AFFILIATED INSTITUTIONS

ANNA UNIVERSITY, CHENNAI

REGULATIONS 2009

M.E. / M. Tech. REMOTE SENSING

II TO IV SEMESTERS (FULL TIME) CURRICULUM AND SYLLABUS

SEMESTER II

S.NO.	SUBJECT CODE	SUBJECT	L	T	P	C
THEORY						
1	RS9321	Image Processing	3	0	0	3
2	RS9322	Visual Programming and Customization	3	0	0	3
3	RS9323	Geographic Information System Application	3	0	0	3
4	E1****	Elective I	3	0	0	3
5	E2****	Elective II	3	0	0	3
6	E3****	Elective III	3	0	0	3
PRACTICAL						
7	RS9325	Image Processing Laboratory	0	0	3	2
8	RS9326	Seminar	0	0	2	1
		TOTAL	18	0	5	21

SEMESTER III

S.NO.	SUBJECT CODE	SUBJECT	L	T	P	C
THEORY						
1	E4****	Elective IV	3	0	0	3
2	E5****	Elective V	3	0	0	3
3	E6****	Elective VI	3	0	0	3
Practical						
4	RS9331	Project Work (Phase I)	0	0	12	6
		TOTAL	9	0	12	15

SEMESTER IV

S.NO.	SUBJECT CODE	SUBJECT	L	T	P	C
PRACTICAL						
1	RS9341	Project Work (Phase II)	0	0	24	12
		TOTAL	0	0	24	12

Total Credits to be Earned for the Award of the Degree = 68

ELECTIVES

S.NO.	SUBJECT CODE	SUBJECT	L	T	P	C
		THEORY				
1	RS9001	Microwave Remote Sensing	3	0	0	3
2	RS9002	Non–Topographic Photogrammetry	3	0	0	3
3	RS9003	Air Borne Laser Terrain Mapping (ALTM)	3	0	0	3
4	RS9004	Digital Cartography	3	0	0	3
5	RS9005	GPS Surveying	3	0	0	3
6	RS9006	Remote Sensing and GIS Applications for Hydrology and Water Resources	3	0	0	3
7	RS9007	Remote Sensing and GIS Applications to Earth Sciences	3	0	0	3
8	**RS9008**	Remote Sensing and GIS Applications for Agriculture and Forestry	3	0	0	3
9	RS9009	Remote Sensing and GIS Applications in Environmental Engineering	3	0	0	3
10	RS9010	Remote Sensing and GIS Applications to Ocean Engineering and Coastal Zone Management	3	0	0	3
11	RS9011	Remote Sensing and GIS Applications for Urban and Regional Planning	3	0	0	3
12	RS9012	Remote Sensing and GIS Applications in Disaster Mitigation and Management	3	0	0	3

RS9321   **IMAGE PROCESSING**

L	T	P	C
3	0	0	3

UNIT I   SATELLITE DATA   9

Satellite systems and data – Acquisition and storage – Data formats – Data products – Image display system – Current missions.

UNIT II   SENSOR AND DATA MODEL   9

Sensor model – Resolutions – Pixel characters – Image formation – Univariate   & multivariable Image statistics – spatial Statistics – Geometric and radiometric correction – noise models

UNIT III   IMAGE ENHANCEMENTS   9

Spectral signatures – Image characteristics feature space scatterogram –   point, local and regional operation – Fourier transform scale – space transform wavelet transform.

UNIT IV   INFORMATION EXTRACTION   9

Image registration and – ortho rectification resampling multi-image fusion Classification – feature extraction training – Supervised Unsupervised and Hybrid training Non – parametric and sub-pixel classification Hyper – spectral Image analysis

UNIT V   IMAGE ANALYSIS AND UNDERSTANDING   9

Pattern recognition boundary detection and representation textural and contextual Analysis decision concepts – Fuzzy sets evidential reasoning. Expert system Artificial Neural Network Integration of data.

L: 45 T: 0 TOTAL: 45PERIODS

REFERENCES:

1.   John R. Jenson, "Introductory Digital Image Processing", Prentice Hall Series, 1996.
2.   John A. Richards, Springer- Verlag , "Remote Sensing Digital Image Analysis" 1999.
3.   Rafael C. Gonzalez, "Digital image processing (2nd Edition)" , Prentice Hall, 2002.

