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)
							PAPER HRS	TH (1)		PR (4)		OR (8)		TW (9)		
				TH	TU	PR		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**												

Student Contact Hours Per Week: **34 Hrs.**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks **: 900**

@ - Internal Assessment, # - External Assessment, [redacted] No Theory Examination, $ - Common to all branches, #* - Online Theory Examination.

Note: In plant training of 04 weeks after IVth semester & before Vth semester. Optional for the students & to be assesses in the Vth semester in PPT.

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

**** Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.**

Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5th Semester.

- 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.

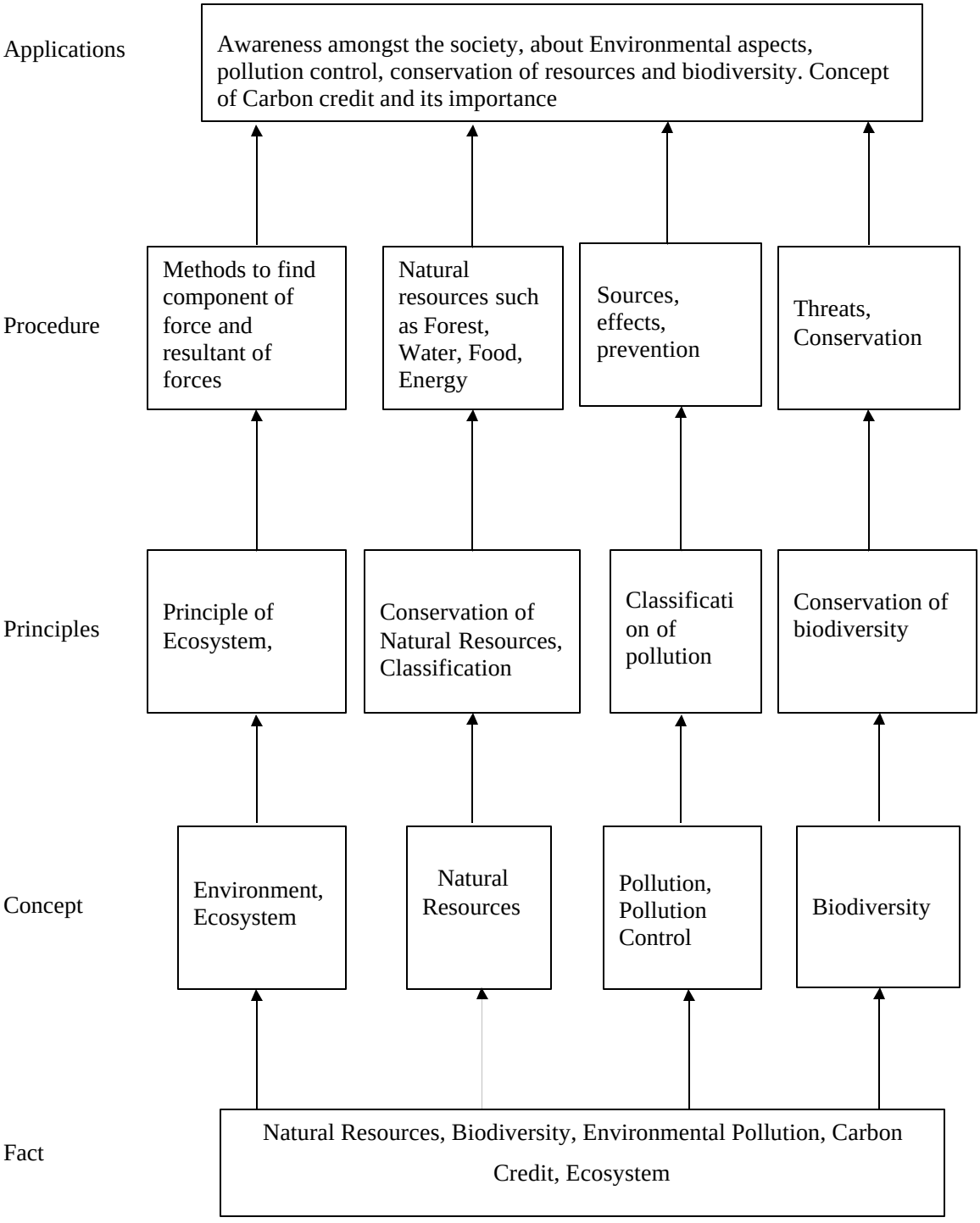
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
Topic 1: Nature of Environmental Studies Specific Objectives: ➢ Define the terms related to Environmental Studies ➢ State importance of awareness about environment in general public **Contents:** • 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
Topic 2: Natural Resources and Associated Problems Specific Objectives: ➢ Define natural resources and identify problems associated with them ➢ Identify uses and their overexploitation ➢ Identify alternate resources and their importance for environment **Contents:** 2.1 Renewable and Non renewable resources • Definition • Associated problems 2.2 Forest Resources • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. 2.3 Water Resources • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community 2.4 Mineral Resources: • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment 2.5 Food Resources: • Food for all • Effects of modern agriculture • World food problem	04	10
Topic 3. Ecosystems • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world	01	04
Topic 4. Biodiversity and Its Conservation • Definition of Biodiversity • Levels of biodiversity	02	06

• Value of biodiversity • Threats to biodiversity • Conservation of biodiversity		
Topic 5. Environmental Pollution • 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 • 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: • 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 • 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 tunnellining. 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.

