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MC5008 GEOLOGICAL INFORMATION SYSTEMS

DETAILED SYLLABUS

OBJECTIVES

- Understand the basic concepts of Geological information systems.
- To provide an exposure to spatial database structures and their utility in GIS.
- Understand the process of scanning, digitizing and georeferencing.
- To introduce the raster and vector geoprocessing capabilities of GIS.

UNIT I SPATIAL DATA REPRESENTATION

GIS – Definition and related terminology- Digital representation of geospatial data – raster – vector – object oriented – geo database model-analysis.

UNIT II DATA - DIGITIZATION AND PREPARATION

Data – Sources and types. Maps and scales – advantages and limitations. Coordinates, Datum and projection system. Raster data. Characteristics and file formats. Vector data characteristics. Scanner: Principles, On Screen Digitization-post scanning-importing- data editing . Linking digital databases: ODBC – GPS data integration.

UNIT III RASTER DATA ANALYSIS

Raster Geospatial Data Analysis-Local operations: Reclassification, Logical and Arithmetic overlay operations – Neighbourhood operations: Aggregation, Filtering, Slope and Aspect map – Extended neighbourhood operations: - Statistical Analysis, Proximity, Connectivity operations, Buffering, Viewshed analysis – Regional operations: Area, Perimeter, Shape, Identification of region and Classification-output functions of Raster geoprocessing.

UNIT IV VECTOR DATA PROCESSING

Non-topological analysis: Attribute database query, SQL, Summary statistics-statistical computation-calculation-quantification- Address geocoding, -Topological analysis Feature based topological functions-overlay-buffering- Layer based topological function Reclassification, Aggregation, Overlay analysis- Point-in-polygon, Line-in-polygon, Polygon on-polygon: Clip, Erase, Identity, Union, Intersection – Network based Geoprocessing – Output functions.

UNIT V GIS MODELLING AND APPLICATIONS

Spatial indexing. Spatial modelling – External, Conceptual, Logical, Internal –GIS Modeling with case study- spatial data mining-DEM- introduction and applications.

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