 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES																	
COURSE NAME : CIVIL ENGINEERING GROUP																	
COURSE CODE : CE/CS/CR/CV																	
DURATION OF COURSE : 6 SEMESTERS for CE/CS/CR (8 SEMESTERS for CV)											WITH EFFECT FROM 2012-13						
SEMESTER : THIRD											DURATION : 16 WEEKS						
PATTERN : FULL TIME - SEMESTER											SCHEME : G						
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		
Total				16	01	15	--	500	--	50	--	50	--	200	--	50	

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:

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

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

Learning Resources:**1) Books:**

Sr. No	Title	Authors	Publication
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

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.

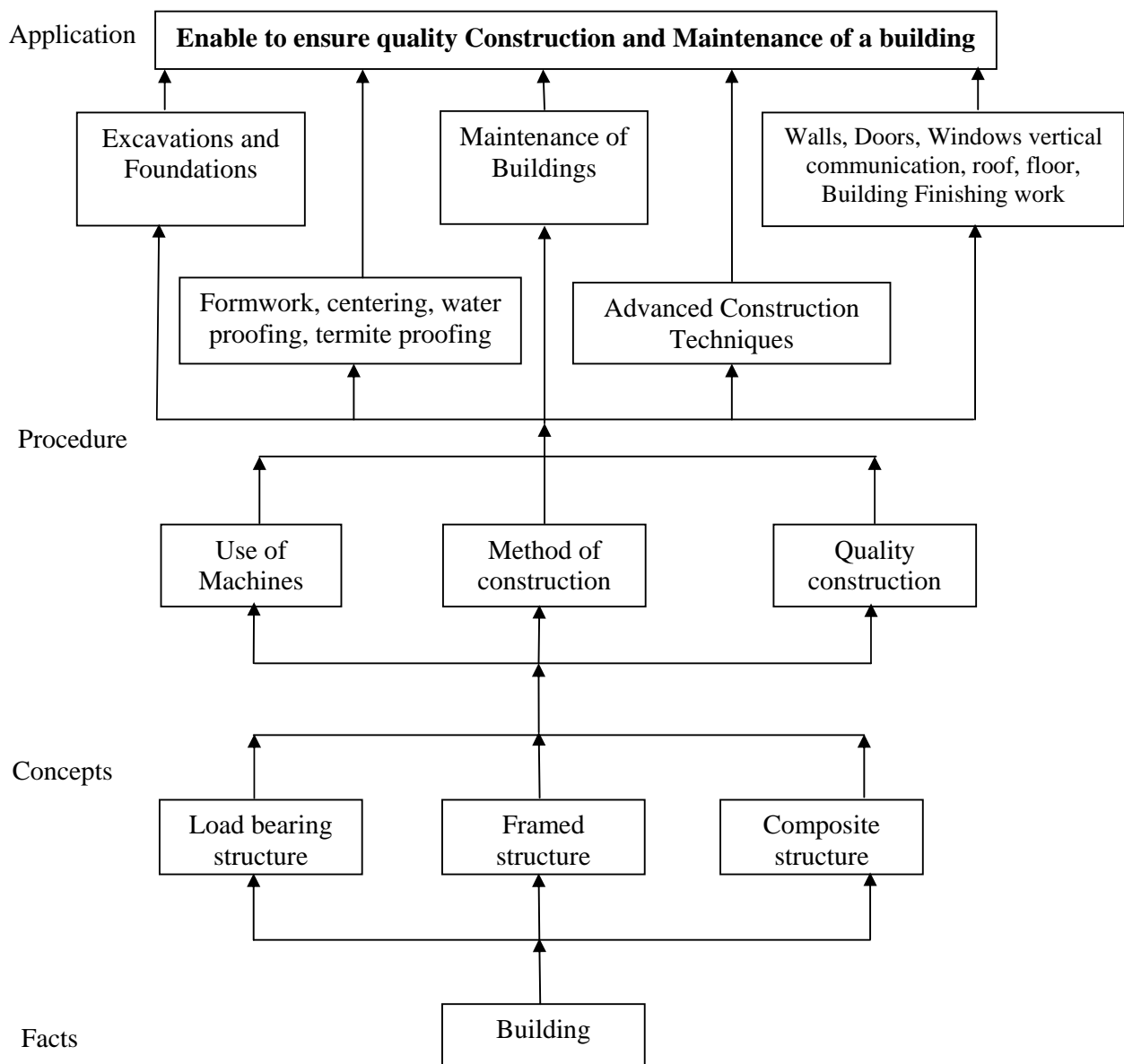
Thus the knowledge and skill acquire by the learner would enable them to plan and execute the building construction effectively.

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>Topic – 1 Building Structures And Components</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Classify various types of structure ➤ List various components of building and their function ➤ Draw sketches and label the parts of various components. <p>Contents :</p> <ul style="list-style-type: none"> • Load bearing , Framed and composite structure • Sub structure: foundation, Plinth and DPC its function. • Super structure: Wall, sill, lintel, doors and windows, floor, roof, parapet, slab, columns, beams, and their functions. • General design Principles of Earthquake Resistant structures: while planning and during construction 	04	08
<p>Topic – 2 Construction of Sub Structure</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Set out layout of building structure on ground ➤ State various terms related to substructure. ➤ Classify the foundations. ➤ List the precautions in construction of foundation <p>Contents:</p> <p>2.1 -----(08)</p> <ul style="list-style-type: none"> • 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. • Excavation for foundation, timbering and strutting for foundation trench, dewatering of foundation, tools and plants used for excavation. <p>2.2----- (12)</p> <ul style="list-style-type: none"> • 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. 	12	20

<p>Topic – 3 Construction of Superstructure</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State terms used in various masonry ➤ Describe various types of masonry ➤ Sketch and label various components of super structure <p>Contents :</p> <p>3.1 –Masonry Work-----(12)</p> <ul style="list-style-type: none"> • 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. 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. • Comparison between stone masonry and Brick Masonry. • Tools and plants required for construction of stone masonry and brick masonry. • Hollow concrete block masonry and composite masonry. • Scaffolding: Necessity, component parts and types of Scaffolding , Scaffolding and platforms used for multi storeyed building <p>3.2 –Doors and windows-----(06)</p> <p>Door & 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>3.3 Vertical Communications----- (06)</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>Topic – 4 Floors and Roofs</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State types of floors and floor finishes ➤ Identify types of roofs. <p>Contents :</p> <p>a) Types of floors – Mud floor, wood floor, stone floor, concrete floor (construction and suitability).</p> <ul style="list-style-type: none"> • Types of floor finishes- Shahabad, Kota, marble, granite, kaddappa, ceramic, vitrified, marbonite, chequered tiles (construction procedure). • Pavement blocks, tremix floors, skirting and dado • Mezzanine Floors, location and use. <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"> • Comparison between pitched and flat roof. 	04	08

<p>Topic – 5 Finishing works</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ State procedure of plastering, pointing and painting ➤ State terms and list tools used in plastering and pointing ➤ Identify defects in plastering and painting <p>Contents :</p> <ul style="list-style-type: none"> • 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. • Pointing : Necessity, types and procedure of pointing • 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. 	08	10
<p>Topic – 6 Miscellaneous works (Centering , allied process and maintenance)</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ Distinguish form work and centering ➤ State procedure for Water proofing construction for RCC slab and sanitary block ➤ State procedure of termite proofing ➤ Do Maintenance of building <p>Content</p> <ul style="list-style-type: none"> • 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. • Water proofing – necessity and importance, water proofing procedure for RCC slab and sanitary blocks, during the construction and after construction. • Termite proofing – necessity and importance. Pre-construction termite proofing and post construction termite proofing. • Building maintenance • Cause and types of cracks in masonry walls, plaster, concrete slabs, beams, columns, staircases, identification and repairs of cracks. • Settlement – cause and remedial measures • Plinth protection – necessity and material used • Rebaring techniques 	08	10

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

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.

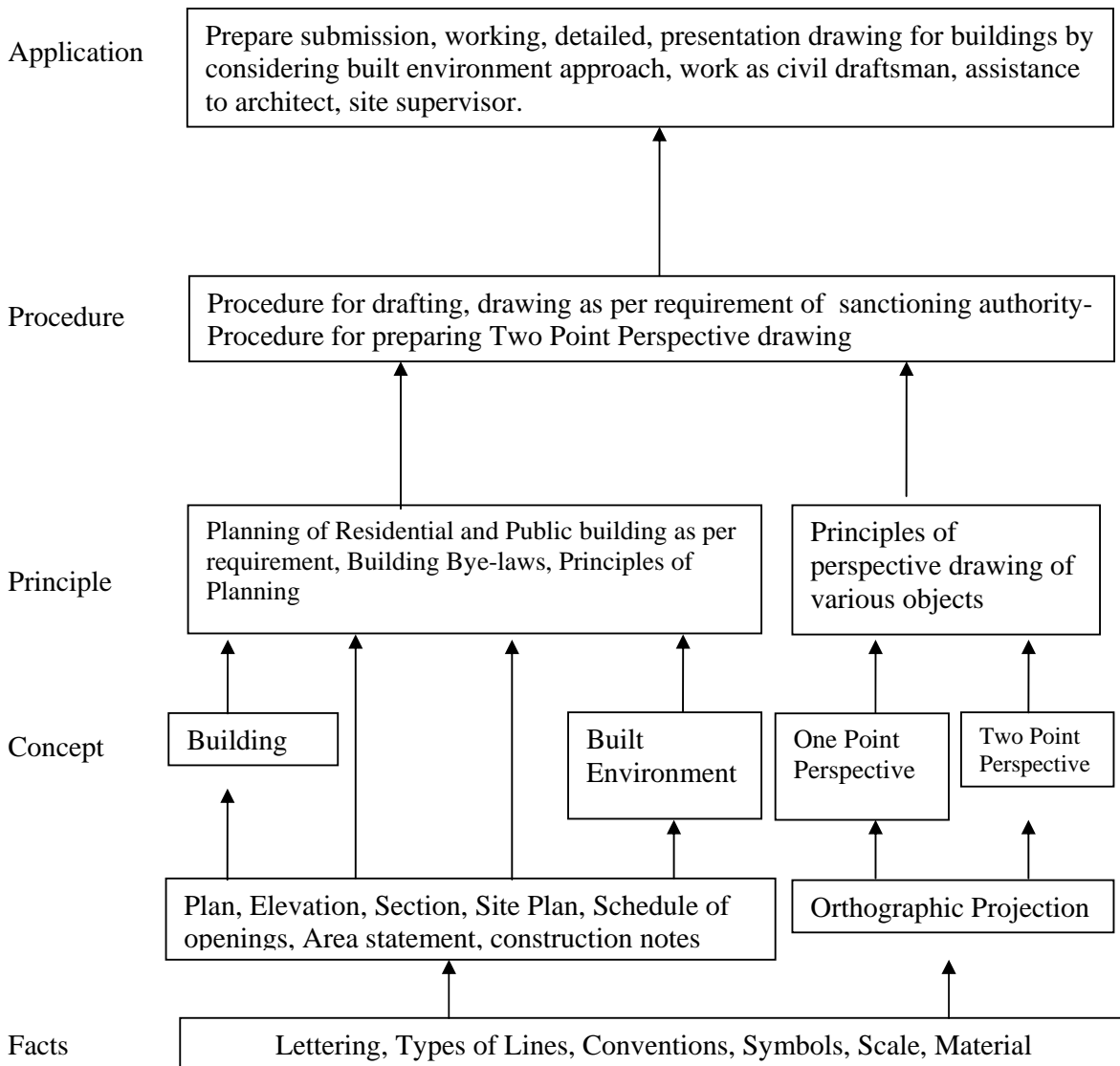
In long run construction industry should have orientation towards the skillful design and energy efficient technique. Emphasis shall be given on integrated approach using National Code of Building of India (2005) for appropriate planning of building .This will be further useful in the area of Building 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>Topic 1. Conventions</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ Draw the conventions , signs and symbols ➤ Use appropriate scale for different building drawings ➤ Read and interpret the readymade drawings <p>Contents:</p> <ul style="list-style-type: none"> • 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. • 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 • Types of scale- Monumental, Intimate, criteria for Proper Selection of scale for various types of drawing • Reading and interpreting readymade Architectural building drawing (To be procured from Architect, Planning Consultants, Planning Engineer) 	04	04
<p>Topic 2. Planning of Building</p> <p>Specific objectives :</p> <ul style="list-style-type: none"> ➤ State space requirement and norms for minimum dimensions of each units of a building ➤ Calculate different areas such as plinth area, floor area, built-up area, carpet area ➤ Draw line plan for residential and public buildings <p>Contents:</p> <ul style="list-style-type: none"> • Principles of planning of Residential and Public building- Aspect, Prospect ,Orientation ,Grouping, Privacy, Elegance, Flexibility, Roominess, Circulation, Furniture requirements, Sanitation, Economy. • Space requirement and norms for minimum dimension of different units in the residential and public buildings. • Rules and bye-laws of sanctioning authorities for construction • 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 • Line plans for residential building of minimum three rooms including w/c, bath and staircase as per principles of planning. • Line plans for public building-school building, primary health centre, hospital building, bank, post office, hostel, canteen, Restaurant. 	14	36
<p>Topic 3. Types of Drawing</p>	10	44

<p>Specific objectives :</p> <ul style="list-style-type: none"> ➤ Draw developed plan, elevation, section, site plan based on given line plan. ➤ Prepare submission drawing, working drawing, foundation drawing of a residential building. <p>Contents:</p> <ul style="list-style-type: none"> • 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. • Submission drawing of Single storey Load Bearing residential building (2 BHKD) with staircase. • Submission drawing of Two storey Framed Structure (G+1) residential building (2 BHKD) with staircase. • Working drawing of Load Bearing Structure – developed plan, elevation, section passing through staircase, foundation plan with Scale 1:50. • Foundation plan of Framed Structure and section of column and footing with scale 1:50 • Details of RCC components with scale 1:20 for Chajjas and Lintel, Staircase. 		
<p>Topic.4. PERSPECTIVE DRAWING</p> <p>Specific objectives :</p> <ul style="list-style-type: none"> • Use the principles of perspective drawings • Draw perspective drawing of object. <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Types of perspective , terms used in perspective drawing , principles used in perspective drawing • One Point and Two Point Perspective of small objects such as steps, monuments, pedestals etc. 	04	16
Total	32	100
<ul style="list-style-type: none"> ➤ 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. ➤ 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. 		

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.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.

