

Surveying II **EG 2201 CE**

Year: II
Semester: II

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 of different surveying techniques and equipment. The different surveying techniques include area, volume, coordinate system, and graphical and analytical method of mapping.

Course Objective

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

1. Apply different surveying techniques of civil engineering field;
2. Use modern survey instrument for surveying, constructions and map making procedures.

Course Content

Theory

Unit 1: Contouring

[8 Hrs.]

- 1.1 Definition of the terms – Contour line, Contour interval, Horizontal equivalent, Index contour
- 1.2 Characteristics of contour
- 1.3 Criteria for selection of contour interval
- 1.4 Methods of contouring – Direct method, Indirect method (Square method/ Radial method/Tachometric method/Cross section method)
- 1.5 Interpolation of contours (Arithmetic calculation, Graphical method, Estimation method)
- 1.6 Uses of contour maps, Interpretation of typical contours sheets
- 1.7 Field procedures

Unit 2: Plane Table Surveying [6 Hrs.]

- 2.1 Principles of plane table surveying
- 2.2 Accessories required in plane table surveying
- 2.3 Working operations of plane table surveying
- 2.4 Orientation – Orientation by magnetic compass, Orientation by back-sighting
- 2.5 Methods of plane table surveying – Radiation method, Intersection method (at least two points)
- 2.6 Introduction of Resection method
- 2.7 Advantages and Disadvantages of plane table surveying

Unit 3: Theodolite

[11 Hrs.]

- 3.1 Introduction of theodolite
- 3.2 Geometry of theodolite, fundamental lines and planes of theodolites
- 3.3 Uses of theodolite
- 3.4 Classification of theodolite – Transit theodolite, and Non-transit theodolite

- 3.5 Essentials of theodolite – Telescope, Micrometer screw, Horizontal circle, Vertical circle, Optical plummet, Levelling screws, Bubble tube, Level tube, Upper clamp and Upper tangent screw, Lower clamp and Lower tangent screw
- 3.6 Working principle of theodolite
- 3.7 Terminology –Transiting, Swinging the telescope, Changing Face
- 3.8 Temporary adjustment of theodolite – Setting up of theodolite, Centering, Levelling
- 3.9 Reading a theodolite - Zero setting, Elimination of parallax, Face left observation, Face right observation
- 3.10 Measurement of Horizontal angle – Reiteration method, and Mean direction method
- 3.11 Measurement of Vertical angle and Zenithal angle
- 3.12 Sources of errors in theodolite survey

Unit 4: Theodolite Traversing

[10 Hrs.]

- 4.1 Definition of Traversing, Purpose of Traversing
- 4.2 Types of Traverse – Closed traverse/Open traverse
- 4.3 Traverse field works
- 4.4 Omitted measurements in traverse field works
- 4.5 Traverse adjustment – computation of angles, angular error, correction of angle, Computation of bearings, Computation of consecutive coordinates, Error in consecutive coordinates (Latitude and Departure), Correction of consecutive coordinates (using Bowditch rule/Transit Rule), and Computation of Independent coordinates, Computation of Adjusted Length and Adjusted Bearing.
- 4.6 Traverse plotting

Unit 5: Area and Volume Measurement

[10 Hrs.]

- 5.1 Area measurement of geometric figures - Triangle, Parallelogram, Trapezium
- 5.2 Measurement of area from offsets – Mid-ordinate rule, Average ordinate rule, Trapezoidal rule, Simpson's one third rule
- 5.3 Measurement of area from coordinates
- 5.4 Measurement of area from cross section
- 5.5 Measurement of volume from cross section and Longitudinal section (Level section, Two Level section)
- 5.6 Measurement of volume by Trapezoidal formula, and Prismoidal formula

Practical (Field works)

- 1. Perform Contouring on a sloped ground by indirect method (Grid method) [12 Hrs.]
- 2. Perform Plane tabling and detailing [08 Hrs.]
- 3. Carryout Theodolite handling practices [12 Hrs.]
- 4. Perform Theodolite traversing, computation, plotting of traverse in grid sheet [20 Hrs.]
- 5. Perform measurement of area of a plot [08 Hrs.]

Evaluation of Practical: Continuous evaluation (Viva + Instrumentation + Objective test)

Textbooks:

- 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 Distributors Pvt. Ltd., Kathmandu, Nepal.

References:

1. N Basnet and M Basnet, "Basic Surveying – I & II", Benchmark Education Support Pvt. Ltd., Tinkune Kathmandu and Rajmati Press, Lalitpur.
2. S K Duggal, "Surveying" Vol I and II, Tata MC Graw Hill Publishing.
3. 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.	Mark distribution*
1	Contouring	08	12
2	Plane Table	06	08
3	Theodolite	11	20
4	Theodolite Traversing	10	20
5	Area and Volume Measurement	10	20
	Total	45	80

* There may be minor deviation in marks distribution.