Semester	**:**	**I**			
Course No.	**:**	**SWCE-111**	**Credit Hrs.**	**:**	**3(1+2)**
Course Title	**:**	**Surveying and Levelling**			

SYLLABUS

Objectives: To enable the students to conduct the survey work for any area and also to prepare layout of engineering structures.

THEORY

Surveying: Introduction, classification and basic principles; Linear measurements, chain surveying, cross staff survey, compass survey, planimeter; Errors in measurements, their elimination and correction; Plane table surveying, methods, advantages and disadvantages. Levelling, levelling difficulties and error in levelling, contouring, computation of area and volume; Theodolite traversing, introduction to setting of curves; Total station; Introduction to GPS survey, Remote Sensing and GIS use in survey.

PRACTICAL

Linear measurements using different instruments; Reconnaissance survey in the field; Use of field book; Study on various types of chain used in chain survey and its components; Study of errors in chain surveying; Use of ranging rods and ranging in the field; Obstacles during chaining; Offsets in chain survey; Cross Staff; Survey of an area; Preparation of map; Study on various types of compass; Compass survey of an area; Plotting of compass survey; Plane table surveying and different methods; Study on various types of levels and its components; Setting up of dumpy level in the field; Computation of various methods for RL; Study on Levelling, L section and X sections and its plotting; Measurement of slope in the field; Study on contour and its characteristics; Contour survey of an area and preparation of contour map; Introduction of software in drawing contour; Theodolite surveying; Ranging by Theodolite; Height of object by using Theodolite; Setting out curves by Theodolite; Use of minor instruments; Use of total station, Use of modern computers for surveying.

Suggested Readings [SWCE-111]:

1. Kanetkar T.P. and S.V. Kulkarni, Surveying and Levelling, Part 1, 24th edition, reprint, 2017.
2. Remote Sensing and GIS by M. Anji Reddy.
3. Kanetkar T.P. and S.V. Kulkarni Surveying and Levelling, Part 2, 21st edition, reprint 1983.
4. Agor R.A Textbook of Surveying & Levelling. Khanna Publishers, New Delhi.
5. Arora K R. 1990. Surveying (Vol.I), Standard Book House, Delhi.
6. Kanetkar T P. 1993. Surveying and Levelling. Pune Vidyarthi Griha, Prakashan, Pune.
7. Punmia B C. 1987. Surveying (Vol.I). Laxmi Publications, New Delhi.

TEACHING SCHEDULE

THEORY [SWCE-111]

Lecture No.	Topic	Sub-topics/ Key Points	Weightage (%)
1-4	Surveying	Definitions, Object of Survey, Primary Divisions of Survey, Classification and use of survey	30
		Principle of surveying, Measurement, Units of measurements, Methods of locating points, Precision in surveying, Works of the surveyor.	
		Reconnaissance survey in the field; Principles of Chain Surveying, Triangulation survey, offsets in chain survey, ranging and types of ranging	
		Chaining, Type of chains used in chain survey and its components, Errors in lengths due to incorrect chain, Numerical on chain and tape corrections	
5	Computation of area and volume	Computation of areas, Computation of earth work volume, Prizmoidal formula and Numerical, Planimeter	
6	Instruments for setting right angles	Instruments for setting right angles, Cross staff, Prism square and optical square, Obstacles during chaining, Numerical	
7-8	Compass survey	Types and Methods of Traverse survey, Prismatic Compass, Surveyor Compass, Bearing of line, and computation of angles.	25
		Local attraction and numerical, Magnetic declinations, Dip of needles, Plotting of traverse survey, Errors and limitation of compass survey.	
9-10	Plane Table Surveying	Plane Tabling, Instruments and Accessories. Advantages and Disadvantages, setting and orienting tables,	
		Methods of Plane tabling, Radiation, Intersection, Traversing and Resection, Errors in Plane Tabling	
11-13	Levelling	Terms used in Levelling, Types of levels, Levelling staffs, Focusing, Bench Marks, Adjustment of Level.	25
		Principles of levelling, Reduction of levels, Booking of staff reading, Numerical.	
		Classification of levelling, Differential, Profile, Cross sectioning, effect of curvature and refraction, check levelling, Reciprocal and precise levelling.	
14	Contouring	Contouring, Characteristics of contours Use of contours, Locating the contours, Interpolation of contours.	20
15	Theodolite Traversing	Theodolites, Traversing, Measurement of horizontal and vertical angle, Introduction to setting of curves, Total Survey Stations	
16	GPS, RS & GIS use in survey	Introduction to GPS, Remote Sensing and GIS use in survey	
		Total=	**100**

TEACHING SCHEDULE

PRACTICAL [SWCE-111]

Exercise No.	Exercise Title
1	Reconnaissance survey in the field, introduction to different linear measuring instruments and Use of Field Book
2	Study on various types of chain used in chain survey and its components
3	Study of errors in chain survey
4	Study of direct ranging of survey line and Offsets in chain survey
5	Study of indirect ranging of survey line
6	Study on various obstacles or obstructions in Chaining
7	Chain survey of an area by Triangulation using cross staff
8	Plotting of chain survey and computation of area
9	Study of Prismatic Compass and surveyor compass,
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, levelling staff and their adjustment
16	To study booking of staff reading to determine the reduced level
17	To study the simple and differential levelling to determine reduced levels
18	To study the profile levelling and determine reduced levelling
19	To study the plotting of profile levelling and compute cutting and filling
20	To study the contour survey of field
21	Plotting of contours, interpolation of contours and determine the slope of field
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 height of object with Total Survey Station
29	Study of Minor Instruments (Abney level, hand level, Box sextant and Clinometers)
30	Study of Planimeter and measurement of area from map
31	Study of GPS and Measuring area with GPS
32	Study of DEM and preparation of contour map in GIS