

## **SURVEYING – I**

Lectures / Tutorials : 4 Periods/Week

Sessional marks : 40

Semester End Exam. : 3 Hours

Semester End Exam. marks: 60

Credits : 4

### **Course Objectives:**

- To take measurements to determine the relative positions of the existing features on the ground.
- To train various theoretical aspects of the surveying principles.
- To familiarize the simple surveying techniques.
- To give adequate knowledge on chain surveying, compass surveying.
- To acquaint with procedures of leveling by dumpy level & auto level.
- To layout or to mark the positions of the proposed structures on the ground.

### **Course Outcomes:**

By the end of the course surveying-I, the students will be able to

- To know the relative positions of the existing ground by conducting the survey.
- To know the how to take the levels of existing ground.
- To layout the existing structures on the ground.

## **UNIT – I**

### **Surveying & Measurements**

Definitions; Classification; Principles of Surveying; Plan and map; Scales used for Maps and plans.  
Phases of survey work and Duties of a surveyor; Precision in surveying work.

### **Errors**

Reliability of measurements – Accuracy, Precision, Significant figures, rounding of Numbers; Sources and types of errors; Probability in Survey measurements; Normal distribution; weights of measurements.

## **UNIT – II**

### **Measurement of horizontal distance**

Methods of distance measurements; Equipment for distance measurement; Procedures for distance measurement – Ranging, Chaining/taping a line; Errors in chaining and taping, and their corrections.

### **Measurement of angles and directions**

Angles and Bearings; Instruments used to measure angles and directions; Vernier Theodolite; Basic definitions; Fundamental lines and desired relations; Temporary and permanent adjustments; Field operations - Measurement of a horizontal angle: Repetition and Reiteration methods, a vertical angle, bearings; Lining-in, Balancing-in, Double sight, Random line method of running a line, Prolonging a straight line and location of intersection of two straight lines, to lay off a horizontal angle and Traversing; Sources of errors in Theodolite survey.

## **UNIT – III**

### **Chain and Compass Surveying**

Basic definitions; chain survey of an area – Principle, selection of scale of the map, Selection of stations, Offsets and Booking the survey; Accuracy of measurements; Office work; Problems encountered in chain survey; Chain and Compass Traversing; Field work; Plotting of a compass traverse.

### **Traversing – Uses of traversing surveying**

Types of traverses – Open and closed traverse, Traverse procedure - Selection of traverse stations; Marking of stations, linear and angular (both bearings and angles) measurements; Compatibility of linear and angular measurements; Sources of errors in traversing; Checks in traversing; Traverse Computations – Gale's traverse table; Methods of adjustments; Omitted measurements.

## **UNIT – IV**

### **Simple Leveling**

Basic definitions; Curvature and Refraction; Different methods of leveling; Levels – Dumpy level, Tilting level, Auto level; Sensitivity of a Level tube; Leveling staff; Level field book; Booking and reducing levels; Classification of direct differential leveling methods –Fly leveling, Check leveling, Profile leveling and Cross sectioning, Reciprocal leveling and Precise leveling; Sources of errors in leveling; Degree of Precision; Difficulties in leveling.

### **Contouring**

Methods of representing Relief; Contouring; contour interval; Characteristics of contours; Methods of locating contours; Direct and indirect methods of contouring; Interpolation and sketching of contours; Location of a contour gradient on map and ground; Uses of contour maps;

### **NOTE**

*Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.*

### **TEXT BOOK:**

1. Surveying Vol. 1 & II by Dr. K. R. Arora, 11<sup>th</sup> Edition, Standard Book House, 2012.

### **REFERENCE TEXT BOOKS**

2. Plane Surveying by AM Chandra, 2<sup>nd</sup> Edition, New Age International (P) Ltd., 2006.
3. Fundamentals of Surveying by S K Roy, 2<sup>nd</sup> Edition, Prentice- Hall of India Private Ltd., 2010.
4. Surveying Vol-I&II by B.C. Punmia, Laxmi Publications, 2005.

### **WEB REFERENCES:**

<http://nptel.iitm.ac.in/video.php?subjectId=105104101>

<http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-ROORKEE/SURVEYING/home.htm>

<http://www.engineeringcivil.com/theory/surveying/>

<http://www.engineeringcivil.com/theory/civil-engineering-notes-from-universities/>