RS9322   **VISUAL PROGRAMMING AND CUSTOMISATION**

L	T	P	C
3	0	0	3

UNIT I   VISUALBASICPROGRAMMING   10

Visual Basic Applications – Creating and using Controls – Menus and Dialogs Managing projects – Programming fundamentals – Objects and instances –Debugging –Responding to mouse events – Using grid control – Creating graphics for application – Displaying and printing information – Interacting with the environment – File system controls   – Processing files.

UNIT II   DATABASE CONNECTIVITY IN VISUAL BASIC   8

Accessing databases with the data controls – ADO Object Model – ODBC and data access Objects – ODBC using DAO and Remote Data Objects – Data Environment and Data Report – ActiveX Controls – Dynamic Data Exchange (DDE).

UNIT III   VISUAL BASIC .NET PROGRAMMING   9

Understanding Visual Basic .NET terminology – specifications, design, code, test, and document Visual Basic .NET programs – maintenance, repair, and enhance Visual Basic .NET programs – create custom dialog boxes, clocks, menus, and animation effects – manage text files and use encryption and sorting algorithms – master programming fundamentals, including variables, decision structures, loops, and functions.

UNIT IV   COMPONENT OBJECT MODELLING (COM)   9

Basics – Software Reuse – Object Model Diagram, Class diagram, Interaction diagram – ActiveX Connector – Component Object Model (COM), Dynamic Link Library (DLL) – ASP –- Linking Models and GIS – Loose Coupling, Tight Coupling, Embedded Coupling.

UNIT V   GIS CUSTOMISATION PROGRAMMING   9

GIS Customization – Need – Advantages of Macro Scripting – Case studies using standard GIS software

L: 45 T: 0 TOTAL: 45 PERIODS

REFERENCES

1.   David S. Platt, " Introducing Microsoft .NET Microsoft Press", SAARC Edition, 2001
2.   Julia Case Bradley and Anita C. Millspaugh, "Programming in Visual Basic .NET".
3.   Francesco Balena, "Programming Microsoft Visual Basic 6.0", Microsoft Press, Indian Reprint, 2001.
4.   Cornell, G., "Visual Basic 6.0", Tata McGraw Hill, 1998.
5.   Deitel, H.M., Deitel.P.J., Nieto,T. and Nieto. T.M., "Visual Basic 6, How to Program", Prentice Hall of India, 1999.
6.   Tony Stevenson, Visual Basic 6.0: The Complete Reference, Osborne/ McGraw-Hill, 2000.

RS9323	GEOGRAPHIC INFORMATION SYSTEM APPLICATION	L	T	P	C
		3	0	0	3

UNIT I   NATURAL RESOURCE MANAGEMENT APPLICATIONS   9

Forestry: Resource Inventory, Forest Fire Growth modelling – Land: Land use Planning, Watershed Management studies – Water – Identification of Ground Water Recharge – Resource Information System – Wetlands Management, Wildlife Habitat Analysis

UNIT II   DISASTER MANAGEMENT & FACILITY MANAGEMENT
                   APPLICATIONS   9

Disaster Management: Use of GIS in Risk Assessment, Mitigation, Preparedness, Response and Recovery phases of Disaster Management – Utilities – Water utility applications – Electric Utility Application – Telecommunication: Tower Spotting, Route optimization for meter reading for utilities – Other utilities

UNIT III   LOCATION BASED SERVICES APPLICATIONS   9

Vehicle Tracking: Automatic Vehicle Location(AVL), Components of AVL:In Vehicle Equipment, Various Communication Channels, Web Server, Client – Vehicle Tracking – Alarms used in Vehicle Tracking, Fleet Management – Vehicle Navigation – Emergency Call: Address Geocoding , Distress Call Application

UNIT IV   LAND INFORMATION SYSTEM & WEB GIS APPLICATIONS   9

Land Information System (LIS) – Tax Mapping – Other LIS applications – Web GIS: Architecture of Web GIS , Map Server, Web GIS Applications