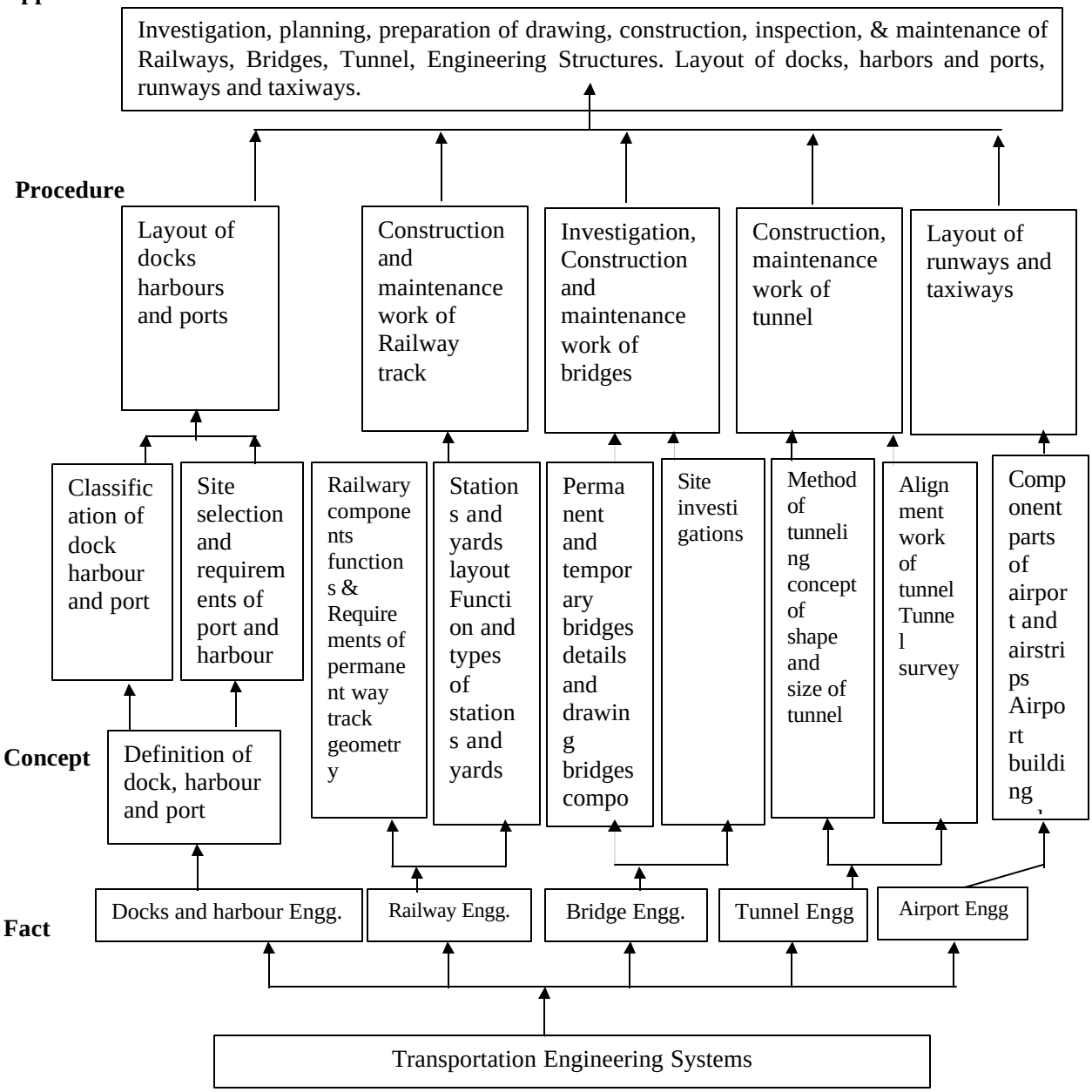
General Objectives:

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.

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

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
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 **Contents:** • 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
Topic 2. Railway Engineering 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 **Contents:** 2.1 Alignment and Gauges and Permanent ways…….12 • 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. 2.2 Railway Track Geometrics and Branching of Tracks…….14 • 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. 2.3 Station and Yards and Track Maintenance……..06	18	32

• 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, orgnisation, duties of permanent way inspector,gang mate key man.		
Topic 3. Bridge Engineering Specific objectives: ➢ Define different terminologies related to bridge engineering ➢ State functions of component parts of bridge ➢ Draw sketches of temporary and permanent bridges **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 • 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 mansoon inspection-Purpose Maintenance of bridges: types – routine and special Maintenance.	16	32
Topic 4. Tunnel Engineering. Specific objectives: ➢ Draw tunnel cross sections for highways and railways. ➢ List data for tunnel investigation and survey. ➢ State precautions in constructions of tunnel. **Contents:** 4.1……16 • Definition, necessity, advantages, disadvantages, Classification of tunnels, Shape and Size of tunnels, Tunnel Cross sections for highway and railways	12	32

• Tunnel investigations and surveying –Tunnel surveying locating center line on ground, transferring center line inside the tunnel. Shaft - its purpose and construction. 4.2 ……16 • 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.

