

COURSE DESCRIPTION			
Program	Civil Engineering, Civil Engineering & Planning, Civil & Rural Engineering, Civil & Environmental Engineering, Civil Engineering (Construction Technology)		
Course Title	Basic Surveying Lab		
Course Code	2019	Semester	II
Type of Course	Lab	Contact Hours	45
Teaching Scheme (L: T:P:R)	0:0:3:0	Credits	1.5
CIE Marks	60	ESE Marks	40

Introduction

In basic survey lab students will get hands-on experience with fundamental surveying instruments like theodolites, levels, and compasses, and learn to measure angles, distances, and elevations for mapping and construction purposes. Through practical exercises, students will develop skills in data collection, error correction, and plan preparation, building a strong foundation for fieldwork in civil engineering and related fields.

Course Objectives

1	To complement and reinforce the theoretical knowledge in basic survey
2	To train students to use basic survey equipment like chain, cross staff, compass, levelling equipment.
3	Give hands on practice of surveying and leveling

Course Pre-requisite

Topic	Course code	Course Title	Semester
Basic knowledge on area of different shapes, trigonometry.	1002	Fundamentals of Engineering Mathematics	I

Course Outcome

CO	Course Outcome	Blooms Taxonomy Level
CO1	Plot land area using principles of chain survey and compass survey	Apply
CO2	Determine level difference between stations in the field	Apply
CO3	Prepare longitudinal profiles, cross profiles and contour maps using a leveling instrument.	Apply
CO4	Measure the horizontal angles using theodolite	Apply

CO-PO mapping

COURSE ARTICULATION MATRIX											
Course Outcomes	PROGRAM OUTCOMES										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	-	3	3	-	-	-	-	-	-
CO2	3	2	-	3	3	-	-	-	-	-	-
CO3	3	2	-	3	3	-	-	-	-	-	-
CO4	3	-	-	-	3	-	-	-	-	-	-
Total	12	6	-	9	12	-	-	-	-	-	-
Correlation Level	3	2	-	3	3	-	-	-	-	-	-

Legends: 1 - Low; 2 - Medium; 3 - High; No Correlation - "-"

Teaching and Assessment Scheme

Teaching Scheme/Week				Self-learning (SS)/Week	Total Hours/Semester	Credits C	Examination Scheme						
							Theory			Practical			Total
L	T	P	S				CIE	ESE	Total	CIE	ESE	Total	
0	0	0	3	1.5	45	1.5				60	40	100	100

L: Lecture (One unit is of one-hour duration with one credit), T: Tutorial (One unit is of one-hour duration with one credit), P: Practical (One unit is of one-hour duration with 0.5 credit), S: Project (One unit is of one-hour duration with 0.5 credit) SS: Self-Learning, CIE: Continuous Internal Evaluation, ESE: End Semester Examination

Detailed Syllabus

Expt No.	Experiment name	Practical Outcome	Mapped CO	Taxonomy Level	Instructional Hours
Module I					
1	Introduction to surveying equipment	Demonstration of various basic survey equipment (Chain, cross staff, plane table, compass)	CO1	Apply	3
2	Area calculation	Determine area of open field using tape	CO1	Apply	3
3	Compass survey	Determine inaccessible distances between points using compass and tape.	CO1	Apply	3
Module II					
4	Simple Levelling	Determine level difference by simple leveling	CO2	Apply	3
5	Rise and fall method	Determine reduced levels by Rise and Fall method	CO2	Apply	3
6	Height of Instrument method	Determine reduced levels by Height of Instrument (HI) method.	CO2	Apply	3
	Series Exam - I		CO2	Apply	3
Module III					
7	Profile levelling	Plot longitudinal profiles and cross sections for the alignment of road.	CO3	Apply	3
8	Fly levelling	Perform fly leveling with double check using dumpy level/ Auto level and levelling staff.	CO3	Apply	3
9	Contouring	Take spot levels and prepare contour map	CO3	Apply	3
Module IV					
10	Repetition method	Measure horizontal angles by repetition method	CO4	Apply	3
11	Reiteration method	Measure horizontal angles by reiteration method	CO4	Apply	3
12	Prolonging a straight line	Prolong a line using theodolite , measure the bearing of a line using theodolite	CO4	Apply	3
	Open Ended Experiment		CO4	Apply	3
	Series Exam - II		CO4	Apply	3

Open-ended experiment**Objective:**

To encourage creativity, innovation, and application of knowledge by allowing students to use the concepts learned during the course for performing survey of a site for a given application

Description:

At the end of the laboratory course, each student (or group of students) shall undertake one open-ended experiment. In this activity, students are expected to conceive, design, and implement an experiment of their own choice related to the course outcomes. The aim is to apply theoretical knowledge and laboratory skills to a new or practical problem not explicitly covered in the regular experiments. Any 3 to 5 open ended problem may be chosen and divided among student groups.