UNIT V   BUSINESS, HEALTH AND OTHER APPLICATIONS   9

Business Applications: Sitting a new Facility, Customer Loyalty studies, Market Penetration studies – Health applications : Disease Surveillance, Health Information System – Crime Mapping: Mapping Crime data, Hot Spot Analysis – 3D GIS

TOTAL: 45 PERIODS

REFERENCES:
1.   Laura Lang, "Managing Natural Resources with GIS", ESRI Press, 1998.
2.   Uzair M. Shamsi, U. M. Shamsi, "GIS Tools for Water, Wastewater, and Stormwater Systems", Asce Press, 2002.
3.   Alan L., MD Melnick, "Introduction to Geographic Information Systems for Public Health", Aspen Publishers, 1st Edition, 2002.
4.   Amin Hammad, Hassan Karimi, "Telegeoinformatics: Location-Based Computing and Services", 1st Edition, CRC Press, 2004.
5.   Paul A. Longley, Michael F. Goodchild, David J. Maguire, David W. Rhind, "Geographical Information Systems", Vol. I and II, John Wiley and Sons, 1999.
6.   Van Dijk, Bos , M.G., "GIS and Remote Sensing Techniques in Land-And-Water-Management", Kluwer Academic Publishers, 2001.
7.   Laura Lang, "GIS for Health Organizations", ESRI Press, 2000.
8.   Lisa Godin, "GIS in Telecommunications Management", ESRI Press, 1st Edition, 2001.

RS9325   IMAGE PROCESSING LABORATORY

L	T	P	C
0	0	3	2

1.   Reading and Displaying satellite data from BIL, BSQ and BIP Formats
2.   Generating False Colour Composite (FCC)
3.   Extracting area of Interest (AOI)
4.   Generating Histogram of various bands
5.   Georeferencing the base image
6.   Geometric correction of satellite image
7.   Enhancement using Band ratio and NDVI
8.   Enhancement using different Filtering techniques
9.   Principal Component Analysis (PCA)
10.   Fourier analysis
11.   Unsupervised Classification
12.   Supervised Classification
13.   Classification using Neural Network and Fuzzy Logic
14.   Accuracy Assessment
15.   Change detection study

TOTAL: 45 PERIODS

RS9001   **MICROWAVE REMOTE SENSING**

L	T	P	C
3	0	0	3

UNIT I   FUNDAMENTALS AND RADIOMETRY   8

Introduction, plane waves, antenna systems, radiometry, microwave interaction with atmosphere constituents, Earth's surface and vegetation, Physical mechanisms and empirical models for scattering and emission Radiometric systems, Sensors, Data product and applications.

UNIT II   RADAR REMOTE SENSING   7

Radar interaction with Earth surface and vegetation, Surface scattering theory. Radar equation, Fading concept, Measurement and discrimination, Physical mechanisms and empirical models for scattering, Geometry of RADAR images, Radar return and image signature. Resolution concepts

UNIT III   REAL AND SYNTHETIC APERTURE RADARS   8

Airborne, Spaceborne, different platforms and sensors, Data products and selection procedure. SEASAT, SIRA, SIRB, ERS , JERS, RADARSAT missions.

UNIT IV   APPLICATION OF RADAR REMOTE SENSING   8

Application in Agriculture, Forestry, Geology, Hydrology, ice studies, landuse, mapping and ocean related studies.

UNIT V   SPECIAL TOPICS IN RADAR REMOTE SENISNG   14

SAR Interferometry – Basics – Differential SAR Interferromentry Polarimetry – Radargrammetry – applications, Altimeters.

TOTAL: 45 PERIODS

REFERENCES

1.   Ulaby, F.T., Moore, R.K. AND Fung, A.K., "Microwave Remote Sensing Active and Passive", Vol. 1,2 and 3, Addison – Wesley Publication Company, 2001.
2.   Floyd. M. Handerson and Anthony, J. Lewis, "Principles and Application of Imaging Radar, Manual of Remote Sensing", 3rd edition Vol.2 ASPRS, Jhumurley and Sons, 1998.

RS9002   **NON –TOPOGRAPHIC PHOTOGRAMMETRY**

L	T	P	C
3	0	0	3

UNIT I   BASICS OF NON–TOPOGRAPHIC PHOTOGRAMMETRY   9

Definition – Non-topographic photogrammetry – Brief History – Potential of Close range Photogrammetry – Instrumentation for Data Acquisition – Phototheodolite, Metric Camera Non – metric Camera Stereometric Camera Digital Camera – Instrumentation for Data Analysis – Analog and Analytical Stereoplotters – Software in Non – topographic Photogrammetry.

