Syllabus

M. Sc. Course in Remote Sensing & Geographic Information System

REVISED IN 2024: TO BE EFFECTIVE FROM THE ACADEMIC SESSION 2024-2025

P.G. DEPARTMENT OF RS &GIS
MAHARAJA SRIRAM CHANDRA BHANJA DEO UNIVERSITY
Takatpur, Baripada, Mayurbhanj, Odisha
PIN – 757003

M.Sc. (RS & GIS) EXAMINATION
(Choice Based Credit System)
(Semester Pattern)

1. The course is of two years duration comprising of four semesters of theory, software and field works.
2. There are two supportive papers one in semester-II (RS-402) and other in semester-III (RS-501). These are open for the students of other departments.

3.Each student has to carry out project work from Semester-III and submit a dissertation before the commencement of Semester-IV theory examination.

4. The student can opt one elective course comprising of two papers in the 2nd year of PG programme.

5. The examination system for each theory paper consists of one IAE of 20 marks and one semester exam of 80 marks. The IAE shall be one hour duration and shall cover at least two units. The semester examination shall be 3 hour duration and the question paper shall be of unit pattern with two alternatives from each unit having equal weight. However, in practical paper semester examination shall be 100 marks and of 6 hours duration.

6. A candidate must secure at least 40% marks in practical and 30% marks in individual theory paper to pass the semester examination.

7. A student securing cumulative Grade Point Average (CGPA) 5.5 shall be declared as pass in the Post-Graduation Examination.

8. Formula for conversion of CGPA to Percentage is:

9. (CGPA – 0.75) ×10 = Percentage of mark

10. Example: {7.85 (CGPA) – 0.75} ×10 = 7.10 × 10= 71.0 %

11. Candidate securing at least 6.75 CGPA (minimum 60% marks in aggregate) shall be declared as First Class..

12.If the candidate passes all the four semester examinations he/she will be declared to have passed the M.Sc. examination in Remote Sensing & GIS. Further, under no circumstance a candidate shall be allowed to appear any Semester Examination after completion of the twice the duration of the course.

13. The student has to secure at least 75% of attendance to be eligible to appear at the University examination.

Programme Outcome:

• The students will acquire advanced conceptual knowledge and comprehensive understanding of the fundamental principles in Remote sensing, Geographical Information System (GIS), Global Positioning System (GPS), Digital Image processing (DIP), Geo-Science and their different filed applications

• They will be prepared to take up challenges as globally competitive Geo Scientists/researchers in diverse areas of theoretical as well as experimental GIS.

• They will be equipped with enough technical and analytical skilled to pursue their further studies and develop continuous learning through their professional career.

• They will be trained to appear national level tests like UGC-CSIR NET, GATE, etc., successfully.

• They will acquire the sense of academic and social ethics.

1st Semester

Code	Title	Credit	Marks				Total
			Internal			Semester	
			Internal	Quiz	Sem/Asses		
RS-101	**F**undamental of Optical Thermal & Microwave Remote Sensing	05	20	10	10	60	100
RS-102	Remote Sensing – II	05	20	10	10	60	100
RS-103	Application Of Remote Sensing	05	20	10	10	60	100
RS-104	Cartography	05	20	10	10	60	100
RS-105	Practical On Photogrammetry & Image Interpretation		30			70	100
RS-106	The Indian Knowledge System	02	10	05	05	30	50
	Life Skill						
	Total	**28**					**550**

2nd Semester

Code	Title	Credit	Marks				Total
			Internal			Semester	
			Internal	Quiz	Sem/Ass		
RS-201	Aerial Photography & Photogrammetry	05	20	10	10	60	100
RS-202	IT In RS&GIS	05	20	10	10	60	100
RS-203	Digital Image Processing (DIP)	05	20	10	10	60	100
RS-204	Earth System Science	05	20	10	10	60	100
RS-205	Practical On DIP (P.P) + Field Tour	06	30			70	100
OE-RS-206	Basic Of Remote Sensing &Geographical Information system	05	20	10	10	60	100
	Total	**31**				**380**	**600**

3rd Semester

Code	Title	Credit	Marks				Total
			Internal			Semester	
			Internal	Quiz	Sem/Ass		
RS-301	Research & Methodology	05	20	10	10	60	100
RS-302	SWYAM MOOC Course	04					100
RS-303	Geographical Information System	05	20	10	10	60	100
RS-304	Advanced GIS – 1	05	20	10	10	60	100
RS-305	Practical on Geographic Information System (I)	06	30			70	100
RS-306	Practical On Geographic Information System-II	06	30			70.	100
	Total	**31**				**400**	**600**

4th Semester

Code	Title	Credit	Marks		Total
			Internal	Semester	
RS-401	Dissertation	06		200	200
RS-402	Practical on Geo Informatics	05	30	70	100
	Total	**11**		**300**	**300**
	GRAND TOTAL	**101**			**2050**

SEMESTER - I

Fundamental of Optical Thermal & Microwave Remote Sensing

(Assignment/Seminar-10, Quiz-10, Mid Sem-20, Theory Exam-60)

(Paper code-RS-101) **Marks-100**

OBJECTIVES: This Chapter is designed to fulfil the following objectives

1. To provide exposure to students in gaining knowledge on concepts and applications leading to modelling of earth resources management using Remote Sensing
2. To acquire skills in storing, managing digital data for planning and development.
3. To acquire skills in advance techniques such as Optical, Thermal & Microwave Remote Sensing for mapping, modelling and monitoring.

Unit-I (Fundamental of Remote sensing)

Definition and Overview of Remote Sensing, History and Evolution of Remote Sensing , Remote Sensing Systems. Remote sensing Art or Science process Concept and Scope of Remote Sensing: Process and Characteristics of Remote Sensing System, Advantages and limitations. Remote Sensing Scenario in Indian Context

Unit-II (Platform & Sensor)

Wavelength-frequency-energy relationship of EMR, EMR Spectrum and its properties, EMR wavelength regions and their applications, Energy: Sources of energy, Energy radiation principle, Fundamental laws governing the science: Sources of Energy, Radiation laws: StefanBoltzman law, Wien's law, Kirchhoff's law etc., Black body and Real body, Radiant temperature & Kinetic temperature

Unit-III (Process of Remote Sensing)

Energy interaction in the atmosphere , Atmospheric windows, Energy interactions with earth surface feature, Spectral signatures. Recording energy by sensor transmission, Reception processing, Interpretation & Analysis.

Energy Interaction in the atmosphere: Scattering, absorption, transmission, atmospheric windows , Energy Interactions with Earth Surface Features: Spectral Reflectance Curve, Concept of signatures Recording energy by sensor, transmission, Reception processing, Interpretation & Analysis.

