

CENTRE FOR GEOINFORMATICS
P.G.Diploma in Spatial Technologies
(Revised Syllabus w.e.f the Academic year 2018 – 19 under the CBCS)

| Semester | Category | Course Code | Title of the Paper | No. of Credits | Theory hours | Practical | Duration of ESE (Hours) | Evaluation Marks | | Total Marks |
|--------------------------------------|--------------------|-----------------------------|--|----------------|--------------|-----------|-------------------------|------------------|-----|-------------|
| | | | | | | | | CFA | ESE | |
| I | Core Courses | 18PSTP0101 | Introduction to Spatial Technologies | 4 | 4 | - | 3 | 40 | 60 | 100 |
| | | 18PSTP0102 | Elements of Cartography | 3 | 3 | - | 3 | 40 | 60 | 100 |
| | | 18PSTP0103 | IT for Spatial Technologies | 3 | 3 | - | 3 | 40 | 60 | 100 |
| | | 18PSTP0104 | Geographical Information system | 4 | 4 | - | 3 | 40 | 60 | 100 |
| | | 18PSTP0105 | Remote Sensing and DIP | 4 | 4 | - | 3 | 40 | 60 | 100 |
| | | 18PSTP0106 | PRACTICAL - I: Geographical Information System | 2 | - | 4 | 2 | 60 | 40 | 100 |
| | | 18PSTP0107 | PRACTICAL -II: Remote Sensing & Digital Image Processing | 2 | - | 4 | 2 | 60 | 40 | 100 |
| VPP | 18VPPP0101 | Village Placement Programme | 2 | - | - | - | 50 | - | 50 | |
| 1st Semester Total | | | | 24 | 18 | 8 | - | | | |
| II | Core Courses | 18PSTP0208 | Global Navigation Satellite System | 3 | 3 | | 3 | 40 | 60 | 100 |
| | | 18PSTP0209 | Spatial Technologies in Resource Management | 3 | 3 | | 3 | 40 | 60 | 100 |
| | | 18PSTP0210 | Spatial Technologies in Disaster Management | 3 | 3 | | | | | |
| | | 18PSTP0211 | Spatial Decision Support System | 3 | 3 | | 3 | 40 | 60 | 100 |
| | | 18PSTP0212 | Dissertation | 4 | | 8 | | 75 | 125 | 200 |
| | ME | 18PSTP02EX | Major Elective | 4 | 4 | | 3 | 40 | 60 | 100 |
| | MC | 18PSTP02MX | Modular course | 2 | 2 | - | | 50 | - | 50 |
| | VAC | 18PSTP02F1 | Extension / Field Visit | - | 0 | - | - | 50 | - | 50 |
| | | 18CSKP0201 | Communication and Soft Skills | | 2 | | | 50 | | 50 |
| | Total (III) | | | | 22 | 20 | 8 | - | | |
| Grant Total (I + II) | | | | 46 | 38 | 16 | | | | |

Dissertation Evaluation

* Award of 200 marks as given below, 75 marks for evaluation by the internal examiner. 75 marks for evaluation by the external examiner. 50 marks for the joint viva voce examination conducted by the internal & external examiners.

List of Major Elective Courses for 18PSTP02EX

| | |
|------------|---|
| 18PSTP02E1 | Geography |
| 18PSTP02E2 | Geology |
| 18PSTP02E3 | Watershed Management |
| 18PSTP02E4 | Web Technology for Spatial Technologies |
| 18PSTP02E5 | Open source data and software |

List of Modular Courses for 18PSTP02MX

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|-----------------------------------|
| Spatial Modeling |
| Introduction to Rural Development |

S E M E S T E R - 1

| 18PSTP0101 | <u>Core Course</u> Introduction to Spatial Technologies | 3 Credits |
|---|---|------------------|
| Course Objective: The Course introduces Spatial technologies as an advanced tool consisting of various Geospatial Technologies used for mapping and managing earth resources. | | |
| Course Outcome CO1. Understand the meaning, scope and science and technologies involved in Spatial Technologies. Understand CO2. Understand the various concepts related to earth and acquiring earth related data. Understand CO3. Understand the basics principles of surveying using conventional and modern tools and technologies Understand CO4. Apply various methods of Geodata visualization for analysis. Apply CO5. Apply tools of Geoinformatics in various applications. Apply | | |
| UNIT I Spatial Technologies | Meaning and Scope of Geoinformatics – Science and Technologies involved: Cartography- Geodesy- Geology- Remote Sensing- Geographical Information System- Photogrammetry - Information & Communication Technologies- Global Positioning System- Digital Image Processing - Map as decision tool. | |
| UNIT II Earth | Earth – Origin, Interior, Age, size, shape and Physiography of the Earth - Sources and methods of acquiring geodata Atmosphere: Origin and nature, Composition and layers of the atmosphere. Fundamental principles of acquiring earth related information: geodetic information - lat - long - time - altimetry – bio-physical and bio-chemical information. | |
| UNIT III Basics Principles of Surveying | Basic principles of surveying – Classification and applications- Scales - Conventional signs - Survey instruments, their care and adjustment - traversing, trilateration and triangulation - conventional, electronic (total station) - Aerial and Satellite based survey techniques (Photogrammetry, RADAR, LiDAR) - Survey by GPS. | |
| UNIT IV Geodata Visualization | Geodata visualization and analysis - two – three – fourth dimension viewing - viewing by animation - Visualization by hyper map - virtual images – webGIS. | |
| UNIT V Applications | Application of Geoinformatics: Rural Development, Geosciences, Agriculture, Forestry, Soil Studies, Meteorology, Military, Transport, Environmental studies, Banking and Health Civil Engineering etc., | |

Text Books

1. LO. C.P., and Albert K.W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice-Hall of India, New Delhi, 2009.
2. Lillesand M. Thomas and Ralph W.Kiefer, Remote Sensing and Image Interpretation, 6th Edition, John Wiley & Sons, New York, 2017.