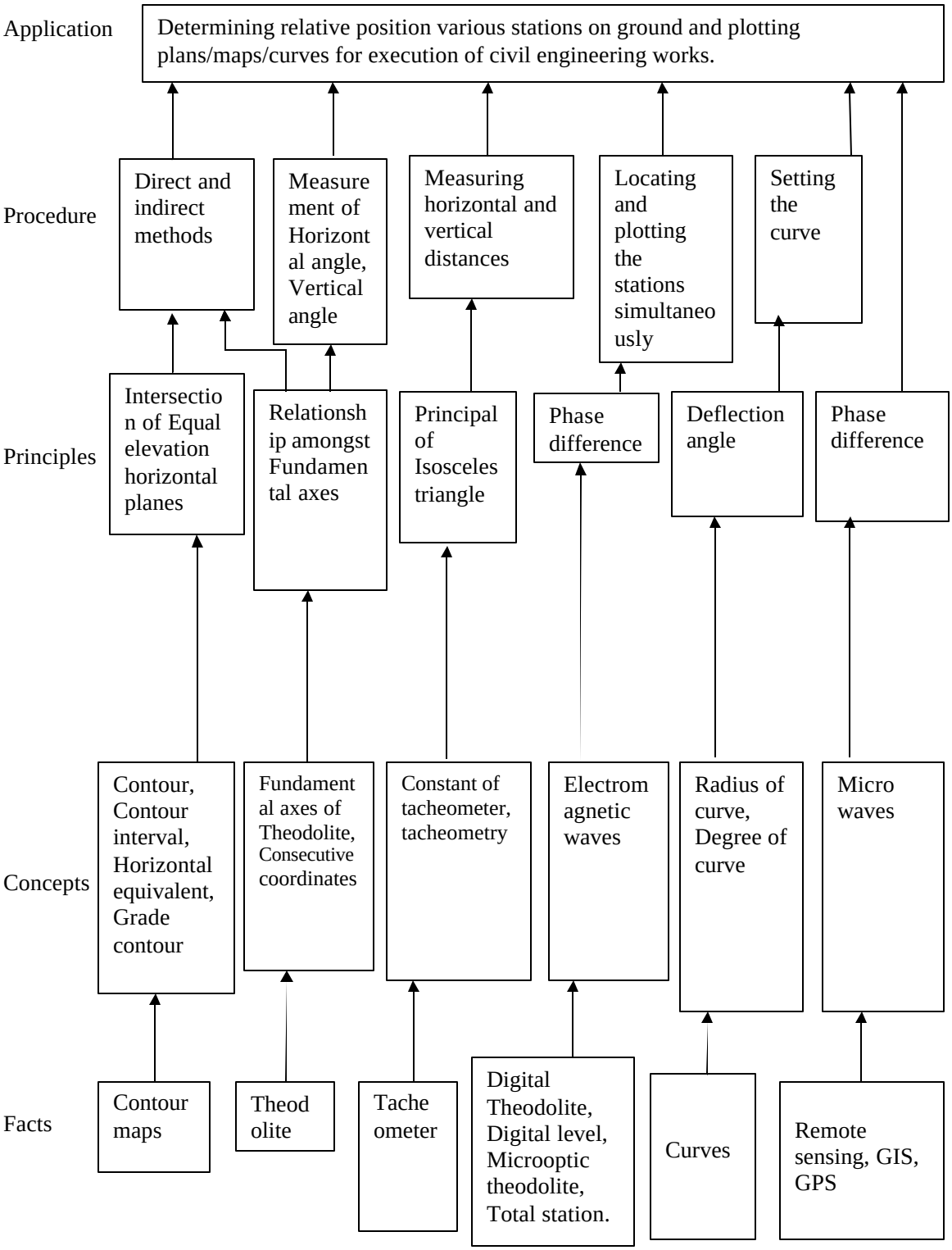
Geographical Information System (GIS) is rapidly used in technological field which intend to assess real-world problems. GIS backed by modern computers allow us to benefit from visual power of maps. It is the time demand to nurture civil engineers with latest surveying technology.

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.
- Interprete survey maps.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
Topic 1. Contouring Specific objectives : ➢ 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 Contents: • 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, Esta blishing grade contour on ground, Locating grade contour on contour map.	06	14
Topic 2. Area and Volume Measurement Specific objectives : ➢ Measure the area of plans/maps. ➢ Compute the volume Contents: • 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 Priszmoidal formulae, Simple numerical problems.	04	10
Topic 3. Theodolite Survey Specific objectives : ➢ 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. 3.1 ……(06) Types of theodolite, uses of theodolite, Component parts of transit theodolite and their functions, Reading the vernier of transit thedolite, Technical terms- Swinging, Transiting, Face left, Face right, Fundamental axes of transit theodolite and their relationship 3.2 ……(08) Temporary adjustment of transit theodolite, Measurement of horizontal angle- Direct and Repetition method, Errors eleminated 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) 3.3……(10) • Thedolite 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

cordinates, Independent cordinates, Balancing traverse by Bowditch's rule and Transit rule, Gale's table calculations, Simple numerical problems		
Topic 4. Tacheometry Specific objectives : ➢ Use tacheometer to find horizontal and vertical distances ➢ Carry out contour survey by tacheometer Contents: • 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
Topic 5. Modern Survey Instrument Specific objectives : ➢ 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 Contents: 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. 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.	10	20
Topic 6. Curves Specific objectives: ➢ List components of simple circular curve ➢ Set simple circular curve by offsets from long chord and Rankine's deflection angle method **Contents:** • 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
Topic 7. Remote sensing and GIS Specific objectives: ➢ Descibe remote sensing process ➢ Identify the components of GIS	04	08

