Department of Geography

Faculty of Natural Sciences

JAMIA MILLIA ISLAMIA

NEW DELHI – 110 025

(A Central University by an Act of Parliament)

Post Graduate Diploma in
Remote Sensing & GIS Applications

Syllabus (w.e.f. 2010-2011)

Post Graduate Diploma in
Remote Sensing and GIS Applications

Semester – I

Paper No.	Title of the Paper/Practical	Credits
I.	Photogrammetry and Cartography	4
II.	Principles of Remote Sensing and Image Interpretation	4
III.	Digital Image Processing-I	4
IV.	Geographical Information Systems and GPS	4
Practicals		
I.	Photogrammetry and Image Interpretation	2
II.	Digital Image Processing	2
III.	Geographical Information System & GPS	2

Semester-II

Paper No.	Title of the Paper/Practical	Credits
V	Thematic Applications of Remote sensing & GIS	4
VI	Urban Area Analysis	4
VII	Digital Image Processing II	4
VIII	Urban Mapping & Planning	4
Practicals		
IV	Remote Sensing and GIS Applications	2
V	Urban Area Interpretation	2
	Project	8

Paper - I (PGDRS-301)

Photogrammetry and Cartography

Credits: 4

Unit I: Aerial Photography

Aerial photography – Definition, scope, advantages and limitations; Flight planning; Elements of photographic system – Aerial camera and aerial films; Types and geometry of aerial photographs; Procurement of aerial photographs in India.

Unit II: Stereophotogrammetry

Stereoscopy and stereoscopic parallax; Photogrammetric stereo plotters and mapping instruments; Control extension and aerial triangulation.

Unit III: Basics of Digital Photogrammetry

Analytical and digital photogrammetry; Photogrammetric mapping and mapping accuracy.

Unit IV: Cartography

Defining cartography; Essentials of map making: Scale, coordinate system, map projection, map generalization and symbolization, map designing, Types and series of maps; Toposheets numbering system.

Books Recommended

1. American Society of photogrammetry, 1984, *Manual of photogrammetry*, Falls Church, Virginia.

2. American Society of photogrammetry, 1993, *Manual of Remote Sensing,* Falls Church, Virginia.

3. American Society of photogrammetry, 1960, *Manual of Photographic* interpretation, Falls Church, Virginia.

4. Avery, T.E. and GL Berlin, 1985, *Interpretation of Aerial Photographs*, Burgess, Minneapolis.

5. Burnside, C.D; 1979, *Mapping froAerialPhotographs*,Granda,London.

6. Ghosh, S.K., 1979, *Analytical Photogrammetry*, Pergamon, New York.

7. Wolf,Paul R; !983, *Elements of Photogrammetry*, McGraw-Hill,New York.

Paper – II (PGDRS-302)

Principles of Remote Sensing & Image Interpretation

Credits: 4

Unit I: Principles of Remote Sensing

Definition, types and scope of remote sensing; Stages in remote sensing data acquisition; Electromagnetic radiation and electromagnetic spectrum; Black body radiation and radiation laws; Interaction of EMR with atmosphere and Earth's surface features.

Unit II: Platforms, Sensors and Data Products

Remote sensing platforms; Types & characteristics of sensors: IRS, LANDSAT, SPOT, IKONOS, Quick Bird; Remote sensing data products.

Unit III: Thermal & Microwave Remote Sensing

Thermal Remote Sensing; Thermal properties of materials: emissivity of materials; thermal inertia of Earth surface features; Thermal data sets: LANDSAT and ASTER; Concept and Principles of microwave remote sensing; Microwave data sets SLAR. LIDAR and SAR; Application of Thermal and Microwave data.

Unit IV: Image Interpretation

Factors affecting image interpretation; Image characteristics and preparation of image interpretation keys; Elements of Image interpretation; Methods and techniques of image interpretation; Multi concepts in image interpretation.

Books Recommended:

1. Curran,Paul J; 1985, Principles of Remote Sensing,Longman,London.
2. Estes, J.E. and LW Senger, 1974, Remote Sensing techniques for environmental Analysis, Hamilton, Santa Barbara, California.
3. Lillesand, Thomas M. and RW Kiefer, 1987, Remote sensing and Image Interpretation, John Wiley & Sons, New York.
4. Lindgren, D.T; 1985, Land use Planning and Remote Sensing, Nijhoff,Dordrecht.
5. Sabins, floyd F,1986, Remote Sensing: Principles and Interpretation, Freeman, New York.
6. Slater,PN,1980,Remote Sensing: Optics and Optical System, Addison-Wesley, Reading .

