**Part-A (Common)**

**Engineering Mathematics**: Surveying measurements, Accuracy, Precision, Most probable value, Errors and their adjustments, Regression analysis, Correlation coefficient, Least square adjustment, Statistical significant value, Chi square test.


**GNSS**: Principle 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-B1: 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-B2: Image Processing and Analysis**

**Data Quantization and Processing**: Sampling and quantization theory, Principle of Linear System, Convolution, Continuous and Discrete Fourier Transform.

**Digital Image Processing**: Digital image characteristics: image histogram and scattergram 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, Colour transformations (RGB - IHS, CMYK), Indices (Ratios, NDVI, NDWI).

**Image Segmentation and Classification**: Simple techniques.