➢ State applications of GPS **Contents:** • 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 processs, 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.

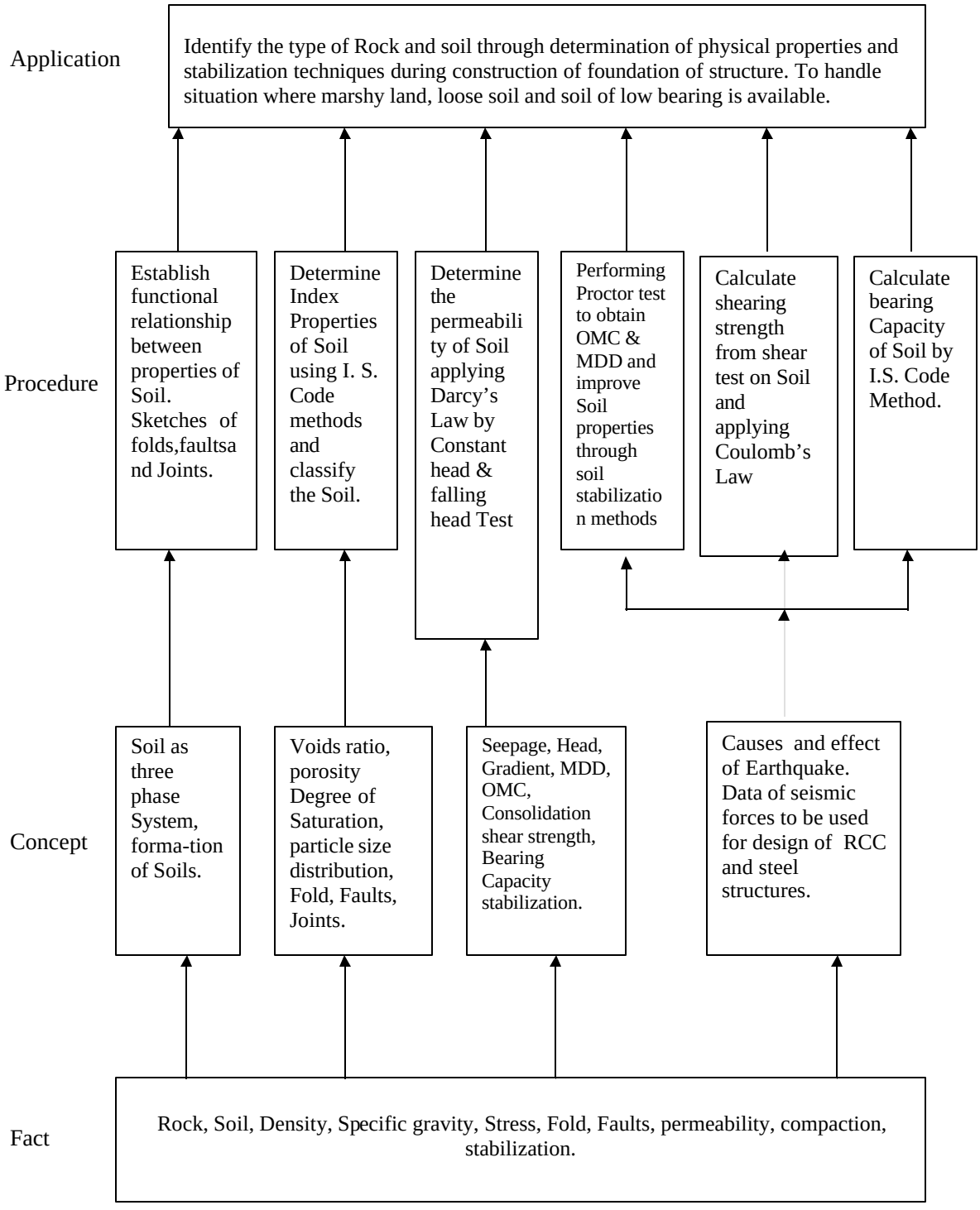
The content of this subject are also useful in designing basement, underground tank and underwater structures. Knowledge of geology, soil characteristics, and stress distribution under loading on soil, bearing capacity of soil is also useful to every engineer in the design, execution and stability analysis 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
Topic 1: General geology, mineralogy and petrology. **Specific Objectives:** ➢ **State purpose of geology in civil engineering.** ➢ **Describe different structure and composition of earth.** **Contents:** • 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
Topic 2: Structural Geology **Specific Objectives:** ➢ **State the meaning of different terms related to structural geology.** ➢ **State causes and condition of formation of fold, fault and joints.** **Contents**: • StructuralGeology: Definition, importance, Outcrop, dip, strike, folds- Definition, parts and types, Joints- Definition and classification, Faults- Definition, parts and Types	02	06
Topic 3: Physical Geology. **Specific Objectives:** ➢ **State the effect of weathering on rocks.** ➢ **Describe the Earth movement and Volcanism.** **Contents:** • 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
Topic 4: Overview Geotechnical Engineering **Specific Objectives:** ➢ **State purpose of Soil as construction and Engineering material.** ➢ **Describe field application of Geo-technical Engineering.** • 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
Topics 5: Physical Properties of Soil **Specific Objectives:** ➢ **State the different physical properties of Soil.** ➢ **Classify the soil as per IS classification.** **Contents:**	12	26