Reference Books

1. Radhakrishnan. V, General Geology, V.V.V.P Publishers, Tuticorin, 1996
2. Arthur H.Robinson, Joel L.Morrison, Phillip C.Muehreke, A.Jon Kimerling and Stephen C.Guptill, Elements of Cartog
3. Peter A. Burrough and Rachael A. Mc. Donnell, Principles of Geographical Information System, 3rd Edition, Oxford University Press Inc., New York, 2015.
4. Ian Heywood, Sarah Cornelivs and Steve Carver, An Introduction to Geographical Information System, 3rd Edition, Pearson Education Pvt .Ltd., New Delhi, 2010.
5. Lillesand M. Thomas and Ralph W.Kiefer, Remote Sensing and Image Interpretation, 6th Edition, John Wiley & Sons, New York, 2017

E-Learning Resources

1. Applications <http://elearning.irrs.gov.in>, www.geospatialworld.net/edu.
2. Basics Principles of Surveying <http://onlinecourses.nptel.ac.in>

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|---|--|------------------|
| 18PSTP0102 | <u>Core Course</u> Elements of Cartography | 3 Credits |
| <u>Course Objective:</u> The course helps the students to know about the basic principles and importance of cartography, map projection, data visualisation, map design and layout and various techniques of map production and reproduction. | | |
| <u>Course Outcome:</u> | | |
| CO 1. Understand the basics of cartography and projection | | Understand |
| CO 2. Get knowledge on data collection and visualization | | Understand |
| CO 3. Design and prepare layout of maps | | Apply |
| CO 4. Apply the computers in map making | | Apply |
| UNIT I Concept of Cartography | Introduction to cartography: Definition – nature, scope and History of Cartography; Principles of Cartography; map and its components, Types of maps, Interpretation of topographic/ thematic maps. | |
| UNIT II Map Projection | Projection: Definition – major types of projection – rectangular, polar coordinate systems – UTM-WGS - projection | |
| UNIT III Data and Visualisation | Data Collection and Nature of Data, Creation of Database, Representation of data: Isopleth, Choropleth, Choroscopic and Chorochromatic mapping techniques. Cartographic communication process - map compilation and generalization- symbolization - 3D visualization | |
| UNIT IV Map Design & Layout | Map designing and layout: Definition - Overall map designing – Internal map components designing. Data output: Cartographic data products – Methods of printing maps | |
| UNIT V Digital Cartography | Digital Cartography: Adaptation of Computer in Cartography – Components of digital Cartography - advantages – disadvantages of digital cartography - Conventional mapping Vs Digital Mapping. | |

Text Book

1. Arthur H. Robinson et al. Elements of Cartography, John Wiley & Sons, New York, 2002.

Reference Books

1. LO, C.P. and Albert K.W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice-Hall of India, New Delhi, 2009.
2. Misra, R.P. and Ramesh, A., Fundamentals of Cartography, Concept Publishing Company, New Delhi, 2002.
3. Cartwright .W, Gartner G. ALehn (Eds.), Cartography and Art, Springer – Verlag Berlin Heidelberg, 2009.
4. Anji Reddy, M, Geoinformatics for Environmental Management, BS Publications, Hyderabad, 2004.
5. Menno-Jan Kraak, Ferjan Ormeling, Cartography Visualization of Geospatial Data, Pearson Education Pvt Ltd, New Delhi, 2005.

E-Learning Resources

1. Fundamentals of General Cartography,
http://164.100.133.129:81/econtent/Uploads/Fundamentals_of_General_Cartography.pdf
2. Cartography – a tool for spatial analysis, <https://www.pdfdrive.net/cartography-a-tool-for-spatial-analysis-d39693639.html>

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| 18PSTP0103 | <u>Core Course</u> IT for Spatial Technologies | 3 Credits |
| Course Objective : This course offers basic knowledge about hardware and software used in Spatial technologies, GPS and Remote sensing and creates awareness about the user security. | | |
| Course Outcome: | | |
| CO1. Understand about computer hardware and software | | Understand |
| CO2. Know about usefulness of computers in Spatial Technologies | | Analyze |
| CO3. Understand about the Internet and net works | | Understand |
| CO4. Gather the information from the internet /Google Earth & maps | | Apply |
| CO5. Understand Mobile computing | | Understand |
| UNIT I Hardware | The computer system - types of computers - foundations of modern technology - types of memory – buses - Communication with peripherals – Inputs output devices: Modern output - display screens – printers - secondary storage - Modern Storage: storage media - floppy disk, hard disk drive and optical disk – pen drive – memory card- blue ray - backing up of data. | |
| UNIT II Software | Software: User interface - application programs - Operating systems - file management and utilities –Cloud computing – Data base management system – Data mining – Big data Analytics - major software issues - Global Positioning System - applications of IT in GPS - Remote Sensing - GIS Cartography - Real Time GIS. | |
| UNIT III Internet | Introduction to World Wide Web and Web - Client server technology - Foundations of modern networks – LAN and WAN - introduction, architecture and system - Some Internet Applications : Email, Information browsing and data retrieval from the web, (audio /video/ pictures, animation) use of Google maps and Google earth. | |
| UNIT IV Mobile Computing | Mobile Computing – Wireless application Protocol – blue tooth- IR transmission - Video Conferencing- Virtual reality - GIS Mobile apps – VoIP – 3G , 4G and 6G technologies – VoLTE. | |
| UNIT V Security | Personal, Social and Ethical Issues: Computers and health - viruses – Anti-viruses - cyber crime – cryptography. Concept of fire wall - network security - wireless technology and security - Virtual Private Network. | |

Text Book

1. Dennis P. Curtin, Kim Foley, Kunal Sen & Cathleen Morin, Information Technology - The Breaking Wave, Tata McGraw Hill Ed., 1999.

Reference Books

1. Rajaraman V., Fundamentals of Computers, 4/e, Prentice Hall of India, New Delhi, 2008.
2. Alex Leon, Fundamentals of Information Technology, Leon Techno Publications, Chennai 2008
3. Cryptography and Network Security, William Stallings, 1999, 5th Edition, Pearson Education, Inc., publishing as Prentice Hall.
4. Borko Furht Armando Escalante, Handbook of Cloud Computing, Springer Publications, 2010.
5. Tomasz Imielinski, Henry F. Korth, Mobile Computing, Kluwer Academic Publishers, 1996.

