

SURVEYING AND GEOMATICS
I Year B. Tech. I Semester
(CIVIL)

Course Code:

L	T	P	C
3	0	2	4

Course Outcomes:

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

CO1: Determine horizontal and angular measurements, measure levels and draw contours (L3)

CO2: Calculate the areas of irregular boundaries, volumes of borrow pits, embankments and capacity of reservoirs (L3)

CO3: Demonstrate the theodolite traversing and different types of horizontal curves (L3)

CO4: Discuss the applications and importance of Total station, GPS and EDM (L2)

CO5: Explain about Photogrammetric surveying (L2)

UNIT-I

(10 Lectures)

INTRODUCTION TO SURVEYING:

Principles, Linear, Angular, Survey stations, Survey lines- ranging, Bearing of survey lines.

LEVELLING:

Principles of leveling - booking and reducing levels; differential, reciprocal leveling, profile leveling and cross sectioning. Errors in leveling.

CONTOURING: Characteristics, methods, uses.

Learning outcomes:

At the end of this unit, the student will be able to

1. discuss the basic procedures in surveying (L2)
2. calculate errors in leveling (L3)

3. explain the contour maps (L2)

UNIT-II

(10 Lectures)

AREAS AND VOLUMES:

Area from field notes, Computation of areas along irregular boundaries and areas consisting

of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes. Determination of the capacity of the reservoir. Volume of borrow pits.

Learning outcomes:

At the end of this unit, the student will be able to

1. calculate areas using different methods (L3)
2. determine volume of borrow pits (L3)
3. determine the capacity of the reservoir (L3)

UNIT-III

(10 Lectures)

TRIGONOMETRIC LEVELING AND CURVES:

Theodolite Surveying: Instruments, Measurement of horizontal and vertical angle;

Horizontal and vertical control - methods -triangulation: - Inter-visibility of height and distances - Trigonometric leveling - Axis single corrections. Traversing – Types, balancing the traverse.

Curves: Elements of simple and compound curves – Method of setting out.

Learning outcomes:

At the end of this unit, the student will be able to

1. determine the angles using Theodolite (L3)
2. discuss trigonometric leveling (L2)
3. explain the Setting of simple and compound curve (L2)

UNIT-IV

(10 Lectures)

MODERN FIELD SURVEY SYSTEMS:

Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, 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- Segments, GPS measurements, errors and biases, Surveying with GPS, Coordinate transformation, accuracy considerations.

Learning outcomes:

At the end of this unit, the student will be able to

1. describe the distance measurements using modern field survey systems (L2)
2. discuss the Total Station surveying (L2)
3. discuss the surveying using GPS (L2)

UNIT-V

(10 Lectures)

PHOTOGRAMMETRY SURVEYING:

Introduction, Basic concepts on maps and aerial photographs, 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.

Learning outcomes:

At the end of this unit, the student will be able to

1. explain basic concepts on maps and aerial photographs (L2)
2. differentiate between aerial and radial triangulation (L2)
3. discuss the photographic mapping (L2)

Text books:

1. Punmia, B.C., Ashok Kumar Jain and Arun Kumar Jain, Surveying, 18 th Edition, Laxmi Publications (P) Ltd., New Delhi, 2016.
2. Duggal S K, Surveying, 5 th Edition, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2017.

References:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, 8 th Edition, McGraw Hill-2000, 2010.
2. Arora K R, Surveying, 9 th Edition, Standard Book House, Delhi, 2018.
3. Chandra A M., Plane Surveying, 3 rd Edition, New Age International Pvt. Ltd., Publishers, New Delhi, 2015.
4. Subramanian, R., Surveying and Levelling, 2 nd Edition, Oxford University Press, New Delhi, 2012.

Web References:

1. <https://nptel.ac.in/courses/105/104/105104101/>
2. <https://nptel.ac.in/courses/105/107/105107122/>
3. <https://nptel.ac.in/courses/105/103/105103176/>

Surveying and Geomatics Lab

LIST OF EXPERIMENTS:

Course Outcomes:

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

CO1: Calculate the bearings of lines with a prismatic compass for open and closed traverses

(L3)

CO2: Determine the level differences between different stations by dumpy level and prepare contour maps (L3)

CO3: Calculate heights and distances using trigonometric surveying (L3)

CO4: Demonstrate the setting of simple and compound curves (L3)

CO5: Demonstrate the Total Station and its operation (L3)

(Any 12 out of 15 experiments)

1. Determination of distance between two inaccessible points using compass.
2. Closed Traversing by compass & graphical adjustment.
3. Measurement of elevation difference between two points using Dumpy level by Height of Instrument and Rise and Fall method
4. Determination of Longitudinal Section and Cross sections of a given road profile.
5. Contouring of a small area by method of blocks / grids.
6. Determination of horizontal angle by repetition and reiteration method using theodolite.
7. Determination of a given Tower/ Building height with base is accessible and inaccessible.
8. Exercise on Curve setting.
9. Determination of area using Total Station.
10. Traversing and contouring using Total Station.

11. Determination of remote height using Total Station.

12. Stake out using Total Station.

13. Feature tracking and plotting using GPS

14. Topographic Survey using GPS

15. Flight plan using photogrammetry principles

References:

1. Arora K R, Surveying, 9 th Edition, Standard Book House, Delhi, 2018.

2. Chandra A M., Plane Surveying, 3 rd Edition, New Age International Pvt. Ltd., Publishers, New Delhi, 2015.