

INSTITUTE	DIPLOMA STUDIES
PROGRAM	DIPLOMA ENGINEERING (CIVIL ENGINEERING)
SEMESTER	3
COURSE TITLE	BASIC SURVEYING
COURSE CODE	09CI0310
COURSE CREDITS	4

Objective:

- 1 To provide basic knowledge of the principles and importance of surveying in civil engineering.
- 2 To familiarize students with various surveying instruments and their uses in field measurements.
- 3 To develop understanding of measurement of distances, angles, and elevations using standard surveying methods.
- 4 To introduce modern surveying techniques such as GPS and their applications in engineering projects.

Course Outcomes: After completion of this course, student will be able to:

- 1 Explain the basic concepts, classification, objectives, and principles of surveying, and use scales in practical surveying tasks.
- 2 Select and use appropriate surveying equipment for linear measurements, identify errors, and compute areas from given data or drawings
- 3 Apply traverse surveying techniques using compass and plane table, eliminate errors, and plot accurate traverse drawings
- 4 Perform levelling operations using dumpy level, auto level, or digital level, and prepare contour maps.
- 5 Explain the basic principles of GPS and apply it for determining location and basic surveying applications.

Pre-requisite of course: basics of mathematics

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
2	0	4	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Basics of Surveying Measurement of area & Volume , Concept of area & volume , Simpson rule , Calculation of irregular area , Survey Purpose and use , Types of surveying- Primary and Secondary, Classification: Plane, Geodetic, Cadastral, Hydrographic, Photogrammetry and Aerial, Principles of Surveying, Scales: Engineer's scale, Representative Fraction (RF) and diagonal scale	4
2	Chain Survey Instruments used in chain survey: Metric Chain, Tapes, Arrow, Ranging rod, Line ranger, Offset rod, Open cross staff, Optical square, Technical terms: Chain survey Station, Base line, Check line, Tie line, Offset, Tie station. , Ranging: Direct and Indirect Ranging , Methods of Chaining, obstacles in chaining, Errors in length: Instrumental error, personal error, error due to natural cause, random error, Principles of triangulation, Types of offsets: Perpendicular and Oblique. , Conventional Signs, Recording of measurements in a field book	8
3	Compass Survey Compass Traversing- open, closed, Technical Terms: Geographic True Magnetic Meridians and Bearings, Whole Circle Bearing, system and Reduced Bearing system , Examples on conversion of given bearing to another bearing (from one form to another), Fore Bearing and Back Bearing,, Calculation of internal and external angles from bearings at a station, Dip of Magnetic needle, Magnetic Declination , Components of Prismatic Compass and their Functions, Methods of using Prismatic Compass- Temporary adjustments and observing bearings, Local attraction, , Methods of correction of observed bearings - Correction at station and correction to included angles, Methods of plotting a traverse and closing	6
4	Levelling Basic terminologies: Level surfaces, Horizontal and vertical surfaces, Datum, Bench Marks GTS, Permanent, Arbitrary and Temporary, Reduced Level, Rise, Fall, Line of collimation, Station, Back sight, Fore sight, Intermediate sight, Change point, Height of instruments,, Types of levels: Dumpy, Tilting, Auto level, Digital level, Components of Dumpy Level and its fundamental axes, Temporary adjustments of Level., Types of Leveling Staff: Self-reading staff and Target staff , Reduction of level by Line of collimation and Rise and Fall Method ,, Leveling Types: Simple, Differential, Fly, Profile and Reciprocal Leveling. , Counter, Contour intervals, Characteristics of contours, Methods of Contouring: Direct and indirect.	6
5	Introduction to Global Positioning System(GPS) Introduction to GPS, Maps, Types of digital map , Fundamentals of GPS,, Purpose of GPS , Components of GPS, Field procedures of GPS, Observations and applications in Civil Engineering Field	4
Total Hours		28

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Example 1 Measure distance between two intervisible stations using chain, tape and ranging rods	4
2	Example 2 Perform reciprocal ranging and measure distance between two stations on uneven ground	4
3	Example 3 Determine area of open field using chain and cross staff survey method	4
4	Example 4 Measure fore bearing and back bearing of survey lines of open traverse using Prismatic Compass	4
5	Example 5 Measure and correct fore bearing and back bearing of closed traverse (3–4 sides) for local attraction and included angles	4
6	Example 6 Conduct chain and compass survey project for closed traverse with minimum five stations and plotting	4
7	Example 7 Perform simple leveling using Dumpy Level / Auto Level and leveling staff	4
8	Example 8 Perform differential leveling and determine reduced levels using HI method and rise & fall method	4
9	Example 9 Conduct fly leveling with double check using dumpy level/auto level and leveling staff	4
10	Example 10 Conduct survey project for contour mapping using block contouring method (100 m × 100 m area with 10 m grid)	4
11	Example 11 Plot contours on A1 size drawing sheet using collected survey data	4
12	Example 12 Demonstrate use of Global Positioning System (GPS) in surveying applications	4
13	Example 13 Solve numerical problems on chain surveying including correction of chain length and area calculation	4
14	Example 14 Solve numerical problems on compass surveying and leveling including bearings, included angles, HI method and rise & fall method	4
Total Hours		56

Textbook :

- 1 Surveying and Levelling Vol-I, Dr. B. C. Punmia, Laxmi Publication, 2019
- 2 Surveying and Levelling, R. Subramanian, Oxford University Press, 2012

References:

- 1 Surveying and Levelling Vol-I, Surveying and Levelling Vol-I, S.S. Bhavikatti, I. K. International, 2019
- 2 Surveying Vol. I, Surveying Vol. I, Punmia, B.C.,; Jain, Ashok Kumar; Jain, Arun Kumar,, Laxmi Publications Pvt. Ltd, 2020

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
10.00	20.00	30.00	30.00	10.00	0.00

Instructional Method:

- 1 The internal evaluation will be done based on continuous evaluation of students in the laboratory and classroom
- 2 Practical examination will be conducted at the end of the semester for evaluation of the performance of students in the laboratory
- 3 Students will use supplementary resources such as videos, e-courses, virtual laboratory.

Supplementary Resources:

- 1 <https://nptel.ac.in/courses/105107122>