

SYLLABUS FOR THE CONDUCT OF ENTRANCE TEST FOR EARNING ELIGIBILITY TO PH.D ADMISSION IN REMOTE SENSING AND GIS

(Examination to be held in 2025, 2026 and 2027)

Unit-I

Introduction to aerial photography-Basic information and specifications of aerial photographs.
Planning and execution of photographic flights, Aerial cameras-types and their characteristics,
Aerial film negative and its processing-completion of photographic task.
Introduction-definition and terms in Photogrammetry, Types of aerial photographs.
Geometry of aerial photographs, Introduction to digital Photogrammetry – orthophotos and digital orthography

Unit-II

Basic principles, types steps and elements of image interpretation, Techniques of visual interpretation and interpretation keys
Sensors-types and their characteristics, across track (whiskbroom) and along track (pushbroom) scanning
Earth Resources Satellites – LANDSAT, SPOT, IRS, IKONOS, satellite series, Meteorological satellites-INSAT, NOAA, GOES
Optical mechanical scanners-MSS, TM, LISS, WiFS, PAN, Concept of resolution-spatial spectral, temporal radiometric
Basic concept and principles of thermal, microwave and hyperspectral sensing.

Unit-III

Introduction to digital image processing-concept of digital image, steps in DIP, Digital data and storage formats (BSQ, BIL and BIP)
Concept of image classification supervised, unsupervised classification, Classification algorithms, maximum likelihood, maximum distance to mean, parallel piped. Classification accuracy error matrix, errors of commissions and omissions, kappa statistics.
Principal component analysis (PCA), Enhancement by using colors-advantages, types of colour enhancements, Image transformation-Intensity Hue Saturation (IHS)

Unit-IV

Introduction-definition, historical perspective, components of GIS and types of GIS.
Technology trends in GIS, relationship between Geoinformatics, information technology and sensor technology, distributing computing (cloud GIS, SDI)
Concept of data, geographic data sources (Remote Sensing, GPS, maps and field observations)
Introduction to spatial decision problem, decision support system, overview of internet GIS, location based services.

Unit-V

Thermal radiation principles, thermal process and properties, characteristics of thermal IR Image and factors affecting thermal Images.

Microwave remote sensing- concept and principles backscattering, cross section wavelength, incidence angle, aspect angle, aircraft radar system. Application of microwave RS and microwave image interpretation

Introduction to Global Positioning System (GPS)- fundamentals concepts, GPS System elements and signals, Classification of GPS receivers, GPS measurements and accuracy of GPS.

Unit-VI

Basic concept of geomorphology, earth surface process and resultant landforms, Drainage, patterns-types and its significance in geologic interpretation, Lithological and structural mapping Interpretation of folds, faults, unconformities and lineaments.

Watersheds managements- introduction philosophy and concept and role of Remote Sensing in watershed conservation, planning and management.

Types of aquifers, aquiclude, aquitard and aquifuge and location of aquifers, Drainage mapping and morphometric analysis

Unit VII

Principles of crop identification and crop acreage estimation, Crop yield modelling using remote sensing.

Agro-meteorology-the importance and application of RS in agro-meteorology, Drought assessment and monitoring through remote sensing

Soil erosion and erosion hazard assessment through Remote Sensing.

Vegetation indices, Forest cover mapping through RS& GIS.

Forest types and forest density mapping, Remote Sensing application in forest cover change detection.

Unit VIII

Remote Sensing in human settlement and urban planning, Principles of urban area development planning and land use. Urban land use classification, mapping and their analysis. Remote sensing applications in regional and district level planning.

Solid waste management classification and environmental problems, Remote sensing and GIS in solid waste management & waste water management.

Disaster management cycle and role of Remote Sensing and GIS in disasters management, Remote sensing and GIS application in hazard zonation mapping.

Note: There shall be eight “**Research Aptitude Questions**” (descriptive in nature of 300 words each) set from the eight sections of the syllabi. In addition, 50 multiple choice “**Objective Type Questions**” (with four alternative responses) covering the entire syllabi equally. The examinees are required to attempt any five questions of research aptitude (of 10 marks each) and all the objective type questions (of one mark each)

Note 2: The examinees shall be required to secure at least 50% marks in the entrance test in aggregate in each component separately

Suggested Text Books and References

- Computers Today by S.K. Basandra, Galgotia Publications
- Introduction to Information Technology by EFRAIM TURBAN, R. KELLY RAINER and RICHARD E. POTTER Published by John Wiley & Sons.
- Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.
- Sabbins, F.F., 1985: Remote Sensing Principles and interpretation. W.H. Freeman and company
- Joseph George, 2003: Fundamentals of Remote Sensing. Universities Press
- RRobinson A., Morrison, J.L., Muehrcke P.C., Guptil S.C. 2002: Elements of Cartography. John Wiley
- Rampal K.K. 1999: Hand book of Aerial Photography and Interpretation. Concept Publication.
- Heywood. I, Cornelius S, CrverSteve. 2003: An Introduction to Geographical Information Systems. Pearson Education
- Ram Mohan Rao. 2002: Geographical Information Systems. Rawat Publication.
- Gibson, P.J. 2000: Digital Image Processing. Routledge Publication
- Pandey, S.N., 1987; Principles and Applications of Photogeology, Wiley Eastern