Syllabus

The Syllabi M.Sc Remote Sensing and GIS First Semester for the Examination to be held in the year of Dec. 2008, Dec. 2009 and Dec. 2010

COURSE NO RSGT-101
TITLE: Fundamentals of Information Technology and GIS
Maximum Marks: 80 Credit: 4 Time allowed: 3 hours

Unit-1
1.1 Information technology support- Introduction to Information systems and IT
1.2 Information system infrastructure and Architecture,
1.3 The Evolution and types of information systems,
1.4 Managing of Information Technology.

Unit-2
2.1. Information Technology Infrastructure Hardware, software and Data related issues, Systems Application software, Enterprise software,
2.2 Basic of Data Arrangement and access, file Environment, DBMS, Logical Data model, Data Warehouses, Meta Data and Global Databases, Spatial Databases available for natural resources and Terrain.
2.3 Telecommunication systems, Types of satellites for telecommunication, Major types of networks-LAN, WAN, distributed processing, Mobile and wireless Applications;
2.4 Network communications software, Network Processing Strategies, Internet, WWW

Unit-3
3.1 Application of Information Technology, Inter-organizational and Global Information System.
3.2 Electronic Data Interchange (EDI) and Electronic Fund Transfer (EFT), Extranets, Implementing Inter-organizational Information System, Transaction processing.
3.3 Information System, Accounting and Finance system, Marketing and sales systems, Production and operational systems, Human Resources Management Systems, Integrated Information Systems and Enterprise Resource Planning, Data, knowledge, and Decision support.
3.4 The Data Management Life Cycle, DSS, Data visualization Technologies, knowledge Management and Organizational knowledge Bases, Data mining.

Unit-4
4.1 Intelligent system in business- Expert Systems, NLP and voice Technology, element of fuzzy logic,
4.2 Concept and application of Virtual Reality E-Commerce-Business to Computer applications.
4.3 Business to Business applications, Consumers, Market Research, and Customer Support, Infrastructure, Payments, and other support, Legal and Ethical Issues.
4.4 Strategic Advantage and IT, Illustrative cases of Strategic Information System, Issues related to business process Reengineering, Virtual Corporations and IT.

Unit-5
5.1 Developing and Managing Systems, Traditional systems Development Life Cycle (SDLC),
5.2 Alternative methods for Systems Development, Advantages and Disadvantages of System
5.3 Development Methodologies, Systems Development, Building Internet and Intranet Applications.
5.4 IT Ethical Issues, Security and protecting Information Systems.

NOTE FOR PAPER SETTING:
The question paper will contain two questions from each unit (total ten questions) and the candidate will be required to answer one question from each unit (total number of question to be attempted will be Five) i,e. there will internal choice within the unit

TEXT BOOKS:
Introduction to Information Technology
By EFRAIM TURBAN, R. KELLY RAINER and RICHARD E. POTTER Published by John Wiley & Sons.
Computers today by S.K. Basandra, Galgotia Publications

COURSE NO. RSGT –102
TITLE: Fundamentals of Remote Sensing and Image Interpretation
Maximum Marks: 80 Credit: 4 Time allowed: 3 hours

Unit – 1
1.1 Remote Sensing – history & development, definition, concept and principles
1.2 Energy Resources, radiation principles, EM Radiation and EM Spectrum
1.3 Black body radiation, Laws of radiation
1.4 Interaction of EMR with atmosphere and Earth's surface

Unit – 2
2.1 Platforms – Types and their characteristics
2.2 Satellites and their characteristics – Geo-stationary and sun-synchronous
2.3 Earth Resources Satellites -LANDSAT, SPOT, IRS, IKONOS satellite series
2.4 Meteorological satellites – INSAT, NOAA, GOES

Unit –3
3.1 Sensors – Types and their characteristics, Across track (whiskbroom) and Along track (pushbroom) scanning
3.2 Optical mechanical scanners – MSS, TM, LISS, WiFS, PAN
3.3 Concept of Resolution – Spatial, Spectral, Temporal , Radiometric
3.4 Basic concept and principles of Thermal , microwave and hyperspectral sensing

Unit – 4
4.1 Basic principles, types, steps and elements of image interpretation
4.2 Techniques of visual interpretation and interpretation keys
4.3 Multidate, multispectral and multidisciplinary concepts
4.4 Instruments for visual interpretation

Unit – 5
5.1 Remote Sensing Data Products and their procurement
5.2 Ground Truth Collection – Spectral Signatures