UNIT II   ARCHITECTURE   9

Applications in Architecture and Archaeology – Survey of Historic monuments – their conservation and preservation – Photomontage by Inverse Photogrammetry for visulisation of proposed construction – virtual 3D model for walk through simulation.

UNIT III   INDUSTRIAL AND ENGINEERING APPLICATIONS   9

Aerospace Industry, Automobile Industry – Measuring Communication Antennas – Measurement of Storage Tanks and Cooling Tower, Model Studies – Hologrammetric applications for vibration and stress concentration studies.

UNIT IV   APPLICATIONS IN MEDICINE   9

Biomedical Application Using X-ray Photogrammetry Systems. Principle point location in Radiographs – Stereo X-ray Photogrammetry – Analysis – Bio-Stereometrics – Whole body form, trunks and limbs - Electron Microscopy – Systems and Applications using SEM & TEM

UNIT V   APPLICATIONS IN CRIMINOLOGY   9

Forensic Photogrammetric Applications – Mapping Crime scene using conventional photogrammetry – Reverse Projection Technique in Accident Investigations. Under water Photogrammetry – case studies

TOTAL: 45 PERIODS

REFERENCES:
1. Atkinson, K.B., "Close Range Photogrammetry and Machine Vision", Whittles Publishing, 2003
2. Paul R. Wolf and Bon A. DeWitt, "Elements of Photogrammetry with Applications in GIS", McGraw Hill, 2000.
3. Anonymous, "Non-Topographic Photogrammetry", 2nd Edition, American Society for Photogrammetry and Remote Sensing", 1989.

RS9003	AIR BORNE LASER TERRAIN MAPPING (ALTM)	L	T	P	C
		3	0	0	3

UNIT I   BASICS OF AIRBORNE LASER TERRAIN MAPPING   9

LASER, LIDAR – Principle and Properties – Different LIDAR systems – Applications – Advantages Disadvantages – Spaceborne and Airborne LIDAR missions – Typical parameters of a LIDAR system.

UNIT II   LIDAR   9

Principle of Laser Altimetry – Components of the system – GPS IMU LASER, LIDAR data formats – Terrain Mapping Laser Configuration – Ocean bathymetry Laser Configuration – Limitations of the system

UNIT III   LIDAR DATA PROCESSING   9

GPS and IMU data Processing – Strip Adjustment – Geometric Correction – Data quality enhancement – Digital Surface Model – Filtering – Ground Point filtering –Digital Elevation Model

UNIT IV   LIDAR MAPPING AND MODELLING   9

Hydrology Disaster Mitigation and Management – 3D city models – Telecommunication Modelling – Urban planning – Coastal Zone Bathymetry Mapping – Feature extraction vectorisation – Surface and landuse classification

UNIT V   LIDARGRAMMETRY   9

Orthophoto rectification using LIDAR – Integrated LIDAR and Digital Photogrammetry techniques – Integration of LIDAR DEM with other hyperspectral data

TOTAL: 45 PERIODS

REFERENCES:

1.   Yves Egels and Michel Kasser,. "Digital Photogrammetry", Taylor and Francis, 2001.
2.   Lee-Leung Fu, Satellite Altimetry and Earth Sciences, "A Hand Book of Techniques and Applications", Academic Press, 2000.
3.   Roger Read and Ron Graham, "Manual of Aerial Survey: Primary Data Acquisition", Whittles Publishing, 2002.

RS9004	**DIGITAL CARTOGRAPHY**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

UNIT I   MANAGING DATA BASES   9

Data organisation – Data compression – Data measurement – Basic statistical processing – Geographic information system – The measuring of GIS to cartography.

UNIT II   DATA PROCESSING   9

Computer system for the processing of graphic data – Hardware –Software – SICAD – Digitising of cartographic presentation – Structuring and storage of data – Cartographic data processing – Output of cartographic presentation – Examples and applications.