E-Learning Resources

1. Operating System: <http://nptel.ac.in/courses/106106144/>
2. Cloud Computing : <http://nptel.ac.in/courses/106106129/28>
3. Mobile Computing: <http://nptel.ac.in/courses/106105167/1>

| 18PSTP0104 | Core Course Geographical Information System | 3 Credits |
|---|--|------------------|
| Course Objective: The course provides knowledge on Geographical Information System, data structures, methods to input and editing data into GIS, basic tools of GIS, GIS outputs and the recent development in GIS. Thus providing a strong foundation in GIS. | | |
| Course Outcome: CO 1. Understand GIS and methods of data input and editing. Understand CO 2. Apply various tools of GIS Apply CO 3. Get knowledge on different forms of GIS outputs Understand CO 4. Know the recent developments in GIS. Understand | | |
| UNIT I Basics of GIS | GIS – scope – components – Data used in GIS - sources of spatial and attribute data - data structure - raster and vector - Modeling third and fourth dimension - integration of spatial and attribute data | |
| UNIT II Data input and editing | Data Input methods: Keyboard – scanning - digitization – electronic data transfer - Data editing: Checking and correcting errors in spatial and attribute data - transformation – edge matching - rubber sheeting – building integrated database – cloud computing - big data analysis – spatial data mining | |
| UNIT III Data analysis | Measurement - queries – reclass – buffer - overlay - spatial interpolation – surface analysis - network analysis. | |
| UNIT IV GIS outputs | Maps as output – Thematic Maps - spatial multimedia – delivery mechanism - map as a decision tool. | |
| UNIT V Trends in GIS | Trends in GIS: Easy access to digital data – Location based services - hardware revolution – software trends – Future Issues. | |

Text Book

1. Ian Heywood, Sarah Cornelivs and Steve Carver, An Introduction to Geographical Information System, 3rd Edition, Pearson Education Pvt .Ltd., New Delhi, 2010.

Reference Books

1. Peter A. Burrough and Rachael A. Mc. Donnell, Principles of Geographical Information System, 3rd Edition, Oxford University Press Inc., New York, 2015.
2. David Martin, Geographic Information Systems, Routledge, London, 2002.
3. Kang-tsung chang, Introduction to Geographic Information Systems, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2006.
4. LO C.P. and Albert K.W. Yeung, Concepts and Techniques of Geographic Information Systems, Prentice-Hall of India, New Delhi – 2009.

E-Learning Resources

1. Shahab Fazal, GIS Basics, New Age International Publishers, New Delhi, 2008, <https://www.pdfdrive.net/gis-basics-e19526515.html>
2. Francis Harvey, A Primer of GIS, The Guilford Press. London, 2008 <https://www.pdfdrive.net/primer-of-gis-e38168527.html>
3. Otto Huisman, Rolf A.de. By, Principles of Geographic Information System, ITC, Netherlands, 2009.

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|---|--|------------------|
| 18PSTP0105 | <u>Core Course</u> Remote Sensing and DIP | 4 Credits |
| <u>Course Objectives :</u> The course enables the students to understand the basic concepts of remote sensing, aerial photographs, photogrammetry and Digital Image Processing | | |
| <u>Course Outcome :</u> | | |
| | CO1. Understand the basic concepts of remote sensing. | Understand |
| | CO2. Understand aerial photography and photogrammetry. | Understand |
| | CO3. Understand various digital data and preprocessing stages in DIP. | Understand |
| | CO4. Understand image enhancement and classification in DIP | Understand |
| UNIT I Remote Sensing - I | Remote sensing: History and development - components of remote sensing – Electro Magnetic Spectrum - Energy interaction with atmosphere and Earth (Rocks, Soil, Water, Vegetation etc.,) Resolutions (Spectral, Spatial, Temporal & Radiometric) - Optical Remote Sensing: Basic concepts - Optical sensors and scanners | |
| UNIT II Remote Sensing - II | Thermal Remote sensing & Microwave remote sensing - data formats and systems, - Major satellite systems: Sensors and data products of IRS, LANDSAT, SPOT, ERS, IKONOS, Quik Bird, ORBVUEW, ASTER, MODIS, WORLD VIEW, AVIRIS, CASI, MODIS and Hyperion | |
| UNIT III Aerial Photography and Photogrammetry | Aerial photography: Historical development – definition, types of aerial photography and uses, Planning and execution – ground control for aerial photography Photogrammetry: Definition, history of Photogrammetry - Geometry of vertical aerial photograph, scale of vertical aerial photograph, relief displacement.- Stereoscopic parallax - Aerial triangulation - Digital Photogrammetry- use of GPS in Photogrammetry | |
| UNIT IV Digital Image Processing - I | Digital Data: Basic Characteristics of digital image - data type and file format.- Data acquisition and interpretation- Use of multiple images- multi-station – multi-band – multi-date - multi-stage – multi-polarization – multi-direction – multi-spectral. Digital Image Processing: Introduction - stages in digital image processing - Preprocessing: geometric correction, atmospheric correction and radiometric correction | |
| UNIT V Digital Image Processing - II | Image Enhancement - Image classification: Supervised – unsupervised – Hybrid- Fuzzy Classification - Hyperspectral Image Processing - Output Generation: graphic products - tabular data - digital files - post classification smoothing - data merging - change detection procedures - image transmission and compression. | |

Text Books

1. Edward M. Mikhail , James S. Bethel , J. Chris McGlone (2001), Introduction to Modern Photogrammetry ,Wiley
2. M. Anji Reddy, Textbook of Remote Sensing and Geographical Information systems, BS Publications, Hyderabad. 2011. ISBN: 81- 7800-112-8

Reference Books

1. Lillesand M. Thomas and Ralph W.Kiefer, Remote Sensing and Image Interpretation, 6th Edition, John Wiley & Sons, New York, 2017.
2. Avery T.E., and G.L.Berlin, 19085, Interpretation of Aerial Photographs, 4th Ed, Bergess, Minneapolis, Minn, 34-908.
3. Betnstein, R. 19708, Digital Image processing for remote Sensing, IEEb Press, New York, 26-64.

4. Bruno Marcolongo and Franco Mantovani, 1997, Photogeology, Remote sensing Applications in Earth science, Oxford and IBH Pub. Co Pvt. Ltd., New Delhi, 12-1008.
1. Schowengerd R .A. 1995 Techniques for Image processing and classification in Remote Sensing, Academic Press. New York.

E-Learning Resources

1. Remote Sensing www.gisdevelopment.net/books/mapping/bmap0010.htm
2. Digital Image Processing <http://www.esri.com/>

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|---|---|------------------|
| 18PSTP0106 | <u>Core Course</u> Practical I – Geographical Information System | 2 Credits |
| <u>Course Objective:</u> The course imparts knowledge on ACAD and ArcGIS software. | | |
| <u>Course Outcome :</u> | | |
| CO 1. Use of AutoCAD tools in georeferencing and digitization. | | Apply |
| CO 2. Exposure to basic tools of ArcGIS. | | Understand |
| CO 3. Analyze the spatial data with appropriate tools in ArcGIS. | | Analyze |
| CO 4. Design a map layout. | | Apply |
| <ol style="list-style-type: none"> 1. Appreciation of General purpose/ thematic maps and their interpretation – spatial objects – data dictionary 2. AutoCAD: data input – georeference – digitization – export to GIS. 3. Rectification: Survey of India toposheet – satellite image – large scale map - setting projections – GIS database creation 4. Spatial and attribute data entry, editing and their joining in GIS 5. Working with tables and layer properties – creation of new layer based on selection 6. Methods of data analysis I : Measurement - Buffer – overlay– spatial interpolation – reclass – TIN – DEM 7. Methods of data analysis II: Network analysis – surface analysis tools 8. Map algebra – building models 9. Map Design and Layout | | |

