

**HEMVATI NANDAN BAHUGUNA GARHWAL UNIVERSITY
(A Central University)**



Syllabus

for

**Ph.D. Admissions Test/ Entrance Test
in Remote Sensing & GIS Applications**

(w.e.f. 2025-26)

DEPARTMENT OF REMOTE SENSING & GIS APPLICATIONS

SCHOOL OF EARTH SCIENCES

DEPARTMENT OF REMOTE SENSING AND GIS APPLICATION

Syllabus for Ph.D. Admissions Test/ Entrance Test

The Entrance exam will be based on the following topics.

1. Fundamentals of Remote Sensing

Introduction- Components, platforms, applications; Remote sensing of the environment- the remote sensing process; Principles of electro-magnetic radiations-atmospheric windows, energy matter interactions; Fundamentals of aerial photography- classification of aerial photography, scale, resolution, geometric characteristics of aerial photographs, photo recognition elements; Elements of visual interpretation; Sensors; Remote Sensing Data Products; Multi-spectral remote sensing; Thermal infrared remote sensing; Applications of passive, microwave and lidar remote sensing

2. Fundamentals of Geographic Information Systems

Introduction to GIS; Geographic data and data measurement map basics, basic geographic concepts; data models, data structures and data input; Global Positioning Systems; Database management; Data Analysis; GIS Project Design and Management. Overview of database; Database models and modeling; Spatial data and database systems; Introduction to Oracle; Simple queries; PostgreSQL.

3. Photogrammetry and Digital Image Processing

Photogrammetric sensing systems; Introduction to digital image processing-data formats, errors; Image rectification and restoration; Image enhancement techniques; Image classification; Data merging and GIS integration; Hyperspectral Image analysis; Digital change detection; LiDAR & UAV Technology.

4. Spatial Statistics

Data in ecology and environmental sciences; Statistical techniques; Basic elements and tools of statistical analysis; Concepts of probability; Distribution; Contingency tables and χ^2 ; χ^2 - test of goodness – of – fit and homogeneity; Correlation of measurement; Regression analysis; Introductory Multivariate Statistics and Partial correlation Geostatistics

5. Spatial analysis

Introduction to Spatial analysis; Vector and raster-based spatial analysis; Network analysis; Point pattern analysis; Surface analysis; Spatial modeling, Decision Support System, MCDM Techniques

6. Applications of remote sensing and GIS

Remote sensing and GIS applications in ecosystem studies and conservation, agricultural applications, urban applications, water resources and related applications, health studies, Remote sensing and GIS applications in forest studies, marine sciences, urban mapping, disaster management.

7. Trends in Geoinformatics

Web GIS; ML and DL in Geoinformatics, Programming Applications in Geoinformatics, 3D GIS and visualization, Object-oriented GIS; Mobile GIS; Spatial data warehousing and mining, Open GIS consortium, Customization and automation in GIS.