 <b>MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI</b> <b>TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES</b>																	
<b>COURSE NAME : CIVIL ENGINEERING GROUP</b>																	
<b>COURSE CODE : CE/CS/CR/CV</b>																	
<b>DURATION OF COURSE : 6 SEMESTERS for CE/CS/CR ( 8 SEMESTERS for CV)</b>											<b>WITH EFFECT FROM 2012-13</b>						
<b>SEMESTER : THIRD</b>											<b>DURATION : 16 WEEKS</b>						
<b>PATTERN : FULL TIME - SEMESTER</b>											<b>SCHEME : G</b>						
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17300)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Applied Mathematics \$	AMS	17301	03	--	--	03	100	40	--	--	--	--	--	--	--	50
2	Building Construction	BCO	17308	04	--	02	03	100	40	--	--	--	--	25@	10		
3	Building Drawing	BDR	17309	02	--	04	04	100	40	--	--	25#	10	50@	20		
4	Surveying	SUR	17310	04	--	04	03	100	40	50#	20	--	--	50@	20		
5	Mechanics of Structures	MOS	17311	03	01	02	03	100	40	--	--	25#	10	25@	10		
6	Professional Practices-I	PPO	17018	--	--	03	--	--	--	--	--	--	--	50@	20		
<b>Total</b>				<b>16</b>	<b>01</b>	<b>15</b>	<b>--</b>	<b>500</b>	<b>--</b>	<b>50</b>	<b>--</b>	<b>50</b>	<b>--</b>	<b>200</b>	<b>--</b>	<b>50</b>	

Student Contact Hours Per Week: **32 Hrs.**  
**THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.**  
Total Marks : **850**  
@ Internal Assessment, # External Assessment,   No Theory Examination, \$ - Common to all branches

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, ,OR-Oral, TW- Term Work, SW- Sessional Work

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

**Course Name : All Branches of Diploma in Engineering & Technology**

**Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/  
ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI**

**Semester : Third**

**Subject Title : Applied Mathematics**

**Subject Code : 17301**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	--	03	100	--	--	--	100

**NOTE:**

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

**Rationale:**

Applied mathematics is designed for its applications in engineering and technology. It includes the topics integration, differential equation, probability distribution. The connection between applied mathematics and its applications in real life can be understood and appreciated.

Derivatives are useful to find slope of the curve, maxima and minima of function, radius of curvature. Integral calculus helps in finding the area. In analog to digital converter and modulation system integration is important. Differential equation is used in finding curve. Probability is used in Metrology and quality control.

The fundamentals of this topic are directly useful in understanding engineering applications in various fields.

**General Objectives:**

Students will be able to:

1. Apply derivatives to find slope, maxima, minima and radius of curvature.
2. Apply integral calculus to solve different engineering problems.
3. Apply the concept of integration for finding area.
4. Apply differential equation for solving problems in different engineering fields.
5. Apply the knowledge of probability to solve the examples related to the production process.

**Learning Structure:**

**Applications**

Apply the principles of mathematics to solve examples in all branches of Engineering Diploma.

**Procedure**

Solving problems of tangent, normal. Finding maxima, minima and radius of curvature

Solving problems on methods of integration and its properties. Finding area.

Solving examples of differential equations of first order and first degree.

Solving different examples on binomial, poisson and normal distribution

**Principle**

Methods of finding slope, curvature, maxima and minima

Methods of finding integration, definite integration and its properties

Methods of differential equations of first order and first degree

Formulae for binomial, normal, and poisson distribution

**Concept**

Geometrical meaning of derivatives, increasing and decreasing functions

Integration of standard functions. Rules of integration, integration by parts, partial fractions

Order and degree of differential equation. Formation of differential equation

Probability of repeated trails of random experiments

**Facts**

First order and second order derivatives

Derivatives, notation of integration, definition of integration

Integration, definition of differential equation

Permutation , Combination, probability of an event

**Theory:**

<b>Topic and Contents</b>	<b>Hours</b>	<b>Marks</b>
<b>Topic-1 Applications of Derivative</b> <b>Specific objectives :</b> ➤ Find slope, curvature, maximum and minimum value of functions related to different engineering applications. <ul style="list-style-type: none"> <li>• Examples for finding slope , equations of tangent and normal to the curve</li> <li>• Maxima and minima.</li> <li>• Radius of curvature.</li> </ul>	06	16
<b>Topic-2 Integral Calculus</b>		
<b>2.1 Integration ----- 20</b> <b>Specific objectives :</b> ➤ Integrate function using different method. <ul style="list-style-type: none"> <li>• Definition of integration as anti derivative, rules of integration.</li> <li>• Integration of standard functions</li> <li>• Methods of integration               <ul style="list-style-type: none"> <li>Integration by substitution.</li> <li>Integration by partial fractions.</li> <li>Integration by parts and generalized rule by parts.</li> </ul> </li> </ul>	14	44
<b>2.2 Definite Integrals ----- 16</b> <b>Specific objectives :</b> ➤ Solve problems on definite integrals using the properties. <ul style="list-style-type: none"> <li>• Definite integral- Definition, examples.</li> <li>• Properties of definite integrals without proof and simple examples.</li> </ul>	08	
<b>2.3 Application of Definite Integrals -----08</b> <b>Specific objectives :</b> ➤ Find area. <ul style="list-style-type: none"> <li>• Area under a curve.</li> <li>• Area between two curves.</li> </ul>	04	
<b>Topic 3 - Differential Equation.</b>		
<b>3.1 Differential equation</b> <b>Specific objectives :</b> ➤ Solve the differential equation of first order and first degree ➤ Solve different engineering problems using differential equation <ul style="list-style-type: none"> <li>• Differential equation- Definition, order and degree of a differential equation. Formation of differential equation containing single constant.</li> <li>• Solution of differential equation of first order and first degree for following types               <ul style="list-style-type: none"> <li>Variable separable form,</li> <li>Equation reducible to variable separable form.</li> <li>Linear differential equation.</li> <li>Homogeneous differential equation.</li> <li>Exact differential equation.</li> </ul> </li> </ul>	10	20

<b>Topic 4 - Probability</b>		
<b>4.1 Probability</b> <b>Specific objectives :</b> ----- <b>08</b> ➤ Solve different engineering problems related to probability process. <ul style="list-style-type: none"> <li>• Definition of random experiment, sample space, event, occurrence of event and types of event (impossible, mutually exclusive, exhaustive, equally likely)</li> <li>• Definition of probability, addition and multiplication theorems of probability.</li> </ul>	02	20
<b>4.2 Probability Distribution</b> ----- <b>12</b> <ul style="list-style-type: none"> <li>• Binomial distribution</li> <li>• Poisson's Distribution</li> <li>• Normal distribution</li> </ul>	04	
<b>Total</b>	<b>48</b>	<b>100</b>

**Learning Resources:****1) Books:**

<b>Sr. No</b>	<b>Title</b>	<b>Authors</b>	<b>Publication</b>
1	Mathematic for Polytechnic	S. P. Deshpande	Pune Vidyarthi Girha Prakashan' Pune
2	Calculus : Single Variable	Robert. T. Smith	Tata McGraw Hill
3	Higher Engineering mathematics	B. V Ramana	Tata McGraw Hill
4	Higher Engineering mathematics	H. K. Dass	S .Chand Publication
5	Higher Engineering Mathematics	B. S. Grewal	Khanna Publication, New Delhi
6	Applied Mathematics	P. N. Wartikar	Pune Vidyarthi Griha Prakashan, pune

**2) Websites :**i) [www.khan.academy](http://www.khan.academy)

**Course Name : Civil Engineering Group**

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

**Semester : Third**

**Subject Title : Building Construction**

**Subject Code : 17308**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	02	03	100	--	--	25@	125

**NOTE:**

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

**Rationale:**

Building Construction is a core subject in Civil Engineering it deals with the construction processes of sub structure, super structure, Building Finishes and maintenance of buildings.

The topic on substructure will be useful in executing the excavation and foundation in different situations. The contents on stone and brick masonry, doors and windows and vertical communication will be useful to understand the process of construction of these which will further enable to execute these works effectively.

The topic on roofs, floors and finishing works will lead to understand construction process involved this will be useful in proper execution of various constructions.

The contents like formwork and centering, waterproofing and termiteproofing will be useful in guiding the construction process at various stages. Topic on building maintenance will provide the information about effective and efficient upkeep of building after construction.

The topic on advance construction techniques will provide information on different construction techniques with use of equipments, with this the work can be executed in a different situations with less period of construction.