5.3 Commonly used Ground Truth equipments - use of Radiometers
5.4 Display Forms – Computer printouts, Thematic maps

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BOOKS RECOMMENDED
Campbell, J.B.2002: Introduction to Remote sensing. Taylor Publications
Drury, S.A., 1987: Image Interpretation in Geology. Allen and Unwin
Gupta, R.P.., 1990: Remote Sensing Geology. Springer Verlag
Jensen, J.R. 2000: Remote Sensing of the Environment: An Earth resource Perspective. Prentice Hall.
Joseph George, 2003 : Fundamentals of remote sensing. Universities Press
Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.
Sabbins, F.F., 1985: Remote sensing Principles and interpretation. W.H.Freeman and company

COURSE NO. RSGT – 103
TITLE: Aerial Photography and Photogrammetry
Maximum Marks: 80 Credit: 4 Time allowed: 3 hours

Unit – 1
1.1 Introduction to aerial photography – Basic information and specifications of aerial photographs
1.2 Planning and execution of photographic flights
1.3 Aerial cameras – Types and their characteristics
1.4 Aerial film negative and its processing- completion of photographic task

Unit –2
2.1 Introduction – Definition and terms in Photogrammetry
2.2 Types of aerial photographs
2.3 Geometry of Aerial Photographs
2.4 Introduction to digital photogrammetry- Orthophotos and digital orthophotography
Unit – 3
3.1 Orientation of aerial photographs, Aerial mosaics
3.2 Scale of aerial photographs and its determination
3.3 Stereovision and stereoscopes
3.4 Stereoscopic parallax and Parallax equations
Unit - 4

4.1 Making measurements from aerial photographs, Measurement of height from Aerial Photograph
4.2 Relief displacement of vertical features and its determination
4.3 Vertical exaggeration and slopes – Factor affecting vertical exaggeration and its determination
4.4 Elements of photointerpretation , Symbols and colour schemes used in photointerpretation

Unit – 5
5.1 Principles of stereo photogrammetry
5.2 Model deformation and rectification
5.3 Simple plotting Instruments – simple and stereoplotters
5.4 Aerial triangulation, control and mapping

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Gupta, R.P.., 1990: Remote Sensing Geology. Springer Verlag.
Jensen, J.R. 2000 : Remote Sensing of the Environment: An Earth resource Perspective. Prentice Hall
Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation , John Wiley.
Miller, V.C., 1961: Photogeology. McGraw Hill.
Moffitt, F.H. and Mikhail, E.M., 1980. Photogrammetry, Harper and Row,
Paine, D.P.,1981: Aerial Photography and Image Interpretation for Resource Management. John Wiley.
Pandey, S.N.,1987: Principles and Applications of Photogeology. Wiley Eastern,.
Rampal K.K. 1999: Hand book of aerial photography and interpretation. Concept publication

COURSE NO. RSGT – 104
TITLE: Cartography and Global Positioning System
Maximum Marks: 80 Credit: 4 Time allowed: 3 hours

Unit – 1
1.1 Introduction to cartography, nature and scope of cartography
1.2 Digital cartography - elements of digital cartography Relation between digital cartography, RS & GIS
1.3 Conventional mapping VS Digital mapping
1.4 Scale, reference and coordinate system

Unit – 2
2.1 Cartographic transformations and reasons for transforming cartographic data
2.2 Map Projection – concept and classification
2.3 Azimuthal, cylindrical , conical and rectangular projection system
2.4 Choice of map projection – Satellite image and map projection

Unit – 3
3.1 Mechanics of map construction - Principles of drawing, Base materials -Instruments
3.2 Cartographic design - map design principles, symbolisation and lay out
3.3 Study of different types of maps, Survey of India national series maps, layout and Numbering of topographical maps
3.4 Thematic maps and base maps

Unit – 4
4.1 Representation of natural and cultural features, relief representations
4.2 Map digitization and Map Compilation

4.3 Fair drawing and editing of maps
4.4 Map reproduction process

Unit – 5
5.1 Introduction to Global Positioning System (GPS) – Fundamental concepts
5.2 GPS system elements and signals
5.3 GPS measurements and accuracy of GPS
5.4 Classification of GPS receivers

