

# **P.G. DIPLOMA IN SPATIAL TECHNOLOGIES**

## **SYLLABUS**

(with effect from June 2015)



### **CENTRE FOR GEOINFORMATICS**

The Gandhigram Rural Institute – Deemed University  
Gandhigram – 624 302 Tamil Nadu

**CENTRE FOR GEOINFORMATICS**  
**The Gandhigram Rural Institute – Deemed University, Gandhigram – 624302**  
**P.G.Diploma in Spatial Technologies**  
**(Syllabus to be offered from the Academic year 2015 – 16 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	
<b>I</b>	<b>Core Courses</b>	15PSTP0101	Introduction to Spatial Technologies	4	4	-	3	40	60	100
		15PSTP0102	Elements of Cartography	3	3	-	3	40	60	100
		15PSTP0103	IT for Spatial Technologies	3	3	-	3	40	60	100
		15PSTP0104	Geographical Information system	4	4	-	3	40	60	100
		15PSTP0105	Basics of Remote Sensing and DIP	4	4	-	3	40	60	100
		15PSTP0106	PRACTICAL - I: Geographical Information System	2	-	4	2	60	40	100
		15PSTP0107	PRACTICAL -II: Digital Image Processing & GPS	2	-	4	2	60	40	100
	<b>CNCC</b>	15GTPP0001	Gandhi in Everyday Life	-	2	-	-	50	-	50
	<b>VPP</b>	15VPPP00V1	Village Placement Programme	2	-	-	-	50	-	50
	<b>1<sup>st</sup> Semester Total</b>			<b>23</b>	<b>19</b>	<b>8</b>	<b>-</b>			

**Semester – II**

Semester	Category	Course Code	Title of the Paper	No. of Credits	Theory	Practical	Duration of ESE (Hours)	Evaluation		Total Marks	
								CFA %	ESE %		
II	Core Courses	15PSTP0208	Global Positioning System and its Applications	3	3		3	40	60	100	
		15PSTP0209	Application of Spatial Technologies	3	3		3	40	60	100	
		15PSTP0210	Spatial Decision Support System	3	3		3	40	60	100	
		15PSTP0211	Dissertation	4		8		75	75+50	200	
	Major Elective	15PSTP02EX	Major Elective	4	4		3	40	60	100	
	MC	15PSTP02MX	Modular course	2	2	-		50	-	50	
	CNC	15PSTP02F1	Extension / Field Visit	-	2	-	-	50	-	50	
		15CSKP00C1	Communication and Soft Skills		2			50		50	
	<b>Total (III)</b>				<b>19</b>	<b>19</b>	<b>8</b>	<b>-</b>			
	<b>Grant Total (I + II)</b>				<b>44</b>	<b>38</b>	<b>16</b>				

***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 Moduler Courses for 15PSTP02MX**

Spatial Modelling  
Introduction to Rural Development

**List of Major Elective Courses for 15PSTP02EX**

15PSTP02E1	Geography
15PSTP02E2	Geology
15PSTP02E3	Watershed Management
15PSTP02E4	Regional Development & Planning
15PSTP02E6	Open source software

# **P.G.Diploma in Spatial Technologies**

(To be offered from the Academic year 2015 - 16 under the CBCS)

## **S E M E S T E R - 1**

**CENTRE FOR GEOINFORMATICS**

**The Gandhigram Rural Institute - Deemed University, Gandhigram - 624302**

<b>15PSTP0101</b>	<b><u>Core Course</u></b> <b>Introduction to Spatial Technologies</b>	<b>3 Credits</b>
<b><u>Objective:</u></b> <i>To introduce Spatial as an advance tool consists of various advance science and technologies used for mapping and managing earth resources.</i>		
<b><u>Specific Objectives of Learning:</u></b> <ol style="list-style-type: none"> <li>1. To introduce the science and technologies involved in Spatial Technologies</li> <li>2. To explain the earth and mapping principles.</li> <li>3. To impart knowledge on traditional, conventional and advance surveying technologies.</li> <li>4. To learn basics about the Geodata &amp; WebGIS.</li> <li>5. To apply Geoinformatics in various fields</li> </ol>		
<b>UNIT 1</b> 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.	
<b>UNIT 2</b> 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.	
<b>UNIT 3</b> 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.	
<b>UNIT 4</b> Geodata Visualization	Geodata visualization and analysis - two – three – fourth dimension viewing - viewing by animation - Visualization by hyper map - virtual images – webGIS.	
<b>UNIT 5</b> Applications	Application of Geoinformatics: Rural Development, Geosciences, Agriculture, Forestry, Soil Studies, Meteorology, Military, Transport, Environmental studies, Banking and Health Civil Engineering etc.,	

#### **Text Book**

1. LO. C.P., and Albert K.W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice-Hall of India, New Delhi, 2006.

#### **Reference Books**

1. Peter A. Burrough and Rachael A. Mc. Donnell, Principles of Geographical Information System, Oxford University Press Inc., New York, 2004.
2. Ian Heywood, Sarah Cornelivs and Steve Carver, An Introduction to Geographical Information System, Pearson Education Pvt .Ltd., New Delhi, 2007.
3. Arthur H. Robinson et al. Elements of Cartography, V Edition, John Wiley & Sons, New Delhi, 2002.
4. Misra, R.P.and Ramesh, A, Fundamentals of Cartography, Concept Publishing Company, New Delhi, 2002.
5. Lillesand M. Thomas and Ralph W.Kiefer, Remote Sensing and Image Interpretation, John Wiley & Sons, New York, 2007.

