

3.4 SURVEYING - I

L	P
2	6

RATIONALE

The important functions of a diploma civil engineer includes the jobs of detailed surveying, plotting of survey data, preparation of survey maps and setting out works

While framing the curriculum for the subject of surveying, stress has been given to the development of the skill in each type of survey like chain surveying, compass surveying leveling, that the Civil Engineering diploma holder will normally be called upon to perform and plane table surveying.

Field work should be a selected one so that student can check his work and have an idea of the results the extent of error in the work done by him. As far as possible, the surveys done should be got plotted, as this will also reveal errors in the work and develop skill in plotting.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

CO1: Prepare maps for closed traverse and open traverse with survey instruments

CO2: Measure bearing of line

CO3: Perform leveling with digital level

CO4: Perform temporary adjustments of leveling instruments

CO5: Draw a contour plan of an area.

DETAILED CONTENTS

UNIT I

Introduction and Basic Concepts

- 1.1 Definition and Purpose of Surveying
- 1.2 Primary Division of Surveying
- 1.3 Basic principles of surveying
- 1.4 Measurements-linear and angular
- 1.5 Units of measurements

- 1.6 Instruments used for taking these measurements
- 1.7 Classification of surveying

UNIT-II

Chain and Compass Surveying

- 2.1 Purpose and principles of chain surveying
- 2.2 Operations in Chain Surveying (Ranging, Measurement, Offsetting)
- 2.3 Purpose of compass surveying
- 2.4 Use of prismatic compass: Setting and taking observations
- 2.5 Concept of following with simple numerical problems:
 - a) Meridian - Magnetic and true, Arbitrary
 - b) Bearing - Magnetic, True and Arbitrary
 - c) Whole circle bearing and reduced bearing
 - d) Fore and back bearing
 - e) Magnetic dip and declination
- 2.6 Local attraction – Problems, causes, detection, errors and corrections,

UNIT-III

Levelling

- 3.1 Definition and Purpose of levelling
- 3.2 Various technical terms used in levelling (level surface, horizontal surface, vertical surface, datum, reduced level, bench marks, line of collimation, axis of the bubble tube, axis of the telescope and vertical axis)
- 3.3 Identification of various parts of Auto level, leveling staff types, uses and least count of leveling staff
- 3.4 Temporary adjustment and permanent adjustment of Auto level
- 3.5 Concept of back sight, foresight, intermediate sight, change point, to determine reduce levels
- 3.6 Level book and reduction of levels by
 - 3.7.1 Height of collimation method and
 - 3.7.2 Rise and fall method (Numerical problems)
- 3.7 Methods of Leveling (Simple levelling, differential levelling, fly levelling, check leveling and profile levelling (L-section and X-section) only (Numerical problems)
- 3.8 Problem on reduction of levels, Errors in levelling

UNIT-IV**Plane Table Surveying**

- 4.1 Introduction and Definition of plane table surveying
- 4.2 Advantages & Disadvantages of plane table surveying
- 4.3 Equipment used in plane table survey
- 4.4 Setting of a plane table:
 - (a) Centering
 - (b) Levelling
 - (c) Orientation
- 4.5 Methods of plane table surveying
 - (a) Radiation,
 - (b) Traversing
- 4.6 Errors in plane table survey

UNIT-V**Contouring**

- 5.1 Definition and Purpose of contours
- 5.2 Contour interval and horizontal equivalent
- 5.3 Factors effecting contour interval
- 5.4 Characteristics of contours
- 5.5 Methods of contouring: Direct and indirect
- 5.6 Use of stadia measurements in contour survey
- 5.7 Interpolation of contours; use of contour map
- 5.8 Drawing cross section from a contour map; marking alignment of a road, railway line and a canal on a contour map

PRACTICAL EXERCISES

- I Demonstration of chain surveying
- II Compass Surveying
 - i)
 - a) Study of prismatic compass
 - b) Setting the compass and taking observations
 - c) Measuring angles between the lines meeting at a point
- III Levelling
 - i)
 - a) Study of Auto level and levelling staff
 - b) Temporary adjustments of Auto levels

- c) Taking staff readings on different stations from the single setting and finding differences of level between them
- ii) To find out difference of level between two distant points by shifting the instrument
- iii) Longitudinal and cross sectioning of a road/railway/canal
- iv) Setting a gradient by auto-level.
- IV Plane Table Surveying
 - i)
 - a) Study of the plane table survey equipment
 - b) Setting the plane table
 - c) Marking the North direction
 - d) Plotting a few points by radiation method
 - ii)
 - a) Orientation by
 - Trough compass
 - Back sighting
 - b) Plotting few points by intersection, radiation and resection method
 - iii) Traversing an area with a plane table (at least five lines)
- V Layout of Buildings (from given drawing of two room residential building) by use of surveying instruments.
- VI Contouring:
 - i) Preparing a contour plan by radial line method by the use of a Auto level.
 - ii) Preparing a contour plan by method of squares
 - iii) Preparing a contour plan of a Road/Railway track/Canal by taking cross sections.
 - iv) Computation of earth work and reservoir capacity from a contour map

RECOMMENDED BOOKS

1. CL Kochar, "A Text Book of Surveying", Katson Publishing House, Ludhiana.
2. TP Kanetkar and SV Kulkarni, "Surveying and Leveling", AVG Parkashan, Poona.
3. Sanjay Mahajan, "Surveying –I", Tech. Publication, Delhi.
4. BC Punmia, "Surveying and Leveling", Standard Publishers Distributors, Delhi.
5. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

SUGGESTED WEBSITES

1. <http://swayam.gov.in>

INSTRUCTIONAL STRATEGY

This is highly practice-oriented course. While imparting theoretical instructions, teachers are expected to demonstrate the use of various instruments in surveying, stress should be laid on correct use of various instruments to avoid/minimize errors during surveying. It is further recommended that more emphasis should be laid in conducting practical work by individual students. Technical visit to Survey of India, Northern Region and Great Trigonometrical Survey (GTS), Dehradun. This subject contains five units of equal weightage.