

## SURVEYING AND GEOMATICS

### III Semester: CE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACEB01	Core	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
<b>Contact Classes: 45</b>	<b>Tutorial Classes: 15</b>	<b>Practical Classes: Nil</b>			<b>Total Classes: 60</b>			

## OBJECTIVES:

**Students will try to learn:**

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

**COURSE OUTCOMES:**

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

- CO 1: **List**the needs for accurate and thorough note taking field workin serving as a legal record.
- CO 2: **Apply**the differences in elevation plotted on contour mapsfor measuring volume of earthwork at construction sites.
- CO 3: **Explain**the principle and working of theodolitefor measuring angles in vertical and horizontal planes.
- CO 4: **Apply**the methods of radiation and intersectionfor obtaining an area enclosed with in the traverse
- CO 5: **Illustrate**the various methods of setting out curvesin tracing alignment and path at suitable locations
- CO 6: **Demonstrate**different types of digital instruments usedin surveying for accurate measurement and data record keeping
- CO 7: **Explain**the practical application on total station using the principle of Electronic Distance Measurementfor minimizing local errors
- CO 8: **Outline**the co-ordinate transformation and accuracy considerations associated withGlobal Positioning System based measurements
- CO 9: **Recall**the importance of terrestrial photogrammetry, flight planning and Stereoscopyfor preparing 3D geographical maps
- CO 10: **Analyze**remote sensing data acquisition on platforms and sensors using satellite imagesin providing base maps for graphical reference in real time

<b>MODULE-I</b>	<b>INTRODUCTION TO SURVEYING</b>	<b>Classes: 09</b>
Principles, Linear, angular and graphical methods, Survey stations, Survey lines ranging, 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. Triangulation and Trilateration Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical		

control methods, triangulation network signals. Baseline choices instruments and accessories extension of base lines corrections Satellite station reduction to centre, Inter visibility of height and distances, Trigonometric levelling, Axis single corrections.		
<b>MODULE -II</b>	<b>CURVES</b>	<b>Classes: 07</b>
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.		
<b>MODULE-III</b>	<b>MODERN FIELD SURVEY SYSTEMS</b>	<b>Classes: 09</b>
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.		
<b>MODULE-IV</b>	<b>PHOTOGRAMMETRIC SURVEYING</b>	<b>Classes: 08</b>
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		
<b>MODULE-V</b>	<b>REMOTE SENSING</b>	<b>Classes: 12</b>
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		
<b>Text Books:</b>		
1. Madhu, N, Sathikumar, R and Satheesh Gobi, “Advanced Surveying: Total Station, GIS and Remote Sensing”, Pearson India, 2 <sup>nd</sup> 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.		
<b>Reference Books:</b>		
1. Chandra, A.M., “Higher Surveying”, New Age International (P) Limited, 3 <sup>rd</sup> 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.		
<b>Web References:</b>		
1. <a href="https://nptel.ac.in/courses/105104100/43">https://nptel.ac.in/courses/105104100/43</a> 2. <a href="https://www.coloradomesa.edu/wccc/programs/land-surveying-geomatics.html">https://www.coloradomesa.edu/wccc/programs/land-surveying-geomatics.html</a> . 3. <a href="https://books.google.co.in/books?id=FaCgAAQBAJ&amp;printsec=frontcover&amp;dq=surveying+and+geomatics+ONLINE+text+books&amp;hl=en&amp;sa=X&amp;ved=0ahUKEwi1wP3x24HgAhUJ5o8KHS2EDzkQ6AEIMzAB#v=onepage&amp;q&amp;f=false">https://books.google.co.in/books?id=FaCgAAQBAJ&amp;printsec=frontcover&amp;dq=surveying+and+geomatics+ONLINE+text+books&amp;hl=en&amp;sa=X&amp;ved=0ahUKEwi1wP3x24HgAhUJ5o8KHS2EDzkQ6AEIMzAB#v=onepage&amp;q&amp;f=false</a>		
<b>E-Text Books:</b>		
1. <a href="https://www.jntubook.com/surveying-textbook-free-download">https://www.jntubook.com/surveying-textbook-free-download</a> . 2. <a href="http://www.freeengineeringbooks.com/Civil/Surveying-Books.php">http://www.freeengineeringbooks.com/Civil/Surveying-Books.php</a> 3. <a href="https://www2.unb.ca/gge/Study/Undergraduate/Handbook.pdf">https://www2.unb.ca/gge/Study/Undergraduate/Handbook.pdf</a>		