<b>15PSTP0102</b>	<b><u>Core Course</u></b> <b>Elements of Cartography</b>	<b>3 Credits</b>
<b><u>Objectives</u></b> <i>To know the basic principles and importance of Cartography, various maps projection/ co-ordinate systems, generalization, different aspects of map design/ layout, and different techniques of map production for reproduction.</i>		
<b><u>Specific Objectives of Learning:</u></b> <ol style="list-style-type: none"> <li>1. To know the basics, importance, and methods of Cartography</li> <li>2. To study the various maps projection and co-ordinate systems.</li> <li>3. To learn the different aspects of design in cartography.</li> <li>4. To learn the generalization and designing aspects of cartography.</li> <li>5. To study the different techniques of map production and reproduction</li> </ol>		
<b>UNIT 1</b> Maps	Basics: Map - Definition - Need - characteristics - Components and types of maps Principles and History of cartography.	
<b>UNIT 2</b> Coordinate systems	Distortions in maps: angle-area-distance-direction-shape - Transferring geoid information to paper maps - Spherical and Rectangular coordinate systems - UTM projection system - classification of projections and applications	
<b>UNIT 3</b> Map database	Spatial database: Survey of India – NRSC - BHUVAN - NATMO – Geological Survey of India - Census of India –National Informatics Centre - Cadastral maps – openstreet map – foreign sources of data - Physical surveying - GPS and Total station. Attribute database: Census of India- statistical – National Informatics Centre – India stat – year books - other attribute data sources available in Internet for mapping.	
<b>UNIT 4</b> Mapping Techniques	Map as a communication system - Theory of Perception - Symbolization: Conventional signs and symbols - quantitative, qualitative symbols – use of colour. Qualitative mapping technique - Choroscopic and Chorochromatic. Quantitative mapping techniques: Choropleth - Isopleth	
<b>UNIT 5</b> Map design and Layout	Scientific and artistic aspects of design and layout - Overall map designing: size and shape of maps - preparation for presentation - dominance, simplicity, harmony, balance, pattern, variation and contrast – lettering - Design of internal map elements: map title, legend, scale, grid, direction, border. Intellectual design: Map generalization -Map reproduction: Methods of printing	

#### 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, 2006.
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.

<b>15PSTP0103</b>	<b><u>Core Course</u></b> <b>IT for Spatial Technologies</b>	<b>3 Credits</b>
<p><b><u>Objective:</u></b></p> <p><i>To introduce the IT tools and its applications in Spatial Technologies, and also to learn the basic Computing Skills, Storage Mechanisms Operating Systems, various software and hardware devices.</i></p>		
<p><b><u>Specific Objectives of Learning:</u></b></p> <ol style="list-style-type: none"> <li>1.To expose about the computer, storage devices and other components</li> <li>2.To know the usefulness of computers in GIS</li> <li>3.To learn the network security and fundamentals of protecting a system from virus and malwares.</li> <li>4.To train for in gathering information from the internet through WWW.</li> <li>5.To explore Google Earth &amp; Google maps.</li> </ol>		
<p><b>UNIT 1</b> Computer System</p>	<p>The Computer System - types of computers - foundations of modern technology - microprocessor fabrication - types of memory – buses - Communication with peripherals – server- client concepts and networking.</p>	
<p><b>UNIT 2</b> Devices</p>	<p>Input, output and storage : input and output devices - pointing devices - foundations of modern output - display screens – printers - secondary storage - foundations of modern storage - storage media - floppy disk, hard disk drive and optical disk – pen drive - increasing data storage capacity - backing up your data.</p>	
<p><b>UNIT 3</b> Software</p>	<p>Software - user interfaces - application programs - Operating systems - file management and utilities - document - centric computing - major software issues - network computing - Information Technology today - Introduction to IT - information system software and data - Global Positioning System - applications of IT in GPS - Information Technology in Remote Sensing - GIS Applications of IT in Cartography - Applications of IT in Real Time GIS.</p>	
<p><b>UNIT 4</b> Internet and World Wide Web</p>	<p>Introduction to World Wide Web and Web - Foundations of modern networks - Local Area Network - introduction, architecture and system - introduction of Wide Area Network. Some Internet Applications : Email, Information browsing, WWW, Information - retrieval from the web, Other facilities provided by the browser, audio /video/ pictures, animation on the internet -Introduction to applications such as Google maps and Google earth.</p>	
<p><b>UNIT 5</b> Security and Ethics</p>	<p>Personal, Social and Ethical Issues: Computers and health - viruses - computer crime – cryptography. Concept of fire wall - network security - wireless technology and security.</p>	

### **Text Book**

1. Dennis P. Curtin, Kim Foley, Kunal Sen & Cathleen Morin, Information Technology - The Breaking Wave, Tata McGraw Hill Ed., 1999. Chapters: 1, 2, 3, 4, 5, 6, 9, 10, 11&13.

### **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. Brain K.Williams, Stacey C.Sawyer, Sarah E.Hutchinson, using Information Technology, 3/e, TMH publication, 2008
4. Subash Mehta, Global Business Press, Understanding and Using Internet, New Delhi. (1996)
5. Cryptography and Network Security, William Stallings, 1999, 5<sup>th</sup> Edition, Pearson Education, Inc., publishing as Prentice Hall.

<b>15PSTP0104</b>	<b><u>Core Course</u></b> <b>Geographical Information System</b>	<b>4 Credits</b>
<b>Objective:</b> <i>Understand and gather knowledge about the basic principles of GIS.</i>		
<b>Specific Objectives of Learning:</b>  <ol style="list-style-type: none"> <li>1. To introduce use of computer in mapping, GIS, components, data structure, modelling, DBMS</li> <li>2. To learn about encoding methods and editing of data</li> <li>3. To know various capabilities of GIS</li> <li>4. To study about various models of GIS</li> <li>5. To understand output from GIS and SDSS</li> </ol>		
<b>UNIT 1</b> Basics of GIS	Map– computer assisted mapping – GIS -components of GIS – Data used in GIS characteristics of Spatial Data – sources of spatial and attribute data - data structure - raster and vector - GIS approach: Layer – tile – object oriented; Modeling third and fourth dimension - Database Management system: Disadvantages of traditional DBMS – relational database model - integrated spatial and attribute data	
<b>UNIT 2</b> Data input and editing	Encoding methods: Keyboard – digitization – electronic data transfer - Data editing: Checking and correcting errors in spatial and attribute data - transformation – generalization – edge matching - rubber sheeting – building integrated database	
<b>UNIT 3</b> Data analysis	Measurements of length, perimeter and area - queries – reclassification – buffering - overlay - spatial interpolation – surface analysis - network analysis – geo-statistics	
<b>UNIT 4</b> GIS Modelling Basics	Process models: Natural and Scale Analogue Models - Conceptual Models – Mathematical Models - Process Modeling and GIS.- Modeling the Decision Making Process - Visualization Model – TIN – DEM –DTM - Problems in using GIS to Model Spatial Process	
<b>UNIT 5</b> GIS outputs	Maps as output – Thematic Maps - non-cartographic outputs – spatial multimedia – delivery mechanism - GIS and Spatial Decision Support - map as a decision tool	
<b>Text Book</b>		
1. Ian Heywood, Sarah Cornelivs and Steve Carver, An Introduction to Geographical Information System, Pearson Education Pvt .Ltd., New Delhi, 2010.		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. Peter A. Burrough and Rachael A. McDonnell, Principles of Geographical Information Systems, Oxford University Press Inc., New York, 2004.</li> <li>2. M. Anji Reddy, Geoinformatics for Environmental Management, BS Publications, Hyderabad, 2004.</li> <li>3. David Martin, Geographic Information Systems, Routledge, London,2002.</li> <li>4. Kang-tsung chang, Introduction to Geographic Information Systems,Tata McGraw – Hill Publishing Company Limited, New Delhi, 2006.</li> <li>5. C.P.LO and Albert K.W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice-Hall of India, New Delhi – 2006.</li> </ol>		

