

## **Interdisciplinary Department of Remote Sensing and GIS Applications**

### ***M.Sc. (Remote Sensing & GIS Applications)***

**Session 2016-17**

**Semester III**

Contact hours: 56

Credit 4

**Paper-10**

### **Application of Remote Sensing in Natural Hazards**

#### **Unit-I**

Natural hazards: Concept of natural hazard. Types and classification of natural hazards: Causes, effects, monitoring, management of Earthquakes, Volcanic eruptions, Tsunamis. Role of remote sensing in monitoring and damage assessment. History of natural hazards in India. Vulnerable states and regions of India. Vulnerability index of various natural hazards in India. Preventive measures. Earthquake and Tsunami warning system in India

#### **Unit-II**

Causes, effects and management of floods, cyclones, draughts, landslides. Application of remote sensing in monitoring, management and damage assessment of these hazards. Case studies and examples from India. Indian policies and programmes to tackle natural hazards at state and national level.

#### **Unit-III**

Causes, effects and impacts of desertification and land degradation. Monitoring and mapping desertification from space data. Wasteland classification. Application of remote sensing and GIS in wasteland mapping. Spatial and non-spatial data for monitoring and management of natural hazards. Case studies and examples from India.

#### **Unit-IV**

Water logging and salinization hazards- role of remote sensing in mapping and monitoring. Remote sensing application in post hazards rehabilitation and resettlement. Role of NGOs in post hazards measures. GIS data for Decision support system. Stakeholders participation in natural hazard monitoring and management.

#### **Suggested readings:**

Web resources of Govt. Of India, Ministries of S&T, Earth Sciences, IMD, ISRO, Env,& Forest etc.

Web sites of journals [www.springerlink.com](http://www.springerlink.com), [www.elsevier.com](http://www.elsevier.com) [www.tandf.co.uk](http://www.tandf.co.uk)

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**Credit 4**

**Paper-11**

**Cartography, Mapping and GIS Techniques**

**Unit I**

Cartography – meaning and scope, historical development, Maps – its types; concept of scale and its function; Representing earth – map projections and its function.

**Unit II**

Map as an interface – representing geography – point, line, area features. physical features, terrain, weather and climatic data; socio – economic data – qualitative and quantitative data.

**Unit III**

Maps and the nature of GIS applications; vector and raster data characteristics; data classification and analysis. Working with digital data.

**Unit IV**

Data analysis – measurements, queries, reclassification, buffering, data integration. Modelling human processes, GIS project design and management.

**Suggested Books:**

1. Fundamentals of GIS by Micheal Demers
2. Remote Sensing and Geographic Information System by Anji Reddy
3. Remote Sensing and Geographic Information System by A.M. Chandra
4. Concepts and Techniques of Geographic Information System by Lo and Yeung.
5. [www.GISdevelopment.net](http://www.GISdevelopment.net)

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**Paper 12**

**Data mining and software application**

(same as in 2015-16)

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### ***M.Sc. (Remote Sensing & GIS Applications)***

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**Semester III**

Credit 4

**Elective (E3)**

### **Remote Sensing and GIS Applications in Geosciences-I**

#### **Unit-I**

Concepts and techniques of lithological mapping. Application of remote sensing in identification, delineation and characteristics of common rock types: sandstone, shale, limestone, granite, quartzite, basalt etc. Case studies and examples from India.

#### **Unit-II**

Concept and technique of Structural mapping. Application of remote sensing in identification, delineation and characteristics of lineaments, joints, fractures, faults, folds etc. Importance of structural features in site selection of engineering structures: dams, tunnels, reservoirs etc. Case studies and examples from India.

#### **Unit-III**

Geomorphological mapping of the landforms. Identification, delineation and characteristics of fluvial, eolian and glacial landforms on remotely sensed data. Major geomorphic features of important geological regions of India and their characteristics.

#### **Unit IV**

Drainage characteristics and slope analysis using remote sensing and GIS. Morphometric analysis of drainage basins-linear, shape and areal parameters. DEM and its applications in geological studies. Slope suitability analysis for geological structures.