| | | |
|--|---|------------------|
| 18PSTP0107 | Practical II Remote Sensing and Digital Image Processing | 2 Credits |
| Course Objective: The course provides hands on experience on visual interpretation of different satellite images and digital image processing techniques. | | |
| Course Outcome CO1. Interpret aerial photographs, satellite images Apply CO2. Transfer of information from Image to base map Apply CO3. Preprocessing and enhancement of satellite data. Apply CO4. Apply Unsupervised & supervised classification techniques and analyze the accuracy. Apply & Analyze CO5. Apply change detection technique. Apply CO6. Analyze hyperspectral image. Analyze | | |
| REMOTE SENSING 1. Stereovision Test and Anatomy of pocket, prism & Mirror Stereoscopes. 2. Decoding, Marking & Transfer of Principal Points, Base line drawing, Flight line marking, 3D Observation, Tracing details, Transfer the details to base map. 3. Interpretation of Aerial photographs 4. Study of various visual Remote Sensing Equipments 5. Decoding of different Satellite data 6. Interpretation of Black & White and false color multi band imagery 7. Interpretation of Thermal and microwave imagery 8. Transfer of information from Imagery to Base map DIGITAL IMAGE PROCESSING 1. Reading and displaying satellite data from BIL,BSQ and BIP formats 2. Generating True, False and Pseudo Colour Composite (FCC) 3. Extracting / Subset area of Interest (AOI) 4. Measuring length, distance and area. 5. Generating histograms of various bands 6. Georeferencing the base image, Image to Image, Map to Image – Geometric correction of satellite image 7. Mosaic 8. Enhancement using different filtering techniques, Image Fusion 9. Principal Component Analysis (PCA) 10. Band ratio and NDVI 11. Unsupervised Classification – Cluster - Iso cluster 12. Supervised Classification 13. Accuracy Assessment 14. Change detection study 15. Layout Preparation 16. Hyper spectral Image Analysis | | |

S E M E S T E R - 2

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|---|--|------------------|
| 18PSTP0208 | <u>Core Course</u> Global Navigation Satellite System | 3 Credits |
| <u>Course Objectives:</u> The course provides the basics of GPS, surveying and its applications. | | |
| <u>Learning Objectives</u> | | |
| | CO1. Understand fundamental of GPS. | Understand |
| | CO2. Understand different GPS satellites and systems. | Understand |
| | CO3. Understand different types of GPS and its techniques. | Understand |
| | CO4. Analyze error and basics of LASS & WASS. | Analyze |
| | CO5. Apply GPS in various fields. | Apply |
| UNIT I Introduction to GPS | History of GPS - Advantages and limitations of GPS - Segments of GPS - Control segment - Space segment - User segment - Geo positioning: Point positioning - Relative Positioning. Static Positioning – Kinematics Positioning- Uses of GPS | |
| UNIT II GPS Systems | GPS systems - NAVSTAR GPS – GALILEO – GLONASS – IRNSS – MTSAT - Beidou – Compass - GPS receivers based on: data type and yield - realization of channel – user community - Signal structure: carrier ranging, ranging code and navigational message | |
| UNIT III GPS Surveying | Basic modes of GPS surveying: Differential GPS surveying vs static GPS surveying. Rapid static positioning technique - Reoccupation technique - Stop & go technique. Kinematic positioning technique - Relative advantages and disadvantages - Data transfer and analysis | |
| UNIT IV Sources of error | Sources of error: Ionospheric and atmospheric delays - satellite and receiver clock error - anti spoofing - selective availability - multi path - dilution of precision - Error correction - Number and geometry of visible satellites - location of GPS receiver - distance between base station and rover receiver - signal to noise ratio - occupation time at a point - differential correction - WAAS, LAAS | |
| UNIT V Applications | GPS applications - Siting and routing - surveying - navigational application - vehicle tracking - mobile computing - military application - Precision Farming | |

Text books

1. Satheesh Gopi, Global Positioning System Principles and Applications. Tata McGraw-Hill Publishing Company Limited, New Delhi, 2005.
2. Ahmed el Rabbany, Engineer's Guide to GPS (Mobile Communications Library) (English) 1st Edition, Artech House Publishers, 2002

Reference Books

1. Hofmann-Wellnhof, B., Lichtenegger, H., and Collins, J., GPS theory and Practice, Springer (India) Private Limited, New Delhi, 2007.
2. Michael Kennedy, 'The Global Positioning System and GIS: An Introduction', Taylor and Francis Inc. New York, 2002.
3. Leick Alfred, GPS Satellite Surveying, Third Edition, John Wiley & Sons, Inc., Hoboken, New Jersey, 2004.
4. Seeber, G., Satellite Geodesy, Walter de Gruyter, Berlin, 1993.
5. Alfred Leick, GPS Satellite surveying, John Wiley and Sons, 1995. Hofmann Wellnhof, B., Lichtenegger, H. and Collins, J., Global Positioning System, SorinQer - Verlag, New York, 1994.

E.learning Resources

1. Basics of GNSS <http://www.palowireless.com/gps/>
2. GPS applications <http://www.maps-gps-info.com/ed-resources.html>