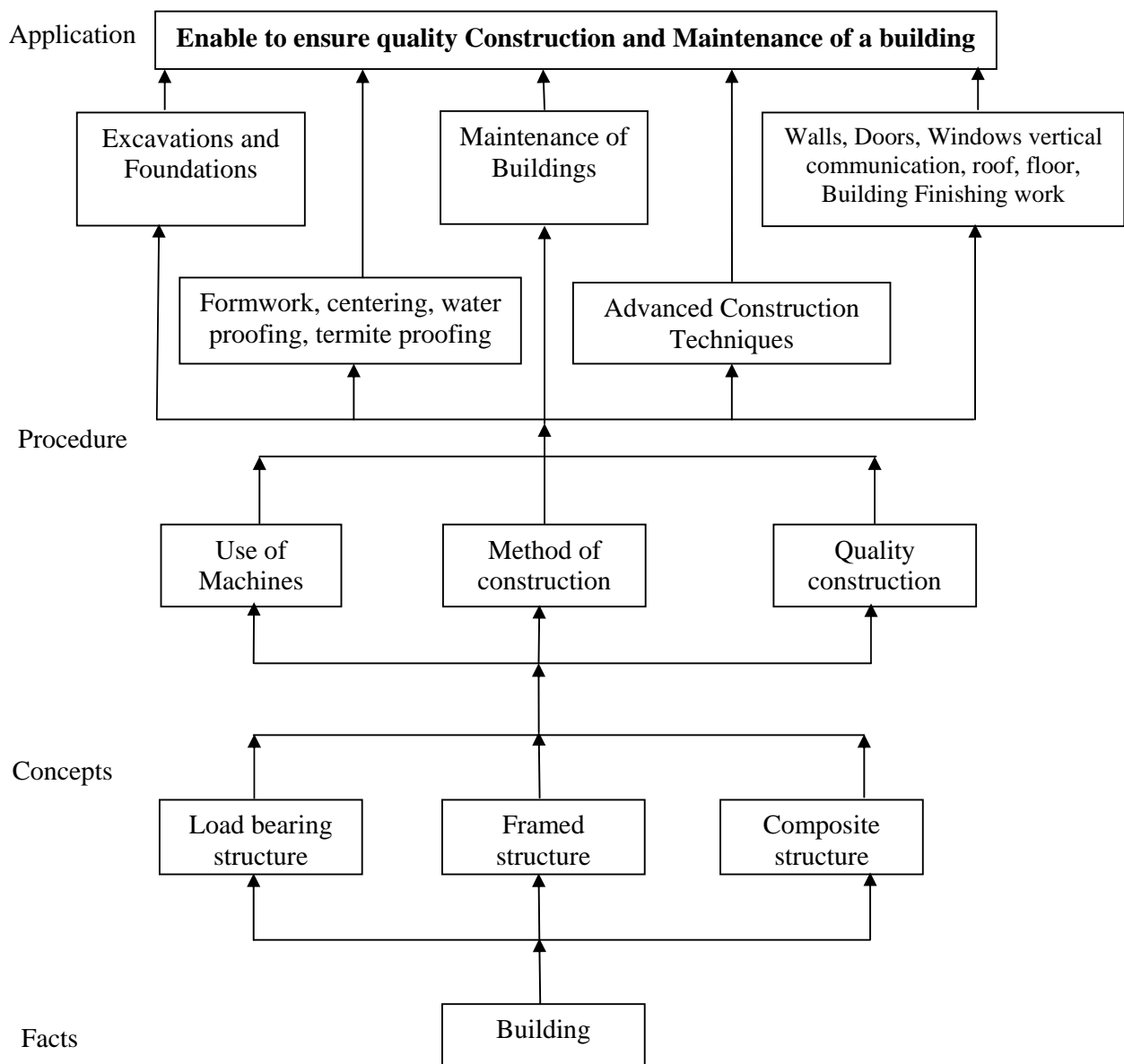
Thus the knowledge and skill acquire by the learner would enable them to plan and execute the building construction effectively.

**General Objectives:**

Student will be able to:

1. Know various technical term related to different components of building structure.
2. Understand various construction processes of different building components with use of equipments.
3. Understand the process of setting out of building.
4. Know various materials required for execution of various construction processes.
5. Suggest rectifications for various defects in Building works.

**Learning Structure:**



**Theory**

Name of the Topic	Hours	Marks
<p><b>Topic – 1 Building Structures And Components</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Classify various types of structure</li> <li>➤ List various components of building and their function</li> <li>➤ Draw sketches and label the parts of various components.</li> </ul> <p><b>Contents :</b></p> <ul style="list-style-type: none"> <li>• Load bearing , Framed and composite structure</li> <li>• Sub structure: foundation, Plinth and DPC its function.</li> <li>• Super structure: Wall, sill, lintel, doors and windows, floor, roof, parapet, slab, columns, beams, and their functions.</li> <li>• General design Principles of Earthquake Resistant structures: while planning and during construction</li> </ul>	04	08
<p><b>Topic – 2 Construction of Sub Structure</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Set out layout of building structure on ground</li> <li>➤ State various terms related to substructure.</li> <li>➤ Classify the foundations.</li> <li>➤ List the precautions in construction of foundation</li> </ul> <p><b>Contents:</b></p> <p><b>2.1 -----(08)</b></p> <ul style="list-style-type: none"> <li>• Site Clearance, preparing job layout, layout for load bearing structure and framed structure by centre line and face line method. Precautions while marking layout on ground.</li> <li>• Excavation for foundation, timbering and strutting for foundation trench, dewatering of foundation, tools and plants used for excavation.</li> </ul> <p><b>2.2----- (12)</b></p> <ul style="list-style-type: none"> <li>• Foundations: Definition, Function, requirements of good foundation, Types a) Shallow foundation- wall footing, isolated and combined column footing, stepped foundation, raft foundation. b) Deep Foundation: Pile foundation, well foundation and caisson. Precautions to be taken while constructing foundation in black cotton soil.</li> </ul>	12	20



<p><b>Topic – 3 Construction of Superstructure</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ State terms used in various masonry</li> <li>➤ Describe various types of masonry</li> <li>➤ Sketch and label various components of super structure</li> </ul> <p><b>Contents :</b></p> <p><b>3.1 –Masonry Work------(12)</b></p> <ul style="list-style-type: none"> <li>• Stone masonry: Terms used in stone masonry- facing, backing, hearting, through stone, corner stone, cornice etc. Type of stone masonry: Rubble masonry, Ashlar Masonry and their types. Requirements of good stone masonry, expansion joints in stone masonry their purpose and procedure.</li> <li>Brick masonry: Terms used in brick masonry- bond, joints, lap, frog, line, level and plumb. Bonds in brick masonry- header bond, stretcher bond, English bond and Flemish bond. Requirements of good brick masonry, expansion joints in brick masonry their purpose and procedure.</li> <li>• Comparison between stone masonry and Brick Masonry.</li> <li>• Tools and plants required for construction of stone masonry and brick masonry.</li> <li>• Hollow concrete block masonry and composite masonry.</li> <li>• Scaffolding: Necessity, component parts and types of Scaffolding , Scaffolding and platforms used for multi storeyed building</li> </ul> <p><b>3.2 –Doors and windows------(06)</b></p> <p>Door &amp; window frames, location of Doors and Windows, various sizes of doors and windows for residential and public buildings.</p> <p>a) Types of doors: Batten Ledged braced framed door, panelled, glazed, flush, collapsible, revolving doors, rolling shutters.</p> <p>b) Types of windows: Casement, Panelled, Steel, Aluminium, Sliding, louvered window, Grills and Ventilators. Fixture and Fastening for doors, windows Sill, lintel - types and function, Arch - types and function. Procedure for replacing the glass of existing sliding window.</p> <p><b>3.3 Vertical Communications------(06)</b></p> <p>Means of vertical communications: Stairs, lift/ Elevators, Escalators, Ramp (sketches and suitability).Terms used in stair- Step, riser, tread, flight, Winder, Kite step, landing, soffit, pitch, Newel posts, hand rail, balustrade, head room. Types of stairs: straight, quarter turn, half turn, open well, doglegged, spiral, bifurcated, circular, sketch and suitability, Requirements of good staircase, thumb rule for stair design</p>	12	24
<p><b>Topic – 4 Floors and Roofs</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ State types of floors and floor finishes</li> <li>➤ Identify types of roofs.</li> </ul> <p><b>Contents :</b></p> <p>a) Types of floors – Mud floor, wood floor, stone floor, concrete floor (construction and suitability).</p> <ul style="list-style-type: none"> <li>• Types of floor finishes- Shahabad, Kota, marble, granite, kaddappa, ceramic, vitrified, marbonite, chequered tiles (construction procedure).</li> <li>• Pavement blocks, tremix floors, skirting and dado</li> <li>• Mezzanine Floors, location and use.</li> </ul> <p>b) Types of roofs -Pitched roofs and Flat roof : Terms used, lean to roof, king post truss, queen post truss, roofing tiles, their types and their suitability</p> <ul style="list-style-type: none"> <li>• Comparison between pitched and flat roof.</li> </ul>	04	08

<p><b>Topic – 5 Finishing works</b></p> <p><b>Specific objectives:</b></p> <ul style="list-style-type: none"> <li>➤ State procedure of plastering, pointing and painting</li> <li>➤ State terms and list tools used in plastering and pointing</li> <li>➤ Identify defects in plastering and painting</li> </ul> <p><b>Contents :</b></p> <ul style="list-style-type: none"> <li>• Plastering: Necessity, pre-construction preparation, single coat, double coat, rough finish, sponge finish, neeru finish, Special plasters, pebble finish and stucco plaster. Precautions to be taken while plastering. Defects in plastering, methods for curing.</li> <li>• Pointing : Necessity, types and procedure of pointing</li> <li>• Painting: Necessity, selecting suitable material. Surface preparation for painting to wall, timber, steel. Types of painting white wash, colour wash, oil bound, distemper, plastic emulsion, oil paint, cement paint. Defects in painting. Number of coats in painting. Procedure for repainting after repairs.</li> </ul>	08	10
<p><b>Topic – 6 Miscellaneous works ( Centering , allied process and maintenance)</b></p> <p><b>Specific objectives</b></p> <ul style="list-style-type: none"> <li>➤ Distinguish form work and centering</li> <li>➤ State procedure for Water proofing construction for RCC slab and sanitary block</li> <li>➤ State procedure of termite proofing</li> <li>➤ Do Maintenance of building</li> </ul> <p><b>Content</b></p> <ul style="list-style-type: none"> <li>• Form work and centering – Meaning of different terms, Necessity, materials used in form work and centering. Form work sketches for column, beam, chajja, stripping time of form work, shifting of formwork for highrise works, bolting, fixing, strutting etc. Centering for beam, columns and slab. Requirements of goods form work.</li> <li>• Water proofing – necessity and importance, water proofing procedure for RCC slab and sanitary blocks, during the construction and after construction.</li> <li>• Termite proofing – necessity and importance. Pre-construction termite proofing and post construction termite proofing.</li> <li>• Building maintenance</li> <li>• Cause and types of cracks in masonry walls, plaster, concrete slabs, beams, columns, staircases, identification and repairs of cracks.</li> <li>• Settlement – cause and remedial measures</li> <li>• Plinth protection – necessity and material used</li> <li>• Rebaring techniques</li> </ul>	08	10