Unit-IV (Platform, Sensor, Resolution)

Orbital characteristics of Remote sensing satellite, Concept of platforms and sensors, Remote Sensing systems , Types of sensors, Sensor materials, Sensor System - Framing and Scanning System, Whiskbroom scanners, Push-broom scanners, Side Looking scanner .Types and Characteristics of Sensor: Imaging and non-imaging sensors, Active and passive sensors, Resolution of Sensors - Spectral, Spatial, Radiometric & Temporal, Scale, Mapping unit, Multi-band concepts and False Colour Composites, Different application with respect to earth surface feature

Unit-V (Thermal Remote Sensing)

Fundamental of Thermal Remote Sensing, Thermal infrared radiation properties.Atmospheric effect of thermal remote sensors, Interaction of thermal radiation with terrain element, Thermal scanners, interpreting thermal scanner imagery, Geometric characteristics of thermal imagery, Temperature mapping with thermal scanner data.

COURSE OUTCOMES:

1. On completion of this course, the student shall be able to
2. Understand concepts of passive and active microwave system
3. Gain knowledge in the principles of Microwave image analysis and interpretation
4. Understand the various application domains of microwave satellite data
5. Acquire skills in analysing Thermal and Hyperspectral Remote Sensing data for various thematic mapping and its applications.
6. Provides employability opportunity in space organization.

REFERENCE BOOKS:

I. Remote Sensing and Image interpretation: Thomas Lille sand & R.W. Keifer, John Wiley and Sons (3rd Ed.).

II. Text Book of Remote Sensing & Cartography Kalyani Publication, D. Nandi, T. Chattrejee..

III. Remote Sensing: Principles and Interpretation: F. Sabins, Freeman Publication.

IV. Remote Sensing of the Environment by J.R. Jensen, Pearson Publication

Theory question pattern for all paper of Remote Sensing and GIS is given below

1. Five Questions 2 Marks 2X5 =10
2. `Four Question compulsory 5X4=20
3. Three Question 10 Marks 10X3=30

SEMESTER - I
REMOTE SENSING-II
(Assignment/Seminar-10, Quiz-10, Mid Sem-20, Theory Exam-60)
(Paper code-RS-102) **Marks-100**

OBJECTIVES:

This Chapter is designed to fulfil the following objectives
1.To introduce the student to the physical Advanced Satellite of Remote Sensing, Hyperspectral Remote Sensing, LIDAR Remote Sensing and their different application in terrestrial and vegetation mapping.
2. Acquire skills in handling instruments, tools, techniques and modelling while using Remote Sensing Technology

Unit-I (Advanced Satellite remote sensing)

Satellite and its classification. Sun synchronous orbit and geostationary orbit, Remote sensing satellites in operation Earth Resources Satellites -LANDSAT, SPOT, IRS, IKONOS satellite series Meteorological satellites – INSAT, NOAA, GOES Sensors – types and their characteristics, across track (whiskbroom) and along track (pushbroom) scanning ,Optical mechanical scanners – MSS, TM, LISS, WiFS, PAN their sensor characteristics and application.

Unit-II (Microwave Remote Sensing)

Microwave Remote sensing : Fundamental of microwave remote sensing , SLAR: system components, spatial resolution , Synthetic Aperture Radar (SAR), Geometric characteristics of SLAR imagery , Earth surface features influencing radar returns, Interpretation of SLAR imagery. Microwave satellite in operation: Seasat, Radarsat , Shuttle, Imaging Radar (SIR) , ERS :Elements of Passive microwave remote sensing , Passive microwave scanner , application of passive microwave remote sensing .

Unit-III (Hyper spectral remote sensing)

Hyper spectral Remote Sensing Hyper spectral image analysis: Atmospheric correction, Analysis technique of hyper spectral remote sensing, Biophysical modelling, Image transmission & compression. Spectroscopy, Image cube, Hyperian/HYSI, Spectral matching, Digital Spectral Data, Libraries, Application of Hyper spectral data, MODIS

Unit-IV (LIDAR Remote Sensing)

Fundamental of LIDAR remote sensing, LIDAR Data Processing, LIDAR Data Management And Applications,(Topographic Mapping, flood inundation analysis, line-of-sight analysis, Forestry, various types of LIDAR sensors-, vegetation metric calculations, Corridor mapping system,) Terrestrial And Bathymetric Laser Scanner

Unit-V Ground Truth Data

Ground truth data collection - use of radiometers, and spectrophotometers, etc Spectral Reflectance, Physical basis of spectral signatures of the objects and Spectral, Signature for Vegetation, Soil, Water and Snow. Thermal Image and Interpretation, Interpretation of SAR data (from Satellite) for Land use studies.

COURSE OUTCOMES:

On completion of this course, the student shall be able to get knowledge to the
1. Advanced Satellite of Remote Sensing, Hyperspectral Remote Sensing, LIDAR Remote Sensing and their different application in terrestrial and vegetation mapping.
2. Acquire skills in handling instruments, tools, techniques and modelling while using Remote Sensing Technology.
3. Get familiarized about various image enhancement and image processing techniques.
4. provides employability opportunity in space organization.

REFERENCE BOOKS:

1. *Remote Sensing and Image interpretation: Thomas Lille sand & R.W. Keifer, John Wiley and Sons (3rd Ed.).*
2. *Text Book of Remote Sensing & Cartography Kalyani Publication, D. Nandi, T. Chattrejee.*
3. *Remote Sensing: Principles and Interpretation: F. Sabins, Freeman Publication.*
4. *Remote Sensing of the Environment by J.R. Jensen, Pearson Publication*
5. *Lidar: Range-Resolved Optical Remote Sensing of the Atmosphere, edited by Claus Weitkamp.*
6. *Manual of Airborne T opographicLidar by Michael S. Renslow.*
7. *Lidar T echniques and Remote Sensing in the Atmosphere: Understanding the Use of Laser Light in the Atmosphere by Francis Emmanuel Mensah.*

Theory question pattern for all paper of Remote Sensing and GIS is given below

1. Five Questions 2 Marks 2X5 =10
2. `Four Question compulsory 5X4=20
3. Three Question 10 Marks 10X3=30

SEMESTER - I
APPLICATION OF REMOTE SENSING

Assignment/Seminar-10, Quiz-10, Mid Sem-20, Theory Exam-60

(Paper code-RS-103) **Marks-100(60+40)**

OBJECTIVES:

This Chapter is designed to fulfil the following objectives

1. The content of this course enable the students to understand the application potentialities of remote sensing data for Agriculture and Forestry.
2. The objective of the course is to impart knowledge about the various geological structures and Geomorphic Landforms.
3. The students will be exposed to various Remote Sensing Applications to earth Sciences.
4. To introduce the concepts of urban and regional planning.
5. To explore the use of the geospatial technology in advanced analysis in planning.