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BOOKS RECOMMENDED
Anji Reddy, M. 2004: Geoinformatics for environmental management.B.S. Publications
Mishra R.P and Ramesh A. 1989: Fundamentals of Cartography. Concept publishing company Nag P. and Kudrat M. 1998: Digital Remote Sensing. Concept Publication
Rampal K.K. 1993: Mapping and compilation. Concept publication
Robinson A., Morrison, J.L., Muehrcke P.C., Guptil S.C. 2002: Elements of Cartography.
John Wiley Taylor,D.R.F. 1985: Education and Training in contemporary cartography, John Willey

COURSE NO. RSGL – 105
TITLE: PRACTICALS RELATING TO COURSE No. RSGT-101 and RSGT-102
Maximum Marks: 100 Credit: 4 Time allowed: 4 hours

MS OFFICE
i) MS WORD
ii) MS EXCEL
iii) MS ACCESS

Internet
i) URL
ii) Search Engines
iv) Surfing

HTML
i) Development of simple Web. Pages
ii) Working Knowledge of GIS Softwares

Study of satellite image, Border information and marking Reference System

Analysis of spectral reflectance curves

Visual interpretation of satellite images

Interpretation of different resolution IRS satellite images – LISS III, PAN and WIFS

Interpretation of cultural details from IRS image

COURSE NO. RSGL – 106
TITLES: PRACTICALS RELATING TO COURSE No. RSGT-103 and RSGT-104
Maximum Marks: 100 Credit: 4 Time allowed: 4 hours

Stereo Test and Orientation of Aerial Photograph

Determination of photo scale

Use of parallax bar, determination of heights

Preparation of photo line index

Identification of features on single vertical aerial photographs

Visual interpretation of satellite images and aerial photographs

Study of SOI topographic sheets

Calculation of Map Numbering System

Base map preparation

Handling of GPS, data collection and integration of GPS Data

REMOTE SENSING FIELD WORK (GPS SURVEY)

Familiarisation with GPS Receiver and to know the set up unit

Initialisation of the system in the field

To get aquainted with the various functions of the GPS

Using GPS with map & compass

Area calculation by GPS

Navigation by way points

Navigation by track points

Transfer of way points

Map preparation and map upgradation

COURSE NO: RSGT – 201
TITLE: APPLIED STATISTICS & PROGRAMMING CONCEPT
Maximum Marks: 80 Credit: 4 Time allowed: 3 hours

Unit I: Statistics

1.1 Sources, Types, Organization of data discrete and continuous series, scale of measurement, population, samples and sampling techniques, Matrix Algebria: types and properties of Matrices, addition, subtraction, Multiplication, Inverse

1.2 Measures of location, Dispersion, Skewness, Kurtosis

1.3 Linear Correlation, rank correlation and Regression analysis.

1.4 Multiple and Partial correlation

Unit II: Probability theory

2.1 Random and discrete variables-Concept of probability and probability distribution

2.2 Mathematical expectation

2.3 Standard distributions- Binomial and Poisson distribution with applications

2.4 Normal distributions with applications

Unit III: Theory of Sampling

3.1 Concept of sampling, sampling distribution and standard error. Sampling distribution

of mean
3.2 Estimation of parameters; Interval and point estimation (MLE). Test of significance; Hypothesis, two types of error, concept of confidence level.
3.3 Small and large sample test –concerning proportions, means, variances (such as Z, t and F test)
3.4 Chi square test- goodness of fit and test of independence

Unit IV: ANOVA and design of experiment
4.1 Concept of analysis of variance, ANOVA with one way classification
4.2 ANOVA with two way classification Small samples,
4.3 Design of Experiment: Basic Principles of design of experiments, CRD and RBD
4.4 Latin square design (LSD), Pattern analysis, measures of arrangement & dispersion Autocorrelation, semivariogram Analysis, concept of principal component analysis

Unit V: Programming in C
5.1 Conventional computers, Evolution of Programming Languages
5.2 Introduction to C-Language, C-Language-constant and variable, operators, statements and their types
5.3 C-Language-loops, arrays and pointers, functions, input-output
5.4 Introduction to Data structure-arrays, stack, linked list, queue.