| 18PSTP0209 | <u>Core Course</u> Spatial Technologies in Resource Management | 3 Credits |
|---|--|------------------|
| Course Objectives: The course enables the students to apply various tools of geoinformatics in different fields. | | |
| Course Outcome: CO1. Apply Geoinformatics in Land resource management CO2. Apply Geoinformatics in Water Resources Management CO3. Apply Geoinformatics in Agriculture and Forestry CO4. Apply Geoinformatics in Utility management CO5. Apply Geoinformatics in Environmental and Oceanography | | |
| UNIT I Land Resource Management | Introduction – importance – problems - soil erosion estimation using RUSLE/USLE Land Classification System – FAO- USDA- land capability assessment – crop suitability – Land use / Land cover – classification – change detection - land use planning: Rural and urban - Land Reclamation –Land Information System - DSS for Land use planning and management | |
| UNIT II Water Resource Management | Introduction – Water Conservation - Ground water investigation - artificial recharge zone identification – Command area Program - water quality monitoring - surface water harvesting structure - flood prediction - Model - sedimentation evaluation - watershed approach for natural resource management – runoff and hydrological modeling | |
| UNIT III Agriculture & Forestry | Introduction , Spectral properties of crops, crop canopy , identification & inventory, Yield modeling, crop production forecasting through digital analysis, crop condition assessment and monitoring, land use and land cover analysis, Microwave RS for crop inventory & case studies.precision forming Introduction, Forest taxonomy, inventory of forestlands, forest types and density mapping using RS techniques, Forest stock mapping, factors for degradation of forest, - Forest change detection and monitoring , Forest fire mapping & damage assessment , LiDAR remote sensing for Forest studies. | |
| UNIT IV Facilities Management | Infra structure demand analysis - Transportation interaction models – intelligent transportation systems - Transportation planning – mapping transportation - network – classification – optimum route – alignment planning – traffic and parking studies accident analysis - Water utility and electrical utility -telecommunication – tower spotting – route optimization – other utilities - Sitting a new facility - customer loyalty studies - health information system - Crime Analysis: mapping crime data - hot spot analysis - solid waste management | |
| UNIT V Environmental & Oceanographic applications | Environmental types and components – pollution: Air – Water – Soil and Noise – Environmental Impact Assessment - Environmental Information System - GIS and RS in Environmental Studies - Environmental and ecological concerns – resource development in remote areas - impacts of anthropogenic activities Introduction – Major issues/problem – wetland classification - Thematic maps on coastal resources – site suitability analysis for aquaculture – Coastal Regulation zone – Coastal aquifer modelling using GIS – Integrated coastal Zone Management | |

Text Books

1. Fundamentals of Remote Sensing. George Joseph. Universities Press (India) Pvt Ltd, 3-5-819 Hyderguda, Hyderabad 500 029. 2003. 433 pp.
2. C.S. Agarwal and P.K. Garg. Text Book on Remote Sensing in Natural Resources, Monitoring and Management.2000. Wheeler publishing Co & Ltd., New Delhi.

Reference Books

1. Lo.C.P. and Yeung, Albert KW, Concepts and Techniques of Geographic Information System, Prentice Hall of India, 2002.
2. Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press, 1996.
3. Laura L., Managing Natural Resources with GIS, ESRI Press, 1998.
4. Alan L., MD Melnick, Introduction to Geographic Information Systems for Public Health, Aspen Publishers, 1st Edition, 2002.
5. Amim Hammad, Hassan karimi, Telegeoinformatics: Location-based Computing and Services, CRC Press, 1st Edition, 2004

E- Learning Resources

1. Facilities Management <http://elearning.irrs.gov.in>, www.geospatialworld.net/edu.
2. Water Resource Management, Forestry <http://onlinecourses.nptel.ac.in>

| 18PSTP0210 | <u>Core Course</u> Spatial Technologies in Disaster Management | 3 Credits |
|--|---|-----------|
| Course Objective: The course enables the students to apply various tools of geoinformatics in different fields. | | |
| Course Outcome: CO1. Apply Geoinformatics in Disaster mitigation and management | | |
| UNIT I | Disaster Management Concepts of disaster; Types of disaster Natural and manmade : Definition - Classification – Causes - Earthquakes – Landslides - Volcanism - Tsunami-Cyclones – Floods - Drought - Forest Fire | |
| UNIT II | Vulnerability – Hazard – Risk Assessment - Natural Disaster Mapping, Management and mitigation using Geoinformatics Technology. | |
| UNIT III | Remote sensing in, Damage assessment, Land use planning and regulation for sustainable development. Pre-disaster and post disaster planning for relief operations, Development of Disaster management plan. | |
| UNIT IV | Emergency Support Functions and their coordination mechanism. Resource & Material Management. Management of Relief Camp | |
| UNIT V | Information systems & decision making tools - Rehabilitation Programs | |

Text Books

1. Bell, F.G. Geological Hazards: Their assessment, avoidance and mitigation. E & FN SPON Routledge, London. 1999.
2. Nick Carter. W. Disaster Management -A Disaster Manager's Handbook. Asian Development Bank, Philippines. 199.

Reference Books

1. Sisizlatanova & Andrea Fabbrijonathanli, Geometrics solutions for Disaster management, Springer Verlag, 2007.
2. C.EmdadHaque, Mitigation of natural Hazards & disasters, Kluwer Academic publishers group, 2005. 3. Linda C. Bottersl I& ponald A. wilhite, From Disaster response to Risk management. Kluwer Academic publishers group, 2005.
3. Gerard Blokdiijk, Disaster recovery planning and services, Gennaio publishers, 2008. 5. Mohamed Gad Large scale disasters : prediction, control and mitigation, Cambridge university press, 2008

E-Learning Resources

1. <http://elearning.irrs.gov.in>
2. <http://onlinecourses.nptel.ac.in>
3. www.imd.gov.in

| | | |
|---|--|------------------|
| 18PSTP0211 | <u>Core Course</u> Spatial Decision Support System | 3 Credits |
| Course Objective: The course exposes the students to decision making and concepts of spatial decision support system | | |
| Course Outcome: | | |
| CO1. Understand the concept, architecture and frame work of SDSS and decision variables | | |
| CO2. Learn about various ranking, rating and comparison methods involved in decision modeling | | |
| CO3. Gain knowledge on types of decision modeling | | |
| CO4. Apply the SDSS in specified areas | | |
| UNIT I Introduction | Introduction to Information and Decision Making - Concept and Characteristics of Spatial Decision Support Systems (SDSS) – Architecture of SDSS - Framework for Spatial Decision modeling - Spatial Decision Support System (SDSS) and GIS | |
| UNIT II Decision Variables | Decision variables - Concept – Deterministic, Random - Decision Alternatives and Constraints - Efficiency and Effectiveness of Decision Making | |
| UNIT III Estimation of Weights | Concept of Estimating Weights – Ranking Methods – Rating Methods – Pairwise comparison methods – Trade off analysis methods – their comparisons – Decision Rules. | |
| UNIT IV Decision Modeling | Concept and types of Multi-attribute Decision modeling – Multi objective Decision Modeling – Sensitivity Analysis – Maps as Decision tools. | |
| UNIT V Areas of Application | Land Suitability Analysis - Water Resources Management – Education and Health Care Resources location – Industry and Business– Site Selection. | |

Text Book

1. Ramanathan Sugumaran and John Degroote, Spatial Decision Support Systems- Principles and Practices, CRC Press, Taylor and Francis Group, USA, 2011.