15PSTP0105	<b><u>Core Course</u></b> <b>Basics of Remote Sensing and DIP</b>	<b>4 Credits</b>
<b><u>Objectives</u></b> <i>To understand the basic concepts of Remote sensing and Digital Image Processing</i>		
<b><u>Specific Objectives of Learning:</u></b> <ol style="list-style-type: none"> <li>1. To understand the basic principles, components and types of Remote sensing.</li> <li>2. To know about different sensors and data products available in India as well as abroad.</li> <li>3. To learn traditional and Digital Photogrammetry</li> <li>4. To understand the various Digital Image Processing techniques.</li> </ol>		
<b>UNIT 1</b> 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	
<b>UNIT 2</b> 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, ORBVVIEW, ASTER, MODIS, WORLD VIEW, AVIRIS, CASI, MODIS and Hyperion	
<b>UNIT 3</b> 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	
<b>UNIT 4</b> 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	
<b>UNIT 5</b> 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.	

15PSTP0106	<b><u>Core Course</u></b> <b>Practical I – Geographical Information System</b>	<b>2</b> <b>Credits</b>
<b><u>Objectives:</u></b> <i>To familiarize and learn different GIS Software and capabilities of different GIS analysis techniques</i>		
<b><u>Specific Objectives of Learning:</u></b> <i>To know about the GIS software capabilities.</i> <i>To study the various tools and analysis available and perform query operations, statistical operations &amp; internet capabilities in GIS.</i>		
<ol style="list-style-type: none"> <li>1. Map appreciation – map interpretation – thematic layers – map objects – data dictionary</li> <li>2. Scanning – digitization in CAD</li> <li>3. Rectification using GPS data, image to image rectification, keyboard entry rectification - setting projections – GIS database design</li> <li>4. Spatial and attribute data entry and editing and their integration</li> <li>5. Different methods of selection of spatial and attribute data</li> <li>6. Working with tables and layers properties</li> <li>7. Map algebra – raster processing tools – interpolation tools – surface analysis tools - hydrology tools– building models</li> <li>8. Methods of data analysis: Measurement - Buffer – overlay – network analysis – surface interpolation – reclassification – TIN – DEM– distance tools</li> <li>9. Geo statistical analysis</li> <li>10. Layout designing</li> </ol>		

15PSTP0107	<b>Practical II</b> <b>Remote Sensing and Digital Image Processing</b>	<b>2</b> <b>Credits</b>
<p><b>Objective:</b> <i>To provide practical and hands on experience on visual interpretation elements, digital image processing and some extent in 3D visualization.</i></p>		
<p><b><u>REMOTE SENSING</u></b></p> <ol style="list-style-type: none"> <li>1. Stereovision Test and Anatomy of pocket, prism &amp; Mirror Stereoscopes.</li> <li>2. Decoding, Marking &amp; Transfer of Principal Points, Base line drawing, Flight line marking, 3D Observation, Tracing details, Transfer the details to base map.</li> <li>3. Interpretation of Aerial photographs</li> <li>4. Study of various visual Remote Sensing Equipments</li> <li>5. Decoding of different Satellite data</li> <li>6. Interpretation of Black &amp; White and false color multi band imagery</li> <li>7. Interpretation of Thermal and microwave imagery</li> <li>8. Transfer of information from Imagery to Base map</li> </ol> <p><b><u>DIGITAL IMAGE PROCESSING</u></b></p> <ol style="list-style-type: none"> <li>1. Reading and displaying satellite data from BIL,BSQ and BIP formats</li> <li>2. Generating True, False and Pseudo Colour Composite (FCC)</li> <li>3. Extracting / Subset area of Interest (AOI)</li> <li>4. Measuring length, distance and area.</li> <li>5. Generating histograms of various bands</li> <li>6. Georeferencing the base image, Image to Image, Map to Image – Geometric correction of satellite image</li> <li>7. Mosaic</li> <li>8. Enhancement using different filtering techniques, Image Fusion</li> <li>9. Principal Component Analysis (PCA)</li> <li>10. Band ratio and NDVI</li> <li>11. Unsupervised Classification – Cluster - Iso cluster</li> <li>12. Supervised Classification</li> <li>13. Accuracy Assessment</li> <li>14. Change detection study</li> <li>15. Layout Preparation</li> <li>16. Hyper spectral Image Analysis</li> </ol>		

