

RS & GIS Syllabus

Remedial Mathematics

Vector algebra and vector calculus. Linear algebra, matrices, Cayley-Hamilton Theorem. Eigenvalues and eigenvectors. Linear ordinary differential equations of first & second order, Special functions (Hermite, Bessel, Laguerre and Legendre functions).

Electromagnetic Theory

Electrostatics: Gauss's law and its applications, Laplace and Poisson equations, boundary value problems. Magnetostatics: Biot-Savart law, Ampere's theorem. Electromagnetic induction. Electromagnetic waves in free space. Dielectrics and conductors. Reflection and refraction, polarization, Fresnel's law, interference, coherence, and diffraction. Dynamics of charged particles in static and uniform electromagnetic fields.

Thermodynamics

Laws of thermodynamics and their consequences. Thermodynamic potentials, Maxwell relations, chemical potential, phase equilibria. Phase space, micro- and macro-states. Micro-canonical, canonical and grand-canonical ensembles and partition functions. Free energy and its connection with thermodynamic quantities. Classical and quantum statistics. Ideal Bose and Fermi gases. Principle of detailed balance. Blackbody radiation and Planck's distribution law.

Electronics

Semiconductor devices (diodes, junctions, transistors, field effect devices, homo- and hetero-junction devices), device structure, device characteristics, frequency dependence and applications. Opto-electronic devices (solar cells, photo-detectors, LEDs). Operational amplifiers and their applications. Digital techniques and applications (registers, counters, comparators and similar circuits).

Fundamentals of Remote Sensing

Concept and Scope of Remote Sensing: Definitions, Process and Characteristics of Remote Sensing System, Advantages and limitations .Concept of Electromagnetic Radiation (EMR): Wavelength-frequency-energy relationship of EMR, EMR Spectrum and its properties, EMR wavelength regions and their

applications, Atmospheric windows, Interaction of EMR with matter, Spectral signatures

Fundamental laws governing the science: Sources of Energy, Radiation laws: Stefan-Boltzmann law, Wien's law, Kirchhoff's law, Black body and Real body, Radiant temperature & Kinetic temperature, Brightness temperature. Energy Interaction in the atmosphere: Scattering, absorption, transmission, reflected radiation. Energy Interactions with Earth Surface Features: Spectral Reflectance Curve, Concept of signatures; Remote Sensing Scenario in Indian Context

Fundamentals of Geographic Information System

Basic Concepts: definition of GIS, Components of GIS, Variables – points, lines, polygon, Functionality of GIS, Areas of GIS application, Advantage and Limitation of GIS.

GIS Data: Spatial and Attribute Data, Information Organization and Data Structures -Raster and Vector data structures, Data file and database

Creating GIS Database: GIS Software, file organization and formats, Geodatabase, Rectification, Digitization and Map Composition

GIS Data Input: Nature and Source of data, Method of spatial data capture - Primary and Secondary, digitization and scanning method, Techniques and procedure for digitizing, Errors of Digitization, Attribute data capture

Data Editing: Detecting and correcting errors, Re-projection, Transformation and Generalization, Edge matching and Rubber sheeting, Topology, Conversion from Other Digital Sources