Unit – I

Unit – II
Overview of Software Tools in Image Processing; Open Source Image Processing Software; Image Enhancement Techniques; Gray Level Transformations; Histogram Processing; Enhancement Using Arithmetic/Logic Operation; Density slicing; Geometric Corrections; Image Registration – Definition, Principle and Procedure; Radiometric Correction;

Unit – III
Basics of Spatial Filtering; Convolutions and Morphology (High Pass, Low Pass, Laplacian; Gaussian; Sobel; Roberts, Erode, Dilate); Adaptive Filtering (Lee, Frost, Gamma, Kuan); Image Sharpening; Principal Component Analysis; Minimum Noise Fraction (MNF) Transformation; Color Image Processing; RGB Color Model; Generation of FCC’s; Image transformation – Intensity Hue Saturation (HIS).

Unit- IV
Pattern Recognition and Image Classification; Image Segmentation; Unsupervised Classification – advantage, disadvantage and limitations. Supervised Classification - training site selection, Classifiers used in supervised classification – Minimum distance to mean, Parallelepiped, maximum likelihood, Classification Accuracy Assessment; Band Ratios; NDVI : utility and applications.

Suggested Books:

2. Image Interpretation in Geology. Allen and Unwin
Interdisciplinary Department of Remote Sensing and GIS Applications

M.Sc. (Remote Sensing & GIS Applications)

Semester-II                                Contact hours: 28
Session: 2016-2017                          Credits 2

Paper-7

Thermal and Microwave Remote Sensing

Unit I


Unit II

Active microwave system components. Slant range versus ground range RADAR image geometry. Relief displacement, image foreshortening, layover, shadows and speckle. Synthetic aperture radar system, surface roughness characteristics. Electrical characteristics and relationship with moisture content.

Unit III

SAR remote sensing- Seasat, Shuttle Imaging Radar series, RADARSAT, ERS-1, JERS-1, Almaz-1, RISAT, RADAR interferometry, topographic mapping, velocity mapping. Light detection and ranging (LIDAR) sensor system, accuracy, penetration capability and measurements.

Unit-IV

Thermal infrared images and applications in vegetation/forestry, water resources, forest fires, volcanic eruptions. Recent advances in thermal infrared remote sensing: advantages and limitations.

Suggested Books:

1. Remote sensing of the Environment by J R Jenson
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M.Sc. (Remote Sensing & GIS Applications)

Semester-II Contact hours: 28

Session: 2016-2017 Credits 2

Paper 8

Earth Systems

Unit I


Unit II


Unit III


Unit IV

Cycles in the earth system - hydrologic cycle, carbon cycle, biogeochemical cycle and rock cycle. Earth system science organization (ESSO): components, principle and operations. Early warning systems. Application of remote sensing in monitoring components of earth systems.

Books:

Interdisciplinary Department of Remote Sensing & GIS Applications

M.Sc. (Remote Sensing & GIS Applications)

Semester-II  Contact hours: 56
Session: 2016-2017  Credits 4

Paper 9

Advanced Statistics for GIS and Spatial Data

Unit I


Unit II

Multivariate Statistics: Multivariate random sample, Multivariate mean, standard deviation, and sample correlation coefficient with their geometric interpretation, the generalized variance, Distances in p-dimensional space, Multivariate normal distribution, Mahalanobis distance. Introduction to spatial variation.

Unit III

Multivariate inference and Principal Component Analysis: Inference about mean vector, testing the multivariate population mean, Finding Principal components, Interpretation of principal component loadings, scaling of variables, Fair-Share Stopping rules, Principal component score, Imaging related sampling schemes.

Unit IV

Discrimination and classification: Supervised Learning: classification for two populations, linear and quadratic discriminant analyses; Unsupervised Learning: Similarity and dissimilarity measures for observations and for variables and other objects; Clustering algorithm: Single linkage algorithm; Non-hierarchal Clustering Method: K-means Method.

Suggested Books:

RLM-3 (Lab-3) (Based on Papers 6 & 9) (2 Credits)


Linear and multiple regression, Multivariate Inference, Principal component analysis, finding Mahalanobis distance, cluster analysis, linear and quadratic discriminant analyses

RLM-4 (Lab-4) (Based on Papers 7 & 8) (2 Credits)


Ability Enhancement (AE-2) (4 Credits)

Seminar presentation

Elective (Discipline Centric) E2 (4 Credits)

(a) Geography of India

(b) Mineral Resources of India
Interdisciplinary Department of Remote Sensing & GIS Applications

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Session: 2016-2017

Semester-II

Contact hours: 56
Credits 4

Elective Paper (E2)
(Discipline Centric)

Geography of India

Unit I
Major geographical features of India. Bases of Physiographic divisions of India; Peninsular and Extra Peninsular India- its Evolution and Geological structure. Their physical and topographic characteristics.

Unit II
Drainage and water resources. Major river system of India and their morphological characters. Evolution of extra peninsular drainage and peninsular drainage, characteristics of their major river systems. Difference between peninsular and extra peninsular drainage systems.

Unit III

Unit IV
Soil structure, texture, reaction and profile. Factors determining the types of soil, distribution and characteristics. Major areas affected by soil erosion, soil erosion and conservation. Problems of soils and its measures of reclamation.
Interdisciplinary Department of Remote Sensing & GIS Applications

M.Sc. (Remote Sensing & GIS Applications)

Semester-II             Contact hours: 56
Session: 2016-2017            Credits 4

Elective Paper (E2)

(Discipline Centric)

Mineral Resources of India

Unit I

Metallic and non-metallic minerals. Occurrence, distribution and reserves in India. Mineral resources in geological periods. Distribution of mineral deposits in space and time.

Unit II

Iron ore deposits, distribution, production and reserves. Copper ores and their distribution. Lead and zinc deposits. Gold and diamond deposits in India.

Unit III

Radioactive mineral deposits: occurrence, distribution and production of uranium and thorium. Coal resources: reserves, production and distribution. Oil and gas basins of India.

Unit IV


Books suggested:

1. India’s Mineral resources by Krishnaswami
2. Ore deposits of India by Gokhle and Rao
3. Industrial minerals and rocks by Deb
This is to inform you that the Department of Remote Sensing and GIS Applications has no infrastructure facilities to carry out the classes of the students of M.Sc. (Remote Sensing and GIS Applications).

In view of the above, it is requested to kindly arrange a Projector to run the classes of the students of M.Sc. (Remote Sensing and GIS Applications) at the earliest possible. Your kind support is highly appreciated.

(Prof. Abdul Munir)
Chairperson