GEO-INFORMATICS AND REMOTE SENSING

PART A: Common – Engineering Mathematics and Basic Geomatics
Engineering Mathematics- Surveying measurement, Accuracy, Precision, Most probable value, Errors and their adjustment, Regression analysis, Correlation coefficient, Least square adjustment, Statistical significant value, Chi Square test.
Remote Sensing- Basic concept, Electromagnetic spectrum, Spectral signature, Resolutions- Spectral, Spatial, Temporal and Radiometric, Platforms and Sensors, Remote Sensing Data Products – PAN, Multispectral, Microwave, Thermal, Hyperspectral, Visual and digital interpretation methods.
GNSS- Principal used, Components of GNSS, Data collection methods, DGPS, Errors in observations and corrections.
GIS- Introduction, Data Sources, Data Models and Data Structures, Algorithms, DBMS, Creation of Databases (spatial and non-spatial), Spatial analysis – Interpolation, Buffer, Overlay, Terrain Modeling and Network analysis.
PART B: Section I – Surveying and Mapping
Maps- Importance of maps to engineering projects, Types of maps, Scales and uses, Plotting accuracy, Map sheet numbering, Coordinate systems- Cartesian and geographical, map projections, map datum – MSL, Geoid, spheroid, WGS-84.
Land Surveying- Various Levels, Levelling methods, Compass, Theodolite and Total Station and their uses, Tachometer, Trigonometric levelling, Traversing, Triangulation and Trilateration.
Aerial Photogrammetry- Types of Photographs, Flying height and Scale, Relief (height) displacement, Stereoscopy, 3-D Model, Height determination using Parallax Bar, Digital Elevation Model (DEM), Slope.
PART B: Section II – Image Processing and Analysis
Data Quantization and Processing – Sampling and quantization theory, Principal of Linear System, Convolution, Continuous and Discrete Fourier Transform.
Digital Image Processing- Digital image characteristics: image histogram and scatter gram and their significance, Variance- Covariance matrix, Correlation matrix and their significance.
Radiometric and Geometric Corrections- Registration and Resampling techniques.
Image Enhancement – Contrast Enhancement: Linear and Non-linear methods; Spatial Enhancement: Noise and Spatial filters.
Image Transformation – Principal component Analysis (PCA), Discriminant Analysis, Color transformations (RGB- IHS, CMYK), Indices (Ratios, NDVI, NDWI).
Image Segmentation and Classification – Simple techniques.