Courses of Studies
P. G. Dip. in Remote Sensing and Geographic Information System
Theory Papers : 4nos Practical and Dissertation: 1nos

Course No.		Marks
Paper- I	Fundamentals and Basic principles of Remote Sensing **Objectives:** In this unit, the basic knowledge and fundamentals of remote sensing has been introduced to the students. **Expected outcome:** The students shall be in a position to know about the different components of remote sensing and their individual contribution to this science.	100
Paper- II	Aerial photography and Satellite Remote Sensing **Objectives:** The students are introduced with the concept of types of aerial photographs and satellite imagery. **Expected outcome**: The students shall know the art of taking photographs from aerial platforms as well as from the satellites and shall be in a position to interpret them properly.	100
Paper- III	Digital Image Processing **Objectives:** The students are introduced with the concept of digital images and of various techniques of processing them to draw information according to the need of the user. **Expected outcome**:The students will be in a position to process digital images which can be performed in several ways for the extraction of very useful information.	100
Paper- IV	Geographic Information System **Objectives:**The students are introduced with the concept of spatial and non-spatial data and of the way they are collected , stored and analysed in a system software to draw a variety of space-related issues. **Expected outcome**: The spatial and descriptive data can be stored in a GIS software and can be processed and analysed to solve many space related problems.	100
Paper- V	Practical and dissertation	100

Details of the course

Paper - I

	Fundamentals and Basic principles of Remote Sensing
Unit- IA:	History of Remote Sensing, Benefits of Remote Sensing over conventional methods of resource survey, Uses of Remote Sensing.
Unit-IB:	Nature of Remote Sensing; Components of Remote Sensing System: Terrestrial System, Aerial System, Spatial System
Unit- IIA:	Electro-magnetic Radiation (EMR)- The nature of radiation; Radiation at source; Radiation in propagation; Radiations at its target; Radiation from sun; Radiation from the earth.
Unit- IIB:	Properties of EMR; Atmospheric windows; Perturbing effects of the atmosphere.
Unit- IIIA:	EMR properties; Reflection, Emission, Absorption, Transmission, Scattering

Unit-IIIB:	Characteristics of objects; Interaction of EMR with rocks, minerals, vegetation, water, urban areas, soil etc.
Unit-IVA:	Platforms: Role of Platform in Remote Sensing; Manned Earth Resource Satellite; Unmanned Earth Resource Satellite, Meteorological Satellite.
Unit-IVB	Types of platforms; Ground borne Platforms- Cherry arm configuration; Airborne Platforms- balloons, aircrafts; Space borne Platforms- satellites.
Unit-VA:	Fundamental properties of sensors; types of sensors- Passive and active sensors; Optical scanner, thermal scanner; Multispectral scanner.
Unit- VB:	Basic features of different types of sensors in use

Books Recommended

1. Lillesand M. Thomas and Ralph W. Kiefer, (2007) Remote Sensing and Image Interpretation, 6th revised edition, John Wiley & Sons, New York, page no. 1-768.
2. Jensen R. John (2013) Remote Sensing of the Environment, 2nd edition An Earth Resource Perspective, Pearson India Pvt. Ltd., Delhi, page no: 1-618.
3. M. Anji Reddy (2004) Geoinformatics for Environmental Management, B.S Publications, Hyderabad,
4. Sharma V.K. (1991) Remote Sensing for Land Resources Planning, Concept Publishing Company, New Delhi, page no. 1- 456
5. LO, C. P., and Albert K. W. Yeung, (2006) Concepts and Techniques of Geographic Information Systems, 2nd edition, Prentice-Hall of India, New Delhi, page no: 1-544.
6. Peter A. Burrough and Rachael A. Mc. Donnell, (2015) Principles of Geographical Information System, Oxford University Press Inc., New York, page no: 1-352.

Paper - 2

Paper- 2	**Aerial photography and Satellite Remote Sensing**
Unit- IA:	Fundamentals of aerial photography; Acquisition of photographs- Terrestrial System and Aerial System
Unit-IB:	Uses of aerial photographs in different fields of science (geology, geography, forestry, natural hazard assessment) and for the earth features.
Unit- IIA:	Aerial photography- photographic instruments; photographic configuration; types of photography.
Unit- IIB:	Types of aerial photographs; B&W panchromatic photographs, Coloured photographs, False coloured infrared photographs, Ultraviolet photographs, Multiband photographs. photographs
Unit- IIIA:	Characteristic features of aerial photographs
Unit- IIIB:	Geometric characteristic of aerial photographs- scale, overlap, sidelap, vertical exaggeration, and geometric resolution.
Unit- IVA:	Photo features- Form, shape, texture, tone, contrast, colour, drainage pattern, structure, relief displacement.
Unit- IVB	Stereoscopic perception, conditions for stereoscopic vision.
Unit- VA:	Remote Sensing data acquisition system; Sensors in the visible wave length; Sensors outside the visible wave length; Active and passive sensors; Optical-mechanical sensors.
Unit- VB:	Remote Sensing data products; Satellite mageries, FCC, CCT etc. Role of manual data analysis and interpretation, Methods of data interpretation.

