**20CE3202 – REMOTE SENSING & GIS**

**(Civil Engineering)**

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

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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 Indian 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 CHARACTERISTICS:** 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, 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. TsurgCharg, *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, 2ndedition, 2014.
2. Peter ABurragh 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** | **PSO1** | **PSO2** | **PSO3** |
| **CO 1** | 1 | - | - | 1 | - | - | 1 | - | - | - | - | 1 | - | 1 | - |
| **CO 2** | 1 | - | - | - | - | 1 | 1 | - | - | - | - | 1 | - | - | - |
| **CO 3** | 2 | - | - | - | 1 | - | 1 | - | - | - | - | - | 2 | 1 | 2 |
| **CO 4** | 2 | - | - | 1 | 1 | - | 1 | - | - | - | - | - | 2 | - | 1 |
| **CO 5** | 1 | - | - | 1 | 1 | - | 1 | - | - | - | - | - | - | 2 | 3 |
| **CO 6** | 1 | - | - | 2 | 1 | 1 | 2 | - | - | - | 1 | 1 | 1 | 1 | 2 |