<p><b>Topic – 7 Advance Construction Techniques</b></p> <p><b>Specific objectives</b></p> <ul style="list-style-type: none"> <li>➤ State procedure of Prestressed Concreting, prefabrication</li> <li>➤ List Equipments and accessories used in Prestressed Concreting</li> <li>➤ Identify applications of Soil Reinforcing techniques</li> </ul> <p><b>Contents :</b></p> <p><b>7.1 -----(10)</b></p> <ul style="list-style-type: none"> <li>• Prestressed Concreting Methods- Methods of prestressed – pre tensioning &amp; post tensioning, Equipments and accessories for prestressing, precautions during prestressing of members.</li> <li>• Prefabricated Construction- Definition, plant prefabrication and site prefabrication, advantages and disadvantages of prefabrication</li> <li>• Soil Reinforcing techniques- necessity of soil reinforcing, Use of wire mesh and geo-synthetics. Strengthening of embankments.</li> <li>• Underwater concreting for bridge piers. Tremy method of underwater concreting</li> </ul> <p><b>7.2 -----(10)</b></p> <ul style="list-style-type: none"> <li>• Ready Mix concrete- Necessity and use of Ready Mix Concrete. Production and equipments for RMC. Workability and water cement ratio for RMC. Strength of RMC.</li> <li>• Tremix Concreting method – Definition, Procedure of vacuum dewatering concreting (Tremix). Application of vacuum dewatering concreting. Equipments used in tremix concreting.</li> <li>• Special Concretes - Properties, uses and procedure of <ul style="list-style-type: none"> <li>a) Roller compacted concrete.</li> <li>b) High Impact Resisting concrete.</li> <li>c) Steel fiber reinforced concrete.</li> </ul> </li> </ul>	16	20
<b>Total</b>	<b>64</b>	<b>100</b>

**Practicals:****Skills to be developed****Intellectual Skills:****Students will be able to:**

- a) Identify the components of building.
- b) Select materials for components of building.
- c) Select appropriate of construction process for various building components.
- d) Identify various methods of checking for quality in building components.
- e) Identify defects in building construction.
- f) Prepare appropriate visit report.

**Motor Skills: Students will be able to:**

- a) Supervise and check quality of construction.
- b) Use of instruments to ascertain the quality of construction.
- c) Exercise accuracy in the measurement.

**List of Practical:**

1. To set out Foundation Plan on ground for load bearing structure.
2. To set out foundation plan on ground for framed structure.
3. To visit building construction site to understand construction of substructure.
4. To construct dry brick masonry using actual bricks in stretcher. Header, English bond and Flemish bond with closer and bats for half, one and half brick thick wall.
5. To visit building construction site to understand construction of super structure.
6. To check the verticality and horizontal level of construction work.
7. Demonstration of plastering wall surface including preparation of cement mortar 1:4 with all precautions.
8. Observe various defects such as efflorescence, cracks, and leakages in building components and to suggest remedial measures.
9. Assignment on building components and construction work like scaffolding, formwork, centering (Any four)
10. Assignment on advance construction methods.
11. Assignment on advance construction material.

**Learning Resources****1. Books**

Sr.No.	Title	Author	Publisher
1	Building Construction	Sushil Kumar	Standard, New Delhi
2	Building Construction	P C Varghese	PHI, New Delhi
3	Building Construction	S. C. Rangwala	Charotor
4	Building construction illustrated	Francis D.K. Ching	Wiley India
5	Building Construction	S. P.Arora	Dhanpat Rai & sons

**2. Models & charts :**

- a) Cut section of building showing different components
- b) Cross section of Load bearing wall
- c) Types of Foundations
- d) Types of Bonds in Brick masonry
- e) Types of Door and Windows
- f) Types of Stairs
- g) Types of Roofs
- h) Formwork for different RCC elements
- i) Types of scaffolding
- j) RMC plant
- k) Methods of Prestress concrete
- l) Under water concreting
- m) Pre and post tensioning

**Course Name : Civil Engineering Group**

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

**Semester : Third**

**Subject Title : Building Drawing**

**Subject Code : 17309**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
02	--	04	04	100	--	25#	50@	175

**NOTE:**

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**
- **In Term End Examination, students shall attempt all Questions including Theory Questions on Drawing Sheet.No separate Answer Book shall be issued to answer theory questions.**
- **In Term End Examination, Question papers shall be set by allotting maximum 20 marks towards Theory portion and remaining 80 Marks for Drawing portion to test the drawing skills.**

**Rationale:**

This subject is core technology subject, enabling the principles of planning for drafting the content into graphical form and thereafter its execution. Civil Engineer has to convert design parameters and process details into actual practice. The planning for buildings includes the entire facilities to be provided as per individual's requirements, economical status and suitable to the users.

Therefore, students are required to understand, interpret and prepare working drawing. This will further lead into reading and understanding of drawing that will make the execution and implementation easy in the field.

As a matter of fact, whatever is best in the universe ought to be preserved and must be remembered and desired by common man. Based on this ideology, an integrated approach to protect the environment, efforts towards Ecological- Environmental –Settlement of Building –Man and nature relationship shall be adopted. Architecturally, building should create occupational comfort, functional utility, aesthetic approach, environmental filters.

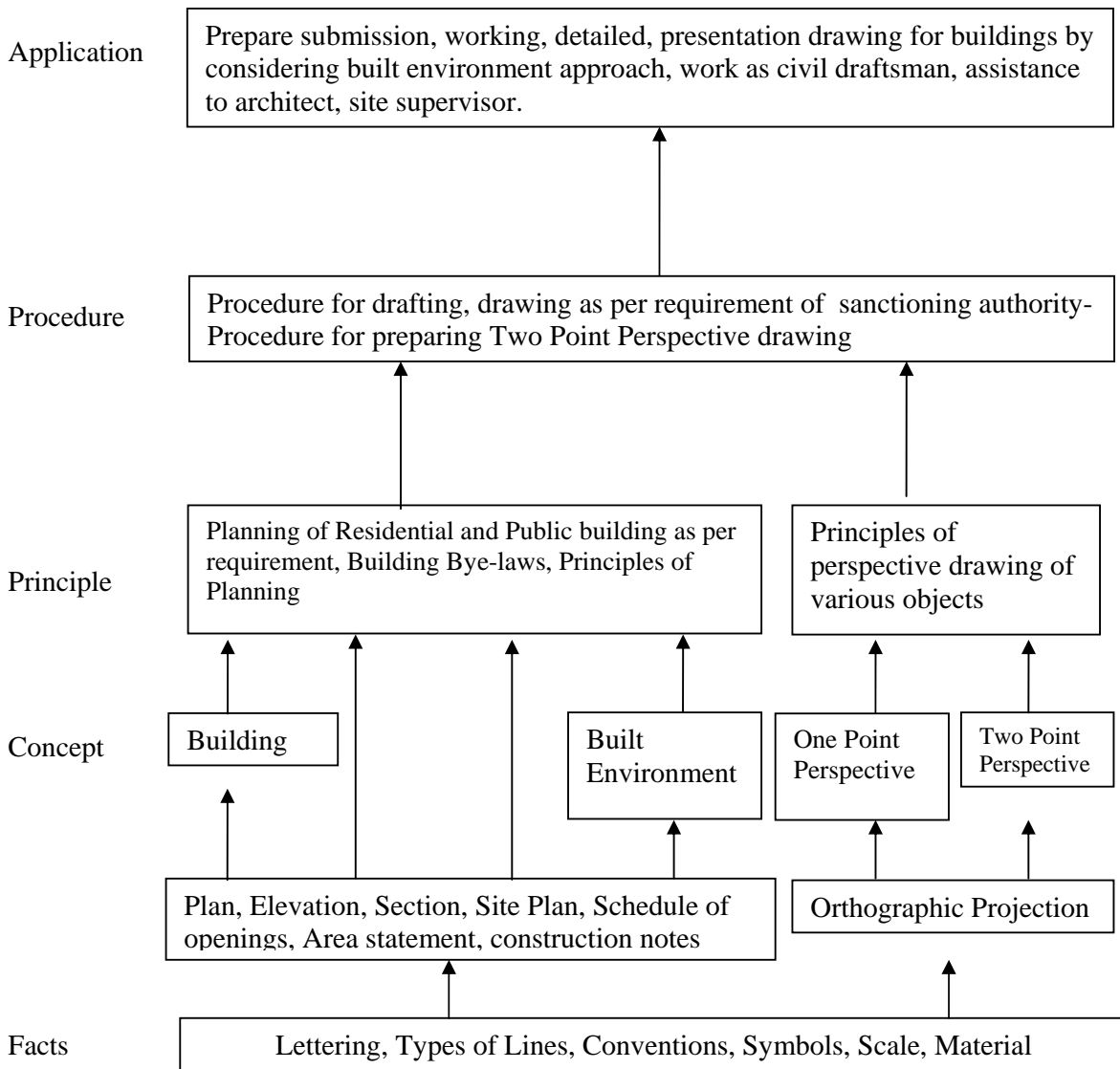
In long run construction industry should have orientation towards the skillful design and energy efficient technique. Emphasis shall be given on integrated approach using National Code of Building of India (2005) for appropriate planning of building .This will be further useful in the area of Building Construction, Estimating and Costing, Surveying, Design of Structure and Projects. This will create confidence and share a grain of salt in building nation in a beautiful way of approach.

