B. Tech Civil Engineering				
Course code: Course Title	**Course Structure**			**Pre-Requisite**
CE433: Advanced Surveying and Geoinformatics	L	T	P	CE207: Surveying and Geoinformatics
	3	0	2	

Course Objective: It introduces the advanced concepts of Surveying and Geoinformatics

S. No	Course Outcomes (CO)
CO1	Understand and apply the advanced concepts of Surveying
CO2	Understand and apply advanced concepts of GNSS and GPS in Surveying and navigation
CO3	Understand and apply advanced concepts of Remote sensing in Surveying and Mapping
CO4	Understand and apply advanced concepts of Remote sensing in Surveying and Mapping
CO5	Develop an understanding of emerging technologies and applications in Geoinformatics

S. No	Contents	Contact Hours
UNIT 1	**Advanced Surveying Techniques -**Principles and Methods of Precise Surveying, Electronic Distance Measurement (EDM) and Total Station, Digital Theodolites and Auto Levels, Laser Scanning and LiDAR Surveying, Hydrographic and Underground Surveying, Error Analysis and Adjustment Techniques	8
UNIT 2	**Global Navigation Satellite Systems (GNSS) and GPS -** Fundamentals of GNSS: GPS, GLONASS, Galileo, BeiDou, GPS Signal Structure and Positioning Methods, Differential GPS (DGPS) and Real-Time Kinematic (RTK) Techniques, GPS Data Processing and Accuracy Assessment, Applications of GNSS in Engineering and Mapping, Case Studies: GNSS in Land and Urban Planning	8
UNIT 3	**Remote Sensing for Surveying and Mapping -** Fundamentals of Remote Sensing and Electromagnetic Spectrum, Types of Remote Sensors: Optical, Microwave, Thermal, Satellite Image Interpretation and Classification Techniques, DEM and DSM Generation from Remote Sensing Data, Applications in Topographic Mapping and Land Use Analysis, UAV (Drone) Surveying: Data Acquisition and Processing	8
UNIT 4	**Geographic Information System (GIS) and Spatial Analysis -**GIS Data Models: Raster and Vector, Coordinate Systems and Map Projections, Spatial Data Analysis: Overlay, Buffering, Interpolation, GIS-based 3D Modelling and Terrain Analysis, Web GIS and Cloud-based GIS Applications, Case Study: GIS in Disaster Management and Urban Planning	8
UNIT 5	**Emerging Technologies and Applications in Geoinformatics -** Artificial Intelligence and Machine Learning in Geospatial Analysis, Internet of Things (IoT) and Smart Cities Mapping, 3D Laser Scanning and BIM (Building Information Modelling), Geospatial Big Data and Cloud Computing, Blockchain for Land Records and Cadastral Mapping, Future Trends in Surveying and Geoinformatics	10
	Total	**42**

REFERENCES		
S. No.	**Name of Books/Authors/Publishers**	**Year of Publication / Reprint**
1	Advanced Surveying Techniques - Title: *Advanced Surveying: Total Station, GIS and Remote Sensing* Authors: Satheesh Gopi Publisher: Pearson Education India Edition: Reprint Edition Year of Publication: 2007 ISBN: 9788131700679	2007
2	Global Navigation Satellite Systems (GNSS) and GPS -Title: *GPS and GNSS for Land Surveyors* , Author: Jan Van Sickle , Publisher: CRC Press, Edition: 5th Edition , ISBN: 9781032521022	2023
3	Remote Sensing for Surveying and Mapping -Title: *Remote Sensing and Image Interpretation*, Authors: Thomas M. Lillesand, Ralph W. Kiefer, Jonathan W. Chipman, Publisher: Wiley, Edition: 7th Edition, ISBN: 9781118343289	2015
4	Geographic Information System (GIS) and Spatial Analysis -Title: *GIS, Spatial Analysis, and Modeling*, Editors: David J. Maguire, Michael F. Goodchild, Michael Batty, Publisher: Esri Press, Edition: 1st Edition, ISBN: 9781589481305	2005
5	Emerging Technologies and Applications in Geoinformatics -Title: *Emerging Trends in Open Source Geographic Information Systems*, Editor: G. Mustafa Mohiuddin, Publisher: Engineering Science Reference, Edition: 1st Edition, ISBN: 9781522550396	2018