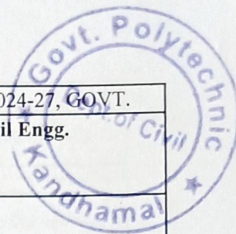


LESSON PLAN: Surveying (CEPC301 TH-1) FOR THE SESSION 2026-27(WINTER-2026) BATCH-2024-27, GOVT.		
Discipline: Civil Engineering	Semester: 5th	Name of the Teaching Faculty - SWASTIK PRADHAN, Lecturer -II in Civil Engg.
Subject: Surveying (CEPC301 TH-1)	No. of days/ per week class allotted: 3	Semester From Date : 1/07/2026 to Date: 5/11/2026 No. of Weeks: 15
Week	Class Day	Theory/ Practical Topics
1st	1st	Introduction to Surveying • Definition of Survey• Purpose of Surveying• Uses of Surveying in Civil Engineering
	2nd	Types of Surveying • Primary Survey• Secondary Survey• Plane Survey• Geodetic Survey
	3rd	Classification of Surveying • Cadastral Survey• Hydrographic Survey• Photogrammetric Survey• Aerial Survey
2nd	1st	Principles of Surveying • Working from Whole to Part• Fixing New Points by at least Two Independent Measurements• Practical examples and numerical illustrations
	2nd	Scales in Surveying • Engineer's Scale• Representative Fraction (RF)• Diagonal Scale• Simple numerical problems
	3rd	Introduction to Chain Surveying • Definition and principles of chain surveying• Instruments used: Metric Chain, Tapes, Arrows, Ranging Rods, Line Ranger, Offset Rod, Open Cross Staff, Optical Square• Care and maintenance of instruments
3rd	1st	Chain Survey Terminology • Survey Station• Base Line• Check Line• Tie Line• Offset• Tie Station• Ranging – Direct and Indirect Ranging
	2nd	Methods of Chaining and Obstacles • Methods of chaining on level ground• Chaining on sloping ground• Obstacles in chaining (obstacles to ranging, chaining and both)• Methods to overcome obstacles
	3rd	Errors in Chain Surveying • Instrumental Errors• Personal Errors• Errors due to Natural Causes• Random Errors• Types of Offsets – Perpendicular and Oblique
4th	1st	Field Book and Conventional Signs • Conventional Signs used in surveying• Recording measurements in a Field Book• Single Line and Double Line Field Book• Booking of Chain Survey Observations• Practice Exercise
	2nd	Introduction to Compass Traversing • Definition and principles of compass traversing• Open Traverse and Closed Traverse• Technical Terms: True (Geographic) Meridian, Magnetic Meridian, Bearing, Dip of Magnetic Needle, Magnetic Declination
	3rd	Bearing Systems • Whole Circle Bearing (WCB) System• Reduced Bearing (RB)/Quadrantal Bearing System• Conversion of WCB to RB and RB to WCB• Fore Bearing (FB) and Back Bearing (BB)• Calculation of Internal and External Angles from Bearings
5th	1st	Types of Compass and Their Use • Prismatic Compass• Surveyor's Compass• Components and Functions• Temporary Adjustments• Procedure for Observing Bearings
	2nd	Local Attraction and Corrections • Causes of Local Attraction• Detection of Local Attraction• Correction of Observed Bearings• Correction at Stations• Correction to Included Angles• Numerical Examples
	3rd	Plotting of Traverse and Closing Error • Methods of Plotting a Traverse• Closing Error• Graphical Adjustment of Closing Error• Practical Exercise and Revision
6th	1st	Introduction to Levelling and Basic Terminologies • Purpose and applications of levelling• Level Surface, Horizontal Surface, Vertical Surface• Datum and Bench Marks (GTS, Permanent, Temporary, Arbitrary)• Reduced Level (RL), Rise, Fall, Line of Collimation• Station, Back Sight (BS), Fore Sight (FS), Intermediate Sight (IS), Change Point (CP), Height of Instrument (HI)
	2nd	Levelling Instruments and Temporary Adjustments • Types of Levels: Dumpy, Tilting, Auto and Digital Level• Components and Fundamental Axes of Dumpy Level• Temporary Adjustments of Level Instrument• Types of Levelling Staff: Self-reading Staff and Target Staff
	3rd	Reduction of Levels and Types of Levelling • Line of Collimation (Height of Instrument) Method• Rise and Fall Method• Comparison of Both Methods• Types of Levelling: Simple, Differential, Fly, Profile and Reciprocal Levelling• Numerical Problems



