

**Course Name:** Civil Engineering Group

**Course Code:-**CE/CS/CR/CV

**Semester:** Fourth

**Subject Title:** - Advance Surveying

**Subject Code:** 9045

**Teaching And Examination Scheme:**

Teaching Scheme			Examination Scheme						
TH	TU	PR	Paper Hrs	TH	TEST	PR	OR	TW	Total
02	-	04	03	80	20	50#	--	25@	175

**Rationale:**

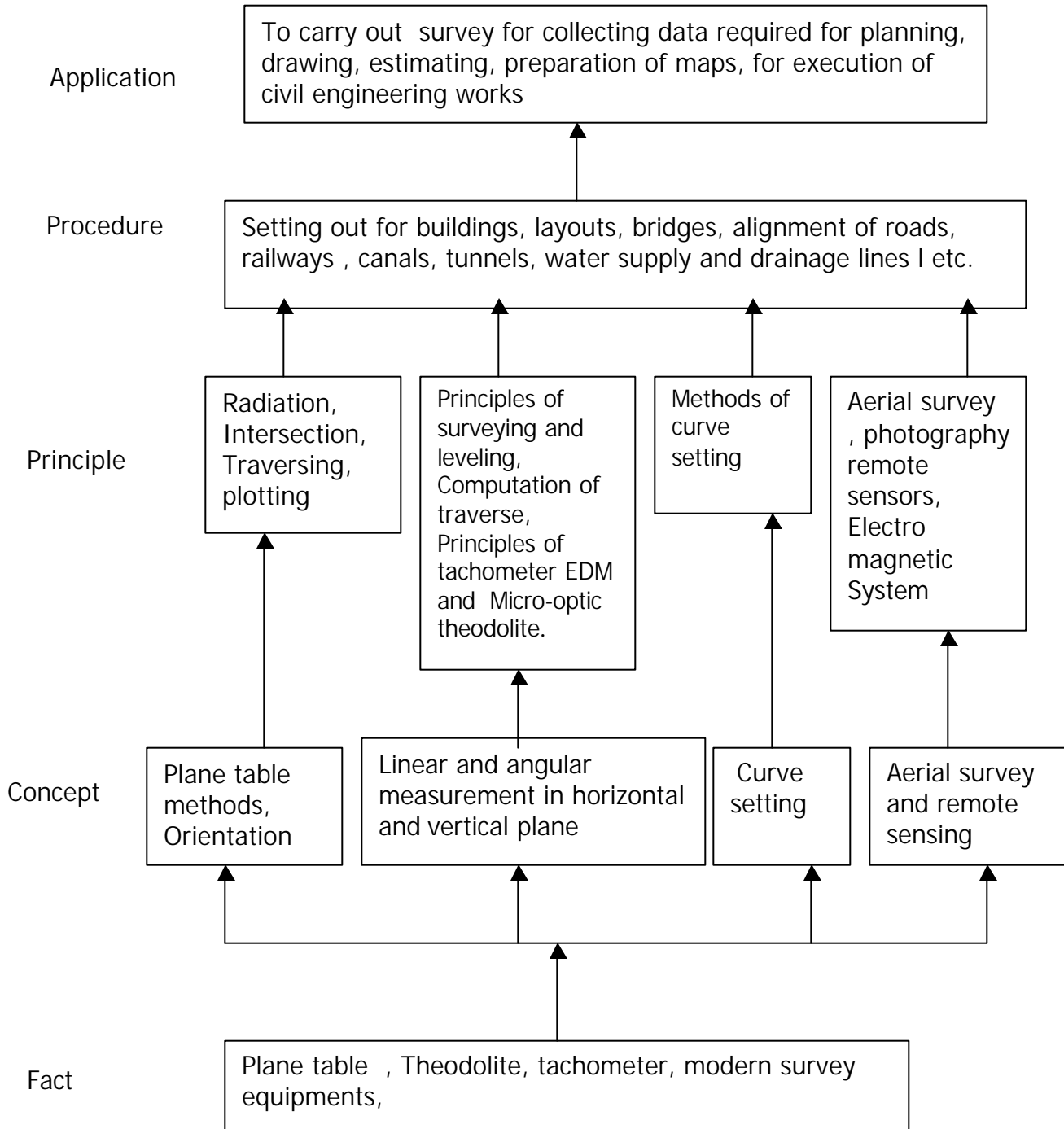
This is an applied technology Course Which is intended to teach Students application of facts , Concepts , Principles, and procedures in surveying and Levelling . It is also intended to teach students theodolite traversing and Modern Surveying equipments. With this knowledge and skill , He will be able to choose appropriate survey and levelling methods depending on requirement to carry out survey works for various civil engineering activities .

**Objectives:**

The Students will be able to:

- 1) Use survey instruments like theodolite and plane table.
- 2) Record the data in field book and plot the collected data.
- 3) Find out horizontal and vertical distances with a tacheometer
- 4) Set out simple curve using Theodolite.
- 5) Use of Modern Survey equipments - Micro Optic Theodolite and EDM.
- 6) Apply principles of surveying and levelling for Civil Engineering works.

