

Course No. : SWCE 121 Course Title: Surveying and Leveling
Semester : II Credits: 3 (1+2)

Syllabus

Theory:

Surveying: Introduction, classification and basic principles, linear measurements. Chain surveying,. Cross staff survey, Compass survey, Plannimeter, errors in measurements, their elimination and correction, Plane table surveying, Leveling difficulties and error in leveling, Contouring, Computation of area and volume. Theodolite traversing, Introduction to setting of curves, Total Station, Electronic Theodolite, Introduction to GPS survey.

Practical:

Chain survey of an area and preparation of map; Compass survey of an area and plotting of compass survey; Plane table surveying; Leveling L Section and X section and its plotting; Contour survey of an area and preparation of contour map; Introduction of software to drawing contour; Theodolite surveying; Ranging by Theodolite, Height of object by using Theodolite; Setting of curves by Theodolite; Minor instruments; Use of Total Station.

Teaching Schedule – Theory with weightages (%)

Lect. No.	Topic	Book No.	Page No.	Weight age (%)
1	Definitions, Object of Survey, Primary Divisions of Survey, Classification and use of survey	1	1 to 4	30
2	Principle of surveying, Measurement, Units of measurements, Methods of locating points, Works of surveyor, Precision in surveying	1	4 to 9 13 to 15,	
3	Principles of Chain Surveying, Triangulation survey, Survey station, Selection of stations, Survey lines, ranging and types of ranging	1	74 to 91 45 to 51	
4	Chaining, Type of chains, Recording the measurement, Offsets and their types, Number of offsets, Computation of areas.	1	34 to 46 77 to 83 309 to 317	
5	Errors in lengths due to incorrect chain, Correction for slopes, Error in chaining with tape and corrections, Numerical on chain and tape corrections	1	32 to 71	
6	Instruments for setting right angles, Cross staff, Prism square and optical square, Obstacles in chaining and ranging, Numerical	1	95 to 119	
7	Types and Methods of Traverse survey, Prismatic Compass, Surveyor Compass, Bearing of line, and computation of angles.	1	130 to 151	25
8	Local attraction and numerical, Magnetic declinations, Dip of needles, Plotting of traverse survey, Errors and limitation of compass survey.	1	151 to 173	25
9	Plane Tabling, Instruments & Accessories. Advantages and Disadvantages, setting & orientating tables,	1	289 to 293	
10	Methods of Plane tabling, Radiation, Intersection, Traversing and Resection, Errors in Plane Tabling	1	293 to 303	
11	Leveling, Terms used in leveling, Types of levels, Leveling staffs, Focusing, Bench Marks, Adjustment of Level.	1	345 to 367	
12	Principles of leveling, Reduction of levels, Booking of staff reading, Numerical	1	368 to 383	20
13	Classification of leveling, Differential, Profile, Cross sectioning, effect of curvature and refraction, check leveling, Reciprocal and precise leveling.	1	384 to 409	
14	Contouring, Characteristics of contours, Use of contours, Locating the contours, Interpolation of contours.	1	430 to 438	
15	Theodolites, Total Survey Stations, Traversing, Measurement of horizontal and vertical angle, Introduction to setting of curves, Introduction to GPS.	1 5	179 to 187 203 to 212, 276-278	

16	Computation of Earth Work Volumes, Formulae for straight level section, Two level section, Side Hill, Two level Section and Three level Section, Prizmoidal formula and Numerical	1	454 to 468	
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Practical Exercises

Ex. No.	Exercise
1.	Study of distance measuring instruments
2.	Determination of error in length of chain using tape
3.	Ranging of survey line (Direct ranging)
4.	Ranging of survey line (indirect ranging)
5.	Dropping of perpendicular on chain line from point outside
6.	Erecting perpendicular on chain line
7.	Chain survey of an area by Triangulation and Cross staff
8.	Plotting of chain survey and computation of area
9.	Study of Prismatic Compass and surveyor compass, Taking bearing, and computation of angle
10.	Open traverses survey of Road or Stream and Plotting
11.	Closed Traverse survey of field / building and Plotting
12.	Plane Table survey by Radiation Methods
13.	Plane Table survey by Intersection Methods
14.	Plane Table survey by Traversing Methods
15.	Study of different levels , leveling staff, and their adjustment
16.	To study booking of staff reading to determine the reduced level
17.	To study the simple and differential leveling to determine reduced levels
18.	To study the profile leveling and determine reduced leveling
19.	To study the plotting of profile leveling and compute cutting & filling
20.	To study the Grid survey of field
21.	Plotting of contours and interpolation of contours
22.	Study the software for drawing of contours
23.	Cross sectioning of gully or nala and plotting
24.	L-section of a gully or nala and plotting
25.	To study the Theodolite, Measurement of vertical and horizontal angle by Theodolite
26.	Determine the height of object with Theodolite
27.	Setting of curves with Theodolite

28.	Study of Total Survey Station and Computation horizontal, Vertical and height of object with Total Survey Station
29.	Study of Minor Instruments (Abney level, hand level, Box sextant and Clinometers)
30.	Study of minor instruments (Box sextant Line ranger, optical square)
31.	Study of Plannimeter and Pentagraph
32.	Study of GPS and Measuring area with GPS

Suggested readings

Text Book:

- 1) Surveying and leveling, Part-I, T. P.Kanetkar, S. V. Kulkarni, 23rd edition, 1999
- 2) Remote Sensing and GIS, By AnjiReddey

Reference Books:

- 1) Surveying and levelling –Part-II, T. P.Kanetkr, S. V. Kulkarni,
- 2) Surveying, Vol I and II, Dr B. C.Punmia
- 3) Surveying, Vol I and II, S. K. Duggal
- 4) Surveying, Vol-I, Arora K R, 1990