Books Recommended

1. . A. E. Allum (1966) Photogeology and Regional Mapping, Elsevier, 3rd Edition, page no. 1-124
2. J. A. E. Allum (1966) Photogeology and Regional Mapping, Pergamon; 1st Edition, page no. 1-214.
3. A. J. Eardley (1941) Aerial Photographs: Their Use and Interpretation, Harper, page no. 1-154.
4. Hart C A (1948) Air Photography Applied To Surveying, Longmans Green and Co; 2nd Edition, pp. 1-215
5. Rampal, K.K. (1999): Handbook of aerial photography and interpretation. Concept Publishing Co., New Delhi. page no:1-232.

Paper - 3

	Digital Image Processing
Unit- IA:	Image processing system characteristics, C. P. U., Arithmetic coprocessor, RAM
Unit-IB:	Operating system and compiler. Operating system and compiler.
Unit- IIA:	Basic features of digital images, Image display system- Black and white image interpretation and display.
Unit- IIB:	Video image display. Transforming video displays to hard copy displays. Verification.
Unit- IIIA:	Data input, verification, correction and storage, data quality and errors.
Unit- IIIB:	Image analysis and pattern recognisation, Image enhancement- reduction and magnification, contrast enhancement
Unit- IVA:	Rationing, spatial filtering, Edge enhancement.
Unit- IVB	Special transformations, Thematic information extraction,
Unit- VA:	Classification scheme, supervised classification, training site selection, Statistics extraction, Classification algorithm.
Unit- VB:	Unsupervised classification, Cluster building, assignment of pixels to one of the clusters using minmum distance classification logic.

Books Recommended

1. Lillesand M. Thomas and Ralph W. Kiefer, (2007) Remote Sensing and Image Interpretation, 6th revised edition, John Wiley & Sons, New York, page no. 1-768.
2. Jensen R. John (2013) Remote Sensing of the Environment, 2nd edition An Earth Resource Perspective, Pearson India Pvt. Ltd., Delhi, page no: 1-618.
3. M. Anji Reddy (2004) Geoinformatics for Environmental Management, B.S Publications, Hyderabad,
4. Sharma V.K. (1991) Remote Sensing for Land Resources Planning, Concept Publishing Company, New Delhi, page no. 1- 456
5. LO. C.P., and Albert K. W. Yeung, (2006) Concepts and Techniques of Geographic Information Systems, 2nd edition, Prentice-Hall of India, New Delhi, page no: 1-544.

6. Peter A. Burrough and Rachael A. Mc. Donnell, (2015) Principles of Geographical Information System, Oxford University Press Inc., New York, page no: 1-352.

Paper - 4

Paper- IV	**Geographic Information System**
Unit- IA:	Components of Geographic information system (GIS). GIS softwares module; Organisational aspects of GIS; Future trends in GIS.
Unit-IB:	Definition of map; map and spatial information; Computer assisted mapping and map analysis.
Unit- IIA:	Data organization in computer; Files and data excess; Data structure of GIS; Points, lines and area; Geographical data in computer; Perceived structures and computer representation of geographical data.
Unit- IIB:	Raster data system, Vector data structure for thematic maps, Choice of vector or raster data; Advantages and disadvantages of vector methods.
Unit- IIIA:	Data encoding; Data base structure; computer representation of data.
Unit- IIIB:	Data manipulation; the need of numerical data manipulation; Operational, automatic decision, / classification techniques.
Unit- IVA:	Definition of database; data analysis; -simple data retrieval.
Unit- IVB	Spatial modeling-cartographic modeling, map overlay.
Unit- VA:	Data quality, Errors- Errors resulting from rasterizing a vector map; errors associated with digitizing a map or with geocoding; errors associated with overlaying two or more polygon network.
Unit- VB:	Data interpretation and application for- Forest resource inventory, landuse-landcover study; crop estimation; Draught monitoring; soil and salinity mapping; geological study; geomorphological study; environment management; oceanographic studies; natural hazard management.

Books Recommended

1. Bloom, A.L. (2004) Geomorphology - A systematic analysis of Late Cenozoic landforms. Waveland Pr Inc; 3 edition, page no:1-482.
2. Chorley, R.J., Schumm, S.A. and Sugden, D.E. (1985) Geomorphology. Methuen.
3. Kale, V.S. and Gupta, A. (2000) Introduction to geomorphology. Orient BlackSwan,page no:. 1-280
4. Thorn, C.E. (1988) Introduction to theoretical geomorphology. Kluwer Academic Publishers, page no:1-288.
5. Thornbury, W.D. (2004) Principles of geomorphology. CBS; 2 edition,page no:1-213.
6. Drury, S.A. (2004) Image interpretation in geology. Routledge; 1 edition, page no:1-304.

Paper- V	**Practical and dissertation**
	Study of Aerial photographs, B & W satellite imageries and FCC; Mosaic and planimetric map preparation; Ground truthing. Dissertation on aerial photograph/ satellite imagery based study.