

NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	BTech Civil Engineering
Course Code:	2CL701CC25
Course Title:	Surveying
Course Type:	Core
Year of Introduction:	2025-2026

L	T	Practical Component				C
		LPW	PW	W	S	
2	-	2	-	-	-	3

Course Learning Outcomes (CLOs):

At the end of the course, the student will be able to –

1. appraise the concepts of surveying for construction projects (BL5)
2. select appropriate survey methods for linear and angular measurements (BL3)
3. solve the practical problems related to vertical measurement (BL3)
4. categorise modern survey instruments and techniques. (BL4)

Unit	Contents	Teaching hours (Total 30)
Unit-I	Fundamentals of Surveying Principles, types, objectives, classification, scales and maps, errors and adjustment, map projections, coordinate systems, applications.	03
Unit-II	Direction, Distance and Angle Measurements Linear measurements; compass: calculation of angles from bearings; theodolite: measurements of horizontal and vertical angle, gales traverse table; curves: types, geometry and setting out work.	08
Unit-III	Vertical Measurements Levelling: principle, types of levelling, errors, levelling instruments; contouring: characteristics of contours, methods, applications; tacheometry: introduction, methods, calculation of area and volume.	07
Unit-IV	Advanced Surveying Instruments and Techniques Electronics distance meter (EDM), total station, global navigation satellite system (GNSS), geographic information system (GIS), remote sensing (RS), photogrammetry, light detection and ranging (LIDAR), unmanned aerial vehicles (UAVs), laser scanner.	12

Self-Study:

The self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from self-study contents.

Suggested Readings/ References: Subramanian, R., *Surveying and Leveling*, Oxford Higher Education.
 Duggal, K. S., *Surveying and Levelling*, Vol. I & II, Tata Mcgraw-Hill Publishing.
 Basak, N. N., *Surveying and Levelling*, Tata Mcgraw-Hill Publishing.
 Punmia, B. C., *Surveying and Levelling*, Vol. I, II & III, Laxmi Publications.
 Chandra, A. M., *Geoinformatics*, New Age International Publisher.
 Anderson, J. M. & Mikhail, E. M., *Surveying: Theory and Practice*, McGraw-Hill Publication.
 Gopi, S., Sathikumar R. & Madhu, N., *Advanced Surveying*, Pearson Education.

Laboratory Work: Laboratory work will be based on above syllabus with minimum 10 experiments/exercises to be incorporated.

Suggested List of Experiments:

Sr. No.	Name of Experiments/Exercises	Hours
1	Study of Map, Image, and Scale	02
2	Angular measurement using compass	02
3	Measurement of Horizontal and Vertical Angles using Theodolite	06
4	Vertical Measurement using Auto level	04
5	Vertical Measurement using Digital Level	02
6	Staking out points using GNSS	04
7	Traverse Surveying using Total Station	04
8	Staking out of points using Total Station	02
9	Drone Survey	02
10	Software demonstration of GIS	02