Surveying III
EG 3101 CE

Year: III **Total: 7 Hrs. /week**
Semester: I **Lecture: 3 Hrs./week**
Tutorial: Hr./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 computation, and setting out of curves, optical and electronic distance measurement.

Course Objectives
After completion of this course students will able to:
1. Apply different techniques of civil engineering survey;
2. Perform traverse survey, detailing, heightening, curves design, and layout techniques and
3. Carryout building layout techniques.

Course Content

Theory

Unit 1: Trigonometric Leveling [6 Hrs.]

1.1 Observation for heights and distances – Base of the object accessible
1.2 Observation for heights and distances – Base of the object inaccessible: instrument stations and elevated object are in the same vertical plane, instrument axes at different level
1.3 Observation for heights and distances – Base of the object inaccessible: Instrument stations and elevated object are in the same vertical plane, Instrument axes at very different level
1.4 Observation for heights and distances – Base of the object inaccessible: instrument stations and elevated object are not in the same vertical plane

Unit 2: Tachometry Surveying [8 Hrs.]

2.1 Introduction to tachometry
2.2 Instrument used in tachometry
2.3 System of tachometric measurements – Stadia system, Tangential System, and Subtense Bar System
2.4 Stadia method - Principle of Stadia method, Distance and elevation formula For horizontal line of sight and inclined line of sight with staff vertical
2.5 Determination of instrumental constants K and C
2.6 Tangential method - Distance and elevation formula for different cases: Both angles are angles of elevation, both angles are angles of depression, One angle of elevation and other angle of depression
2.7 Stadia field procedures
2.8 Errors in stadia tachometry

Unit 3: Horizontal Curve **[8 Hrs.]**

3.1 Classification of horizontal curves – Simple circular curve, Compound curve, Reverse curve, Transition curve, Combined curve
3.2 Designation of curves – Arc definition, and Chord definition
3.3 Elements of simple circular curve – Tangent length, Length of the curve, Length of long chord, Apex distance, Mid-ordinate
3.4 Setting out of simple circular curve by linear method – offsets from the long chord, perpendicular offset from tangent, Radial offset from tangent
3.5 Setting out of simple circular curve by angular method - Rankine's method of deflection angle, Two theodolite method

Unit 4: Vertical Curve **[7 Hrs.]**

4.1 Introduction to vertical curve, Gradient, Rate of change of grade, Length of vertical curves
4.2 Types of vertical curves – Summit curve, and Valley or Sag curve
4.3 Total change of grade
4.4 Computation and setting out of vertical curves - Tangent correction method, and Parabolic equation method

Unit 5: Transition Curve **[4 Hrs.]**

5.1 Introduction to transition curve
5.2 Use of transition curve
5.3 Notation and Elements of combined curve (circular and transition curve)

Unit 6: Total Station Surveying **[6 Hrs.]**

6.1 Introduction of Total station
6.2 Features of Total station
6.3 Electronic data recording
6.4 Field surveying procedure of Total station

Unit 7: Geographic Information System (GIS) **[2 Hrs.]**

7.1 Introduction of GIS
7.2 Application of GIS in civil engineering projects

Unit 8: Global Positioning System (GPS) **[2 Hrs.]**

8.1 Introduction to GPS
8.2 Components of GPS
8.3 Working principle and uses of GPS

Unit 9: Construction Surveying **[2 Hrs.]**

9.1 Four room Building layout – Linear method (3,4, 5 method) and Angular method
9.2 Setting out of a sewer line at plain and sloping ground

Practical (Field Works)

1. Perform the trigonometric leveling for determination of height and distance (base of the object accessible and inaccessible cases) [8 Hrs.]
2. Perform the tachometric surveying (Topographic map) by stadia method, and tangential method [12 Hrs.]
3. Set out simple circular curve by linear and angular method [16 Hrs.]
4. Set out simple building by linear and angular method [8 Hrs.]
5. Set out of a sewer line at plain and sloping ground [8 Hrs.]
6. Demonstrate Total Station and GPS [8 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 Distributers 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	Trigonometric Leveling	06	08
2	Tachometry Surveying	08	16
3	Horizontal Curve	08	16
4	Vertical Curve	07	12
5	Transition Curve	04	08
6	Total Station	06	08
7	Geographic Information System (GIS)	02	04
8	Global Positioning System (GPS)	02	04
9	Construction Surveying	02	04
	Total	**45**	**80**

* There may be minor deviation in marks distribution.