Paper – III (PGDRS-303)

Digital Image Processing –I
Credits: 4

UNIT-I: Fundamental Terms Definitions and Data Formats

Remote Sensing: definition and types; Resolutions: ground, radiometric, spectral and temporal; Images and digital images: definition and types; Image histogram; Digital data formats: band interleaved by pixel, band interleaved by line, band sequential, run length encoded and others.

UNIT-II: Image Pre-processing

Radiometric Errors: Detector's response, scan line banding, scan line offset, line drop outs, destriping, atmospheric attenuation, Sun's elevation; Geometric Errors: mirror scan velocity, panoramic distortion, scan skew, earth rotation, space craft velocity, attitude, altitude; Image rectification: Number and selection of ground control points (GCPs); Rectification models; Image re-sampling methods.

UNIT-III: Digital Signal Processing (DSP)

Definition, Digital device, Analogue device, Analogue Vs digital, Controller theory, DSP domains: Time and Space, frequency; Applications of DSP; Techniques of DSP: bilinear transform, discrete Fourier transform, Z-transform, linear time invariant (LTI) system theory

UNIT-IV: Image Enhancement (Contrast Manipulation)

Grey level thresholding; Contrast Stretching; Linear contrast stretching; Non-linear contrast stretching : Square root stretch, cube root stretch, log stretch, arc tangent stretch, exponential stretch, square stretch, cube stretch, histogram equalization, Gaussian stretch, piecewise stretch, density slicing and pseudo coloring.

Books Recommended:

1. American Society of Photogrammetry, 1993, Manual of Remote Sensing, Falls Church, Virginia.
2. American Society of Photogrammetry, 1968, Manual of Color Photogrammetry, Falls Church, Virginia.
3. Curran, P. J., 1985, Principles of Remote Sensing, Longman, London
4. Ekstrom,M.P., 1984, Digital Image Processing Techniques, Academic Press, New York.
5. Ghosh, S.K., 1979, Analytical Photogrammetry, Pergamon, New York.
6. Jensen,J.R., 1986, Introductory Digital Image Processing: A Remote Sensing Perspective Printice Hall, Englewood Cliffs, New York.

7. Hord, R.M., 1982, Digital Image Processing of Remotely Sensed Data, Academic Press, New York.
8. Lillesand, T.M. & Kiefer, R.W., 1987, Remote Sensing and Image Interpretation, John Wiley & Sons, New York.
9. Muller, P.J., 1986, Digital Image Processing in Remote Sensing, Taylor & Francis London.
10. Nag, P. & Kudrat, M., 1996, Digital Remote Sensing, Concept Publishing Company, New Delhi.
11. Pratt, W.K., 1978, Digital Image Processing, John Wiley & Sons, New York.
12. Sabins,F., 1986, Remote Sensing: Principles and Interpretation, Freeman, New York.
13. Siegal,B.S. & Gillespie,A.R., 1980, Remote Sensing in Geology, John Wiley & Sons, New York.
14. Slater, P.N., 1980, Remote Sensing: Optics and Optical Systems, Addison Wesley, Addison-Wesley Publishing Co. Inc, Reading, Massetts.
15. http://www.wolfram.com/products/applications/digitalimage/

Paper – IV (PGDRS-304)

Geographical Information Systems and Global Positioning System

Credits: 4

Unit I: Introduction to GIS

Definition and scope of GIS; Functional requirements of GIS: GIS components; Cartography –GIS interface; Recent trends and applications of GIS; Open source GIS

Unit II: GIS Data base

Geographic data: Spatial and non spatial; Data models: Raster and vector; Database Management System (DBMS); Data Structures: Relational, hierarchical and network; Data input: Digitization of maps and imageries; Coordinate transformation; Attribute data generation.

Unit III: Spatial analysis

Spatial overlay operations, network analysis and proximity analysis; 3D models; TIN, DEM, DTM Query in GIS;

Unit IV: Global Positioning System

Introduction to Global Positioning System; GPS satellites constellations; GPS segments: Space, Control, User; GPS antennas, signals and codes; GPS receivers; Modes of measurements and post processing of data; Accuracy of GPS measurements; Application of GPS.

