Discipline - Civil Engineering	4TH Semester		Name of the faculty - BIDHUBHUSAN SABAR
Subject: LAND SURVEYING -1	**Date**	**No of Days per week class alloted(5 nos)**	**Commencement date - FEB-14, 2023(SUMMER)**
Week (15)		CLASS DAYS	TOPIC TO BE COVERED
1ST			**1 INTRODUCTION TO SURVEYING, LINEAR MEASUREMENTS:**
	14.02.2023	1ST	1.1Surveying: Definition, Aims and objectives
	15.2.2023	2ND	1.2 Principles of survey-Plane surveying- Geodetic Surveying- Instrumental surveying.
	16.02.2023	3RD	1.3 Precision and accuracy of measurements, instruments used for measurement of distance, Types of tapes and chains.
	17.02.2023	4TH	1.4 Errors and mistakes in linear measurement – classification, Sources of errors and remedies.
2ND	21.02.2023	5TH&1st	1.5 Corrections to measured lengths due to-incorrect length, temperature variation, pull, sag, numerical problem applying corrections
2ND			**2 CHAINING AND CHAIN SURVEYING**
	22.02.2023	2ND	2.1 Equipment and accessories for chaining
	23.04.2023	3RD	2.2 Ranging – Purpose, signaling, direct and indirect ranging, Line ranger – features and use, error due to incorrect ranging.
	24.02.2023	4TH	2.3 Methods of chaining –Chaining on flat ground, Chaining on sloping ground – stepping method, Clinometer-features and use, slope correction.
	27.02.2023	5TH	2.4 Setting perpendicular with chain & tape, Chaining across different types of obstacles –Numerical problems on chaining across obstacles.
3RD	01.03.2023	1ST	2.5 Purpose of chain surveying, Its Principles, concept of field book.
3RD	02.03.2023	2ND	Selection of survey stations, base line, tie lines, Check lines.
	03.03.2023	3RD	2.7 Offsets – Necessity, Perpendicular and Oblique offsets, Instruments for setting offset – Cross Staff, Optical Square.
	09.03.2023	4TH	2.8 Errors in chain surveying – compensating and accumulative errors causes & remedies, Precautions to be taken during chain surveying.
			3 ANGULAR MEASUREMENT AND COMPAS SURVEYING :
	10.03.2023	5TH	3.1 Measurement of angles with chain, tape & compass
4TH	11.03.2023	1ST	3.2 Compass – Types, features, parts, merits & demerits, testing & adjustment of compass
	13.03.2023	2ND & 3RD	3.3 Designation of angles- concept of meridians – Magnetic, True, arbitrary; Concept of bearings – Whole circle bearing, Quadrantal bearing, Reduced bearing,
	14.03.2023	4TH	3.4suitability of application, numerical problems on conversion of bearings
	15.03.2023	5TH	3.5 Use of compasses – setting in field-centering, leveling, taking readings, .
5TH	16.03.2023	1ST & 2ND	3.6 concepts of Fore bearing, Back Bearing, Numerical problems on computation of interior & exterior angles from bearings
	17.03.2023	3RD & 4TH	3.7 Effects of earth's magnetism – dip of needle, magnetic declination, variation in declination, numerical problems on application of correction for declination.
	18.03.2023	5TH	3.8 Errors in angle measurement with compass – sources & remedies.
6TH	20.03.2023	1ST	3.9 Principles of traversing – open & closed traverse, Methods of traversing.
	21.03.2023	2ND & 3RD	3.10 Local attraction – causes, detection, errors, corrections, Numerical problems of application of correction due to local attraction.
	22.03.2023	4TH	3.11 Errors in compass surveying – sources & remedies.
	24.03.2023	5TH	3.12 Plotting of traverse – check of closing error in closed & open traverse, Bowditch's correction, Gales table
			4 MAP READING CADASTRAL MAPS & NOMENCLATURE:

7TH	27.03.2023	1ST	4.1 Study of direction, Scale, Grid Reference and Grid Square
			Study of Signs and Symbols
7TH	03.04.2023	2ND	4.2 Cadastral Map Preparation Methodology
	04.04.2023	3RD	4.3 Unique identification number of parcel
	05.04.2023	4TH	4.4 Positions of existing Control Points and its types
	06.04.2023	5TH	4.5 Adjacent Boundaries and Features, Topology Creation and verification.
8TH			**5 PLANE TABLE SURVEYING :**
	07.04.2023	1ST	5.1 Objectives, principles and use of plane table surveying.
	08.04.2023	2ND	5.2 Instruments & accessories used in plane table surveying.
	10.04.2023	3RD & 4TH	5.3 Methods of plane table surveying – (1) Radiation, (2) Intersection, (3) Traversing, (4) Resection.
	11.04.2023	5TH	5.4 Statements of TWO POINT and THREE POINT PROBLEM.
	13.04.2023		Errors in plane table surveying and their corrections, precautions in plane table surveying.
9TH			**6 THEODOLITE SURVEYING AND TRAVERSING:**
	14.04.2023	1ST	6.1 Purpose and definition of theodolite surveying
	15.04.2023	2ND	6.2 Transit theodolite- Description of features, component parts, Fundamental axes of a theodolite,
	17.04.2023	3RD	6.3 concept of vernier, reading a vernier, Temporary adjustment of theodolite
		4TH	6.4 Concept of transiting –Measurement of horizontal and vertical angles.
	18.04.2023	5TH	6.4 Measurement of magnetic bearings, deflection angle, direct angle
10TH	19.04.2023	1ST	6.5 setting out angles, prolonging a straight line with theodolite, Errors in Theodolite observations.
	20.04.2023	2ND	6.6 Methods of theodolite traversing with – inclined angle method, deflection angle method,
	21.04.2023	3RD	6.7 bearing method, Plotting the traverse by coordinate method, Checks for open and closed traverse.
	25.04.2023	4TH	6.8 Traverse computation – consecutive coordinates, latitude and departure,
10TH	26.04.2023	5TH	6.9 Gale's traverse table, Numerical problems on omitted measurement of lengths & bearings
11TH	27.04.2023	1ST	6.10 Closing error – adjustment of angular errors, adjustment of bearings, numerical problems
	28.04.2023	2ND	6.11 Balancing of traverse – Bowditch's method, transit method, graphical method, axis method, calculation of area of closed traverse
	29.04.2023		**7 LEVELLING AND CONTOURING :**
	01.05.2023	3RD	7.1 Definition and Purpose and types of leveling– concepts of level surface, Horizontal surface, vertical surface, datum, R. L., B.M.
	03.05.2023	4TH	7.2 Instruments used for leveling, concepts of line of collimation, axis of bubble tube, axis of telescope, Vertical axis.
	04.05.2023	5TH	7.3 Levelling staff – Temporary adjustments of level, taking reading with level,
12TH	05.05.2023	1ST	7.4 concept of bench mark, BS, IS, FS, CP, HI.
	06.05.2023	2ND & 3RD	7.4 Field data entry – level Book – height of collimation method and Rise & Fall method, comparison, Numerical problems on reduction of levels applying both methods, Arithmetic checks.
	08.05.2023	4TH & 5TH	7.5 Effects of curvature and refraction, numerical problems on application of correction.
13TH	09.05.2023	1ST & 2ND	7.6 Reciprocal leveling – principles, methods, numerical problems, precise leveling.
	10.05.2023	3RD & 4TH	7.7 Errors in leveling and precautions, Permanent and temporary adjustments of different types of levels.
	11.05.2023	5TH	7.8 Definitions, concepts and characteristics of contours.
14TH	12.05.2023	1ST & 2ND	7.9 Methods of contouring, plotting contour maps, Interpretation of contour maps, toposheets.

14TH	15.05.2023	3RD & 4TH	7.10 Use of contour maps on civil engineering projects – drawing cross-sections from contour maps, locating proposal routes of roads / railway / canal on a contour map, computation of volume of earthwork from contour map for simple structure.
	16.05.2023	5TH	7.11 Map Interpretation: Interpret Human and Economic Activities (i.e.: Settlement, Communication, Land use etc.), Interpret Physical landform (i.e.: Relief, Drainage Pattern etc.), Problem Solving and Decision Making
15TH			**8 COMPUTATION OF AREA & VOLUME:**
	17.05.2023	1ST	8.1 Determination of areas, computation of areas from plans.
	22.05.2023	2ND & 3RD	8.2 Calculation of area by using ordinate rule, trapezoidal rule, Simpson's rule
		4TH & 5TH	8.3 Calculation of volumes by prismoidal formula and trapezoidal formula, Prismoidal corrections, curvature correction for volumes.