UNIT III   MODELLING IN DIGITAL CARTOGRAPHY   9

Fundamentals of modelling, graph theory, topology – Digital planimetric modelling – Digital relief modelling – Quality of digital landscape models – Topographic model generalisation, Map revision – Web Cartography – Dynamic and Static Web Maps.

UNIT IV   MAP DESIGN   9

Theory of communication, information and signs – methods of computer assisted design of cartographic expressions – computer assisted evaluation of geo data for thematic maps – Cartographic aspects of GIS.

UNIT V   TECHNIQUES OF MAP PRODUCTION   9

Modern techniques in map production – Dynamic and interactive mapping – animation – navigation system – simulation – interactive cartography – map as interface – Expert systems and Web Maps – Electronic Atlas – Trends for future developments

REFERENCES:
1. Menno, Jan Kraak and Ferjan Ormeling, "Cartography – Visualization of Geo spatial Data", 2nd Edition, Pearson Education, 2004.
2. Arthur. H. Robinson etal "Elements of Cartography", 7th Edition, John Wiley and sons, 2004.
3. R.W. Anson and F.J. Ormeling, "Basic Cartography for Students and Technicians"
   Vol. I, II and III, 2nd Edition, Elsevier Applied Science Publishers, 2002.
4. Menno, Jan Kraak and Allan Brown, "Web Cartography Developments and Prospects, Taylor and Francis, 2001.

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RS9005	GPS SURVEYING	L	T	P	C
		3	0	0	3

UNIT I   BASICS   6

Definition – Fundamental goals of Geodesy – Definitions – basic concepts – Historical perspective – development applications in Satellite Geodesy – Geoid and Ellipsoid satellite orbital motion – Keplerian motion – Kepler's Law – Perturbing forces – Geodetic satellite

UNIT II   DIFFERENT TECHNIQUES   6

Determination of direction by photography – SECOR – Electronic observation techniques – Doppler   effect – Positioning concept – Development of TRANSIT satellites.

UNIT III   SATELLITE SYSTEM   6

GPS – Different segments – space control and user segments – satellite configuration – GPS signal structure – Orbit determination and Orbit representation Anti Spoofing and Selective Availability – Task of control segment – GPS receivers – main receiver components – Example of GPS receivers.

UNIT IV   GPS DATA PROCESSING   6

GPS observables – code and carrier phase observation – linear combination and derived observables – concept of parameter estimation – data processing – software modules – solutions of cycle slips ambiguities RINEX format. Concepts of rapid static methods with GPS semi kinematic and pure kinematic methods – basic constellation of satellite geometry & accuracy measures.

UNIT V   APPLICATIONS OF   SATELLITE GEODESY   6

Geodetic control surveys, Cadastral surveying, Photogrammetry & Remote Sensing, Engineering applications and Monitoring – GIS. GLONASS satellite configuration comparison – Satellite Laser Ranging & Applications – Concepts of satellite altimetry.

TOTAL: 45 PERIODS

REFERENCES:
1.   Alfred Leick, "GPS Satellite Surveying", 3rd Edition, John Wiley and Sons 2004.
2.   Guocheng Xu, "GPS Theory, Algorithms and Applications", Springer-Verlag, 2003.
3.   Seeber G., "Satellite Geodesy", Walter De Gruyter, 1998.

RS9006   **REMOTE SENSING AND GIS APPLICATIONS FOR**   **L T P C**
                    HYDROLOGY AND WATER RESOURCES   **3 0 0 3**

UNIT I   BASICS OF HYDROLOGY   12

Hydrologic cycle – estimation of various components of hydrologic cycle – clouds – rainfall – runoff – evaporation – transpiration – evapo-transpiration – interception – depression storage – Spectral properties of water – GIS application in surface water modelling – case studies.

UNIT II   DRAINAGE BASIN   6

Watershed divide – stream networks – Delineation and codification of watersheds morphometric analysis – linear – aerial – relief aspects – Rainfall – runoff modelling urban hydrology – case studies.

UNIT III   AERIAL ASSESSMENT   5

Mapping of snow covered area – snow melt runoff – flood forecasting and inundated area – soil moisture area – drought affected area – GIS applications in aerial assessment – case studies.

