| B.E CIVIL ENGINEERING | | | |
|---|---|---|---|
| **Choice Based Credit System (CBCS)** | | | |
| **SEMESTER - VI** | | | |
| **Satellite Remote Sensing and GIS** (3:0:0) 3 | | | |
| (Effective from the academic year 2023-24) | | | |
| Course Code | 21CV653 | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P) | 3:0:0 | SEE Marks | 50 |
| Total Number of Contact Hours | 40 | Exam Hours | 3 Hours |

**Course Objectives:**

This course will enable students to:
1. Comprehend the basic concepts of remote sensing.
2. Analyze satellite imagery and extract the required information
3. Extract the GIS data and prepare the thematic maps.
4. Use the thematic maps for various applications

### Module – 1

**Introduction:** Relevance in the Global scenario. Financial bearing on the World Economy. Role in Environmental and Societal concerns. Internship and Job opportunities. Significance and application of the course in Civil Engineering.

**Remote Sensing**: Basic concept of Remote sensing, Data and Information, Remote sensing data collection, Remote sensing advantages & Limitations, Remote Sensing process. Electromagnetic Spectrum, Energy interactions with atmosphere and with earth surface features (soil, water, and vegetation), Resolution, image registration and Image and False color composite, elements of visual interpretation techniques.

**Applications**: The above topic is required for concept of remote sensing.

**(8 hours)**

### Module – 2

**Remote Sensing Platforms and Sensors:** Indian Satellites and Sensors characteristics, Remote Sensing Platforms, Sensors and Properties of Digital Data, Data Formats: Introduction, platforms IRS, Landsat, SPOT, Cartosat, Ikonos, Envisat etc. sensors, sensor resolutions (spatial, spectral, radiometric and temporal). Basics of digital image processing- introduction to digital data, systematic errors(Scan Skew, Mirror-Scan Velocity, Panoramic Distortion, Platform Velocity , Earth Rotation) and non-systematic [random] errors(Altitude, Attitude). Image enhancements (Gray Level Thresholding, level slicing, contrast stretching), image filtering.

**Applications**: The above topic is required for different platform and sensor in satellites

**(8 hours)**

### Module – 3

**Geographic Information System:** Introduction to GIS; components of a GIS; Geographically Referenced Data, Spatial Data- Attribute data-Joining Spatial and attribute data, GIS Operations: Spatial Data Input – Attribute data Management, Geographic coordinate System, Datum; Map Projections: Types of Map Projections, Projected coordinate Systems. UTM Zones.

**Applications**: The above topic is required for processing satellite imageries.

(**8 hours)**

### Module – 4

**Data Models:** Vector data model: Representation of simple features – Topology and its importance; coverage and its data structure, Shape file; Relational Database, Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, and Data conversion.

**Applications**: The above topic is required for creating different thematic maps

| Module – 5 |
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**Integrated Applications of Remote sensing and GIS:** Applications in land use land cover analysis, change detection, water resources, urban planning, environmental planning, Natural resource management and Traffic management. Location Based Services And Its Applications. Bhuvan website satellite imagery download and Google Earth integrating imageries.

**Applications**: The above topic is required for planning and implementation.

**(8 hours)**

Course outcomes:
The students will be able to:
CO1: Comprehend the various data collection and delineate various elements from the satellite imagery
CO2: Apply the knowledge of remote sensing in different features of ground information to create raster or vector data
CO3: Analysis of different thematic maps for various sectors.
CO4: Propose the latest technology to process satellite imageries.
CO5: Identify latest techniques and trends in GIS and cost effective aspects for analyzing Satellite data.

**Teaching Practice:**
- Classroom teaching (chalk and Talk)
- ICT – Power Point Presentation
- Audio & Video Visualization Tools

**Textbooks**
1. Narayan Panigrahi, "Geographical Information Science", and ISBN 10: 8173716285 / ISBN 13:9788173716287, University Press2008.
2. Basudeb Bhatta, "Remote sensing and GIS" , ISBN:9780198072393, Oxford University Press2011
3. Kang – T surg Chang, "Introduction to Geographic Information System". Tata McGraw Hill Education Private Limited2015.
4. Lilles and, Kiefer, Chipman,"RemoteSensingandImageInterpretation",Wiley2011.

   **References**
1. 1. Chor Pang Lo and Albert K.W Yeung, "Concepts &Techniques of GIS", PHI,2006
2. John R. Jensen, "Remote sensing of the environment", an earth resources perspective–2nd edition– by Pearson Education2007.
3. Anji Reddy M., "Remote sensing and Geographical information system", B. S. Publications2008.
4. Peter A. Burrough, Rachael A. McDonnell, and Christopher D. Lloyd, "Principals of Geo physical Information system", Oxford Publications2004.
5. S Kumar,"Basics of remote sensing & GIS", Laxmi publications 2005