Seat No. : _____

DE-111

December-2025

M.Sc., (CA & IT), Sem.-IX

Geographical Information System

Time : 2:30 Hours] **[Max. Marks : 70**

1. Write the following :

   (A) Describe the structure of raster datasets. Discuss how cell size affects storage, accuracy, and spatial analysis. **7**

   (B) Explain the advantages and limitations of representing real-world features using the vector model. **7**

   OR

   (A) What is a GIS workflow ? Explain the role of data acquisition, data preprocessing, and data management in a GIS workflow. **7**

   (B) Discuss the importance of spatial relationships in vector data. Explain how GIS handles relationships such as “overlap”, “touch”, and “disjoint”. **7**

2. Write the following :

   (A) A GIS analyst prefers to work in projected coordinates even for small-scale maps. Explain when this preference is valid and when it leads to wrong spatial interpretation. **8**

   (B) Describe how a coordinate reference system affects measurement of distance and area in GIS. **6**

   OR

   (A) Two datasets of the same city – one in WGS84 and one in UTM Zone 43N – do not overlay correctly. Explain why this happens and how coordinate systems cause such misalignment. **7**

   (B) Describe the different types of spatial data models used for representing elevation. **7**

3. Write the following :

(A) What is a map projection ? Why is it needed ? What are the different map projections and distortion associated with it ? **7**

(B) Spatial queries often confuse students because they resemble attribute queries. Explain two spatial queries that cannot be solved using attribute queries alone. **7**

OR

(A) A world map created using a conformal projection shows Greenland appearing almost as large as Africa.

Explain why this happens, and identify which projection families commonly create this illusion. **7**

(B) A field survey dataset has accurate coordinates but wrong land-use categories entered during attribute coding.

Explain which type of error this is and why geometric accuracy alone cannot guarantee reliable analysis. **7**

4. Write the following :

(A) Explain the responsibilities of a GIS analyst when maintaining a spatial database. **7**

(B) What is Run Length Encoding ? Explain its use in compressing binary images with an example. **7**

OR

(A) Quadtree Encoding. **7**

(i) What is Quadtree encoding in GIS raster data representation ?

(ii) Explain how a raster is recursively subdivided in Quadtree structure.

(iii) Describe advantages and disadvantages of Quadtree compared to full raster storage.

(B) Explain normalization in DBMS. **7**

5. Short Questions : (Each for **1** mark) **14**

(1) What is Logical Consistency ?

(2) Buffer analysis in GIS is used to :

(a) Create zones around spatial features (b) Classify raster data

(c) Interpolate elevation values (d) Manage topology

(3) Define : Spatial Query.

(4) Normalization in GIS databases is aimed at :

(a) Improving map visualization

(b) Reducing data redundancy

(c) Enhancing spatial queries

(d) Automating projections

(5) What is a Geocoding Process ?

(6) Thematic maps in GIS are used to :

(a) Display geodetic datum

(b) Visualize patterns of specific themes

(c) Show topographic features

(d) Illustrate natural boundaries

(7) What do you mean by GCP ?

(8) Examples of 'continuous fields' are

(a) Barometric Pressure

(b) Soil Salinity

(c) Elevation

(d) All the given

(9) Which coordinate system is typically used for global-scale GIS applications ?

(a) Cartesian coordinate system

(b) Universal Transverse Mercator (UTM)

(c) Geographic coordinate system (latitude/longitude)

(d) State Plane Coordinate System (SPCS)

(10) Which of the following resampling methods is most appropriate for categorical data ?

(a) Nearest Neighbor

(b) Bilinear Interpolation

(c) Cubic Convolution

(d) Bicubic Resampling

(11) Interpolation is made possible by a principle called...

(a) Spatial Autocorrelation

(b) Spatial auto-correction

(c) Thematic Autocorrelation

(d) Thematic auto-correction

(12) True or False : Conformal projections preserve area.

(13) True or False : A map scale 1:10,000 is larger-scale than 1:50,000.

(14) What is a Legend ?