:
1. To develop a basic understanding about Geo-Spatial techniques and its applications.
2. To enable the students to apply the tools to solve various problems related to Civil Engineering.

Teaching and Examination Scheme:

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

Content:

Sr. No.	Content	Total Hrs
1	**FUNDAMENTAL OF REMOTE SENSING:** Definition –Components of Remote Sensing –Active and Passive Remote Sensing – Electro Magnetic Spectrum – Interaction of EMR With the Earth's Surface – Interactions with the Atmosphere Energy Sources and Radiation. Active and Passive Remote Sensting. Energy Interaction in the Atmosphere. Energy Interaction with the Earth Surface Features. Data Acquisition and Recording. Remote Sensing Data Products.	07
2	**IMAGE INTERPRETATION AND DIGITAL IMAGE PROCESSING** - Introduction to Digital Image and Imaging Sensors- Data Formats of Digital Image- Display of Digital Image - Image Processing Systems – Strategies – Keys – Equipments – Digital Image Processing – Rectification and Restoration – Enhancement of Image – Image Transformation, Classification and Analysis.	08
3	**GEOGRAPHIC INFORMATION SYSTEM** - Introduction to GIS- Definitions of GIS and related terminology - Components of GIS – GIS Data – Georeferenced data – Components of GIS- Data input and output –Data	11

	quality and Management –		
4	**SPATIAL DATA ANALYSIS** -GIS analysis functions – Retrieval – Reclassification –- Buffering and Neighbourhood – Overlaying – Data Output – Implementation of GIS- GIS Analysis functions – Functions of GIS and application areas- Implementation - Characteristics of Map Coordinate systems- Map projections- Georeferencing Frameworks and Reference Coordinate Systems	**11**	
5	**SOFTWARE** - GIS and Image interpretation Software – Salient features – Capabilities and Limitations. Data management in different GIS software- Spatial Data Models- Attribute Data Management	**08**	
6	**APPLICATIONS** - Application of Remote Sensing / GIS– Case studies. GIS and Remote Sensing – Usefulness in Civil Engineering.	**04**	

Suggested Specification table with Marks (Theory): (For PDDC only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10%	40%	30%	5%	5%	10%

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. Lilliesand T.M. and Kiefer R.W., Remote Sensing and image Interpretation , John Wiley and Sons, New York, 2004.
2. Burrrough P.A and McDonnel R.A., Principles of Geographic Information Systems, Oxford university press, 1998
3. A.M. Chandra and S.K. Ghosh,Remote Sensing and Geographical information System, Narosa Publishing House, New Delhi, 2006
4. BhattaB.,Remote Sensing and GIS, Oxford University Press, New Delhi, 2008
5. Stan Aronoff, "Geographical Information Systems", WDL Publications, Ottawa, Canada, 1989.
6. Agrawal N.K., Essentials of GPS, Spatial Network Pvt. Ltd., Hydrabad, 2004.
7. Bhatta B., Remote Sensing and GIS, Oxford University Press, New Delhi, 2008
8. Manual of Remote Sensing (Edited), Series of volumes.
9. Lo C.P. and Yeung Albert K.W., Concepts and Techniques of Geographical Information Systems, Prentice-Hall of India Pvt. Ltd. New Delhi, 2006

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Course Outcomes:

Sr. No.	CO statement	weightage
CO-1	Observe, Identify and define simple/ complex problems of day to day lives present in Industry/ Society where GIS and Remote Sensing applications can be useful.	20 %
CO-2	Apply knowledge of basic image interpretation and data image processing.	25%
CO-3	Integrate the existing data through various observations from various angles and layer creation.	15%
CO-4	Apply problem-solving methodologies to generate, evaluate and justify innovative solutions by designing and conducting/ analyzing and interpreting the data.	15%
CO-5	Demonstrate the ability to give solutions with an ability which can help communicate effectively for giving betterinterpretation and solutions.	25%

List of Tutorials/Activities:

1. Projects on Water Resource Mapping and Management.
2. Projects on Land Use Mapping and LandResource Management.
3. Projects on Site Selection for major infrastructure.
4. Projects on Natural Disaster Mitigation and Management.

List of Open Source Software/learning website:

1. CCRS Canada Centre for Remote Sensing -http://landmap.mimas.ac.uk/ipc/ccrs/fundam_e.html
2. NASA Remote Sensing Tutorial - http://rst.gsfc.nasa.gov/
3. TELSAT, Belgium - http://eoedu.belspo.be/en/guide/index.htm
4. http://www.landsat.org/ (Free)
5. SRTM 90m Digital Elevation Data (Free) http://srtm.csi.cgiar.org/
6. Freeware MultiSpec (A Multispectral Image Data Analysis System) http://cobweb.ecn.purdue.edu/~biehl/MultiSpec/
7. Commercial ERDAS Imagine http://gi.leica-geosystems.com/LGISub1x33x0.aspx
8. PCI Geomaticshttp://www.pcigeomatics.com/
9. ENVI http://rsinc.com/envi/
10. ER Mapper http://www.ermapper.com/
11. IDRISI http://www.clarklabs.org/

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