Discipline - Civil Engineering	**4TH Semester**	**Name of the faculty - BIDHUBHUSAN SABAR**
Subject: LAND SURVEY PRACTICE -1	**No of Days per week PRACTICAL alloted(7nos)**	**Commencement date FEB-14, 2023(SUMMER)**
Week (15)	PRACTICAL DAYS	TOPIC TO BE COVERED
		1. Linear Measurements, Chaining and Chain Surveying:
1ST	1ST(3P)	1.1 Testing and adjusting of a metric chain.
		1.2 Measurement of distance between two points (more than 2 chain lengths apart) with chain including direct ranging.
		1.3 Setting out different types of triangles, given the lengths of sides with chain and tape.
		1.4 Measurement of distance between two points by chaining across a sloped ground using stepping method and a clinometer.
	2ND (4P)	1.5 Measurement of distance by chaining across a obstacles on the chain line i) a pond ii)a building iii) a stream/ river (in the event of non-availability of stream / river, a pond or lake may be taken, considering that chaining around the same is not possible.
		1.6 Setting perpendicular offsets to various objects (at least 3) from a chain line using-(1) tape, (2) cross-staff, (3) optical square and comparing the accuracy of the 3 methods
		1.7 Setting oblique offsets to objects (at least 3) from a chain using tape
		2 Angular Measurement and Compass Surveying:
2nd	1ST(3P)	2.1 Testing and adjustment of Prismatic compass and Surveyor’s compass.

2nd	1ST(3P)	2.2 Measurement of bearings of lines (at least 3 lines) and determination of included angles using Prismatic compass and Surveyor's compass.
	2ND (4P)	2.3 Setting out triangles (at least 2) with compass, given the length and bearing of one side and included angles.
3RD	1ST(3P)	2.4 Setting out a closed traverse of 5 sides, using prismatic compass, given bearing of one line and included angles and lengths of sides.
	2ND (4P)	2.5 Conducting chain and compass traverse surveying in a given plot of area (2plots) and recording data in the field book. (5 to 6 students/groups
		3 Map Reading Cadastral Maps & Nomenclature:
4TH	1ST(3P)	3.1 Study of direction, Scale, Grid Reference and Grid Square
		3.2 Study of Signs and Symbols
		3.3 Cadastral Map Preparation Methodology
	2ND (4P)	3.4 Unique identification number of parcel
		3.5 Positions of existing Control Points and its types
		3.6 Adjacent Boundaries and Features, Topology Creation and verification.
		4 Plane Table Surveying:
5TH	1ST(3P)	4.1 Setting up of Plane Table and Plotting five points by radiation method and five inaccessible points by intersection method.
	2ND (4P)	4.2 Conducting Plane Table surveying in a given plot of area by traversing (Atleast a 5-sided traverse and locating the objects)
6TH	1ST(3P)	4.3 Plane table surveying by Resection method (two point &three point problem method)
		5 Theodolite Traversing:
6TH	2ND (4P)	5.1 Measurement of horizontal angles (3nos.) by repetition and reiteration method and compare two methods

7TH	1ST(3P)	5.2 Prolonging a given straight line with the help of a theodolite
	2ND (4P)	5.3 Determination of magnetic bearing of 3 given straight lines
		Setting out a closed traverse with 6 sides and entering the field data
		5.4 Plotting the traverse from exercise 4.1 and checking the error of closure
8TH	1ST(3P)	5.5 Setting out an open traverse with 5 sides and entering the field data
		5.6 Plotting the traverse from exercise 4.3 and checking the error of closure
		6 Leveling and Contouring:
8TH	2ND (4P)	6.1 Making temporary adjustments of Levels
		6.2 Determining Reduced Levels of five given points taking staff readings with Levels.
9TH	1ST(3P)	6.3 Determining the difference of levels between two points (3 pairs of points / group) by taking staff readings form single set up of level, recording the readings in level book and application of Arithmetic check. (At least 3 change points must be covered)
	2ND (4P)	6.4 Conduct Fly Leveling (Compound) between two distant points with respect to R.L. of a given B.M. and reduction of levels by both height of collimation and rise & fall method and applying Arithmetic check. (At least 3 change points must be covered)
10TH	1ST(3P)	150m length, taking L. S. at every 15m and C. S. at 1m & 3m apart on both sides at every 30m interval and recording the data in level book and applying arithmetical check.
		6.6 Locating contour points in the given area by direct method / indirect method
		6.7 Conducting block level survey in the given area
	2ND (4P)	6.8 Plotting and drawing contour map of a given area by radial method

10th	2ND (4P)	6.9 Map Interpretation: Interpret Human and Economic Activities (i.e.: Settlement, Communication, Land use etc.), Interpret Physical landform (i.e.: Relief, Drainage Pattern etc.), Problem Solving and Decision Making
		7 Basics of Aerial Photography:
11TH	1ST(3P)	7.1 Film
	2ND (4P)	7.2. Focal Length
12TH	1ST(3P)	7.3. Scale
		7.4. Types of Aerial Photographs (Oblique, Straight
		8 Basics of Photogrammetry, DEM and Ortho Image generation:
12TH	2ND (4P)	Photogrammetry:
		8.1 Classification of Photogrammetry
		8.2 Aerial Photogrammetry
13TH	1ST(3P)	8.3 Terrestrial Photogrammetry
		Photogrammetry Process:
		8.4 Acquisition of Imagery using aerial and satellite platform
	2ND (4P)	8.5 Control Survey
		8.6 Geometric Distortion in Imagery
14TH	1ST(3P)	8.7 Application of Imagery and its support data
	2ND (4P)	8.8 Orientation and Triangulation
		8.9 Stereoscopic Measurement: X-parallax and Y-parallax
15TH	1ST(3P)	8.10 DTM/DEM Generation
	2ND (4P)	8.11 Ortho Image Generation

Discipline - Civil Engineering		6TH Semester	Name of the faculty - BIDHUBHUSAN SABAR
Subject: LAND SURVEYING -2	**Date**	**No of Days per week class alloted(5nos)**	**Commencement date - JAN-16, 2024(SUMMER)**
Week (15)		CLASS DAYS	TOPIC TO BE COVERED
1st			**1 TACHEOMETRY:**
			(Only concepts; applications without derivation)
	16.01.2024	1st	1.1 Principles
		2nd	,1.2 stadia constants determination
		3rd	1.3 Stadia tacheometry with staff held vertical
	19.01.2024	4th	1.4 Stadia tacheometry with line of collimation horizontal
		5th	1.5 Stadia tacheometry with line of collimation inclined,
2nd		1st & 2nd	1.6 numerical problems
	31.01.2024	3rd & 4th	1.3 Elevations and distances of staff stations – numerical problems
			2 CURVES :
		5th	2.1 compound, reverse and transition curve, Purpose & use of different types of curves in field
3rd	07.02.2024	1st	2.2 Elements of circular curves, numerical problems
		2nd	2.3 Preparation of curve table for setting out
		3rd & 4th	2.4 Setting out of circular curve by chain and tape and by instrument angular methods (i) offsets from long chord and numerical problems.
	08.02.2024	5th	2.5 (iii) offsets from tangents, (iv) offsets from chord produced and numerical problems
4th		1st	2.6 (v) Rankine's method of tangent angles (No derivation) and numerical problems.
4th		2nd	2.7 Obstacles in curve ranging – point of intersection inaccessible
4th			**3. BASICS ON SCALE AND BASICS OF MAP:**
	09.02.2024	3rd	3.1 Fractional or Ratio Scale, Linear Scale, Graphical Scale
		4th	3.2 What is Map, Map Scale and Map Projections
		5th	3.3 How Maps Convey Location and Extent
5th	12.02.2024	1st	3.4 How Maps Convey characteristics of features
		2nd	3.5 How Maps Convey Spatial Relationship
	15.02.2024		3.5.1 Classification of Maps
			3.5.1 Physical Map
		3rd	3.5.2 Topographic Map
			3.5.3 Road Map
		4th	3.5.4 Political Map
			3.5.5 Economic & Resources Map

5th		5th	3.5.6 Thematic Map
			3.5.7 Climate Map
			4. SURVEY OF INDIA MAP SERIES:
6th	16.02.2024	1st	4.1 Open Series map
		2nd	4.2 Defense Series Map
		3rd	**4.3 Map Nomenclature**
		4th	4.3.1 Quadrangle Name
		5th	4.3.2 Latitude, Longitude,
7th	21.02.2024	1st	4.3.3 UTM's
		2nd	4.3.4 Contour Lines
			4.3.5 Magnetic Declination
	22.02.2024	3rd	4.3.6 Public Land Survey System
			4.3.7 Field Notes
			5. BASICS OF AERIAL PHOTOGRAPHY, PHOTOGRAMMETRY, DEM AND ORTHO IMAGE GENERATION:
7th	23.02.2024	4th	5.1 Aerial Photography:
		5th	5.1.1 Film, Focal Length, Scale
8th		1st	5.1.2 Types of Aerial Photographs (Oblique, Straight)
	28.02.2024	2nd	5.2 Photogrammetry:
			5.2.1 Classification of Photogrammetry
			5.2.2 Aerial Photogrammetry
		3rd	5.2.3 Terrestrial Photogrammetry
	29.02.2024	4th	5.3 Photogrammetry Process:
		5th	5.3.1 Acquisition of Imagery using aerial and satellite platform
9th		1st	5.3.2 Control Survey
		2nd	5.3.3 Geometric Distortion in Imagery
	04.03.2024		Application of Imagery and its support data
			Orientation and Triangulation
		3rd	Stereoscopic Measurement
			19.9.1 X-parallax
	06.03.2024	4th	19.2.2 Y-parallax
		5th	5.4 DTM/DEM Generation
			5.5 Ortho Image Generation
			6. MODERN SURVEYING METHODS :
10th	07.03.2024	1s & 2nd	6.1 Principles, features and use of (i) Micro-optic theodolite
		3rd	6.2 Principles, features and use of (2) digital theodolite
		4th & 5th	6.3 Working principles of a Total Station (Set up and use of total station to measure angles
11th	11.03.2024	1st & 2nd	6.2 Working principles of a Total Station (Set up and use of total station to distances of points under survey from total station and the co-ordinates (X,Y & Z or northing, easting, and elevation) of surveyed points relative to Total Station position using trigonometry.
		3rd ,4th & 5th	6.2 Working principles of a Total Station (Set up and use of total station to distances of points under survey from total station and the co-ordinates (X,Y & Z or northing, easting, and elevation) of surveyed points relative to Total Station position using trianguation.
			7.0 BASICS ON GPS & DGPS AND ETS:
	13.03.2024	1st	7.1 GPS: - Global Positioning
	13.03.2024		7.1.1 Working Principle of GPS,GPS Signals,

12th	13.03.2024	2nd	7.1.2 Errors of GPS,Positioning Methods
	13.03.2024		7.2 DGPS: - Differential Global Positioning System
	14.03.2024	3rd	7.2.1 Base Station Setup
			7.2.2 Rover GPS Set up
		4th	7.2.3 Download, Post-Process and Export GPS data
			7.2.4 Sequence to download GPS data from flashcards
	15.03.2024	5th	7.2.5 Sequence to Post-Process GPS data
			7.2.6 Sequence to export post process GPS data
			7.2.7 Sequence to export GPS Time tags to file
			7.3 ETS: - Electronic Total Station
13th	10.04.2024	1st	7.3.1 Distance Measurement
		2nd	7.3.2 Angle Measurement
		3rd	7.3.3 Leveling
		4th	7.3.4 Determining position
		5th	7.3.5 Reference networks
			7.3.6 Errors and Accuracy
			8.0 BASICS OF GIS AND MAP PREPARATION USING GIS
14th	12.04.2024	1st	8.1 Components of GIS, Integration of Spatial and Attribute Information
		2nd	8.2 Three Views of Information System
		3rd	8.2.1 Database or Table View, Map View and Model View
		4th	8.3 Spatial Data Model
			8.4 Attribute Data Management and Metadata Concept
		5th	8.5 Prepare data and adding to Arc Map.
			8.6 Organizing data as layers.
15th		1st	8.7 Editing the layers.
		2nd	8.8 Switching to Layout View.
		3rd	8.9 Change page orientation.
		4th	8.10 Removing Borders.
		5th	8.11 Adding and editing map information.
			8.12 Finalize the map

