SYNERGY SCHOOL OF ENGINEERING, DHENKANAL
LESSON PLAN
SESSION 2026-2027
DEPARTMENT OF CIVIL ENGINEERING

Discipline: Civil Engineering	**Semester:** 5th/W 2026	**Name of the Faculty: Manmohan Murmu** **Email: manmohan19murmu@gmail.com**
Subject: Surveying	**No. of Days/week:** 03	**Start Date:** 01/7/26 **End Date:** 05/11/26

Week	Class Day	Theory Topics
1st	1st	Introduction to surveying and its overview. Survey- Purpose and Use.
	2nd	Types of surveying- Primary and Secondary, Classification: Plane, Geodetic, Cadastral, Hydrographic, Photogrammetry and Aerial. Principles of Surveying.
	3rd	Scales: Engineer's scale, Representative Fraction (RF) and diagonal scale.
2nd	1st	Introduction to chain surveying. Instruments used in chain survey: Metric Chain, Tapes, Arrow, Ranging rod, Line ranger, Off-set rod, Open cross staff, Optical square.
	2nd	Chain survey Station, Base line, Check line, Tie line, Offset, Tie station.
	3rd	Ranging: Direct and Indirect Ranging. Methods of Chaining, obstacles in chaining.
3rd	1st	Errors in length: Instrumental error, personal error, error due to natural cause, random error. Types of offsets: Perpendicular and Oblique
	2nd	Conventional Signs, Recording of measurements in a field book. Introduction to compass traverse survey.
	3rd	Compass Traversing- open, closed. Technical Terms: Geographic/ True Magnetic Meridians and Bearings, Whole Circle Bearing system and Reduced Bearing system and examples on conversion of given bearing to another bearing Fore Bearing and Back Bearing,
4th	1st	Calculation of internal and external angles from bearings at a station, Dip of Magnetic needle, Magnetic Declination. Types of Compass-prismatic and surveyor compass
	2nd	Components of Prismatic Compass and Surveyor compass and their Functions, Methods of using Prismatic Compass Temporary adjustments and observing bearings.
	3rd	Local attraction, Methods of correction of observed bearings - Correction at station and correction to included angles.
5th	1st	Methods of plotting a traverse and closing error, Graphical adjustment of closing error.
	2nd	Assignment check and doubt clear class.
	3rd	Introduction to Levelling and contouring. Basic terminologies: Level surfaces, Horizontal and vertical surfaces, Datum, Bench Marks- GTS, Permanent, Arbitrary and Temporary, Reduced Level, Rise, Fall, Line of collimation, Station, Back sight, Fore sight, Intermediate sight, Change point, Height of instruments
6th	1st	Types of levels: Dumpy, Tilting, Auto level, Digital level, Components of Dumpy Level and its fundamental axes, Temporary adjustments of Level.
	2nd	Types of leveling Staff: Self-reading staff and Target staff
	3rd	Reduction of level by Line of collimation and Rise and Fall Method.
7th	1st	Leveling Types: Simple, Differential, Fly, Profile and Reciprocal Leveling.
	2nd	Contour, contour intervals, horizontal equivalent. Uses of contour maps. Characteristics of contours, Methods of Contouring: Direct and indirect.

M. Murmu
11/06/26

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	3rd	Measurement of Area and Volume. Components and use of Digital planimeter
8th	1st	Measurement of area using digital planimeter.
	2nd	Measurement of volume of reservoir from contour map.
	3rd	Introduction to theodolite Surveying. Types and uses of Theodolite, Components of transit Theodolite and their functions, Reading the Vernier of transit Theodolite.
9th	1st	Technical terms- Swinging, Transiting, Face left, Face right. Fundamental axes of transit Theodolite and their relationship
	2nd	Temporary adjustment of transit Theodolite.
	3rd	Measurement of horizontal angle- Direct and Repetition method, Errors eliminated by method of repetition.
10th	1st	Measurement of magnetic bearing of a line, Prolonging and ranging a line, deflection angle.
	2nd	Measurement of vertical Angle. • Theodolite traversing by Included angle method and Deflection angle method
	3rd	Checks for open and closed traverse, Calculations of bearing from angles
11th	1st	Traverse computation-Latitude, Departure, Consecutive coordinates, Independent coordinates, balancing the traverse by Bowditch's rule and Transit rule, Gale's Traverse table computation. (Simple numerical problems and concept only
	2nd	Introduction to tacheometric surveying and curve setting. Principles of Tacheometry, Anallatic lens.
	3rd	Tacheometric formula for horizontal distance with telescope horizontal and staff vertical.
12th	1st	Field method for determining constants of tacheometer, Determining horizontal and vertical distances with tacheometer by fixed hair method and staff held vertical, Limitations of tacheometry
	2nd	Types of curves used in roads and railway alignments. Designation of curves.
	3rd	Setting simple circular curve by offsets from long chord and Rankine's method of deflection angles.
13th	1st	Doubt clear and problem discussion
	2nd	Introduction to Advanced surveying equipment. Principle of Electronic Distance Meter (EDM), its 5 10 component parts and their Functions, use of EDM
	3rd	Use of micro-optic Theodolite and Electronic Digital Theodolite.
14th	1st	Use of Total Station, Use of function keys.
	2nd	Measurements of Horizontal angles, vertical angles, distances and coordinates using Total Station, Traversing, Profile Survey and Contouring with Total Station.
	3rd	Remote Sensing – Overview, Remote sensing system, Applications of remote sensing in Civil engineering, land use / Land cover, mapping, disaster management.
15th	1st	Use of Global Positioning System (G.P.S.) instruments, and DGPS
	2nd	Geographic Information System (GIS): Over view, Components, Applications, Software for GIS.
	3rd	Introduction to Drone Surveying.

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