GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Civil and Infrastructure Engineering
Subject Code: 3164009
Semester – VI
Subject Name: Remote Sensing and GIS

Type of course: Open Elective

Prerequisite: Knowledge of Surveying

Rationale: To impart the knowledge of applications of Remote Sensing and GIS for decision making, planning and disaster management.

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)	
2	0	2	3	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	**Remote Sensing:** Concept of remote sensing, Definition of remote sensing, remote sensing process, source of energy, energy interaction in atmosphere, energy interaction with earth surface, interpretation and analysis, analog (visual) image interpretation, digital image processing, process of remote sensing data analysis. Data acquisition, various remote sensing platforms, satellites, sensors, multi spectral scanners, microwave sensing, spatial and spectral resolutions. **Applications of Remote Sensing:** Application of remote sensing Land cover and land use, agriculture application, forestry application, hydrology, oceans and coastal monitoring, environmental impact assessment.	**10**
2	**GIS:** Cartography, Geographic mapping process, transformations, map projections, Geographic Data Representation, Spatial and Non-spatial data, Storage, Quality and Standards, database management systems, Raster data representation, Vector data representation, GIS Data Processing, Analysis and Modelling Raster based GIS data processing – Vector based GIS data processing – Queries – Spatial analysis – Descriptive statistics – Spatial autocorrelation – Quadrant counts, and nearest neighbour analysis – Network analysis –	**10**

	Surface modelling – DEM and DTM. **Applications of GIS:** Decision making, Cartography, Environment, Transportation, Highway Management, Managing Water Resources, Integrated Land Management, Real Estate Transaction, Land Survey, Utilities Management, Disaster Warning and Management System, Physical Development, Organization of Capitals and Cities.	
3	**GPS**: Basic concepts, components, factors affecting, GPS setup, accessories, segments satellites & receivers, GPS applications, Case studies. Applications of remote sensing, GIS and GPS, Engineering applications, land use/land cover mapping, applications to urban and regional planning, Water resources, environmental studies, transportation engineering, other civil engineering fields.	**8**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
0	**25**	**25**	**20**	**20**	**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. 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. De Mers, 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.

7. Basudeb Bhatia; "Remote Sensing and GIS"; Second Edition; Oxford University Press (ISBN: 9780198072393)

8. Cristopher D. Lloyd; "Spatial Data Analysis (An Intro for GIS Users)"; Oxford University Press (ISBN: 978-0-19-955432-4)

9. Lillesand, T. M., Kiefer R. W. and Chipman, J. W. "Remote Sensing and Image Interpretation", 5th Edition, John Wiley and Sons India.

Course Outcomes: After studying this subject, students will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Understand remote sensing, various platforms, satellites, sensors.	10
CO-2	Apply concepts of remote sensing in vrous fields	35
CO-3	Comprehend GIS, raster data and vector data, DEM, DTM, and its applications	35
CO-4	Understand concepts of GPS and apply it in various fields	20

Software Based Practical:

- Introduction to GIS software
- Dataset sources and importing files to GIS
- Digitization of map in GIS
- Contour maps using GIS
- Contour maps using Google Earth
- Create maps in GIS
- Image Classification in GIS
- False color composite using GIS
- DEM creation in GIS
- Georeferencing in GIS

Major Equipment:

Computers with higher configuration and internet, server.

List of Open Source Software/learning website:

☐ Cad drafting tools, Google earth (free ware)

☐ Google SketchUp Pro for Nonprofits (https://www.google.com/earth/outreach/grants/software/sketchup.html)

☐ Remote Sensing & Geographic Information System (http://gis.nic.in/)

☐ National Remote Sensing Centre (http://www.nrsc.gov.in/)

☐ Indian Space Research Organisation (http://www.isro.org/)

☐ Indian institute of Remote Sensing (http://www.iirs.gov.in/)

☐ List of geographic information systems software (http://en.wikipedia.org/wiki/List_of_geographic_information_systems_software)

☐ Google books on GIS and Remote Sensing (https://www.google.co.in/search?q=Urban+Planning+Techniques&btnG=Search+Books&tbm=bks&tbo=1&gws_rd=ssl#q=GIS+Remote+Sensing&tbm=bks)