UNIT IV   GROUND WATER AND WATER QUALITY   10

Ground water potential – surface water indicators – vegetation, Geology Soil aquifer – aquifer parameters – Well hydraulics – estimation of ground water potential – hydrologic budgeting – mathematical models – GIS application in Ground Water modelling –   study on sea water Intrusion – modelling of sea water intrusion – Water quality parameters – physical, Chemical Biological properties. Water quality mapping and monitoring – Correlation model for pollution detection – case studies.

UNIT V   IRRIGATION AND WATERSHED MANAGEMENT   12

Project investigation, implementation maintenance stage – location of storage/diversion works – canal alignment – capacity calibration curve generation, – conjunctive use of surface and ground water – Mapping and monitoring the catchment and command area – artificial recharge of groundwater – water harvesting structures – sediment yield – modelling of reservoir siltation – prioritization of watershed – sustainable development – Development of information system for Natural Resource Management – case studies.

TOTAL: 45 PERIODS

REFERENCES:

1.   Eric C. Barrett, Clare H. Pawer, "Satellite Remote Sensing for Hydrology and Water Management", Gordon @ Breach Science Publications,1990.
2.   David Maidment and Dean Djokic, "Hydrologic and Hydraulic Modelling Support with GIS", ESRI Press, 2000.
3.   Gert A. Schulitz, Edwin T. Engman, "Remote Sensing in Hydrology and Water Management", Springer-verlay, 2000.
4.   Andy D. Ward, William J. Elliot, "Environmental Hydrology", Lewis Publisher,1995.

**RS9007   REMOTE SENSING AND GIS APPLICATIONS IN EARTH   L T P C
                SCIENCES   3 0 0 3**

UNIT I   LITHOLOGY AND STRUCTURE   9
Introduction Rocks and Minerals image characters of igneous sedimentary and metamorphic rocks. Lithological mapping using aerial and satellite data – Structural Geology introduction Mapping structural features such as folds Lineaments / faults fractures image characters of folds faults lineaments etc. – Digital techniques for lithological and structural analysis – case studies.

UNIT II   SPECTRA OF ROCKS AND MINERALS   9
Spectral properties of geologic features in different regions of Electromagnetic Spectrum Elemental composition and nature of the spectra of rocks and minerals Optimal spectral windows – Geologic Remote Sensing and its significance in Geologic mapping – case studies.

UNIT III   GEOMORPHOLOGICAL APPLICATIONS   9
Introduction – Geomorphic processes and Geomorphic Landforms Geomorphic mapping using aerial photographs and satellite data – Landform analysis in Ground water studies coastal zone management and Civil Engineering projects – case studies.

UNIT IV   REMOTE SENSING AND GIS APPLICATIONS   9
Thematic presentation of Lithologic structural and Geomorphic details ground truth data. Integration of all relevant data using Remote Sensing and GIS in ground water studies.

UNIT V   CASE STUDIES ON RS & GIS APPLICATIONS   9
Coastal zone management Disaster Management Studies like Landslides Droughts and Floods Engineering Geology Mineral exploration and Petroleum exploration.

                                                                TOTAL: 45 PERIODS

REFERENCES
1.   Sabins, F., 'Remote Sensing principles and interpretation' W.H. Freeman and Company, 1987.
2.   Parbin Singh, 'Engineering and General Geology', Ketson Publication House, 1987.
3.   Drury, S.A., Image interpretation in Geology , Chapman and Hall, 1993.
4.   Michael N. Demers, "Fundamentals of GIS", John Wiley and Sons, 1999
5.   Resources Management and Environmental Monitoring - Manual of Remote Sensing", 3rd Edition, Vol.4, American Society of Photogrammetry and Remote Sensing/John Wiley and Sons, 2004.
6.   Pete Bettinger and Michael G Wing. "Geographic Information Systems: Applications in Forestry and Natural Resources Management", McGraw-Hill Higher Education, 2003.
7.   Roy, P.S.,'Geoinformatics for Tropical Ecosystems', Asian Association of Remote Sensing, 2003.
8.   Singh, R.P. and Vinod Tare. 'Spatial Technologies for Natural Hazards Management'. Proceedings of ISRS National Symposium, November 21–22 IIT, Kanpur. ISRS Publications, , 2000.