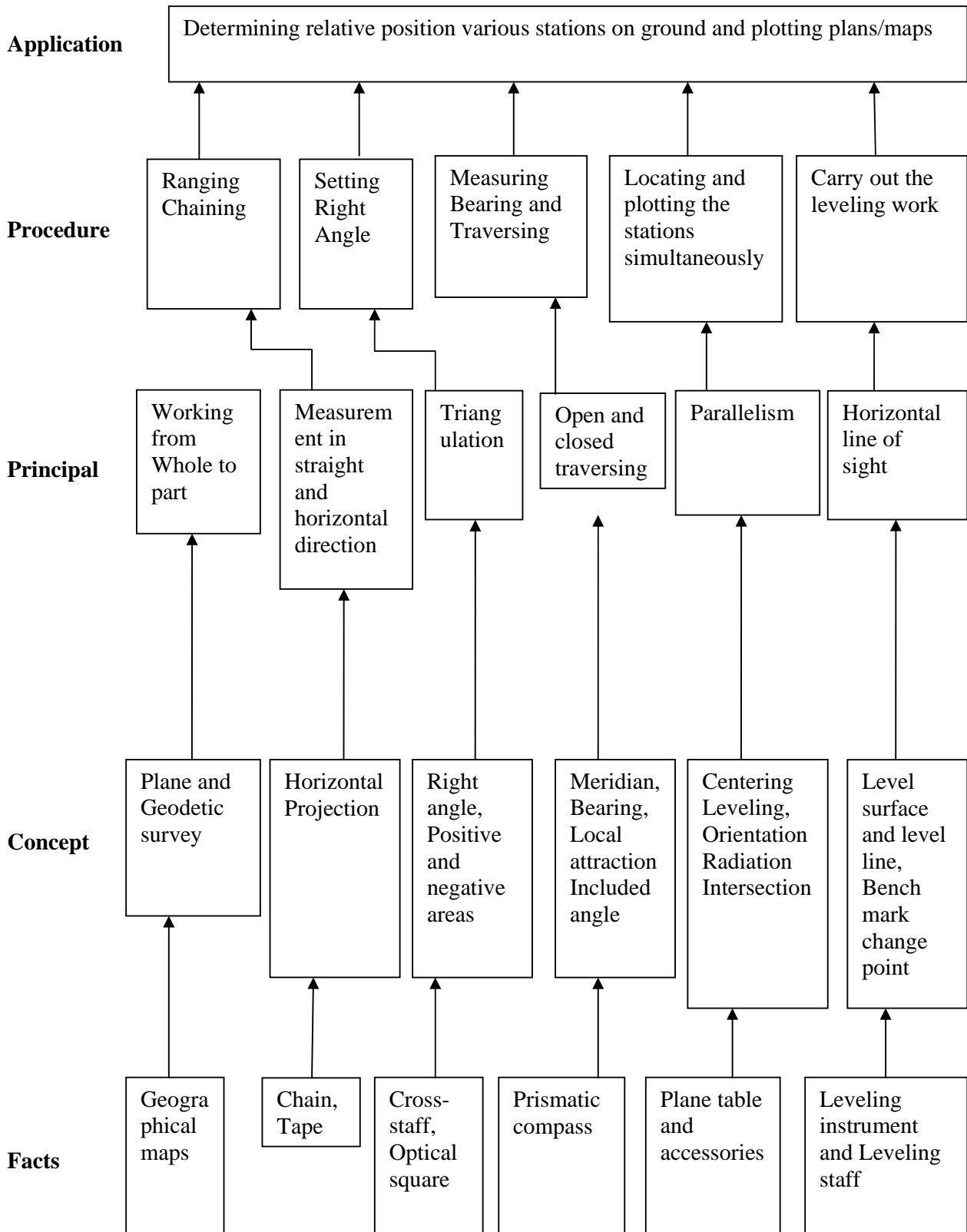
This further will lead the students as professionals in surveying.

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>Topic 1. Introduction Specific objectives :</p> <ul style="list-style-type: none"> ➤ Define and state use of surveys ➤ Classify the survey stating the basis of classification <p>Contents</p> <ul style="list-style-type: none"> • Definition of survey, Objects of different surveys, Uses of surveys. • 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. • Conventional symbols in survey plans/maps. 	06	08
<p>Topic 2. Linear Measurements Specific objectives :</p> <ul style="list-style-type: none"> ➤ Describe construction and use different instruments for linear measurements ➤ Describe the method of linear measurement <p>Contents:</p> <ul style="list-style-type: none"> • 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. • Ranging- Direct and indirect ranging and procedure, Code of signals used in ranging • Chaining-Procedure on plane and sloping ground. Correction of linear measurement for incorrect length of chain/tape. (Simple problems) 	09	12
<p>Topic 3. Chain Triangulation and cross staff survey. Specific objectives :</p> <ul style="list-style-type: none"> ➤ Write construction and use of different instruments for setting offsets ➤ Calculate the area of field <p>Contents:</p> <ul style="list-style-type: none"> • 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. • 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. 	10	16
<p>Topic 4. Compass Traverse Survey Specific objectives :</p> <ul style="list-style-type: none"> ➤ Describe construction and state use of prismatic compass. ➤ Describe the method of compass traversing. <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>Topic 5. Plane Table Survey</p> <p>Specific objectives :</p> <ul style="list-style-type: none"> ➤ Describe different methods of orientation of Plane Tabling. ➤ Locate and plot the stations simultaneously. <p>Contents:</p> <ul style="list-style-type: none"> • Principle of plane table survey. Different accessories of plane table and their use. Setting of plane table, Telescopic alidade and its advantages. • 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. 	08	12
<p>Topic 6. Levelling</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ State meaning of different terms used in leveling. ➤ Write construction and use of Dumpy Level and Auto Level. ➤ Describe the method of carrying out different types of leveling. <p>Contents:</p> <p>6.1.....(08)</p> <ul style="list-style-type: none"> • 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. • 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. <p>6.2.....(08)</p> <ul style="list-style-type: none"> • 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, • Methods of leveling- Simple levelling, Differential levelling, Profile and Cross sectioning, Fly levelling, Check levelling and reciprocal levelling <p>6.3.....(12)</p> <ul style="list-style-type: none"> • Method of reduction of level- Height of instrument, Rise and Fall method. Arithmetic check. Numerical problems. • Sources of errors in leveling, precautionary measures. 	16	28
Total	64	100

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 5th semester.

Learning Resources:**Books:**

Sr. No.	Title	Author	Publisher
1	Surveying and Leveling- 38 th 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.

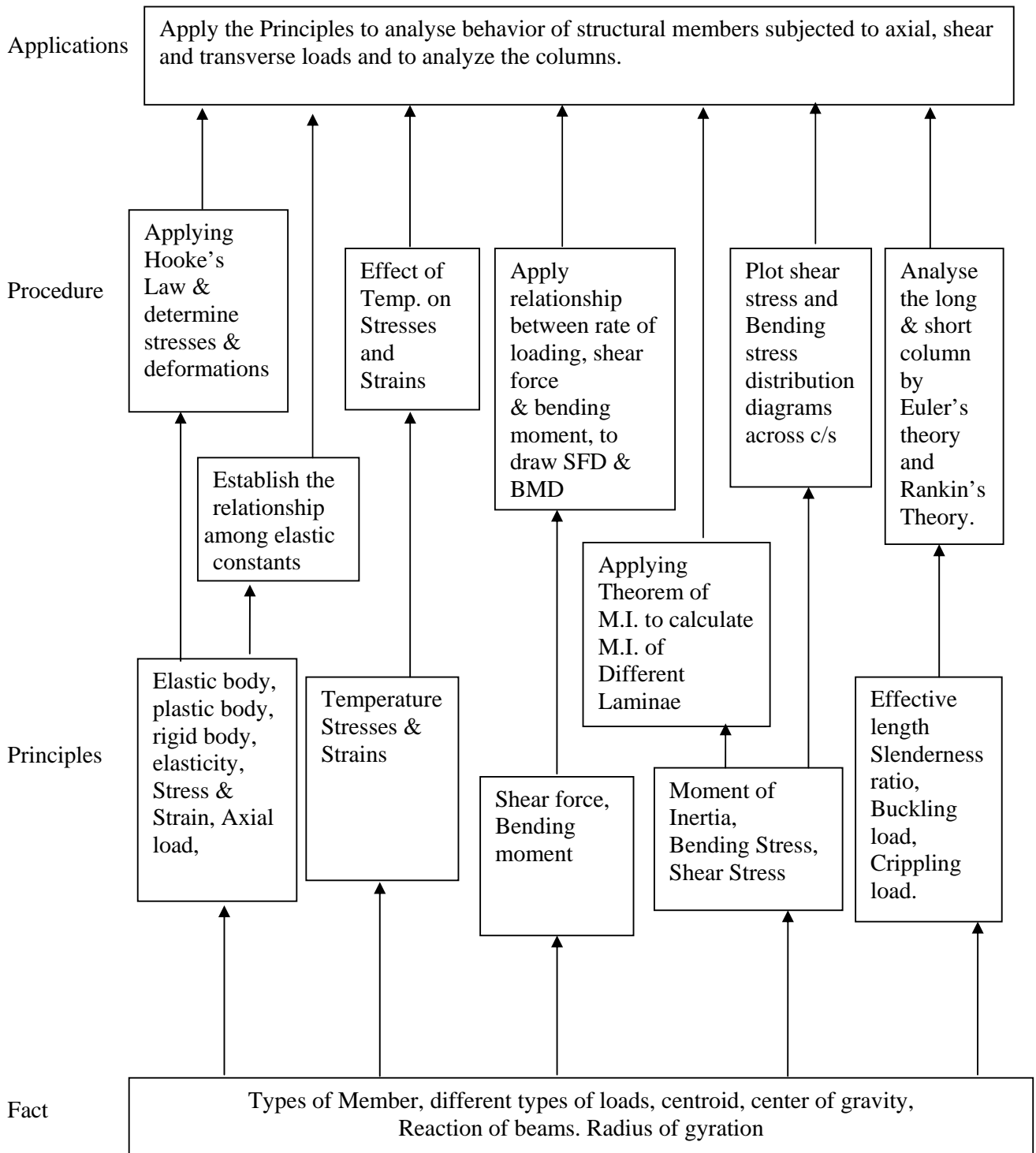
The knowledge gained in this subject is useful to study further the subjects like Theory of structures, Design of steel structures, Design of R. C. structures, Hydraulics, Geotechnical Engineering etc.

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>Topic 1: Moment of Inertia Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Calculate moment of inertia Standard plane figures. ➤ Calculate moment of inertia, Radius of gyration of Built up sections. <p>Contents :</p> <ul style="list-style-type: none"> • Concept of Moment of Inertia, Moment of Inertia of plane areas such as square, rectangle, triangle, circle, semicircle and quarter circle • Parallel axis and perpendicular axis theorem, M.I of built up sections, symmetrical and Unsymmetrical sections, radius of gyration and polar moment of inertia. 	06	16
2	<p>Topic 2: Simple Stress and Strain Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Draw stress-strain curve for ductile and brittle materials and locate salient points. ➤ Calculate deformation of body subjected to axial load. ➤ Calculate stress and strains of composite sections subjected to axial load <p>Contents :</p> <ul style="list-style-type: none"> • Definition of rigid body, plastic body, mechanical properties of metal such as elasticity and elastic limit. • 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. • 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. • Shear stress, shear strain and modulus of rigidity, complementary shear stress, state of simple shear, punching shear. 	10	16
3	<p>Topic 3: Elastic Constants Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Calculate change in dimensions and volume of the body subjected to uniaxial, biaxial, triaxial loads. ➤ Calculate different modulli by using relations between E, G, K and $1/m$. ➤ Calculate stress and strain of the body subjected to Temperature. <p>Contents :</p> <ul style="list-style-type: none"> • Definition of lateral strain, Poisson's ratio, Change in lateral dimensions • Volumetric strain due to uni-axial force and change in dimension, Biaxial and tri-axial stresses and volumetric strain and change in volume 	08	16

	<ul style="list-style-type: none"> • Definition of bulk modulus, volumetric strain. • Relation between modulus of elasticity, modulus of rigidity and bulk modulus. • Definitions of temperature stress and strain, Nature of stress and strain due to change in temperature (no composite sections) in a bar. 		
4	<p>Topic 4: Shear Force And Bending Moment :</p> <p>Specific Objectives</p> <ul style="list-style-type: none"> ➤ Classify different types of loads and beams and calculate end reactions. ➤ Calculate shear force and bending moments for different load combinations of loading. ➤ Draw Shear force and Bending Moment diagrams and locate salient points. <p>Contents :</p> <ul style="list-style-type: none"> • 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 • Concept of shear force and bending moment, sign convention. Relation between bending moment, shear force and rate of loading • 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 	08	16
5	<p>Topic 5: Stresses In Beams:</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Calculate bending stresses and shear stresses in beams of various cross sections. ➤ Draw bending stress and shear stress distribution diagram. <p>Contents :</p> <p>5.1 Bending Stresses (08)</p> <ul style="list-style-type: none"> • 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. • Application of theory of bending to symmetrical and unsymmetrical sections. <p>5.2 Shear Stresses (08)</p> <ul style="list-style-type: none"> • 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 • Relation between maximum shear stress and average shear stress 	08	16
6	<p>Topic 6: Column</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Classify the columns. ➤ Calculate safe load carrying capacity of column. ➤ Calculate Dimension of column for given load. <p>Contents :</p> <ul style="list-style-type: none"> • Definition, classification of column, Buckling of axially loaded 	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"> Assumptions in the theory of long column, Euler's theory, buckling load and Rankine's theory, crippling load, factor of safety, safe load. Application of Rankine's and Euler theory, designing solid circular or hollow circular sections, Limitations of Euler's formula. Simple numerical problem 		
7	<p>Topic 7: Strain Energy Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Calculate strain energy on body subjected to different loads. ➤ Comparison of stresses on body subjected to different loads. <p>Contents :</p> <ul style="list-style-type: none"> Strain energy – Definition, calculation of strain energy due to types of loading – gradual, suddenly applied load & Impact load Modulus of resilience and proof resilience – meaning of the term, simple examples. Comparison of stresses due to gradual load, sudden load and impact load. 	04	08
Total		48	100

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, 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:**

