GEO-SPATIAL TECHNOLOGIES

(SYLLABUS)

Course Code	23CE2702B	Year	IV	Semester	I
Course Category	Open Elective-IV	Branch	CIVIL	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks:	100

Course Objectives:

The objective of this course is to:

1. Understand the various spatial and non-spatial data types, and data base management techniques
2. Develop the concepts and professional skills in utility of geo spatial techniques
3. Improve the working knowledge of geospatial techniques in field problems

Course Outcomes:

At the end of the course the student will be able to:

CO	Statement	BL
CO 1	Describe geospatial technology related to data acquisition and processing associated with geographic locations	**L2**
CO 2	Apply geospatial techniques in decision support systems	**L3**
CO 3	Analyze geospatial data for natural resource and urban planning problems.	**L4**
CO 4	Generate thematic maps using geospatial techniques	**L5**
CO 5	Apply geospatial concepts to civil engineering problems	**L3**

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	**3**	**2**	**-**	**-**	**2**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	**2**
CO2	**3**	**3**	**2**	**1**	**3**	**1**	**-**	**-**	**1**	**-**	**-**	**3**	**2**
CO3	**3**	**3**	**2**	**2**	**3**	**2**	**-**	**-**	**1**	**-**	**-**	**3**	**3**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**-**	**-**	**2**	**1**	**-**	**3**	**3**
CO5	**3**	**2**	**2**	**1**	**3**	**2**	**-**	**-**	**1**	**1**	**-**	**3**	**3**

Syllabus

Unit No	Content	Mapped COs
I	**Introduction** – Basic concepts, socioeconomic challenges, fundamentals of geographical information systems (GIS), history of geographical information system, components of geographical information systems. **Projections and Coordinate Systems** – Map definitions, representations of point, line, polygon, common coordinate system, geographic coordinate system, map projections, transformations, map analysis.	**CO1**
II	**Data Acquisition:** Data Types, Spatial, Non-Spatial (Attribute) Data, Data Format –	**CO2,**

	Vector and Raster Data, Manual Digitizing, Scanner, Aerial Photographic Data, Remotely Sensed Data, Digital Data, Cartographic Database, Digital Elevation Data. **Data Management:** Data Storage and Maintenance, Data Compression, Data Quality and Standards, Precision, Accuracy, Error – Geometric errors and corrections, Radiometric errors and corrections, types of Systematic and Non-systematic errors.	**CO1**
III	**Data Modeling:** Spatial Data Analysis, Data Retrieval Query, Simple Analysis, Recode Overlay, Vector Data Model, Raster Data Model, Digital Elevation Model. **GIS Analysis and Functions:** Organizing data for analysis, analysis function, maintenance and analysis of spatial data, buffer analysis, overlay analysis, transformations, conflation, edge matching and editing, maintenance and analysis of spatial and non-spatial data.	**CO2, CO3**
IV	**Applications of GIS:** Environmental and Natural Resource Management, Soil and Water Resources, Agriculture, Land Use Planning, Geology and Municipal Applications, Urban Planning and Project Management, GIS for decision making under Uncertainty, standard GIS packages, Introduction to Global Positioning Systems (GPS) and its applications.	**CO3,CO4**
V	**Introduction to Remote Sensing:** General background of Remote Sensing Technology, Objectives and Limitations of Remote Sensing, Electro-Magnetic Radiation, Characteristics, Interaction with Atmosphere and Earth Surface, Remote Sensing Platforms and Sensors, Satellite Characteristics, Digital Image Processing, IRS Series and High-Resolution Satellites, Remote Sensing Applications to Watershed, Environmental, Urban Planning and Management.	**CO4,CO5**

Learning Resource(s)

Text Book(s)

1. Demers, M.N, (2013). 'Fundamentals of Geographic Information Systems' Wiley India Pvt. Ltd,.
2. Burrough, P.A., and Mc Donnell R.A.(1998). Principles of Geographical Information Systems. Oxford University Press, New York.
3. Kang-tsung Chang. (2006). Introduction to Geographical Information Systems. Tata McGraw- Hill Publishing Company Ltd., Third Edition, NewDelhi.
4. George Joseph, (2013). 'Fundamentals of Remote Sensing' Universities Press.

Reference Book(s)

1. Sabins F.F. Jr. (1978). Remote Sensing Principles and Interpretations. W.H. Freeman and Company, SanFrancisco.
2. Tor Bernhardsen. (2002). Geographical Information System. Wiley India (P) Ltd., Third Edition, NewDelhi.
3. Hoffman-Wellenhof, B, et al. (1997). GPS Theory and Practice. Fourth Edition, Springer Wein, New York.
4. Lilys and T.M., and Kiefer R.W. (2002). Remote Sensing and Image Interpretation. John Wiley and Sons, Fourth Edition, NewYork.
5. Choudhury S., Chakrabarti, D., and Choudhury S. (2009). An Introduction to Geographic Information Technology, I.K. International Publishing House (P) Ltd, NewDelhi.