**General objectives:**

The students will be able to –

- 1) Interpret different building drawings.
- 2) Understand principles of planning considering built environment approach.
- 3) Apply building rules and byelaws and IS 962:1989 specifications for planning of buildings.
- 4) Understand the preparation of line plans for Residential and Public Buildings.
- 5) Draw submission drawing and working drawing
- 6) Understand methods of perspective drawing for various objects.

**Learning Structure:**



**Theory:****Note: Drawing skills to be developed through theory and practical hours.**

Topic and Contents	Hours	Marks
<p><b>Topic 1. Conventions</b></p> <p><b>Specific objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Draw the conventions , signs and symbols</li> <li>➤ Use appropriate scale for different building drawings</li> <li>➤ Read and interpret the readymade drawings</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Conventions as per IS 962:1989, symbols for different materials such as earthwork, brickwork, stonework, concrete ,woodwork etc. used in civil engineering construction, graphical symbols for door and window, Abbreviations, symbols for sanitary and electrical installations .Symbols for room furnishing such as kitchen platform, sink, bed, wardrobe, door opening etc.</li> <li>• Types of lines- visible lines, centre line, hidden line, section line, dimension line, extension line, pointers, arrow head or dots .Appropriate lettering and numbering for drawing</li> <li>• Types of scale- Monumental, Intimate, criteria for Proper Selection of scale for various types of drawing</li> <li>• Reading and interpreting readymade Architectural building drawing ( To be procured from Architect, Planning Consultants, Planning Engineer )</li> </ul>	04	04
<p><b>Topic 2. Planning of Building</b></p> <p><b>Specific objectives :</b></p> <ul style="list-style-type: none"> <li>➤ State space requirement and norms for minimum dimensions of each units of a building</li> <li>➤ Calculate different areas such as plinth area, floor area, built-up area, carpet area</li> <li>➤ Draw line plan for residential and public buildings</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Principles of planning of Residential and Public building- Aspect, Prospect ,Orientation ,Grouping, Privacy, Elegance, Flexibility, Roominess, Circulation, Furniture requirements, Sanitation, Economy.</li> <li>• Space requirement and norms for minimum dimension of different units in the residential and public buildings.</li> <li>• Rules and bye-laws of sanctioning authorities for construction</li> <li>• Calculation for areas such as plot area, built up area, super built up area, plinth area, carpet area, floor area, FAR (Floor Area Ratio) / FSI</li> <li>• Line plans for residential building of minimum three rooms including w/c, bath and staircase as per principles of planning.</li> <li>• Line plans for public building-school building, primary health centre, hospital building, bank, post office, hostel, canteen, Restaurant.</li> </ul>	14	36
<p><b>Topic 3. Types of Drawing</b></p>	10	44

<p><b>Specific objectives :</b></p> <ul style="list-style-type: none"> <li>➤ <b>Draw developed plan, elevation, section, site plan based on given line plan.</b></li> <li>➤ <b>Prepare submission drawing, working drawing, foundation drawing of a residential building.</b></li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Data drawing – developed plan, elevation, section, site plan, schedule for openings, construction notes with specifications, area statement. Planning of staircase- Rise and Tread for residential and public building.</li> <li>• Submission drawing of Single storey Load Bearing residential building (2 BHKD) with staircase.</li> <li>• Submission drawing of Two storey Framed Structure (G+1) residential building (2 BHKD) with staircase.</li> <li>• Working drawing of Load Bearing Structure – developed plan, elevation, section passing through staircase, foundation plan with Scale 1:50.</li> <li>• Foundation plan of Framed Structure and section of column and footing with scale 1:50</li> <li>• Details of RCC components with scale 1:20 for Chajjas and Lintel, Staircase.</li> </ul>		
<p><b>Topic.4. PERSPECTIVE DRAWING</b></p> <p><b>Specific objectives :</b></p> <ul style="list-style-type: none"> <li>• <b>Use the principles of perspective drawings</b></li> <li>• <b>Draw perspective drawing of object.</b></li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Definition, Types of perspective , terms used in perspective drawing , principles used in perspective drawing</li> <li>• One Point and Two Point Perspective of small objects such as steps, monuments, pedestals etc.</li> </ul>	04	16
<b>Total</b>	<b>32</b>	<b>100</b>
<ul style="list-style-type: none"> <li>➤ <b>N.B. -- In Term End Examination, Question papers shall be set by allotting maximum 20 marks towards Theory portion and remaining 80 Marks for drawing portion to test the drawing skills.</b></li> <li>➤ <b>In Term End Examination, students shall attempt all Questions including Theory Questions on Drawing Sheet. No separate Answer Book shall be issued to answer the theory questions.</b></li> </ul>		

**Practical:****Skills to be developed:****Intellectual Skills:**

- Read and interpret building drawing
- Plan residential and public building as per requirement
- Apply building rules, regulations and bye-laws

**Motor Skills:**

- Prepare proportionate line plan for residential and public building



- Draw developed plan, elevation, section, site plan, and foundation plan, with neat letterings and dimensions.
- Prepare schedule of openings, area statement
- Write construction notes.

### **LIST OF PRACTICALS (TERM WORK):**

#### **A. SKETCH BOOK**

1. Draw various types of lines, graphical symbols for materials, doors, windows, sanitary and water supply installations, electrical installations, abbreviations as per IS 962:1989 location for bed, sofa, dinning table with chairs, wardrobe etc.
2. Collect one readymade drawing for residential building (1 BHKD or 2BHKD)  
Read various details shown on drawing. write summary of observations on the drawing itself such as orientation of rooms ,placement of doors and windows, wall thicknesses, flooring in rooms and sanitary block, skirting, dado, kitchen platform-size, height etc; room height, chajja projections, staircase-rise, tread, landing etc. attach this drawing with the sketch book.
3. Draw line plans for five Residential Buildings with minimum three rooms and staircase in each with WC and Bath.
4. Draw line plans for five Public Building- School Building, Primary Health Centre, Hospital Building, Bank, Post Office, Hostel, and Canteen.
5. Draw developed plan, Elevation, section, site plan, area statement, schedule of opening and construction notes from given line plan (1BHKD) **OR** (2BHKD) for Load Bearing Structure.

#### **B. FULL IMPERIAL SIZE SHEET (A1) :**

1. Submission drawing, to the scale 1:100,(Sheet no. 1)of single storeyed Load Bearing Residential Building (2BHKD) with Flat Roof and staircase showing developed plan, elevation, section passing through Stair **or** W.C. and Bath, site plan (1:200), area statement, schedule of openings , construction notes.
2. Submission drawing, to the scale 1:100, of (G+1) Residential Building Framed Structure (2 BHKD with attached toilet to 1 bedroom showing the position of European type WC pan) showing developed plan, elevation, section passing through staircase, site plan (1:200), foundation plan (1:50), area statement, schedule of openings. (Also Show the place for Washing machine, WHB, Pooja, store, bed, dinning table with chairs, sofa, wardrobe etc.)
3. Working drawing of Sheet No 1 to the scale 1:50, showing developed plan, elevation, section passing through staircase **or** W.C.and Bath and Component Drawing of RCC Lintel and Chajjas. Shows detailed enlarge section.

4. Two Point Perspective Drawing of small objects - steps, monuments, pedestals (**any one**) scale 1:50

**Learning Resources:**

**1. Books :**

Sr. No.	Title	Author	Publisher
1.	Building Drawing	M.G. Shah, CM Kale, S.Y. Patki	Mc Graw Hill
2.	Planning and design of Building	Y.S. Sane	Allied Publishers
3	Civil Engineering Drawing	Malik and Mayo	New Asian Publishers
4.	Principles of Perspective Drawing	M. G. Shah & C. M. Kale	Mc Graw Hill
5.	Building Planning and Drawing	Dr N Kumara Swamy and A Kameshwara Rao	Charotar Publication

**2. IS, BIS and International Codes:**

- SP-41 (S&T) (1987) ISI Handbook of functional requirements of buildings other than industrial building
- SP-35 (S&T) (1987) ISI Handbook water supply and drainage with special emphasis on plumbing
- IS 962- 1989 code of practice for architectural and building drawing
- IS 1742: 1972 Code of practice for building drainage
- SP-27 ( 1987) Handbook of methods of measurements of building works
- Data book – National Building code, CBRI Publication.
- Sandeep Mantri , reference book, “A TO Z Practical Building construction and its Management” , Satya Prakashan, New Delhi

**3. Websites:**

- [http://www.greenhomebuilding.com/sustainable\\_architecture.htm](http://www.greenhomebuilding.com/sustainable_architecture.htm)
- [http://www.cgarchitect.com/upclose/VI/Week23/VI\\_Week23.pdf](http://www.cgarchitect.com/upclose/VI/Week23/VI_Week23.pdf)

**Course Name : Civil Engineering Group**

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

**Semester : Third**

**Subject Title : Surveying**

**Subject Code : 17310**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	04	03	100	50#	--	50@	200

**NOTE:**

- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

**Rationale:**

Surveying is of special specific importance and interest to a civil engineer. Variety of surveys are required to be conducted prior to and during the planning and construction of any infrastructure development in various civil engineering projects like Building Construction, Irrigation Engineering, Transportation Engineering, Water Supply and Sanitary Engineering Systems etc.

