Lok Jagruti Kendra University
University with a Difference

Diploma
in
Civil Engineering

Course Code:025050401

Advanced Surveying

Programme / Branch Name			Diploma in Civil Engineering			
Course Name	Advanced Surveying				**Course Code**	025050401
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week				**Evaluation Scheme**			
L	**T**	**P**	**Total Credit**	**CCE**	**SEE (Th)**	**SEE (Pr)**	**TOTAL**
3	0	4	5	50	50	100	200

Legends:
L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisites

- ✓ Basic Surveying

3. Rationale

Surveying is the first process of starting anyconstruction project and the technique of determining the relative position of different features of a surface of the earth.In the era of globalization today, technology has brought significant advancement in surveying instruments. Available precise digital surveying instruments are used currently due to their accuracy and easy operation. The syllabus involves different methods of calculating vertical measurements, angular measurements and plotting of the traverse on the ground. This course will help the students to get familiar with advanced surveying instruments like total station, remote sensing and GIS. This course provides skills of surveying at the advanced level to develop students understanding, performance-oriented abilities to apply their knowledge in the construction industry.

4. Objectives

- ✓ To gain knowledge of advanced survey equipment and their relevant uses.
- ✓ To understand the use of theodolite for the measurement of horizontal and vertical angles.
- ✓ To calculate the height of objects through trigonometrical levelling.
- ✓ To plot the traverse and angular measurements of any earth's surface.
- ✓ To understand the principles and various methodologies involved in tacheometry.
- ✓ To gain knowledge about remote sensing and GIS.
- ✓ To understand the applications of remote sensing and GIS.

5. Contents

Unit No.	Unit Name	Topics	Learning Outcomes	% Weightage	Hours
1.	**Theodolite Surveying**	1.1. Main Parts of a Vernier Theodolite 1.2. Technical Terms Associated with Measurement with Theodolite 1.3. Fundamental Axes of Theodolite 1.4. Temporary Adjustments of a Theodolite 1.5. Measurement of Horizontal Angle 1.6. Measurement of Horizontal Angle by Repetition Method 1.7. Measurement of Horizontal Angle by Method of Reiteration 1.8. Measurement of Vertical Angle 1.9. Field Operations with Theodolite 1.10. Theodolite Traversing 1.11. Plotting and Adjusting Closing Error 1.12. Errors in Theodolite Surveying 1.13. Additional Problems on Theodolite Survey	• Understand the Various Parts of Theodolite and Their Uses. • Explain the Procedure to Measure Horizontal and Vertical Angle. • Understand the Errors in Theodolite Survey.	25	10
2.	**Applications of Theodolite**	2.1. Trigonometric Levelling 2.1.1. Base of the Object Accessible 2.1.2. Base of the Object Inaccessible-Single Plane Method Possible 2.1.3. Base of the Object Inaccessible-Double Plane Method is Necessary 2.2. Tacheometry 2.2.1. Advantages of Tacheometric Surveying 2.2.2. Different Systems of	• Determine Relative Elevation for Different Ground Conditions. • Explain the Methods of Tacheometry Surveying. • Understand the Errors in Tacheometry Surveying.	20	9

		Tacheomeric Measurements 2.2.3. Principle of Stadia Method 2.2.4. Distance-Elevation Formula for Horizontal Sights 2.2.5. Determination of Tacheometric Constants 2.2.6. Distance and Elevation Formula for Inclined Sight with Staff Vertical 2.2.7. External- Focussing Telescope with an Anallactic Lens 2.2.8. Tangential Method of Tacheometry 2.2.9. Errors in Tacheometric Surveying			
3.	**Total Station**	3.1. Parts of a Total Station 3.2. Accessories 3.3. Commercially Available Total Stations 3.4. On-Board Calculations 3.5. Field Procedure 3.6. Errors in Total Station Survey 3.7. Good Practices in Using Total Stations 3.8. Office Work 3.9. Advantages of Using Total Stations 3.10. Additional Examples	• Explain Parts of Total Station and Their Uses. • Understand the Errors in Total Station. • Explain Working Operation of Total Station.	25	10
4.	**Remote Sensing**	4.1. History of Remote Sensing 4.2. Electromagnetic Energy 4.3. Electromagnetic Spectrum 4.4. Remote Sensing Observation Platforms 4.5. Types of Remote Sensing 4.6. Sensors 4.7. Types of Sensors 4.8. Advantages of	• Understand the Remote Sensing and Types of Sensors • Understand the Appications of Remote Sensing	15	6