Unit-I (Remote Sensing In Environmental Mapping)

Rocks types, forms, Minerals and their field characteristics, Image interpretation for delineation of lithology (Rocks) and minerals, Geological structures - Folds, Faults and Joints and their field characteristics, Various important land forms, Image characteristics of geological structures and major land forms

Unit-II (Cultural Geo Science)

Urban, Rural Development & Regional Planning, Natural Resource Management, Application of Archeology, wet land management, Wildlife management, Forest management

Unit-III (Remote Sensing in Vegetation)

Remote sensing in Vegetation – an overview ,Spectral characteristics of crops and factors affecting spectral signatures of crops ,Principles of crop identification and crop acreage estimation ,RS and GIS applications in crop inventory.

Unit-IV (Remote Sensing of water)

Remote sensing in Surface water, Surface water Characteristics, Spectral Response of water as a function Wave, Water Penetration (Bathymetry),Water Surface Temperature, Precipitation , Water vapor & Snow In the Spectral Signature

Unit-V (Application of Hazards and Disasters Management)

Geological Hazards: Landslide, Earthquake, Mining hazards, Volcanic hazards, Coastal Hazards, Environmental hazards: Forest hazards (Deforestation, Degradation and Forest fire), Land, soil degradation, Pollution (Water, air and soil). Applications of Remote Sensing in managing forest fires, floods, landslides, cyclone and earthquake, multiple hazard mapping

COURSE OUTCOMES

1. *On completion of this course, the student shall be able to understand*
2. *The application potentialities of remote sensing data separately and in combination with GIS techniques for Agriculture, Forestry, Impart knowledge about the various geological structures and Geomorphic Landforms.*
3. *The students will be exposed to various Remote Sensing Applications to earth Sciences, urban and regional planning.*
4. *Understand the concepts involved in mapping of crop acreage and yield estimation, crop damage assessment.*
5. *Understand mapping lithological and structural features. Understand the concepts involved in Geomorphic Mapping.*
6. Provides employability opportunity in space organization and survey of India.

REFERENCE BOOKS:

1. *Remote Sensing and Image interpretation: Thomas Lille sand & R.W. Keifer, John Wiley and Sons (3rd Ed.).*
2. *Manual of Remote Sensing, Vol. 1, American Society of Photogrammetry.*
3. *Remote Sensing: Principles and Interpretation: F. Sabins, Freeman Publication.*
4. *Remote Sensing of the Environment by J.R. Jensen, Pearson Publication*

Theory question pattern for all paper of Remote Sensing and GIS is given below

1. Five Questions 2 Marks 2X5 =10
2. `Four Question compulsory 5X4=20
3. Three Question 10 Marks 10X3=30

SEMESTER - I

CARTOGRAPHY

(Assignment/Seminar-10, Quiz-10, Mid Sem-20, Theory Exam-60)

(Paper code-RS-104) **Marks- 100(60+40)**

OBJECTIVES

This Chapter is designed to fulfil the following objective.

1. Expose the students with concepts of cartography as major components of input and output related to cartography.
2. To expose the basic concept of cartography, projection, elements of cartography and Interpretation of topo graphical and Geological map.

Unit-I (Basic of Cartography)

Evolution of cartography, Roll of technology in the development of cartography. Types of map, element of cartography, coordinate system, cartography data and its measurement (ordinal, nominal, interval, ratio), Map designing and lay out ,cartography variable, types of symbolization- use of point, line and area symbols. Map compilation

Unit-II (Map projection)

History of map projection.Types of map projection, Fundamental properties of map projection, Elementary idea on zenithal projection. Conical projection, and cylindrical projection.

Unit-III (Element of Cartography)

Datum, Ellipsoid, Geodesy, geoid, scale, area measurement, latitude, longitude, parallel, meridian, grid, UTM. Maplettering. Cartographic coverage of the world,

Unit- IV (Topo Graphical & Geological Map)

Interpretation of topographical (Relief, Drainage, Natural vegetation, communication, settelement)& geological maps(Uniclinal, unconformity), interpretation of statical data, mapping the terrain.Base map .Map enlargement and reduction, Map reproduction,

Unit- V (Graph and Diagrams)

Graph and Diagrams, Chorochromatic maps, isopleths and choropleth maps. Relief maps, Climate maps, Economic maps and diagrams, Population map and diagrams, Settlement map and Diagram, Mapping the Weather and Climatic data, Mapping socio-economic data, Thematic and Complex mapping constructing maps.

COURSEOUTCOME

On completion of this course, the student shall be able to

1. Familiarize with concepts of choosing map projections, 2D transformation.
2. Understand the data models and data structures used for spatial data.
3. Perform geospatial analysis and network analysis.
4. To understand the web based GIS architecture and concepts of Map server.
5. This helps in getting job in survey of India.

REFERENCE BOOKS:

1. *Robinson A., Morrison, J.L., Muehrcke P.C., Guptil S.C. 2002: Elements of Cartography. John Wiley*
2. *Rampal K.K. 1993: Mapping and compilation. Concept publication*
3. *Taylor,D.R.F. 1985: Education and Training in contemporary cartography, John Willey*
4. *Mishra R.P and Ramesh A. 1989: Fundamentals of Cartography. Concept publishing company*

Theory question pattern for all paper of Remote Sensing and GIS is given below

1. Five Questions 2 Marks 2X5 =10
2. `Four Question compulsory 5X4=20
3. Three Question 10 Marks 10X3=30

THE INDIAN KNOWLEDGE SYSTEM
(Assignment/Seminar-05, Quiz-05, Mid Sem-10, Theory Exam-30)
(Paper code-RS-105) **Marks-50**

Course Objectives:

- The course aims to equip student teachers with the following skills:,Exploring Indian Spirituality and Philosophy,Studying spirituality in Indian context.
- Examining life philosophy in Indian scriptures.,Analyzing Indian Knowledge Systems (IKS) for preserving and spreading indigenous knowledge.,Highlighting IKS contributions in mathematics and astronomy.,Exploring Indian wisdom in environmental sciences.
- Exploring Indian literature and aesthetics theory in art forms.

Learning Outcomes:

In this module, learners will gain a comprehensive understanding of the Indian Knowledge System, including its definition, relevance, and overview. They will also explore Ancient Indian Literature and Scriptures, and evaluate the applicability of Panini's grammatical framework to Indian and other languages. Furthermore, the module aims to equip learners with an appreciation of the Indian scheme of knowledge and to examine the relevance of this framework in establishing valid knowledge in today's society.

UNIT -I: Bharatiya Civilization and Development of Knowledge System (4 hours)

Genesis of the land, Antiquity of civilization, On the Trail of the Lost River, Discovery of the Saraswati River, the Saraswati-Sindhu Civilization, Traditional Knowledge System, The Vedas, Ancient Education System, the Takṣaśilā University, the Nālanda University, Alumni, Knowledge Export from Bhārata.

UNIT-II: Science, Astronomy, and c (4 hours)

Concept of Matter, Life and Universe, Gravity, Sage Agastya's Model of Battery, Velocity of Light, Vimāna: Aeronautics, Vedic Cosmology and Modern Concepts,

UNIT-III (Mathematics)

Bharatiya Kala-gaṇana, Kerala School for Mathematics and Astronomy, History and Culture of Astronomy, Sun, Earth, Moon, and Eclipses, Earth is Spherical and Rotation of Earth.

