SURVEYING AND GEOMATICS

Course Code	18CV35	Credits	03
Course type	PC	CIE Marks	50 marks
Hours/week: L-T-P	2-2-0	SEE Marks	50 marks
Total Hours:	40	SEE Duration	3 Hours for 100 marks

Course learning objectives

1.	Explain the principles of surveying with linear and angular measurements and its applications.
2.	Illustrate the objective and working of modern surveying instruments and Compute the areas and volumes for civil engineering works.
3.	Explain the fundamentals of Trigonometric surveying and topographical map
4.	Design of simple curves and discuss the use of compound, reverse, vertical and transition curves.
5	Understand the applications of GIS and remote sensing in the civil engineering works.

Pre-requisites: NIL

UNIT I **08 Hours**

Introduction: Definition of surveying, Primary divisions of surveying, Basic principles of Surveying, Classification of surveying, Units of measurements, Precision and accuracy, Chain surveying, Ranging, Compass surveying, traversing.

Case Study: Identification of errors acquires in distance and direction measurements and its correction.

Fundamentals of Topographic Map: Types of Scale used, Latitude and Longitude, Map projection, Types of Scale used, Latitude and Longitude, Map projection, **Case Study:** Interpretation of Topographic maps and its uses in civil engineering works.

Self-Learning topics: Local attraction and elimination of errors

UNIT II **08 Hours**

Leveling: Definition, Objective, Temporary adjustment of dumpy level, Curvature and Refraction, Type of leveling- Differential leveling, Profile leveling, Cross sectioning, Fly leveling and Fly back leveling, Booking of levels - Rise and Fall method and Height of Instrument method-Numerical problems.

Case Study: Application of levelling in highway and water supply projects.

Contours: Contours and their characteristics, Direct and Indirect methods, Interpolation techniques, Uses of contours

Case Study: Proposal of economic alignment and plotting profile using contours

Self-Learning topics: NIL

UNIT III **08 Hours**

Theodolite: Parts of a theodolite, Fundamental lines and their desired relations, Temporary adjustments, Measurement of horizontal and vertical angles.

Trigonometric Surveying: Heights And Distances: Determination of height of (i) An accessible object and (ii) Inaccessible object- single plane and double plane methods

Case Study: Use of trigonometric surveying in modern instruments.

Total Station: Electronic Distance Measurement, Components of Total station, Temporary adjustments. File Manager, Measurement functions- Missing Line Measurement (MLM), Remote Distance Measurement (RDM), Area measurement and volume measurement, Remote elevation Measurement (REM), Setting out (Staking out) & Special functions. Uses of Total Station. A**dvantages of using total station over the conventional surveying instruments.**

Self-Learning topics: NIL

UNIT IV **08 Hours**

Curves: Simple Curves-Definition, Designation-Elements of curves, Setting out of simple curves -Linear methods-perpendicular offsets from long chord, chords produced method, Rankine's Method and Numerical problems, Compound Curves, Reverse Curve, Transition Curve and Vertical curve. **Design of Horizontal Curve for Highway and Railway Project.**
Areas and Volumes: Methods of determining area by Cross staff surveying, trapezoidal and Simpson rules, Determination of volume by prismoidal and trapezoidal formulae.
Case Study: Earth work calculation for highway and water supply project and preparation of worksheet on calculation of area and volume.

Self-Learning topics: Design of compound curves

UNIT V **08 Hours**

Geoinformatics: Introduction to Remote Sensing- Definition, working process and components. Introduction to GIS- Definition, Key Components, Functions, Data types, layer concepts, Introduction to aerial photogrammetry, Triangulation survey.
Case Study: Applications of GIS and Remote Sensing in Civil Engineering.
GPS and DGPS: Global Positioning system-GPS satellite systems, components of GPS, positioning and relative positioning with GPS. DGPS and its working principle. Applications of GPS and DGPS in civil engineering
Case study on various GPS satellite systems and its applications

Self-Learning topics: NIL

Text Books:

1. Punmia B. C., **"Surveying Vol–1"**, Laxmi Publications, New Delhi
2. B. C. Punmia, **"Surveying Vol 2 and Vol 3"-**, Laxmi Publications, Twelfth edition reprint, 2005
3. Subramanian R., **"Surveying and Leveling"**, Oxford University Press (2007)
4. Venkataramiah C., **"Text Book of Surveying"**, Universities Press.(2009 Reprint)
5 Rethaliya R. P, **"Surveying"**, Atul Prakashan, Gandhi road, Ahmadabad
6 Kanetkar T. P and Kulkarni S.V, **"Surveying and Levelling Part- I"**, Pune Vidyarthi Ghrih Prakasha
7 A.M. Chandra, **"Higher Surveying"**, New age international(P) Ltd., Revised second edition,2007
8 Satheesh Gopi, R. Sathikumar and N. Madhu- **"Advance Surveying"**- Pearson Education, India., Second edition, 2008.

References:

1. Milton O. Schimidt, **"Fundamentals of Surveying"**, Wong, Thomson Learning
2. Roy S. K., **"Fundamentals of Surveying"**, Prentice Hall of India
3 Duggal S. K., **"Surveying Vol. I"**, Tata McGraw Hill – Publishing Co. Ltd., New Delhi.
4 Milton O. Schimidt and Wong, **"Fundamentals of Surveying"**, CL-Engineering, ISBN 13: 9780534041618, 1985.
5 S.K. Roy, **"Fundamentals of Surveying"**, PHI Learning Pvt. Ltd., ISBN 8120341988, 9788120341982, 11-Oct-2010.
6 Arther Bannister et al., **"Surveying"**, Pearson Education, India., Seventh edition, 1998
7 Maps, Survey of India Publication

E-resourses
(https://www.youtube.com/watch?v=1JfPeQzA62g&list=PL20A0651466E8A776&index=4**)**

Course Outcome (COs)

At the end of the course, students will be able to: **Bloom's**

		Level
1.	**Apply** Basic principles of surveying and **Make use of** linear and angular instrument	**L1**
2.	**Distinguish** between source and types of errors present in surveying measurement and their significance.	**L3**
3.	**Make use of** leveling, trigonometric leveling, Curves in civil engineering work and **Estimate** quantity required.	**L3**
4.	**Create** and **Interpret** Contours and topographic Map	**L2**
5.	**Demonstrate** applications of modern surveying instruments and geoinformatics in civil engineering works	**L2**

Program Outcomes (POs)

1.	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems	**PO 1**
2	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	**PO 5**
3	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	**PO 10**

	Course delivery methods		**Assessment methods**
1.	Lecture and Board	1.	Assignments and Open Book Assignments
2.	NPTEL/ Edusat	2.	Quizzes
3.	Power Point Presentation	3.	Internal Assessment Tests
4.	Videos	4.	Semester End Examination

CIE and SEE Pattern:

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum marks: 50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE: 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.