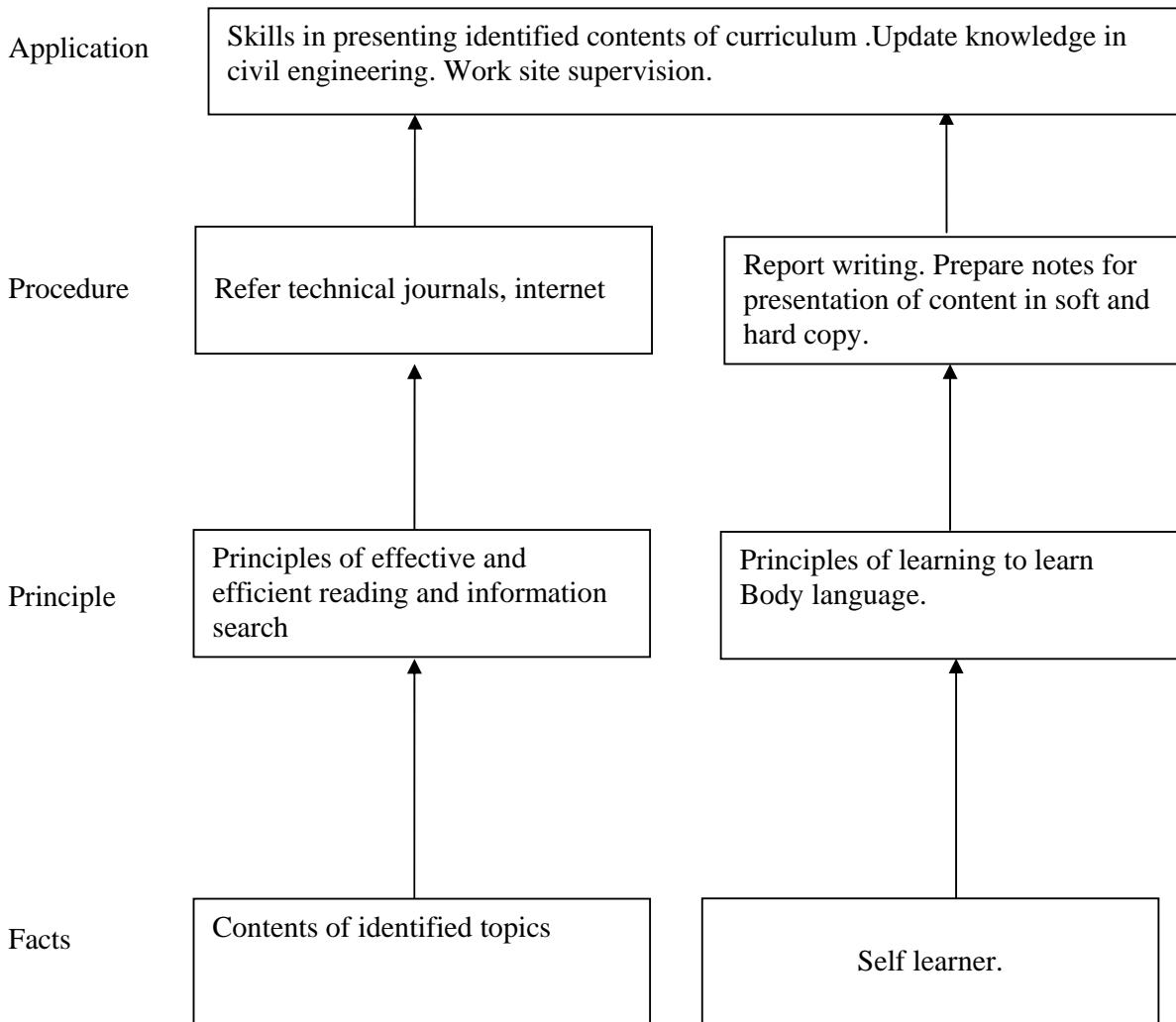
1. Understand application of civil engineering concepts, latest technologies at the visited site
2. Listen and grasp the views of experts
3. Do literature survey, access internet for the preparation of seminar on the topic.

- 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:

Activity	Name of the Activity	Hours
1	<p>Field Visits- 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"> i) Completed Residential/Public building for planning principles ii) Residential/Public building under construction for sub /super structure detailing iii) Civil engineering structure during concreting work iv) Civil engineering structure during brickwork/stone masonry vi) Residential/Public building for finishing items. vii) Cement/lime manufacturing unit viii) Aggregate crusher plant. ix) Tile factory. x) Ready mix Concrete plant. xi) Hot mix plant 	18
2	<p>Lectures by Professional / Industrial Expert to be organized from of the following areas (any two)</p> <ul style="list-style-type: none"> i) Quality in construction ii) New trends in civil engineering iii) Software for drafting iv) Low cost housing v) Building Bye laws vi) Body language vii) Equipments/machinery involved in earthwork. 	10
3	<p>Seminar: 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"> 1. Problems of drinking water in rural area 2. Comparative study of various types of bricks. 3. Suitability of foundation for given site conditions of soil and loading. 4. New trends in concrete technology. 5. Formwork, centering and scaffolding 6. Advanced materials of construction. 7. Vertical communication for Tall buildings. 8. Cracks in structures –causes, prevention, remedies. 	12
4	<p>Market Survey: 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
Total		48

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:**

Sr. No.	Title	Author	Publisher
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>

 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES																	
COURSE NAME : CIVIL ENGINEERING GROUP																	
COURSE CODE : CE/CS/CR/CV																	
DURATION OF COURSE : 6 SEMESTERS for CE/CS/CR (8 SEMESTERS for CV)											WITH EFFECT FROM 2012-13						
SEMESTER : FOURTH											DURATION : 16 WEEKS						
PATTERN : FULL TIME - SEMESTER											SCHEME : G						
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50	
2	Transportation Engineering	TEN	17418	03	--	--	03	100	40	--	--	--	--	--	--		
3	Advanced Surveying	ASU	17419	03	--	04	03	100	40	50#	20	--	--	50@	20		
4	Geo Technical Engineering	GTE	17420	03	--	02	03	100	40	--	--	--	--	25@	10		
5	Hydraulics	HYD	17421	03	--	02	03	100	40	25#	10	--	--	25@	10		
6	Theory of Structures	TOS	17422	03	01	--	04	100	40	--	--	--	--	--	--		
7	Computer Aided Drawing	CAD	17036	--	--	04	--	--	--	25#	10	--	--	25@	10		
8	Professional Practices-II	PPT	17037	--	--	03	--	--	--	--	--	--	--	50@	20		
Total				16	01	17	--	550	--	100	--	--	--	200	--	50	
**	Industrial Training (Optional)			Examination in 5th Semester Professional Practices-III													
<p>Student Contact Hours Per Week: 34 Hrs.</p> <p>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</p> <p>Total Marks : 900</p> <p>@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #* - Online Theory Examination.</p> <p>Note: In plant training of 04 weeks after IVth semester & before Vth semester. Optional for the students & to be assessed in the Vth semester in PPT.</p> <p>Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.</p> <p>** Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.</p> <p>Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5th Semester.</p> <ul style="list-style-type: none"> ➤ 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/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/DC/TC/TX/FG/AU**

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
01	--	02	01	50#*	--	--	25 @	75

#* Online Theory Examination

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:

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

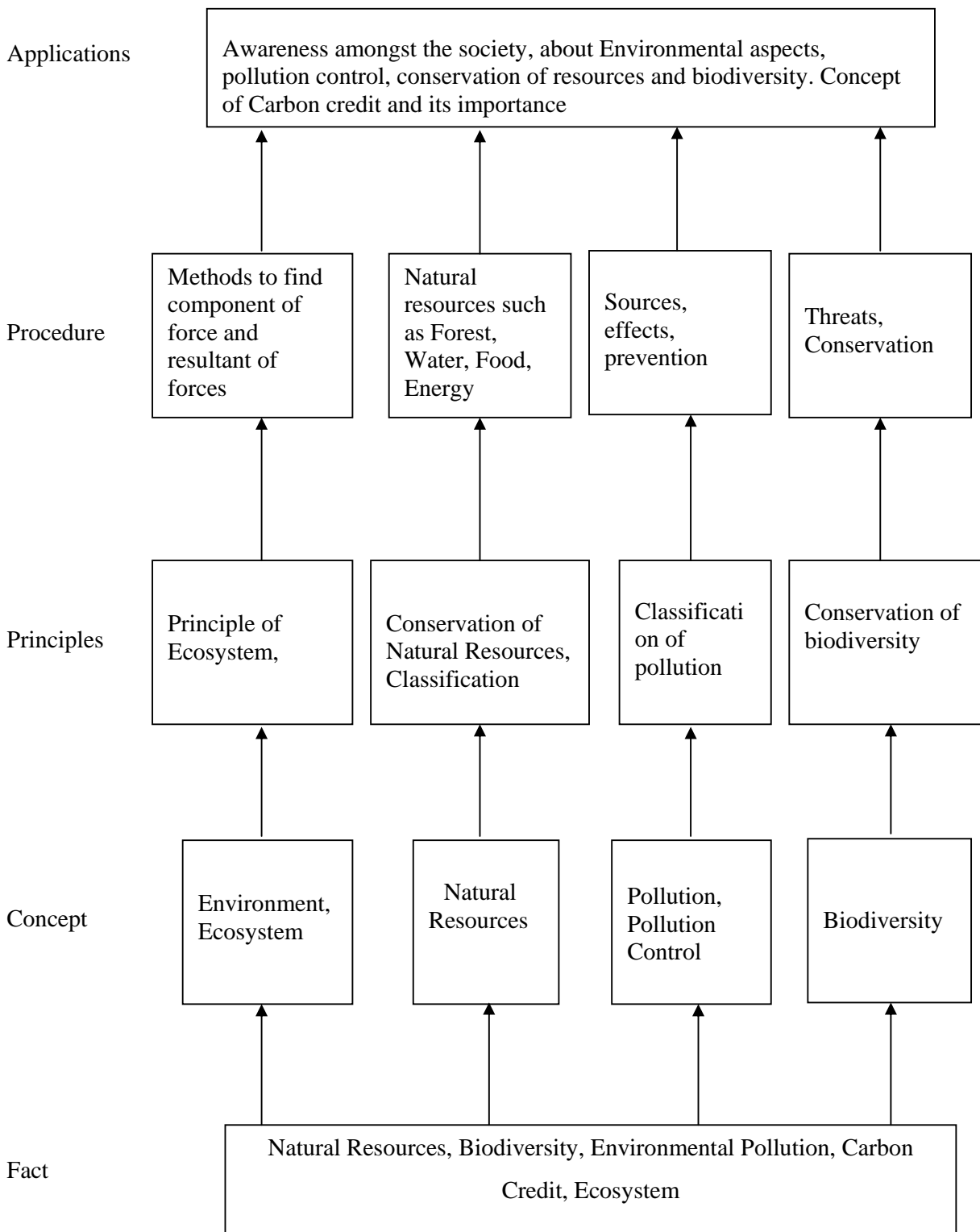
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

1. Understand importance of environment
2. Know key issues about environment
3. Understands the reasons for environment degradation
4. Know aspects about improvement methods
5. Know initiatives taken by the world bodies to restrict and reduce degradation

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity 	02	06

<ul style="list-style-type: none"> • Value of biodiversity • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water harvesting: Definition, Methods and Benefits • Climate Change, Global warming, Acid rain, Ozone Layer Depletion, Nuclear Accidents and Holocaust: Basic concepts and their effect on climate • Concept of Carbon Credits and its advantages 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
Total	16	50

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

1. Collection of information, data
2. Analysis of data
3. Report writing

Motor Skills:

1. Presentation Skills
2. Use of multi media

List of Projects:

Note: Any one project of the following:

1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
3. Study of common plants, insects, birds

4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

Learning Resources:

Books:

Sr. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. Jagdish Krishnaswamy	Environmental Studies	Wiley India

Course Name : Civil Engineering Group

Course Code : CE/CS/CR/CV

Semester : Fourth

Subject Title : Transportation Engineering

Subject Code : 17418

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:

This subject caters to the need of technician engaged in the investigation, planning, construction and maintenance of railway, bridges, tunnels, airways and waterways. In Practical field, each component of transportation is a specialized branch of engineering.

This subject aims at basic knowledge about railway, bridges, tunnels, airport engineering and docks and harbour engineering in respect of their various types, materials used, functions of component parts, methods of construction, planning principles, aspects of supervision and maintenance.

Topic of railway engineering will be useful to understand the components of permanent way with their function, different types of rails and rail gauges. The topic of track geometry and yards will be useful to plan for station and yard layout. The topic on maintenance will be useful in the supervision of railway track.

Content on bridge engineering will be useful to understand different types and components of bridges with their functions. The content in topic site investigation will be useful while taking decision about site selection for a bridge.

Topic on tunnel engineering will be useful to understand different cross-sections of tunnel and methods of tunnelling. Contents on investigation will be useful for transferring the centre line of tunnel during construction.

Topic on Airport engineering and Docks and harbour engineering will be useful to understand different terms and used in these fields.

Thus all modes of transportation are useful in the development of a nation and improving over all standards in Agricultural, medical, industrial, educational and social fields.

General Objectives:

Student will be able to-

1. Know component parts of railway, bridges, tunnels, airport and dock and harbour engineering
2. Understand methods of survey and investigation of alignment of railway, bridges and tunnels.

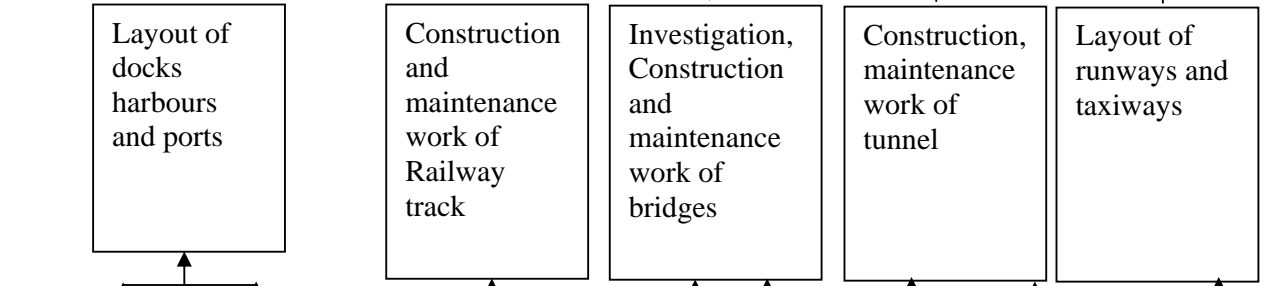
- Organize, supervise and coordinate the construction activities related to railway, bridges and tunnels

Learning Structure:

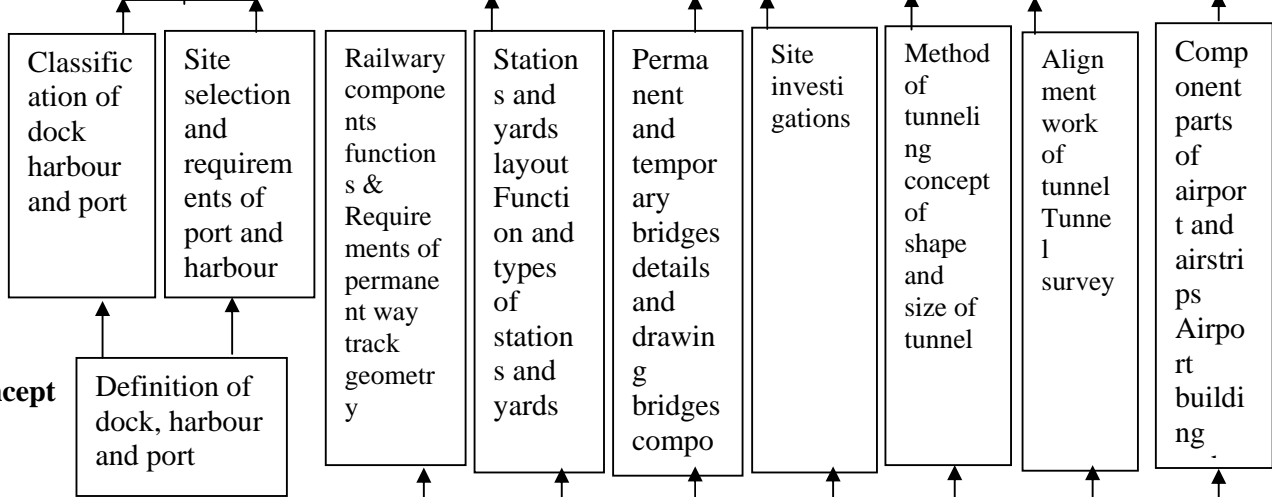
Application

Investigation, planning, preparation of drawing, construction, inspection, & maintenance of Railways, Bridges, Tunnel, Engineering Structures. Layout of docks, harbors and ports, runways and taxiways.