UNIT- IV (Ecology Environment)

Nakshatrara Gyaan and Agriculture : Vernacular Architecture , Forest Management and Urban Planning ,Agroforestry,Tank, Lakes, and Stepwells,Water Management & Transportation , Harappan and Traditional Water Management System of Gujarat ,Historical Sites- Sringeverpur, South Indian Water Management System, Western Ghats Cave- Kanheri, etc. ,Communities Involved in Water Management.

UNIT –V (Ancient Indian Architecture)

Fundamentals of Art and Architecture, Traditional and Historical Town Planning & Ancient Indian Art & Architecture: Geography of Bharatvarsh and Civilizational Journey, Harappan Town Planning, Early Historical Cities , Continuity of Traditional Town Planning,Rainwater Harvesting System: Vav, Kund, Talavetc, Sacred Hills and Mountains , Kumbha: assimilation of ritual, myth, symbology, and cosmology.

Reference Books.

1. Textbook on the Knowledge System of Bharata by Bhag Chand Chauhan,
2. Histrory of Science in India Volume-1, Part-I, Part-II, Volume VIII, by Sibaji Raha, et al. National Academy of Sciences, India and The Ramkrishan Mission Institute of Culture, Kolkata (2014).
3. Baladev Upadhyaya, Samskrta Śāstrom ka Itihas, Chowkhambha, Varanasi, 2010.
4. D. M. Bose, S. N. Sen and B. V. Subbarayappa, Eds., a Concise History of Science in India, 2nd Ed., Universities Press, Hyderabad, 2010.
5. Astāngahrdaya, Vol. I, Sutrasthāna and Śarīrasthāna, Translated by K. R. Srikantha Murthy, Vol. I, Krishnadas Academy, Varanasi, 1991.
6. Dharampal, the Beautiful Tree: Indian Indigenous Education in the Eighteenth Century, Dharampal Classics Series, Rashtrotthana Sahitya, Bengaluru, 2021

Theory Question Pattern

1. One Marks Five question compulsory 1X5
2. Five Marks two questions 2X5=10
3. Five marks for three Questions 3X5=15

SEMESTER - I
PRACTICAL ON PHOTOGRAMMETRY & IMAGE INTERPRTETATION
(Mid Sem-30, Practical Exam-70)

(Paper code-RS-106) **Marks-100 (30+70)**

OBJECTIVES

1. To introduce the student to the toposheet and satellite image interpretation and photogrammetry as a tool for mapping.
2. To inform him of the different tools of ERDAS and Arc GIS, Quantum GIS software.
3. Understand the concept of stereoscopy and its use to determine height by parallax measurements.

Content:

1. Border information of satellite image.
2. Study of survey of India topo sheets (Base Map, Relief Map, Drainage Map, Natural vegetation, Communication settlement)
3. True colour and false colour image.
4. Satellite image Interpretation (Land use land cover, forest, Soil, Geomorphology, Surface water, Geology)
5. DEM & DTM image.
6. Interpretation of tools of ERDAS and Arc GIS, Quantum GIS
7. Download Microwave data
8. Download of LIDAR data
9. Layer stacking
10. Field Exercises for ground data collection for data Validation for satellite image interpretation.

COURSEOUTCOME

On completion of this course, the student shall be able to

1. Understand the concept of stereoscopy and its use to determine height by parallax measurements.
2. Perform orientations using analogue, semi-analytical and digital photogrammetric workstations.
3. To obtain spectral signature of various objects using spectro radiometer.
4. To visually interpret satellite imagery for generation of various thematic maps
5. This provides which provides employability in space organization.

SEMESTER-II

AERIAL PHOTOGRAPHY AND PHOTOGRAMMETRY

(Assignment/Seminar-10, Quiz-10, Mid Sem-20, Theory Exam-60)

(Paper code-RS-201) Marks-100(60+40)

OBJECTIVES

1. To introduce the student to the physical principles of Remote Sensing and image interpretation as a tool for mapping.
2. To mastering the students in Image Interpretation and Analysis:
3. To Exploring Photogrammetric Principles

Unit-I

Early history of aerial photography, Aerial platform, The simple camera, Camera systems, Filters,Films, Vantage point, Ideal time, Atmosphere for Aerial Remote sensing. Basic negative to positive photographic sequence ,Spectral sensitivity of black &white films, Colour film ,Processing of colour films, colour infrared films, Filters & their signification in Remote sensing .

Unit-II

Aerial camera and types, Types of aerial photographs, Geometry of aerial photographs, Scale of aerial photographs, Taking of vertical aerial photographs, Ground coverage of aerial photographs, Area measurement, Photo mosaics, flight planning

Unit-III

Photogrammetry: Relief displacement, Fundamental of human stereoscopy, Stereoscopy as applied to aerial photography, Image parallax, Parallax measurement, Stereoscope, Ortho photos.

Unit- IV

Development of photogrammetry, Photogrammetric process Orientation &Triangulation DTM/DEM generation, Ortho rectification, Contour map generation, Limitation of photogrammetry

Unit- V

UAV: History of unmanned air vehicle (UAV) development. Classifications and components of UAVs – Design standards and Regulatory aspects – Environment, Budget & Time, Airframe Design & Payload, Flight planning, Mosaicing, Ground control, Feature detection and mapping, Point cloud, 3D Models, DEM generation, Orthophoto generation, UAV Applications

COURSEOUTCOME

On completion of this course students shall be able to understand the principles of Remote Sensing andimage interpretation

1. Develop Mapping and Modeling Expertise
2. Acquire Proficiency in Imaging Techniques
3. Gain insight into the versatile applications of aerial photography and photogrammetry in diverse sectors

REFERENCE BOOKS:

1. *Moffitt, F.H. and Mikhail, E.M., 1980. Photogrammetry, Harper and Row,*
2. *Paine, D.P.,1981: Aerial Photography and Image Interpretation for Resource Management. John Wiley.*
3. *Pandey, S.N.,1987: Principles and Applications of Photo geology. Wiley Eastern,.*
4. *Rampal K.K. 1999: Hand book of aerial photography and interpretation. Concept publication*

Theory question pattern for all paper of Remote Sensing and GIS is given below

1. Five Questions 2 Marks 2X5 =10
2. `Four Question compulsory 5X4=20
3. Three Question 10 Marks 10X3=30

SEMESTER-II
IT IN RS&GIS

(Assignment/Seminar-10, Quiz-10, Mid Sem-20, Theory Exam-60)
(Paper code-RS-202) Marks-100

OBJECTIVES

1. To study and understand the concepts of Statistical methods and its applications in Engineering.
2. To study the effect of estimation theory, testing of hypothesis, correlation and regression, randomized Design, and multivariate analysis.