RS9009	**REMOTE SENSING AND GIS APPLICATIONS IN ENVIRONMENTAL ENGINEERING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

UNIT I   REMOTE SENSING APPLICATION TO ENVIRONMENTAL STUDIES   9

Introduction – Environmental Satellites: GOES, NOAA, AVHRR, CZCR –Monitoring land, water, atmosphere and ocean using Remote Sensing data – Case studies.

UNIT II   SOIL DEGRADATION STUDY USING GIS AND REMOTE SENSING   9

Taxonomical classification of soils – soil survey Interpretation and mapping – Impact of agricultural and Industrial activity on soil properties – Soil salinity / alkalinity, erosion studies – Application of GIS in assessing soil salinity, erosion productivity etc.,

UNIT III   WATER QUALITY DATA ANALYSIS USING GIS   9

Classification of water quality for various purposes – Data base creation and quality modeling using GIS. Database creation and maintaining water supply network – sewage network using GIS – Case studies.

UNIT IV   GROUND WATER POLLUTION   9

Aquifer – Vulnerability Intrinsic & Specific Vulnerability, DRASTIC, SINTACS MODELS, MOD FLOW, MT3D, contaminant transport model

UNIT V   AIR QUALITY MONITORING   9

Atmosphere: chemicals, Particulate matters present in the atmosphere, allowable limits – Remote Sensing technique to monitor atmosphere constituents, air pollution due to industrial activity – monitoring of modelling using GIS.

TOTAL: 45 PERIODS

REFERENCES:

1.   "World in transition: The threat to Soils" Annual Report of the Germon Advisory Council on Global change, Economical Verlag, 1994.
2.   Sabins, F, ' Remote Sensing Principles and Interpretation', W. H. Freeman and Company, 1987.
3.   "Ground Water vulnerability assessment: Predicting Relative Contamination Potential Under Conditions of Uncertainty", National Academic Press, 1993.
4.   Savigny. D. and Wijeyaratne .P., 'GIS for Health and Environment', Stylus Publication.
5.   Allaric Sample .V.,"Remote Sensing and GIS for Eco System Management". Island Press,

RS9010   **REMOTE SENSING AND GIS TO OCEAN ENGINEERING**   L T P C
              AND COASTAL ZONE MANAGEMENT   3 0 0 3

UNIT I   OCEAN ENGINEERING   10
Coastal processes – Oceanic circulation – Upwelling and sinking – current Measurement   – Waves –surface waves – Water motion in waves – reflection, diffraction and refraction   – wave generated currents catastrophic waves   – Tides – Tidal forces – sediment drift – salinity intrusion.

UNIT II   OCEAN GENERAL STUDIES   6
Study of physical properties of sea water and parameters – chemistry of sea water – Biological parameters – Oceanographic instruments – collection of water samples – current measuring devices – deep sea coring devices – dredges.

UNIT III   COASTAL ENGINEERING   7
Coastal Hydrodynamic – Coastal erosion and protection – different Coastal protection works – design of Breakwaters. – Estuaries and their impact on coastal process – Hydrodynamic of pollution dispersion.

UNIT IV   REMOTE SENSING APPLICATION   10
Use of Microwave data – CZCS studies – chlorophyll production index – various sensors used for coastal application – physical oceanographic parameter estimation – sea surface temperature significant wave height – wind speed and direction – coastal Bathymetry – sea level rise.

UNIT V   COASTAL ZONE MANAGEMENT   12
Introduction – Major issues/problem – Thematic maps on coastal resources,   – wetland classification creation of CZIS – Coastal Regulation zone – Coastal aquifer modelling using GIS – Integrated coastal zone Management using GIS.

TOTAL: 45 PERIODS

REFERENCES:
1.   Vasilis D. Valavanis, "GIS in Oceanography and Fisheries", Taylor and Francis, 2002
2.   Shifrin K.S., "Physical optics of Ocean Water", American Institute of Physics, 1998.
3.   Eric C. Barrelt and Jenniter, "Remote Sensing for Hazard Monitoring and Disaster Assessment: Marine and Coastal applications in the Mediterranean Region", Gordon and Breach Science Publications, 1991.
4.   AlasdairJ.Edward, "Remote Sensing Handbook for Tropical Coastal Management", UNESCO Publishing, 2000.

