

SURVEYING LAB

Course Title:	Surveying Lab	Course Code :	CE-108
Semester:	I Semester	Course Group :	Practical
Teaching Scheme in Periods (L:T:P):	1:0:2	Credits :	2
Methodology :	Lecture + Practical	Total Contact Periods :	90 Periods
CIE :	60 Marks	SEE :	40 Marks

Prerequisites

This course requires the basic knowledge of Trigonometry and Maths.

Course Outcomes

Upon completion of the course, the student shall be able to

CO1	Perform ranging and linear distance measurements on level and sloping ground using chains and tapes by following standard field procedures.
CO2	Conduct chain surveying of a small area, record field observations, and prepare scaled plans with calculation of area.
CO3	Measure bearings using prismatic compass, convert bearings between WCB and QB systems, and execute closed compass traverses with correction for local attraction.
CO4	Carry out levelling operations and compute reduced levels using Height of Instrument and Rise & Fall methods, including profile and cross-section levelling.
CO5	Prepare contour maps and compute areas and earthwork volumes using standard numerical methods required for construction and earthwork projects.
CO6	Operate modern surveying instruments such as theodolite, tacheometer, and Total Station to measure angles, distances, elevations, and coordinates for engineering applications.

Course Contents

Unit No	Unit Name	Hours/Periods
1	LINEAR MEASUREMENT AND CHAIN SURVEYING	30
2	COMPASS SURVEYING & LEVELLING	30
3	CONTOURING, AREA-VOLUME & MODERN SURVEYING	30
Total		90

UNIT-I: LINEAR MEASUREMENT AND CHAIN SURVEYING

Duration: 30 Periods (L:00-P:30)

1. Ranging of Straight Line on Level Ground
2. Ranging of Straight Line Across Obstacles (Indirect Ranging)
3. Measurement of Distance Using Chain on Level Ground
4. Measurement of Distance Using Tape on Sloping Ground
5. Chain Survey of a Small Plot / Open Area (Main Lines, Offsets, Tie Lines)

UNIT-II: COMPASS SURVEYING & LEVELLING

Duration:(30 Periods (L:0-P:30))

1. Plotting Chain Survey Data and Calculation of Area
7. Measurement of Bearings Using Prismatic Compass
8. Conversion of Bearings Between WCB and Quadrantal Bearing
9. Closed Compass Traverse and Plotting
10. Detection and Correction of Local Attraction in Compass Traversing
11. Simple Levelling Using Height of Instrument Method
12. Differential Levelling Using Rise and Fall Method
13. Profile Levelling and Cross-Sectioning of a Given Area

UNIT-III: CONTOURING, AREA-VOLUME & MODERN SURVEYING

Duration:(30 Periods (L:0-P:30))

14. Preparation of Contour Map Using Grid Method
15. Preparation of Contour Map Using Radial Line Method
16. Area Computation of Plot Using Mid-ordinate Rule
17. Area Computation Using Trapezoidal and Simpson's Rule
18. Earthwork / Volume Computation Using Trapezoidal and Prismoidal Rule
19. Measurement of Horizontal and Vertical Angles Using Theodolite
20. Tacheometric Survey and Determination of Distance and Difference in Elevation

21. Total Station Survey: Setting up, Measurement of Distances, Angles, and Coordinate Determination

Suggested Student Activities

1. Measuring the precise length of line on plane and sloped grounds
2. Perform Direct and indirect ranging to plot an intermediate point
3. Conduct Chain Triangulation survey around the main building of the institute
4. Compute the area of the given ground by compass survey/Theodolite survey and plot it
5. Conduct a survey camp to familiarize with practical procedures of Chain and compass survey
6. Conduct a open and closed traverse survey and adjusting errors in traverse.
7. Road survey (at least for 150m) by total station.
8. Conduct a traverse survey of a given plot and find out the area.
9. Prepare the contour maps of the given area in your locality.

REFERENCE BOOKS

1. Surveying I&II by B.C.Punmia
2. Surveying by S.K. Husain
3. Surveying and levelling I& II by T.P.Kanetkar
4. Surveying by S.K.Dugal
5. Surveying by R.Agor(Khanna Publisher)
6. Surveying (McGrawhill) by N.N.Basak
7. Higher Surveying by A.M.Chandra(NewAgeInt)

KEY Competencies to be achieved by the student

Exp. No.	Title of Experiment	Key Competencies Achieved by Students
1	Ranging of straight line on level ground	Ability to align survey stations accurately using direct ranging techniques and basic field procedures.
2	Ranging of straight line across obstacles (Indirect ranging)	Skill in establishing straight survey lines when direct vision is obstructed using indirect ranging methods.
3	Measurement of distance using chain on level ground	Competence in accurate horizontal distance measurement using chain, including proper alignment and booking.

Exp. No.	Title of Experiment	Key Competencies Achieved by Students
4	Measurement of distance using tape on sloping ground	Ability to measure distances on sloping terrain and understand slope corrections in field practice.
5	Chain survey of a small plot / open area	Skill in planning and executing chain survey using main lines, tie lines, and offsets with proper field notes.
6	Plotting chain survey data and calculation of area	Ability to plot survey data to scale and compute area accurately from field observations.
7	Measurement of bearings using prismatic compass	Competence in measuring and recording bearings using a prismatic compass following standard procedures.
8	Conversion of bearings between WCB and quadrantal bearing	Skill in converting bearings between WCB and QB systems for traverse computations.
9	Closed compass traverse and plotting	Ability to conduct closed traverse survey and plot traverse with accuracy.
10	Detection and correction of local attraction	Competence in identifying local attraction and applying corrections to bearing observations.
11	Simple levelling using Height of Instrument method	Ability to perform levelling and compute reduced levels using HI method.
12	Differential levelling using Rise and Fall method	Skill in computing reduced levels using Rise and Fall method and checking arithmetic accuracy.
13	Profile levelling and cross-sectioning	Competence in obtaining longitudinal and cross sections for roads, canals, and site layouts.
14	Preparation of contour map using grid method	Ability to collect spot levels and prepare contour maps using grid method.
15	Preparation of contour map using radial line method	Skill in contour mapping using radial line method and interpretation of terrain.
16	Area computation using mid-ordinate rule	Ability to calculate area of plots using mid-ordinate rule.
17	Area computation using trapezoidal and Simpson's rule	Competence in applying standard numerical methods for accurate area computation.
18	Earthwork / volume computation using trapezoidal and prismoidal rule	Skill in estimating earthwork volumes required for excavation and embankment works.

Exp. No.	Title of Experiment	Key Competencies Achieved by Students
19	Measurement of horizontal and vertical angles using theodolite	Ability to measure horizontal and vertical angles accurately using theodolite.
20	Tacheometric survey	Competence in determining distances and elevations indirectly using tacheometric observations.
21	Total Station survey	Skill in setting up Total Station and determining distances, angles, and coordinates for engineering surveys.

SUGGESTED LEARNING OUTCOMES

After completing the Surveying Laboratory, the student will be able to:

1. Use basic surveying instruments for ranging and linear measurement.
2. Measure distances accurately on level and sloping ground using chain and tape.
3. Conduct chain survey of a small area and prepare scaled plans with area calculation.
4. Measure and convert bearings and execute compass traverses with correction of local attraction.
5. Carry out levelling operations and compute reduced levels using standard methods.
6. Prepare profiles and cross-sections for engineering works.
7. Develop and interpret contour maps using direct and indirect methods.
8. Compute areas and earthwork volumes using standard numerical methods.
9. Measure angles and distances using theodolite and tacheometric methods.
10. Operate Total Station for basic field data collection and coordinate determination.

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, and Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	2	2	3	3	1	2	1	1,2,3,4,6,7
CO2	3	2	3	3	2	2	1	1,2,3,4,6,7
CO3	2	3	3	3	2	2	1	1,2,3,4,6,7
CO4	3	3	3	3	2	2	1	1,2,3,4,6,7
CO5	3	3	2	3	1	2	1	1,2,3,4,6,7
CO6	2	2	3	2	2	1	3	1,2,4,5,6,7

State Board of Technical Education and Training, Telangana
Mid I Model Question paper
DCE I-YEAR

Course Code: CE-108

Duration:1 hour

Course Name: Surveying Lab

Max.Marks:20 Marks

Instructions to the Candidate:

(i) Answer any One of the following Questions.

(ii) Plot the details of field work for illustration and conclude your observation of the experiment

1. Perform direct ranging between two given points on level ground and record the procedure.
2. Carry out indirect ranging across an obstacle where the end stations are not intervisible.
3. Measure the distance between two given points using chain on level ground and enter the observations in the field book.
4. Measure the distance on sloping ground using tape and determine the horizontal distance.
5. Conduct a chain survey of the given small plot, showing main lines, tie lines, and offsets. Record field notes.
6. Plot the given chain survey data to a suitable scale and calculate the area of the plot.

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MID –II Model Question Paper

DCE I-YEAR

Course Code: CE-108

Duration:1hour

Course Name: Surveying Lab

Max.Marks:20Marks

Instructions to the Candidate:

Pick and Answer any One of the following Questions from given list.

1. Measure the bearings of the given survey lines using a prismatic compass and enter the observations in the field book.
2. Convert the given bearings from Whole Circle Bearing (WCB) to Quadrantal Bearing (QB) and vice-versa.
3. Conduct a closed compass traverse for the given area and plot the traverse to a suitable scale.
4. Detect and correct local attraction in the given compass traverse observations.
5. Perform simple levelling using the Height of Instrument method and determine the reduced levels of the given points.
6. Carry out differential levelling using the Rise and Fall method and prepare the level book.

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End Examination

Model Question Paper

DCE I- YEAR

Course Code: CE-108P

Duration: 2 hours

Course Name: Surveying Lab

Max. Marks: 40 Marks

Instructions to the Candidate: Pick and Answer any One of the following Questions from the given list.

1. Perform direct ranging between two given points on level ground and explain the procedure.
2. Measure the distance between two given points using chain or tape (level or sloping ground) and record the observations in the field book.
3. Conduct a chain survey of the given small plot, showing main lines, tie lines, and offsets. Enter the field notes.
4. Measure the bearings of the given survey lines using a prismatic compass and record the observations.
5. Conduct a closed compass traverse, detect local attraction if any, apply corrections, and plot the traverse.
6. Carry out simple levelling using Height of Instrument method and determine the reduced levels of the given points.
7. Perform differential levelling using Rise and Fall method and prepare the level book.
8. Prepare a contour map for the given area using grid or radial line method and draw contours to a suitable interval.
9. Compute the area or earthwork volume of the given plot using appropriate numerical methods.
10. Set up the theodolite or Total Station and measure horizontal/vertical angles or coordinates as instructed.