GANPAT UNIVERSITY

FACULTY OF DIPLOMA ENGINEERING

Programme	Diploma in Civil Engineering				
Semester	II		Version	1.0.0.0	
Effective from Academic Year	2025-26		Effective for the batch Admitted in		JULY 2025
Course code	1CI2101	Course Name	Basic Surveying		

I.TEACHING-LEARNING AND ASSESSMENT SCHEME

Course Type	Course Code	Learning Scheme						Assessment Scheme										
		Actual Contact Hrs./Week			SLH	NLH	Credits	Theory				Practical				Based on SL		Total Marks
		CL	TL	LL				FA-TH	SA-TH	TOTAL		FA-PR	SA-PR	TOTAL		SLA		
								MAX	MAX	MAX	MIN	MAX	MAX	MAX	MIN	MAX	MIN	
DSC	1CI2101	2	-	2	4	8	4	40	60	100	40	60	40	100	40	20	08	220

Abbreviation:			
	CL- Classroom Learning	**TL -** Tutorial Learning	**LL -** Laboratory Learning
	SLH - Self Learning Hours	**NLH -** Notional Learning Hours	**SLA -** Self Learning Assessment
	FA - Formative Assessment (Term work +Mid Sem Exam +Attendance)		**SA -** Summative Assessment

II. PRE-REQUISITES

Basic knowledge of Mathematics and Elements of Civil Engineering.

III. INDUSTRY / EMPLOYER EXPECTED OUTCOMES

Prepare plans and Contour maps using Surveying Equipment's and Techniques.

IV. COURSE LEARNING OUTCOMES

At the end of the course, students will be able to achieve the following course learning outcomes:

CO1.Understand the fundamentals of surveying, types, principles, scales and their applications in land measurement and mapping.

CO2.Students will be able to perform compass traversing, calculate bearings, and apply corrections in field surveys using prismatic and surveyor compass.

CO3.Determine Reduced Level to prepare Contour maps for the given type of terrain.

CO4.Analise the plan using Plane Table Surveying to locate relevant details.

CO5.Apply basic knowledge of theodolite components and procedures to accurately set up the instrument and measure horizontal and vertical angles.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:

Name of Unit	Theory Learning outcomes (TLO's) aligned to CO's	Learning Content mapped with Theory Learning outcomes (TLO's) & CO's	Marks	Hours
Unit-1 Introduction	**TLO 1.1**Learn the basic of surveying **TLO 1.2**Apply various types of scale as per needs.	**1.1** Definition of surveying **1.2** Objective and use of surveying **1.3** Plain and Geodetic survey **1.4** Classification of survey **1.5** Principles of survey **1.6** Different types of scales and selection of scale	**08**	**04**
Unit-2 Compass survey	**TLO 2.1**Describe procedure for angular measurements. **TLO 2.2** Record bearing accurately with compass. **TLO 2.3** Prepare drawing as per recorded and corrected measurements of bearings with chain and	**2.1** Introduction of Traversing **2.2** Components of Prismatic Compass **2.3** Functions of different parts of prismatic compass **2.4** Differentiate between Prismatic and Surveyor compass **2.5** Types of meridians and bearings	**16**	**06**

	compass survey.	**2.6** Technical terms **2.7** Dip of Magnetic needle& declination **2.8** Fore Bearing & Back Bearing **2.9** Whole circle Bearing system and Reduced Bearing system & its examples **2.10** Conversion of bearing from one system to another. **2.11** Method of finding included angles from bearings & its examples **2.12** Local attraction and Closing error with relevant example **2.13** Errors in compass survey and elimination of errors.		
Unit-3 **Levelling and contouring**	**TLO 3.1**Learn different methods and their procedure for levelling. **TLO 3.2**Demonstrate procedure for using the instruments and levelling staff and entering levels in proper tabular form. **TLO3.3** Carryout corrections for errors in levelling records if any **TLO 3.4** Prepare contour maps by calculating Reduce level as per data book.	**3.1** Basic terminology related with levelling **3.2** Types of levelling instrument **3.3** Types of levelling staff **3.4** Temporary adjustment of level **3.5** Methods of levelling **3.6** Methods of finding out the R.L. in levelling book by H.I. method & Rise and Fall method **3.7** Correction for Curvature and Refraction **3.8** Errors in levelling and its Elimination **3.9** Contour **3.10** Uses of contours **3.11** Characteristics of contours **3.12** Methods of Contouring **3.13** Preparing drawing & estimation of gradients.	**20**	**12**
Unit-4 **Plane Table Surveying**	**TLO 4.1**Demonstrate procedure for plain table survey. **TLO 4.2** Select the relevant method of plane tabling for a given situation. **TLO 4.3**Find the areas from prepared drawings.	**4.1** Principle of plane table survey. **4.2** Plane table Accessories **4.3** Advantage and disadvantage of plane table survey. **4.4** Setting of plane table; Orientation of plane table - Back sighting and Magnetic meridian method. **4.5** Methods of plane table surveys e.g. Radiation, Intersection and Traversing.	**10**	**04**
Unit-5 **Introduction to theodolite**	**TLO 5.1** Build knowledge of the basic functions of different parts of theodolite. **TLO 5.2** Use theodolite and read horizontal and vertical angle.	**5.1** Introduction to theodolite and its types, Uses of theodolite, and parts of Transit Vernier theodolite. **5.2** Reading of main and vernier scale on a horizontal and vertical plate **5.3** Temporary adjustment of a theodolite.	**06**	**04**