RS9011	REMOTE SENSING AND GIS APPLICATIONS FOR	L	T	P	C
	URBAN AND REGIONAL PLANNING	3	0	0	3

UNIT I   BASICS OF URBAN PLANNING   6

Remote Sensing for Detection of Urban features – Scale and Resolution – Scope and Limitations – Interpretation from Aerial and Satellite images – Digital Image Processing Techniques – Image Fusion – case studies.

UNIT II   SETTLEMENT MAPPING   6

Classification of Settlement – Settlement Structure – Segmentation of Built-up Areas – Classification Algorithms – Landuse/Land Cover Mapping – Change Detection – High Resolution Remote Sensing.

UNIT III   ANALYSIS AND PLANNING   12

Urban Morphology – Housing Typology – Population Estimation from Remote Sensing – Infrastructure Demand Analysis – Urban Renewal – Land Suitability Analysis – Plan Formulation – Regional, Master and Detailed Development – Use of remote sensing and GIS in plan preparation – Urban Information System – Web GIS – case studies.

UNIT IV   TRANSPORTATION PLANNING   9

Mapping Transportation Network – Classification – Optimum Route/ Shortest Route – Alignment Planning – Traffic and Parking Studies – Accident Analysis – case studies.

UNIT V   CURRENT TRENDS   12

Urban Growth Modelling – Expert Systems in Planning – 3D city models – ALTM – Landuse Transportation Interaction Models – Intelligent Transportation Systems – case studies.

TOTAL: 45 PERIODS

REFERENCES:

1.   Jean-Paul Donnay, Mike J Barnsley and Paul A Longley, "Remote Sensing and Urban Analysis", Taylor and Francis, 2001.
2.   Sokhi, B. S. and Rashid, S.M., "Remote Sensing of Urban Environment", Manak Publications, 1999.
3.   William E Huxhold, "An Introduction to Urban Geographic Information Systems", Oxford University Press, 1991.

RS9012	REMOTE SENSING AND GIS APPLICATIONS IN DISASTER	L	T	P	C
	MITIGATION AND MANAGEMENT	3	0	0	3

UNIT I   DISASTER PRINCIPLES   9

Basic concepts and principles – Hydrological and geological disasters characteristics crisis and consequences – Role of Government administration University research organization and NGO's – International disaster assistance – Sharing technology and technical expertise.

UNIT II   LONG TERM MITIGATION MEASURES   9

Needs and approach towards prevention – Principles and components of mitigation Disaster legislation and policy – Insurance – Cost effective analysis – Utilization of resources – Training – Education – Public awareness – Roles of media.

UNIT III   SAFETY RATING OF STRUCTURES   9

Slope stability of Ghat roads –Structural safety of Dams Bridges Hospitals Industrial structures – Disaster resistant structures – Low cost housing for disaster prone areas – Cyclone shelter projects and their implications – Reconstruction after disasters: Issues of practices.

UNIT IV   SPACE SCIENCE INPUT IN DISASTER MANAGEMENT   9

Remote sensing in Hazard evaluation – Zonation – Risk assessment – Damage assessment – Land use planning and regulation for sustainable development –Communication satellite application – Network – Use of Internet – Warning system – Post disaster review – Case studies.

UNIT V   EMERGENCY PLANNING USING SPATIAL AND NON-SPATIAL DATA   9

Information systems management – Spatial and non-spatial data bank creation – Operational emergency management – Vulnerability analysis of infrastructure and settlements – Pre-disaster and post disaster planning for relief operations – Potential of GIS application in development planning – Disaster management plan – Case studies.

TOTAL: 45 PERIODS

REFERENCES:
1.   Bell, F.G., "Geological Hazards: Their assessment, Avoidance and Mitigation", E and FN SPON Routledge, 1999.
2.   David Alexander, "Natural Disasters", UCL Press, 1993.
3.   Nick Carter, W., "Disaster Management – A Disaster Manager's Handbook", Asian Development Bank, 1991.
4.   "Mitigating Natural Disasters, Phenomena, Effects and Options, A Manual for policy Makers and Planners", United Nations, 1991.
5.   George G. Penelis and Andreas J. Kappos, "Earthquake Resistant concrete Structures", E and FN SPAN, 1997.