15GTPP0001	<b>Compulsory Non Credit Course Gandhi In Everyday Life</b>
<p><b>Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To understand and appreciate the principles and practices of Gandhi and their relevance in the contemporary times.</li> <li>2. To develop noble character and attitude to enable the students to cope up with the challenges of daily life</li> </ol>	
<p><b>Specific Objectives of Learning:</b></p> <p>To enable students:</p> <ol style="list-style-type: none"> <li>1. To study in-depth the life and message of Gandhi.</li> <li>2. To understand the Gandhian way of Management.</li> <li>3. To practice the Gandhian model of conflict reduction.</li> <li>4. To lead a humane life on Gandhian lines.</li> <li>5. To become a Gandhian constructive worker</li> </ol>	
<p><b>UNIT 1</b> Understanding Gandhi</p>	<p>Child hood days, Student days, influence of Books and Individuals, Religion, Family, and Social factors. Gandhi as rebel, acquaintance with vegetarianism, as lawyer, encountering and transforming humiliation: in India, in south Africa- train incident, Coach incident, on path way, at court, attack by protesters. Gandhi as political leader and reformer.</p>
<p><b>UNIT 2</b> Management</p>	<p>Gandhi's experiments in managing family- Eleven vows, non-possession and sacrifice begin at home – Managing Ashram - community living, service and financial ethics – Managing Social movements- Transvaal March and Salt Satyagraha and nonattachment to position (Nishkama Seva).</p>
<p><b>UNIT 3</b> Conflict Reduction</p>	<p>Pursuance of truth and nonviolence ends and means, openness, transparence, love and kindness in handling relationship, nonviolent communication, practicing nonviolence in social and political issues (Satyagraha), conflict resolution practices, art of forgiveness and reconciliation and shanti sena.</p>
<p><b>UNIT 4</b> Humanism</p>	<p>Humanism: Trust in goodness of human nature, respect for individual and pluralistic nature of society, dignity of differences, equal regard for all religions (Sarvadharm Samabhava), castes, races, colours, languages etc., simple and ethical life, swadeshi and unity of humankind</p>
<p><b>UNIT 5</b> Constructive programmes &amp; contemporary issues</p>	<p>Concept of Sarvodaya, poverty, terrorism, environmental degradation, problems in sharing common resources, health systems and education, science and technology and centralization of power and governance.</p>
<p>Films</p>	<p>Richard Attenborough, <b>Gandhi</b>. Syam Benegal, <b>The Making of Mahatma</b>. Anupam P. Kher, <b>Mine Gandhi Ko Nahin Mara</b>. Peter Ackerman and Jack Duvall, <b>A Force More Powerful</b></p>

### Reference Books

- M.K. Gandhi, (2012) *An Autobiography or The Story of My Experiments with Truth*, Navajivan Publishing House, Ahmedabad.
- . (2003) *Satyagraha in South Africa*, Navajivan Publishing House, Ahmedabad.
- . (1945) *Constructive Programme: Its Meaning and Place*, Navajivan Publishing House, Ahmedabad.
- . (2003) *Key to Health*, Navajivan Publishing House, Ahmedabad
- . (1949) *Diet and Diet Reform*, Navajivan Publishing House, Ahmedabad.
- . *Basic Education*, Navajivan Publishing House, Ahmedabad.
- . (2004) *Village Industries*, Navajivan Publishing House, Ahmedabad.
- . (1997) *Hind Swaraj*, Navajivan Publishing House, Ahmedabad.
- . (2004) *Trusteeship*, Navajivan Publishing House, Ahmedabad.
- . (2001) *India of my Dreams*, Navajivan Publishing House, Ahmedabad.
- K.S.Bharathi (1995) *Thought of Gandhi and Vinoba*, *Shanti Sena*, Sarva Seva Sangh Prakashan, Varanasi.
- V.P.Varma, (1999) *Political Philosophy of Mahatma Gandhi and Sarvodaya*, Lakshmi Narain Agarwal, Agra.
- Louis Fisher (2010) *Gandhi: His Life and Message*.
- B.R. Nanda. (2011) *Mahatma Gandhi: A Biography*, Allied Publishers Private Ltd., New Delhi.
- N.K. Bose. (2008) *Studies in Gandhism*, Navajivan Publishing House, Ahmedabad.
- Gopinath Dhawan, (2006) *The Political Philosophy of Mahatma Gandhi*, Navajivan Publishing House, Ahmedabad.
- N. Radhakrishnan, (2006) *Gandhi's Constructive Programmes: An Antidote to Globalized Economic Planning?*, Gandhigram Rural Institute, 2006

**15VPPP0101**

**2 Credits**

**COMPULSARY NON CREDIT COURSES**

**Village Placement Programme**

# **P.G.Diploma in Spatial Technologies**

(To be offered from the Academic year 2015 - 16 under the CBCS)

## **S E M E S T E R - 2**

**CENTRE FOR GEOINFORMATICS**

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<b>15PSTP0208</b>	<b><u>Core Course</u></b> <b>Global Positioning System and its Applications</b>	<b>3 Credits</b>
<b>Objectives:</b> <i>To study GPS surveying and its application</i>		
<b><u>Specific Objectives of Learning:</u></b>		
<ol style="list-style-type: none"> <li>1. Fundamental of GPS.</li> <li>2. Different GPS satellites and Systems.</li> <li>3. Different types of GPS &amp; its techniques.</li> <li>4. Error calculation &amp; basics of LASS &amp; WASS.</li> <li>5. GPS applications in various fields.</li> </ol>		
<b>UNIT 1</b> 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	
<b>UNIT 2</b> 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	
<b>Unit 3</b> 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	
<b>Unit 4</b> 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	
<b>Unit 5</b> 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.

#### Reference Books

1. Hofmann-Wellnhof.B, Lichtenegger.H, and Collins.J, GPS theory and Practice, Spinger (India) Private Limited, New Delhi, 2007.
2. <http://www.palowireless.com/gps/>
3. Michael Kennedy, 'The Global Positioning System and GIS: An Introduction', Taylor and Francis Inc. New York, 2002.
4. Leick Alfred, GPS Satellite Surveying, Third Edition, John Wiley & Sons, Inc., Hoboken, New Jersey, 2004.
5. <http://www.maps-gps-info.com/ed-resources.html>
6. <http://www.gisdevelopment.net/tutorials/tuman004.htm>
7. [http://www.colorado.edu/geography/gcraft/notes/gps/gps\\_f.html](http://www.colorado.edu/geography/gcraft/notes/gps/gps_f.html)

