

COURSE NAME: Civil Engineering Group

COURSE CODE: CE /CS/ CR/CV

SEMESTER : Third

SUBJECT TITLE : Surveying

SUBJECT CODE: 9022

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
03	--	04	03	80	20	50#	--	25@	175

Rationale:

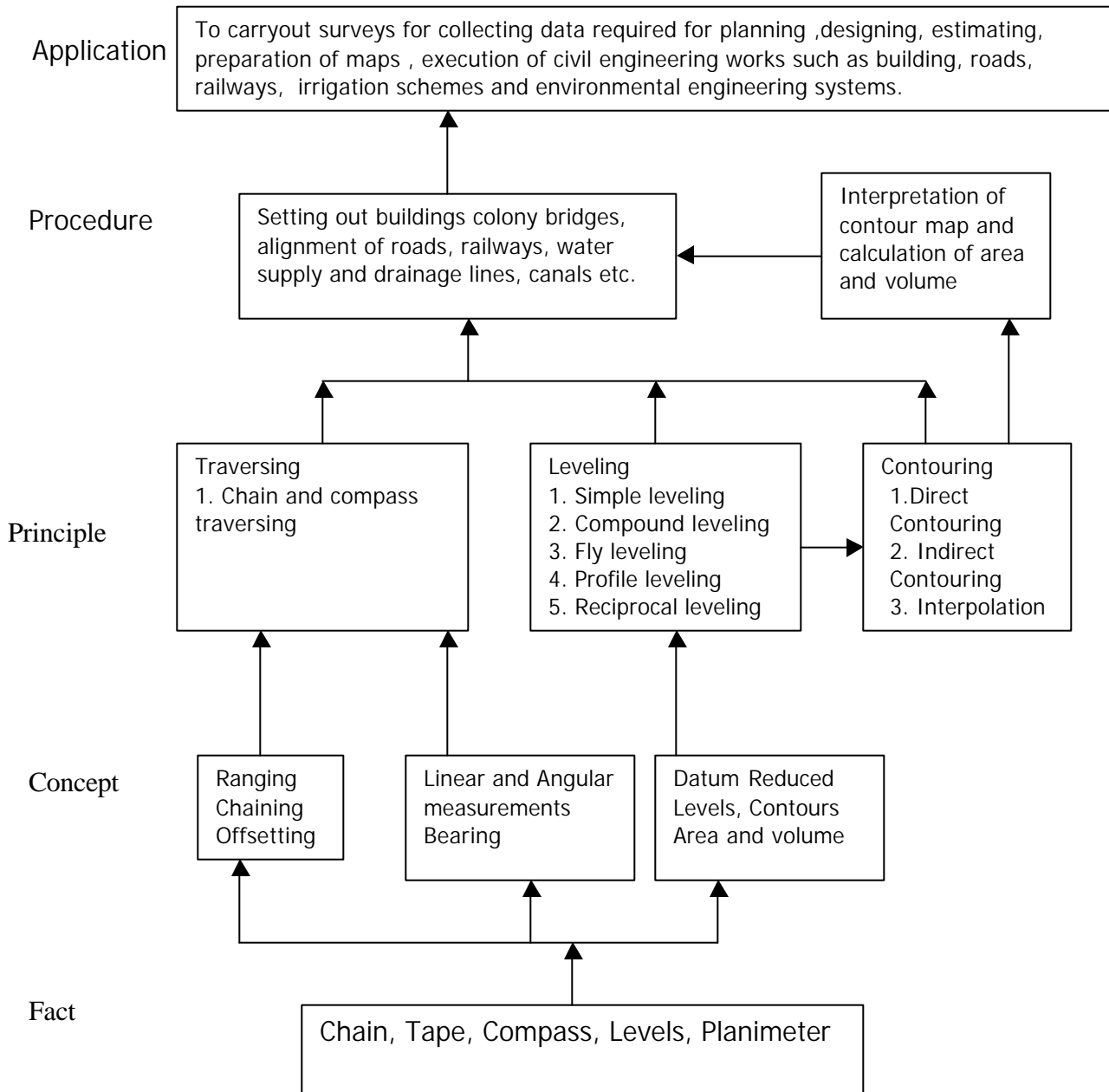
To initiate any Civil Engineering Project in Building Construction System, Irrigation Engineering System and Environmental Engineering System, the knowledge and skill of Surveying is a basic requirement for a Civil Engineer. With this knowledge and skill he will be able to choose appropriate survey and leveling methods, instruments and carry out survey work to prepare required maps. The plans /maps will be further used for designing, estimating and execution of Civil Engineering Works. One should acquire knowledge and develop the skills in surveying.

Objectives:

Students will be able to:

- 1) use the survey instruments.
- 2) take linear and angular measurements .
- 3) measure the area of land .
- 4) prepare layouts and maps.
- 5) set out alignments for roads, railways, canals, pipelines, tunnels etc.
- 6) prepare contour map.
- 7) compute area and volume from given contour map.