Books Recommended

1. Burrough, P.A., 1986, *Geographical Information System for land Resources System*, Oxford Univ. Press, UK.
2. Fotheringham, S.; Rogerson, P. (ed.), 1994. Spatial analysis and GIS. Taylor and Francis, London, UK.
3. Laurini, Robert and Dierk Thompson, 1992, Fundamentals of Spatial Information Systems, Academics Press, ISBN 0-12-438380-7.
4. Maguire,D.J.; Goodchild, M.F.; Rhind,D.W. 1991.Geographical information System, Longman, London,UK
5. Siddiqui, M.A.; 2006, Introduction to Geographical Information System, Sharda Pustak Bhavan, Allahabad.
6. Siddiqui, M.A.; 2011, Concepts and Techniques of Geoinformatics, Sharda Pustak Bhavan, Allahabad.

Practical – I (PGDRS-305)

Photogrammetry and Image Interpretation

Credits: 2

Unit I: Aerial Photography

Introduction to aerial photographs; Numerical problems on the aerial photographs: Determination of photo scale; determination of number of Strips and total number of aerial photographs; Preparation of photo index.

Unit II: Photogrammetry

Stereo test; Orientation of stereopair under mirror stereoscope; Use of parallax bar and the determination of heights and slopes; Preparation of base map.

Unit III: Interpretation of Aerial Photographs

Detection of defined objects; Use of auxillary information in object identification; Preparation of image interpretation keys; Interpretation of stereopair for physical and cultural features; Preparation of land use/land cover classification system based on aerial photographs; Interpretation, delineation, and mapping of general land use.

Unit IV: Interpretation of Satellite Imageries

Referencing and lay out of satellite images; Identification of objects/features on multi-band imageries and FCC; Interpretation of physical and cultural features from IRS imagery; Preparation of image interpretation keys using FCC; Interpretation, delineation and mapping of land use/land cover using FCCs.

Books Recommended:

1. American Society of Photogrammetry, 1993, Manual of Remote Sensing, falls Church, Virginia
2. Curran, Paul J., 1995, Principles of Remote Sensing, Longman, London
3. Joseph George (2003) Fundamentals of Remote Sensing, University Press, Hyderabad.
4. Lillesand T.M and Keifer R.W. (2000) Remote Sensing and Image Interpretation, IVth Eds. John Wiley and Sons, New York.
5. Lo C.P. & Yeung A.K.W., (2004). Concepts and Techniques of GIS, Prentice-Hall of India, New Delhi.
6. J. R. Jenson (2000) Remote Sensing of Environment, Pearson Education, New Delhi
7. Muller, P.J., 1996, Digital Image Processing in Remote Sensing, Taylor & Francis, London.

8. Nag, P. & Kudrat, M., 1996, Digital Remote Sensing, Concept Publishing Company, New Delhi.

9. Rashid, S.M. and MMA Khan, 1993, Dictionary of Remote Sensing, Manak Publication Pvt. Ltd, New Delhi

10. Sabins,F.F.(2002), Remote Sensing: Principles and Interpretation, Freeman, New York

11. Sabins, Floyd F, 1996, Remote Sensing: Principles and Interpretation, Freeman, New York

12. Wolf, Paul R., 1993, Elements of Photogrammetry, McGraw - Hill, New York.

Practical – II (PGDRS-306)

Digital Image Processing

Credits: 2

Unit I:Introduction to Image Processing

System Configuration; User interface with DIP software; Loading of digital data into DIP software; Conversion of digital data into image processing software format; Analysis of statistics, projection and datum for newly loaded data.

UNIT II: Data Processing, Image Restoration and Enhancement

Digital images; Subsetting of data; referencing of digital data; Reprojection of digital data; Image enhancement techniques: Histogram equalization; Band ratioing; Image filtering; Principal Component Analysis (PCA).

UNIT III: Pattern Recognition and Image Classification

Image classification: Unsupervised classification; Training sets and supervised classification using Maximum likelihood and Minimum to Mean distance methods; Accuracy assessment: User, Producer, Overall accuracies; K-Statistics.

UNIT IV: Programming for Image Processing

Programming on C++; Java and Oracle.