Surveying is the basic need for any project or constructional scheme under consideration. Details of proposed work are plotted from the field notes. The reliability of the estimation of quantities and effectiveness of design depends upon the precision and thoroughness exercised during the detailed survey.

Topic on various surveying instruments like Chain, Tape, Cross-staff, Prismatic Compass, Plane-Table and Leveling instruments are useful for preparation of various preliminary, detailed and construction surveys. Contents on Planimeter are useful for measuring regular and irregular areas on plan or map which is further useful in estimating the volumes.

Knowledge and skills acquired by the students in the subject would enable them to prepare plans/maps. These plans/maps will be further used for effective planning, designing, estimating and executing civil engineering construction work.

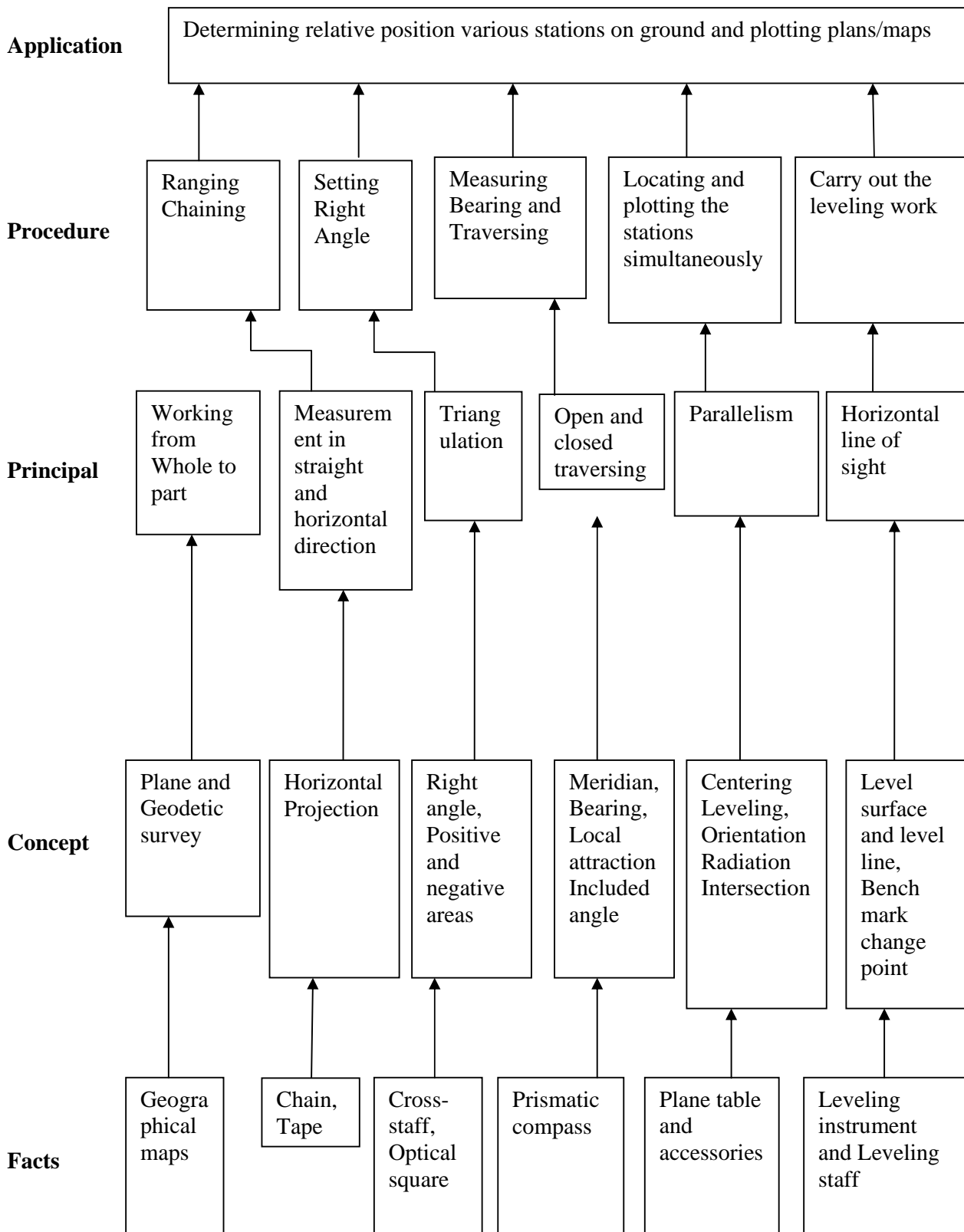
This further will lead the students as professionals in surveying.

**General Objectives:**

Student will be able to:

- Understand the need of surveying.
- Understand handling and use of different survey instruments for the field operations.
- Understand linear and angular measurements
- Select suitable instruments and appropriate method of survey..
- Understand the preparation of plans/maps by using field observations.
- Read and interpret survey plans/maps.

**Learning Structure:**



**Theory:**

Topic and Contents	Hours	Marks
<p><b>Topic 1. Introduction</b> Specific objectives :</p> <ul style="list-style-type: none"> <li>➤ Define and state use of surveys</li> <li>➤ Classify the survey stating the basis of classification</li> </ul> <p><b>Contents</b></p> <ul style="list-style-type: none"> <li>• Definition of survey, Objects of different surveys, Uses of surveys.</li> <li>• Classification of surveys- Primary and Secondary, Primary Division-Plane and Geodetic Surveys, Secondary- Based on instruments used, Nature of field and Objective. Principles of survey.</li> <li>• Conventional symbols in survey plans/maps.</li> </ul>	06	08
<p><b>Topic 2. Linear Measurements</b> Specific objectives :</p> <ul style="list-style-type: none"> <li>➤ Describe construction and use different instruments for linear measurements</li> <li>➤ Describe the method of linear measurement</li> </ul> <p>Contents:</p> <ul style="list-style-type: none"> <li>• Study and use of instruments for linear measurements- Metric chain, Measuring Tapes and its types, Ranging rod, Arrow, Peg, Digital tape, Methods of linear measurements- By pacing, by speedometer, by chaining, by digital tape.</li> <li>• Ranging- Direct and indirect ranging and procedure, Code of signals used in ranging</li> <li>• Chaining-Procedure on plane and sloping ground. Correction of linear measurement for incorrect length of chain/tape. (Simple problems)</li> </ul>	09	12
<p><b>Topic 3. Chain Triangulation and cross staff survey.</b> Specific objectives :</p> <ul style="list-style-type: none"> <li>➤ Write construction and use of different instruments for setting offsets</li> <li>➤ Calculate the area of field</li> </ul> <p>Contents:</p> <ul style="list-style-type: none"> <li>• Principles of chain survey-Triangulation, Survey station types and their selection, survey line, Base line, Check line, Tie line. Offset, Types of offsets- Long, Short, Perpendicular and oblique, Instrument for setting offsets- Open cross staff, optical square, Principle of optical square, Setting offset with open cross staff and optical square. Survey field book and recording entries.</li> <li>• Chain and Cross staff survey for finding area of the field. Simple numerical problems Types of obstacles in chaining and methods of overcoming them. Simple numerical problems.</li> </ul>	10	16
<p><b>Topic 4. Compass Traverse Survey</b> Specific objectives :</p> <ul style="list-style-type: none"> <li>➤ Describe construction and state use of prismatic compass.</li> <li>➤ Describe the method of compass traversing.</li> </ul> <p>Contents:</p> <p>4.1.....(12)</p> <p>Principle of compass survey- Traversing, Prismatic compass- Component parts and their functions, setting of compass,. Meridian- True meridian,</p>	15	24

<p>magnetic meridian and arbitrary meridian. Magnetic declination, dip of needle. Bearing of a line- True bearing, Magnetic bearing and arbitrary bearing. Systems of bearing- Whole circle bearing and Quadrantal bearing, Fore and back bearing of line and their relationship.</p> <p>4.2.....(12)</p> <p>Compass traversing-Open and close traverse, Local attraction and its detection. Correction for local attraction and finding corrected bearings and included angles. Numerical problems. Plotting the compass traverse and its graphical adjustment by Bowditch Rule. Sources of errors in compass survey.</p>		
<p><b>Topic 5. Plane Table Survey</b></p> <p>Specific objectives :</p> <ul style="list-style-type: none"> <li>➤ Describe different methods of orientation of Plane Tabling.</li> <li>➤ Locate and plot the stations simultaneously.</li> </ul> <p>Contents:</p> <ul style="list-style-type: none"> <li>• Principle of plane table survey. Different accessories of plane table and their use. Setting of plane table, Telescopic alidade and its advantages.</li> <li>• Orientation of plane table- Back sighting and Magnetic meridian. Methods of plane table surveys- Radiation, Intersection and Traversing. Merits and demerits of plane table survey.</li> </ul>	08	12
<p><b>Topic 6. Levelling</b></p> <p>Specific objectives:</p> <ul style="list-style-type: none"> <li>➤ State meaning of different terms used in leveling.</li> <li>➤ Write construction and use of Dumpy Level and Auto Level.</li> <li>➤ Describe the method of carrying out different types of leveling.</li> </ul> <p>Contents:</p> <p>6.1.....(08)</p> <ul style="list-style-type: none"> <li>• Concept of leveling. Meaning of terms used in leveling- Level surface, Level line, Horizontal surface and line, Vertical line, Datum line, Reduced Level, Bench Mark and its types.</li> <li>• Levelling instruments- Dumpy level and Auto level. Dumpy level- Component parts, Line of collimation, Axis of telescope, Axis of bubble-tube and their relationships, temporary adjustment, permanent adjustment of dumpy level(only relationship of different axes of dumpy level). Auto Level- Component parts and temporary adjustments. Advantages of Auto Level. Leveling Staff- Telescopic.</li> </ul> <p>6.2.....(08)</p> <ul style="list-style-type: none"> <li>• Fore Sight, Back Sight, Intermediate Sight, Negative staff reading, Change point, Height of plane of collimation, Station point, Rise and Fall, Level book and its recording,</li> <li>• Methods of leveling- Simple levelling, Differential levelling, Profile and Cross sectioning, Fly levelling, Check levelling and reciprocal levelling</li> </ul> <p>6.3.....(12)</p> <ul style="list-style-type: none"> <li>• Method of reduction of level- Height of instrument, Rise and Fall method. Arithmetic check. Numerical problems.</li> <li>• Sources of errors in leveling, precautionary measures.</li> </ul>	16	28
<b>Total</b>	<b>64</b>	<b>100</b>

