

(2½ Hours)

[Total Marks: 75

- N. B.: (1) **All** questions are **compulsory**.  
 (2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.  
 (3) Answers to the **same question** must be **written together**.  
 (4) Numbers to the **right** indicate **marks**.  
 (5) Draw **neat labeled diagrams** wherever **necessary**.  
 (6) Use of **Non-programmable** calculators is **allowed**.

1. Attempt **any three** of the following: 15

- Write a short note on GIScience, GISystem and GIS application.
- What is a Spatial Data and Spatial Analysis? Explain using suitable example.
- Define Model. Explain how models help in representing real world in GIS.
- Represent the given three valued raster using quad tree.

F- Forest Land  
 I-Industrial Area  
 R- Residential Area

I	I	I	I	R	R	I	F
I	I	I	I	R	R	F	I
F	F	I	I	R	R	R	R
F	F	F	F	R	R	R	R
F	F	F	F	F	F	I	I
F	F	F	F	F	F	F	F
F	F	F	F	R	R	R	R
F	F	F	F	R	R	R	R

- Explain the mathematical properties of geometric space used in spatial data using suitable diagram.
- Define spatiotemporal data model. Explain the concept of representing time in GIS.

2. Attempt **any three** of the following: 15

- Define GIS. Explain its range of capabilities to handle georeferenced data.
- Explain the GIS Architecture and functionality using suitable diagram.
- Differentiate between Vector and Raster data representation.
- What are the reasons for using DBMS in GIS? Explain any five
- Write a short note on the Relational Data Model
- Explain the process of linking GIS and DBMS.

3. Attempt **any three** of the following: 15

- Explain the reference surface for mapping the Earth's surface.
- Explain the 2D geographic coordinate system.
- How Map projections are classified? Explain.
- Explain the working of GPS.
- Write a short note on vectorization.
- What is Interpolation? Explain interpolation of continuous Data.

[Contd...]

4. Attempt any three of the following:

15

- a. What are Neighborhood functions in GIS? Explain any four.
- b. Write a short note on vector overlay operation.
- c. Explain the two main techniques of determining Automatic classification.
- d. Perform the raster overlay operation to project Ground Water Level Raster in 2025  
 $R2 = \text{con}(R1 > 5, R1 - 5, 0)$

R1 – Ground Water Level Raster in 2023

7	8	5	4	3	3
6	4	12	5	4	4
7	10	12	8	7	4
4	8	9	8	7	4
1	1	0	3	0	0
1	0	0	7	0	0

- e. Write a short note on Network Analysis.
- f. How Error Propagates in GIS? Explain using suitable diagram.

5. Attempt any three of the following:

15

- a. Explain using suitable diagram the Visualization strategy.
- b. Define the following terms:
  - i. Symbology
  - ii. Cartography
  - iii. Map Legend
  - iv. Pixel
  - v. Voxel
- c. Explain the statement “How do I say what to whom, and is it effective?” with reference to map in GIS.
- d. List and explain Bertin’s six categories of Visual Variables.
- e. How to map time series? Explain using suitable example.
- f. Write a short note on map dissemination.