15PSTP0209	<b><u>Core Course</u></b> <b>Application of Spatial Technologies</b>	<b>3 Credits</b>
<b>Objectives:</b> <i>To Make the students to formulate, plan, execute and manage Geoinformatics for Various Applications.</i>		
<b><u>Specific Objectives of Learning:</u></b> <ol style="list-style-type: none"> <li>1. To Applied of Spatial Technologies for Land resource management</li> <li>2. To Applied of Spatial Technologies for Water Resources Management</li> <li>3. To Applied of Spatial Technologies for Disaster mitigation and management</li> <li>4. To Applied of Spatial Technologies Utility management</li> <li>5. To Applied of Spatial Technologies for Environmental management</li> </ol>		
<b>UNIT 1</b>  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	
<b>UNIT 2</b>  Water Resource Management	Introduction – importance - water pollution – 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	
<b>UNIT 3</b>  Disasters and Calamities	Definition - Classification – Causes - Earthquakes – Landslides - Volcanism - Tsunami Cyclones – Floods - Drought - Forest Fire - Vulnerability – Hazard – Risk Assessment - Natural Disaster Mapping, Management and mitigation using Remote Sensing and GIS.	
<b>UNIT 4</b>  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	
<b>UNIT 5</b> Environmental Management	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.	

### **Text Books**

1. Fundamentals of Remote Sensing. George Joseph. Universities Press (India) Pvt Ltd, 3-5-819 Hyderguda, Hyderabad 500 029. 2003. 433 pp.

### **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
6. Allah Brimicomber, GIS Environmental Modeling and Engineering, Taylor and Francis, 2003
7. Savigny D De and Wijeyaratne.P. GIS for Health and Environment, Stylus publication, 1994.
8. Paul A Longley, Michael F Goodchild, David J Maguire, David W Rhind, Geographical Information Systems, Volume I and II, John Wiley and Sons, Inc., 1999.
9. Van Dijk M.G.Bos, GIS and Remote Sensing Techniques in Land-And-Water-Management, Kluwer Academic Publishers, 2001.
10. Juliana Maantay, John Ziegler and John Pickles, GIS for the Urban Environment, ESRI Press, 2006.
11. Laura Lang, GIS for Health Organizations, ESRI Press, 2000.
12. Lisa Godin, GIS in Telecommunications Managements, ESRI Press, 1st Edition, 2001.
13. Applications in Coastal Zone Research Management, Martin, K.St. (ed), U.N. Institute for Training and Research, 1993.
14. Integrated Ocean and Coastal Management, Sain, B.C., and Knecht, R.W., UNESCO Publication, 1998.

<b>15PSTP0210</b>	<b><u>Core Courses</u></b> <b>Spatial Decision Support System</b>	<b>3 Credits</b>
<b>Objective:</b> <i>To expose the students about decision making and them to construct spatial decision support system</i>		
<b><u>Specific Objectives of Learning:</u></b>		
<ol style="list-style-type: none"> <li>1.To introduce concepts, Architecture and frame work in Decision Making</li> <li>2.To understand the Concepts of Decision variables</li> <li>3.To learn about various ranking,rating and comparision methods involved in SDSS</li> <li>4.To learn about various modelling techniques</li> <li>5.To Discuss about role of SDSS in various applications</li> </ol>		
<b>UNIT 1</b>	Introduction to Information and Decision Making - Concepts and Characteristics of Decision Support Systems (DSS) – Architecture of DSS - Framework for Spatial Decision modelling - Spatial Decision Support Systems (SDSS) and GIS	
<b>UNIT 2</b>	Concepts of Decision variables – Deterministic, Random, Linguistic - Decision Alternatives and Constraints - Efficiency and Effectiveness of Decision Making – DSS and Expert Systems	
<b>UNIT 3</b>	Concepts of Estimating Weights – Ranking Methods – Rating Methods – Pairwise comparison methods – Trade off analysis methods – their comparisons – Decision Rules.	
<b>UNIT 4</b>	Concepts and types of Multi-attribute Decision modelling – Multi objective Decision Modelling – Sensitivity Analysis – Maps as Decision tools.	
<b>UNIT 5</b>	Land Suitability Analysis – Education and Health Care Resources Allocation – Industry and Business - Water Resources Management – Site Selection – Biodiversity	

#### **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.
6. Roy, P.S. 2000, Natural Disaster and their mitigation. Published by Indian Institute of Remote Sensing (IIRS).
7. Schultz, G. A. and Engman, E. T., 2000, Remote Sensing in Hydrology and Water Management, Springer-Verlag, Berlin, Germany.
8. Spatial Technologies for Natural Hazard Management. Proceedings of ISRS National Symposium, Nov. 21-22, 2000, IIT, Kharagpur.
9. Sprague, R.H., 1980, A framework for the development of decision support systems Management Information Sciences, Quarterly 4:1-26.
10. Sprague, R.H., and Carlson, E.D., 1982, Source for DSS development model, Building Effective Decision Support Systems, Prentice-Hall, Englewood Cliffs NJ

15PSTP0204	Core Course Dissertation	4 Credits
<ul style="list-style-type: none"> <li>▪ The project shall be selected in connections with the internal guide at the beginning of the semester</li> <li>▪ A proposal is prepared with details of objectives, methodology and expected outcome.</li> <li>▪ The following are the steps:</li> <li>▪ Identification of a problem in consultation with internal guide</li> <li>▪ 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"> <li>▪ Designing of Geoinformatics</li> <li>▪ GIS implementation and application</li> <li>▪ Map server design</li> <li>▪ RS application</li> <li>▪ GPS application</li> <li>▪ Spatial modeling or such other related topics, which will give focus to Geoinformatics implementation</li> </ul> </li> <li>▪ The size of the dissertation may be between 50 and 70 pages, which is not inclusive of scripts and other appendices</li> <li>▪ The dissertation should be submitted both in print form and digital form (pdf / crystal reports).</li> </ul>		

