

INSTITUTE	FACULTY OF TECHNOLOGY
PROGRAM	BACHELOR OF TECHNOLOGY (CIVIL ENGINEERING)
SEMESTER	7
COURSE TITLE	APPLICATION OF GIS AND GPS IN CIVIL ENGINEERING
COURSE CODE	01CI0714
COURSE CREDITS	4

Objective:

- 1 To introduce students to the principles, techniques, and applications of Geographic Information Systems (GIS) and Global Positioning Systems (GPS) in the field of Civil Engineering
- 2 Students will learn about the fundamental concepts of GIS and GPS technologies
- 3 Student will learn how they can be effectively utilized in various civil engineering applications such as urban planning, transportation, environmental engineering, and infrastructure management
- 4 Students will learn how to apply GIS and GPS technologies to analyze spatial data

Course Outcomes: After completion of this course, student will be able to:

- 1 Describe the basic concepts and functionalities of GIS and GPS systems.
- 2 Apply principles of various data collection methods and remote sensing techniques.
- 3 Analyze GIS data models and GPS applications in civil engineering
- 4 Utilize GIS software and assess emerging trends in GIS and GPS technologies.

Pre-requisite of course:Basics Knowledge of GIS

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Basics Knowledge of GIS Definition and basic concepts, Historical development, Components and functionalities of GIS and GPS systems	4
2	GPS & Spatial Data Acquisition Principles of spatial data collection, GPS data collection methods (static, kinematic, differential), Remote sensing techniques and data sources	5

Contents : Unit	Topics	Contact Hours
3	GIS Data Models and Data Analysis Vector data model, Raster data model and Attribute data, Common GIS data formats (shapefiles, geodatabases, etc.), Data storage and organization, Spatial analysis techniques (buffering, overlay, proximity analysis), Geoprocessing operations	12
4	GPS Applications in Civil Engineering Surveying and mapping, Construction site layout and monitoring, Geotechnical investigations, Transportation planning and traffic management	8
5	Introduction of GIS Software Introduction to GIS software (e.g., ArcGIS, QGIS), GIS data analysis and visualization projects	7
6	Emerging Trends and Future Directions Advanced GIS and GPS technologies, Integration with Building Information Modeling (BIM), Smart cities and Internet of Things (IoT) applications	6
Total Hours		42

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Experiment-1 Geodatabase creation	2
2	Experiment-2 Spatial data Integration (Digitization) – point, line, polygon	2
3	Experiment-3 Determination of Latitude, Longitude, and height by GPS.	2
4	Experiment-4 Tracking through GPS	2
5	Experiment-5 Non-Spatial Data Integration.	2
6	Experiment-6 Handling of GPS, data collection and integration of GPS data	2
7	Experiment-7 Area calculation by GPS	2
8	Experiment-8 Familiarization with ARC GIS software	2
9	Experiment-9 Georeferencing in ARC GIS	2
10	Experiment-10 Data input, data editing and topology creation	2
11	Experiment-11 Digitization and layer creation	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
12	Experiment-12 Linking spatial and non-spatial data	2
13	Experiment-13 Buffer analysis and quarry analysis (selection by location and selection by attributes)	2
14	Experiment-14 Network analysis: finding the shortest route between two places, finding the optimum path etc.	2
Total Hours		28

Textbook :

- 1 Geographic Information Science and Systems, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W., John Wiley & Sons, 2015

References:

- 1 Introduction to Geographic Information Systems, Introduction to Geographic Information Systems, Kang-tsung Chang, McGraw- Hill Education., 2015

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
5.00	10.00	30.00	30.00	15.00	10.00

Instructional Method:

- 1 Prerequisite of the course and its pattern shall be discussed on the commencement of the course.
- 2 Lectures shall be conducted in class room using various teaching aids
- 3 Presence in all academic sessions is mandatory which shall carry 5% marks of the total internal evaluation
- 4 At the end of each unit/topic an assignment based on the course content shall be given to the students which shall carry 5% weightage for timely completion and submission of the assigned work.

Supplementary Resources:

- 1 <https://www.youtube.com/watch?v=2kvT93QlFto&list=PLX17kXRvcmbEYwA1ZGIqHDCMXhkYjR2Rk>

Supplementary Resources:

- 2 https://www.youtube.com/watch?v=ZNKOWP8qAMY&list=PL8ZbncaV3f_anQs_DoyKUxmNDApXM0HT8