Books Recommended

1. Ekstrom, M.P., 1994, Digital Image Processing Techniques, Academic Press, New York.
2. Hord, R.M., 1992, Digital Image Processing of Remotely Sensed Data, Academic Press, New York
3. Jensen,J.R., 1996, Introductory Digital Image Processing: A Remote Sensing Perspective, Printice Hall, Englewood Cliffs, New York.
4. Lillesand T.M and Keifer R.W. (2000) Remote Sensing and Image Interpretation, IVth Eds. John Wiley and Sons, New York.
5. Muller, P.J., 1996, Digital Image Processing in Remote Sensing, Taylor & Francis, London.
6. Nag, P. & Kudrat, M., 1996, Digital Remote Sensing, Concept Publishing Company, New Delhi.
7. NRSA, 1995. IRS - IC, Data User Handbook, Hyderabad.
8. Sabins,F.F.(2002), *Remote Sensing: Principles and Interpretation*, Freeman, New York
9. Wolf, Paul R., 1993, Elements of Photogrammetry, McGraw - Hill, New York.

Practical – III (PGDRS-307)

Geographical Information Systems and Global Positioning System

Credits: 2

Unit -I: Introduction to Computers & GIS

Introduction to computers, Basics of operating system: DOS and Windows; Hardware and software requirements of GIS; Graphical user interface of Arc-View and Geo-Media and Arc GIS.

Unit - II: Data Base Creation

Spatial data input and Geo-referencing; Spatial data base creation; Creation of non-spatial data sets into DBF format; Linking of Spatial data with non-Spatial data sets

Unit-III: Spatial Analysis

GIS analysis: Proximity, Thematic mapping and Over lay; 3D modeling: DEM, Slope and Aspect Overlay, buffer and proximity analysis; Output and report generation;

Unit IV: Global Positioning System

Demonstration on GPS; Selection of datum, units and scale; GPS measurement: Collection of GCPs; Mobile mapping; Transfer of GPS data in to GIS software.

Books Recommended

1. Bernhardsen (2003) Geographic Information Systems: An Introduction, 3ed, Wiley India Pvt. Ltd., New Delhi.
2. Demers (2004) *Fundamentals of Geographic Information Systems*, 3ed, Wiley India Pvt. Ltd., New Delhi.
3. Joseph George (2003) Fundamentals of Remote Sensing, University Press. Hyderabad
4. Lillesand T.M and Keifer R.W. (2000) Remote Sensing and Image Interpretation, IVth Eds. John Wiley and Sons, New York.
5. Lo C.P. & Yeung A.K.W., (2004). Concepts and Techniques of GIS, Prentice-Hall of India, New Delhi
6. LO & YEUNG (2009) Concepts and Techniques of Geographic Information Systems, 2nd ed., PHI Learning Pvt. Ltd, New Delhi.
7. Laurini, Robert and Direk Thompson, 1992, Fundamentals of Spatial Information Systems, Academic Press.
8. Maguire, D.J.; Goodchild, M.F.; Rhind, D.W. 1991. Geographical Information

Systems, Longman, London, UK.

9. N.K.Agarwal (2004), *Essentials of GPS*, Spatial Network Pvt. Ltd.

Paper – V (PGDRS-308)

Thematic Applications of Remote Sensing and GIS

Credits: 4

Unit I: Remote Sensing Applications in Human Settlement and Urban Analysis

Remote sensing and GIS in urban and regional planning; Application of remote sensing and GIS in facilities mapping; Land transformation and urban sprawl; Solid waste management using remote sensing and GIS; Urban Information System.

Unit II: Remote Sensing Application in Geosciences

Elements of interpretation; Principles of geomorphologic analysis; Genetic landforms and their identification; Applied geomorphology; Identification and mapping of various rock types and structural elements; Applied aspects of geological mapping.

Unit III: Remote Sensing Application in Agriculture and Soil

Importance of remote sensing in agriculture; Principles and approaches of crop inventory and crop production forecasting; Soil classification as per soil taxonomy; Kind of soil survey; Physiographic - soil relationship: Approaches and methods of mapping; Watershed characterization; Prioritization of watershed based on SYI model; Principles of land evaluation.

Unit IV: Remote Sensing Applications in Hydrology & Water Resources Management

Hydrological cycle - Types of precipitation and the analysis of precipitation data; Thiessen polygon method of estimating average rainfall using GIS; Evapotranspiration; Runoff estimation using modified SCS method; Methods of estimating evapotranspiration and soil moisture; Water balance computation using Thornthwait and Mather model; Role of remote sensing and GIS in watershed management.

Books Recommended :

1. Lillesand T.M and Keifer R.W. (2000) Remote Sensing and Image Interpretation, IVth Eds. John Wiley and Sons, New York.

