

## **EV806 FOUNDATION COURSE IN ENVIRONMENTAL GEO INFORMATICS 1-0-0-1**

### **Unit 1: Geodetical aspects, mapping concepts and surveying**

Earth System – Geodesy: Datum/Spheroids and coordinate systems, map projection - different projections and their characteristics

Features on the earth's surface: their basic properties – discrete vs continuous and geometries of representation

Cartography: Maps – their characteristics and elements, types - EDMs and GNSSs; GNSSs – segments, various constellations, errors, differential correction and precise positioning

Map reading and interpretation

Global, national and state mapping agencies and their authorized reference maps – general & thematic

### **Unit 2: Remote sensing: Introduction**

Remote sensing system – components and principles – platforms, sensors, medium, target, interactions and their characteristics including various resolutions, concept of DN value, radiance, reflectance, emission

Electromagnetic spectrum - energy interaction with atmosphere and earth surface, atmospheric windows, spectral properties of various objects on the earth's surface and the concept of spectral signature, active and passive remote sensing

Space borne earth observation: various orbits and their characteristics, operations, image acquisition and various data products

Indian remote sensing programme & other satellites and sensors like Landsat, SPOT, etc.

### **Unit 3 Digital Image Processing: Basics**

Various image formats, loading and visualization – panchromatic and multispectral colour visualization – TCC and FCCs

Image restoration – geometric, radiometric – atmospheric errors and their correction

Image enhancements – single band, multiband operations – layer stacking, ratioing and various indices, PCT, TCT, resolution merging/image fusion

Image interpretation – visual and digital; visual interpretation elements and key

Digital image classification – unsupervised and supervised; accuracy assessment

### **Unit 4 Geographical Information System (GIS): Basics**

Concepts, components and organisation of GIS

Representing & modelling spatial features and processes - vector and raster structures, relationship between features – topology; raster data compressions and storage formats

Non-spatial/attribute Database Management Systems (DBMS), significance of DBMS, principles, data types, models – RDBMS, data storage, query and retrieval

Basic GIS functions: data inputting methods & various data sources, data management, data manipulation and geographic analysis and output presentation

### **Unit 5 Introduction to ISRO**

Indian Space Programme - Vision, Mission, Aspirations

Earth observation-EO sensors & platforms, Spectral properties of various objects on Earth

Major EO data portals - NASA, ESA, NRSC, Open source data archives & repositories - eg: NOEDA

## **TEXT BOOKS/ REFERENCES:**

1. Agarwal S. K. 2002. Eco-informatics. APH Publishing Corporation, 1535 pages, ISBN-13: 978-8176483247.
2. Agarwal N. K. 2004. Essentials of GPS. Spatial Networks Pvt. Ltd., Hyderabad
3. Anji Reddy M. 2004. Geoinformatics for Environmental Management. B. S. Publications
4. Burrough P.A. and McDonnel A. R. 1998. Principles of Geographic information Systems. Spatial information systems and Geostatistics. Oxford university press.
5. Chouhan T. S. and Joshi K. N. 1996. Applied remote sensing and photo interpolation. Vigyan Prakasham, Jodhpur.
6. Coronel C., Morris S. and Rob P. 2009. Database Systems: Design, Implementation and Management (9th Ed.). Course Technology, 700 pages, ISBN 13: 978 0538748841.
7. David L. Verbyla. 1995. Satellite Remote Sensing of Natural resources. Lewis Publishers, New York
8. George Joseph. 2005. Fundamentals of remote sensing (Second Edition). Universities Press (India) Pvt. Ltd., Hyderabad
9. Goodchild M. F., Parks B. O. and Steyaert L. T. (Eds.). 1993. Environmental Modeling with GIS (Spatial Information Systems). Oxford University Press, USA, 520 pages, ISBN-13: 978-0195080070.