Reference Books

1. Bonczek, R.H., C.W. Holsapple, and A.B. Whinston, 1981, Foundations of Decision Support Systems, Academic Press, New York.
2. House, W.C. (ed.), 1983. Decision Support Systems, Petrocelli, New York.
3. Jenson, J.R. 2000, Remote Sensing of the environment – An Earth Resource Perspective, Prentice Hall Inc.
4. Malczewski, J. 1999, GIS and Multicriteria Decision Analysis, John Willey and Sons, New York.
5. Raghu Ramakrishnan, 2002, Database Management Systems, Johannes Gehrke, McGraw- Hill.

| 18PSTP0212 | Core Course Dissertation | 4 Credits |
|---|-------------------------------------|------------------|
| <ul style="list-style-type: none"> ▪ The project shall be selected in connections with the internal guide at the beginning of the semester ▪ A proposal is prepared with details of objectives, methodology and expected outcome. ▪ The following are the steps: ▪ Identification of a problem in consultation with internal guide ▪ Executing the work as per the instructions of both internal and external guide while incorporating any of the following activities or combination of activities <ul style="list-style-type: none"> ▪ Designing of Geoinformatics ▪ GIS implementation and application ▪ Map server design ▪ RS application ▪ GPS application ▪ Spatial modeling or such other related topics, which will give focus to Geoinformatics implementation ▪ The size of the dissertation may be between 50 and 70 pages, which is not inclusive of scripts and other appendices ▪ The dissertation should be submitted both in print form and digital form (pdf / crystal reports). | | |

| 18PSTP02F1 | Extension / Field Visit |
|--|--------------------------------|
| <ul style="list-style-type: none"> ▪ Creation of GIS for all UBA villages | |

| 18PSTP02E1 | <u>Major Elective</u> Geography | 4 Credits |
|--|---|------------------|
| Objective: The course provides an outline about geography and its basic branches such as geomorphology, climatology and oceanography. | | |
| Course Outcome: | | |
| CO1. | Understand basics of Geography. | Understand |
| CO2. | Understand the Geomorphological features and created by various weathering agents. | Understand |
| CO3. | Understand the concept of climate & weather & temperature | Understand |
| CO4. | Understand the distribution of atmosphere pressure, wind and precipitation | Understand |
| CO5. | Understand the surface configuration of ocean floor, distribution of temperature & salinity, circulation of ocean | Understand |
| UNIT I Geography | Basics of Geography – Scope – approaches to study geography: systematic – regional – regional – methods - and techniques of geography: cartography – quantitative – regional – branches of geography | |
| UNIT II Geomorphology | Geomorphology - nature and scope – application of geomorphic techniques - earth's interior – origin of continents and ocean basins - concept of plate tectonics – earth movements: orogenetic and epirogenetic movements – Isostasy – Mountain building . Earthquakes – Volcanoes – Rocks – origin – types - characteristics; Weathering - Fluvial landscape –Karst topography – Coastal topography; Glacial landscape – Eolian landscape | |
| UNIT III Climatology I | Climate/ Weather: Significance of climatology – Climatic elements – Surface composition and structure of the atmosphere – Insolation - Horizontal and vertical distribution of temperature - Range of temperature – Diurnal, seasonal and annual | |
| UNIT IV Climatology II | Atmospheric pressure and winds – Vertical and horizontal distribution of pressure – Planetary, periodic and local winds – Atmospheric moisture – Condensation forms and precipitation – Types – Spatial and seasonal - Air masses and fronts – Concepts – Classification and properties - Atmospheric disturbances - Tropical cyclones – Temperate cyclones and anti-cyclones | |
| UNIT V Oceanography | Oceanography: Definition – Surface configuration of the ocean floor – Continental shelf, slope, deep sea plain and deeps –Distribution of temperature and salinity in the seas/oceans - Circulation of oceanic waters - Waves, tides and currents - Marine deposits and coral reefs. | |

Text Book

1. Surender Singh, Geography, Tata McGraw-Hills Series, New Delhi, 2007

Reference Books

1. Thornbury, W. D. (1960): Principles of Geomorphology, John Wiley and Sons, New York.
2. Chorley, R. J., Schumm, S. A. and Sugden, D. E. (1984): Geomorphology, Methuen, London
3. Savindra Singh (2002): Physical Geography, Prayag Pustak Bhawan, Allahabad.
4. D. S. Lal: Climatology. Sharda Pustak Bhawan ,11 , University road Allahabad- 211002 Edition, 2003
5. Frederick K. Lutgen, Edward Tar buck: “The Atmosphere An Introduction to Meteorology” Prentice Hall, Englewood Cliffs ,New Jersey 0762 ,1998

E-Learning Resources

1. Fundamentals of Physical Geography, <https://www.pdfdrive.net/fundamentals-of-physical-geography-d564637.html>
2. Climatology, <https://www.pdfdrive.net/climatology-e34719617.html>

| 18PSTP02E2 | Major Elective Course Geology | | 4 Credits |
|--|--|--|------------------|
| Course Objective: The course exposes the students to geology and its branches such as landforms, minerals and rocks, geophysical exploration and its applications. | | | |
| Course Outcome: CO1. Understand structure of earth, geological structures and tectonic activities Understand CO2. Understand various geomorphic units, unconformity Understand CO3. Understand distribution of minerals, rock types, occurrence and distribution and economic minerals in India Understand CO4. Apply various geophysical methods for Resources Inventory Apply CO5. Apply geological techniques for natural resources inventory Apply | | | |
| UNIT I Introduction to Geology | Introduction: Geology for natural resources inventory - Branches of geology – Scope - Interior of the Earth - Stratigraphic sequence, Geological Time scale - Weathering, - Introduction to geological structures - Plate Tectonics – Earthquake and volcanic belts in India | | |
| UNIT II Geomorphic and Structural landforms | Landforms and geomorphic process – Classification - Description of Structural, Denudational, Tectonic Fluvial, Glacier, Aeolian and Coastal landforms - Drainage pattern and Morphometry - Primary and Secondary structures - Dip - Strike - Foliation and Lineation - Folds- faults – Joint – Unconformity | | |
| UNIT III Minerals & Rocks | Introduction to Minerals – Physical properties - Chemical properties - Rock Cycle – Classification and description of rocks - Forms and mode of occurrence of rocks – Physical properties of important rocks and ore forming minerals - Distribution of economic minerals in India. | | |
| UNIT IV Geophysical Exploration | Geophysical methods - Seismic, Electrical, Gravity - Magnetic and aeromagnetic methods - their bearing on Resources Inventory | | |
| UNIT V Applications | Resources Inventory: Mineral – Water – hydrocarbon – Soil resources - Natural Disaster Management and Mitigation – Engineering Applications : Site selection & Construction of major structures like Dam, Tunnel, Road, Railway etc. - Artificial recharge structure, Natural disaster mitigation structures | | |

