M.A./M.Sc. Geography
Second Semester
Practical – II (42365 B) Basics of Remote Sensing and Image Interpretation

Unit: I

Basics of Remote Sensing

a) Historical development; Significance of remote sensing in geographical studies
b) Electromagnetic Radiation (EMR) Spectrum; Laws of Radiation
c) Stages of Remote Sensing, EMR interaction with earth's surface
d) Spectral signatures, typical spectral reflectance curves of vegetation, soil and water

Unit: II

Remote Sensing Satellites and Platforms

a) Orbits and platforms for earth observation
b) Satellite and sensor types: geo-synchronous and polar satellites, active and passive systems
c) Image characteristics: image formats; types of image resolutions; color composites
d) Characteristics of major satellite systems: IRS, Landsat, NOAA, IKONOS, World-View Satellite System

Unit: III

Digital Image Processing

a) Types of radiometric errors, methods of radiometric correction- Dark Object Subtraction
b) Geometric errors: Types, geometric correction, Resampling
c) Image enhancement techniques: stretching, histogram equalization, density slicing
d) Image ratioing- NDVI

Unit: IV

Thematic Map Generation and Map Composition

a) Visual Image Interpretation: principles, elements, interpretation keys
b) Map composition
c) Interpretation and Mapping of Natural Landscapes using satellite image.
d) Interpretation and Mapping of Cultural Landscapes using satellite image.

Unit: V

Application of Remote Sensing

a) Application of Remote Sensing in Urban Land Use, Urban Heritage and Ecology.
b) Application of Remote Sensing in Resource Management
c) Application of Remote Sensing in Agricultural Studies
d) Application of Remote Sensing in Environmental Studies.

Practical Exercises:

1. Familiarization with the software –ILLWIS/ Erdas Imagine/ ENVI
2. Data acquisition-accessing satellite data of area of interest, digital referencing system
3. Data import and subset
4. Observation and identification of earth's features in various spectral bands and different types of images (PAN/ multi-spectral)

5. Observation of spectral profiles of water, soil and vegetation
6. Analysis of image histograms
7. Image display – TCC, FCC
8. Radiometric correction using Dark Object Subtraction
9. Geometric correction- Image to map rectification: NN, Bi-linear and Cubic interpolation
10. Geometric correction- Image to image registration
11. Image enhancement: Stretching, interpretation of results
12. Image enhancement: Histogram Equalization, interpretation of results
13. Image enhancement: Density Slicing, interpretation of results
14. NDVI image generation, interpretation of results
15. Identification of features using elements of visual interpretation
16. Thematic map generation using visual interpretation and on-screen manual digitization/ analog multi-spectral images: Natural landscape
17. Thematic map generation using visual interpretation and on-screen manual digitization/ analog images: Cultural landscape
18. Mapping urban land use/ forest cover/ agriculture typology using satellite images
19. Computation of area of different classes

Exercises will be implemented in ERDAS, ENVI, Illwis or any other DIP Software as per availability. One computer system will be provided to each student for conducting practical exercises. One local field trip will be conducted for field verification of satellite image of Udaipur city and nearby areas. Students will be required to prepare a Field Report and submit along with the Record Work.

References:

1. American Society of Photogrammetry, 1983. Manual of Remote Sensing, ASP, Falls Church, VA
2. Barrett, E. C. and L. F. Curtis, 1992. Fundamentals of Remote Sensing and Air Photo Interpretation, Macmillan, New York
3. Campbell, J., 1989. Introduction to Remote Sensing, Guilford, New York
4. Chauniyal, D.D., 2004. Remote Sensing and Geographical Information Systems (**in Hindi)**, Sharda Pustak Bhawan, Allahabad
5. Curran, Paul J., 1985. Principles of Remote Sensing, Longman, London
6. Jenson J.R., 1996. Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall, New Jersey
7. Jenson, J.R., 2000. Remote Sensing of the Environment: An Earth Resource Perspective. Perason Education
8. Lillesand, T.M., Keifer R.W. & Chipman, J.W., 2008. Remote Sensing and Image Interpretation. John Wiley & Sons, New Delhi
9. Pratt W.K., 1978. Digital Image Processing. Wiley, New York

WEB RESOURCES

1. Ebook on Remote Sensing Applications, www.**nrsc**.gov.in/Learning_Centre_**EBook**.html
2. E-Tutorial on Fundamentals of Remote Sensing, Canada Centre for Mapping and Earth Observation, Natural Resources Canada, accessible at http://www.nrcan.gc.ca/earth-sciences/geomatics

Distribution of Marks **Total Marks 100**

A Part – Basics of Remote Sensing and Image Interpretation, (40 marks)

Practical paper of three hours duration will be held along with main theory paper examination.

Section – A Objective type- 5 marks. Asked 10 questions, attempt all questions.

Section – B Short Answers – 20 marks, Asked 10 questions, one question from each unit and attempt five questions.

Section-C Descriptive type-15 marks, Asked 5 questions, one question from each unit and attempt two questions

Practical – Assessed by External Examiner

B Part – **Basics of Remote Sensing and Image Interpretation, (60 marks)**

Test paper Lab exercise – 35 marks (25+10),

Practical exercise shall be of three hours duration and of 25 marks and candidates will be required to attempt any 2 exercises out of 4. One based on computer.

i. The identification of objects (at least 10) on the satellite imagery shall be of 30 minutes duration and will carry 10 marks

B - Record work – 15 marks

C - Viva-voce – 10 marks

The practical exercises, record work and viva-voce examination shall be conducted by an external examiner in consultation with the internal examiner