19CE101 SURVEYING AND LEVELLING

Source :

https://www.vpcivil.co.in/wp-content/uploads/2016/07/Leica-NA-532-Auto-Level.jpg

Hours Per Week :

L	T	P	C
1	0	4	3

Total Hours :

L	T	P
15	-	60

WA/RA	SSH/HSH	CS	SA	S	BS
5	40	-	8	5	-

COURSE DESCRIPTION AND OBJECTIVES:

This course deals with the various methods employed for the measurement of distances, areas and volumes. In addition it also deals with the marking positions of the proposed structures on the ground by using various surveying techniques. The objective of this course is to provide the students the basics of surveying and levelling principles, theory and their applications.

COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand the basic principles of surveying and levelling.	2
2	Apply the basic principles of surveying and levelling in agricultural engineering.	1
3	Measure the horizontal and vertical angles to simplify the calculations involving height and distance measurements of inaccessible points.	4
4	Construct closed and open traverses for identifying land areas in large landscapes.	5

SKILLS:

- ✓ *Find the distance between two stations and area of irregular field.*
- ✓ *Perform chaining and ranging where various types of obstructions are present.*
- ✓ *Take offsets (Perpendicular and Oblique) in various field conditions.*
- ✓ *Find latitude and longitude of area using GPS.*
- ✓ *Determine bearings of different survey lines by using Prismatic Compass.*
- ✓ *Setting plane table by various orientation methods on a given survey station.*
- ✓ *Measure the geomorphological properties of an area.*

UNIT - I **L-03**

Surveying: Introduction and basic principles - objects and uses of surveying - classification and methods of surveying. Linear measurements - principles in chain surveying - selection of survey stations and lines - types of ranging - direct ranging and indirect ranging - chaining - folding and unfolding of chains - reading the chain - leader and follower and their duties - conventional signs. Types of chains - ranging rod - offsets - types - measurement of offsets - cross staff - optical square. Steps involved in chain survey - reconnaissance - marking stations - reference sketches - running survey lines - booking field notes - plotting a chain survey; Testing of chain - degree of accuracy in chaining - error in length due to incorrect chain - compensating and cumulative errors - mistakes - Chaining on sloping ground - direct and indirect methods - obstacles in chaining - chain and tape corrections.

UNIT - II **L-03**

Compass surveying: Prismatic compass - surveyor's compass - whole circle and reduced bearings. True and magnetic bearing - dip and declination - local attraction - traversing - plotting plane table survey - instruments and accessories - setting up - orientation - different methods - radiation - intersection - traversing. Two-point problem - three - point problem - advantages and disadvantages - errors in plane tabling.

UNIT - III **L-03**

Levelling: Definitions - types of levels - optical principles - sensitivity of bubble - adjustments of levels - types of bench marks - principles in levelling - booking the reading. Reduction of levels - collimation system - problems. Rise and fall system - problem.

Classification of levelling - profile levelling - cross sectioning - plotting - curvature andrefraction - contouring - characteristics - uses - different methods - direct and indirect interpolation.

UNIT - IV **L-03**

Theodolite surveying: Definitions - parts of a theodolite - adjustment of a theodolite - measurement of angles - horizontal angles - different methods - vertical angle.

Theodolite traverses - traverse computations - adjustment of closed traverse - problems. Tachometric surveying - stadia system - fixed and movable hair methods - instrument constants - analytic lens-tangential tachometry. Areas and volumes - mid ordinate rule - average ordinate rule - trapezoidal rule - Simpson's rule - use of planimeter - volumes - trapezoidal and prismoidal formula.

UNIT - V **L-03**

Contouring minor instruments: Hand levels - clinometer. Electronic theodolite. Total station - Introduction to total station survey. GPS survey - Introduction to GPS survey.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS **TOTAL HOURS-60**

1. Chain surveying.
2. Compass surveying - 1.
3. Compass surveying - 2.

4. Plane table surveying - radiation.
5. Plane table surveying - Intersection.
6. Plane table surveying – solving two point problem.
7. Plane table surveying - solving three point problem.
8. Plane table surveying- traversing.
9. Levelling fly levelling- plane of collimation method.
10. Levelling fly levelling- rise and fall method.
11. Levelling longitudinal and cross sectioning.
12. Levelling contouring - 1.
13. Levelling contouring - 2.
14. Theodolite surveying: Measurement of horizontal angle by repetition method.
15. Theodolite surveying: Measurement of horizontal angle by reiteration method.
16. Measurement of vertical angle.
17. Measurement of vertical angle.
18. Theodolite traversing - closed.
19. Theodolite traversing - open.
20. Determination of tacheometric constants.
21. Heights and distances by stadia method - line of sight horizontal.
22. Heights and distances by stadia method - line of sight inclined.
23. Heights and distances by tangential method.
24. Heights and distances by tangential method.
25. Heights and distances by solution of triangles.
26. Heights and distances by solution of triangles.
27. Trigonometric levelling - base of the object accessible.
28. Study of minor instruments - hand level - clinometer.
29. Study of electronic theodolite.
30. Total station surveying.
31. GPS surveying.
32. Practical examinations.

TEXT BOOK :

1. Punmia, B C, 1987, “Surveying (Vol.I)”. Laxmi Publications, New Delhi.

REFERENCE BOOKS:

1. Arora K R, 1990, “Surveying(Vol.I)”, Standard Book House, Delhi.
2. Kanetkar T P, 1993, “Surveying and Levelling”. Pune VidyarthiGriha, Prakashan, Pune.