Unit I

Introduction of Hardware, software & data, DBMS, Communication system. Wire and wireless communication, Communication type LAN, WAN, MAN, Web server, client Web Browser, IP address.Topology

Unit II

Classification of computer, Input and Output peripherals of a computer memory — concept and types , Programming languages- types , Characteristics and application , Operating system — meaning types and function.

Unit III

Basic computer organization: Number system —Binary, Octal, and Decimal and their inter conversion, Computer arithmetic, Data representation —ASCII& EBDIC: their basic concepts.

Unit IV

Software, Data processing, Data storage, Standard method of organizing Data file management System, Database management system. Internet: Definition, History, Basic Services, Browsers, User of the internet, Advantages of internet Disadvantages of internet Client & server concepts Multimedia

Unit V

GIS Data Structures;Relational databases, spatial databases (PostGIS, Oracle Spatial)
Data Quality and MetadataData accuracy, precision, and uncertainty,Metadata standards and management ,Cloud-based GIS;Cloud platforms for GIS data storage and analysis. Big data in GIS, machine learning, and AI applications.

COURSEOUTCOME

1. On completion of this course the students will be able to solve various problems in the field of engineering employing probability and statistical methods.
2. It is used for data mining, data compression, artificial intelligence, network and traffic modelling, vision and image analysis.

3. The skill of applied statistics and analysis provides opportunity in getting job in space organization.

REFERENCE BOOKS:

1. *Paul L. Meyer: Introductory Probability and statistical Applications, Adsion Wesley.*
2. *C.E. Balaguruswamy: Programming in ANSIC, Tata McGraw Hill Publishing Co. Ltd.*
3. *Gottrfriield, B.S.: Programming with C, Tata McGraw Hill Publishing Co. Ltd.*
4. *Introduction to Data Structure (Array, Stack, Linked List, Q)*
5. *Gupta .S.C and Kapoor .V.K, "Fundamentals of Mathematical Statistics", Sultan Chand and sons, Reprint 2003.*
6. *Gupta .S.C, and Kapoor, V.K, "Fundamentals of Applied Statistics", Sultan Chand and sons, 2003.*
7. *Veerarajan.T, "Probability Statistics and Random Processes", TMH, First reprint, 2004*

Theory question pattern for all paper of Remote Sensing and GIS is given below

1. Five Questions 2 Marks 2X5 =10
2. `Four Question compulsory 5X4=20
3. Three Question 10 Marks 10X3=30

SEMESTER-II
DIGITAL IMAGE PROCESSING
(Assignment/Seminar-10, Quiz-10, Mid Sem-20, Theory Exam-60)

(Paper code: RS-203) **Marks-100**

OBJECTIVES:

1. To study the image fundamentals and mathematical transforms necessary for image processing.
2. To study the image enhancement techniques
3. To study image restoration procedures.
4. To study the image compression procedures.

Unit – 1

Introduction to digital image processing- concept of digital image, steps in DIP. Image processing systems –hardware and software considerations. Digitization of photographic image, converting digital image to visual form image. Digital image data formats, Image data storage and retrieval

Unit – 2

Image registration – definition principle and procedure. Fundamental of image recertification, interpolation, intensity interpolation. Radiometric & geometric correction of remotely sensed data. Basic statistical concept in DIP and use of probability methods in DIP

Unit – 3

Image enhancement techniques - an overview .Contrast enhancement - linear and nonlinear, histogram equalisation and density slicing .Spatial filtering and edge enhancement. Multi image manipulation – addition, subtraction and band rationing

Unit 4

Principal Component Analysis (PCA) 4.2 Enhancement by using colours – advantages, types of colour enhancements. BGR – coding and generation of FCC's. Image transformation – Intensity Hue Saturation (IHS)

Unit – 5

Pattern recognition and image classification, unsupervised classification – advantage, disadvantage and limitations, supervised classification - training site selection, classifiers used in supervised. Fuzzy classifier, hybrid classifier, decision tree classification and data minning classification – minimum distance to mean, parallelepiped, maximum likelihood .Classification accuracy assessment (error matrix and kappa coefficient). High resolution and hyperspectral image analysis

COURSEOUTCOME:

On completion of this course, the student shall be able to

1. Review the fundamental concepts of a digital image processing system.
2. Analyze images in the frequency domain using various transforms.
3. Evaluate the techniques for image enhancement and image restoration.
4. Categorize various compression techniques.
5. Interpret Image compression standards.
6. Interpret image segmentation and representation techniques.
7. This provides opportunity of getting job in all organizations involving Image processing.

REFERENCE BOOKS:

1. *Introductory Digital Image Processing: J.R. Jensen.*
2. *Jensen, J.R. 2000: Remote Sensing of the Environment: An Earth resource Perspective. Prentice Hall.*
3. *Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley. N*
4. *Sabbins, F.F., 1985: Remote sensing Principles and interpretation. W.H. Freeman and company*

Theory question pattern for all paper of Remote Sensing and GIS is given below

1. Five Questions 2 Marks 2X5 =10
2. `Four Question compulsory 5X4=20
3. Three Question 10 Marks 10X3=30

SEMESTER-II

EARTH SYSTEM SCIENCE

(Assignment/Seminar-10, Quiz-10, Mid Sem-20, Theory Exam-60)

(Paper code: RS -204) **Marks -100**

OBJECTIVE

The objective of the course is to impart knowledge about the various geological structures and Geomorphic Landforms.

The students will be exposed to various Remote Sensing Applications to earth Sciences.

Unit - I: Spectral Properties of Rocks and Minerals

Reflectance Properties of Rocks, minerals in visible, NIR, MIR, SWIR, TIR and Microwave regions Laboratory spectroscopy - laboratory and field spectral data comparative studies, Spectral reflection curves for important Rocks, Minerals.

Unit - II: Geological Structure and Applications

Significance of Geological structures, Role of aerial photographs, Photo interpretation characters of photographs and satellite images, structural mapping, Fold, fault, Lineaments, Direction circular features. Intrusive rocks, rock exposure, Fractures and Joints, Rose diagram. Digital image processing for structural mapping.

Unit - III: Lithological Mapping

Introduction on Igneous rocks, sedimentary rocks, metamorphic rocks, mapping of regional scale lithological units, Image Characters of igneous rocks, sedimentary and metamorphic rocks, examples. Digital image processing of various rock types, resolution and Scale of lithological mapping and advantages.

Unit - IV: Geological & Geomorphological Mapping

Significance of landform, Geomoprphological guide, interpretation and image/photo characters, Tectonic landforms, Fluvial landforms, Denudational landforms, Volcanic landforms- Aeolian landforms, Coastal landforms. Importance of ground truth and geological field data collection. Geophysical survey, surface investigation, subsurface investigation.

