

Faculty of Climate Variability and Aquatic Ecosystem

Subject Code: D1813

Name of the Subject: Remote Sensing & GIS

Module. 1	EMR-Electromagnetic Spectrum Energy sources and Radiation principles, Energy equation, EMR and Spectrum – EMR interaction with Atmosphere – Scattering, Absorption – EMR interaction with Earth surface features reflection, absorption, emission and transmission, - Microwave Band Designation Microwave interaction with atmospheric constituents, Earth's surface, vegetation, and ocean. – Spectral response pattern – Vegetation, Rocks, Soil, Water bodies – Spectral properties and characteristics.
Module. 2	Active, Passive, Optical Remote sensing, Visible, Infrared, thermal, Sensors and characters. Microwave Remote sensing sensors, Concept of Microwave Remote sensing, – Characters of real and successful remote sensing system- Platforms and sensors- orbit types– Resolutions in Remote Sensing, Types of Scanners in Remote Sensing, LIDAR, SONAR, Land observation satellites, characters and applications, , High resolution satellites, character and applications, Weather/Meteorological satellites and, Marine observation satellites and Applications
Module .3	Terrestrial and Aerial photographs - vertical and oblique photographs - height determination contouring - photographic interpretations- stereo- pair generation – parallax bar- Flight Planning- Photo Interpretation, Applications of aerial Photos, Orth photo generation, Aero- triangulation Internal Orientation Parameters, External orientation Parameters.
Module. 4	Geographical Information Systems: Maps and Spatial information – Computer Assisted Mapping and Map Analysis. Components of Geographical Information System, Map projections in GIS – Coordinate System – Georeferencing – Data Structures for Geographic Information Systems – GIS Entities – Point, Lines and Polygon. Definition of a map, Data input, verification, storage and output: Data input - Data verification, Correction and Storage. Data output – Data output format – Thematic maps, Charts and Graph, Data structures for thematic maps – Difference of Raster and Vector model. Digital Elevation Models: TIN – DEM Proximity analysis, Overlay Analysis, Network analysis
Module. 5	Geodesy: Definition and classification - geometry of ellipsoid – various co-ordinate systems – spherical excess – geoid and deflection of vertical, various height systems – rectangular and polar coordinates. Geodetic computation. GPS satellites – Components – Satellite Ranging – Codes - GPS – DGPS - GPS Receiver and its Features – Receiver selection – Enhancement of receiver - GPS processor Software – GPS Data Processing of GPS data and types. GPS Field Survey Techniques – Advantages – Characteristics Positioning modes – Static surveying – Kinematics surveying. Doppler Effect and basic positioning concept – Dilution of Precision – Types – Multipath Effect – Field practices.

<p style="text-align: center;">Module.6</p>	<p>Image enhancement - Satellite image statistics, Uni-variate and multi-variate statistics. Basics of Histogram, noise models, image quality, contrast manipulation, grey level thresholding, level slicing, contrast stretching- Spatial feature manipulations, spatial filtering, convolution Low pass, high pass, edge enhancement, edge detection, Fourier analysis. Image classification - Introduction, Classification techniques, feature extraction, Supervised, training stage, classification stage, scatterogram, minimum distance to mean classifier, Parallelepiped classifier, Gaussian maximum Likelihood classifier, unsupervised classification, Hybrid classifier, classification of mixed pixel-fuzzy classification, output stage, classification accuracy, error matrix. Expert system, Artificial Neural Network; Integration with GIS</p>
<p style="text-align: center;">Module. 7</p>	<p>Definition, scope and concepts of cartography. Characteristics of Map. Categories of maps. Methods of mapping, relief maps, thematic maps. Trends in Cartography. Map projection, classification principles of construction of common projections, cylindrical, conical, azimuthal and globular projections. Properties & uses of projection. The spheroid, Map scale, and co-ordinate system. Plane co-ordinates in UTM system, projection used in Survey of India topographic sheets. Computer assisted cartographic processes, symbolization, mapping with point, line and area Symbols-Portraying the land surface form. Map Compilation – Analog and Digital Compilation. Map reproduction. Methods of Few Copies and Many Copies. Map production: Form of Art Work-Construction Method-Output option - Digital cartography.</p>