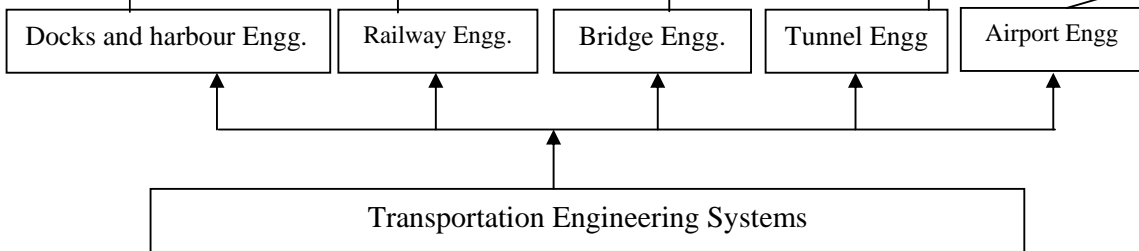
Procedure



Concept



Fact



Theory:

Topic and Contents	Hours	Marks
<p>Topic 1. Overview of Transportation Engineering Specific objectives: ➤ List various modes of transportation system with their merits and demerits ➤ State importance of cross drainage works</p> <p>Contents:</p> <ul style="list-style-type: none"> • Role of transportation in the development of nation • Modes of transportation system - roads, railway, airways, waterways, Importance of each mode, comparison and their relative merits and demerits. • Necessity of Cross drainage works for railways. 	02	04
<p>Topic 2. Railway Engineering</p> <p>Specific objectives: ➤ List zones of Indian Railway and rail gauges. ➤ State component parts of permanent way with their functions types, merits and demerits. ➤ Calculate the superelevation and cant deficiency. ➤ Draw different track junctions and station yards</p> <p>Contents:</p> <p>2.1 Alignment and Gauges and Permanent ways.....12</p> <ul style="list-style-type: none"> • Classification of Indian Railways, zones of Indian Railway. Alignment- Factors governing rail alignment. Rail Gauges – types, factors affecting selection of gauge. Rail track cross sections – standard cross section of BG and M.G Single and double line in cutting and embankment. • Permanent ways Ideal requirement, component parts. Rails - function and its types. Rail Joints - requirements, types, Creep of rail, causes and prevention of creep. Sleepers - functions and Requirement, types - wooden, metal, concrete sleepers and their suitability, sleeper density Ballast - function and different types with their properties, relative merits and demerits. Rail fixtures and fastenings – fish plate, bearing plates, spikes, bolts, keys, anchors and anti creepers. <p>2.2 Railway Track Geometrics and Branching of Tracks.....14</p> <ul style="list-style-type: none"> • Coning of wheels, tilting of rails, Gradient and its types, Super elevation limits of Super elevation on curves, cant deficiency negative cant, grade compensation on curves • Branching of Tracks Definition of point and crossing, a simple split switch turnout consisting of points and crossing lines. Sketch showing different components, their functions and working. Line sketches of track junctions-crossovers, scissor cross over, diamond crossing, triangle. Inspection of points and crossings. <p>2.3 Station and Yards and Track Maintenance.....06</p>	18	32

<ul style="list-style-type: none"> • Site selection for railway stations, Requirements of railway station, Types of stations (way side, crossing, junction and terminal) Station yards , types of station yard, Passenger yards, good yard Locomotive yard – its requirements, water column , Marshalling yard – its types. . • Track Maintenance Necessity, types, Tools required and their function, organisation, duties of permanent way inspector, gang mate key man. 		
<p>Topic 3. Bridge Engineering Specific objectives:</p> <ul style="list-style-type: none"> ➤ Define different terminologies related to bridge engineering ➤ State functions of component parts of bridge ➤ Draw sketches of temporary and permanent bridges <p>Contents: 3.1 Site selection and investigation.....08 Factors affecting selection of site of a bridge. Bridge alignment Collection of design data, Classification of bridges according to function, material, span, size, alignment, position of HFL. 3.2 Component parts of bridge.....16 Plan and sectional elevation of bridge showing component parts of, substructure and super structure. Different terminology such as effective span, clear span, economical span, waterway, afflux, scour, HFL, freeboard, etc. Foundation – function, types. Piers-function, requirements, types. Abutment – function, types. Wing walls – functions and types. Bearing – functions, types of bearing for RCC and steel bridges. Approaches –in cutting and embankment. Bridge flooring- open and solid floors. 3.3 Permanent and Temporary Bridges and Maintenance of Bridge...08</p> <ul style="list-style-type: none"> • Permanent Bridges - Sketches and description in brief of culverts, causeways, masonry, arch, steel, movable steel bridges, RCC girder bridge, prestressed girder bridge, cantilever, suspension bridge. Temporary Bridges- timber, flying, floating bridges • Inspection and Maintenance Of Bridge Inspection of bridges-General points to be observed. Pre and post monsoon inspection-Purpose Maintenance of bridges: types – routine and special Maintenance. 	16	32
<p>Topic 4. Tunnel Engineering. Specific objectives:</p> <ul style="list-style-type: none"> ➤ Draw tunnel cross sections for highways and railways. ➤ List data for tunnel investigation and survey. ➤ State precautions in constructions of tunnel. <p>Contents: 4.1.....16</p> <ul style="list-style-type: none"> • Definition, necessity, advantages, disadvantages, Classification of tunnels, Shape and Size of tunnels, Tunnel Cross sections for highway and railways 	12	32

<ul style="list-style-type: none"> Tunnel investigations and surveying –Tunnel surveying locating center line on ground, transferring center line inside the tunnel. Shaft - its purpose and construction. 		
4.216		
<ul style="list-style-type: none"> Methods of tunneling in Soft rock-needle beam method, fore-poling method. Line plate method, shield method. Methods of tunneling in Hard rock-Full-face heading method, Heading and bench method, drift method Precautions in construction of tunnels Drilling equipments-drills and drills carrying equipments, Types of explosives used in tunneling. Tunnel lining and ventilation-Purpose and methods 		
Total	48	100

Learning Resources:**1. Books:**

Sr. No.	Title	Author	Publisher
01	Railway Engineering	S.C. Saxena	Dhanpatrai & sons
02	Railway Track	K.R. Antia	The New Book Co. Pvt. Ltd Mumbai
03	Principles of Railway Engineering	S.C. Rangwala	Charotar Publication
04	Principles and Practice of Bridge Engineering	S.P. Bindra	Dhanpatrai & sons
05	A Text book Transportation Book of Engineering	N.L.Arora and S.P. Luthra	IPH New Delhi
06	Elements of Bridge Engineering	J.S. Alagia	Charotar Publication
07	Road railway and bridges	Birdi and Ahuja	Std.Book house

2. IS, BIS and International Codes:

Sr. No.	Title
01	IS 4880,I.S.5878,Part-I to X

Course Name : Civil Engineering Group**Course Code : CE/CR/CS/CV****Semester : Fourth****Subject Title : Advanced Surveying****Subject Code : 17419****Teaching and Examination Scheme:**

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

In search of precision and accuracy surveyor has to use more precise instruments like transit theodolite, micro optic theodolite, digital theodolite, total station and digital planimeter. Being a versatile instrument theodolite can be used more precisely for all civil engineering survey works. After studying theodolite survey student will able to precisely measure horizontal and vertical angles and calculate coordinates of various stations. After studying components of curve students will able to set the curve.

After studying Tacheometry student will able to find horizontal distances and elevations of various stations. After studying contouring student will able to prepare and interpret contour map.

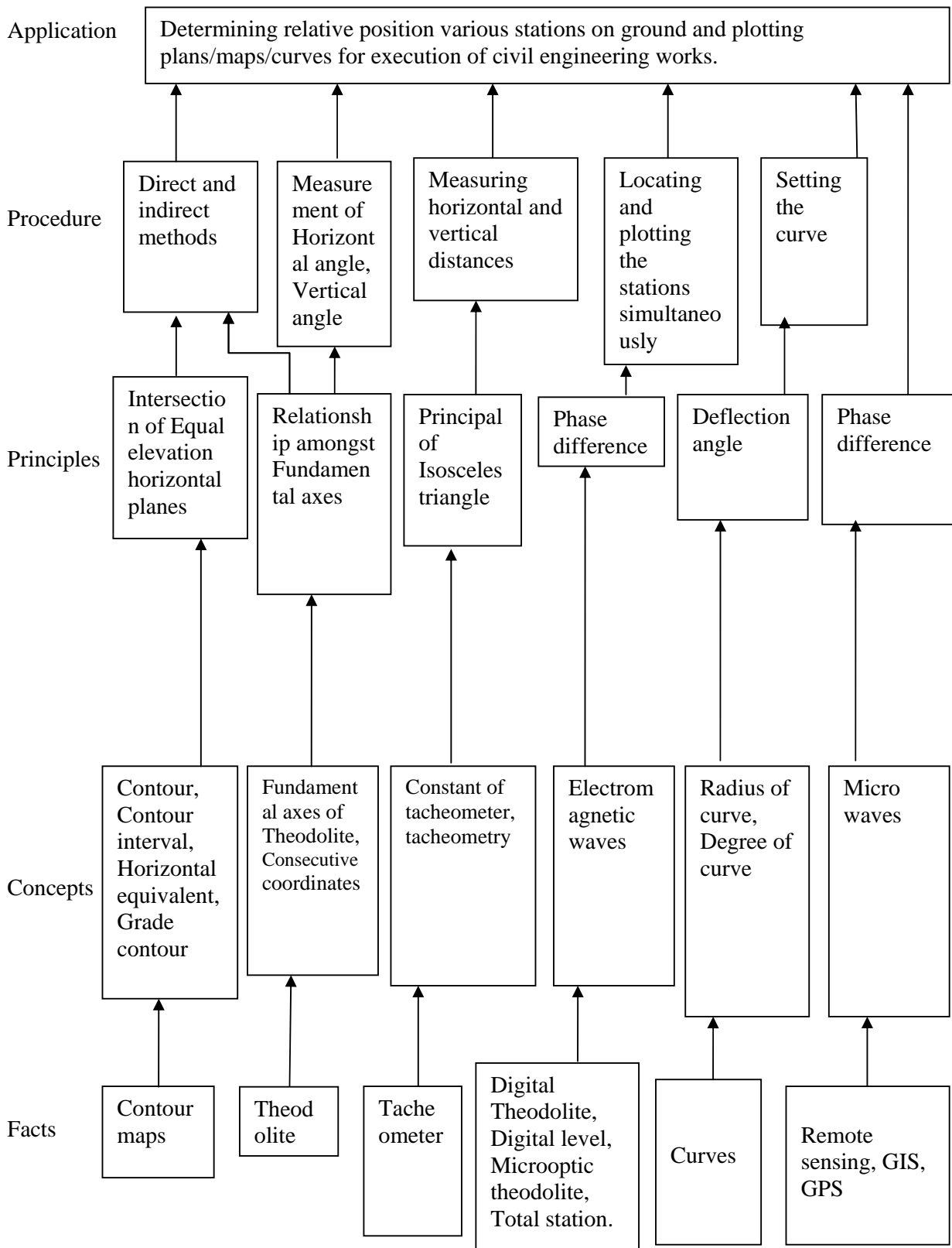
With the use of planimeter student will able to calculate area of contour and volume occupied. It is intended to abreast with new technology for which study and use of Total station becomes inevitable.

Geographical Information System (GIS) is rapidly used in technological field which intend to assess real-world problems. GIS backed by modern computers allow us to benefit from visual power of maps. It is the time demand to nurture civil engineers with latest surveying technology.

General objectives**Students will be able to:**

- Understand handling and use of various survey instruments for field observations.
- Understand linear and angular measurements
- Select suitable instruments and appropriate method of survey.
- Understand the preparation of maps from the field observations.
- Interpret survey maps.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
<p>Topic 1. Contouring Specific objectives :</p> <ul style="list-style-type: none"> ➤ State the meaning of contour, contour interval and horizontal equivalent. ➤ Carry out contouring by direct and indirect method ➤ Interpret features of ground from contour map <p>Contents:</p> <ul style="list-style-type: none"> • Concept of contour, contour interval and horizontal equivalent. Factors affecting contour interval, Characteristics of contours, Interpretation of ground features from contour map, Uses of contour map. • Methods of contouring, Direct method and Indirect method (block contouring, Longitudinal and cross sectioning) Interpolation of contour and its methods, • Concept of grade contour, Establishing grade contour on ground, Locating grade contour on contour map. 	06	14
<p>Topic 2. Area and Volume Measurement Specific objectives :</p> <ul style="list-style-type: none"> ➤ Measure the area of plans/maps. ➤ Compute the volume <p>Contents:</p> <ul style="list-style-type: none"> • Instruments used for measuring the area- Polar Planimeter and Digital Planimeter. Polar Planimeter- Component parts and procedure of measurement of area. Simple numerical problems. • Digital planimeter- Component parts and procedure of measurement. • Computation of volume from contour maps by Trapezoidal and Prismatical formulae, Simple numerical problems. 	04	10
<p>Topic 3. Theodolite Survey Specific objectives :</p> <ul style="list-style-type: none"> ➤ Use the theodolite for measurement of horizontal angle, deflection angle, magnetic bearing and vertical angle ➤ Carry out theodolite traversing ➤ Carry out calculations for Gale's traverse table. <p>3.1(06) Types of theodolite, uses of theodolite, Component parts of transit theodolite and their functions, Reading the vernier of transit theodolite, Technical terms- Swinging, Transiting, Face left, Face right, Fundamental axes of transit theodolite and their relationship</p> <p>3.2(08) Temporary adjustment of transit theodolite, Measurement of horizontal angle- Direct and Repetition method, Errors eliminated by method of repetition, Measurement of magnetic bearing of a line, Prolonging and ranging a line, Measurement of deflection angle, Measurement of vertical Angle. Permanent adjustment of transit theodolite (only relationship of different axes of theodolite)</p> <p>3.3.....(10)</p> <ul style="list-style-type: none"> • Theodolite traversing by included angle method and deflection angle method. Check in open and closed traverse, Calculations of bearing from angles, Traverse computation-Latitude, Departure, Consecutive 	12	24