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TEXT BOOKS:
Paul L. Meyer: Introductory Probability and statistical Applications, Adsion Wesley.
C.E. Balaguruswamy: Programming in ANSIC, Tata McGraw Hill Publishing Co. Ltd.
Gottrfriield, B.S.: Programming with C, Tata McGraw Hill Publishing Co. Ltd.
Introduction to Data Structure (Array, Stack, Linked List, Q)

COURSE NO: RSGT – 202 TITLE: DIGITAL IMAGE PROCESSING
Maximum Marks: 80 Credit: 4 Time allowed: 3 hours

Unit – 1
1.1 Introduction to digital image processing- Concept of digital image, steps in DIP
1.2 Image processing systems –hardware and software considerations
1.3 Digitization of photographic image , converting digital image to visual form image
1.4 Digital image data formats, Image data storage and retrieval

Unit – 2
2.1 Radiometric correction of remotely sensed data
2.2 Geometric correction of remotely sensed data
2.3 Image registration – definition principle and procedure
2.4 Basic statistical concept in DIP and use of probability methods in DIP

Unit – 3
3.1 Image enhancement Techniques - an overview
3.2 Contrast Enhancement - Linear and non linear, Histogram equalisation and Density slicing
3.3 Spatial filtering and Edge enhancement
3.4 Multi image manipulation – addition, subtraction and Band rationing

Unit 4
4.1 Principal Component Analysis
4.2 Enhancement by using colours – advantages, Types of colour enhancements
4.3 BGR – coding and generation of FCC's
4.4 Image transformation – Intensity Hue Saturation (HIS)

Unit – 5
5.1 Pattern recognition and image classification, Unsupervised classification – advantage, disadvantage and limitations
5.2 Supervised classification - training site selection , Classifiers used in supervised classification – Minimum distance to mean, Parallelepiped, maximum likelihood
5.3 Classification accuracy assessment
5.4 Hyperspectral image analysis

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Drury, S.A., 1987: Image Interpretation in Geology. Allen and Unwin
Gibson, P.J. 2000: Digital Image Processing. Routledge Publication
Gupta, R.P., 1990: Remote Sensing Geology. Springer Verlag.
Joseph George, 2003: Fundamentals of remote sensing. Universities Press
Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.
Nag P. and Kudrat M. 1998: Digital Remote Sensing. Concept Publication
Pratt.W.K. 2004: Digital Image processing. John Wiley
Sabbins, F.F., 1985: Remote sensing Principles and interpretation. W.H.Freeman and company

COURSE NO: RSGT – 203
TITLE: GEOGRAPHICAL INFORMATION SYSTEMS
Maximum Marks: 80 Credit: 4 Time allowed: 3 hours

Unit - 1
1.1 Introduction to GIS – definitions, concept and history of developments in the field of information systems
1.2 Computer fundamentals for GIS
1.3 Hardware and software requirements for GIS
1.4 Coordinate System and Projections in GIS – Conic, cylindrical and planner

Unit – 2
2.1 Data structure and formats
2.2 Spatial data models – Raster and Vector
2.3 Data inputting in GIS
2.4 Data base design - editing and topology creation in GIS, Linkage between spatial and non spatial data

Unit – 3
3.1 Spatial data analysis – significance and type, Attribute Query, spatial query
3.2 Vector based spatial data analysis

3.3 Raster based spatial data analysis
3.4 Buffer analysis

Unit – 4
4.1 Data quality and sources of errors
4.2 Integration of RS and GIS data
4.3 Digital Elevation Model
4.4 Network Analysis in GIS

Unit – 5
5.1 Data analysis and modeling in GIS– types of GIS modeling
5.2 Decision support systems
5.3 Overview of image processing & GIS Packages – ARC GIS, ERDAS, MAP INFO, ILWIS, GEOMEDIA, IDRISI
5.4 Recent Trends in GIS – AM/FM, Virtual 3D GIS, OLAP, Internet GIS, Open GIS

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BOOKS RECOMMENDED:
Anji Reddy, M. 2004 : Geoinformatics for environmental management.B.S. Publications
Chang.T.K. 2002 : Geographic Information Systems. Tata McGrawHill
Heywood.I, Cornelius S, CrverSteve. 2003: An Introduction to Geographical Information Systems. Pearson Education
Ram Mohan Rao. 2002: Geographical Information Systems. Rawat Publication.
Skidmore A.2002: Environmental modeling with GIS and Remote Sensing. Taylor and Francis
Tar Bernhardsen. Geographical Information Systems. John Wiley.
Wise S.2002: GIS Basics. Taylor Publications

COURSE NO: RSGT – 204
TITLES: THERMAL AND MICROWAVE REMOTE SENSING
Maximum Marks: 80 Credit: 4 Time allowed: 3 hours

