



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma in Architecture

Level: Diploma

Branch: Architecture

Course / Subject Code: DA03063041

Course / Subject Name: Surveying and Levelling

w. e. f. Academic Year:	2026-27
Semester:	Third
Category of the Course:	Building Sciences and Applied Engineering (BS & AE)

Prerequisite:	Learners require a basic understanding of mathematics, geometry, and trigonometry to perform accurate measurements and calculations. Learners should be familiar with engineering drawing concepts such as scales, symbols, and reading architectural plans, sections, and elevations. An introductory understanding of building construction and site conditions helps relate surveying work to architectural design.
Rationale:	For students of Diploma in Architecture, understanding the basic principles of surveying and levelling is essential for effective planning, design, and execution of architectural projects. This course provides fundamental knowledge of land measurement, levelling techniques, and site analysis required for preparation of site plans, layouts, and building drawings. It familiarizes learners with commonly used surveying instruments and methods applied in architectural practice. The subject enhances the ability to interpret site topography, contours, and ground levels, which are vital for architectural design decisions. The course also develops basic practical skills in surveying and levelling, enabling learners to carry out preliminary site surveys at the primary level.

Course Outcomes:

After completion of the course, the learner will be able to:

No	Course Outcomes
01	Explain the basic principles of surveying and levelling required for architectural site planning and building layout.
02	Perform linear and angular measurements using surveying instruments for preparation of site plans and setting out of buildings.
03	Use levelling instruments to determine reduced levels and prepare contour drawings for land development and landscape design.
04	Relate advanced surveying techniques in different surveys.



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Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+P	Assessment Pattern and Marks				Total Marks
L	T	P		C	Theory		Tutorial / Practical	
			ESE (E)		PA / CA (M)	PA/CA (I)	ESE (V)	
2	0	2	4	70	30	20	0	120

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P -Practical; C – Credit, CA – Continuous Assessment; ESE -End Semester Examination

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction: 1.1 Objective and uses of surveying. 1.2 Classification of Survey. 1.3 Principles of Survey. 1.4 Types of Scale and selection of scale. 1.5 Construction of diagonal scale.	03	10
2.	Chain and tape Survey: 2.1 Instruments used in chain and tape survey Metric Chain, Tapes, Arrow, Tapes, ranging rod, Offset rod, Open cross staff, optical square. 2.2 Technical terms related with chain survey. Survey Station, Base line, Check line, Tie line, Offset, Tie station. 2.3 Methods of chaining 2.4 Sources of Errors in Chain Survey 2.5 Obstructions in Chaining 2.6 Ranging of Survey Lines 2.7 Field Book and Recording of Observations.	06	20
3.	Compass Survey: 3.1. Introduction 3.2. Survey & Traversing 3.3. Components and functions of Prismatic Compass 3.4. Technical Terms - True Meridian & Bearing, Magnetic Meridian & Bearing, Arbitrary Meridian & Bearing, Dip of Magnetic needle, Declination, Fore Bearing & Back Bearing, WCB, RB. 3.5. Method of finding included angles from bearings-examples	09	30



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	3.6. Local attraction and Closing error with relevant examples. 3.7. Errors and its elimination		
4.	Levelling: 4.1. Introduction 4.2. Basic terminology related with levelling like Level surfaces, horizontal & vertical surfaces, Datum, Bench Marks, Reduced Level, Rise, Fall, Line of collimation, Axis of Telescope, Axis of bubble tube, Station, Back sight, Fore sight, intermediate sight, change point, Height of instruments, Focusing a parallax, etc. 4.3. Dumpy Level & Automatic Level - Components and their functions - Temporary adjustment of Level. 4.4. Levelling Staff. 4.5. Folding and Telescopic staff. 4.6. Examples & methods of finding out the R. L. in Level Book by H.I. Methods & Rise & Fall Method. 4.7. Contour and uses of contours. <ul style="list-style-type: none"> • Characteristics of contours • Methods of Contouring 	9	30
5.	Introduction to advanced surveying Techniques: 5.1. Enlist different types of advanced Surveying instrument. 5.2. Uses of advanced surveying Instrument. 5.3. Demonstration of total station.	03	10
Total		30	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	30	50	0	0	0

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)



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References/Suggested Learning Resources:

(a) Books:

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Surveying and Levelling Vol-I	T. P. Kanetkar & S. V. Kulkarni	Vidyarthi Griha Prakashan, ISBN: 978-8185825113
2	Surveying and Levelling Vol-I	Dr. B. C. Punmia	Laxmi Publications Pvt. Ltd., ISBN: 978-8170088530
3	Surveying and Levelling	N. N. Basak	McGraw Hill Education India, ISBN: 9332901537
4	Surveying and Levelling	R. Agor	Khanna Publications, ISBN: 9788132110255
5	Surveying	S. K. Duggal	McGraw Hill Education India, ISBN: 788174092359
6	Surveying and Levelling Vol-II	Dr. B. C. Punmia	Laxmi Publications Pvt. Ltd., ISBN: 978-8170088837

(b) Open-source software and website:

<https://swayam.gov.in/>

<https://nptel.ac.in/>

Suggested Course Practical List:

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1	Demonstrate the uses of survey tools and equipment.	I	8
2	Carry out the surveying project on a given site to locate surrounding features using Chain and Compass.	II & III	8
3	Carry out levelling project on an undulating ground and prepare the drawing sheet showing ground profile and contours of site.	IV	14
	Total		30



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List of Laboratory/Learning Resources Required:

No.	Equipment Name with Broad Specifications	Pr. No.
1	Metric Chain, Tapes, Open Cross staff, Optical Square, Prismatic Compass, Surveyor's Compass, Dumpy Level, Levelling Staff and other equipment.	1-3
2	Interactive board with LCD overhead projector.	1-3

Suggested Project List:

- Contouring of a small open plot
- Site survey for proposed residential building
- Plinth level survey of an existing building
- Topographical survey of a small site
- Setting out of a simple building layout
- Reduced level (RL) calculation by HI & Rise–Fall method
- Measurement of slope and gradient of land

Suggested Activities for Students:

Other than the classroom and laboratory learning, following are the suggested learner- related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Learners should perform following activities in groups and prepare reports of about 5 pages for each activity. They should also collect/record physical evidence for their (learner's) portfolio which may be useful for their placement interviews:

- a) Prepare a field book of your survey practice.
- b) Explain different types of survey required for the given situation.

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