

GUJARAT TECHNOLOGICAL UNIVERSITY
MASTER OF COMPUTER APPLICATIONS (MCA)
SEMESTER: V

Subject Name: **Geographical Information Systems (GIS) (Elective-III)**
Subject Code: **650013**

Course Objectives:

A Geographic Information System (GIS) is composed of data collection, management and visualisation tools that allow users to manipulate all forms of spatial data. The main objective of the course is to give a basic theoretical and practical understanding of GIS concepts and technical issues.

By completing the course the student will

- have a basic, theoretical and practical understanding of GIS, and
- be able to work independently with various types of geographical data in GIS.

Pre-requisites:

Knowledge of Database Management, Data Computation, Basic Knowledge of Statistical Methods.

Contents:

Unit – 1 – Introduction to GIS and Digital Geographic Data & Maps [12 Lectures] [25%]

Introduction to Digital Geographic Data:

Introduction to Geographic Information Systems, Spatial Measurement, Spatial Location and Reference, Spatial Patterns, Geographic Data Collection

Map Basics:

Abstract Nature of Maps, Map Scale, More Map Characteristics, Map Projection, Grid Systems for Process, Map Symbolism

GIS Data Models:

Computer File Structure, Database Structure, Graphic Representation of Entities and Attributes, GIS data Models for Multiple MAPS,

Unit – 2 – Input, Storage and Editing [08 Lectures] [15%]

The Input Subsystem:

Primary Data, Input Devices, Vector Input, Raster Input, Remote Sensing Data Input, GPS Data Input, Metadata and Metadata Standards.

Data Storage and Editing:

Storage of GIS Databases, Detecting and Editing Errors of Different Types, Dealing with Projection Changes, Edge Matching, Rubber Shitting.

Unit – 3 – Analysis [25 Lectures] [50%]

Elementary Spatial Analysis:

GIS Data Query, Defining Spatial Characteristics, Working with Higher – Level Objectives

Measurement:

Measuring Length of Linear Objectives, Polygons, Shape and Distance

Classification:

Classification Principal, Elements of Reclassification, Neighborhood Functions, Roving Windows, Buffers

Statistical Surfaces:

Surface Mapping, Sampling the Statistical Surface, The DEM, Raster Surface, Interpolation, Terrain Reclassification, Slicing the Statistical Surface, Cut and Fill

Spatial Arrangement

Point, Line and Area Arrangement, Point Patterns, Thiessen Polygons, Area Patterns, Distance and Adjacency, Polygon Arrangement Measures, Linear Patterns, Directionality of Linear and Areal Objective, Connectivity of Linear Objects, Gravity Model, Routing and Allocation, The Missing Variables

Comparing Variables Among Maps:

The Cartographic Overlay, Point-in-Polygon, Line-in-Polygon, Polygon Overlay, Automating the Overlay, Types of Vector Overlay, CAD-Type Overlay, Dasymeric Mapping

Cartographic Modeling:

Model Components, The Cartographic Models, Types of Cartographic Models, Inductive and Deductive Modeling, Factor Selection, model Flowcharting, Model implementation, Model Verification

Unit – 4 – GIS Output**[05 Lectures] [10%]****The Output from Analysis:**

Output: The Display of Analysis, Cartographic Output, The Design Process, Map Design Controls, Noncartographic Output

Text Book:

1. Michael N DeMers, “Fundamentals of Geographic Information Systems”, Wiley India Education

Reference Books:

1. Kang-tsung Chang, “Introduction to Geographic Information Systems”, McGraw-Hill Publication
2. YEUNG, ALBERT K. W., LO, C. P., “Concepts and Techniques of Geographic Information Systems”, PHI Learning