#### **Suggested Books:**

1. Remote Sensing-Principles and Interpretation by Sabins.
2. Remote Sensing and image interpretation by Lillesand and Keifer
3. Fundamentals of Remote Sensing by George Joseph
4. Remote Sensing of Environment by A.R. Jensen
5. Remote Sensing and Geographical Information System by Anji Reddy
6. Principal of Remote Sensing by P.J. Curran
7. Campbell, J.B.2002: Introduction to Remote sensing. Taylor Publications
8. Drury, S.A., 1987: Image Interpretation in Geology. Allen and Unwin
9. Gupta, R.P., 1990: Remote Sensing Geology. Springer Verlag

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### ***M.Sc. (Remote Sensing & GIS Applications)***

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**Semester III**

**Elective (E3)**

### **Remote Sensing and GIS Applications in Water Resources-I**

#### **Unit-I**

Components of hydrologic cycle and Global water resources. Major Indian river basins- surface and groundwater resource potential. Basic Concepts of a river basin, watershed, catchment. Terrain Parameters of watersheds and their role in water resources.

#### **Unit-II**

Spectral characteristics of water, snow and surface water inventory. OCM application in water. Snow horology, snow melt run-off and glacial inventory. Application of remote sensing in laying of canals, construction of reservoirs. Case studies and examples from India.

**Unit-III:** Types of drainage and their characteristics. Watershed characteristics: morphometric analysis of watersheds: linear, shape, relief and areal parameters. DEM and slope analysis. Application of remote sensing in Watershed characterisation and prioritization based on Morphometric parameters. Case studies and examples from India.

**Unit-IV:** Groundwater provinces of India: characteristics, status, problems and challenges. Status of groundwater development in various states: critical, dark and overexploited blocks/districts. Groundwater exploration in consolidated terrain-hard rocks and unconsolidated terrain-alluvial terrain Hydrogeomorphic mapping for delineation of groundwater potential zones in different terrains using remote sensing and GIS. Case studies and examples from India.

#### **BOOKS RECOMMENDED:**

- Anji Reddy, M. 2004 : Geoinformatics for environmental management. B.S. Publications  
Chow, V.T., 1988: Advances in Hydro science McGraw Hill  
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  
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.  
Paine, D.P., 1981: Aerial Photography and Image Interpretation for Resource Management. John Wiley.  
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

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**Elective (E-3)**

**Remote Sensing and GIS Applications in Land use Planning-I**

**Unit I:**

Urban Land Use Mapping: Relevance of RS & GIS in urban studies; Urban area classification; Monitoring of Urban Plan and change detection; Urban land use/land cover classification and mapping; Urban mapping, zonation and field verifications.

**Unit II:**

Urban Growth Monitoring: Detection and identification urban objects on aerial photographs at different scales; Urban area interpretation and analysis using multi -scale imageries; Urban growth monitoring.

**Unit III:**

Residential Area Interpretation and Population estimation: Residential area interpretation using vertical aerial photographs and satellite imageries; Urban population estimation.

**Unit IV:**

Urban Issues and Hazards: Monitoring of urban environment; Urban facility mapping; Traffic survey; Solid waste management

**Suggested Books:**

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

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

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**RLM-5 (Lab-5)** (for Papers 10 and 11) (2 credits)

Exercises related to natural hazards. Monitoring and mapping. Mapping of vulnerable zones of various hazards. Risk assessment using spatial data. Cartographic mapping. Thematic maps and GIS techniques.

**RSM-6 (Lab-6)** (for Papers 12 and E3) (2 credits)

Statistical analysis and data mining. Meta data and software application. R software. Exercises related to application of remote sensing in geosciences/water resources/land use.

**Ability Enhancement (AE-3)** (4 credits)

Field work/GPS survey/Ground truth mapping

**Elective (E-3)** (4 credits)

Remote sensing and GIS Applications in Geosciences-I  
Remote sensing and GIS Applications in Water Resources-I  
Remote sensing and GIS Applications in Land use planning-I