**19CE42E2 – REMOTE SENSING & GIS**

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| **Course Category**  | Professional Elective | **Credits**  | 3 |
| **Course Type**  | Theory | **Lecture - Tutorial - Practical**  | 3 - 0 - 0 |
| **Prerequisite**  | None | **Sessional Evaluation**  | 40 |
| **Semester End Exam Evaluation**  | 60 |
| **Total Marks**  | 100 |

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| **Course Objectives** | 1. To introduce the basic principles of Remote Sensing.
2. To become familiar with different types of sensors and platforms.
3. To impart knowledge on visual image interpretation technique.
4. To understand the principles of spatial analysis.
5. To learn the applications of remote sensing for better earth resources management.
6. To understand the elements of GIS and its importance.
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| **Course Outcomes** | CO1 | Understand various terminologies and interaction of EMR with atmosphere and earth’s surface. |
| CO2 | Explain the different technical aspects of a remote sensing network with special emphasis on India remote sensing technology. |
| CO3 | Compare different types of data obtained from a remote sensing network with tools specifically designed for the purpose. |
| CO4 | Understand various corrections applied to the data collected and techniques of image classification. |
| CO5 | Apply remote sensing in earth resources management.  |
| CO6 | Demonstrate the basic concepts of Geographical Information System |
| **Course****Content** | **UNIT – I****FUNDAMENTAL CONCEPTS OF REMOTE SENSING:** Definition of Remote Sensing; History of Remote Sensing and Indian Space Program; Remote Sensing Process; Source of energy – Concept of energy, Electromagnetic radiation, Electromagnetic Spectrum; Interaction of electromagnetic radiation with atmosphere, Vegetation, soil and water – Absorption, Scattering, Refraction, Reflection; Spectral Reflectance Curve; Atmospheric windows; Advantages and Limitations of Remote Sensing.**UNIT – II****REMOTE SENSING SYSTEM:** Introduction; Types of Remote Sensing - Classification Based on Platform, Energy Source, Imaging Media, Regions of Electromagnetic Spectrum, Number of Bands; Characteristics of Images; Orbital Characteristics of Satellite; Remote Sensing Satellites; Definitions – Swath, Nadir, path, row, Orbital calendar. **SENSOR CHARAVTERISITICS:** Resolutions- Spatial Resolution, Spectral Resolution, Radiometric Resolution, Temporal Resolution.**UNIT – III****VISUAL IMAGE INTERPRETATION:** Introduction; Information Extraction by Human and Computer; Remote Sensing Data Products; Image Interpretation; Elements of Visual Image Interpretation -Location, Size, Shape, Shadow, Tone, Colour, Texture, Pattern, Height and Depth, Site, Situation and Association; Interpretation Keys.**UNIT – IV****DIGITAL IMAGE PROCESSING:** Introduction; Categorization of Image Processing; Image Processing Systems; Data Formats of Digital Image; Pre-processing - Radiometric Correction of Remotely Sensed Data, Geometric Correction of Remotely Sensed Data, Miscellaneous Pre-processing; Image Enhancement - Image Reduction, Image Magnification, Colour Compositing, Transect Extraction, Contrast Enhancement; Filtering; Image Classification - Information Class and Spectral Class - Supervised Versus Unsupervised Classification; Decision Rules for Supervised Classification; Decision Rules for Unsupervised Classification; Accuracy Assessment.**UNIT – V****APPLICATIONS OF REMOTE SENSING FOR EARTH RESOURCES MANAGEMENT:** Agriculture – crop production forecasting, agricultural drought assessment, precision farming; Forestry – Type and density mapping, forest cover change, forest status in India; Land cover/Land use mapping – Wastelands, Urban sprawl; Water Resources; Coastal Zone Management – Coastal zone ecosystem, Coastal regulation zone, integrated coastal zone management.**UNIT – VI****GEOGRAPHICAL INFORMATION SYSTEM :** Definition of GIS; Key components of GIS; Functions of GIS, Application areas of GIS, Advantages of GIS – Advantages over traditional map, mapping software, CAD, Conventional DBMS, Analysis-modeling-Presentation and decision making; Functional Requirements of GIS; Limitations of GIS; Spatial data models – raster data model, vector data model. |

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| **Textbooks** **and** **References** | **TEXTBOOKS:**1. B. Bhatta, *Remote sensing and GIS*, Oxford University Press, 3rd edition, 2021.
2. George Joseph and C Jeganathan, *Fundamentals of remote sensing*, Universities Press, 3nd Edition, 2018.
3. Tsurg Charg, *Introduction to Geographic information system,* Tata McGraw-Hill Education Private Limited. 2nd edition, 2014.

**REFERENCES:**1. John R.Jensen, *Remote sensing of the environment* *– An earth resources perspective,* Pearson Education,2nd edition, 2014.
2. Peter A Burragh and Rachael McDonnnell, *Principals of Geo physical Information system*, Oxford Publications 2nd edition, 2004.
3. A. Kumar, *Basics of remote sensing & GIS,* Laxmi publications, 3rd edition, 2009
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**CO-PO Mapping:** 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

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|   | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO 1** | 1 | - | - | 1 | - | - | 1 | - | - | - | - | 1 |
| **CO 2** | 1 | - | - | - | - | 1 | 1 | - | - | - | - | 1 |
| **CO 3** | 2 | - | - | - | 1 | - | 1 | - | - | - | - | - |
| **CO 4** | 2 | - | - | 1 | 1 | - | 1 | - | - | - | - | - |
| **CO 5** | 1 | - | - | 1 | 1 | - | 1 | - | - | - | - | - |
| **CO 6** | 1 | - | - | 2 | 1 | 1 | 2 | - | - | - | 1 | 1 |