Text books

1. Frank Press Raymond Siever: Understanding Earth (3rd ed). W.H. Freeman and Company. New York . 2000
2. B. J. Skinner and S.C. Porter: The Dynamic Earth – An Introduction to Physical Geology 3rd edition. John Wiley & Sons, New York. 1995

Reference Books

1. Arthur Holmes, (1992) Principles of Physical Geology, Edited by Duff.P.Mcl.D.4th Ed. Chapman and Hall, London.
2. Billings, M. P. Structural Geology, Prentice-Hall, Inc, New Jersey, USA, 1972
3. George Joseph, Fundamentals of Remote Sensing, Second Edition, Universities Press (India) Private Limited, 2005 ISBN 8173715351, 9788173715358.
4. Lillesand M. Thomas and Ralph W.Kiefer, Remote Sensing and Image Interpretation, 6th Edition, John Wiley & Sons, New York, 2017
5. Ravi P. Gupta, Remote Sensing Geology, Springer-Verlag New York, 2002.

E-Learning Resources

1. Introduction to Geology <http://www.tulane.edu/~sanelson/eens1110/>
2. Applications www.gisdevelopment.net/books/mapping/bmap0010.htm

| 18PSTP02E3 | Major Elective Course Watershed Management | 4 Credits |
|--|--|------------------|
| Course Objective: The Course explains about meaning of watershed, watershed development programmes, use of Geoinformatics in watershed planning, monitoring and evaluation. | | |
| Course Outcome: | | |
| CO1. | Able to define goals and objectives of watershed management. | Understand |
| CO2. | Understand the national, State, regional, and local policies of watershed Management. | Understand |
| CO3. | Application the tools of Geoinformatics in delineate on watershed | Apply |
| CO4. | Develop and implement a watershed management plan with the use of various thematic maps. | Apply |
| CO5. | Apply various tools of PRA and Geoinformatics in monitoring and evaluation of watershed plans. | Analyze |
| UNIT I Introduction | Watershed – definition – causes and consequences of watershed deterioration - Watershed delineation and codification – watershed approach – advantages – watershed as a unit of planning - Watershed management – approaches to watershed development – principles and components of watershed management | |
| UNIT II IWMP | Integrated Watershed Management Programme: Introduction – institutional arrangements – livelihood orientation – cluster approach – scientific planning – capacity building – multi tier approach - Criteria for selection of watershed projects – project management: Preparatory phase – work phase – consolidation and withdrawal phase. | |
| UNIT III Planning | Role of Geoinformatics in scientific planning: watershed delineation - Baseline survey/ bench mark survey - evaluation of deterioration – acquiring data – preparation of various thematic maps – scientific planning | |
| UNIT IV Monitoring | Monitoring: Meaning – factors – indicators - learning outcome/ result | |
| UNIT V Evaluation | Evaluation: Focus – need for – types of evaluation: Community participation – PRA methods of Evaluation; Areas of Evaluation: Depth of water table – cropping pattern – area under biomass – various Land use/ land cover – water body | |

Text Books

1. N.D. Mani, Watershed Management: Principles, Parameters and Programmes, Dominant Publishers and Distributors, New Delhi, 2005

Reference Books

1. Paul A.DeBarry, PE,PH,APSS, “Watersheds Process, Assessment and Management”, Wiley Student Edition, New Jersey, 2004
2. Srivastava, O.N. and Y.V. Rao, "Impact of Integrated Wasteland Development Programme (IWDP) - A Study in Uttar Pradesh, National Institute of Rural Development, Hyderabad, 2001.
3. Raj Vir Singh, "Watershed Planning and Management", Yash Publishing House, Bikaner, 2001.
4. E.M. Tideman, “ Watershed Management guidelines for Indian Conditions”, Omega Scientific Publisher, New Delhi, 2006
5. J.V.S.Murty, “Watershed Management”, New Age International, New Delhi, 2007

E-Learning Resources

1. Land Stewardship in the 21st Century: The Contributions of Watershed Management, <https://www.pdfdrive.net/land-stewardship-in-the-21st-century-the-contributions-of-watershed-management-e36318879.html>
2. Watershed Management Guidebook – Integrated Environmental,

| | | |
|---|--|------------------|
| 18PSTP02E4 | Major Elective Course Web Technology for Spatial Technologies | 4 Credits |
| Course Objective: This course provides the basic knowledge about the Internet & Web Technology for Geoinformatics | | |
| Course Outcome: CO 1. Understand the basics of Internet Understand CO 2. Knowledge about markup and scripting languages Understand CO 3. Understand the basic concepts on PHP and AJAX Understand CO 4. Describe about WebGIS Understand | | |
| UNIT I Internet | Internet – overview – Networks – TCP-IP – web organization and address- ports – packets – routers and routing – Web browser and Servers – Client Server architectures – Security. | |
| UNIT II Markup languages | Markup Languages- HTML- XML – DHTML – XHTML - Style sheet technologies – creating dynamic web pages. | |
| UNIT III Scripting Languages | Scripting languages: Introduction- Java script, VB script, ASP, Java script: Introduction, documents, forms, control structure, functions, and objects. | |
| UNIT IV PHP and AJAX | Introduction – PHP –variables – Control statements – Functions – Built-in-function-Data base connections. AJAX: Introduction, advantages & disadvantages, Purpose, AJAX based web application, alternatives of AJAX. | |
| UNIT V WebGIS | WebGIS: basics and services - components of WebGIS - concept of map and software repository - scripts and data management system uses and limitation. | |

Reference Books

1. Andrew S. Tanenbaum, David J, Computer networks, Pearson, 2011.
2. Pinde Fu, Jiulus S: Web GIS: Principle and Applications, ESRI Press, 2011.
3. Powel, HTML and CSS: The Complete Reference, 5th Edition, Tata McGraw Hill.
4. David Flanagan Java Script: The Deinitive Guide O’ Reilly
5. Antony T Holdener Ajase the Definitive Guide O’Reilly

