GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering Syllabus

Subject Code : 3716502

Subject Name : Geo-informatics in Civil Engineering

WEF Academic Year :	2023 - 24
Semester :	1
Category of the Course :	Core II

Course Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	2	5	70	30	30	20	150

Course Content :

Sr. No.	Name of Topic	Teaching Hours
1	**Remote Sensing and its application** – 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, Spectralresponse pattern , vegetation, soil, water bodies- Spectral reflectance	8
2	**GIS and its application** – Geographical Concepts and Terminology, Difference between ImageProcessing System and Geographic Information System (GIS), utility of GIS, various GIS packages and their salient features, Essential components of a GIS.	12
3	**GPS and its application -** 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	12
4	**Data Acquisition -** Digital Image interpretation ,Pattern recognition, shape analysis, Textural analysis, Decision concepts, fuzzy sets and Evidential reasoning, Change detection, multi temporal data merging, multi sensor image mergingmerging image data with ancillary data, Expert system, Artificial Neural Network; Integration with GIS. Scanners and Digitizers, Method of Digitization, Raster and Vector Data,Data Storage, Verification and Edition. Data Preprocessing; Format	12

	Conversion, Data Compression, Data Reduction and Generalization, RunLength Coding, Merging, Edge Matching, Rectification and Registration, Interpolation.	
5	**Data Analysis in Geo-informatics -** Hierarchical Data, Network Systems, Relation Database, Data Management – Conventional Database Management System, Spatial Database Management, 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	12

Reference Book(s) :

1. P.A.Borough,"*PrinciplesofGeographicinformationSystemsforLandResourcesAssessment* ",Oxford University Press, 1986.
2. Manual of Remote Sensing Vol. 2, American Society of Photo grammetry and Remote Sensing.
3. StanAronoff,"*GeographicInformationSystems:AManagementPerspective*",WDLPublications,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, Text book of Remote Sensing and Geographical Informationsystems,BSPublications,Hyderabad.2011.ISBN: 81-7800-112-8
7. A.M.ChandraandS.K.Gosh.RemoteSensingandGIS,NarosaPublishingHome,NewDelhi2009.
8. ThomasM.Lillesand,RalphW.Kiefer,JonathanW.ChipmanRemotesensingandimag interpretation John Wiley & Sons, 2008.
9. GeorgeJoseph,FundamentalsofRemoteSensingUniversitiesPress,Hyderabad 2005.

Course Outcomes :

After completion of this course , student will be able to

Sr. No.	CO Statement
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.
CO-2	Apply knowledge of basic image interpretation and data image processing.
CO-3	Integrate the existing data through various observations from various angles and layer creation.
CO-4	Apply problem-solving methodologies to generate, evaluate and justify innovative solutions by designing and conducting/ analyzing and interpreting the data.
CO-5	Demonstrate the ability to give solutions with an ability which can help communicate effectively for giving better interpretation and solutions.

List of Practicals :

1. Projection and Re-projection Of Image
2. Geo referencing and Image Registration
3. Digitization of Map , Map preparation
4. Working with tables, Attribute Querying , Spatial Querying
5. Basic Raster Analysis and Styling
6. Raster Mosaicking and Clipping
7. Working with terrain Data
8. Watershed Delineation

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