

**DEPARTMENT OF CIVIL ENGINEERING**  
**SPATIAL INFORMATION TECHNOLOGY**  
**(Open Elective-III)**

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs./week):3:0: 0	SEE Marks:60	Course Code:U21OE510CE
Credits : 3	CIE Marks:40	Duration of SEE:3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to	Upon the completion of the course, students are expected to
<b>1.</b> To provide fundamental knowledge on geo spatial technology such as Remote sensing GPS and GIS.	1. Select the type of remote sensing technique/data, identify and analyze the earth surface features from the satellite images. 2. Identify GPS components, interpret the navigational message and signals received by the GPS satellites, Identify the error sources and apply corrections for accurate positioning. 3. Analyse the basic components of GIS, process spatial and attribute data, identify and rectify mapping inaccuracies and prepare thematic maps

**UNIT-I: Introduction and Basic Concepts of Remote Sensing :**Introduction, Basic concepts of remote sensing, Airborne and space born sensors, Passive and active remote sensing, EMR Spectrum, Energy sources and radiation principles, Energy interactions in the atmosphere, Energy interactions with earth surface features, Atmospheric windows, Spectral reflectance curves

**UNIT-II: Remote Sensing Systems:** Satellites and orbits, Polar orbiting satellites, Image characteristics and different resolutions in Remote Sensing, Multispectral, thermal and hyperspectral remote sensing. Some remote sensing satellites and their features, Map and Image, color composites, introduction to digital data, elements of visual interpretation techniques. Applications of Remote sensing in various fields.

**UNIT-III: Global positioning Systems (GPS) :**Overview of GNSS and Introduction to GPS, GLONASS, GALILEO, COMPASS, IRNSS systems , Applications of GPS.  
GPS: Basic concepts, Functional system of GPS – Space segment, control segment and user segment, Working principle of GPS, Signal structure and code modulation, Pseudo-range measurements and navigation message

**UNIT-IV: Errors and Positioning methods of GPS:** Errors and biases in GPS measurements, Accuracy of navigation position: UERE and DOP, Intentional degradation of GPS signals: Selective availability (SA) and Anti-spoofing (AS) Differential GPS: Space based augmentation systems (e.g., SBAS, GAGAN) and Ground based augmentation systems (e.g., WASS, EGNOS). GPS Carrier Phase measurements: Single Differencing, Double Differencing and Triple Differencing in GPS measurements.

**UNIT-V:Basic Concepts:** Introduction to GIS, Areas of GIS application, Components of GIS, Overview of GIS Software packages, Current issues and Trends in GIS. Variables-Point, line, polygon, Map projections, Map Analysis.

**GIS Data:** Data types – spatial, non-spatial (attribute data) – data structure, data format – point line vector – Raster – Polygon

**Data Input :** Keyboard entry, Manual Digitizing, Scanner, Remotely sensed data, Existing Digital data Cartographic database, Digital elevation data

**Data Editing:** Detection and correction of errors, data reduction, edge matching

**Learning Resources:**

1. James B. Campbell & Randolph H. Wynne., Introduction to Remote Sensing, The Guilford Press, 2011
2. Lillesand, Kiefer, Chipman., Remote Sensing and Image Interpretation, Seventh Edition, 2015
3. Leick, A., GPS Satellite Survey, John Wiley: NJ, 2015
4. Hofmann, B., Lichtenegger H. and Collins J., Global Positioning System: Theory and Practice, Springer: Berlin, 2011.
5. BasudebBhatta, Remote Sensing and GIS, Oxford University Press, 2011.
6. Hofmann-Wellenh of, Bernhard, Lichtenegger, Herbert, Wasle, Elmar, GNSS – GPS, GLONASS, Galileo and more, 2013
7. ThanappanSubash., Geographical Information System, Lambert Academic Publishing, 2011.
8. Paul Longley., Geographic Information systems and Science, John Wiley & Sons, 2005
9. John E. Harmon & Steven J. Anderson., The design and implementation of Geographic Information Systems, John Wiley & Sons, 2003
10. ArcGIS 10.1 Manuals, 2013.
11. Kang Tsung Chang., Introduction to Geographic Information Systems, Tata McGraw Hill Publishing Company Ltd, New Delhi, 2008.
12. Burrough, P.A., Principles of GIS for Land Resource Assessment, Oxford Publications, 2005.
13. C.P.Lo& Albert K. W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice Hall India Pvt.Ltd, 2002.

**The break-up of CIE: Internal Tests + Assignments + Quizzes**

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 90 Minutes