2. Sokhi,B.S. and SM Rashid, 1999, Remote Sensing of Urban Environment, Manak Publishers, New Delhi.

3. Siegal, B.S. and AR Gillespie, 1980, Remote Sensing in Geology, Wiley, New York.

4. Way,D; 1978, Terrain Analysis: A Guide to Site Selection using Aerial Photointerpretation,Dowden, Hutchinson & Ross, Stroudsburg

Paper – VI (PGDRS-309)

Urban Area Analysis

Credit: 4

Unit I: Urban Area Interpretation

Urban land use/ land cover classification system; Residential area classification; Principle and unit of sub-divisions; Urban sprawl; Residential environment; Growth of slums and squatter settlements; Suitability analysis for urban development.

Unit II: Aerial Photo and Census Mapping

Census operation in India; Principles of population estimation using remote sensing; Inter - census population estimation and updating of population data.

Unit III: Urban Utility and Services Mapping

Traffic and parking surveys; Traffic volume; Role of remote sensing in transport planning; Utility mapping.

Unit IV: Urban Hazard and Risk Management

Types and mapping of urban hazards; Land use planning and risk assessment; Remote sensing and GIS applications in urban hazard mapping and micro - zonation.

Books Recommended:

1. Bernhardsen (2003) Geographic Information Systems: An Introduction, 3ed, Wiley India Pvt. Ltd., New Delhi.
2. Demers (2004) Fundamentals of Geographic Information Systems, 3ed, Wiley India Pvt. Ltd., New Delhi.
3. Estes, J. E. and LW Senger, 1994, Remote Sensing Techniques for Environmental Analysis, Hamilton, Santa Barbara, California
4. Joseph George (2003) Fundamentals of Remote Sensing, University Press. Hyderabad
5. Laurini, Robert and Direk Thompson, 1992, Fundamental of Spatial Information Systems, Academic Press.
6. Lo, C.P.and Yeung AKW. (2004),Concepts and Techniques of GIS, Prentice - Hall of India, New Delhi.
7. LO & YEUNG (2009) Concepts and Techniques of Geographic Information Systems, 2nd ed., PHI Learning Pvt. Ltd, New Delhi.
8. Lo, C.P.and Yeung AKW. (2004)*Concepts and Techniques of GIS*, Prentice – Hall of India, New Delhi.

9. Sokhi, B.S. and SM Rashid, 1999, Remote Sensing of Urban Environment, Manak Publishers, New Delhi
10. Maguire, D.J.; Goodchild, M.F.; Rhind, D.W. 1991.
11. Geographical Information Systems, Longman, London UK.
12. NRSA, 1995. IRS - IC Data User Handbook, Hyderabad.
13. N.K.Agarwal (2004), Essentials of GPS, Spatial Network Pvt. Ltd.

Paper – VII (PGDRS-310)

Digital Image Processing II

Credit: 4

UNIT-I: Image Enhancement (Spatial Feature Manipulation)

Spatial domain and frequency domain filtering; High pass and low pass filters; Band pass filters; Gradient filters; Mean filters, Median filter, Mode filter, Linear edge enhancement filter: Laplacian filter; Non linear edge enhancement filter: Roberts filter, Sobel's filter.

UNIT-II: Image Enhancement (Multi Image Manipulation)

Multi Image Manipulation: Band rationing, Principal and cannonical transformations; Vegetation Indices: Perpendicular vegetation index, Simple vegetation index, Ratioed vegetation index, normalized differential vegetation index, Soil adjusted vegetation index, Intensity hue saturation (IHS) transform.

UNIT-III: Image Classification

Image classification schemes, Thematic information extraction, Spatial pattern recognition, Image classification types: Supervised, unsupervised; Training site selection and analysis: graphical, quantitative and self classification of training data; Supervised image classifiers : Minimum distance to mean classifier, Parallelepipied classifier, Gaussian maximum likelihood classifier, Unsupervised image classifiers: Histogram based classification, Sequential clustering, Isodata clustering; Fuzzy classification, Neural network classification.

UNIT-IV: Statistics Generation and Classification Accuracy Assessment

Definition and necessity; Classification Accuracies: Producer accuracy, User accuracy, overall accuracy and K statistics, Thematic accuracy, Locational accuracy, Accuracy test.