E-Learning Resources

1. Internet: <http://nptel.ac.in/courses/106105084/25>
2. Javascript: <http://nptel.ac.in/courses/106105084/25>

| 18STP02E6 | Major Elective Open Source Data and Software | 4 Credits |
|--|---|------------------|
| <p>Course Objective : This course provides basics of on open source data and software for research and development. It helps the candidate to think creatively and independently in Spatial technologies project implementation.</p> | | |
| <p>Course Outcome: CO 1. Understand the concept and protocols of Open Source Data and Software. Understand CO 2: Use of Open source satellite and statistical Data Apply CO 3: Understand working concept of open source GIS software Understand CO 4: Describe functions of open GEO apps Understand CO 5: Summarise about web mapping Understand</p> | | |
| <p>UNIT I Introduction and Linux OS</p> | <p>Introduction to Open source – Importance – Need – Advantages – Applications. Open source operating systems LINUX: Introduction – General Overview – Kernel Mode and user mode – Process – Advanced Concepts.</p> | |
| <p>UNIT II Open Source Data</p> | <p>Open Source Spatial Data: Satellite Data- NOAA, Earth Explorer, Bhuvan, Sentinel, Google Earth, Toposheet - University of Texas VectorData: Openstreet map, Geofabrik, Natural Earth Data, Opentopography, GSHHG. Open Source Attribute Data: National Information Centre, Census of India, Statistical Year Book, India Stat, India Water Portal, Indian Water Resource Information System (IWARIS), and NRDMS.</p> | |
| <p>UNIT III Open Source Software</p> | <p>Open source Software- Introduction to Open source tool kit - Openjump – GRASS – ILWIS – Geoda - QGIS - SagaGIS - Map window - PostGIS.</p> | |
| <p>UNIT IV Mobile Geo Apps</p> | <p>Mobile Geo apps: Weather, wind speed/direction, Air pollution, Noise pollution, GPS essentials, Geo data collect, Geo Track, Geo area Map, Geo Camera , My Geo.</p> | |
| <p>UNIT V Web Map</p> | <p>Web Mapping: Open source tool kit - Introduction to digital mapping – Merits and demerits of web mapping – Different kinds of web mapping - Openlayers, GeoServer.</p> | |

Reference Books

1. Markus Neteler, Helena Mitsova, Open Source GIS: A GRASS GIS Approach, Edition, Springer 2007.
2. Neteler, M and H.Mitsova, Open Source GIS. A GRASS GIS Approach, Kluwer Academic Publishers, Boston, USA/London, UK, 2008.
3. Qgis: <https://www.packtpub.com/application-development/mastering-qgis>
4. Machtelt Garrels Introduction to Lmux beginner Guide
5. Pride Fu, Julius S : WebGIS: Principle & Application, ESRI Press, 2011

E-Learning Resources

1. Linux Operating System: <http://nptel.ac.in/courses/106106144/>
2. Javascript: <http://nptel.ac.in/courses/106105084/25>
3. SciLab: <http://nptel.ac.in/courses/113101002/5>

| | | |
|---|---|------------------|
| 18PSTPO2MX | <u>Modular Course</u> Spatial Modeling | 2 Credits |
| Course Objective: The course offers details about spatial model building using GIS. | | |
| Course Outcome: | | |
| CO 1. Understand and classify spatial models | | Understand |
| CO 2. Describe various types of spatial models | | Understand |
| CO 3. Understand surface models | | Understand |
| CO 4. Summarize spatial data mining | | Understand |
| CO 5. Understand the future direction in spatial modeling | | Understand |
| UNIT I Spatial Modelling | Development, Definition, Classification and Verification of spatial models. Spatial system theory. Temporal modeling and dynamic description of geobjects. Spatial access methods. | |
| UNIT II Types | Data models – Static models – Dynamic models - Cartographic models – Spatio – temporal models – Network models – Models based on purpose, methodology and logic – Rased Based Model – Vector based model | |
| UNIT III Surface Modeling | Basic statistics and its GIS expression; Spatial dependency; Spatial interpolation (IDW, Kriging and others); Assessing interpolation results; Mapping spatial dependency; Sampling design – 3D models of relief. | |
| UNIT IV Spatial Data Mining | Linking numeric and geographic patterns; Normalizing maps; Viewing scatter plots; Clustering mapped data; Investigating map correlation; Developing prediction models; Assessing prediction results. | |
| UNIT V Future Directions | Dynamic map pedigree – Toward a humane GIS – GIS software’s changing roles – Evolving the GIS mindset – Multimedia Mapping – Map display | |

Reference Books

1. Longley P.A., M.F. Goodchild, D.J. Maguire and D.W. Rhind. 2005.
2. Geographic Information Systems and Science. Second Edition. John Wiley, Chichester, 2005.
3. Goodchild, M.F.2003. Geographic Information Science and Systems for Environmental Management. Annual Review of Environment and Resources. Vol.28: 493-519.
4. Burrough, P.A. and McDonnell, R.A. 1998. Principles of Geographical Information Systems. London: Oxford.
5. Goodchild, M F.1988. Modeling error in objects and fields. Accuracy of Spatial Databases Meeting; Montecito, CA; (USA); Dec.1988. Pp.107-113.1990.
6. Tomlin, C D.1991 Cartographic Modeling. In Maguire, D., Goodchild
7. M: 361-374.
8. Goodchild, M.F., 1987, Towards an enumeration and classification of GIS functions. Proceedings, / CIS 87: The Research Agenda, edited by R.T.Aangeenbrug and Y.M.Schiffman (Washington, DC: NASA), 11, 67-77.

| | | |
|---|---|------------------|
| 18PSTP02MX | <u>Modular Course</u> Introduction to Rural Development | 2 Credits |
| Course Objective: This course introduces principle and concepts of Remote Sensing and GIS, its applications for geology, natural hazards and environmental management. | | |
| Course Outcome: On completion of this course, student will be able to recognize geological features using image characteristics and will be able to perform image processing and can interpret satellite images for possible earth resources. | | |
| UNIT I | Rural Development: Concept - Facets-Major issues | |
| UNIT II | Theoretical Framework for rural development - Assets distribution- land ownership methods of production - -resource distribution- social framework of agriculture | |
| UNIT III | Rural Development Programmes of Government of India - Past and Present programmes - Impact of rural development programmes | |
| UNIT IV | Stakeholders in rural development: State and Bureaucracy in rural development - Panchayati Raj Institutions (PRIs) - NGOs. People's Participation - Myths and reality | |
| UNIT V | Sustainable Rural Development - Gandhian Economic Order - Dr.J.C.Kumarappa's - Theory of Economic Permanence | |

Reference Books

1. Jai Narain Sharma: Alternative Economics- Economics of Mahatma Gandhi & Globalization, Deep & Deep Publications (P) Ltd., New Delhi, 2003.
2. John M. Riley: Stakeholders in Rural Development, Sage Publications, New Delhi, 2002.
3. Sartaj Aziz: Rural Development- Learning from China, Macmillan Press, 1978.
4. Sudhakar . V: New Panchayati Raj System, Mangal Deep Publications, Jaipur, 2002.
5. Ratnakar Gedam : Poverty in Indian, Deep & Deep Publications, New Delhi, 1998.