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL			
Sr. No.	**Practical/Laboratory Learning Outcome (LLO)**	**Practical Titles**	**Relevant COs**
1	**LLO 1.1** Determine bearing using Prismatic Compass	Find out fore Bearing & Back Bearing of survey line of given traverse using Prismatic compass.	CO2
2	**LLO 1.2** Prepare traverse using Prismatic Compass	Determine the fore bearings and back bearings for a closed traverse with 5 to 6 sides, then adjust the bearings and correct the included angles.	CO2
3	**LLO 1.3** Perform temporary adjustments of a levelling instrument and demonstrate proper handling of a levelling staff.	Instrument Handling & Temporary Adjustments.	CO3
4	**LLO 1.4** Conduct differential levelling / profile levelling using Height of Instrument (H.I.) method and recording observations in a standard tabular format.	Determine Reduced Level by Height of Instrument Method.	CO3
5	**LLO 1.4** Conduct differential levelling / profile levelling using Rise & Fall method and recording observations in a standard tabular format.	Determine Reduced Level by Rise & Fall method Method.	CO3
6	**LLO 1.5** Conduct the levelling survey on the undulated ground and prepare a detailed contour map using a grid layout.	Grid Levelling Survey on Undulated Ground and Contour Map Preparation.	CO3 & CO1
7	**LLO 1.6** Demonstrate Basic Plane Table Setup and Radiation Method	Mapping by Radiation Method Using a Plane Table.	CO4
8	**LLO 1.7** Conduct traversing / Intersection for Area Computation.	Plane Table Traversing & Intersection for Boundary Survey.	CO4
9	**LLO 1.8** Demonstrate transit vernier theodolite.	Identify various parts of the theodolite and Temporary Adjustment of Theodolite.	CO5

VII. SUGGESTED MICRO PROJECT / ASSIGNMENTS / ACTIVITIES FOR SELF LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

- Given a small area (e.g., college campus), select appropriate scales (1:500, 1:1000, etc.) for different purposes (layout plan, drainage design). Justify your choice.
- Create a visual chart classifying surveys (based on purpose, instruments, or area) with real-world examples.
- Design a quiz (10-15 problems) to convert WCB to QB and vice versa. Include magnetic declination adjustments.
- Build a small sand/clay model with slopes. Use a homemade water level to trace contours.

Mini projects

- Collect the contour maps of different terrains available with various authorities & prepare a report on its interpretation.
- Collect the information of survey instruments available in the market with their specifications.
- Prepare a flex chart to explain one method of plane tabling.

VIII. LIST OF INSTRUMENTS / EQUIPMENT / TRAINER BOARD	
1	Ranging rod, Peg
2	Prismatic Compass &Surveyor's Compass with stand
3	Dumpy level & Auto level with stand and Levelling staff
4	Plane table with accessories- Plane and telescopic Alidade, Trough compass, U-fork, Spirit level.
5	Transit Vernier theodolite

IX. LIST OF REFERENCE BOOKS			
Sr.No.	**Title**	**Author**	**Publication**
1	Surveying Vol. I	B. C. Punmia, A. K. Jain, Arun K. Jain	Laxmi Publications
2	Surveying & Levelling	N. N. Basak	Mc Graw Hill Education
3	Surveying & Levelling	S. C. Rangwala	Charotar Publication

X. LINK OF LEARNING WEB RESOURCE	
1	https://nptel.ac.in/courses/105107122
2	https://nptel.ac.in/courses/105107121
3	https://nptel.ac.in/courses/105104101
4	https://www.youtube.com/watch?v=x9ZPMxrlS3U
5	https://www.youtube.com/watch?v=boPrQFZEn9A
6	https://www.youtube.com/watch?v=PQfr1LABZWg

XI. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE							
Unit	**Unit Title**	**Aligned COs**	**Learning Hours**	**R-Level**	**U-Level**	**A-Level**	**Total Marks**
1	Introduction	CO1	4	3	3	2	8
2	Compass survey	CO2	6	6	8	6	16
3	Levelling and contouring	CO3	12	6	8	8	20
4	Plane Table Surveying	CO4	4	3	4	3	8
5	Introduction to theodolite	CO5	4	2	2	2	8
		Grand Total	30	20	25	21	60

XII. COs AND POs AND PSOs MAPPING										
Course outcome (Cos)	**Programme Outcomes (POs)**							**Programme Specific Outcomes (PSOs)**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1	0	1	1	0	1	3	2	1
CO2	2	3	2	3	1	1	1	2	3	2
CO3	2	2	3	3	2	1	1	2	3	3
CO4	1	2	2	3	1	2	1	1	2	3
CO5	1	2	1	3	1	1	1	2	3	2
Legends: -3- High 2-Moderate/Medium 1-Slight/Low 0-None										