coordinates, Independent coordinates, Balancing traverse by Bowditch's rule and Transit rule, Gale's table calculations, Simple numerical problems		
<p>Topic 4. Tacheometry</p> <p>Specific objectives :</p> <ul style="list-style-type: none"> ➤ Use tacheometer to find horizontal and vertical distances ➤ Carry out contour survey by tacheometer <p>Contents:</p> <ul style="list-style-type: none"> • Meaning of tacheometer and tacheometry, Principle of tacheometry, Essential requirement of tacheometer. Tacheometric formula for horizontal distance with telescope horizontal and staff vertical, Field method for determining constants of tacheometer, Determining horizontal and vertical distances with tacheometer by fixed hair method and staff held vertical, Limitation of tacheometry Simple numerical problems. • Contouring by tacheometer-Method and specific use. 	06	12
<p>Topic 5. Modern Survey Instrument</p> <p>Specific objectives :</p> <ul style="list-style-type: none"> ➤ Use the microoptic theodolite for measurement of horizontal and vertical angle ➤ Use the digital theodolite for measurement of horizontal and vertical angle ➤ Use the digital level for finding and recording reduced level. ➤ Use the total station for surveying work <p>Contents:</p> <p>5.1(10) Component parts and procedure to set and use microoptic theodolite for measurement of horizontal and vertical angle, Component parts and procedure to set and use digital theodolite for measurement of horizontal and vertical angle, Component parts and procedure to set and use digital level or finding and recording reduced level.</p> <p>5.2(10) Component parts of total station, Minimum inventory required, Set up of total station, Setting a back sight, Azimuth mark, Measurement with total station, General setting required for all stations, Field book recording, Radial shooting, Survey station description by codes, Instrument station entry, Data retrieval, Field generated graphics, Lay out using Total station.</p>	10	20
<p>Topic 6. Curves</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ List components of simple circular curve ➤ Set simple circular curve by offsets from long chord and Rankine's deflection angle method <p>Contents:</p> <ul style="list-style-type: none"> • Necessity of curve, Classification of curve, Notation of simple circular curve, Designation of curve • Setting simple circular curve by offsets from long chord and Rankine's deflection angle method, Simple numerical problems. 	06	12
<p>Topic 7. Remote sensing and GIS</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ Describe remote sensing process ➤ Identify the components of GIS 	04	08

<p>➤ State applications of GPS</p> <p>Contents:</p> <ul style="list-style-type: none"> • Definition of remote sensing, Concept of remote sensing, Types of remote sensing system-Passive system, Active system, Distance of remote sensing, Remote sensing data, Remote sensing processes, Application of remote sensing, Advantages of remote sensing, Limitations of remote sensing • Definition of GIS, Key components of GIS, Application of GIS in Land information, Environmental field. • Introduction to GPS, Application of GPS in civil engineering. 		
Total	48	100

Practicals:

Skills to be developed:

Instructions: Intellectual Skills:

- Understand different instruments for linear measurement and leveling.
- Understand the method of taking observations with the survey instruments.
- Understand specific use of various types of survey instruments.
- Identify the errors of the survey instruments.

Motor Skills:

- Measure distances, Bearings and finding Reduced Levels with various survey instruments.
- Recording of survey field data collected in Field Book and Leveling Book.
- Prepare drawing (plans/maps) using survey data.
- Reading and Interpretation of drawing (plans/maps).

List of Practicals:

- 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 at field itself.
 - One full day per project is required for project survey work.
 - Drawing and plotting should be considered as a part of practical.
 - Term work shall consists of record of all practicals and projects in field book and drawing sheets for the given projects.
1. Carry out Block contouring of plot 30 m x 30 m with each block 5mx5m
 2. Locate a contour on a field by direct contouring method.
 3. To find area of given contour map with polar planimeter and digital planimeter
 4. Understanding different components of transit theodolite, Temporary adjustment and reading the vernier and recording it.
 5. Measurement of horizontal angle by transit theodolite (direct method)
 6. Measurement of horizontal angle by transit theodolite (repetition method)
 7. Measurement of magnetic bearing by transit theodolite
 8. Measurement of deflection angle by transit theodolite
 9. Measurement of vertical angle by transit theodolite
 10. Find constants of tacheometer
 11. To find horizontal distance and elevation of given object with tacheometer

12. Measure horizontal and vertical angle with micro-optic theodolite
13. Measure horizontal and vertical angle with digital theodolite
14. Use total station for measuring horizontal angle, vertical angle, horizontal distance, sloping distance, vertical distance.
15. Layout with total station
16. Setting curve by offset from long chord method
17. Setting curve by Rankine's deflection angle method

Mini Projects:

1. Carry out Block contouring project for a plot 100mx120m with a block size 10mx10m plot the contours on imperial drawing sheet.
2. Theodolite survey for a closed traverse (5-6) sides and locating the details of buildings. Plotting the Gale's table and traverse on A1 size imperial drawing sheet.
3. Carry out block contouring using total station for a plot of 100x120 meter with block size of 5 m x5m on sloping ground and locate the building layout up to 100 square meter on site. Prepare the contour map and centre line plan on A-1 size imperial sheet.

Learning Resources:**1. Books :**

Sr. No.	Title	Author	Publisher
1	Surveying and Leveling- 38 th edition.	N.N. Basak	Tata McGraw Hill
2	Surveying- Volume-I, II Third Edition	S.K. Duggal	Tata McGraw Hill
3	Surveying and Leveling-1,II	T.P. Kanetkar and Kulkarni	Pune Vidyarthi Grigh Prakashan
4	Surveying and Leveling-1	Dr. B.C. Punmia	Laxmi Publication
5	Surveying and Leveling	R. Subramanian	Oxford university press
6	Advance Surveying	Satheesh Gopi, N. Madhu	Pearson
7	Remote sensing and GIS	Basudeo Bhatta	Oxford university press
8	Surveying,(seventh edition)	Arthur Bannister	Pearson

Course Name : Civil Engineering Group

Course Code : CE/CS/CR/CV

Semester : Forth

Subject Title : Geo Technical Engineering

Subject Code : 17420

Teaching and Examination Scheme

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

Geotechnical engineering is the important for every structure, since all structures rest on soil. The stability of these structures depends upon behavior of soil and bearing capacity of soil to carry loads under different loading conditions. Formation of soil and rocks, defects in rocks, soil behavior, and soil as an engineering material are essential parameter to an engineer. The design of foundation of buildings, dams, towers, embankments, roads, railways, retaining walls, bridges is mainly governed by these above stated parameters.

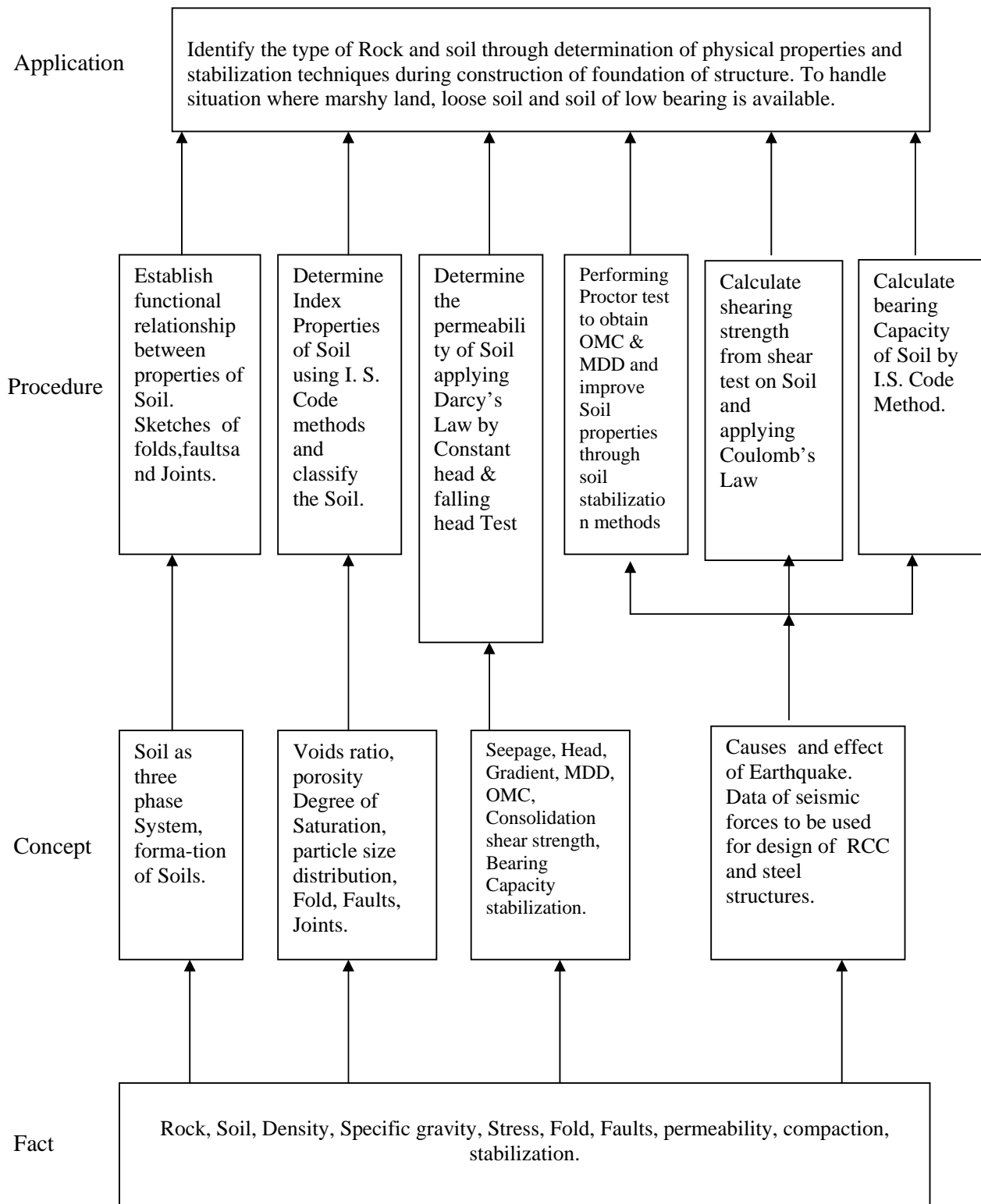
The content of this subject are also useful in designing basement, underground tank and underwater structures. Knowledge of geology, soil characteristics, and stress distribution under loading on soil, bearing capacity of soil is also useful to every engineer in the design, execution and stability analysis of structures.

General Objectives:

Students will be able to

- 1) Know types of rocks and their formation, ground water table, detail investigation, mineralogy, earthquake forces and their effects.
- 2) Understand the structure and sub soil strata of earth.
- 3) Understand the causes and effects of earth quake
- 4) Understand soil properties and interpretation of results of test on soil.
- 5) Understand the suitability of foundation based on soil condition at site.
- 6) Know importance of shear strength, bearing capacity, stability of slopes and techniques of stabilization of soil.

Learning Structure:



Theory:

Topic	Hours	Marks
<p>Topic 1: General geology, mineralogy and petrology.</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State purpose of geology in civil engineering. ➤ Describe different structure and composition of earth. <p>Contents:</p> <ul style="list-style-type: none"> • Introduction of geology, different branches of geology, importance of geology for civil engineering structure and composition of earth. Introduction to mineralogy, physical properties of minerals depending on light and state of aggregation. • Introduction of petrology, definition of a rock, classification based on their genesis (mode of origin), formation, classification and engineering uses of igneous, sedimentary and metamorphic rocks. 	04	06
<p>Topic 2: Structural Geology</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State the meaning of different terms related to structural geology. ➤ State causes and condition of formation of fold, fault and joints. <p>Contents:</p> <ul style="list-style-type: none"> • Structural Geology: Definition, importance, Outcrop, dip, strike, folds- Definition, parts and types, Joints- Definition and classification, Faults- Definition, parts and Types 	02	06
<p>Topic 3: Physical Geology.</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State the effect of weathering on rocks. ➤ Describe the Earth movement and Volcanism. <p>Contents:</p> <ul style="list-style-type: none"> • Introduction of Physical geology, weathering-Definition, Types. Soil- Definition, formation of soil, classification of soils. • Earthquakes-Definition, Terminology-focus, Epicenter, Intensity, Seismograph, Isoseismic lines. Classification of Earthquakes based on focus, origin, Richter's scale. Causes and effect of earthquakes. Record of earthquake, seismic waves Indian earthquakes, earthquake resistant structures 	06	12
<p>Topic 4: Overview Geotechnical Engineering</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State purpose of Soil as construction and Engineering material. ➤ Describe field application of Geo-technical Engineering. <ul style="list-style-type: none"> • IS definition of soil, Importance of soil in Civil Engineering as construction material in Civil Engineering Structures, as foundation bed for structures • Field application of geotechnical engineering for foundation design, pavement design, design of earth retaining structures, design of earthen dams, salient features of earthen dam in Maharashtra and India. 	02	06
<p>Topics 5: Physical Properties of Soil</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State the different physical properties of Soil. ➤ Classify the soil as per IS classification. <p>Contents:</p>	12	26

<p>5.1 Soil Properties (10 Marks)</p> <ul style="list-style-type: none"> • Soil as a three phase system, water content, determination of water content by oven drying method as per IS code, void ratio, porosity and degree of saturation, density index, unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight, determination of bulk unit weight and dry unit weight by core cutter method and sand replacement method as per IS code, specific gravity, determination of specific gravity by pycnometer. <p>5.2 Consistency Limits of Soil (8 Marks)</p> <ul style="list-style-type: none"> • Consistency of soil, stages of consistency, Atterberg's limits of consistency viz. Liquid limit, plastic limit and shrinkage limit, plasticity index, determination of liquid limit, plastic limit and shrinkage limit as per IS code. <p>5.3 Grading of Soils (8 Marks)</p> <ul style="list-style-type: none"> • Particle size distribution, mechanical sieve analysis as per IS code particle size distribution curve, effective diameter of soil, Uniformity coefficient and coefficient of curvature, well graded and uniformly graded soils, particle size. classification of soils, I.S. classification of soil. 		
<p>Topics 6: Permeability and Shear Strength of Soil. Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State the factors affecting the permeability of soil. ➤ Describe the shear failure of cohesive and Non-cohesive soil. <p>Contents:</p> <ul style="list-style-type: none"> • Definition of permeability, Darcy’s law of permeability, coefficient of permeability, factors affecting permeability, determination of coefficient of permeability by constant head and falling head permeability tests, simple problems to determine coefficient of permeability. Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines, application of flow net, (No numerical problems.) • Shear failure of soil, field situation of shear failure, concept of shear strength of soil, components of shearing resistance of soil – cohesion, internal friction. Mohr-coulomb failure theory, Strength envelope, strength Equation for purely cohesive and cohesion less soils. Direct shear test and vane shear test –laboratory methods. 	06	16
<p>Topics 7: Bearing Capacity, Compaction and Stabilization of Soil Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Describe the procedure of test for Bearing Capacity of soil. ➤ State the necessity of compaction and stabilization of soil. <p>Contents:</p> <p>7.1 Bearing capacity and theory of earth pressure (14 Marks)</p> <ul style="list-style-type: none"> • Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure, Introduction to Terzaghi’s analysis and assumptions made effect of water table on bearing capacity. • Field methods for determination of bearing capacity – Plate load test and standard penetration test. Test procedures as Per IS: 1888 & IS: 2131. • Definition of earth pressure, active earth pressure and passive earth 	16	28

<p>pressure, coefficient of earth pressure, Rankine’s theory and assumptions made for non-cohesive Soils.</p> <p>7.2 Compaction and consolidation (14 Marks)</p> <ul style="list-style-type: none"> • Concept of compaction, purpose of compaction, field situations where compaction is required, Standard proctor test – test procedure as per IS code, Compaction curve, optimum moisture content, maximum dry density, Zero air voids line, Modified proctor test, factors affecting compaction, field methods of compaction – rolling, ramming and vibration and Suitability of various compaction equipments-smooth wheel roller, sheep foot roller, pneumatic tyred roller, Rammer and Vibrator, difference between compaction and consolidation. • Concept of soil stabilization, necessity of soil stabilization, different methods of soil stabilization – Mechanical soil stabilization, lime stabilization, cement stabilization, bitumen stabilization, fly-ash stabilization. California bearing ratio, C.B.R. test, meaning of C.B.R. value. • Necessity of site investigation and sub-soil exploration, types of exploration, criteria for deciding the location and number of test pits and bores.Field identification of soil – dry strength test, dilatancy test and toughness test. 		
Total	48	100

Practicals:

Skills to be developed:

Intellectual Skills:

1. Identify type of rocks and mineral.
2. Identify properties of soil.
3. Interpret test results.
4. Understand IS procedure of testing.

