19CE205 SURVEYING AND GEOMATICS

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	20	48	6	12	3	2

COURSE DESCRIPTION AND OBJECTIVES:

This course offers an introduction to surveying equipment like Theodolite, Tacheometer, and Total Station etc. in order to ascertain the ground profile by creating contour maps. In addition it offers methods to calculate areas and volumes of earth to be excavated for various structures like roads, canals, buildings, etc. The main objective the course is to introduce the students to survey methods employed in different construction projects. Another objective of this subject is to introduce the triangulation methodology which is used for surveying larger areas such as countries, finding out the curvature of the Earth, etc.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Describe the basic concepts and theory of triangulation & trilateration using surveying techniques	1
2	Design simple, compound, reverse and transition curves	2
3	Demonstrate fundamental knowledge of modern survey modern survey equipments such as EDM, Distomat, Total Station and GPS	2
4	Explain the basic concepts of photogrammetri survey	1
5	Explain the basic concepts of Remote sensing	1

SKILLS:

- ✓ *Draw a contour map by taking levels using auto level.*
- ✓ *Create a longitudinal profile of a road.*
- ✓ *Create a transverse profile of a road.*
- ✓ *Map an area using chain survey.*
- ✓ *Map an area using compass survey.*

UNIT I   **L-9**

INTRODUCTION TO SURVEYING: Principles, Linear, angular and graphical methods, Survey stations, Survey lines- ranging, Bearing of survey lines, Levelling: Plane table surveying, Principles of level-ling- booking and reducing levels; differential, reciprocal levelling, profile levelling and cross sec-tioning. 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 - Indivisibility of height and distances - Trigonometric levelling- Axis single correc-tions.

UNIT II: **L-9**

CURVES: 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

UNIT III: **L-9**

MODERN FIELD SURVEY SYSTEMS : Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station –Accessories –Advan-tages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems-Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations.

UNIT IV: **L-9**

PHOTOGRAMMETRY SURVEYING : Introduction, Basic concepts, perspective geometry of aerial pho-tograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; pho-tographic mapping- mapping using paper prints, mapping using stereo plotting instruments, mosa-ics, map substitutes.

UNIT V: **L-9**

REMOTE SENSING: Introduction –Electromagnetic Spectrum, interaction of electromagnetic radia-tion with the atmosphere and earth surface, remote sensing data acquisition: platforms and sen-sors; visual image interpretation; digital image processing

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS   **TOTAL HOURS:30**

1.   Algebra of Matrixes.

2.   Determine Rank of given Matrixes.

3.   Obtain the Triangular & Echelon form of a Matrix.

4.   Solving system of equations using Cramer's rule.

5.   Solving system of equations using matrix inversion method.

6.   Solving system of equations using Gauss-Jordan method.

7. Trigonometric Levelling - Heights and distance problem (Two Exercises)

8. Heights and distance using Principles of tachometric surveying (Two Exercises)

9. Curve setting – different methods. (Two Exercises)

10. Determine of area using total station.

11. Traversing using total station.

12. Contouring using total station.

13. Determination of remote height using total station.

14. Stake out using total station.

15. Distance, gradient, difference in height between two inaccessible points using total station.

TEXT BOOKS:

1. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.

2. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011.

REFERENCE BOOKS:

1. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010.

2. Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.

3. Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 2001.