7th	1st	Contouring • Contour and Contour Interval• Horizontal Equivalent• Characteristics of Contours• Uses of Contour Maps• Methods of Contouring: Direct and Indirect• Interpretation of Contour Maps
	2nd	Measurement of Area and Volume • Components and Working of Digital Planimeter• Measurement of Area using Digital Planimeter• Measurement of Reservoir Volume from Contour Maps• Practical Demonstration and Revision
	3rd	Introduction to Theodolite Surveying • Definition and applications of theodolite surveying• Types of Theodolites (Transit and Non-Transit; Vernier and Digital)• Uses in civil engineering projects
8th	1st	Components and Technical Terms • Components of Transit Theodolite and their functions• Reading the Vernier Scale• Technical Terms: Swinging, Transiting, Face Left, Face Right
	2nd	Fundamental Axes and Temporary Adjustments • Fundamental Axes of a Transit Theodolite• Relationships among Axes• Temporary Adjustments: Setting, Centering, Levelling, Focusing
	3rd	Measurement of Horizontal Angles • Direct Method• Repetition Method• Errors eliminated by Repetition Method• Numerical Examples
9th	1st	Measurement of Bearings and Vertical Angles • Measurement of Magnetic Bearing• Prolonging a Line• Ranging a Line• Deflection Angle• Measurement of Vertical Angle
	2nd	Theodolite Traversing • Included Angle Method• Deflection Angle Method• Open and Closed Traverse• Traverse Checks• Calculation of Bearings from Angles
	3rd	Traverse Computation • Latitude and Departure• Consecutive Coordinates• Independent Coordinates• Introduction to Traverse Balancing
10th	1st	Traverse Balancing and Gale's Traverse Table • Bowditch's Rule• Transit Rule• Gale's Traverse Table Computation (Concept and Simple Numericals)• Revision and Unit Quiz
	2nd	Introduction to Tacheometric Surveying • Definition and principles of tacheometry• Advantages, disadvantages and applications• Components of a tacheometer• Anallatic Lens – Purpose and Working Principle
	3rd	Tacheometric Formulae • Stadia Principle• Tacheometric Formula for Horizontal Distance (Telescope Horizontal and Staff Vertical)• Meaning of Instrument Constants (K and C)• Simple Numerical Problems
11th	1st	Determination of Instrument Constants and Field Measurements • Field Method for Determining Multiplying Constant (K) and Additive Constant (C)• Determination of Horizontal and Vertical Distances by Fixed Hair Method with Staff Held Vertical
	2nd	Limitations of Tacheometry and Introduction to Curves • Limitations of Tacheometric Surveying• Need for Curves in Road and Railway Alignments• Types of Curves: Simple Circular, Compound, Reverse and Transition Curves• Designation of Curves
	3rd	Simple Circular Curve • Elements of a Simple Circular Curve (Radius, Central Angle, Tangent Length, Long Chord, Curve Length)• Setting Out by Offsets from Long Chord• Numerical Examples
12th	1st	Rankine's Method of Deflection Angles • Principle of Rankine's Method• Calculation of Deflection Angles• Field Procedure for Curve Setting• Simple Numerical Problems
	2nd	Revision, Practical Demonstration and Assessment • Review of Tacheometric Surveying Concepts• Review of Curve Setting Methods• Practical Demonstration• Quiz and Discussion
	3rd	Electronic Distance Meter (EDM) • Introduction to EDM• Principle of Electronic Distance Measurement• Components of EDM and their Functions• Advantages, Limitations and Applications of EDM
13th	1st	Electronic Theodolites • Micro-optic Theodolite• Electronic Digital Theodolite• Features, Advantages and Applications• Comparison with Conventional Transit Theodolite• Demonstration of Instrument Operation
	2nd	Introduction to Total Station • Principle and Components of Total Station• Function Keys and Display Panel• Instrument Setup: Centering, Levelling and Orientation• Basic Operations
	3rd	Field Measurements Using Total Station • Measurement of Horizontal Angles• Measurement of Vertical Angles• Distance Measurement• Coordinate Measurement (X, Y, Z)• Recording and Downloading Survey Data

14th	1st	Applications of Total Station • Traversing with Total Station• Profile Survey• Contouring using Total Station• Advantages of Total Station over Conventional Surveying• Revision and Practical Assessment
	2nd	Introduction to Remote Sensing • Definition and Overview of Remote Sensing• Principles of Remote Sensing• Components of a Remote Sensing System (Energy Source, Sensor, Platform, Data Processing, Interpretation)• Types of Remote Sensing (Passive and Active)
	3rd	Applications of Remote Sensing • Land Use/Land Cover Mapping• Civil Engineering Applications• Urban Planning and Infrastructure Development• Watershed Management• Disaster Management (Flood, Earthquake, Landslide Monitoring)
15th	1st	Global Positioning System (GPS) and DGPS • Overview of GPS• Components of GPS (Space, Control and User Segments)• Working Principle of GPS• Differential GPS (DGPS)• Uses of GPS Instruments in Surveying
	2nd	Geographic Information System (GIS) • Overview of GIS• Components of GIS (Hardware, Software, Data, People and Methods)• GIS Data Types (Raster and Vector)• Applications of GIS• Introduction to GIS Software (e.g., QGIS, ArcGIS)
	3rd	Introduction to Drone Surveying • Overview of Drone (UAV) Surveying• Components of a Survey Drone• Advantages and Limitations• Applications in Topographic Survey, Construction Monitoring, Volume Estimation and Mapping• Revision and Unit Quiz

Susanta Pradhan

25/06/2026

Sheet stage-II
(Civil Engg.)


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