Motor Skills:

1. Measure the quantities accurately.
2. Handle the instruments carefully.

List of Practicals:-

1. Identity different rocks specimen.
2. Prepare chart of different mineral families with physical properties.
3. (A) Determine water content of given soil sample by oven drying method as per I.S. 2720 part- II

And

3. (B) Determine specific gravity of soil by pycnometer method as per I.S. 2720 part- III.
4. (A) Determine dry unit weight of soil in field by core cutter method as per I.S. 2720 part- XXIX.

OR

4. (B) Determine dry unit weight of soil in field by sand replacement method as per I.S. 2720 part- XXVIII.
5. Determine Liquid Limit and Plastic Limit of given soil sample as per I.S. 2720 part- V.

6. Determine grain size distribution of given soil sample by mechanical sieve analysis as per I.S. 2720 part- IV.
7. (A) Determine co efficient of permeability by constant head test as per I.S. 2720 part- XVII
OR
7. (B) Determine co efficient of permeability by falling head test as per I.S.
8. (A) Determine shear strength of soil by direct shear test as per I.S. 2720 part- XIII
OR
8. (B) Determine shear strength of soil by vane shear test as per I.S. 2720 part- XXX
9. Determine MDD and OMC by standard proctor test of given soil sample as per I.S. 2720 part- VII.
10. Identify and classify soil by conducting field tests-Visual inspection, Dry strength test, Dilatancy test and Toughness test. (Organize visit to construction site)

Note: For experiments 4, 7 and 8, divide batch in two sub groups and allot experiment 'A' to one sub group and 'B' to other sub group .

Learning Resources:

1. Books:

Sr. No.	Author	Title	Publisher
1	M.T. Maruthesha reddy.	A text book of applied Engineering Geology.	New age International Publishers
2	Dr.R.B.Gupte	A text book of Engineering Geology.	Pune Vidyarthi Griha Prakashan.
3.	Prof.T.N.Ramamurthy & Prof.T.G.Sitharam	Geotechnical Engineering (Soil Mechanics)	S Chand and Company LTD.
4	Dr.B.C.Punmia	Soil Mechanics and Foundation Engineering	Standard Book House, New Delhi.

2. IS, BIS and International Codes:

1. Is 2809-1972-Glossary of Terms and Symbols Relating To Soil Engineering?
2. Is 4410-Part Vii-1968-Engineering Geology
3. Is 1892-1979-Code oOf Practice For Sub Surface Investigation of Foundation
4. Is 2132-1986-Code of Practice For Thin Walled Tube Sampling
5. Is 2720-Test For Soil
Part 1-1983 To Part 29

3. Websites:

www.totalgte.com, www.igs.org.in, www.gsi.gov.in, www.igsjournal.org,
www.geology.com

Course Name : Civil Engineering Group**Course Code : CE/CS/CR/CV****Semester : Fourth****Subject Title : Hydraulics****Subject Code : 17421****Teaching and Examination Scheme:**

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

Hydraulics is a branch of engineering science which deals with behavior of liquids at rest as well as in motion. It forms the basis of core engineering subjects like Irrigation Engineering, Bridge Engineering and Inland water transport.

Problems in the field of water supply, irrigation, navigation can be solved by applying principles of Hydraulics.

Physical properties of water will be useful in the analysis of the flow of water through pipes, open channels.

The measurement of flow through pipe and open channel will be useful in the design of water supply system, design of irrigation channels and assessment of water charges for water supply and filed of irrigation.

The measurement of flow in open streams, flow over the spillways will be useful for regulation of flood discharge.

The empirical formulae developed in hydraulics are useful in solving engineering problems.

Thus this subject will help students in the hydraulic design of various civil engineering structures.

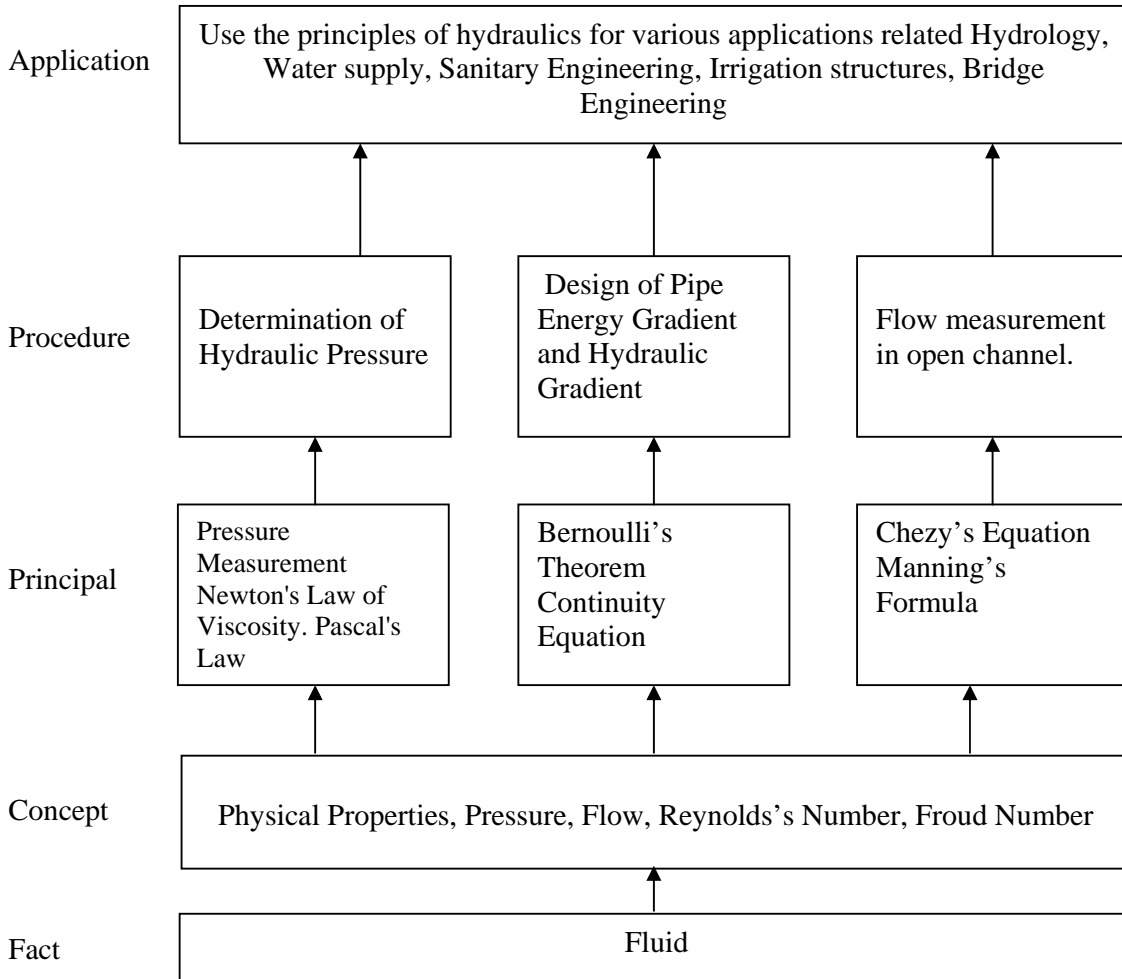
General Objectives:

The students will able to:

1. Understand principles of pressure measuring devices and computation of hydrostatic pressure and center of pressure
2. Identify the types of fluid flow.
3. Estimate the loss of head for flow through pipes.
4. Estimate the diameter of pipes for different arrangements of pipes.

5. Design most economical channel section.
6. Estimate the discharge over weirs and notches.
7. Understand the velocity of flow in open streams as well as in pipes.
8. Decide horse power of pump and selection of pump.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
<p>Topic 1: Properties of fluid Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Differentiate between fluids with solids ➤ List properties of fluids <p>Contents :</p> <ul style="list-style-type: none"> • Definition of fluid, Fluid mechanics and Hydraulics, Hydrostatics, Hydrodynamics. Difference in behavior of liquid with solids, • Application of hydraulics with respect to irrigation and environmental engineering. • Physical properties of fluid and standard values of Mass density, Weight density, Specific volume, Specific gravity, Surface tension and Capillarity, Compressibility, Viscosity, Ideal and Real fluids. Newton's law of viscosity, simple numerical problems. 	04	08
<p>Topic 2: Hydrostatic Pressure Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State principles, laws of hydrostatic pressure ➤ Compute total hydrostatic pressure and centre of pressure on different surfaces <p>Contents :</p> <ul style="list-style-type: none"> • Definition of pressure and its SI Unit. Hydrostatic pressure at a point in fluid, Pascal's law of fluid pressure. Variation of pressure in static liquid, Pressure diagram –concept and use. • Total hydrostatic pressure and center of pressure-Determination of total pressure and center of pressure on vertical, inclined and horizontal plane surfaces in contact with liquid and horizontal plane surfaces in contact with liquid faces of dams, sides and bottom of water tanks sides and bottom of tanks containing two liquids. Vertical surface in contact with liquid on either side. Numerical Problems on all cases above. 	08	12
<p>Topic 3: Measurement of Liquid Pressure In Pipes Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State meaning of liquid pressure, pressure head ➤ State principles and uses of different pressure measuring devices <p>Contents :</p> <ul style="list-style-type: none"> • Concept of pressure, pressure head and its unit, conversion of pressure head of one liquid into pressure head of other liquid. • Devices for pressure measurements in pipe, principles and working of Piezometer, U-tube simple manometers, U-tube differential manometers, Inverted manometers. Numerical problems. on manometers • Bourdon's pressure gauge – construction and principle of working. 	04	12
<p>Topic 4: Fundamentals of Fluid Flow Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Identify type of flow ➤ State the use of Reynolds number ➤ List the components of energy of liquid flow ➤ Write the statement of Bernoulli's theorem as applied to flow of liquid. 	06	12

<p>Contents:</p> <ul style="list-style-type: none"> • Types of flow- Gravity flow, pressure flow.steady and unsteady flow, uniform and non- uniform flow, laminar and turbulent flow. Various combinations of above flows with practical examples. • Reynolds number and its application. Stream line and equi-potential line. Flow net and its use. • Discharge and its unit, continuity equation for liquid flow. • Energy of flowing liquid – datum head, velocity head, pressure head. Bernoulli’s theorem- statement, assumptions, equation.Loss of energy and Bernoulli’s modified equation. Numerical Problems on all above topics. 		
<p>Topic 5: Flow of Liquid Through Pipes Specific Objectives:</p> <ul style="list-style-type: none"> ➤ List various losses in flow through pipes ➤ Estimate loss of head for flow through pipes ➤ List various pipe arrangements and calculate diameter of pipe <p>Contents :</p> <p>5.1 Loss of energy or loss of head in flow through pipe.....06</p> <ul style="list-style-type: none"> • Loss of head due to friction- Darcy-Weisbach Equation. • Moody’s diagram and its use, common range of friction factor for different types of pipe materials. • Minor loss of head in flow through pipe- loss of head due to sudden contraction, sudden expansion, entrance and exit losses. Losses in various pipe fittings. <p>5.2 Different Pipes arrangements and hydraulic gradient line.....10</p> <ul style="list-style-type: none"> • Flow through pipes in series and parallel pipes. • Syphon pipe. • Equivalent pipe- Dupit’s equation. • Hydraulic Gradient Line and Energy Gradient Line • Water Hammer- concept, causes, effects and remedial measures. • Use of Nomograms for design of pipe. Numerical Problems on above topics. 	08	16
<p>Topic 6: Flow Through Open Channel Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Work out discharge through open channel ➤ Design most economical section of channel <p>Contents :</p> <p>6.1 Open channel flow.....04</p> <ul style="list-style-type: none"> • Definitions of open channel flow. • Types of channels- artificial and natural. Different shapes of artificial channels. Geometrical properties of channel sections-wetted area, wetted perimeter, hydraulic radius, hydraulic mean depth. • Types of flow in open channel- steady, unsteady and uniform, non-uniform flow. <p>6.2 Determination of discharge through open channel.....08</p> <ul style="list-style-type: none"> • Chezy’s equation and Manning’s equation. • Most economical channel sections- conditions for most economical rectangular and trapezoidal channel sections. <p>6.3 Hydraulic Jump.....04</p>	07	16