Unit 1
1.1 Thermal radiation principles, thermal process and properties
1.2 Characteristics of thermal IR images and Factors affecting thermal images
1.3 Interaction of thermal radiation with terrain elements
1.4 Multispectral thermal data

Unit 2
2.1 Thermal image and qualitative interpretation,
2.2 Semi quantitative analysis
2.3 Temperature mapping with thermal scanner data
2.4 Applications of thermal sensing

Unit 3
3.1 Introduction to microwave remote sensing – Concept and principle, backscattering ,cross section Wavelength, incidence angle, aspect angle.
3.2 Interactions between radar and surface materials - complex dielectric properties, roughness polarization
3.3 Passive microwave sensors
3.4 Active microwave sensors

Unit – 4
4.1 Side looking radar system
4.2 Geometric characteristics of Side looking radar images
4.3 Synthetic aperture radar
4.4 Transmission characteristics of radar signals and other radar image characteristics

Unit – 5
5.1 Radar image interpretation
5.2 Fundamentals of radar interferometry
5.3 LIDAR – working principle, scope and applications
5.4 Applications of microwave remote sensing

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Jensen, J.R. 2000: Remote Sensing of the Environment: An Earth resource Perspective. Prentice Hall
Joseph George, 2003: Fundamentals of remote sensing. Universities Press
Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.
Sabbins, F.F., 1985: Remote sensing Principles and interpretation. W.H. Freeman and company

COURSE NO. RSGL – 205
TITLE: PRACTICALS RELATING TO COURSE No. RSGT-201 and RSGT-202
Maximum Marks: 100 Credit: 4 Time allowed: 4 hours

Frequency distribution , moments of distribution

Matrix Algebria: types and properties of Matrices, addition, subtraction, Multiplication, Inverse

Correlation: concepts and methods

Regression: Bi-variate, Linear

Exponential and Power

Multivariate , Principle component analysis

Normal, Binomial, Poison

Introduction to Boolean and Fuzzy logic

Pattern analysis, measures of arrangement & dispersion Autocorrelation, semivariogram Analysis

Elementary C-Programming

Following tasks to be done using ERDAS image processing software:

To load digital data and to convert image data

Display of B&W and FCC using ERDAS

File management- raster layer and layer information

Image enhancements – spectral, radiometric and spatial

Look up table and histogram manipulation

Low pass filters, High pass filters, band ratioing, Principal Component analysis

Geometric correction and mosaicing of image

Vector functions – attribute querry

Data import and export

Georeferencing and geometric correction

Unsupervised classification

Supervised classification

Use of model maker

Map Composition

COURSE NO. RSGL – 206
TITLE: PRACTICALS RELATING TO COURSE No. RSGT-203 and RSGT-204
Maximum Marks: 100 Credit: 4 Time allowed: 4 hours

Radar image

Radar image interpretation

Familiarisation with ARC GIS software

Georeferencing in ARC GIS

Digitization and layer creation

Data input, data editing and topology creation

Editing the layers (use of snap tolerance, remove over lap, gaps etc.)

Non spatial data entry

Linking spatial and non spatial data

Create new table, add field to table, add record to table, calculate area, perimeter

Buffer analysis and Querry analysis (Selection by location and selection by attributes)

Overlay analysis

Net work analysis – Finding the shortest route between two places, finding the optimum path etc.

Output map generation

COURSE NO. RSGT – 301
TITLE: REMOTE SENSING IN GEOSCIENCES
Maximum Marks: 80 Credit: 4 Time allowed: 3 hours

Unit – 1

1.1 Remote Sensing in geology – an overview
1.2 Basic concept of geomorphology, earth surface process and resultant landforms
1.3 Spectral characteristics of rocks and minerals
1.4 Drainage patterns – types and its significance in geologic interpretation

Unit -2

2.1 Interpretation of drainage patterns through aerial photographs and satellite images
2.2 Interpretation of fluvial landforms
2.3 Interpretation of glacial and coastal landforms
2.4 Interpretation of eolian and volcanic landforms

Unit - 3

3.1 Interpretation of Karst landforms
3.2 Interpretation of structural and denudational landforms – cuesta, hogback , butte, mesa etc.
3.3 Interpretation of landforms related to igneous, sedimentary and metamorphic rocks
3.4 Geomorphological mapping and terrain evaluation

Unit – 4

4.1 Lithological interpretation of Igneous rocks
4.2 Lithological interpretation of Sedimentary rocks
4.3 Lithological interpretation of Metamorphic rocks
4.4 Structure – Definition, types and structural mapping Interpretation of folds, faults, unconformities and lineaments

Unit – 5

5.1 Remote Sensing in Mineral exploration - An Overview and application of Remote Sensing in Mineral Exploration – Indian Examples
5.2 Remote Sensing in Oil Exploration – Features helpful in detection of target areas for oil exploration
5.3 Engineering geological Investigation , Alignment studies – roads, tunnels, canals etc Site selection studies – Dams, bridges, highways, airstrips etc
5.4 Natural disaster mapping and management.