Unit – V(Remote sensing in oil exploration)

Remote sensing in oil exploration – features helpful in detection of target areas for oil exploration ,Engineering geological investigation, alignment studies – roads, tunnels, canals etc. site selection studies – dams, bridges, highways, airstrips etc,Geological hazards mapping and disaster management

COURSEOUTCOME

On completion of this course, the student shall be able to

1. Understand mapping lithological and structural features.
2. Understand the concepts involved in Geomorphic Mapping.
3. Understand the geophysical / geomagnetic surveys for subsurface exploration.
4. Get exposed to various earth sciences applications.

REFERENCE BOOKS:

1. *John J. Qu, Wei Gao, MenasKafatos , Robert E. Murphy, Vincent V. Salomonson, "Earth Science Satellite Remote Sensing", Springer 2007.*
2. *Gupta .R.P, "Remote sensing Geology", Springer, 2003.*
3. *Drury .S.A, "Image interpretation in Geology", Chapman and Hall, London. 1993.*
4. *Pandey .S.N, "Principles and Applications of Photogeology", Wiley eastern. 1987.*

Theory question pattern for all paper of Remote Sensing and GIS is given below

1. Five Questions 2 Marks 2X5 =10
2. `Four Question compulsory 5X4=20
3. Three Question 10 Marks 10X3=30

SEMESTER-II
PRACTICAL ON DIGITAL IMAGE PROCESSING

(Paper Code: RS-205) **Marks- 100**

OBJECTIVE:

This course will facilitate the students to have hands on experience on different steps of satellite image processing using ERDAS software.

Content

1. Photogrammetry
a. Stereo Test
b. Mirror Stereoscopes
c. Stereo model
d. Measurements/ Parallax
2. Image loading and display/registration
a. Image to topo
b. Image to registered image
c. Image with known points
3. Image masking
a. Vector boundary generation
b. Vector polygon topology building
c. Vector to raster conversion
d. Masking image with mask raster
4. Image mosaicking
a. Registration of all adjacent images in the same coordinate system
b. Image mosaicking
5. Sub set image registration
a. Image cutting with given boundary
6. Image enhancement
a. Linear Contrast stretching
b. Non-linear contrast stretching
7. Principal component generation
8. Band rationing and NDVI analysis
9. Spatial filtering and Edge enhancement
10. Image classification
a. Supervised classification
b. Non-supervised classification

COURSEOUTCOME

1. On completion of this course, the student shall be able to
2. Acquire skills to carry out the Lab Exercises independently on various Visual and digital Image processing techniques.
3. This helps in getting employability in space organization.

REFERENCE BOOK:

EARDAS Manual

SEMESTER-II

BASIC OF REMOTE SENSING &GEOGRAPHICAL INFORMATION SYSTEM

(Assignment/Seminar-10, Quiz-10, Mid Sem-20, Theory Exam-60)

(Paper code-OE-RS-206) Marks-100

OBJECTIVES:

1. To introduce the student to the physical principles of Remote Sensing and image interpretation as a tool for mapping.

2. To provide exposure to fundamental data models and data structures in GIS

3. To introduced principle of GPS , It's components, signal structure, and working procedure.

Unit -I (Fundamental of Remote Sensing)

Concept and foundations of remote sensing: Basics of Remote sensing, remote sensing Art or Science process. Energy: Sources of energy, Energy radiation principle, Energy interaction in the atmosphere , Energy interactions with earth surface feature, Recording energy by sensor transmission, Reception processing, Interpretation & Analysis.

Unit-II (Aerial Photography)

Early history of aerial photography, Aerial platform, The simple camera, Camera systems, Aerial camera and types, Types of aerial photographs, Geometry of aerial photographs, Scale of aerial photographs, Taking of vertical aerial photographs, Ground coverage of aerial photographs, Area measurement, Photo mosaics, flight planning

Unit -III (Fundamental of Image interpretation)

Satellite imagery interpretation, Elements of image interpretation, image interpretation strategies, interpretation keys, temporal aspect of image interpretation, interpretation techniques, methods of search in image interpretation.Steps of Image interpretation.

Unit -IV (Fundamental of G.I.S)

Evolution of Geographical Information system, Concept of Geographic information systems: Introduction, Definition of GIS, Key components of GIS, Data Conceptual model of spatial information: Spatial Information and data models conceptual models of spatial information- raster and models vector data models, advantages and disadvantages of raster and vector data models.

Unit -V (Fundamental of GPS)

Global positioning system (GPS): Concept of Global positioning system (GPS) and its architecture. Working procedure of GPS, Different types of Errors in GPS, Kinds of GPS, application of GPS in different applications.

COURSEOUTCOME

On completion of this course students shall be able to

1. understand the principles of Remote Sensing and image interpretation
2. Understand the fundamental of GIS, GPS,its component signal and applications.
3. The Department of Wildlife & Biodiversity Conservation, Zoology, Botany ,Master in Computer Application and Master in Computer science students are able to take this paper

REFERENCE BOOKS

1. *Remote Sensing and Image interpretation: Thomas Lille sand & R.W. Keifer, John Wiley and Sons*
2. *Manual of Remote Sensing, Vol. 1, American Society of Photogrammetry.*
3. *Remote Sensing: Principles and Interpretation: F. Sabins, Freeman Publication.*
4. *Remote Sensing of the Environment by J.R. Jensen, Pearson Publication*

Theory question pattern for all paper of Remote Sensing and GIS is given below

1. Five Questions 2 Marks 2X5 =10
2. `Four Question compulsory 5X4=20
3. Three Question 10 Marks 10X3=30

SEMESTER - III

RESEARCH METHODOLOGY (Supportive)

(Assignment/Seminar-10, Quiz-10, Mid Sem-20, Theory Exam-60)

(Paper Code- RS-301) Marks-100

OBJECTIVES

1. To gain familiarity with a phenomenon or to achieve new insights into it studies with this object in view are termed as exploratory or formulate research studies).
2. To portray accurately the characteristics of a particular individual, situation or a group (studies with this object in view are known as descriptive research studies).
3. To determine the frequency with which something occurs or with which it is associated with something else studies with this object in view are known as diagnostic research studies.
4. To test a hypothesis of a causal relationship between variables (such studies are known as hypothesis-testing research studies).

Unit 1(Research Methodology)

An Introduction Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process.

Unit 2 (Developing a Research Proposal)

Format of research proposal-Individual research proposal-Institutional proposal-Hypothesis: Meaning-Types of hypothesis.

Unit 3 (Sampling Design)

Sampling: Sample Survey and Population, Different Types of Sample Designs,Techniques sampling selection, Characteristics of a good sample, Sampling errors and how to reduce them.

Unit 4

(Data and Techniques of Data Collection)

Collection of Primary Data, Observation Method, Checklist, Data schedule, Observation, Opinionative, Interview, Sociometric techniques, Questionnaire, Rating scales, Interview schedules.

Unit 5 (Research Report)

Significance of Report Writing, Format of the Research Report, Style of writing the report, Precautions for Writing Research Reports, References and Bibliography, Evaluation of Research: Criteria of evaluation.

COURSEOUTCOME:

The outcome that the research seeks to achieve is the entire reason for the research, so it should guide each step of the process.