<ul style="list-style-type: none"> • Froude’s number and its significance. • Hydraulic Jump, its occurrence in field, use . <p>Numerical Problems.on above all topics</p>		
<p>Topic 7: Flow Measurement Techniques</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Understand principles and working of flow measuring devices ➤ Determine discharge through pipes and open streams <p>Contents :</p> <p>7.1 Discharge measuring devices for pipes.....08</p> <ul style="list-style-type: none"> • Venturimeter- component parts, its working, determination of discharge through venturimeter. • Flow through orifice-Definition, use, types. Hydraulic Coefficients of orifice (C_d, C_c, C_v), relation between them and their determination, Discharge through small sharp edged circular orifice. <p>7.2 Discharge measuring devices for open channel.....08</p> <ul style="list-style-type: none"> • Notches –Types- Rectangular, ‘V’, Trapezoidal notches. Expression for discharge. • Weirs- Types, discharge over rectangular sharp crested weir. <p>Velocity area method of discharge measurement --</p> <ul style="list-style-type: none"> • Velocity measuring devices-floats, pitot tube, Current meter. • Study and use of water meter. <p>Numerical Problems. .on all above topics</p>	07	16
<p>Topic 8: Pumps and Turbines</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Identify various types of pumps and their uses in different situations ➤ Calculate power for pump <p>Contents :</p> <ul style="list-style-type: none"> • Pumps- Definition and types. • Suction head, delivery head, static head and manometric head of Pump. Computation of power required for pump. numerical problems. • Centrifugal pump, Reciprocating pump, Submersible pump and Jet pump- component parts and their function, principle of working. • Selection and choice of pump. • Turbine- Types-impulse and reaction, components and their functions, working, selection. 	04	08
Total	48	100

Practicals:

Skills to be developed

- Intellectual Skills:**
- 1) Interpret test results
 - 2) Calculate parameters
 - 3) Interpret graphs

- Motor Skills:**
- 1) Observe and measure different parameters and record accurately
 - 2) Operate the equipments
 - 3) Handle various apparatus
 - 4) Draw graphs

List of Practicals:

1. Measure pressure head and pressure intensity by using piezometer and simple U-tube manometer and demonstrate Bourdon's tube pressure gauge for measurement of positive and negative gauge pressure.
2. Measure pressure difference by using differential U-tube manometer and inverted U tube differential manometer.
3. Calculate total head at different cross sections of a given pipe to verify Bernoulli's theorem.
4. Identify type of flow through a pipe using Reynolds's apparatus.
5. Determine friction factor for given pipes of different diameters using Darcy weisbach equation.
6. Determine minor losses of head due to sudden enlargement, sudden contraction, bend and elbow in pipe.
7. Calculate chezy's and Manning's constant for a given rectangular tilting flume and demonstrate Hydraulic jump.
8. Determine coefficient of discharge for a given Venturimeter.
9. Determine coefficient of discharge for a given rectangular and triangular notch.
10. Determine Hydraulic coefficients for small circular sharp edged orifice.
11. Determine Hydraulic coefficients for small circular sharp edged orifice.
12. Understand construction and working of centrifugal and reciprocating pumps with the help of model of charts and collect catalogues of pumps and use it for selection of pump for design discharge and head.

Learning Resources:**1. Books:**

Sr. No.	Author	Title	Publisher
01	Dr. P. N. Modi Dr. S. M. Seth	Hydraulics & Fluid Mechanics	Standard Book House, Dehli
02	Dr. R. K.Bansal	Fluid Mechanics & Hydraulic Mechanics	Laxmi Publication New Delhi
03	R. S. Khurmi	A Text Book of Hydraulics, Fluid Mechanics, Hydraulic Machines	S.Chand & Company Ltd. New Delhi
04	S. Ramamurtam	Hydraulics & Fluid Mechanics	Dhanpat Rai & Sons, Delhi
05	S. K. Likhi	Hydraulic Laboratory Manual	T.T.T.I.Chandhigrah
06	Dr. S. K. Ukarande	Fluid Mechanics and Hydraulics	Ane Books Pvt. Ltd. ISBN 9789381162538

2. Models and Charts etc.:

Model of pumps, hydraulic jump and pipe fittings.

3. Websites: 1) www.howstuffworks.com

Course Name : Civil Engineering Group

Course Code : CE/CS/CR/ CV

Semester : Fourth

Subject Title : Theory of Structures

Subject Code : 17422

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	01	--	04	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:

Civil engineering structures are mainly made-up of column, Beam and Slabs and these structures are subjected to axial as well as eccentric loading. These structures may be determinate or indeterminate in nature. The members like fixed beam, continuous beam, portal frame are indeterminate structures.

The content on calculations of actual shear stresses, bending moments and deflections which are developed in various structural members will be useful in analyzing the forces in these members which is further useful in design of these members. Analysis of member for deflection, combined direct and bending stresses will be useful in safe design of various structural members.

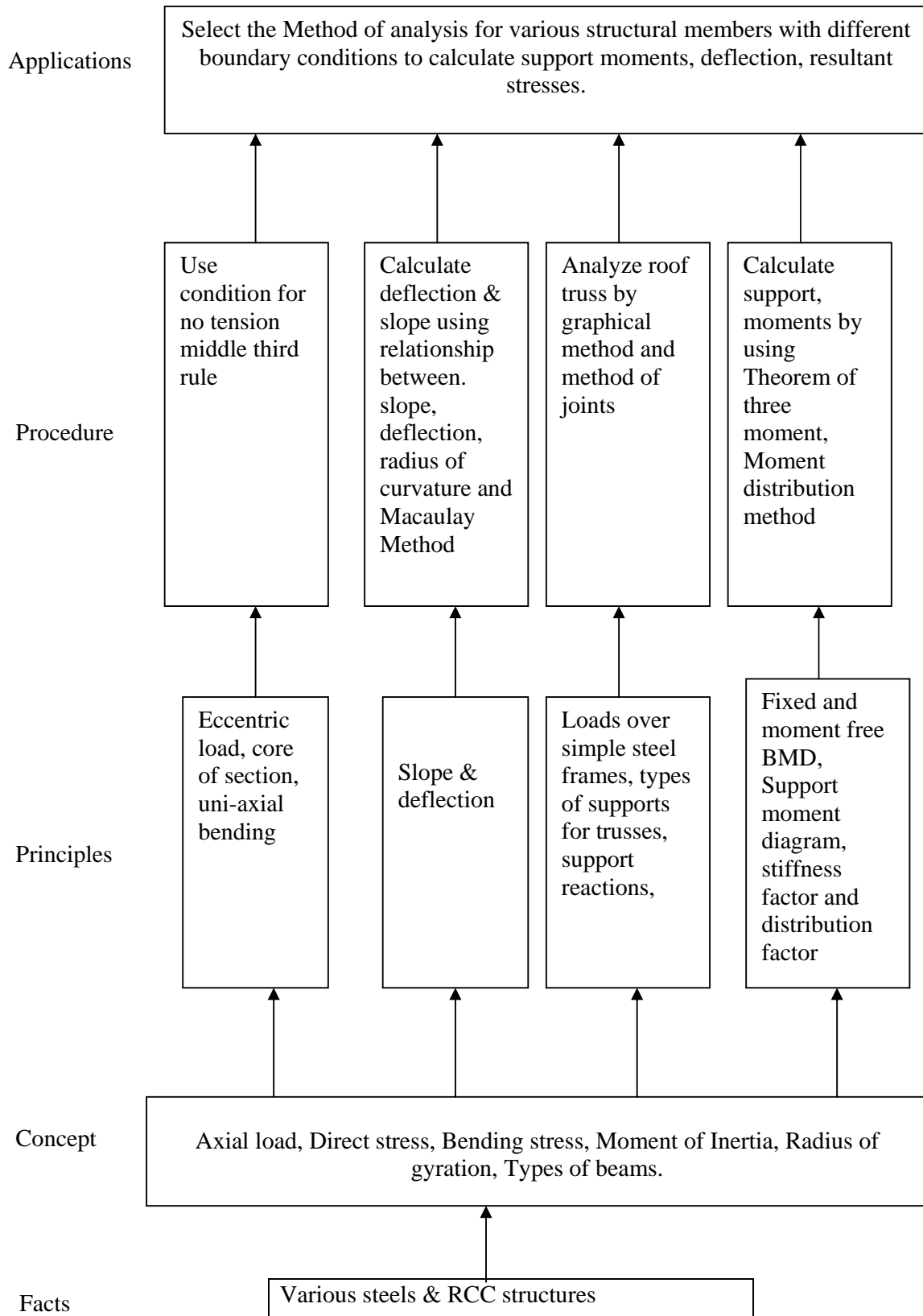
Thus the total contents of this subject forms the basic for the efficient and safe design of steel and RCC structures.

General Objectives:

The students will be able to-

1. Understand the stresses in the members due to eccentric load and wind pressure
2. Understand shear force and bending moment diagram for Fixed and continuous beams for various external loading on them.
3. Understand the shear force and bending moment diagrams for beams subjected to point load and uniformly distributed load.
4. Understand analysis of forces in various members of steel roof trusses for different spans.

Learning Structure:



Theory Content:

Topic and Contents	Hours	Marks
<p>Topic 1: Direct and Bending Stresses Specific Objectives:</p> <ul style="list-style-type: none"> ➤ List direct and eccentric loads on columns. ➤ Write conditions of no tension for beams, columns and pillars. ➤ Draw stress distribution diagram at bases of column, pillars and chimneys subjected to wind pressure. <p>Contents:</p> <p>1.1(12 Marks)</p> <ul style="list-style-type: none"> • Introduction of direct and eccentric loads, • Eccentricity about one principal axis, nature of stresses • Maximum and minimum stresses, resultant stress distribution diagram. • Condition for no tension or zero stress at extreme fiber • Limit of eccentricity, core of section for rectangular and circular cross sections • Middle third rule. <p>1.2(08 Marks)</p> <ul style="list-style-type: none"> • Chimneys subjected to wind, rectangular and circular cross section, wind pressure, coefficient of wind pressure, stress distribution diagram at base. • Walls subjected to horizontal pressure & stress distribution at base. 	10	20
<p>Topics 2: Slope and Deflection Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State meaning of slope and deflection and stiffness of simply supported beams and cantilevers. ➤ Calculate slope and deflection of simply supported and cantilever beam subjected to point load and UDL by Macauley method. ➤ State relationship between slope and deflection and radius of curvature. <p>Contents:</p> <p>2.1(08 Marks)</p> <ul style="list-style-type: none"> • Concept of slope and deflection, stiffness of beams. • Relation among bending moment, slope deflection and radius of curvature, differential equation (no derivation), double integration method to find slope and defection of simply supported and cantilever beam. <p>2.2(12 Marks)</p> <ul style="list-style-type: none"> • Macaulay’s method for slope and deflection, application to simply supported and cantilever beam subjected to concentrated and uniformly distributed load on entire span,. 	10	20
<p>Topics 3: Fixed Beam Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State meaning of fixity effects and list advantages of fixed beam. ➤ Write the principle of superposition. ➤ Draw BMD and SFD for fixed beams with point load and UDL. <p>Contents: Fixed Beam</p>	06	12

<ul style="list-style-type: none"> • Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam. • Principle of superposition. • Fixed end moments from first principle for beam subjected to UDL over entire span, central point load, Point load other than mid span. • Application of standard formulae in finding moments and drawing S.F. and B.M. diagrams for a fixed beam (Derivation need not be asked in the examination). 		
<p>Topics 4: Continuous Beam</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State the effects of continuity of beams and nature of moments induced. ➤ Write Clapeyron's theorem of three moments (No derivation) ➤ Draw sketches of BMD and SFD for continuous beams. <p>Contents:</p> <p>Continuous Beam</p> <ul style="list-style-type: none"> • Definition, effect of continuity practical example, nature of moments induced due to continuity, concept of deflected shape • Clapeyron's theorem of three moment (no derivation). • Application of theorem maximum up to three spans and two unknown support moment only, Support at same level, spans having same and different moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span. • Drawing SF and BM diagrams for continuous beams. 	08	16
<p>Topics 5: Moment Distribution Method</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ List introduction and sign convention for fixed end moments. ➤ State meaning of carry over factor, stiffness factor and distribution factor. ➤ Draw BMD, SFD with support at same level. <p>Contents:</p> <p>Moment Distribution Method.</p> <ul style="list-style-type: none"> • Introduction, sign convention • Carry over factor, stiffness factor, distribution factor. • Application of moment distribution method for various types of continuous beams subjected to concentrated loads and uniformly distributed load over entire span having same or different moment of inertia up to three spans and two unknown support moment only, SF and BM diagrams (Supports at same level) • Introduction to portal frames – Types of portal frames (No problems shall be asked on portal frames). 	08	16
<p>Topic 6: Simple Frames</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ List different types of roof trusses. ➤ State conditions for redundant and non- redundant frames. ➤ List types of forces in different members. <p>Contents:</p> <p>Simple Frames</p> <ul style="list-style-type: none"> • Types of trusses (Simple, Fink, compound fink, French roof truss, 	06	16

pratt roof truss, Howe roof truss, North light roof truss, King post and Queen post roof truss) <ul style="list-style-type: none"> • Calculate support reactions for point loads at nodal points. • Calculate forces in different members by using method of joints and Method of sections. • Graphical method of analysis of truss.(No problem in the theory examination) 		
Total	48	100

Tutorial:

Questions from any two old QP shall be given for tutorial on each topic. Students shall solve these problems in a separate note book. The staff member shall assess these work batchwise.

Learning Resources:**Books:**

Sr. No.	Author	Title	Publisher
01	S. B. Junnarkar	Mechanics of structures Volume-I,II	Charotar Publishing House, Anand
02	S. Ramanrutham	Theory of Structures	Dhanpatrai & Sons, Delhi
03	R. S. Khurmi	Theory of Structures	S.Chand Publications, Delhi
04	G.S. Pandit & S.P.Gupta	Theory of Structures	Tata Mcgraw Hill
05	West	Fundamentals of Structural Analysis	Wiley India

Course Name : Civil Engineering Group

Course Code : CE/CS/CR/CV

Semester : Fourth

Subject Title : Computer Aided Drawing

Subject Code : 17036

Teaching and Examination Scheme:

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

Rationale:

Drawing is a language of engineers and in the era computers, engineers prepare most accurate and descent presentation of plans to satisfy the clients. It has become the practice to prepare the drawing with the help of computer. This not only saves time, but also provides scope for immediate improvements, changes in the drawings. From the aesthetic point of view also the drawings give better presentations. Therefore, use of computer software's (Auto Cad, Felix Cad, Auto Civil) will enable Civil Engineers to prepare quality drawing in shortest possible time. Hence, it becomes mandatory for the students of Diploma in Civil Engineering to possess drafting skills with the help of software.

General Objectives:

The students will be able to –

- 1) Use different CAD commands for drawing
- 2) Prepare line plans with CAD Software
- 3) Prepare Submission drawing/ working drawing of buildings.