Learning Structure:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	<p>Types of Survey Definition. Objects of Surveying,. Principles of Surveying. Uses of survey, Classification of Surveying. Primary –Plain, Geodetic. Secondary – Based on Instruments, method, object, Nature of field.</p>	04	06
02	<p>Chain & Cross Staff Survey 2.1 Principle of Chain Survey .Study and use of Instruments for linear measurements – chain, Tape, Ranging Rod, arrows, pegs , cross Staff , optical Square , line Ranger. 2.2 Ranging –Direct and Indirect Ranging Chaining – Plain and sloping grounds. Chain Triangulation – Survey Station and their Selections, Survey lines, Check lines, Tie lines, base line. Taking offsets .long and short offset, degree of offset. Obstacles in chaining. 2.3 Chain & cross staff Survey for finding area of a field (Numerical problems) Errors in chain Surveying & applying Corrections for chain & Tape (Numerical problems). Conventional signs related to survey.</p>	08	14
03	<p>Compass Survey 3.1 Principle of Compass Survey. Bearing of lines – Meridian –True, Magnetic, and Arbitrary. Bearing –fore bearing, Back bearing, Whole circle bearing, Quadrantal bearing system and Reduced bearing, Conversion of bearings, finding included angles from bearings. 3.2 Prismatic Compass – Component, construction and use. 3.3 Local attraction, Causes, precautions to be taken to avoid and correction of bearings affected due to local attraction, calculation of included angles.</p>	12	18

	<p>3.4 Traversing – open traverse, closed traverse, check on open and closed traverse. Graphical adjustment for closing error.</p> <p>3.5 Numerical problems on calculation of Bearings, Angles and local attraction.</p>		
04	<p>Levelling</p> <p>4.1 Definitions – Level surface, Level line, horizontal line, Vertical line, Datum surface , Reduced level, Bench mark and its types .</p> <p>4.2 Dumpy level –Components, Construction, Line of sight, Line of Collimation, Bubble tube axis, leveling Staff – Telescopic and folding type .Foresight, back sight, Intermediate sight, Change point, Height of collimation . Fundamental axes and their relationship</p> <p>4.3 Recording in level book. Temporary adjustments of dumpy level.</p> <p>4.4 Method of Reduction of levels – Height of instrument method and Rise and fall method. Arithmetical checks, Numerical problems, Computation of missing readings.</p> <p>4.5 Classifications of leveling - simple, differential, profile, cross sectional, fly and check levelling.</p> <p>4.6 Study and use of tilting level & Auto level.</p> <p>4.7 Sources and errors in levelling, precautions and difficulties faced in levelling.</p>	16	24
05	<p>Contouring</p> <p>5.1 Definitions – Contour, contour interval, Horizontal equivalent.</p> <p>5.2 Characteristics of contours .Method of locating contours. Interpolation of contours. Establishing grade contours.</p> <p>5.3 Uses of Contour Maps. Interpretation of Typical Contour Sheets.</p>	04	10
06	<p>Area and Volume Measurements</p> <p>Construction and use of polar planimeter for measurement of area and simple numerical problems. Study and use of Digital Planimete .Concept of computation of Volume by Trapezoidal and Prismoidal formulae.(No numerical problems)</p>	04	08
	Total	48	80

Practical:

Skills to be developed:

Intellectual Skills:

- 1) Identify the different instruments for Linear measurement and levelling
- 2) Record and observing necessary Observation with the survey instruments
- 3) Classify and discriminating various types of survey instruments.
- 4) Identify the errors of the survey instruments.

Motor Skills:

1. Measure distances, bearings and finding reduced levels with survey instruments.
2. Prepare drawing using survey data.
3. Prepare contour map of a given terrain/topography.
4. Measure area of an irregular shape figure with planimeter.

Instructions:

- 1) Group size for Survey Practical work should be maximum 6 Students.
- 2) Each student from a group should handle the instrument independently 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.

Term work shall consist of record of all practical and projects in field book and Drawing of project work on full imperial size drawing sheets.

- 1) Measurement of distances with chain & tape on ground with direct or indirect ranging.
- 2) Construction and use of optical square and open cross staff for setting out perpendicular and running a survey line for locating details .
- 3) Measurement of Area by Chain and cross staff survey.
- 4) Use of prismatic compass and observing fore bearing and back bearing.
- 5) Measuring Fore bearing and Back bearing of 5-6 side closed polygon. Identifying stations affected by local attraction and calculation of corrected F.B. & B.B.
- 6) Measuring fore bearing and back bearing for an open traverse (5 to 6 sided). Calculate direct angles between successive lines.
- 7) Use of Dumpy level, temporary adjustments and taking reading on levelling staff. Recording readings in field book.
- 8) Differential levelling practice, reduction of level by H.I. method.
- 9) Differential levelling practice, reduction of level by rise & fall method.

- 10) Carrying Bench mark from one point to another point about 200 m by fly levelling with tilting level.
- 11) Use of auto level and taking observation.
- 12) Measurement of Area of irregular figure by polar planimeter
- 13) Measuring area enclosed by closed contours on contour map prepared earlier, by simple digital planimeter

SURVEYING PROJECTS:-

- 1) **Chain & Compass Traverse Survey** – A simple closed traverse of 5-6 sides enclosing a building. Calculation of included angles, locating details and plotting them on A 1 size imperial drawing sheet.
- 2) **Block Contouring** – A block of 100 x 150m with spot levels at 10x10m plotting the contours on A-1 size imperial drawing sheet with a contour interval of 1m.
- 3) **Profile levelling survey** – Running a longitudinal section for a length of 500 m for a road /canal /railway alignment. Cross section shall be taken suitably. Plotting plan, L- section and cross section on A1 size imperial drawing sheet.

Learning Resources:

1. 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

2) Video Cassettes /CDS:

Sr. No.	Title
01	MSBTE CAI Package