Course No.	**CE 205001**
Course Title	**Remote Sensing**
Credits	**L T P Cr** **3 1 0 4**
Prerequisites	**-**

Course Contents:

Introduction to Remote Sensing: Observations about remote sensing; Remote sensing advantages and limitations; The remote sensing process: Remote sensing data collection, Types of resolution, Data processing.

Digital Remote Sensor Data Collection: Sensor types characteristics; Multispectral Imaging (NASA Landsat 8, Indian Remote Sensing Systems, Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), QuickBird, WorldView series); Imaging spectrometry (Hyperion Hyperspectral Imager, NASA Airborne Visible/Infrared Imaging Spectrometer (AVIRIS), Moderate Resolution Imaging Spectrometer (MODIS)); Thermal-infrared remote sensing; LiDAR remote sensing; RADAR remote sensing; Digital Image Data Formats.

Remote Sensing Image Corrections: Radiometric Errors: Scattering, Reflectance, Absorption: Atmospheric windows; Atmospheric Correction: Unnecessary and Necessary Atmospheric Correction; Remote sensing detector error: Random bad pixels (Shot Noise), Line or column drop-outs, Partial line or column drop-outs, Line-start problems, N-line striping; Geometric correction: Geometric error: Internal and External, Types of geometric correction, Image to map rectification, Image to image registration, Ground control points (GCPs), Spatial and Intensity interpolation, Root mean square error (RMSE), Mosaicking.

Image Enhancement: Contrast enhancement: Linear contrast modification, saturating linear contrast enhancement, Automatic contrast enhancement, Piecewise linear contrast modification; Density slicing; Neighbourhood raster operations: Image smoothing, Edge detection; Vegetation indices; Texture.

Pattern Recognition: Interpreting Images: Photointerpretation, Quantitative analysis, Fundamentals of quantitative analysis, Sub-classes and Spectral classes; Supervised classification: Minimum distance, Parallelepiped, *k*-Nearest Neighbour, Unsupervised classification: Clustering (*k*-Means), Object-based image analysis (OBIA) classification, Accuracy assessment: Error matrix.

Reference / Text Books

1. Jensen, J. R., *Introductory digital image processing: A remote sensing perspective*, 4th ed., Pearson, 2016.
2. Richards J.A., *Remote Sensing Digital Image Analysis*, 5th ed., Springer, Berlin Heidelberg, 2013.
3. Mather P.M. and Koch M., *Computer Processing of Remotely-Sensed Images: An Introduction*, 4th ed., Wiley-Blackwell, Chichester, UK, 2011.
4. Jensen J. R., *Remote Sensing of the Environment: An Earth Resource Perspective*, 2nd ed., Pearson, 2013.

Any other Remarks: