Surveying I
EG 2101CE

Year: II
Semester: I

Total: 7 Hrs./week
Lecture: 3 Hrs./week
Tutorial: Hrs./week
Practical: 4 Hrs./week
Lab: Hrs./week

Course Description

This course focuses on familiarization on different surveying techniques and handling of surveying equipment. The different surveying techniques include linear, angular, vertical measurements, and plotting skills.

Course Objective

After the completion of this course, students will be able to:

1. Apply distance measurement techniques.
2. Use basic surveying techniques and plotting of plan and map.

Course Content

Theory

Unit 1: Introduction to surveying [4 Hrs.]

- 1.1 Definition and Purpose of surveying
- 1.2 Classification of surveying
- 1.3 Principles of surveying
- 1.4 Units of measurements
- 1.5 Definition of Scale, Types of Scale – Plain, Diagonal and Vernier Scale, Scale of chord, Scale conversion
- 1.6 Maps and Conventional symbols

Unit 2: Errors, Accuracy, and Correction [2 Hrs.]

- 2.1 Sources of errors, Types of error – Mistake, Systematic error, and Random error
- 2.2 Accuracy and Precision in surveying, Permissible Error, and Correction

Unit 3: Linear Distance Measurement [8 Hrs.]

- 3.1 Linear distance measurement with Chain, Tape, and Pedometer
- 3.2 Ranging survey lines, Direct ranging, and Indirect or Reciprocal ranging
- 3.3 Linear distance measurement on smooth level ground
- 3.4 Introduction to Abney hand level, and simple calculation
- 3.5 Linear distance measurement on sloping ground – Direct method, and Indirect method
- 3.6 Errors in chaining
- 3.7 Tape correction for – Standard Length/Slope/Tension (Pull)/Temperature/and Sag

Unit 4: Chain Surveying [6 Hrs.]

- 4.1 Principles of chain surveying
- 4.2 Meaning of the Terms – Survey line/Base line/Check line/Tie line/Offset/Station
- 4.3 Reconnaissance, Selection and Fixing of Survey stations
- 4.4 Referencing and Marking of stations
- 4.5 Perpendicular offset and Oblique offset
- 4.6 Obstacles in chaining, Computation of width of river

4.7 Field work in chain surveying, Field Book and Booking the data
4.8 Plotting a chain survey

Unit 5: Compass Surveying [12 Hrs.]

5.1 Compass – Prismatic compass, and Surveyor's compass, Temporary adjustment of compass
5.2 Meridian – True meridian/Magnetic meridian/Arbitrary meridian
5.3 Bearing – True bearing/Magnetic bearing/Arbitrary bearing
5.4 Magnetic declination, Variation of Magnetic declination
5.5 Local attraction, Detection and elimination of local attraction
5.6 Whole circle bearing system (WCB), Reduced or Quadrantal bearing system (RB/QB), Conversion of WCB to QB, and Conversion of QB to WCB,
5.7 Fore bearing, Back bearing, Relationship between Fore bearing and Back bearing
5.8 Calculation of angles from bearings, and Calculation of bearings from angle
5.9 Definition of traverse, Types of traverse – Closed traverse, and Open traverse, Compass traverse, Angular error in compass traverse, Angular correction in compass traverse, and Bearing correction in compass traverse
5.10 Graphical adjustment of traverse
5.11 Field problems and procedures

Unit 6: Leveling [13 Hrs.]

6.1 Principles of leveling – Simple leveling, and Differential leveling
6.2 Instruments used in leveling – Level, and Leveling staff
6.3 Definition of the terms – Levelling/Datum/Benchmark/Reduced level/ Line of collimation/Line of Sight/Back sight/Intermediate sight/Fore sight/Change point
6.4 Types of Level – Tilting level/Dumping level/Automatic level
6.5 Curvature and Refraction
6.6 Temporary adjustment of level
6.7 Classification of leveling - Simple leveling/Differential leveling/Fly leveling/ Reciprocal leveling/Profile leveling/Cross-sectioning/Check leveling/Precise leveling
6.8 Two peg tests
6.9 Balancing Back sight distance and Fore sight distance
6.10 Field Procedure in levelling, Use of inverted staff
6.11 Booking and reducing levels – Height of instrument method/Rise and Fall method
6.12 Error in leveling, Permissible Error in leveling, Error adjustment in closed circuit
6.13 Plotting of Profile leveling and Cross-sectioning

Practical (Field work)

1 Perform Pacing/Measure linear distance on plane and sloping ground. [8 Hrs.]
2 Perform Chain triangulation and detailing [16 Hrs.]
3 Perform Compass traversing and detailing [16 Hrs.]
4 Perform Leveling – Simple leveling, Differential leveling, Two peg test, Fly leveling,
5 Profile leveling and cross sectioning [20 Hrs.]

Evaluation of Practical

Continuous evaluation (Viva + Instrumentation + Objective test)

Text Books

1. R. Agor," Surveying and Leveling", Khanna Publication New Delhi.
2. Dhakal B.B. and Karki B.K.," Engineering Surveying I &II", Heritage Publishers and Distributers Pvt. Ltd., Kathmandu, Nepal.

Reference Books

3. N Basnet and M Basnet, "Basic Surveying – I & II", Benchmark Education Support Pvt. Ltd., Tinkune Kathmandu and Rajmati Press, Lalitpur.
4. S K Duggal, "Surveying" Vol I and II, Tata MC Graw Hill Publishing.
5. Dr. B. C Punmia, " Surveying " Vol I and II, Laxmi Publication New Delhi

Evaluation Scheme

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as indicated in the table below:

Chapter	Title	Hrs.	Marks distribution*
1	Introduction	04	04
2	Errors, Accuracy, and Correction	02	04
3	Linear Distance Measurement	08	16
4	Chain Surveying	06	08
5	Compass Surveying	12	24
6	Levelling	13	24
Total		**45**	**80**

* There may be minor deviation in marks distribution.