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Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation , John Wiley.
Paine, D.P.,1981: Aerial Photography and Image Interpretation for Resource Management. John Wiley.
Pandey, S.N.,1987: Principles and Applications of Photogeology. Wiley Eastern,.
Miller, V.C., 1961: Photogeology. McGraw Hill.
Ray, R.G., 1969: Aerial Photographs in geologic Interpretations. USGS Prof, Paper 373.
Sabbins, F.F., 1985: Remote sensing Principles and interpretation. W.H.Freeman and company
Skidmore A.2002: Environmental modeling with GIS and Remote Sensing. Taylor and Francis

COURSE NO. RSGT – 302
TITLE: REMOTE SENSING IN WATER RESOURCES
Maximum Marks: 80 Credit: 4 Time allowed: 3 hours

Unit 1
1.1 Basic concept of water resources: Hydrological cycle, Darcy's law
1.2 Porosity, permeability, transmissibility, Specific yield
1.3 Issues in water resources development, management and utilization
1.4 Spectral characteristics of water and Relevance of RS techniques for hydrological investigations

Unit – 2
2.1 Remote sensing in Ground water exploration and factors affecting ground water occurrence
2.2 Types of aquifers , aquiclude, aquitard and aquifuge and Location of aquifers
2.3 Drainage mapping and Morphometric analysis
2.4 Significance of geological mapping of rocks & structure and their hydrological properties in groundwater exploration

Unit – 3
3.1 Remote Sensing in evaluating hydrogeological features and elements
3.2 Ground water targetting in various terrain types - hard rock terrain and in alluvial terrain
3.3 Water harvesting structures and optimum site selection for rain water harvesting
3.4 Significance of geological mapping of rocks and structures and their hydrological properties in groundwater exploration.

Unit –4
4.1 Watershed management- introduction, philosophy and concept and Role of Remote Sensing in watershed conservation, planning and management
4.2 Watershed characterisation and mapping
4.3 Runoff estimates from watersheds
4.4 GIS database for watershed management

Unit – 5
5.1 Snow – Snow in visible spectrum, middle infrared and microwave regions, Snow Mapping
5.2 Flood and flood plain mapping and zoning
5.3 Water quality monitoring and Hydrogeological modeling using RS and GIS
5.4 Groundwater resources estimation and production

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Chow, V.T., 1988: Advances in Hydro science McGraw Hill
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Gupta, R.P.., 1990: Remote Sensing Geology. Springer Verlag.
Jensen,J.R. 2000 : Remote Sensing of the Environment: An Earth resource Perspective. Prentice Hall
Karanth, K.R., 1987: Groundwater Assessment-Development and Management. Tata McGraw Hill.

Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.
Miller, V.C., 1961: Photogeology. McGraw Hill.
Paine, D.P.,1981: Aerial Photography and Image Interpretation for Resource Management. John Wiley.
Pandey, S.N.,1987: Principles and Applications of Photogeology. Wiley Eastern,.
Sabbins, F.F., 1985: Remote sensing Principles and interpretation. W.H.Freeman and company
Todd, D.K., 1980: Groundwater Hydrology. John Wiley
Rajora, R., 2003: Integrated Watershed Management. Rawat Publication

COURSE NO. RSGT – 303
TITLE: REMOTE SENSING IN AGRICULTURE SOIL AND LAND EVALUATION STUDIES
Maximum Marks: 80 Credit: 4 Time allowed: 3 hours

Unit -1
1.1 Remote Sensing in Agriculture – An Overview
1.2 Spectral characteristics of crops
1.3 Principles of crop identification and Crop acreage estimation
1.4 Crop yield modelling using Remote Sensing

Unit – 2
2.1 Crop condition and stress assessment using RS techniques
2.2 RS and GIS applications in Crop inventory
2.3 Agro-meteorology – its importance and application of RS in agro-meteorology
2.4 Drought assessment and monitoring through Remote Sensing

