16CE210 SURVEYING - II

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	5

Course Description and Objectives:

This course offers an introduction to surveying equipments like Theodolite, Tacheometer, 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:

The Students will be able to:

- understand the way an EDM and a Total Station works.
- understand various methods used calculate areas and volumes.
- employ tacheometry and trigonometric levelling based on site conditions.

SKILLS:

- ✓ *Create a contour map by using total station.*
- ✓ *Find out 2D and 3D surface areas of ground.*
- ✓ *Mark out the foundation for a building.*
- ✓ *Design the levels and stake out the centre line of a road or a rail or a canal.*
- ✓ *Use a tachometer and theodolite for finding out elevations and distances.*

ACTIVITIES:

o *Create a digital contour map using a total station survey results.*

o *Design the levels of a road such that the haul is minimum.*

o *Execute a simple curve on the ground.*

o *Find out the levels of a hilly region using tachometry and creating a contour map.*

o *Find out the levels using trigonometric leveling.*

UNIT – 1   **L-09**

ELECTORNIC DISTANCE MEASUREMENTS: Basic concepts, Classification of Electronic Radiation, Basic principle of Electronic Distance Measurement, Computing the distance from the phase differences, Electronic Total Station, Types, Measurement, Recording, Traversing, Data retrieval, Instrumental errors in EDM.

UNIT – 2   **L-09**

AREAS: INTRODUCTION: Simpson's rule, Boundaries with offsets at irregular intervals, Meridian distance methods, Coordinate method, Planimeter, Area of zero circle.

VOLUMES: Area of cross sections, Two level section only, Trapezoidal rule, Prismoidal formula, Volume from spot levels, Volume from contour plan, Capacity of a reservoir.

SETTING OUT WORKS: Control station, Horizontal control, Reference grid, Vertical control, Positioning of a structure, Setting out a foundation, Setting out with a theodolite, Grade stakes, Setting out a sewer, Setting out a culvert.

UNIT – 3   **L-09**

THEODOLITE TRAVERSE: Selection of traverse stations, Traversing fast needle method, Sources of errors in theodolite traversing, Field checks in traversing, Traverse Computations, Gale's traverse table, Methods of adjustments, Omitted measurements.

TACHEOMETRIC SURVEYING: Advantages of tacheometric surveying, Basic systems of tacheometric measurements, Determination of constants K and C, Inclined sight with staff vertical, Inclined sight with staff normal to the line of sight.

UNIT – 4   **L-09**

TRIANGULATION: Principles of triangulation, Uses of triangulation survey, Classification of triangulation, Signals and towers, Satellite station, Base line & Extension of the base line.

TRIGONOMETRIC LEVELING: Introduction, Determination of level of top of object, Base accessible, Base inaccessible, Axis signal correction, Difference in elevation by single observation and reciprocal observations.

UNIT – 5   **L-09**

CIRCULAR CURVES: Basic definitions, Designation of a curve, Relationship between radius and degree of curve, Elements of a simple circular curve, Location of the tangent points, Selection of peg interval, Methods of setting out simple curves, Problems in setting out curves.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS   Total hours: 30

Total Station

1. Study of iInstrument, determination of distances, directions and elevations.

2. Determination of boundaries of a field and computation of area.

3. Determination of heights of objects.

Setting out simple curves and works using

4. Tape and theodolite.

5. Total Station.

6. Setting out foundations for a Building.

Survey Camp is to be conducted for a minimum period of seven days Using Total Station to train in one of the following areas:

7. Preparation of a contour Plan/ Map.

8. Earth work computations for a high way / canal projects.

9. Marking of a sewer line/ water supply line.

10. Or any other type of construction work.

TEXT BOOKS:

1. B. C. Punmia, "Surveying", Vol.1 and 2, 15th edition, Laxmi Publishers, 2005

2. Dr. K. R. Arora, "Surveying", Vol. 1 and 2, 10th edition, Standard Book House, 2008

REFERENCE BOOKS:

1. A. M. Chandra, "Plane Surveying", 2nd edition, New Age International (P) Ltd. 2006.

2. Arthur Bannister and Stanly Reymond, "Surveying", 10th edition, Prentice Hall and Reymand Baker Addison - Wesly, 2002.