**Practicals:****Skills to be developed****Intellectual Skills:**

- Identify the different instruments for linear measurement and leveling.
- Select various types of survey instruments for specific survey work.
- Identify the errors in the survey instruments.
- Reading and Interpretation of drawing (plans/maps)

**Motor Skills:**

- Measure distances, Bearings and calculate Reduced Levels.
- Recording of survey field data collected in Field Book and Leveling Book.
- Prepare drawing (plans/maps) using survey data.

**List of Practicals:****Instructions:**

- Group size for survey practical shall be about five students.
- Each teaching staff shall handle maximum two groups.
- Students shall record the observations in Field Book in the field itself.
- One full day per project is required for mini project survey work.
- Drawing and plotting should be considered as a part of practical.
  1. Measurement of distances with chain and tape on ground with direct and indirect ranging.
  2. Use Optical Square and Open Cross Staff for setting out perpendicular and running a survey line for locating details. Drafting page of field book.
  3. Measurement of area of selected field by Chain and Cross Staff survey.
  4. Setting Prismatic Compass and observe Fore and Back bearings.
  5. Measuring Fore and Back Bearings of 5-6 side closed traverse. Identifying stations affected by local attraction and calculating corrected F.B. and B.B. and included angles. Apply arithmetic check for sum of interior angles.
  6. Carry out the temporary adjustments of Plane Table and locating details by Radiation Method.
  7. Locating details by Intersection method.
  8. Carry out the Plane Table traverse of 4-5 sides.
  9. Use of Dumpy Level, its temporary adjustments and carry out the simple leveling. Reduction of level by H.I. method and rise and fall method.
  10. Use of Auto Level, its temporary adjustments and carry out the differential leveling. Reduction of level by Rise and Fall method.
  11. Carrying Bench Mark one point to other point about 200 m by Fly leveling using Auto Level.
  12. Profile leveling and Cross Sectioning for 60 m length with spot level at 10 m interval and cross section at 20 m intervals.
  13. Carry out the permanent adjustment of dumpy level
  14. Check permanent adjustment of auto level.

**Mini Projects:**

1. Chain and Compass survey for a closed traverse (5-6) sides and locating the details of buildings, roads and other details. Plotting of the corrected traverse on A1 size imperial drawing sheet.
2. Plane Table survey for a closed traverse (5-6) sides and locating the details of buildings, roads and other details. Use A1 size imperial drawing sheet.
3. Profile Levelling and Cross Sectioning for 500 m length. Spot levels at 10 m interval and 30 m cross section at 50 m interval. Plotting Plan, longitudinal section and cross section on A1 size imperial drawing sheet (show the formation level on drawing and write values in the columns for gradient, formation level, height of banking, depth of cutting, nature of soil on the drawing of profile leveling. This may be used for estimating purpose in 5<sup>th</sup> semester.

**Learning Resources:****Books:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>
1	Surveying and Leveling- 38 <sup>th</sup> edition.	N.N. Basak	Tata McGraw Hill
2	Surveying- Volume-I, Third Edition	S.K. Duggal	Tata McGraw Hill
3	Surveying and Leveling-I	T.P. Kanetkar and Kulkarni	Pune Vidyarthi Grigh Prakashan
4	Surveying and Leveling-I	Dr. B.C. Punmia	Laxmi Publication
5	Surveying and Leveling	R. Subramanian	Oxford university press



**Course Name : Civil Engineering Group**

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

**Semester : Third**

**Subject Title : Mechanics of Structure**

**Subject Code : 17311**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	01	02	03	100	--	25#	25@	150

**NOTE:**

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

**Rationale:**

The structures are constructed by using different materials like steel, wood and reinforced cement concrete etc. These structures are subjected to different types of loads such as axial load, eccentric load, shear load and transverse load etc. The subject deals with the study of the mechanics of deformable bodies, strength and other mechanical properties of materials.

The topic on shear force and bending moment, different stresses and shear stresses at critical locations will be useful to analyze the internal behaviour of structural member under different combinations of loads.

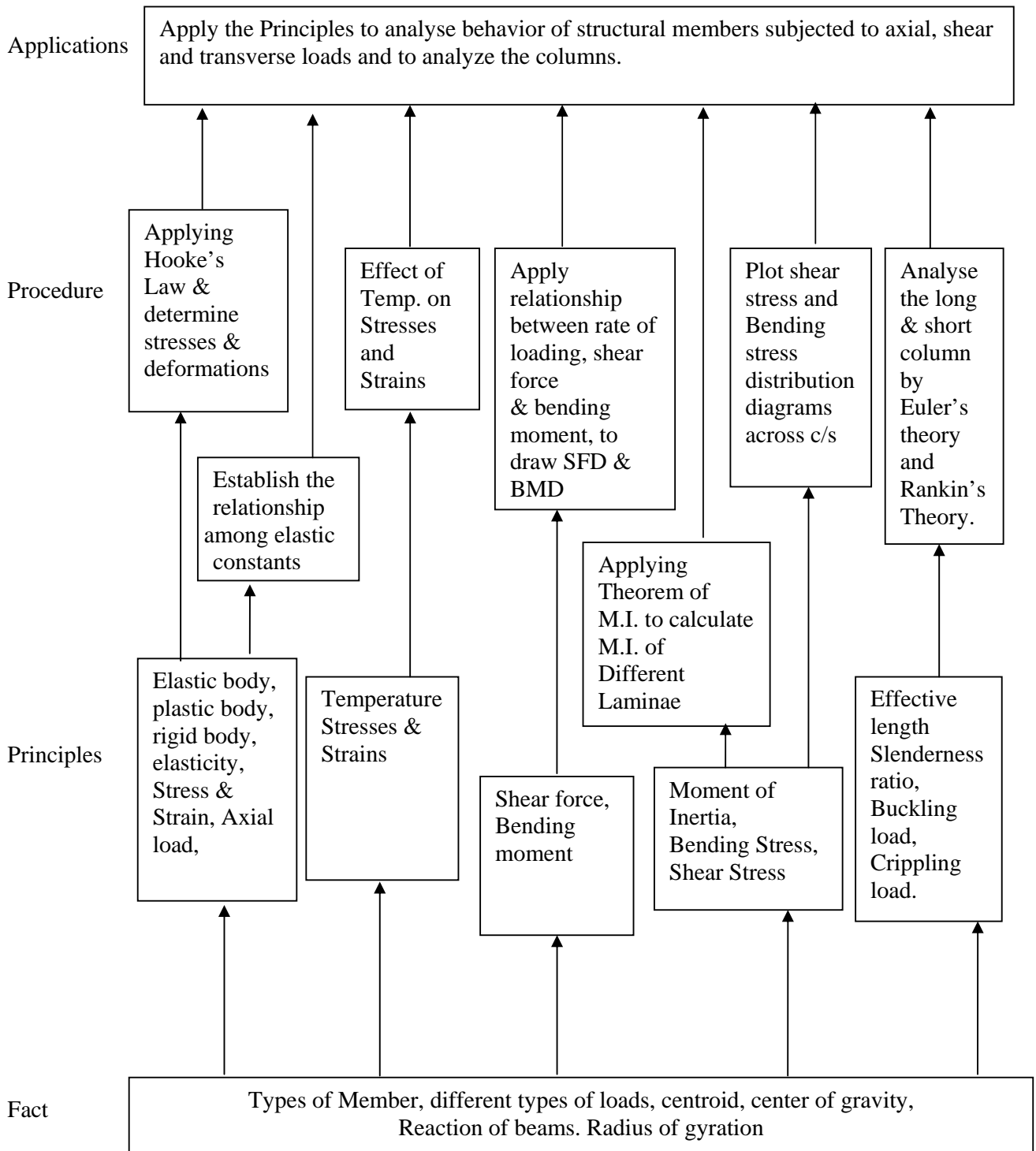
The knowledge gained in this subject is useful to study further the subjects like Theory of structures, Design of steel structures, Design of R. C. structures, Hydraulics, Geotechnical Engineering etc.

**General Objectives:**

The students will be able to:

- Understand various mechanical properties of materials.
- Understand the behavior of members under different types of load.
- Apply principles of equilibrium for determining shear force and bending moment for a given beam.
- Understand the principles of calculating moment of Inertia for simple and composite sections.