To develop following skills:

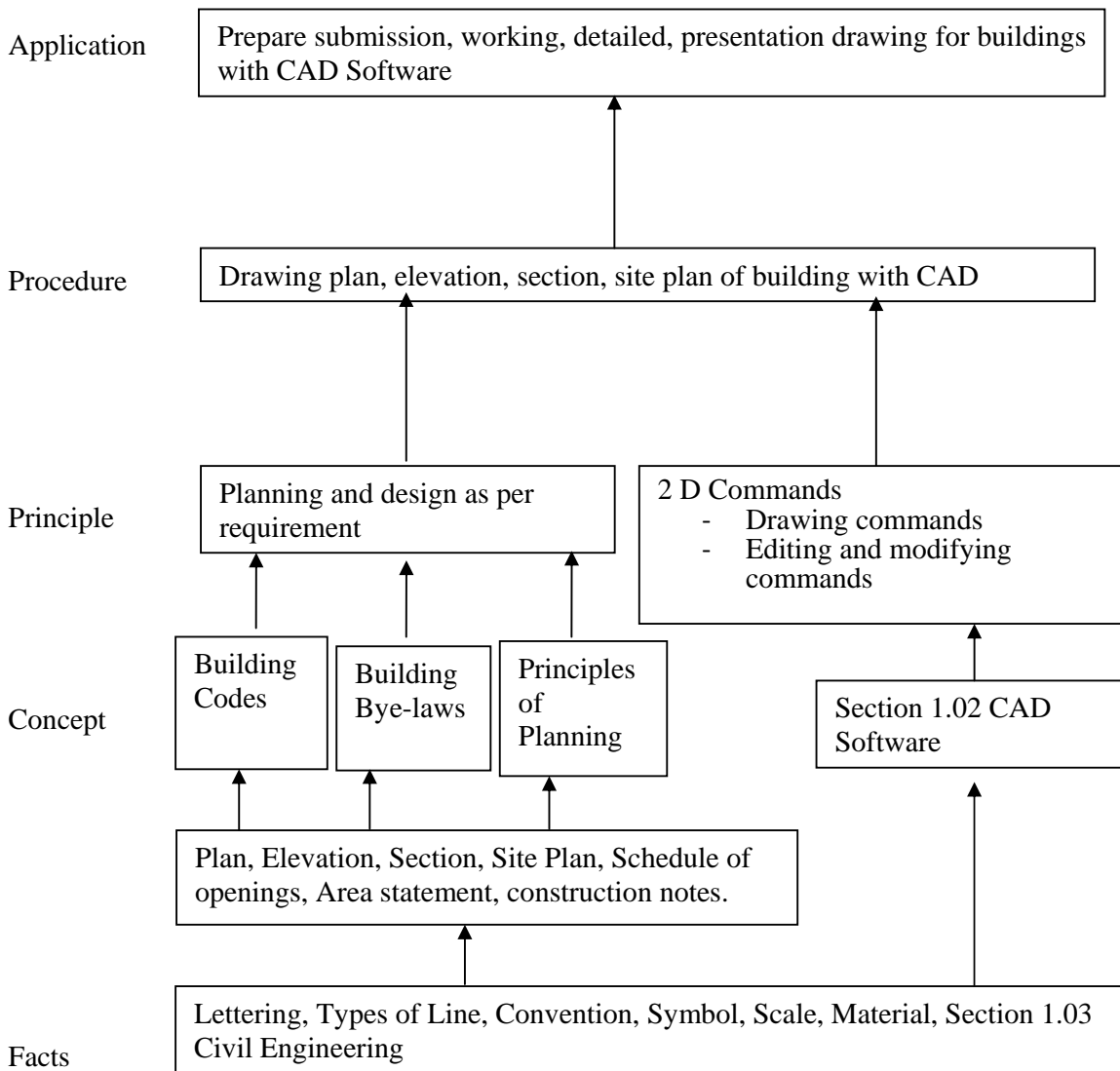
Intellectual Skills:

- Read and interpret building drawing
- Plan residential and public building as per requirement

Motor Skills:

- Prepare line plan for residential and public building
- Draw developed plan, elevation, section, site plan, foundation plan,
- Prepare schedule of openings, area statement

Learning Structure:



Theory:

Topic and Contents	Hours
Topic 1. FUNDAMENTAL OF CAD <ul style="list-style-type: none"> • CAD Software – Meaning, various CAD software's available in market, Advantages of CAD • Starting up of Cad, CAD Window, Toolbar, Drop down menu, Drop down menu, Introduction of starting Auto Cad Screen. • CAD fundamental, coordinate system in CAD. Absolute, Relative, Polar, Spherical, Cylindrical coordinate system, filters, Use of function key in AUTOCAD. 	08
Topic 2. CAD COMMANDS <ul style="list-style-type: none"> • WCS icon, UCS icon, coordinates, drawing limits , grid, snap, ortho features • Drawing commands- line circle, arc, polyline, multiline, construction line, sp line, ellipse, polygon, rectangle, table, block, text. • Editing commands – copy, move, offset, fillet, chamfer, trim, stretch, lengthen, extend, rotate, mirror, array etc. • Working with hatches, fills, dimensioning, text etc. • Important commands in insert menu, format menu, tools and dimensions. 	16
Topic3. SUBMISSION AND WORKING DRAWING <ul style="list-style-type: none"> • Preparation of line plan, detailed plan, developed plan, section, site plan, area statement • Procedure for printing drawings. 	36
Topic 4. INTRODUCTION TO 3D DRAWING <ul style="list-style-type: none"> • Preliminary commands required for 3D. 	04
Total	64

LIST OF PRACTICALS (TERM WORK) / ASSIGNMENTS:**Submission print on A 4 size paper**

1. Draw a line plan of given residential building**08 Hrs.**
2. Draw line plan of given public building**12 Hrs.**
3. Drawing symbols of construction materials /components such as stone, brick, glass, partition, wall doors and windows.**04 Hrs.**
4. Prepare working and detailed drawing for any two items, such as foundation plan, plan of Stair such as straight, dog legged, open Newel. **08 Hrs.**
5. Submission drawing, to the scale 1:100, 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 show enlarged section with details **16 Hrs.**

(Print on A 4 size paper: Developed Plan, Elevation and Section on one page and remaining drawing on other page)

6. 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 etc. Also show bed position, Dining table with chairs, sofa, wardrobe etc.....) **12 Hrs.**

(Print on A 4 size paper: Developed Plan, Elevation and Section on one page and remaining drawing on other page)

7. Submission of soft copy of above drawing files on CD and Hard copy on A4 size paper..... **4 Hrs.**

List of Equipment

S.No	Name of Equipments	Quantity
1	Personal Computer's with latest version, TFT monitor 17 inches and Window based operating system with networking	20
2	Printer	02
3	Software's : AUTOCAD	01 for 20 users

Learning Resources:

1. Books:

Sr. No.	Title	Author	Publisher
1	AUTOCAD	David Frey	BPB Publication New Delhi
2	Introduction To Auto Cad 2012	Nighat Yasmin	SDC Publication.
3	AUTOCAD	Shyam & Titkoo	--
4	Auto Cad 2010 Instructor	James Leach	Tata McGraw Hill
5	Auto CAD and its Applications- Basics 2010	Terence M. Shumaker David A. Madsen David P. Madsen	Goodheart- Willcox (Duplicate of GOODW)

2. CDs, PPTs Etc.:

SOFTWARE REQUIRED: Latest version of Auto-CAD, Build master, interior Designer, 3D- Max Studio.

3. Websites: www.zwsoft.com/cad

Course Name : Civil Engineering Group**Course Code : CE/CS/CR/CV****Semester : Fourth****Subject Title : Professional Practices-II****Subject Code : 17037****Teaching and Examination Scheme:**

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

Rationale:-

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, attitude and ability to communicate and attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to student to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

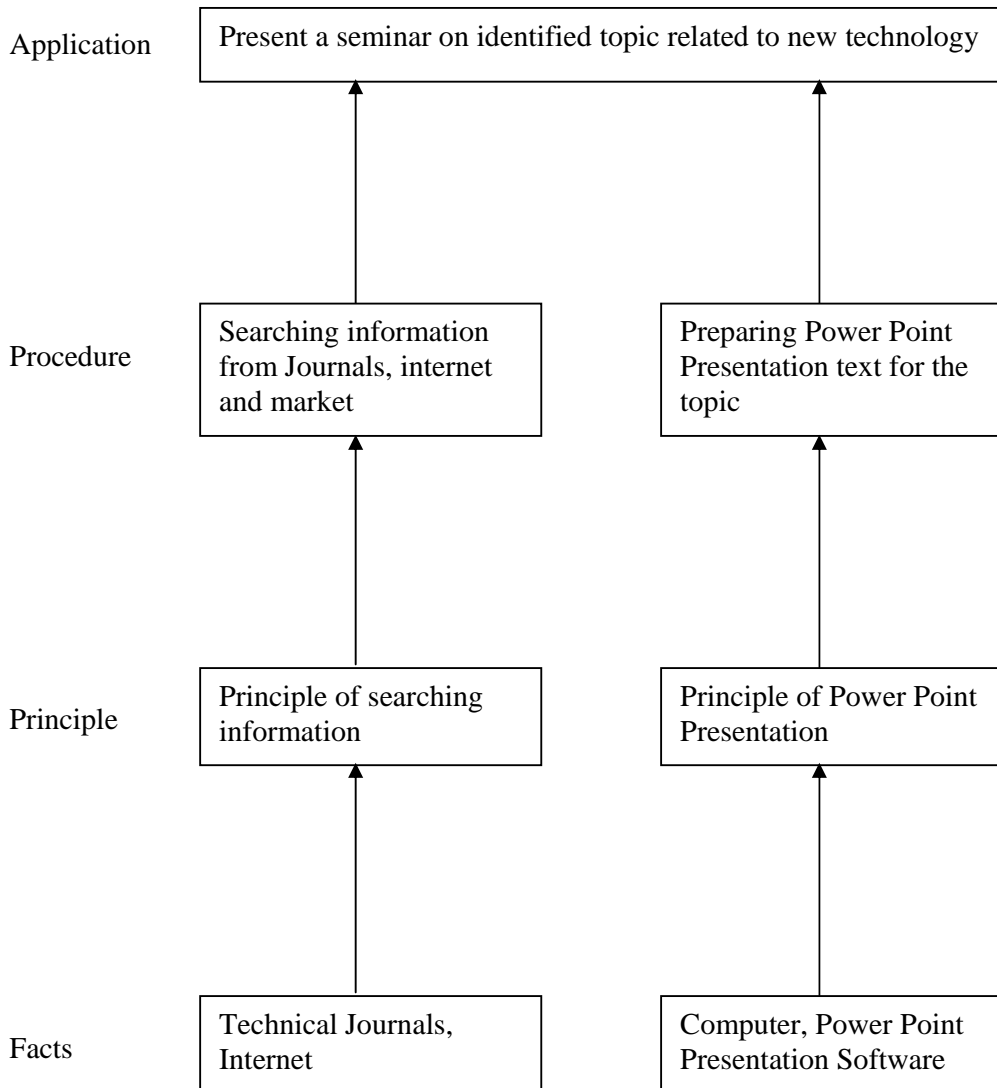
Objective:**To develop the following Skills:****Intellectual Skills**

1. Understand construction of different Civil Engineering works through visits.
2. Understand the techniques of collecting different data.
3. Understand the Presentation for giving the seminar.

Motor Skills

1. Write report on various field visits to the construction sites.
2. Present the seminar.

Learning Structure:



Activities

Activity No.	Content	Hours
1	<p>Field Visits: Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. The industrial visits may be arranged in the following areas / industries (Any Three)</p> <ul style="list-style-type: none"> i) Bridges under construction ii) Tunnel site visit iii) Railway Station iv) Construction of basement / retaining wall /pile foundation v) Public building under construction vi) Airport / Docks and Harbour vii) Visit to different construction Exhibitions 	12
2	<p>Expert Lectures: Lectures by Professional persons / Industrial Expert / Entrepreneur Seminars based on information search, expert lectures to be organized from any two of the following areas :</p> <ul style="list-style-type: none"> i) Construction of Flyovers : Special Features ii) Ready Mix Concrete iii) Safety in Construction iv) Latest Trends in Construction activities like Water Proofing, Centering, Cladding, Plumbing v) Software for Drafting vi) Any other subject related to Civil Engineering vii) Introduction to Apprenticeship Training Scheme 	06
3	<p>Data Collection: Information search can be done through manufacturers, catalogue, internet, magazines, books etc. and a submit a report (any three)</p> <ul style="list-style-type: none"> i) Collection and reading of drawings of buildings from architect / Practicing engineers and listing of various features from the drawings. ii) Market survey for pumps, pipes and peripherals required for multi storied buildings. iii) Non conventional energy sources with focus on solar energy iv) Elevators - Installation and Maintenance v) Market survey for Advanced Construction material with respect to Quality, Rate and application vi) Modern products of Non-Conventional Energy like solar cooker, solar lamp, solar water heater, solar distillation 	08
4	<p>Seminar : Seminar topic should be related to the subject of fourth semester. Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time - 10 minutes) (Any one topic) Seminar topics may be from areas:</p> <ul style="list-style-type: none"> i) Geology ii) Soil Mechanics iii) Transportation Engineering iv) Surveying and Advance Surveying v) Environmental Science. 	10

Activity No.	Content	Hours
	vi) Building Construction vii) Materials for construction	
5	Mini Project / Activities: (any one) i) Mix design of concrete. ii) Preparing two dimensional submissions drawing of residential building using CAD. iii) Soil Investigation at a site to find out the Bearing capacity iv) A week program on Construction site and prepare a detail report v) Student shall collect the information by visiting Electrical / Electronics Engineering dept. about the material required for wiring and switches - lamps, fans, boards their materials and capacities, systems of wiring and material used, control switches, fuse, etc. vi) Student shall collect the information by visiting Mechanical Engineering department and study the mechanical devices like pumps	12
Total		48

List of assignments to be done by each student as term work (Group of 5-6 students shall be prepared and each group shall be given different activity.

1. **Field Visit:**

Industrial visit to be arranged for class / batch. Students are expected to observe and collect data. Finally prepare a visit report. Report of three industrial visits,

2. **Expert Lectures:**

Expert lecture to be arranged at institute for the class. Student should attend and prepare the keynote of it as a part of term work. Report of two expert Lecture

3. **Data Collection:**

Students are expected to collect data from various sources under the guidance of faculty member and submit the report for the term work. Data collection report on two topics.

4. **Seminar:**

Each student should select the topic of his own interest from the list and prepare and present the seminar on it and submit the hard copy as a term work.

5. **Mini Project:**

Form a group of 4 to 5 students. Each group shall select a topic from the given list. Submit a report of 8-10 pages with sketches, photographs, diagrams, statements etc. as a part of term work.

Learning Resources:

Reference Book, Journal, Exhibitions, Seminar Papers.

Sr. No.	Title
1.	Fourth semester subjects reference books
2.	Journals and magazines – IEEE Journals, IT technologies.
3.	Local news papers and events
4.	Apprenticeship Training Scheme: Compiled By – BOAT (Western Region), Mumbai, Available on MSBTE Web Site.

Web sites: On Google search refer various sites on

1. How to write a report
2. How to prepare seminar
3. Effective Listening.

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/DC/TC/TX/FG**

Industrial Training (Optional) after 4th semester examination.

Note:- Examination in Professional Practices of 5th Semester.

INDUSTRIAL TRAINING (OPTIONAL)

Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- Their work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.