Discipline - Civil Engineering	**6TH Semester**	**Name of the faculty - BIDHUBHUSAN SABAR**
Subject: LAND SURVEYING PRACTICE-2	**No of Days per week class alloted(5nos)**	**Commencement date - JAN-16, 2024(SUMMER)**
Week (15)	CLASS DAYS	TOPIC TO BE COVERED
		1.0 TRIGONOMETRICAL SURVEYING & TACHEOMETRY:
1ST	1ST & 2ND	1.1 Determination of height of 3 objects whose bases are accessible
	3RD	1.2 Determination of stadia constants
	4TH & 5TH	1.3 Determination of horizontal distance an elevation with Staff vertical , by stadia method
		2.0 SETTING OUT CURVES AND SITE SURVEYING:
2ND	1ST & 2ND	2.1 Setting out a simple circular curve by offsets from long chord
	3RD & 4TH	2.2 Setting out a simple circular curve by offsets from the tangent
	5TH	2.3 Setting out a simple circular curve by offsets from chords produces
3RD	1ST & 2ND	2.4 Setting out a simple circular curve by Rankine's method of tangent angle (Deflection angles)
		Setting out a site the center line and foundation width of a building from the given plan
	3RD, 4TH & 5TH	2.5 Setting out the foundation line for a culvert
		2.6 Dividing an area into plots of given size
		3. STUDY OF MAP AND MAP SERIES:
4TH	1ST	3.1 Physical Map
	2ND & 3RD	3.2 Topographic Map

4TH	4TH & 5TH	3.3 Road Map
	1ST	3.4 Political Map
	2ND	3.5 Economic & Resources Map
	3RD	3.6 Thematic Map
5TH	4TH	3.7 Climate Map
5TH	5TH	3.8 Open Series map and Defense Series Map
		4.0 STUDY ON GPS & DGPS AND ETS:
	1ST & 2ND	4.1 GPS: - Global Positioning, GPS Signals, Errors of GPS,Positioning Methods
	3RD & 4TH	4.2 DGPS: - Differential Global Positioning System
6TH	5TH	4.2.1 Base Station Setup
	1ST & 2ND	4.2.2 Rover GPS Set up
	3RD & 4TH	4.2.3 Download, Post-Process and Export GPS data
7TH	5TH	4.2.4 Sequence to download GPS data from flashcards
	1ST & 2ND	4.2.5 Sequence to Post-Process GPS data
	3RD & 4TH	4.2.6 Sequence to export post process GPS data
8TH	5TH	4.2.7 Sequence to export GPS Time tags to file
		4.3 ETS: - Electronic Total Station
	1ST & 2ND	4.3.1 Distance Measurement
	3RD & 4TH	4.3.2 Angle Measurement
9TH	5TH	4.3.3 Leveling
	1ST & 2ND	4.3.4 Determining position
	3RD & 4TH	4.3.5 Reference networks
10TH	5TH	4.3.6 Errors and Accuracy
		5.0 STUDY OF GIS AND MAP PREPARATION USING GIS
	1ST & 2ND	5.1 Components of GIS, Integration of Spatial and Attribute Information
11TH	3RD & 4TH	5.2 Three Views of Information System

11TH	5TH	5.2.1 Database or Table View, Map View and Model View
12TH	1ST & 2ND	5.3 Spatial Data Model
	3RD & 4TH	5.4 Attribute Data Management and Metadata Concept
	5TH	5.5 Prepare data and adding to Arc Map.
13TH	1ST & 2ND	5.6 Organizing data as layers.
	3RD & 4TH	5.7 Editing the layers.
	5TH	5.8 Switching to Layout View.
14TH	1ST & 2ND	5.9 Change page orientation.
	3RD & 4TH	5.10 Removing Borders.
	5TH	5.11 Adding and editing map information.
		5.12 Finalize the map