**Learning Structure:**



**Theory:**

Sr. No	Topic and Contents	Hours	Marks
1	<p><b>Topic 1: Moment of Inertia</b>  <b>Specific Objectives :</b></p> <ul style="list-style-type: none"> <li>➤ Calculate moment of inertia Standard plane figures.</li> <li>➤ Calculate moment of inertia, Radius of gyration of Built up sections.</li> </ul> <p><b>Contents :</b></p> <ul style="list-style-type: none"> <li>• Concept of Moment of Inertia, Moment of Inertia of plane areas such as square, rectangle, triangle, circle, semicircle and quarter circle</li> <li>• Parallel axis and perpendicular axis theorem, M.I of built up sections, symmetrical and Unsymmetrical sections, radius of gyration and polar moment of inertia.</li> </ul>	06	16
2	<p><b>Topic 2: Simple Stress and Strain</b>  <b>Specific Objectives :</b></p> <ul style="list-style-type: none"> <li>➤ Draw stress-strain curve for ductile and brittle materials and locate salient points.</li> <li>➤ Calculate deformation of body subjected to axial load.</li> <li>➤ Calculate stress and strains of composite sections subjected to axial load</li> </ul> <p><b>Contents :</b></p> <ul style="list-style-type: none"> <li>• Definition of rigid body, plastic body, mechanical properties of metal such as elasticity and elastic limit.</li> <li>• Definition of stress, strain, modulus of elasticity, S. I. Unit. Classification of stress, strain, Sign convention. Stress, strain curve for mild steel and HYSD bar, yield stress/ proof stress, Ultimate stress, breaking stress and percentage elongation.</li> <li>• Deformation of body due to axial load. Deformation of a Body subjected to axial forces. Deformation of body of stepped cross section due to axial load, maximum stress and minimum stress induced. Stresses in bars of composite section and deformation.</li> <li>• Shear stress, shear strain and modulus of rigidity, complementary shear stress, state of simple shear, punching shear.</li> </ul>	10	16
3	<p><b>Topic 3: Elastic Constants</b>  <b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Calculate change in dimensions and volume of the body subjected to uniaxial, biaxial, triaxial loads.</li> <li>➤ Calculate different modulli by using relations between E, G, K and <math>1/m</math>.</li> <li>➤ Calculate stress and strain of the body subjected to Temperature.</li> </ul> <p><b>Contents :</b></p> <ul style="list-style-type: none"> <li>• Definition of lateral strain, Poisson's ratio, Change in lateral dimensions</li> <li>• Volumetric strain due to uni-axial force and change in dimension, Biaxial and tri-axial stresses and volumetric strain and change in volume</li> </ul>	08	16

	<ul style="list-style-type: none"> <li>• Definition of bulk modulus, volumetric strain.</li> <li>• Relation between modulus of elasticity, modulus of rigidity and bulk modulus.</li> <li>• Definitions of temperature stress and strain, Nature of stress and strain due to change in temperature (no composite sections) in a bar.</li> </ul>		
4	<p><b>Topic 4: Shear Force And Bending Moment :</b>  <b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ Classify different types of loads and beams and calculate end reactions.</li> <li>➤ Calculate shear force and bending moments for different load combinations of loading.</li> <li>➤ Draw Shear force and Bending Moment diagrams and locate salient points.</li> </ul> <p><b>Contents :</b></p> <ul style="list-style-type: none"> <li>• Types of beams - cantilever, simply supported, fixed and continuous beams with overhang, types of loading- point load, uniformly distributed load, support reactions for determinate structures</li> <li>• Concept of shear force and bending moment, sign convention. Relation between bending moment, shear force and rate of loading</li> <li>• Shear force and bending moment diagrams for simply supported beams, overhanging beams and cantilever subjected to point loads, UDL and couples, (combination of any two types of loading) point of contra flexure</li> </ul>	08	16
5	<p><b>Topic 5: Stresses In Beams:</b>  <b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Calculate bending stresses and shear stresses in beams of various cross sections.</li> <li>➤ Draw bending stress and shear stress distribution diagram.</li> </ul> <p><b>Contents :</b></p> <p><b>5.1 Bending Stresses (08)</b></p> <ul style="list-style-type: none"> <li>• Bending Stresses in Beams: Concept of pure bending, theory of simple bending, assumptions in theory of bending, neutral axis, bending stresses and their nature, bending stress distribution diagram, moment of resistance.</li> <li>• Application of theory of bending to symmetrical and unsymmetrical sections.</li> </ul> <p><b>5.2 Shear Stresses (08)</b></p> <ul style="list-style-type: none"> <li>• Shear stresses in beams: Shear stress equation, meaning of terms in equation, shear stress distribution for rectangular, hollow rectangular, circular sections and hollow circular sections</li> <li>• Relation between maximum shear stress and average shear stress</li> </ul>	08	16
6	<p><b>Topic 6: Column</b>  <b>Specific Objectives :</b></p> <ul style="list-style-type: none"> <li>➤ Classify the columns.</li> <li>➤ Calculate safe load carrying capacity of column.</li> <li>➤ Calculate Dimension of column for given load.</li> </ul> <p><b>Contents :</b></p> <ul style="list-style-type: none"> <li>• Definition, classification of column, Buckling of axially loaded</li> </ul>	04	12

	<p>compression member, Types of end conditions for column, effective length, radius of gyration, slenderness ratio.</p> <ul style="list-style-type: none"> <li>Assumptions in the theory of long column, Euler's theory, buckling load and Rankine's theory, crippling load, factor of safety, safe load.</li> <li>Application of Rankine's and Euler theory, designing solid circular or hollow circular sections, Limitations of Euler's formula. Simple numerical problem</li> </ul>		
7	<p><b>Topic 7: Strain Energy</b>  <b>Specific Objectives :</b></p> <ul style="list-style-type: none"> <li>➤ Calculate strain energy on body subjected to different loads.</li> <li>➤ Comparison of stresses on body subjected to different loads.</li> </ul> <p><b>Contents :</b></p> <ul style="list-style-type: none"> <li>Strain energy – Definition, calculation of strain energy due to types of loading – gradual, suddenly applied load &amp; Impact load</li> <li>Modulus of resilience and proof resilience – meaning of the term, simple examples.</li> <li>Comparison of stresses due to gradual load, sudden load and impact load.</li> </ul>	04	08
<b>Total</b>		<b>48</b>	<b>100</b>

**Practicals:****Intellectual Skills:**

1. Interpret the results.
2. Apply different parameters to understand the of structural member.

**Motor Skills:**

1. Observe the phenomenon during testing of specimen.
2. Draw the graphs and diagrams.

**List of Practical:****Group – A**

1. Identify the components and understand the operation of universal testing machine by taking trial on sample test pieces.
2. Tension test on mild steel/ Tor steel
3. Izod and Charpy Impact test on three metals. eg. mild steel/ brass/aluminum/ copper / cast iron etc.
4. Flexural test on timber beam on rectangular section and square section having same cross-sectional area.
5. Flexure test on floor tiles or roofing tiles.
6. Single Shear and double shear test on any two metals eg. Mild steel/ brass/aluminum/ copper / cast iron etc.
7. Water Absorption and Compression test on bricks on dry and weight bricks.
8. Abrasion Test on flooring tiles (any two) eg. Mosaic tiles, Ceramic Tiles, Cement Tiles.

**Group – B**

1. Drawing of Shear force and Bending Moment diagrams of cantilever, simply supported and overhanging beams for different types of loads two problems on each type of beam

on a A4 size graph paper. From group of 4 to 5 student. Each group shall be given different types of problem.

### List of Tutorials:

The tutorials shall be conducted with a batch of 20 students. Form a group of five students. Each group shall be allotted five different types of problem on the following topics. Problems shall be submitted in separate note book Teacher shall provide the feed back to the student on the submitted.

- Stress and strain.
- Change in length of compound bars & varying forces at different locations.
- Elastic constant and temperature stresses.
- Change in dimensions, volume.
- Draw SFD and BMD. for any two combination of loading
- Moment of Inertia.
- Bending stresses.
- Shear stresses.
- Column.
- Strain energy.

### Learning Resources:

#### 1. Books:

Sr. No.	Title	Author	Publisher
01	Strength of Materials	R. S. Khurmi	S. Chand & Company Delhi
02	Mechanics of materials	R. C. Hibbeler	Pearson Education
03	Strength of materials	S. S. Bhavikatti	Vikas Publishing House
04	Strength of Materials	B. K. Sarkar	Tata McGraw -Hill
05	Strength of Material	S. Ramamurtham	Dhanpat Rai and sons
06	Strength of material	R. K. Bansal	Laxmi Publications

#### 2. Websites: [www.nptel.com](http://www.nptel.com), [www.nittr.com](http://www.nittr.com)

**Course Name : Civil Engineering Group**

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

**Semester : Third**

**Subject Title : Professional Practice-I**

**Subject Code : 17018**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	03	--	--	--	--	50@	50

**Rationale:**

Students are provided the opportunity to learn different subjects which encourages development of related intellectual and motor skills amongst them. These skills are further to be incorporated with various activities in the work environment further. This is introduced through this subject.

Students are expected to have updated knowledge, current developments in industries and innovations in the field of Civil engineering.

Students' participation in the above mentioned curriculum activities will enhance his confidence, attitude, communication skills also. The exposure to industries, interaction with experts in civil engineering field will enable a learner to improve upon his own personal abilities and will help in decision making ability.

Field visits will visualize the structure under construction/completed structures, materials, equipments & processes involved in execution of work.

Preparing and delivering seminar by students will lead to acquire communication skills, express his views and technical knowledge, answering queries, convincing ability, presentation skills.

Data collection involves visiting to markets, material suppliers, industries, manufacturers, etc by way of which students learn data collection techniques, preparation, analysis and presentation of it. This shall be helpful to them when they work at sites or in industries or become entrepreneurs.