Unit –3
3.1 Distribution of soil types in India and introduction of remote sensing in soil survey
3.2 Soil morphology and classification.
3.3 Salt affected soil and mapping of salt affected soil using remote sensing
3.4 Wasteland their mapping and management using remote sensing
Unit –4
4.1 Relationship of rock types and geomorphology to soil types
4.2 Soil erosion and erosion hazard assessment through Remote sensing
4.3 Soil moisture assessment using RS
4.4 Soil mapping using aerial and satellite remote sensing data

Unit – 5
5.1 Land degradation and erosion -degraded soils ,their identification and mapping of degraded lands
5.2 Land use / land cover – Basic concept and classification
5.3 Land use / land cover mapping through remote sensing
5.4 Land evaluation for optimal land use planning

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Jensen,J.R. 2000 : Remote Sensing of the Environment: An Earth resource Perspective. Prentice Hall
Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation , John Wiley.
Skidmore A.2002: Environmental modeling with GIS and Remote Sensing. Taylor and Francis

COURSE NO. RSGT – 304 TITLE: REMOTE SENSING IN FORESTRY
Maximum Marks: 80 Credit: 4 Time allowed: 3 hours

Unit – 1
1.1 Forest: Introduction and distribution of forests
1.2 Forest types of India
1.3 Forestry: Introduction and concept of forestry
1.4 Role of RS and GIS in forestry

Unit – 2
2.1 Interaction of EMR with vegetation and spectral characteristics of vegetation
2.2 Temporal characteristics of Vegetation
2.3 Vegetation indices
2.4 Forest cover mapping through RS and GIS

Unit – 3

3.1 Forest types and forest density mapping
3.2 Remote Sensing application in forest cover change detection
3.3 Remote Sensing application in mapping of stressed vegetation
3.4 Study of association between rock and forest types using RS and GIS

Unit – 4
4.1 Role of Microwave Remote Sensing in forest studies
4.2 Biomass estimation by non destructive method
4.3 Growing stock estimation using RS and GIS
4.4 Remote Sensing application in formulation of forest working plan

Unit – 5
5.1 Bio diversity studies using RS and GIS
5.2 Wildlife habitat analysis using RS and GIS
5.3 Biological invasion and monitoring of invasive species through RS and GIS
5.4 Forest Management Information System (FMIS)

NOTE FOR PAPER SETTING
The question paper will contain two questions from each unit (total ten questions) and the candidate will be required to answer one question from each unit (total number of question to be attempted will be Five) i,e. there will internal choice within the unit

BOOKS RECOMMENDED:
Anji Reddy,M. 2004 : Geoinformatics for environmental management.B.S. Publications
Franklin S.E. 2001. Remote Sensing for sustainable forest management. Lewis Publication
Gupta, R.P.., 1990: Remote Sensing Geology. Springer Verlag.
Jensen,J.R. 2000 : Remote Sensing of the Environment: An Earth resource Perspective. Prentice Hall

Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.

COURSE NO. RSGL – 305
TITLE: PRACTICALS RELATING TO COURSE No. RSGT-301 and RSGT-302
Maximum Marks: 100 Credit: 4 Time allowed: 4 hours

- Visual interpretation of satellite images and aerial photographs to study the following: Geomorphology, lithology, geology and strcuture
- Digital image processing for the study of geomorphology, structure, and lineaments
- Geomorphic mapping
- Lineament mapping
- Structural mapping
- Route location
- Dam site location studies
- Digital Terrain Modelling
- Drainage mapping
- Morphometric analysis
- Estimation of potential evapotranspiration and water balance through empirical equation
- Hydromorphologeologic interpretation
- Preparation of groundwater potential zone maps

COURSE NO. RSGL – 306
TITLE: PRACTICALS RELATING TO COURSE No. RSGT-303 and RSGT-304
Maximum Marks: 100 Credit: 4 Time allowed: 4 hours

- Land use / land cover mapping
- Identification of degraded lands
- Land utilization mapping
- Soil mapping
- Crop estimation studies
- Identification of forest species from aerial photographs
- Vegetation mapping from satellite images
- Digital image enhancements for vegetation/forest
- NDVI analysis
- Digital classification for forest cover mapping
- Forest change detection studies

REMOTE SENSING FIELD WORK (GROUND TRUTH)
Prefield preparations

- Preparation of various thematic maps in the lab
- Unsupervised classification in the lab for land use classes

Field work

Filed validation of the above mentioned themes and maps in the field

Study of the different signatures for the different land use classes in the field.