<b>15PSTP02E1</b>	<b><u>Major Elective</u></b> <b>Geography</b>	<b>4 Credits</b>
<b>Objectives:</b> <i>To explain about the concept of Geography, and its various branches</i>		
<b><u>Specific Objectives of Learning:</u></b> They will be knowledgeable in geography, geomorphology, climatology, and oceanography <ol style="list-style-type: none"> <li>1. To study the basics, scope and branches of Geography</li> <li>2. To understand different Landforms form by different geomorphic process</li> <li>3. To understand weather and its related phenomena.</li> <li>4. To understand cyclones, wind and its role towards the environment.</li> <li>5. To study coastal and its process.</li> </ol>		
<b>UNIT 1</b> Geography	Basics of Geography – Scope – approaches to study geography: systematic – regional – regional – methods - and techniques of geography: cartography – quantitative – regional – branches of geography	
<b>UNIT 2</b> Geomorphology	Geomorphology - nature and scope – application of geomorphic techniques - Solar system – Origin of the earth – constitution of the earth - earth’s interior – origin of continents and ocean basins - concept of plate tectonics – earth movements: orogenetic and epigenetic movements – Isostasy – Mountain buildings. Earthquakes – Volcanoes – Rocks – origin – types characteristics; - geomorphic agents and process- de weathering - Fluvial landscape – Fluvial cycle; Karst topography – Coastal topography; Glacial landscape – Eolian landscape	
<b>UNIT 3</b> Climatology	Definition: Weather – Climate Significance of climatology – Climatic elements – Surface composition and structure of the atmosphere – Insulation - Horizontal and vertical distribution of temperature - Range of temperature – Diurnal, seasonal and annual	
<b>UNIT 4</b> Atmosphere	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	
<b>UNIT 5</b> Oceanography	Definition of oceanography – Surface configuration of the ocean floor – Continental shelf, slope, deep sea plain and deeps – Submarine relief of Atlantic, Pacific and Indian Oceans - Distribution of temperature and salinity in the seas and oceans - Circulation of oceanic waters - Waves, tides and currents - Marine deposits and coral reefs – Darwin and Daly’s theory on coral reefs.	

### 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. Strahler A. H and Strahler, A. N. (1992) : Modern Physical Geography, John Wiley, New York
4. Savindra Singh (2002): Physical Geography, Prayag Pustak Bhawan, Allahabad.
5. D. S. Lal: Climatology. Sharda Pustak Bhawan ,11 , University road Allahabad- 211002 Edition 2003
6. Frederick K. Lutgen, Edward Tar buck: “The Atmosphere An Introduction to Meteorology” Prentice Hall,
7. Englewood Cliffs ,New Jersey 0762 ,1998
8. Trewartha: Introduction to Weather and Climate.
9. H.J. Critchfield (1993): General Climatology. Prentice Hall, New Delhi

15PSTP02E2	<u>Major Elective Courses</u> Geology	4 Credits
<p><b>Objective:</b> To introduce basic geology subjects to the Geoinformatics student especially non geology candidates.</p>		
<p><b>Specific Objectives of Learning:</b> 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.</p> <ol style="list-style-type: none"> <li>1. The structure of earth, geological structures and tectonic activities</li> <li>2. The concepts of various geomorphic units, unconformity</li> <li>3. Minerals, rock types, occurrence and distribution and economic minerals in India</li> <li>4. Various geophysical methods for Resources Inventory</li> <li>5. The use of geological techniques for natural resources inventory</li> </ol>		
<b>UNIT 1</b> 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	
<b>UNIT 2</b> 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	
<b>UNIT 3</b> 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.	
<b>UNIT 4</b> Geophysical Exploration	Geophysical methods - Seismic, Electrical, Gravity - Magnetic and aeromagnetic methods - their bearing on Resources Inventory	

<b>UNIT 5</b> 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
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### 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. TM.,Kiefer, R.W and Chipman, K.W. Remote sensing and image interpretation Fifth Edition. Wiley. 2007.
5. Ravi P. Gupta, Remote Sensing Geology, Springer-Verlag New York, 2002.
6. Burrough, PA; and RA McDonnell. Principles of Geographic Information Systems. Oxford Press, U.K., 1998.
7. Wolf. P. R. Elements of Photogrammetry. Mc Graw Hill, Japan, 1993.
8. G. Rees. Physical Principles of Remote Sensing. Cambridge University Press, U.K., 2000.
9. SN Pandey, Principles and Applications of Photogeology: New Age International (P) Ltd., New Delhi. 1988.
10. Schowengerdt, R. A., Remote sensing - Models and methods for image processing. Academic press. London.1997.
11. Richards,J.A, Remote Sensing Digital Image Analysis., Springer-Verlag, London 1986.
12. Duda R.O & Hart PE,Pattern classification & Scene Analysis.. Wiley, New York, 1973.
13. Morton Nadia & Eric Smith P, Pattern Recognition Engineering. John Wiley, New York, 1993.
14. Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press. London. 1996.
15. Groundwater Hydrology, Todd.D.K. 1988, John Wiley & Sons.
16. H.M.Ragunath, 1983, Ground water, John Wiely & Sons Ground water and wells.

15PSTP02E3	<b><u>Major Elective Courses</u></b> <b>Watershed Management</b>	<b>4 Credits</b>
<b>Objective:</b> <i>To explain about meaning of watershed, watershed dev. Programmes, use of Geoinformatics in watershed development, methods of monitoring and evaluation, areas of evaluation</i>		
<b>Specific Objectives of Learning:</b> the students will gain knowledge in watershed, watershed dev. Programmes, use of Geoinformatics in watershed development, various methods of monitoring and evaluation, areas of evaluation of watershed development. <ol style="list-style-type: none"> <li>1. Define goals and objectives towards watershed management.</li> <li>2. Understand Federal, State, regional, and local policies as they apply to watershed management.</li> <li>3. Delineate a watershed utilizing Geoinformatics mapping techniques.</li> <li>4. Develop and implement a watershed management plan by preparation of various thematic maps.</li> <li>5. Monitoring, evaluation, PRA methods and financial frameworks needed for successful implementation of a watershed management plan.</li> </ol>		
<b>UNIT 1</b>	Watershed – definition – causes and consequences of watershed deterioration - Watershed delineation and codification – watershed approach – advantages – watershed as a unit of planning - Watershed management – approach to watershed development – principles and components of watershed management	
<b>UNIT 2</b>	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 executed	
<b>UNIT 3</b>	Role of Geoinformatics in scientific planning: Baseline survey/ bench mark survey - evaluation of deterioration – watershed delineation – acquiring data – preparation of various thematic maps – scientific planning	
<b>UNIT 4</b>	Monitoring – evaluation – learning – outcome/ result - Monitoring: Meaning – factors – indicators	
<b>UNIT 5</b>	Evaluation - focus – need for – types of evaluation; Participatory evaluation – community participation – PRA methods 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