**Practicals:-**

**Objectives:-**

**To develop the following skills-**

**Intellectual Skills:**

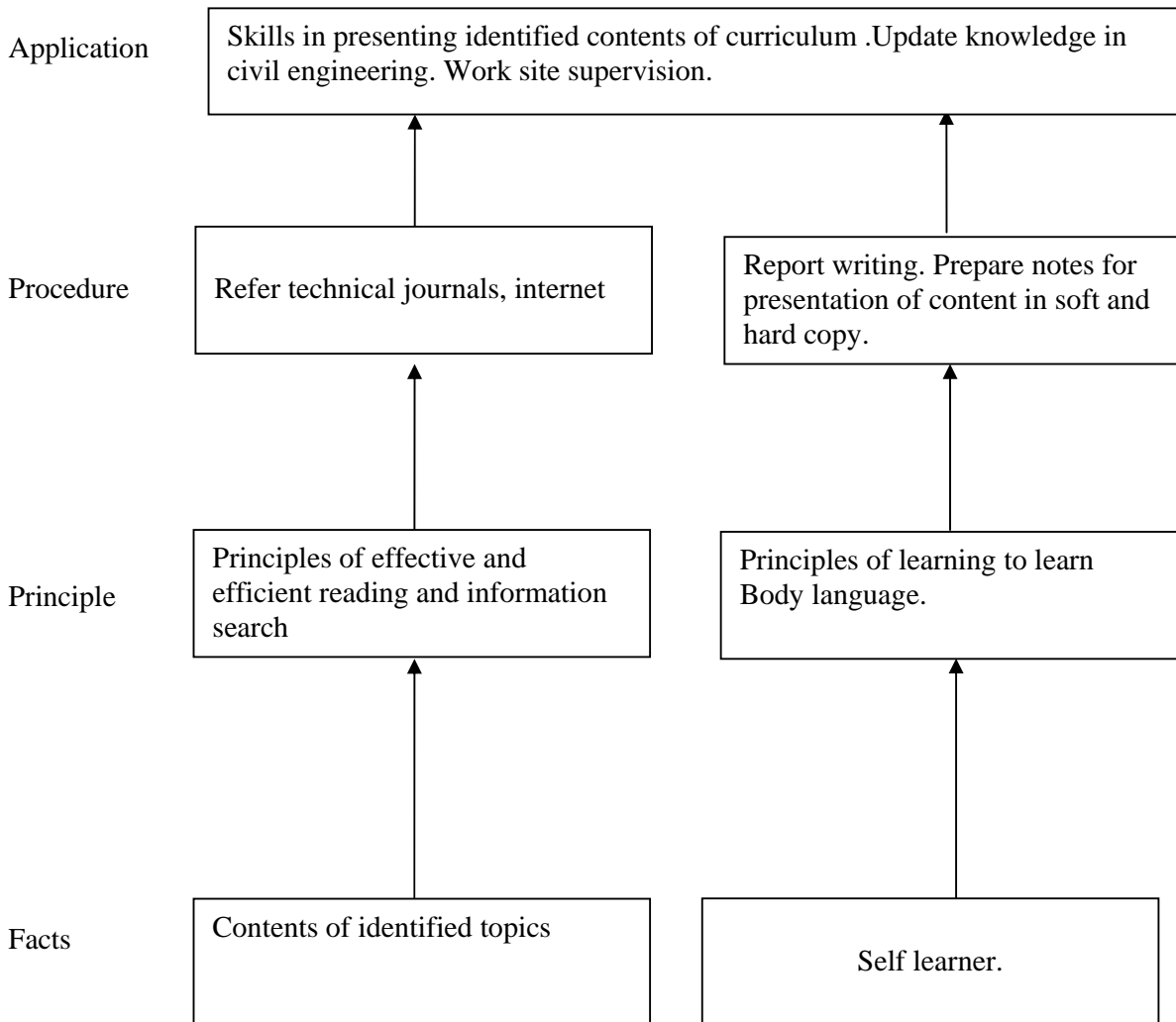
1. Understand application of civil engineering concepts, latest technologies at the visited site
2. Listen and grasp the views of experts
3. Do literature survey, access internet for the preparation of seminar on the topic.

- 4. Understand the technique for asking questions and conducting interviews for the collection of data.

**Motor Skills:**

- 1. Write a report on visits.
- 2. Present with Power point
- 3. Get Feedback from guest lectures
- 4 Organize and structure the collected information.

**Learning Structure:**





**List of Activities:**

<b>Activity</b>	<b>Name of the Activity</b>	<b>Hours</b>
1	<p><b>Field Visits-</b> Structured field visits (minimum three) be arranged and report of the same should be submitted by the individual student, to form a part of the term work. The field visits may be arranged in the following areas / industries:</p> <ul style="list-style-type: none"> <li>i) Completed Residential/Public building for planning principles</li> <li>ii) Residential/Public building under construction for sub /super structure detailing</li> <li>iii) Civil engineering structure during concreting work</li> <li>iv) Civil engineering structure during brickwork/stone masonry</li> <li>vi) Residential/Public building for finishing items.</li> <li>vii) Cement/lime manufacturing unit</li> <li>viii) Aggregate crusher plant.</li> <li>ix) Tile factory.</li> <li>x) Ready mix Concrete plant.</li> <li>xi) Hot mix plant</li> </ul>	18
2	<p><b>Lectures by Professional / Industrial Expert to be organized from of the following areas (any two)</b></p> <ul style="list-style-type: none"> <li>i) Quality in construction</li> <li>ii) New trends in civil engineering</li> <li>iii) Software for drafting</li> <li>iv) Low cost housing</li> <li>v) Building Bye laws</li> <li>vi) Body language</li> <li>vii) Equipments/machinery involved in earthwork.</li> </ul>	10
3	<p><b>Seminar:</b> Any one seminar on the topics suggested below: Students ( Group of 4 to 5 students) has to search /collect information about the topic through literature survey, visits and discussions with experts/concerned persons: Students will have to submit a report of about 10 pages and deliver a seminar for 10 minutes on topics like -</p> <ul style="list-style-type: none"> <li>1. Problems of drinking water in rural area</li> <li>2. Comparative study of various types of bricks.</li> <li>3. Suitability of foundation for given site conditions of soil and loading.</li> <li>4. New trends in concrete technology.</li> <li>5. Formwork, centering and scaffolding</li> <li>6. Advanced materials of construction.</li> <li>7. Vertical communication for Tall buildings.</li> <li>8. Cracks in structures –causes, prevention, remedies.</li> </ul>	12
4	<p><b>Market Survey:</b> A group of four students is expected to collect information from the market regarding specifications and cost of any four items, used in building construction such as plumbing accessories, Floor tiles, Fasteners, Paints, Door panels, Glasswork, sunmica, foremica, etc. and submit a report on comparative study.</p>	08
<b>Total</b>		<b>48</b>

**Assignments for Term work to be done by students-**

- 1) Write report on Field visit no 1 with following point.
- 2) Write report on Field visit no 2 with following point.
- 3) Write report on Field visit no 3 with following point.
  - Points (Guide lines) for writing report of field visits: (Sr. No. 1, 2, 3)  
Title of visit, date of visit, place of visit, address of place of visit, contact number, type of project, cost of project/unit, Flow chart, output of project, Material Management, organisational structure, tools and plants used, advance techniques used, safety measures, photographs (wherever possible), Xerox copy of plans / drawing, sketches etc. conclusion.
- 4) Write summary on the guest lecturer no 1 with subject matter on its topic
- 5) Write summary on the guest lecturer no 2 with subject matter on its topic
  - Guidelines for summary of guest lecture (Sr. no. 4, 5):  
Title of guest lecture, name and designation of the guest, Introduction of the topic (mention points like past history, Purpose, need, why it is necessary to learn this topic).  
Content (shall include block diagram / flow diagram / arrow diagram / line sketches / Photographs and the description of the same. Process involved if any. State situation where this is applicable, salient points, conclusion.
- 6) Seminar topic – hard copy.
- 7) Seminar topic – Soft copy.
  - Seminar Copy (Hard and Soft Copy) (Sr. no. 6, 7):  
This shall include - Name of topic, introduction, (Stating necessity / need, purpose) State concept and procedure involved. Draw concept structures for the terms included; block diagram, state merits and limitations (if any). Give cost analysis wherever possible with Pie Charts, bar charts etc. Soft copy shall have the presentation frames to be submitted in soft copy on CD.
- 8) Market survey information collected and its analysis if any.
  - Market Survey (Sr. No. 8):  
Name of topic, introduction (need and purpose), collect information from market (Mention 2-3 names of the shops / enterprises) Specification of the item, collect drawing, leaflet, line sketches, photographs, technical details (size, thickness, material etc.) packing (in kg, in bundle, in meter, in number etc.) Comparative study of cost if any. Where used (application), conclusion.

**Learning Resources:****1) Books:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>
1	Planning and Design of Building	Y. S. Sane	Allied Publishers
2	P.W.D. Hand book	Govt. of Maharashtra	--
3	Practical Civil Engineering Hand Book	Khanna	Khanna Publications

**2) CDs and PPT:**

1 Super Civil CD etc. for gathering required information before visit / guest lecture / seminar / market survey.

**3) IS/BIS Code:** IS: 2386, 4031, BIS 962-1989 Code of Architectural and Building Drawing. BIS 1256-1967 code for Building Bye laws

**4) Websites:** on Google search refer various websites related to –

- 1) How to write report
- 2) How to prepare for seminar
- 3) Effective listening

e.g. <http://www.lboro.ac.uk/service/ltd/campus/reportwr.pdf>  
<http://unilarning.uow.edu.au/report/5b.html>