5.1 Soil Properties ……. (10 Marks) • 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. **5.2 Consistency Limits of Soil …… (8 Marks)** • 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. **5.3 Grading of Soils ……. (8 Marks)** • 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.		
Topics 6: Permeability and Shear Strength of Soil. **Specific Objectives:** ➢ **State the factors affecting the permeability of soil.** ➢ **Describe the shear failure of cohesive and Non-cohesive soil.** **Contents:** • 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
Topics 7: Bearing Capacity, Compaction and Stabilization of Soil **Specific Objectives:** ➢ **Describe the procedure of test for Bearing Capacity of soil.** ➢ **State the necessity of compaction and stabilization of soil.** **Contents:** **7.**1 Bearing capacity and theory of earth pressure …… **(14 Marks)** • 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

pressure, coefficient of earth pressure, Rankine's theory and assumptions made for non-cohesive Soils. 7.2 Compaction and consolidation …….. **(14 Marks)** • 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 past- 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.

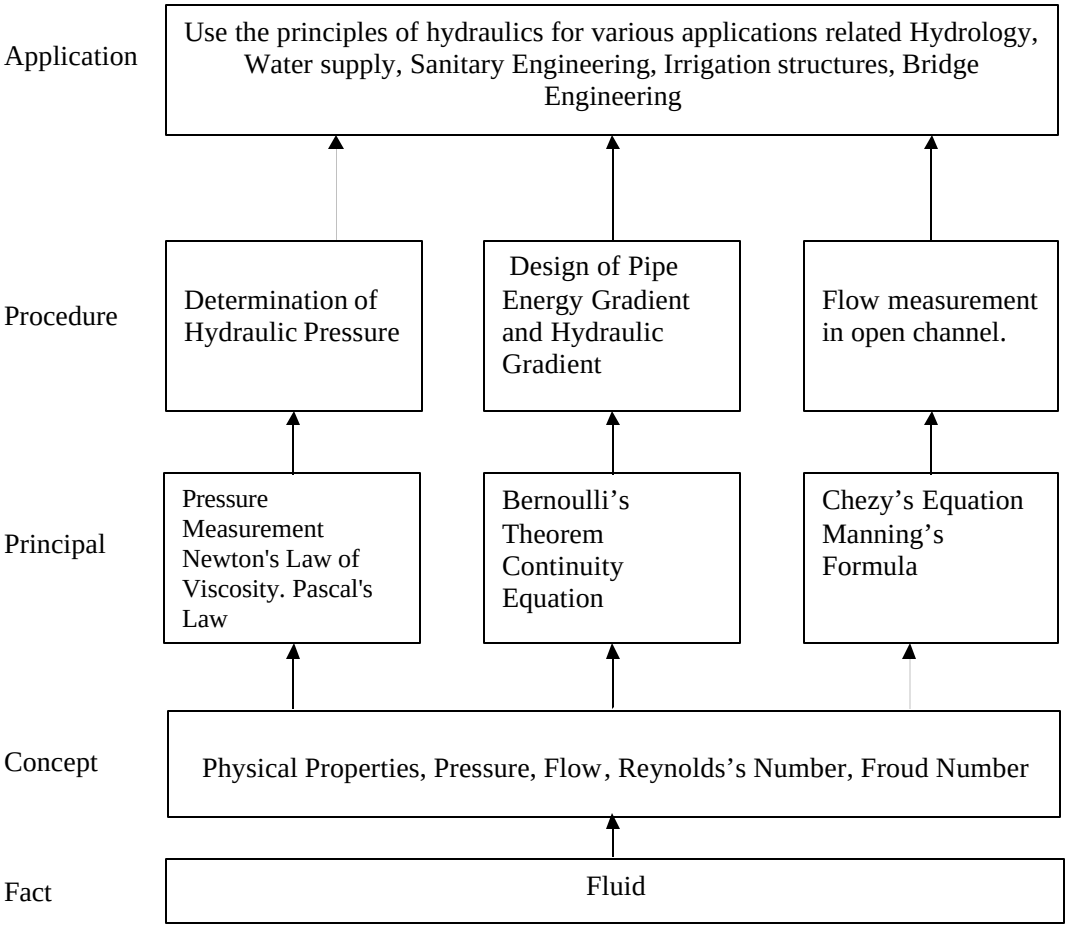
General Objectives:

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
Topic 1: Properties of fluid **Specific Objectives:** ➢ **Differentiate between fluids with solids** ➢ **List properties of fluids** **Contents :** • 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
Topic 2: Hydrostatic Pressure **Specific Objectives:** ➢ **State principles, laws of hydrostatic pressure** ➢ **Compute total hydrostatic pressure and centre of pressure on different surfaces** **Contents :** • 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
Topic 3: Measurement of Liquid Pressure In Pipes **Specific Objectives:** ➢ **State meaning of liquid pressure, pressure head** ➢ **State principles and uses of different pressure measuring devices** **Contents :** • 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
Topic 4: Fundamentals of Fluid Flow **Specific Objectives:** ➢ **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

Contents: • 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.		
Topic 5: Flow of Liquid Through Pipes **Specific Objectives:** ➢ **List various losses in flow through pipes** ➢ **Estimate loss of head for flow through pipes** ➢ **List various pipe arrangements and calculate diameter of pipe** **Contents :** 5.1 Loss of energy or loss of head in flow through pipe……..06 • 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. 5.2 Different Pipes arrangements and hydraulic gradient line.……10 • Flow through pipes in series and parallel pipes. • Syphon pipe. • Equivalent pipe- Dupit's equition. • 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
Topic 6: Flow Through Open Channel **Specific Objectives:** ➢ **Work out discharge through open channel** ➢ **Design most economical section of channel** **Contents :** 6.1 Open channel flow…….04 • 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. 6.2 Determination of discharge through open channel……08 • Chezy's equation and Manning's equation. • Most economical channel sections- conditions for most economical rectangular and trapezoidal channel sections. 6.3 Hydraulic Jump……..04	07	16

• Froud's number and its significance. • Hydraulic Jump, its occurrence in field, use . Numerical Problems.on above all topics		
Topic 7: Flow Measurement Techniques **Specific Objectives:** ➢ **Understand principles and working of flow measuring devices** ➢ **Determine discharge through pipes and open streams** **Contents :** 7.1 Discharge measuring devices for pipes……08 • 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. 7.2 Discharge measuring devices for open channel…….08 • Notches –Types- Rectangular, 'V', Trapezoidal notches. Expression for discharge. • Weirs- Types, discharge over rectangular sharp crested weir. Velocity area method of discharge measurement -- • Velocity measuring devices-floats, pitot tube, Current meter. • Study and use of water meter. Numerical Problems. .on all above topics	07	16
Topic 8: Pumps and Turbines **Specific Objectives:** ➢ **Identify various types of pumps and their uses in different situations** ➢ **Calculate power for pump** **Contents :** • 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. Identity 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 determinant 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.

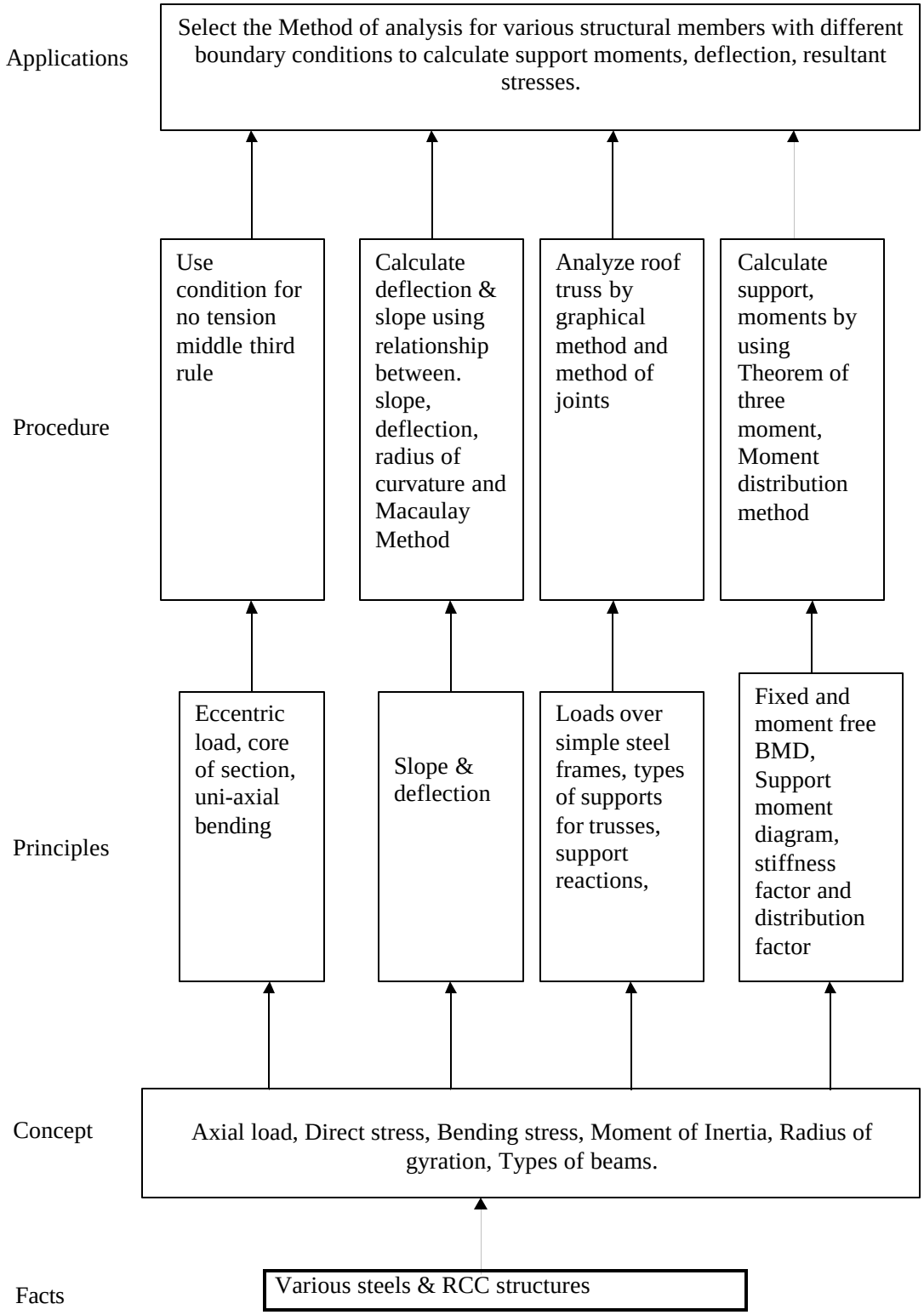
Thus the total contents of this subject forms the basic for the efficient and safe design of steel and RCC structures. .