<b>15PSTP02E4</b>	<b><u>Major Elective Courses</u></b> <b>Regional Development &amp; Planning</b>	<b>4 Credits</b>
<b>Objective:</b> <i>To explain about regional planning, types and process of regional planning</i>		
<b>Specific Objectives of Learning:</b> Students will gain knowledge on <ul style="list-style-type: none"> <li>• Objectives of planning, types of planning</li> <li>• Types of region and goals of regional planning</li> <li>• Fundamental considerations of planning region</li> <li>• Information system for regional development</li> <li>• The process involved in regional planning</li> </ul>		
<b>UNIT 1</b>	Development Planning - meaning and objectives of planning- Rational for Planning in developing countries - Types of Planning - regional planning as an approach of development planning	
<b>UNIT 2</b>	Concept of Regional and Regional Planning - Regional inequality - homogenous region nodal - adhoc region - functional region, goals and objections of regional planning - It is an interdisciplinary technique - Hierarchy of regions - methods - scalogram - sociogram - Bisection	
<b>UNIT 3</b>	Concept of Planning Region: Fundamental considerations - Objective - availability of data - administrative viability. Delimitation of Economic Regions: rational - approaches to regional economic development: Classical - economic - sociological - holistic approach.	
<b>UNIT 4</b>	Information Systems for Regional Development: Systems approach - Task and elements of information system - information required - sources of information - planning for information systems.	
<b>UNIT5</b>	The Process of Regional Planning: identifying the regionalism present - demarcating the region - determining the needs of the region - making a plan for the region - implementing the plan within the framework of the state and federal sovereignties - review of the plan as it goes into effect.	

#### **Text Books**

1. Misra R.P., Regional Planning in India, Concept Publishing House, New Delhi, 1992

#### **Reference Books**

1. Bhat.L.S.et.al: Micro Level Planning - A Case Study of Karnal Area, Haryana - India, K.B. Publications, New Delhi, 1976.
2. Misra.R.P.(Ed): Local Level Planning and Development, Sterling Publishers Pvt.Ltd., New Delhi,1983.
3. Munirathna Naidu.K: Area Planning for Regional development, Inter - India Publications, New Delhi, 1984.
4. Prodipto Roy & Patil, B.R., "Manual for Block Level Planning", Mac.Millan Company of India Ltd., Delhi, 1977.

<b>15PSTP02E5</b>	<b><u>Major Elective Courses</u></b> <b>Web Technology for Spatial Technologies</b>	<b>4 Credits</b>
<b>Objective:</b> <i>To make the students to get basic knowledge about the Internet &amp; Web Technology</i>		
<b><u>Specific Objectives of Learning:</u></b>		
<ol style="list-style-type: none"> <li>1. To learn the basics about internet</li> <li>2. To gain basic knowledge in HTML, XML, DHTML, GHTML, Javascript &amp; VBScript</li> <li>3. To introduce the concept of WebGIS and Open GIS.</li> </ol>		
<b>UNIT 1</b>	Internet - network information system and W3C - IP addresses and routing - core web technologies: server side, client side-Protocols-API	
<b>UNIT 2</b>	Markup Languages- XML – HTML – DHTML – GHTML - Style sheet technologies – creating dynamic web pages	
<b>UNIT 3</b>	Scripting languages: introduction- Java script, VB script, ASP – Java Script - functions, objectives, and control structures - simple programmes	
<b>UNIT 4</b>	Web GIS: basics and services - components of Web GIS - concept of maps and software repository - scripts and data management system uses and limitation.	
<b>UNIT 5</b>	Web GIS technology -browser for web GIS- -the need for map server and database engine - VRML-inter operability - portable and dynamic web pages - Net and .com methodologies in webGIS - open GIS.	

#### **Text Books**

1. Andrew Ford and Tim Dixon, Spinning the Web, 2/e. International Thomson Computer press, 1996.
2. Thomas A. Powell, The Complete Reference - Web Design, Tata Mc Graw - Hill Publishing Company, New Delhi, 2003.

#### **Reference Books**

1. H.M. Deitel Nieto et al. Internet and World Wide Web - How to program, Second Edition, Prentice Hall of India, New Delhi, 2003.
2. Jose A. Ramalho, Advanced HTML 4.0 with DHTML, BPB Publications, New Delhi, 2000

<b>15PSTP02E6</b>	<b><u>Major Elective Courses</u></b> <b>Open source software</b>	<b>4 Credits</b>
<b>Objective:</b> <i>The open source options are for research and development. It helps the candidate to think creatively and independently in Geoinformatics project implementation</i>		
<b><u>Specific Objectives of Learning:</u></b>  <ol style="list-style-type: none"> <li>1. Concepts and protocols used in Open Source GIS</li> <li>2. Introduction to Open source tool kit, Openjump, GRASS, ILWIS, Openstreet map, QGIS, SagaGIS</li> <li>3. Fundamentals applied in Open source database management</li> <li>4. Functionalities of Open Source GIS software in Desktop and Web based environments</li> <li>5. Complete freedom to modify the software to suit the needs availability of various Open Source GIS software and their architecture</li> </ol>		
<b>UNIT 1</b>	Introduction to Open source – Importance and Need of Open source – Advantages of Open source– Application of Open source. Open source operating systems: LINUX: Introduction – General Overview – Kernel Mode and user mode – Process – Advanced Concepts.	
<b>UNIT 2</b>	Open source Software- Introduction to Open source tool kit - Openjump – GRASS – ILWIS – Openstreet map - QGIS - SagaGIS - Map window-cloud GIS	
<b>UNIT 3</b>	Open source Database GIS and allied programming - PostGIS – Python - Java Scripting, HTML.	
<b>UNIT 4</b>	Web Mapping with Open source tool kit - Introduction to digital mapping – Merits and demerits of web mapping - Different kinds of web mapping – Openlayers, GeoServer – Geospatial Data Library – Open source tool kits. Project on Webmapping: A Panchayath GIS will be created by different groups.	
<b>UNIT 5</b>	GIS CUSTOMISATION PROGRAMMING: GIS Customisation - Needs – Scripting Language – Advantage of Macro Scripting – Sample Case studies.	