Books Recommended:

1. American Society of Photogrammetry, 1993, Manual of Remote Sensing, Falls Church, Virginia.
2. American Society of Photogrammetry, 1968, Manual of Color Photogrammetry, Falls Church, Virginia.
3. Curran, P. J., 1985, Principles of Remote Sensing, Longman, London.
4. Ekstrom,M.P., 1984, Digital Image Processing Techniques, Academic Press, New York.
5. Ghosh, S.K., 1979, Analytical Photogrammetry, Pergamon, New York.
6. Jensen,J.R., 1986, Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall, Englewood Cliffs, New York.
7. Hord, R.M., 1982, Digital Image Processing of Remotely Sensed Data, Academi Press, New York.

8. Lillesand, T.M. & Kiefer, R.W., 1987, Remote Sensing and Image Interpretation John Wiley & Sons, New York.
9. Muller, P.J., 1986, Digital Image Processing in Remote Sensing, Taylor & Francis, London.
10. Nag, P. & Kudrat, M., 1996, Digital Remote Sensing, Concept Publishing Company, New Delhi.
11. Pratt, W.K., 1978, Digital Image Processing, John Wiley & Sons, New York.
12. Sabins,F., 1986, Remote Sensing: Principles and Interpretation, Freeman, New York.
13. Siegal,B.S. & Gillespie,A.R., 1980, Remote Sensing in Geology, John Wiley & Sons, New York.
14. Slater, P.N., 1980, Remote Sensing: Optics and Optical Systems, Addison Wesley, Addison-Wesley Publishing Co. Inc, Reading, Mass.
15. http://www.wolfram.com/products/applications/digitalimage/

Paper – VIII (PGDRS-311)

Urban Mapping and Planning

Credit: 4

Unit I: Land Use Planning and Space Use

Issues in land use planning and land use policy in India; Land use/land cover classification system; Land use change detection and monitoring; Mapping of urban sprawl; Space use classification system; NIROV system of classification of space use; Making of inventories.

Unit II: Preparation of Photomap for Base Mapping and Cadastral Mapping

Characteristics and scale of base maps, Role of base maps in regional/district planning; Preparation of Photomap, Orthophotomap; Cadastral mapping.

Unit III: Aspects of Physical Planning

Town planning in the developing countries with special reference to India; Norms in town planning; Location and distribution of facilities; Urban services and utility planning; Urban housing; Planning for urban extension.

Unit IV: Urban and Regional Planning

Remote sensing data products; Availability of remote sensing data products in India; Applications of various remotely sensed data products in urban and regional studies; Multi - concepts and their applications in urban and regional studies - Multi - date, multi-stage, multi-sensor, multi-resolution.

Books Recommended :

1. Bernhardsen (2003) Geographic Information Systems: An Introduction, 3ed, Wiley India Pvt. Ltd., New Delhi.
2. Demers (2004) Fundamentals of Geographic Information Systems, 3ed, Wiley India Pvt. Ltd., New Delhi.
3. Estes, J. E. and LW Senger, 1994, Remote Sensing Techniques for Environmental Analysis, Hamilton, Santa Barbara, California
4. Elangovan,K (2006)"GIS: Fundamentals, Applications and Implementations", New India Publishing Agency, New Delhi"208pp.
5. Joseph George (2003 Fundamentals of Remote Sensing, University Press. Hyderabad
6. Lo, C.P.and Yeung AKW. (2004) Concepts and Techniques of GIS, Prentice - Hall of India, New Delhi.

7. LO & YEUNG (2009) Concepts and Techniques of Geographic Information Systems, 2nd ed., PHI Learning Pvt. Ltd, New Delhi.
8. NRSA, 1995. IRS - IC, Data User Handbook, Hyderabad.
9. Sokhi, B.S. and SM Rashid, 1999, Remote Sensing of Urban Environment, Manak Publishers, New Delhi

Practical – IV (PGDRS-312)

Remote Sensing and GIS Applications

Credits: 2

Unit I: Land use/ Land Cover Mapping

Land use/Land cover classification system; Multi – level classification; Land use/land cover mapping using vertical aerial photographs and satellite imageries.

Unit II: Urban Land Use Mapping

Urban land use classification system; Urban land use mapping and change detection; Interpretation of residential land use and the measurement of net residential areas; Urban population estimation.

Unit III: Geomorphic Mapping

Physiographic analysis; Photo/image sample study for understanding basic elements of interpretation in terrain evaluation; Remote sensing data in identification, delineation and mapping of various landforms and their significance; Identification and delineation of different rock types and geologic structures.