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
Topic 1: Direct and Bending Stresses **Specific Objectives:** ➢ 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. **Contents:** 1.1 ……..(12 Marks) • 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. 1.2 ……..(08 Marks) • 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
Topics 2: Slope and Deflection **Specific Objectives**: ➢ 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. **Contents:** 2.1 ……..(08 Marks) • 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. 2.2 ……..(12 Marks) • 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
Topics 3: Fixed Beam **Specific Objectives:** ➢ 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. **Contents:** Fixed Beam	06	12

• 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).		
Topics 4: Continuous Beam **Specific Objectives:** ➢ State the effects of continuity of beams and nature of moments induced. ➢ Write Calpeyron's theorem of three moments (No derivation) ➢ Draw sketches of BMD and SFD for continuous beams. **Contents:** Continuous Beam • 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
Topics 5: Moment Distribution Method **Specific Objectives:** ➢ 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. **Contents:** Moment Distribution Method. • 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
Topic 6: Simple Frames **Specific Objectives:** ➢ List different types of roof trusses. ➢ State conditions for redundant and non- redundant frames. ➢ List types of forces in different members. **Contents:** Simple Frames • Types of trusses (Simple, Fink, compound fink, French roof truss,	0 6	16

pratt roof truss, Howe roof truss, North light roof truss, King post and Queen post roof truss) • 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:

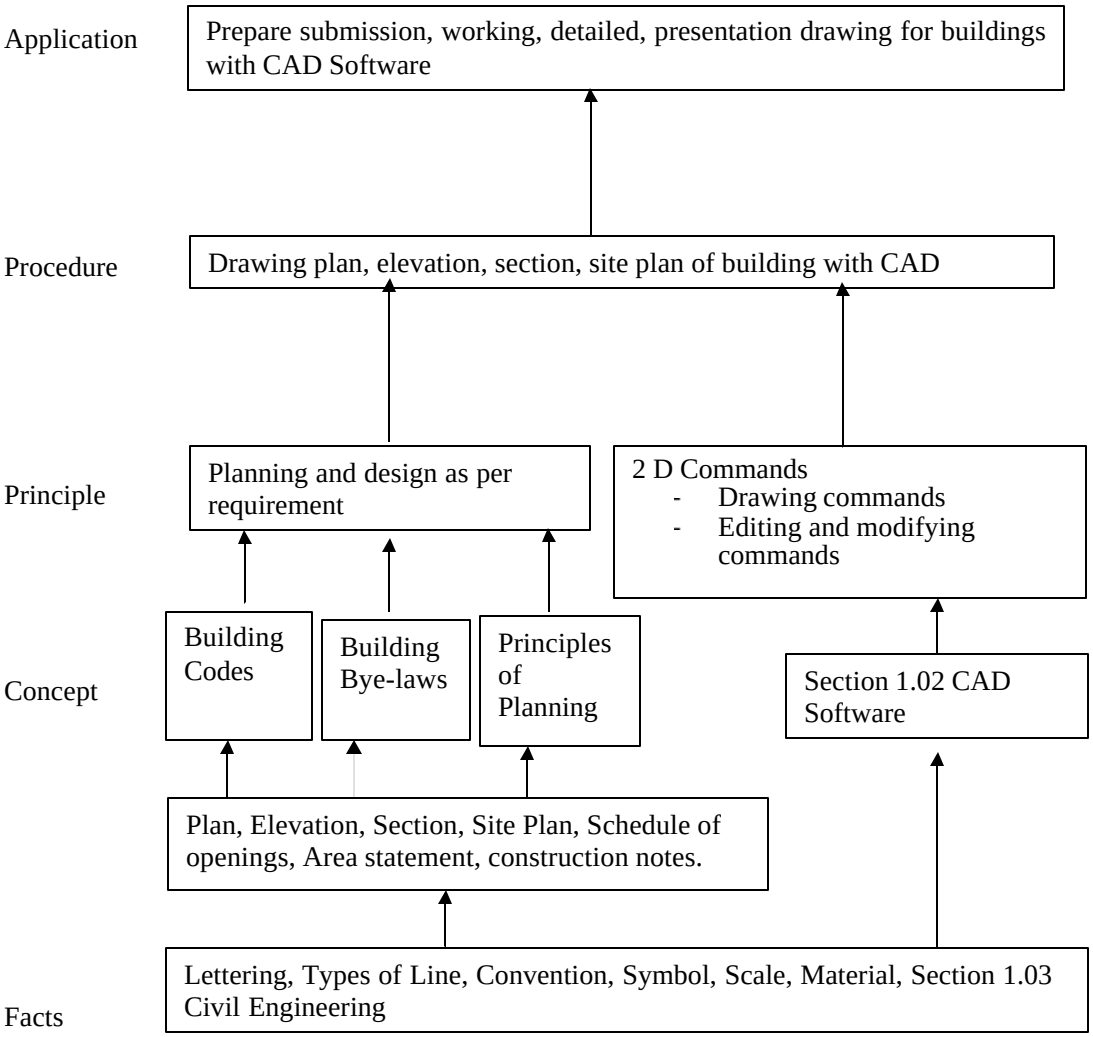
Intellectual Skills:

- 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 • 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 • 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 • Preparation of line plan, detailed plan, developed plan, section, site plan, area statement • Procedure for printing drawings.	36
Topic 4. INTRODUCTION TO 3D DRAWING • **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
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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:

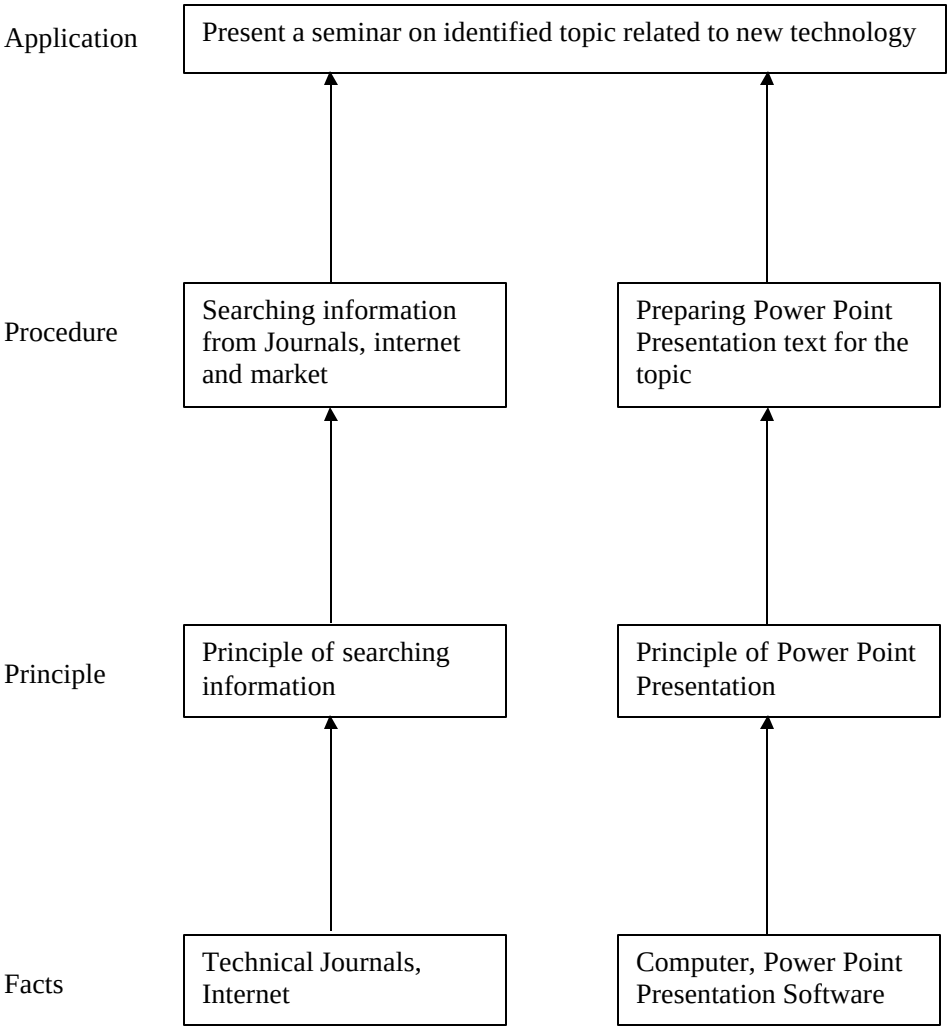
Intellectual Skills

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	**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)** 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	**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 : 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	**Data Collection:** Information search can be done through manufacturers, catalogue, internet, magazines, books etc. and a submit a report **(any three)** 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	**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: 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.