Ground truth collection

Any other relevant data collection in the field

Post Field work in the lab

Training site selection for supervised classification

DEM generation

Thematic maps correction after the filed checking

Report submission

COURSE NO. RSGT – 401
TITLE: REMOTE SENSING IN HUMAN SETTLEMENT ANALYSIS
Maximum Marks: 80 Credit: 4 Time allowed: 3 hours

Unit – 1
1.1 Remote Sensing in Human settlement and urban planning – An Overview
1.2 Principles of urban area development planning and land use
1.3 Data requirement for regional planning and Urban/Sub-urban resolutions considerations
1.4 Large scale mapping for cadastral database in urban areas

Unit – 2
2.1 Settlement patterns – Image characterisation and recognition
2.2 Rural settlements - detection, interpretation, delineation and analysis
2.3 Urban settlements - detection, interpretation, delineation and analysis
2.4 Slum, squatter settlement - detection, interpretation, delineation and analysis

Unit - 3
3.1 Urban land use classification
3.2 Urban land use mapping and analysis
3.3 Residential land use, Commercial land use and Industrial land use
3.4 Urban land conservation using remote sensing

Unit – 4
4.1 Remote sensing in monitoring master plan / new town development area
4.2 Transportation/ road network analysis through RS and GIS
4.3 Site selection and suitability analysis for urban development
4.4 Urban Sprawl and change detection studies

Unit – 5
5.1 Methods of population estimation using remote sensing
5.2 Remote sensing applications in regional and district level planning
5.3 Database design & analysis for urban and regional resource mapping
5.4 Urban hazards and risk management through RS and GIS

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Jensen,J.R. 2000 : Remote Sensing of the Environment: An Earth resource Perspective. Prentice Hall
Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.

COURSE NO. RSGT – 402
TITLE: REMOTE SENSING IN ENVIRONMENTAL SCIENCE
Maximum Marks: 80 Credit: 4 Time allowed: 3 hours

Unit –1

1.1 Ecological, biological aspects of Environment
1.2 Environmental Pollution and types of environmental pollution
1.3 Change detection studies with the help of multi temporal data
1.4 Remote Sensing in pollution monitoring

Unit – 2

2.1 Water quality mapping and monitoring - Introduction
2.2 Remote sensing in water quality mapping monitoring and management
2.3 Solid waste management – introduction classification and environmental problems
2.4 Remote sensing and GIS in solid waste management

Unit – 3

3.1 Man made disasters: Introduction, Types
3.2 Application of remote sensing & GIS in management of Man made disasters
3.3 Fire and Forest fire
3.4 Fire risk assessment and management using RS &GIS

Unit – 4

4.1 Natural Disasters – Introduction and types
4.2 Disaster management cycle and role of Remote Sensing and GIS in disasters management
4.3 Remote Sensing and GIS application in Hazard zonation mapping
4.4 Remote Sensing and GIS application in post disasters

Unit – 5

5.1 Impact assessment – Basic concepts, Environmental impact assessment (EIA) methods
5.2 Environmental analysis and environmental monitoring for sustainable development through RS & GIS
5.3 EIA of mining areas and river valley project through Remote Sensing
5.4 Environmental Management Plan (EMP), its importance and Role of GIS in preparation of EMP

NOTE FOR PAPER SETTING

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Jensen, J. R. 2000: Remote Sensing of the Environment: An Earth resource Perspective. Prentice Hall

Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation , John Wiley.

Skidmore A.2002: Environmental modeling with GIS and Remote Sensing. Taylor and Francis

COURSE NO. RSGL – 403

TITLES: PRACTICALS RELATING TO COURSE No. RSGT-401 and RSGT-402

Maximum Marks: 100 Credit: 4 Time allowed: 4 hours

Urban land use mapping

Determination and delineation of settlement – Urban, rural

Highway, canal, sewage alignment

Land use change detection

Forest fire risk generation

Pollution determination studies

Identification of land slides

Hazard zonation mapping

Mapping of mining areas to identify the overburdens and land degradation

Pollution mapping

Impact assessment of road construction, site identification for setting of industries etc.

PROJECT WORK

To carry out project work on a problem based on Remote Sensing and GIS application in the available Infrastructures in the their own Institution or one of the national Remote Sensing Institutes/ laboratories /GIS Companies etc. to get aquainted with various image processing and GIS softwares.