# REMOTE SENSING AND GIS

## (Professional Elective – V)

**Course Code: 20CE1168**

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**Pre-requisites:** Surveying& Geomatics

**Course Outcomes:**
At the end of the course, the student will be able to:
**CO1:** Discuss the principles of photogrammetry and remote sensing.
**CO2**: Explain sensors and satellites.
**CO3**: Discuss the concepts and fundamentals of GIS.
**CO4**: Impart the knowledge of remote sensing in water resource applications.
**CO5**: Explain the uses of remote sensing in transportation and environmental engineering

### UNIT-I                                                                                        (10 Lectures)

### PHOTOGRAMMETRY & REMOTE SENSING:

Introduction – principle and types of aerial photographs, Stereoscopy, Scale of a vertical aerial photograph, map Vs aerial photographs, mosaic, ground control, parallax measurements for height. Basic concepts and foundation of remote sensing – Elements involved in remote sensing , electromagnetic spectrum, Physics of remote sensing, energy interactions with earth surface features of vegetation, water and soil, energy interactions with atmosphere.

*Learning outcomes:*
1. Describe the importance of remote sensing in civil engineering(L2)
2. Explain the concepts of photogrammetry (L2)
3. Elaborate the concepts of energy interactions with various features(L2)

### UNIT-II                                                                                        (10 Lectures)

### SATELLITES AND SENSORS:

Satellite and sensor characteristics of LANDSAT series, SPOT, IRS, High Resolution SatelliteSystems. Visual interpretation keys - converging evidence.

*Learning outcomes:*
1. Explain various sensors in a satellite system(L2)
2. Elaborate the sensor characteristics(L2)
3. Explain the factors that influence image interpretation(L2)

### UNIT-III                                                                                        (10 Lectures)

### GEOGRAPHIC INFORMATION SYSTEM:

Geographic information system: Introduction, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. Types of data representation-  Data collection data input and output. Manual digitizing and scanning. GIS data file management; Layer based GIS, Feature based GIS mapping. Data storage – raster, vector and attribute data storage, Overview of the data manipulation and analysis. Integrated analysis of the spatial andattribute data. Integration of RS, GIS & GPS.

*Learning outcomes:*
1. Describe the components and workflow of GIS(L2)
2. Explain the methods to create GIS database(L2)
3. Discuss the importance of GIS and GPS(L2)

**UNIT-IV** (10 Lectures)

**WATER RESOURCES APPLICATIONS- I:**

Land use/Land cover, Rainfall – Runoff relations and runoff potential indices of watersheds, flood and drought impact assessment and monitoring. Watershed management for sustainable development and watershed characteristics – Reservoir sedimentation, Identification of suitable sites for ground water & identification of sites for artificial recharge structures, drainage morphometry, water depth estimation and bathymetry.

*Learning outcomes:*
 1. Explain the applications of water resources with RS and GIS(L2)
 2. Describe the applications of watershed management with RS and GIS(L2)
 3. Discuss the case studies on flood and drought management with RS and GIS(L2)

**UNIT-V** (10 Lectures)

**ENVIRONMENTAL AND TRANSPORTATION ENGINEERING APPLICATIONS:**

Air pollution – detection & identification of pollution sources of water – water quality mapping & monitoring, environmental impact assessment – highway alignment-urban planning and infrastructure development.

*Learning outcomes:*
1. Describe the applications of transportation with RS and GIS(L2)
2. Explain the Environment applications with RS and GIS(L2)
3. Discuss the case studies in urban planning using RS and GIS(L2)

**TEXT BOOKS:**

1. Lillesand and Kiefer, "Remote Sensing and Image Interpretation", 5<sup>th</sup>Edition, publishedby John Wiley and Sons, 2008.
2. M.Anji Reddy, "Remote Sensing and Geographical Information systems", 3<sup>rd</sup>Edition, B.S.Publications, 2006.
3. A.M. Chandra, S.K. Ghosh, "Remote Sensing and Geographical Information System", Narosa Publishing house, 1<sup>st</sup>Edition, 2007.
4. Basudeb Bhatta, "Remote Sensing and GIS" Oxford University Press

**REFERENCES:**

1. Micheal N Demers, "Fundamental of GIS", 3rd Edition, John Wiley & Sons, 2008.
2. C.P.Lo Albert, K.W. Yonng, "Concepts & Techniques of GIS", 2<sup>nd</sup>Edition, Prentice Hall (India) Publications, 2008.
3. David P Paine, "Aerial Photography and Image Interpretation", 2<sup>nd</sup>Edition, published by Wiley, Higher Education, 2006.
4. Kang – Tsungchang, "Introduction to GIS", 4<sup>th</sup>Edition, TMH Publications & Co., 2007.
5. Ian Heywood, Sarah Cornelius, Steve Carver, "An Introduction to GeographicalInformation Systems", 1<sup>st</sup>Edition, Pearson Education Asia, 2000.
6. Bernhardsen, "Geographic Information Systems- An Introduction", 3<sup>rd</sup>Edition, Publishedby John Wiley Sons, 2006.
7. LRA Narayana, "Basics of Remote Sensing and its applications", Universities press, 1<sup>st</sup> Edition, 2001
8. Peter ABurrough and Rachael A, MC Donnell, "Principles of Geographical Information Systems", 1<sup>st</sup>Edition, Oxford Publishers, 1998.