SURVEYING AND GEOMATICS

III Semester: CE

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACEC01	Core	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

Prerequisite: Engineering Physics

I. COURSEOVERVIEW

Surveying is the technique, profession, science and art of making all essential measurements to determine the relative position of points or physical and cultural details above, on, or beneath the surface of the Earth, and to depict them in their objectives. Surveyors use elements of mathematics (geometry and trigonometry), physics, engineering and law. Surveyor measures certain dimensions that generally occur on the surface of the Earth. Surveying equipment, such as levels and the odolites, are used for accurate measurement of angular deviation, horizontal, usable form, or to establish the position of points or details. These points are usually on the surface of the earth, and they are often used to establish land maps and boundaries for ownership or governmental purposes. To accomplish vertical and slope distances with computerization, electronic distance measurement (EDM), total stations, remotes sensing, Photogrammetric, GPS surveying and laser scanning have supplemented to a large extent.

II. COURSEOBJECTIVES

The Students will try to learn:

1. The importance and fundamentals of surveying for measuring field parameters using traditional and modern instruments involved in civil construction.
2. The designing of curves and path alignment at suitable locations by implementing the principles of geometry and trigonometry.
3. The programming tools of perspective geometry for preparing 3D geographical maps using aerial and terrestrial photogrammetric surveying.
4. The applications of Remote Sensing in civil construction alteration works, detecting land use and land cover, creating base maps for visual reference.
5. The Modern surveying techniques for addressing the field measurement problems in real time.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**List** the needs for accurate and thorough note taking field work inserving as a legal record.	Remember
CO 2	**Illustrate** the various methods of setting out curves in tracing alignment and path at suitable locations.	Understand
CO 3	**Demonstrate** different types of digital instruments used in surveying for accurate measurement and data record keeping .	Understand
CO 4	**Explain** the practical application on total station using the principle of Electronic Distance Measurement for minimizing localerrors.	Understand
CO 5	**Recall** the importance of terrestrial photogrammetry, flight planning and Stereoscopy for preparing 3D geographical maps.	Remember
CO 6	**Analyze** remote sensing data acquisition on platforms and sensorsusing satellite images in providing base maps for graphical reference in real time.	Analyze

IV. COURSE SYLLABUS:

MODULE-I:INTRODUCTION TO SURVEYING (09)

Principles, Linear, angular and graphical methods, Survey stations, Survey lines ranging, chain surveying, bearing of survey lines, levelling: Plane table surveying, Principles of levelling booking and reducing levels; differential, reciprocal levelling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling; contouring: Characteristics, methods, uses; areas and volumes.

MODULE–II:THEODOLITE SURVEY AND CURVES(07)

Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control methods, Inter visibility of height and distances, Trigonometric levelling, and Tacheometric surveying. Elements of simple and

compound curves, Method of setting out, Elements of Reverse curve, Transition curve, length of curve, Elements of transition curve, Vertical curves.

MODULE–III:ADVANCED SURVEYING (09)
Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station, Parts of a Total Station, Accessories, Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey.

Global Positioning Systems (GPS), Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations.

MODULE–IV:PHOTOGRAMMETRIC SURVEYING (08)
Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping aerial triangulation, radial triangulation, methods; photographic mapping, mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes

MODULE–V:REMOTE SENSING(12)
Introduction, Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation; digital image processing.

V. TEXT BOOKS:

1. Madhu, N, Sathikumar, R and Satheesh Gobi, "Advanced Surveying: Total Station, GIS and Remote Sensing", Pearson India, 2nd Edition, 2006.
2. Manoj, K. Arora and Badjatia, "Geomatics Engineering", Nem Chand & Bros, 2011.
3. Bhavikatti, S.S., "Surveying and Levelling", I.K. International, Vol. I and II, 2010.

VI. REFERENCE BOOKS

1. Chandra, A.M., "Higher Surveying", New Age International (P) Limited, 3rd Edition, 2002.
2. Anji Reddy, M., "Remote sensing and Geographical information system", B. S. Publications, 2001
3. Arora, K.R., "Surveying", Standard Book House, Vol-I, II and III, 2015.

VII. WEB REFERENCES:

1. https://nptel.ac.in/courses/105104100/43
2. https://www.coloradomesa.edu/wccc/programs/land-surveying-geomatics.html.
3. https://books.google.co.in/books?id=FaCgAAQBAJ&printsec=frontcover&dq=surveying+and+geomatics+ONLINE+text+books&hl=en&sa=X&ved=0ahUKEwi1wP3x24HgAhUJ5o8KHS2EDzkQ6AEIMzAB#v=onepage&q&f=false

VIII. E-TEXT BOOKS:

1. https://www.jntubook.com/surveying-textbook-free-download.
2. http://www.freeengineeringbooks.com/Civil/Surveying-Books.php
3. https://www2.unb.ca/gge/Study/Undergraduate/Handbook.pdf
4. http://learningenglishvocabularygrammar.com/files/idiomsandphraseswithmeaningsandexamplespdf
5. http://www.robinwood.com/Democracy/GeneralEssays/CriticalThinking.pdf