

REMOTE SENSING AND PHOTOGRAMMETRY

Unit 1:

Fundamentals of Remote Sensing: Definition, types - Energy sources and radiation principles – Electromagnetic spectrum – Divisions - Stefan Boltzman's law – Blackbody – Wien's displacement law - Active and passive remote sensing system – various platforms of remote sensing

Energy interaction in the atmosphere: Scattering, absorption, transmission, atmospheric window; Energy interaction with the earth's surface features – spectral reflectance curve; Data Acquisition, Receiving and recording – PIXEL – Path and Row – Swath; Ideal and real remote sensing system; Thermal and Microwave remote sensing

Unit 2 :

Photogrammetry – introduction, concept and application; Aerial Remote Sensing: History of aerial photography; Parts of aerial camera, aerial film camera and their types, electronic imaging, Multiband imaging; Types of aerial photographs; Photographic scale – causes for variation; Flight planning; Parallax, Vertical Exaggeration; Stereoscopy - Stereovision – stereoscopes: Lens and mirror stereoscopes – precision study of aerial photos using stereoscope, stereoplottling instruments; Mosaics – Types and construction of mosaics; Annotation - Factors affecting results

Unit 3:

Satellite Remote Sensing: History of space imaging; Types of satellites: Polar orbiting, geostationary and spy satellites; Scanning systems and Detectors: Across-track and along-track scanning systems, FOV & IFOV, charge couple devices; Sensors and their resolutions: spatial, spectral, radiometric and temporal; Data products: photographic and digital; Sensor characteristics of Landsat, SPOT, IRS series of satellites and other high resolution satellites; Indian space programme: past, present and future

Unit 4:

Satellite Data Interpretation: Visual interpretation: Elements of photo and image interpretation, interpretation strategies and keys

Digital interpretation - Digital image processing: Image rectification and restoration: Geometric correction, radiometric correction, noise removal; Image enhancement: Contrast manipulation – Grey level thresholding, level slicing, contrast stretching; Spatial feature manipulation: spatial filtering, edge enhancement, fourier analysis;

Multi image manipulation: multispectral band ratioing and differencing, Principal, canonical and vegetation components, IHS colour space transformation, decorrelation stretching; Image classification: Supervised classification - training stage, classification stage and output stage; Unsupervised classification; Data merging and GIS interpretation; Hyperspectral image analysis, Biophysical modelling

Unit 5:

Remote Sensing Applications in Earth Sciences: Remote sensing interpretation for lithological and structural mapping, geomorphological studies, mineral exploration, groundwater exploration, land use / land cover mapping, hazard zonation mapping: earthquakes, volcanoes, landslides, floods, soil erosion and for pollution studies

TEXT BOOKS:

1. Lillesand, T.M and R.W. Kiefer (2000). Remote sensing and image interpretation. John Wiley & Sons, New York
2. Sabins, F.F (1987). Remote sensing principles and interpretation. Freeman Publishers, New York
3. Miller, V.C (1961). Photogeology. McGraw-Hill Publishers, New York
4. Siegal, B.S and R. Gillespie (1980). Remote sensing in Geology, John Wiley & Sons, New York
5. Curran, P (1988). Principles of remote sensing. Corgman Publishers, London
6. Pandey, S.N (1987). Principles and applications of photogeology. Wiley Eastern Ltd., New Delhi

REFERENCES:

1. Allum, J.A.E (1978). Photogeology and regional mapping, Pergamon Press Ltd., Oxford
2. Barrett, E.C and C.F. Curtis (1982). Introduction to environmental remote sensing. Chapman & Hall publishers, New York.
3. Anji Reddy, M (2001). Textbook of remote sensing and GIS, BSP PS Publications, New Delhi
4. Bruno Marcolongo and Franco Mantovam (1997). Photogeology – Remote sensing applications in earth sciences, Oxford & IBH Publishers Co. Pvt. Ltd., New Delhi
5. Rampal, K.K (1999). Handbook of aerial photography and interpretation. Concept Publishers Company, New Delhi
6. Jean Yves Scanvic (1997). Aerspatial remote sensing in geology. Oxford & IBH Publishers Co. Pvt. Ltd.
7. Agarwal, C.S and Garg, P.K (2000). Textbook on remote sensing in natural resources monitoring and management, Wheeler Publishing Company Ltd., New Delhi
8. Narayan, L.R.A (1999). Remote sensing and its application. Universities Press Ltd., Hyderabad.