### Learning Structure:



## Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	<b>Plane Table Survey</b> 1.1 Principles of plane table survey. Accessories required 1.2 Setting out of plane table , Leveling ,Centering and orientation. 1.3 Methods of plane table surveying – Radiation, Intersection, and Traversing. 1.4 Merits and Demerits of plane table Surveying. situations where plane table survey is used. 1.5 Use of Telescopic Alidade.	05	12
02	<b>Theodolite Survey</b> 2.1 Components of Transit Theodolite and Their functions. Technical terms used. Temporary adjustments of Transit Theodolite. Swinging the telescope, Transiting, Changing the face. 2.2 Measurement of Horizontal angle, method of Repetition, errors eliminated by method of repetition. 2.3 Measurement of Deflection angle. 2.4 Measurement of Vertical angle. 2.5 Measurement of magnetic bearing of a line by Theodolite . 2.6 Prolonging a Straight line. 2.7 Sources of errors in Theodolite Surveying. 2.8 Permanent adjustment of transit Theodolite ( only relationship of different axes of Theodolite.). 2.9 Traversing with Theodolite – Method of included angles, locating details, checks in closed traverse, Calculation of bearings from angles. 2.10 Traverse Computation - Latitude, Departure Consecutive Co-ordinates error of Closure, Distribution of a angular error, balancing the traverse by Bowditch rule and Transit Rule, Gale's traverse table .simple problems on above topic.	10	26
03	<b>Tacheometric Survey</b> 3.1 Principle of Tacheometry.	06	14

	<p>3.2 Essential requirements of Tacheorneter.</p> <p>3.3 Use of Theodolite as a Tacheometer with staff held in vertical and fixed hair method (No derivation).</p> <p>3.4 Determination of tacheometric constants, simple numerical problems on above topics.</p>		
04	<p><b>Curves</b></p> <p>4.1 Types of curves used in road and railway alignments. Notations of simple circular curve. Designation of curve by radius and degree of curves.</p> <p>4.2 Method of Setting out curve by offset from Long chord method and Rankine's method of deflection angles. Simple Numerical problems on above topics.</p>	05	12
05	<p><b>Advanced Survey Equipments</b></p> <p>5.1 Construction and use of one second Micro Optic Theodolite, Electronic Digital Theodolite. Features of Electronic Theodolite</p> <p>5.2 Principle of E.D.M, Components of E.D.M and their functions, use of E.D.M.</p> <p>5.3 Total station</p>	04	10
06	<p><b>Aerial Survey and Remote sensing</b></p> <p>6.1 Aerial Survey Introductions, definition, Aerial photograph.</p> <p>6.2 Remote Sensing – Introduction, Electro-Magnetic Energy , Remote sensing system- Passive system , Active system. Applications – mineral, land use / Land cover, Natural Hazards and Environmental engineering system.</p>	02	06
	Total	32	80

**Practical:**

Skills to be developed:

Intellectual Skill:

- 1) Identify the components of plane table, theodolite, and advanced survey instruments.
- 2) Know the working principles of these survey instruments.
- 3) Finding the horizontal and vertical distances.
- 4) Identifying errors in setting out curve and tabulating elements of a curve.

Motor Skills:

- 1) Taking and recording the observation in the field book.
- 2) Preparing drawings, maps etc. with the observed data.
- 3) Setting out curve for the given alignment.
- 4) Use Micro optic thodolite, EDM for finding different parameters

### **Instructions:-**

- 1) Group size for Practical work should be limited to maximum 6 Students.
- 2) Each student from the group should handle the instrument to understand. the function of different components and use of the instrument.
- 3) Drawing, plotting should be considered as part of practical.
- 4) One full day per project is required for carrying out project work, which is to be plotted on a drawing sheet.
- 5) **Term work** should consist of record of all practicals and projects, in Field Book and drawing sheets for the given projects.

**List Of Practical:**( Minimum 12 practical from list given below)

- 1) Using accessories carry out temporary adjustments of plane table.  
Locating details by method of Radiation.
- 2) Locating details with plane table by method of intersection.
- 3) Understanding the components of Theodolite and their functions, reading the vernier and temporary adjustments of theodolite.
- 4) Measurement of Horizontal angle by transit theodolite.
- 5) Measurement of Horizontal angle by method of Repetition.
- 6) Measurement of vertical angles by theodolite.
- 7) Measurement of Magnetic bearing of a line using theodolite.
- 8) Measurement of deflection angle by taking open traverse of 4 –5 sides.
- 9) To find Reduced levels and horizontal distances using theodolite as a Tacheometer.
- 10) To find constants of a given Tacheometer.

- 11) Study and use of 1 second Micro Optic Theodolite for measurement of Horizontal and Vertical angles
- 12) Study of E.D.M. for knowing its components.
- 13) Use of EDM for finding horizontal and vertical distances and reduced levels.
- 14) Determine the geographical parameters by total station.

**List Of Projects:**

- 1) Plane table survey project for 5-6 sided traverse and locating details of buildings , Roads etc. by radiation and Intersection method , Sheet to be drawn by each student separately on A-1 size imperial drawing sheet.
- 2) Theodolite traverse Survey for a closed traverse of 5-6 sides for a small area. Computation by Gale's traverse table. Plotting the traverse with details on A1 size imperial drawing sheet
- 3) Setting out simple circular curve by Rankine's method of Deflection angles for a given problem and plotting the details of curve on A-1 size imperial drawing sheet

**Learning Resources:**

**Books:**

Sr. No.	Title	Author	Publisher
01	Surveying and Levelling	N N Basak	Tata Mc Graw-Hill
02	Surveying and Levelling Part I and II	T .P. Kanetkar & S. V, Kulkarni	Pune Vidhyarthi Griha Prakashan
03	Surveying and Levelling Vol. I and II	Dr. B. C. Punmiya	Laxmi Publication
04	Text book of Surveying	S.K.Husain, M.S. Nagaraj	S. Chand and company
05	Surveying and Levelling Vol. I and II	S. K. Duggal	Tata Mc Graw-Hill
06	Plane Surveying	A.M.Chandra	New Age International Publishers
07	Higher Surveying	A.M.Chandra	New Age International Publishers