

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

(Examinations to be held in 2014, 2015 & 2016)

Unit - 1

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 orthophotography.

Unit-2

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-3

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 commission and omissions, kappa statistics.

Principal Component Analysis (PCA), Enhancement by using colours – advantages, types of colour enhancements. Image transformation – Intensity Hue Saturation (IHS).

Unit-4

Introduction- definition, historical perspective, components of GIS and types of GIS.

Technology trends in GIS, relationship between geoinformatics, information technology and sensor technology, distributed 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-5

Thermal radiation principles, thermal process and properties, Characteristics of thermal IR images and factors affecting thermal images.

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

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Introduction to Global Positioning System (GPS) – fundamental concepts, GPS system elements and signals, Classification of GPS receivers, GPS measurements and accuracy of GPS

Unit-6

Basic concept of geomorphology, earth surface process and resultant landforms, Drainage patterns–types and its significance in geologic interpretation, Lithological interpretation of igneous, sedimentary and metamorphic rocks, Structure – definition, types and structural mapping Interpretation of folds, faults, unconformities and lineaments.

Watershed management- 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 their morphometric analysis.

Unit-7

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

Agro-meteorology – its 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 and GIS

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

Unit-8

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.
- Robinson 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
- Pandey, S.N., 1987: Principles and Applications of Photogeology. Wiley Eastern,.
- 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
- Gibson, P.J. 2000: Digital Image Processing. Routledge Publication
- Heywood.I, Cornelius S, CrverSteve. 2003: An Introduction to Geographical Information Systems. Pearson Education
- Ram Mohan Rao. 2002: Geographical Information Systems. Rawat Publication.