BACHELORS WITH ENVIRONMENTAL SCIENCE AS MAJOR (CT-3)

7th SEMESTER

EVS722J3 ENVIRONMENTAL SCIENCE_ ENVIRONMENTAL PLANNING, REMOTE SENSING AND GIS

CREDITS: (THEORY-4, PRACTICAL -2)

COURSE LEARNING OUTCOME: *This course focuses on the principles and practices of environmental planning. Students will learn how to assess, design, and implement sustainable solutions to environmental challenges, considering ecological, social, and economic factors. The students will also explore the use of remote sensing and GIS in environmental planning and management. Students will learn how to collect, analyse, and visualize spatial data to make informed decisions for sustainable environmental practices.*

THEORY (4 CREDITS: 60 HOURS)

UNIT I: INTRODUCTION TO ENVIRONMENTAL PLANNING

Environmental planning – importance and objectives; Land use planning and zoning; Urban and rural development and environmental planning; Smart city concept; carbon neutral

UNIT II: INTRODUCTION TO REMOTE SENSING

Remote sensing: Concept and history; Electromagnetic spectrum: EMR sources-active & passive, radiation laws; Resolution: spatial, spectral, radiometric and temporal; Remote Sensing satellites: LANDSAT & IRS satellite series; Image processing and interpretation; Aerial photographs

UNIT III: INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEM (GIS)

GIS: history and development; Functional requirements: Hardware configuration, software modules; Geographic data: Spatial and non-spatial data types; Geospatial data models: raster and vector; Global positioning system (GPS)

UNIT IV: APPLICATIONS OF REMOTE SENSING AND GIS

Environmental impact assessment; Biodiversity conservation; Watershed management; Land-use planning; Disaster management

PRACTICALS: (2 CREDITS) (60 HOURS)

1. Data collection techniques (GPS, field surveys, etc.)
2. Demonstration of basic image interpretation skills using satellite imagery or aerial photography
3. Delineation of point, line and polygon
4. Delineation of drainage of a given area from satellite data
5. Generation of land use/ land cover map
6. Calculate vegetation indices like NDVI (Normalized Difference Vegetation Index) using satellite imagery.
7. Identify changes in land cover using change detection techniques
8. GPS-based survey and mapping

SUGGESTED READINGS:

1. Remote sensing and Image Interpretation, Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman (7th Edn.). by Thomas Lillesand, Ralph.
2. Introduction to Remote Sensing, James B. Campbell, Randolph H. Wynne (5th Edition). 2011. Guilford Press.
3. Principles of Geographic Information System, Peter A. Burrough, Rachael A. McDonnell, Christopher D. Lloyd (3rd Edition.). 2015. Oxford University Press.
4. Geographic Information Systems and Science, Paul A. Longley, Michael F. Goodchild, David J. Maguire, David W. Rhind (4th Edition.). 2015. Wiley.
5. Introduction to Geographic Information Systems, Kang-tsung Chang (9th Edition.) .2019. McGraw-Hill Education.
6. Remote Sensing: Models and Methods for Image Processing, Robert A. Schowengerdt. (3rd Edition.). 2006. Academic Press.
7. Geospatial Analysis: A Comprehensive Guide to Principles, Techniques and Software Tools, Michael J. de Smith, Michael F. Goodchild, Paul A. Longley (6th Edition.). 2020. Winchelsea Press.
8. Fundamentals of Geographic Information Systems, Michael N. DeMers. (5th Edition.). 2017. Wiley.
9. Geospatial Technologies for Resources Planning and Management, Chandan Kumar, S. K. Singh. 2020. CRC Press.
10. Advances in Remote Sensing and GIS Applications in Forest Management, P. K. Joshi, T. P. Singh, P. Pant. 2020. Springer.
11. Remote Sensing and GIS Applications: A Geoinformatics Approach, S. K. Singh, Pradeep Kumar Singh. 2020. CRC Press.
12. GIS and Geostatistical Techniques for Groundwater Science, Dr. Senapathi Venkatramanan, Dr. Hyojin Kim, Dr. Swatantra Kumar Dubey. 2019. Elsevier.
13. Geospatial Technology for Water Resource Applications, Prashant K. Srivastava, Anil Kumar Gupta, Pradeep K. Singh. 2020. CRC Press.
14. Remote Sensing of Agriculture and Land Cover/Land Use Changes in South and Southeast Asian Countries, Krishna Prasad Vadrevu, Toshimasa Ohara, Chris Justice. 2019. Springer.