Interdisciplinary Department of Remote Sensing and GIS Applications

M.Sc. (Remote Sensing & GIS Applications)

Semester-I
Session: 2016-2017
Contact hours: 56
Credits 4

Paper-1

Remote Sensing & Image Interpretation

Unit-I

Unit-II
Sensors and their characteristics on board IRS, LANDSAT, SPOT, NOAA, IKONOS, Quickbird satellites. ASTER and SRTM missions. Spectral reflectance of soil, water vegetation and rock types. Spectral, spatial, temporal and radiometric resolutions.

Unit-III

Unit-IV
Mapping from remotely sensed data: Image characteristics of Flood inundation, cyclone affected areas, environmentally degraded areas, degraded land and desertified areas. Examples and case studies from India.

Suggested Books:
2. Remote Sensing and image interpretation by Lillesand and Keifer
5. Remote Sensing and Geographical Information System by Anji Reddy
6. Principal of Remote Sensing by P.J. Curran

Web sources:
www.isro.org
www.nrsc.gov.in
Interdisciplinary Department of Remote Sensing and GIS Applications

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Semester-I          Contact hours: 28
Session: 2016-2017  Credits 2

Paper-2

Fundamentals of GIS & GPS

Unit-I

Unit-II
Basics of GIS: data, structure, relational, hierarchical network input, format, analysis in GIS. Data integration and overlay analysis in GIS. Functions of GIS. Digitization, editing and topology building in GIS. Concept and applications of Digital Elevation Model (DEM). Data Base Management System (DBMS).

Unit-III
Introduction to Global positioning system: GPS satellite constellations, GPS segments: space, control, user, signals & codes. GPS receivers. Operating principle and sources of errors in GPS. Modes of measurements and Post processing of data, accuracy of GPS observation. GPS applications in various fields. Concept of DGPS and WAAS.

Unit-IV
Applications of GIS in natural resources mapping, socio-economic mappings and infrastructure mapping. Utility of GPS surveys in various fields. Case studies and examples from India.

Suggested Books:

1. Fundamentals of GIS by Micheal Demers
2. Remote Sensing and Geographic Information System by Anji Reddy
3. Remote Sensing and Geographic Information System by A.M. Chandra
5. www.GISdevelopment.net
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Paper-3

Basic Statistics and Computer Programming

Unit I
Introduction, Descriptive Statistics: Measures of Location, Measures of Variability, Skewness and Kurtosis, Data Visualization: Histograms, Box Plots, Scatter Plots

Unit II
Probability and Probability Distributions, Probability and Its Properties, Probability Distributions, Expected Value and Moments, Joint Distributions and Independence, Covariance and Correlation

Unit III

Unit IV
R : Introduction to computer programming and software packages, vectors and assignment, vector arithmetic, arrays and matrices, lists and data frames. Import/export of data objects, Defining new functions, Elements of graphics with R, Numeric and graphic summaries of data.

Suggested Books:

4. W. N. Venables, D. M. Smith and the R Core Team: An Introduction to R Notes on R: A Programming Environment for Data Analysis and Graphics
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Paper-4

Aerial Photography and Photogrammetry

Unit-I
Aerial photographs: Classification of aerial photographs. Scale of aerial photographs on uniform and variable terrain. Geometry of aerial photographs. Types of aerial mosaics and their advantages. Types of aerial cameras

Unit-II

Unit-III
Detections and identification of defined objects. Interpretation of physical and cultural features: hills/ridges, valleys, plains, plateau, settlement, infrastructures, water ways etc. Interpretation, delineation and mapping of general land use. Wasteland identification and classification.

Unit-IV

Suggested Books:

- Remote Sensing of the Environment by J.R. Jenson
- Photogeology by V.C. Miller
- Photogrammetry by F.H. Moffitt and EM Mikhail
- Principles and applications of photogeology by S.N. Panday
DATA STRUCTURE & DATA BASES

UNIT I: LINEAR DATA STRUCTURE
Introduction to data structures, linear and non-linear data structures, concepts of data types, single dimensional arrays, multi-dimensional arrays, operations on arrays, introduction to linked list, applications of linked list, doubly linked list, representation of stack and queues, use of stack and queues.

UNIT II NONLINEAR DATA STRUCTURE
Hierarchical form of data structure, introduction to trees, binary tree, binary search trees, traversal of binary trees: inorder, prorder, postorder, searching and inserting elements in binary trees, introduction to graph, representation of graph, traversing the graph, concept breadth first search, concept of depth first search.

UNIT III INTRODUCTION TO DATABASE
Database and its purpose, characteristics of database approach, database systems and their needs, components of database system, database System architecture, database administrator and his role, database management system and its components, types of database management systems, RDBMS, OODBMS, ORDBMS etc.

UNIT IV DATABASE MODEL

SUGGESTED BOOKS:
Data Structures by Lipschutz (Schaum’s outline series)
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M.Sc. (Remote Sensing & GIS Applications)

Semester I

Session 2016-17

RLM-1 (Lab-1) (Papers 1 and 4) (2 credits)


RLM-2 (Lab-2) (Papers 2, 3 and 5) (2 credits)

Toposheet identification and reading. Exposure to GIS software: Data digitization, editing, topology building. Georeferencing and GCPs. Projection and Coordinate system in GIS. Spatial and non-spatial data and their linkage in GIS. Spatial analysis: Overlay, buffer, proximity & network analysis. GPS measurements and mapping. Use of GPS in field work/survey.
Exercises related to Data structure and data bases

Ability Enhancement (AE-1) (2 credits)

Field work/Ground truth/GPS survey

Elective (Discipline Centric) E-1 (4 Credits)

(a) Global climate Change

(b) Basic programming concepts
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Elective Paper (E1)
(Discipline Centric)

Global Climate Change

Unit I

Unit II
Composition and structure of the atmosphere, Importance of atmosphere to human life, Change in atmospheric composition in the recent time. Burning of fossil fuel, deforestation, global land use/land cover changes. Green house gases and their effects.

Unit III

Unit IV
Sea level rise- causes, impacts and adaptation measures. UNCCC-role, summits, declarations, and protocols on climate change and its mitigation. Role of IPCC in policy making.

Suggested books:

BASIC PROGRAMMING CONCEPTS

UNIT I  INTRODUCTION
Introduction to programming, Introduction to ‘C’, Importance of ‘C’ language, program structure, data types, variables, expressions, statements, operators, input-output functions, some basic programs.

UNIT II  JUMPING, BRANCHING, LOOPING
Decision making statements: IF, IF-ELSE, NESTED IF-ELSE, SWITCH-CASE, Repetitive statements: FOR, WHILE, DO-WHILE, Structured programming, break and continue statements, array handling, handling of character strings, some programs practice.

UNIT III  BASIC DATA STRUCTURE
Introduction to linear and non-linear data structures, Arrays and its memory representation, two-dimensional arrays, program on matrices, character of array, introduction to linked list, stack and queues, introduction to trees and graphs.

UNIT III  OPERATIONS OF DATA STRUCTURE
Operations of data structure: traversing, searching, inserting, deleting, linear search, binary search method, arranging the elements in order, sorting: insertion, selection, bubble, merging of two arrays, and creation of linked list.

SUGGESTED BOOKS:
Programming in C by Gotfried B. S. (Schaum’s outline series)
Introduction to C by Yeshwant Kanitakr
Data Structures by Lipschutz S. (Schaum’s outline series)