Unit IV: Agricultural Crop Inventory and Mapping

Spectral characteristics of crops using Spectroradiometer; Land use/land cover mapping using visual interpretation methods; Agricultural land use mapping using digital techniques; Crop identification and crop acreage estimation; Creation of spatial and non – spatial data for land use change detection and crop inventory analysis.

Books Recommended :

1. American Society of Photogrammetry, 1993, Manual of Remote Sensing falls Church, Virginia.
2. Bernhardsen (2003) *Geographic Information Systems: An Introduction*, 3ed, Wiley India Pvt. Ltd., New Delhi.
3. Curran, Paul J., 1995, Principles of Remote Sensing, Longman, London
4. Demers (2004) *Fundamentals of Geographic Information Systems*, 3ed, Wiley India Pvt. Ltd., New Delhi.
5. Fotheringham, S.; Rogerson, P. (ed.). 1994. Spatial analysis and GIS. Taylor and Francis, London, UK.
6. J. R. Jenson (2000) Remote Sensing of Environment, Pearson Education, New Delhi.
7. Joseph George (2003), Fundamentals of Remote Sensing, University Press,

Hyderabad.

8. Lillesand T.M and Keifer R.W. (2000) Remote Sensing and Image Interpretation, IVth Eds. John Wiley and Sons, New York.
9. Lo, C.P.and Yeung AKW.(2004) *Concepts and Techniques of GIS*, Prentice Hall of India, New Delhi.

10. NRSA, 1995. IRS - IC, Data User Handbook, Hyderabad.
11. Rashid, S.M. and MMA Khan, 1993, Dictionary of Remote Sensing, Manak Pub. Pvt. Ltd, New Delhi.
12. Sabins, Floyd F, 1996, Remote Sensing : Principles and Interpretation, Freeman, New York.
13. Sabins,F.F.(2002), *Remote Sensing: Principles and Interpretation*, Freeman, New York

14. NRSA, 1995. IRS - IC, Data User Handbook, Hyderabad.

Practical – V (PGDRS-313)

Urban Area Interpretation

Credit: 2

Unit I: Urban Land Use Mapping

Urban area classification; Monitoring of Urban Plan and change detection; Urban land use/land cover classification and mapping; Urban mapping, zonation and field verifications.

Unit II: Urban Growth Monitoring

Detection and identification urban objects on aerial photographs at different scales; Urban area interpretation and analysis using multi - scale imageries; Urban growth monitoring.

Unit III: Residential Area Interpretation and Population estimation

Residential area interpretation using vertical aerial photographs and satellite imageries; Urban population estimation.

Unit IV: Urban Issues and Hazards

Monitoring of urban environment; Urban facility mapping; Traffic survey; Solid waste management.

Books Recommended:

1. Bernhardsen (2003) Geographic Information Systems: An Introduction, 3ed, Wiley India Pvt. Ltd., New Delhi.
2. Demers (2004) Fundamentals of Geographic Information Systems, 3ed, Wiley India Pvt. Ltd., New Delhi.
3. Elangovan,K (2006)"GIS: Fundamentals, Applications and Implementations", New India Publishing Agency, New Delhi"208pp.
4. Fotheringham, S.; Rogerson, P. (ed.). 1994. Spatial analysis and GIS. Taylor and Francis, London, UK.
5. Laurini, Robert and Direk Thompson, 1992, Fundamentals of Spatial Information Systems, Academic Press.
6. Joseph George (2003) Fundamentals of Remote Sensing, University Press Hyderabad.
7. Lo, C.P.and Yeung AKW. (2004), Concepts and Techniques of GIS, Prentice - Hall of India, New Delhi.
8. LO & YEUNG (2009) Concepts and Techniques of Geographic Information Systems, 2nd ed., PHI Learning Pvt. Ltd, New Delhi.

9. Maguire, D.J.; Goodchild, M.F.; Rhind, D.W. 1991. Geographical Information Systems, Longman, London, UK.
10. N.K. Agarwal (2004), Essentials of GPS, Spatial Network Pvt. Ltd.
11. NRSA, 1995. IRS - IC, Data User Handbook, Hyderabad.
12. Sokhi, B.S. and SM Rashid, 1999, Remote Sensing of Urban Environment, Manak Publishers, New Delhi.

Project

Credit: 8