		Remote Sensing 4.9. Applications of Remote Sensing			
5.	**Geographic Information System**	5.1. Subsystems of GIS 5.2. Hardware Components of GIS 5.3. Data for GIS 5.4. Integrating Spatial and Attribute Data 5.5. Data Structure 5.6. Database Management Systems 5.7. Errors in GIS 5.8. GIS Software 5.9. GIS and Remote Sensing 5.10. Applications of GIS	• Understand the Applications of GIS • Knowledge of Errors in GIS	15	7
				Total Hours	**42**

6. List of Practicals / Exercises

The practicals/exercises have been properly designed and implemented in an attempt to develop different types of skills so that students can acquire the competencies/programme outcomes. Following is the list of practicals/exercises.

Sr. No.	Practical / Exercises	Key Competency	Hours
A.	**Theodolite Surveying**		
1.	To identify various parts of the transit theodolite.	Understand the Parts of Theodolite	2
2.	To measure the horizontal angle by using the Repetition and Reiteration method.	Measurement of Horizontal Angle	4
3.	To measure the vertical angle.	Measurement of Vertical Angle	2
4.	To measure the deflection angle.	Measurement of Deflection Angle	2
5.	To carry out the project for a closedtraverse of 4 to 5 stations and prepare thedrawing sheet. (A2 size sheet)	Plotting of Traverse with Linear Measurements	6
B.	**Tacheometry**		
1.	To determine the tacheometric constant.	Tacheometric Constant	2
2.	To find out the distance and R.L. of a point when line of sight of horizontal.	Calculation of Distance and R.L	2
2.	To find out the distance and R.L. of an angle of elevation, when the line of sight is inclined and staff is held vertically.	Calculation of R.L.	4
3.	To Carry out the project for 3 to 4stations for closed traverse undulating/hills regions and find R.L.of stations, prepare the drawing sheet. (A2 size sheet)	Plotting of Traverse	8

C.	**Total Station**		
1.	To identify parts of the total station and their relevant uses.	Understand the Parts of Total Station	2
2.	To measure the horizontal angle.	Measurement of Horizontal Angle	2
3.	To measure the vertical angle.	Measurement of Vertical Angle	2
4.	To measure the deflection angle.	Measurement of Deflection Angle	2
5.	To carry out the project for a small traverse on the ground and prepare thedrawing sheet. (A2 size sheet)	Plotting of Traverse	8
D.	**Remote Sensing**		
1.	Prepare a report on the types, applications and advantages of remote sensing.	Understand the Remote Sensing	2
2.	Mapping of a large area with the use of remote sensing.	Mapping by Remote Sensing	2
E.	**Geographic Information System**		
1.	Prepare a report on the applications of GIS.	Understand the GIS	2
2.	To conduct a survey by GIS.	Working Operations of GIS	2
		Total Hours	**56**

7. Suggested Specification Table for Evaluation Scheme

Unit No.	Unit Name	Distribution of Topics According to Bloom's Taxonomy					
		R %	**U %**	**App %**	**C %**	**E %**	**An %**
1.	Theodolite Surveying	15	40	25	15	0	5
2.	Applications of Theodolite	10	25	20	5	20	20
3.	Total Station	10	40	30	5	10	5
4.	Remote Sensing	30	40	20	10	0	0
5.	Geographic Information System	35	30	25	10	0	0

Legends: R: Remembering U: Understanding
App: Applying C: Creating
E: Evaluating An: Analyzing

8. Textbook

1) Surveying Theory and Practice by S.S. Bhavikatti, I.K. International Publishing Pvt.Ltd.

9. Reference Books

1) Surveying Vol-I, II by B.C. Punmia, Laxmi Publications Pvt. Ltd.
2) Surveying Vol-I, II by S.K.Duggal, Tata McGraw Hill.
3) Surveying and Levelling Vol-I,II by T. P. Kanetkar & S.V. Kulkarni, Puna Vidyarthi GrihaPrakashan.
4) Surveying and Levelling Vol-I, II by Hussain & Nagrani, S. Chand New Delhi.

10. Open Sources (Website, Video, Movie)

1) www.nptel.ac.in