

Geo Engineering & Geo Informatics (GG)

Engineering Mathematics

Linear Algebra: Matrix algebra, Systems of linear equations, Eigen values and eigenvectors.

Calculus: Functions of single variable, Limit, continuity and differentiability, Mean value theorems, Evaluation of definite and improper integrals, Partial derivatives, Total derivative, Maxima and minima, Gradient, Divergence and Curl, Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems.

Complex Variables: Analytic functions, Cauchy's integral theorem, Taylor and Laurent series.

Probability and Statistics: Definitions of probability and sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random variables, Exponential, Poisson, Normal and Binomial distributions.

Geo-Engineering: Continents. Earth composition. Earth - Orbit, Oceans - Depth, Bottom, Relief **Rocks:** Kinds of rocks, (Igneous, Sedimentary, Metamorphic Rocks origin and classification) Minerals (Silicate Minerals and Non Silicate Minerals) & physical properties of minerals.

Surveying methods: Topographic surveying, Theodolite applications, topographic sheets, aerial photo formats Maps: Types of photographs: vertical and oblique photographs. Aerial cameras: lens, optical axis, focal length, focal plane and fiducial marks; Principal Point; Geometry of vertical photographs map projections, fundamentals of cartography.

Physical principles of remote sensing, electromagnetic spectrum:

Electro Magnetic Radiation (EMR): Velocity of EM radiation, Propagation of EM waves, Fundamentals of Radiometry: Measure Geometry-concept of the solid angle, radiometric quantities, classification of Remote sensor, selection of sensor parameters, spatial resolution, spectral resolution, radiometric resolution, Temporal resolution Optical and Infrared Microwave sensors Sun-synchronous and Geo-synchronous satellites –Land coverage – Repetitivity – Along track and Across track stereovision capability.

IRS, LANDSAT, SPOT, CANADA, JAPAN, EUROPEAN, satellite series.

GIS concepts:

Components of GIS – Hardware, Software, Data Files and Data bases- Data Types Data base structures – Hierarchical, Network, Relational. Vector Data Structure - Vector Data Model – Arcs, Storing area–Data Base Creation – Digitizer, Topology – Euler Equation, Topological Consistency, Topological Errors, Digital Elevation Models, Data Transformation – Change in Dimensionality, Change in position – Rubber Sheeting, Tin Sheeting – Vector to Raster, Raster to Vector Conversion Vector data – Polygon overlay, polygon statistics, Network Analysis – Non-spatial data analysis – Structured Query Language. Modeling – Definition – Spatial Modeling – External Model, Conceptual Model, Logical Model, Internal Model – GIS applications in Resource Management Data capture using GPS for GIS FM studies – Object Oriented Database Models. Recent trends in GIS. and applications Study of rain fall, estimation of run-off and evapotranspiration, water table Environment - meaning, scope, components Environments. Soils-texture, strengths, porosity and permeability