The knowledge of research methodology in this area makes students competent to work in space organization

REFERENCE BOOK

1. DebashisPati, Marketing Research, University Press
2. Marketing research by N.Malhotra, Pearson Education
3. Cooper, Donald R and Pamela S schindler, Business Research Methods, Tata McGraw-Hill
4. Research Methodology. Methods & Techniques: Kothari, C.R.
5. Tests, Measurements and Research Methods in Behavioural Sciences. Singh, A

Theory question pattern for all paper of Remote Sensing and GIS is given below

1. Five Questions 2 Marks 2X5 =10
2. `Four Question compulsory 5X4=20
3. Three Question 10 Marks 10X3=30

SEMESTER - III

Basics of Remote sensing, GIS & GNSS technology and their applications

(SWYAM MOOC Course)

(Paper code-RS-302) **Marks-100**

OBJECTIVE

Basics of Remote Sensing, Geographical Information System (GIS) and Global Navigation Satellite System (GNSS) is a 15 week course conducted by IIRS, ISRO. The course constitutes 75 learning hours spread across four modules namely Basics of Remote Sensing, Global Navigation Satellite System, Geographic Information System and Applications of Geopspatial technology. The syllabus and the lecture content is modified every year by the faculty based on the feedback received and the emerging trends in the technology.

Course layout

The course consist of 4 Modules namely :

Unit-1

Remote Sensing and Digital Image Analysis: Basic Principles of Remote Sensing, Earth Observation Sensors and Platforms, Spectral Signature of different land cover features, Image interpretation, Thermal & Microwave Remote Sensing, Digital Image Processing: Basic Concepts of Rectification and Registration, Enhancement, Classification and accuracy assessment techniques.

Unit -2

Global Navigation Satellite System: Introduction to GPS and GNSS, receivers, processing methods, errors and accuracy.

Unit-3

Geographical Information System: GIS, databases, topology, spatial analysis and open source software.

Unit-4

RS and GIS Applications: Agriculture and Soil, Forestry and Ecology, Geoscience and Geo-hazards, Marine and Atmospheric Sciences, Urban and Regional Studies and Water Resources.

Books and references

Books:

1. **Joseph, G. (2005).** ***Fundamentals of Remote Sensing*****. Universities Press (India) Pvt. Ltd, Hyderabad, India.**

2. **Lillesand, T. M., Ralph, K. W. & Chipman, J. (2008).** ***Remote Sensing and Image Interpretation*** **(6th ed.), John Wiley.**

3. **Sabins, F. F. (1996).** ***Remote Sensing Principles and Interpretation*****. Waveland Pr. Inc.**

4. **Campbell, J. B. (2002).** ***Introduction to Remote Sensing*****. Guilford Press.**

5. **Remote Sensing III Edition: American Society of Photogrammtery and Remote Sensing.**

6. **Jensen, J. R. (2000).** ***Remote Sensing of the Environment*****:** ***An Earth Resource Perspective*****. New Jersey: Prentice Hall.**

SEMESTER - III
GEOGRAPHIC INFORMATION SYSTEM (GIS)
(Assignment/Seminar-10, Quiz-10, Mid Sem-20, Theory Exam-60)

(Paper Code- RS-303) **Marks-100**

OBJECTIVE

1. To provide exposure to data models and data structures in GIS and to introduce various Raster and Vector Analysis capabilities.
2. To expose the concept of quality and design of cartographic outputs in open GIS environment.

Unit-I Concept of Geographic information systems:
A brief history ofGeographical Information system, Objectives of Geographical Information systems, Components and elements of GIS. coordinate system and map projection GIS- An information of Spatial & Attribute Information, GIS- Three views of information system, GIS- A knowledge Hub, GIS- A set of interrelated subsystems, GIS- An information Infrastructure

Unit- II Conceptual model of spatial information:
Spatial Information and data models conceptual models of spatial information- raster and models vector data models, advantages and disadvantages of raster and vector data models.

Unit- III Conceptual model of Non- spatial information:
Non spatial information and concept of database, Database management systems, Database structures- hierarchical, Network and relational, Important features of relational database structures- primary and foreign keys, Relational joins, Normal forms, object oriented database.

Unit-IV Data input, Verification, Storage and output:
Sources of geographical data, Geographical data collectors and providers, Acquisition of digital data from data suppliers, Creating dataset by manual input, Data editing- error detection and correction, Rms error, TIC match tolerance, fuzzy/node snap weed-grain tolerances, dangle length.

Unit-V (Data analysis and modeling in GIS)
Data analysis and modeling in GIS– types of GIS modelling, Open sources software, free software and cloud computing,Decision support systems , Overview of image processing & GIS Packages – ARC GIS, ERDAS, MAP INFO, ILWIS, GEOMEDIA, IDRISI, GRASS, SAGA, QGIS ,Recent trends in GIS – AM/FM, Virtual 3D GIS, Mobile GIS, OLAP, Internet GIS, Open GIS

COURSEOUTCOME

On completion of this course, the student shall be able to
1. Understand the data models and data structures used for spatial data
2. Perform geospatial analysis and network analysis
3. To understand the web based GIS architecture and concepts of Map server
4. The knowledge of geography information provides opportunity of getting job in various survey related organization

REFERENCE BOOK

1. Principles of GIS: P. A. Burrough and Rachel A.M. McDonnel, Oxford.
2. Concepts and Techniques of GIS by C.P. Lo and A.K.W. Y eung, Prentice Hall.
3. An Introduction to GIS by Heywood, Cornelius and Carver, Pearson Education

Theory question pattern for all paper of Remote Sensing and GIS is given below
1. Five Questions 2 Marks 2X5 =10
2. `Four Question compulsory 5X4=20
3. Three Question 10 Marks 10X3=30

SEMESTER - III

ADVANCED G.I.S & GPS TECHNOLOGY

(Assignment/Seminar-10, Quiz-10, Mid Sem-20, Theory Exam-60)

(Paper Code- RS-304) Marks-100

OBJECTIVE

1. To provide exposure to data models and data structures in GIS and to introduce various Raster and Vector Analysis capabilities.
2. To expose the concept of quality and design of cartographic outputs in open GIS environment.

Unit- I Data quality and errors in GIS:

Nature of geographic data, Sources of errors in GIS database, Data quality parameters, handling error in GIS, Error propagation in GIS. Human and Organizational issues: The issue of GIS applications and users, justifying the investment in GIS. Choosing and implementation of GIS, Organizational changes due to GIS. GIS project design and management: Problem identification, designing a data model, Project management, Implementation problem, Project evaluation.

Unit-II Internet GIS:

Principles of computer network, Network type, Client server computing concept, Application of internet services to GIS software. Issues in GIS and trends: Development of computer method for handling spatial data, Web Page Basics, Web Mapping, Geospatial Web Services, Application of Internet services to GIS, Internet GIS software

Unit-III Spatial analysis-

Digital Terrain Modeling and other raster analysis, Vector overlay analysis, TIN. View shed analysis and its application. Watershed analysis and its application

Unit- IV Network Analysis:

Link and link impedance, Node and turn impedance, Overpass and underpass. Network applications: Shortest path analysis, closest facility allocation, Location allocation.

