

GUJARAT TECHNOLOGICAL UNIVERSITY

ME Civil (Construction Engineering & Management)

Remote Sensing & GIS in Civil Engineering

SUBJECT CODE: 3711410

Type of Course: Elective Subject

Prerequisite: NIL

Teaching and Examination Scheme:

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

Contents:

Sr.No.	Topics	Hrs.	% Weightage
1	Introduction: Introduction of Remote Sensing – Energy sources and Radiation principles, Energy equation, EMR and Spectrum, EMR interaction with Atmosphere scattering, Absorption, EMR interaction with earth surface features reflection, absorption, emission and transmission, Spectral response pattern, vegetation, soil, water bodies- Spectral reflectance Geographical Concepts and Terminology, Difference between Image Processing System and Geographic Information System (GIS), utility of GIS, various GIS packages and their salient features, Essential components of a GIS.	4	12
2	Data Acquisition: Digital Image interpretation, Pattern recognition, shape analysis, Textural analysis, Decision concepts, fuzzy sets and Evidential reasoning, Change detection, multitemporal data merging, multi sensor image merging merging image data with ancillary data, Expert system, Artificial Neural Network; Integration with GIS.	8	22

	Scanners and Digitizers, Method of Digitization, Raster and Vector Data, Data Storage, Verification and Edition. Data Preprocessing; Format Conversion, Data Compression, Data Reduction and Generalization, Run Length Coding, Merging, Edge Matching, Rectification and Registration, Interpolation.		
3	Data Base Structure: Hierarchical Data, Network Systems, Relation Database, Data Management – Conventional Database Management System, Spatial Database Management	8	22
4	Data Manipulation and Analysis: Reclassification and Aggregation, geometric and Spatial Operations on Data Measurement and Statistical Modeling. Data Output – Types of Output. Application of GIS in various Natural Resources Mapping & Monitoring, Engineering Application	8	22
5	Introduction to Global Navigation Satellite System, Introduction to GPS, GPS Segments: Space, Control and User segments. GPS principles, receiver types and positioning techniques GPS applications in Transportation Engineering: Intelligent Transport System, Mass transport system and location based services. GPS applications in Construction Management: Location based material and equipment management	8	22
		36	100

Reference Book(s)

1. P.A. Borough, “*Principles of Geographic information Systems for Land Resources Assessment*”, Oxford University Press, 1986.
2. Manual of Remote Sensing Vol. 2, American Society of Photogrammetry and Remote Sensing.
3. Stan Aronoff, “*Geographic Information Systems: A Management Perspective*”, WDL Publications, 1991.
4. Dr. Chandra A.M., “*Remote Sensing and GIS*”, Narosa Publishers, New Delhi.
5. B. Bhatta, “*Remote Sensing and GIS*”, Oxford University Press, New Delhi.
6. M. Anji Reddy, Textbook of Remote Sensing and Geographical Information systems, BS Publications, Hyderabad. 2011. ISBN: 81- 7800-112-8
7. A.M.Chandra and S.K. Gosh. Remote Sensing and GIS, Narosa Publishing Home, New Delhi 2009.
8. Thomas M. Lillesand, Ralph W. Kiefer, Jonathan W. Chipman Remote sensing and image interpretation John Wiley & Sons, 2008

9. George Joseph , Fundamentals of Remote Sensing Universities Press, Hyderabad 2005