Students may choose to:

Prepare a contour map of a sloped area and calculate how much water a proposed pond / reservoir can hold.
Measure the area of a site where direct measurement is blocked by a building or dense trees.
Prepare a sketch of their own house plot and calculate the plot area using suitable method

Student Activities for Self-Learning

Week	Self-Learning description	Hours
Module I		
1	Study on basic surveying techniques and equipments and preparation of record	1.5
2	Learn the procedure for determination of the area of a given plot using tape and preparation of record	1.5
3	Study the process of compass surveying and preparation of record	1.5
Module II		
4	Identify the different parts of dumpy level and learn the theory of simple leveling, preparation of record	1.5
5	Study the method of determining the level difference between two point by rise and fall method, preparation of record	1.5
6	Study the method of determining the level difference between two point by height of instrument method, preparation of record	1.5

7	Preparation for lab exam 1	1.5
Module III		
8	Study the purpose and method of doing profile leveling, preparation of record	1.5
9	Study the purpose and method of performing fly levelling in field, preparation of record	1.5
10	Learn the process of preparing contour maps by taking spot levels and preparation of record	1.5
Module IV		
11	Learn the steps in doing temporary adjustments of theodolite and the method of determining horizontal angles by repetition method, Record preparation	1.5
12	Study the method of determining horizontal angles by reiteration method, Record preparation	1.5
13	Study the process of prolonging a given straight line using a theodolite, Record preparation	1.5
14	Preparation for lab exam 2	1.5
15	Identifying the suitable method of surveying required to solve the given problem of open ended project, doing required calculations and preparation of record	1.5
Total Self-Learning hours		22.5

Learning Resources

TEXT BOOK			
Sl. No.	Title	Author	Publication
1	Surveying I	Punmia, B.C.; Jain, Ashok Kumar; Jain, Arun Kumar	Laxmi Publications., New Delhi

REFERENCE			
Sl. No.	Title	Author	Publication
1	Surveying and Levelling	Basak, N. N.	McGraw Hill Education, New Delhi
2	Surveying and Levelling volume I	Kanetkar, T. P.; Kulkarni, S. V.,	Pune Vidyarthi Gruh Prakashan
3	Survey I	Duggal, S. K.	McGraw Hill Education, New Delhi.

WEB RESOURCES		
Sl. No.	URL	Modules Covered
1	http://nptel.ac.in/courses Website Link 2	All
2	http://www.vlab.co.in/ba-nptel-labs-civil-engineering	All

Major Equipment/Instruments/Components required for a batch of 30 students

Sl. No.	Particulars	Specifications	Quantity
1	Metric tape	30m,20m	6
2	Prismatic compass and accessories	standard	6
3	Dumpy level and accessories	standard	6
4	Transit theodolite and accessories	standard	6

Major Software required for a batch of 30 students

Sl. No.	Particulars	Specifications	Quantity
	NIL		

Assessment Methodology - Lab

Mode	Attendance	CE	CA1	CA2	OEE	ESE
		Continuous evaluation	Practical test (first half of experiments)	Practical test (second half of experiments)	Open-ended experiment	Practical
Duration			3 hours	3 hours		3 hours
Exam mark		50	40	40	50	40
Converted to		30	15	15	10	
Marks	5	30	15		10	40
Total marks	60					40
Tentative schedule	End of semester	Every lab slot	7th week	14th week	15th week	

Scheme of Evaluation - Practical (Continuous Internal Evaluation)

Sl. No.	Criteria	Description	Marks
1	Preparation & Punctuality	Attendance, timely submission of record, pre-lab preparation, understanding of experiment objectives and theory.	10
2	Experimental Setup & Procedure	Ability to identify components/equipment, correct circuit connections/setup, systematic and safe execution of the procedure.	10
3	Observation & Data Recording	Accuracy and neatness of readings, correct use of units, tabulation, and systematic recording of results.	5
4	Analysis & Result Interpretation	Proper calculations, graphical representation, result verification, discussion, and logical conclusion.	10
5	Viva Voce / Concept Understanding	Clarity of theoretical concepts, explanation of procedure, ability to answer questions related to the experiment.	10
6	Workmanship, Discipline & Teamwork	Laboratory discipline, care of instruments, teamwork, attitude, and safety practices.	5
Total			50

Scheme of Evaluation - Practical Test & End Semester Evaluation

Category	Things to evaluate	Marks
Write-up / Procedure (before experiment)	Aim, circuit diagram/flowchart, stepwise procedure.	10
Experiment Setup & Execution	Correct circuit connections / coding / setup. Handling of instruments/software. Accuracy of execution.	10
Observation & Result / Output	Proper tabulation of readings. Calculations/graphs/program output. Correctness of result / expected outcome.	8
Viva Voce	Conceptual understanding of experiment. Related theoretical knowledge.	8
Record	Completion & neatness of practical record. Proper certification by faculty.	4
Total		40

Scheme of Evaluation - Open-ended experiment

Category	Things to evaluate	Marks
Originality and Relevance of the Idea	Assesses how creative, innovative, and relevant the chosen experiment is to the course objectives.	10
Clarity of Objectives and Experimental Plan	Evaluates how clearly the student defines the aim, scope, and systematic plan of the experiment.	10
Correctness of Execution and Data Recording	Checks the accuracy, safety, and neatness in performing the experiment and recording observations.	10
Analysis, Interpretation, and Presentation of Results	Measures the student's ability to analyze data, interpret outcomes, and present results logically.	10
Teamwork and Innovation Demonstrated	Judges the level of collaboration, initiative, and creativity shown during the experiment.	10
Total		50