Unit- V (GPS & its appliucation)

Introduction of Global Positioning System, Satellite constellation, GPS signals and data,Geo-positioning-Basic Concept, Segments of GPS, GPS Errors and Biases, Application of GPS: GPS in Natural Resource Management, GPS in Surveying and Mapping, GPS in Navigation, GPS Application in Crustal Mapping, GPS Application in Agriculture, GPS Application in Military Operations, GPS in Urban Utilities and Services.

COURSEOUTCOME

On completion of this course, the student shall be able to

.Botanical GIS where integration of plant distributions and local plant locations, ethological studies of animal movement, landscape ecological studies of vegetation blocks, ecological studies of spatial population dynamics, and the study of Bio-geography,. Epidemiology analysis on disease mapping with research on mapping the spread of disease and with location studies for health care delivery, Spatial Visualisation – basically converting all statistics into spatial maps and visualisation Spatial Econometrics. Image Analytics – to determine changes in multi-date images automatically and characterise the changes into morphometric and clustering analysis.

REFERENCE BOOK

1. Principles of GIS: P.A. Burrough and Rachel A.M. McDonnel, Oxford.
2. Concepts and Techniques of GIS by C.P. Lo and A.K.W. Yeung, Prentice Hall.
3. An Introduction to GIS by Heywood, Cornelius and Carver, Pearson Education
4. Pinde Fu and JiulinSun,Web GIS: "Principles and Applications", ISBN:9781589482456,ESRI, 2010.

Theory question pattern for all paper of Remote Sensing and GIS is given below

1. Five Questions 2 Marks 2X5 =10
2. `Four Question compulsory 5X4=20
3. Three Question 10 Marks 10X3=30

SEMESTER-III

PRACTICAL ON GEOGRAPHIC INFORMATION SYSTEM-I

(Paper Code: RS- 305) **Marks-100 (70+30)**

OBJECTIVES

1. Maximize the efficiency of decision making and planning.
2. Provide efficient means for data distribution and handling.
3. Elimination of redundant database-minimize duplication.

Contents

Hands on training on Arc- GIS software/ Quantum GIS

1. Introduction and Basic commands
2. Digitizing using digitizer.
3. Construction of topology, Error identification, error correction and reconstruction of topology.
4. Entry of non- spatial data.
5. Linking of spatial and non- spatial data.
6. Transformation of coordinates/ projections.
7. Buffer analysis.
8. Overlay analysis.
9. Network analysis.
10. Digital elevation model generation via point interpolation techniques and interpolation of contour lines .

COURSEOUTCOME:

1. Spatial search tools.
2. Crime Analysis using GIS.
3. Facility Siting Spatial Analytics tools
4. Land Analytics for real estate
5. Forecasting Land use Change
6. The practical application helps in getting job in various survey related organization

REFERENCE BOOK:

ARC GIS MANUAL

SEMESTER-III

PRACTICAL ON GEOGRAPHIC INFORMATION SYSTEM-II

(Paper code-RS-306) **Marks-100**

OBJECTIVES:

1. Capacity to integrate information from many sources.
2. Complex analysis/queries involving geographical reference data to generate new information.
3. Update data quickly and cheaply.

Content

Lab 1: Familiarization with the GIS software
Lab 2: Georeferencing of spatial data in GIS software
Lab 3: Geodatabase creation and Digitization of point line and polygon features
Lab 4: Creation of Spatial data from Non-spatial data
Lab 5: Topology creation of spatial data
Lab 6 Removing topological error
Lab 7 Attribute data Integration with spatial data
Lab 8 Map Designing (layout creation)
Lab 9 Thematic Map creation
Lab 10 Performing vector analysis; Atrribute query, buffering, overlay
Lab-11 Putting GPS data In Arc-GIS and Create IDW and Kiging model
Lab 12 Generation of Digital Elevation Model from spot height
Lab 13 Performing raster analysis
Lab-14 Understanding formats of satellite images and how to practically exchange them
Lab 15 On screen image interpretation: Comparison of images displayed on RGB and IHS display system
Lab 16 for LU/LC and Vegetation mapping Interpretation of Images with typical natural features
Lab 17 Image characteristics of geological structures and major land forms
Lab 18 Hydrological Analysis
Lab 19 Ground water Potential
REMOTE SENSING Field Work (GPS survey) • Familiarisation with GPS receiver and to know the set up unit • Initialisation of the system in the field • To get aquainted with the various functions of the GPS • Using GPS with map & compass • Area calculation by GPS • Navigation by way points • Navigation by track points • Transfer of way points • Map preparation and map upgradation

COURSE OUTCOME

1. Demographic Projection Analysis
2. Environmental Impact Analysis
3. Optimal Routing Tools
4. Aviation Analytics
5. Traffic Analytics tools
6. Generic Spatial Decision Support tools
7. The practical application of geography information helps in getting job in various survey related organization

SEMESTER-IV

DISSERTATION

(Paper Code: RS- 401) **Marks-200**

OBJECTIVES

Dissertation are an important method of demonstrating that identify a topic of concern to the field , and read , understand and incorporate the relevant literature into a new research question to be investigated .

Duration: Dissertation and Seminar Three months.

M.Sc. projects should be socially relevant and research oriented ones. Each student is expected to do an individual project. At the completion of a project the student will submit a project report, which will be evaluated (end semester assessment) by duly appointed examiner(s). This evaluation will be based on the project report and a viva voce examination on the project.Student will be allowed to appear in the final viva voce examination only if he / she has submitted his / her project work in the form of paper for presentation / publication in a conference / journal and produced the proof of acknowledgement of receipt of paper from the organizers / publishers.

COURSE OUTCOME:

1. Research skill develop
2. Problem solving skills develop
3. Communication skill develop
4. Specialist information
5. Numerical skills develop
6. Project management skills develop in different applications

SEMESTER-IV

Practical on Geo Informatics

(Paper Code 402) **Marks 100**

OBJECTIVES

1. Capacity to integrate information from many sources.
2. Complex analysis/queries involving geographical reference data to generate new information.
3. Update data quickly and cheaply.

Content

Application of Multi-sensor RS and GIS in generation of

a. Land information system
b. Soil & Agriculture application
c. Vegetation & Forest Application
d. Climate Change
e. Marine & Coastal application
f. Disaster Application
g. Urban Planning

COURSE OUTCOME

1. Demographic Projection Analysis
2. Environmental Impact Analysis
3. Optimal Routing Tools
4. Aviation Analytics
5. Traffic Analytics tools
6. Generic Spatial Decision Support tools

7. The practical application helps in getting job in various survey related organization

RESEARCH METHODOLOGY