

Branch Name:	Civil Engineering
Semester/Year:	Semester VII/ Forth Year
Subject Title:	Application of Geoinformatics in Civil Engineering (Elective – III)
Subject Code:	1ET1060707
Pre-requisite:	Basic Knowledge of Surveying, Computer and its Peripherals, Fundamentals of Photogrammetry, Remote Sensing, GPS and GIS.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	02	00	05	70	30	-	-	100

Subject Contents				
Sr. No	Topic	Total Hours	Weightage (%)	
1	INTRODUCTION Introduction to geo-informatics. Conventional methods of mapping. Advanced methods of mapping. Comparison of methods.	6	10	
2	AERIAL PHOTOGRAMMETRY Development and classification of Photogrammetry, Aerial Photogrammetric processes: acquisition of data, classification of photographs, photographic scale, relief displacement, flight planning, stereo Photogrammetry, Stereo model compilation, principal and use of stereoscopic 3D view and parallax bar, Ortho-rectification, Orientation and triangulation, DEM Generation.	8	15	
3	REMOTE SENSING Introduction to Electromagnetic Spectrum (EMR), interaction of EMR with atmosphere and target, Resolutions: Spatial, temporal, spectral and radiometric, sensor characteristics, satellite data products, digital imaging, digital image processing, visual image interpretation, digital image interpretation. microwave remote sensing.	11	20	
4	GNSS and SCANNERS Global Navigation Satellite System (GNSS) basic concepts, GPS (NAVSTAR), Galileo, GLONASS and Indian Regional Navigation Satellite System (IRNSS). Functional segments of GPS and components. Working principle, factors affecting, GPS setup and accessories, satellites & receivers, Differential GPS (DGPS), Applications of GNSS.	9	20	
5	GIS Structure of GIS: Cartography, Geographic mapping process, GIS data models, database management systems, Raster data representation, Vector data representation, transformations, map projections, Geographic Data Representation, Storage, Quality and Standards, Assessment of data quality, Managing data errors, Geographic data standards.	11	20	

	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 – DEM.		
6	APPLICATION of GEOINFORMATICS Case studies of applications of geo-informatics to following areas: a. Environment. b. Water Resources. c. Transportation. d. Town Planning. e. Geology. f. Disaster Management. g. Mapping.	8	15

Course Outcome:

After learning the course the students should be able to:

1. Ability to develop Orthographic and Contour maps using aerial photographs and Remote sensing Images
2. Ability to develop maps using Total Station, GIS, GPS and Scanners
3. Ability to create GIS application referencing Spatial features with Attribute data

Reference Books:

1. B. Bhatta, Remote Sensing and GIS, 2nd Edition, Oxford University Press, New Delhi
2. J.R. Jensen, Introductory Digital Image Processing, Prentice-Hall, New Jersey
3. J.R. Jensen, Remote Sensing of Environment: An Earth Perspective, Pearson Education, Delhi, 2004
4. P.A. Burrough and R.A. McDonnell, Principles of Geographical Information Systems, 2nd ed. Oxford, England, Oxford University Press.
5. T.M. Lillesand, R.W. Kiefer and J.W. Chipman, Remote Sensing and Image Interpretation, 5th edition, John Wiley and Sons, India
6. George Joseph, Fundamentals of Remote Sensing, Universities Press, India, 2005

List of Experiments/Tutorials:

1. Photo interpretation and Photogrammetry
2. Image Registration and Georeferencing
3. Image Interpretation
4. Image classification
5. Application of GIS and GPS
6. Creation of thematic maps
7. Overlay analysis
8. Digital Elevation Modeling
9. Geospatial analysis and Map based Queries

Design based Problems (DP)/Open Ended Problem:

- Faculty may give any open ended problem related to image interpretation and analysis, GPS use, digitization, overlay analysis, map based query and spatial analysis.

List of Open Source Software/learning website:

- <https://www.itc.nl/>;
- <http://52north.org/ilwis>
- <http://nptel.ac.in/courses/105108077/24>
- <http://nptel.ac.in/courses/105102015/>