#### **Reference Books**

1. Markus Neteler, Helena Mitasova, Open Source GIS: A GRASS GIS Approach, Edition, Springer 2007.
2. Neteler, M and H.Mitasova, Open Source GIS. A GRASS GIS Approach, Kluwer Academic Publishers, Bostan, USA/London, UK, 2008.
3. Qgis: <https://www.packtpub.com/application-development/mastering-qgis>

<b>15PSTPO2MX</b>	<b><u>Modular Courses</u></b> <b>Spatial Modeling</b>	<b>2 Credits</b>
<b>Objective:</b> <i>To obtain knowledge about spatial modeling of user's domain using geographical information systems.</i>		
<b><u>Specific Objectives of Learning:</u></b> To understand the principles of spatial analysis and spatio-temporal modeling To understand the principles of digital model of relief creation		
<b>Unit 1</b>	<b>Spatial Modelling:</b> Development, Definition, Classification and Verification of spatial models. Spatial system theory. Temporal modeling and dynamic description of geobjects. Spatial access methods.	
<b>Unit 2</b>	<b>Types:</b> 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	
<b>Unit 3</b>	<b>Surface Modeling:</b> Basic statistics and its GIS expression; Spatial dependency; Spatial interpolation (IDW, Kriging and others); Assessing interpolation results; Mapping spatial dependency; Sampling design – 3 dimensional models of relief.	
<b>Unit 4</b>	<b>Spatial Data Mining:</b> Linking numeric and geographic patterns; Normalizing maps; Viewing scatter plots; Clustering mapped data; Investigating map correlation; Developing prediction models; Assessing prediction results.	
<b>Unit 5</b>	<b>Future Directions:</b> 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.F., and Rhind, D. (Eds) Geographic Information Systems: Principles and Applications. London: Longman: 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.

## MODULAR COURSE

<b>5PSTPO2MX</b>	<p><b><u>Modular Courses</u></b></p> <p><b>Introduction to Rural Development</b></p>	<b>2 Credit</b>
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**Objective:**

*is course introduces principle and concepts of Remote Sensing and GIS, its applications in geology, natural hazards and environmental management.*

**Specific Objectives of Learning:**

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 to assess available earth resources.

<b>Unit 1</b>	Rural Development: Concept - Facets-Major issues
<b>Unit 2</b>	Theoretical Framework for rural development - Assets distribution- land ownership methods of production - resource distribution- social framework of agriculture
<b>Unit 3</b>	Rural Development Programmes of Government of India - Past and Present programmes - Impact of rural development programmes
<b>Unit 4</b>	Stakeholders in rural development: State and Bureaucracy in rural development Panchayati Raj Institutions (PRIs) - NGOs. People's Participation - Myths and reality
<b>Unit 5</b>	Sustainable Rural Development - Gandhian Economic Order - Dr.J.C.Kumarappa's - Theory of Economic Permanence

### Reference Books

9. Jai Narain Sharma: Alternative Economics- Economics of Mahatma Gandhi & Globalization, Deep & Deep Publications (P) Ltd., New Delhi, 2003.
10. John M. Riley: Stakeholders in Rural Development, Sage Publications, New Delhi, 2002.
11. Sartaj Aziz: Rural Development- Learning from China, Macmillan Press, 1978.
12. Jan Nederveen Pieterse: Development Theory- Deconstructions/Reconstructions, Vistaar Publications, New Delhi, 2001.

13. Sugata Dasgupta: Towards a post Development Era-Essays in Poverty, Welfare and Development, Mittal Publications, Delhi, 1985.
14. Sudhakar . V: New Panchayati Raj System, Mangal Deep Publications, Jaipur, 2002.
15. Ratnakar Gedam : Poverty in Indian, Deep & Deep Publications, New Delhi, 1998.
16. Madan. G.R. : Indian Rural Problems, Radha Publications, New Delhi, 2002.
17. Human Development in South Asia - Agriculture and Rural Development, Mahabubul Hag Human Development Centre, Oxford University Press, New York, New Delhi, 2002.
18. Choudhry R.C. & Rajakutty.S : Fifty Years of Rural Development, NIRD, Hyderabad, 1998.
19. Katar Singh: Rural Development - Principles, Policies and Management, Sage Publications, New Delhi, 1986.
20. Maheswari. S : Rural Development in India - A Public Policy Approach, Sage Publications, New Delhi, 1985.
21. Sundaram .K.V.: Decentralized Multilevel Planning - Principles and Practices, Concept Publications, New Delhi, 1997.
22. Lalitha. N. : Rural Development in India - Emerging Issues and Trends, Dominant Publishers and Distributors, New Delhi, 2004 (II volumes).

15CSKP02N1	Compulsory Non Credit Courses Extension / Field Visit	Credits

<b>15CSKP0201</b>	<b>Compulsory Non Credit Course</b> <b>Communication and Soft skills</b>
<b>Objectives:</b>	
<ol style="list-style-type: none"> <li>1. <i>To develop inter personal skills and be an effective goal oriented team player.</i></li> <li>2. <i>To develop professionals with idealistic, practical and moral values.</i></li> <li>3. <i>To develop communication and problem solving skills.</i></li> <li>4. <i>To re-engineer attitude and understand its influence on behavior.</i></li> </ol>	
<b>UNIT 1</b>	SELF ANALYSIS SWOT Analysis, Whom am I, Attributes, Importance of Self Confidence, Self Esteem
<b>UNIT 2</b>	ATTITUDE Factors influencing Attitude, Challenges and lessons from Attitude. Change Management Exploring Challenges, Risking Comfort Zone, Managing Change
<b>UNIT 3</b>	MOTIVATION Factors of motivation, Self talk, Intrinsic & Extrinsic Motivators
<b>UNIT 4</b>	GOAL SETTING Wish List, SMART Goals, Blue print for success, Short Term, Long Term, Life Time Goals. - Time Management Value of time, Diagnosing Time Management, Weekly Planner To do list, Prioritizing work.
<b>UNIT 5</b>	CREATIVITY Out of box thinking, Lateral Thinking Presentation