 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 : FIFTH											DURATION : 16 WEEKS					
PATTERN : FULL TIME - SEMESTER											SCHEME : G					
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME									SW (17500)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)		
								Max	Min	Max	Min	Max	Min	Max	Min	
1	Estimating and Costing	EAC	17501	03	--	04	04	100	40	--	--	25#	10	25@	10	50
2	Irrigation Engineering	IEN	17502	04	--	--	03	100	40	--	--	--	--	--	--	
3	Public Health Engineering	PHE	17503	03	--	02	03	100	40	25#	10	--	--	25@	10	
4	Concrete Technology	CTE	17504	03	--	02	03	100	40	--	--	--	--	25@	10	
5	Design of Steel Structures	DSS	17505	03	--	02	04	100	40	--	--	--	--	50@	20	
6	Behavioural Science \$	BSC	17075	01	--	02	--	--	--	--	--	25#	10	25@	10	
7	Entrepreneurship Development	EDE	17057	--	--	02	--	--	--	--	--	--	--	25@	10	
8	Professional Practices-III	PPT	17058	--	--	03	--	--	--	--	--	--	--	50@	20	
Total				17	--	17	--	500	--	25	--	50	--	225	--	50
<p>Student Contact Hours Per Week: 34 Hrs.</p> <p>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</p> <p>Total Marks : 850</p> <p>@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #* - Online Theory Examination.</p> <p>Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.</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 : Civil Engineering Group

Course Code : CE/CS/CR/CV

Semester : Fifth Semester for CE/CS/CR and Sixth Semester for CV

Subject Title : Estimating and Costing

Subject Code : 17501

Teaching and Examination Scheme:

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

In case of long term planning the prospective cost of the construction project is required for the planning of the budget.

Estimating and Costing determines the prospective costs of the construction project in accordance to the plans and specifications for various items of works. Quality of material, type of labour, equipments, tools, transport cost affects the rates of an item of the work. The rates of completed item of the work vary from place to place. However, learner will be able to determine the quantities and cost with reasonable accuracy and in accordance with the standards as per IS: 1200.

The topic on approximate estimate is useful for calculating approximate cost of the building / roads etc. which is further useful for the making budget provisions in the planned works.

The information on detailed estimate based on measurements and the rate of completed item of work is useful in finding comparatively accurate costs of each item of work and total cost of the buildings / roads / structures etc. which is useful for preparation of tender documents and thereafter for the execution of the work.

The rate analysis of an item of work shall help in finding out the rate per unit on the basis of material cost, labour cost, contractors profit and other probable miscellaneous expenditure required for the completed item of the work for actual execution of the works as per lead and lift.

Thus the subject shall strongly help to build professionalism among the learner by providing the knowledge and estimating skills at the project sites along with the use of software's / programmes of estimating which makes learner a perfect professional civil engineer.

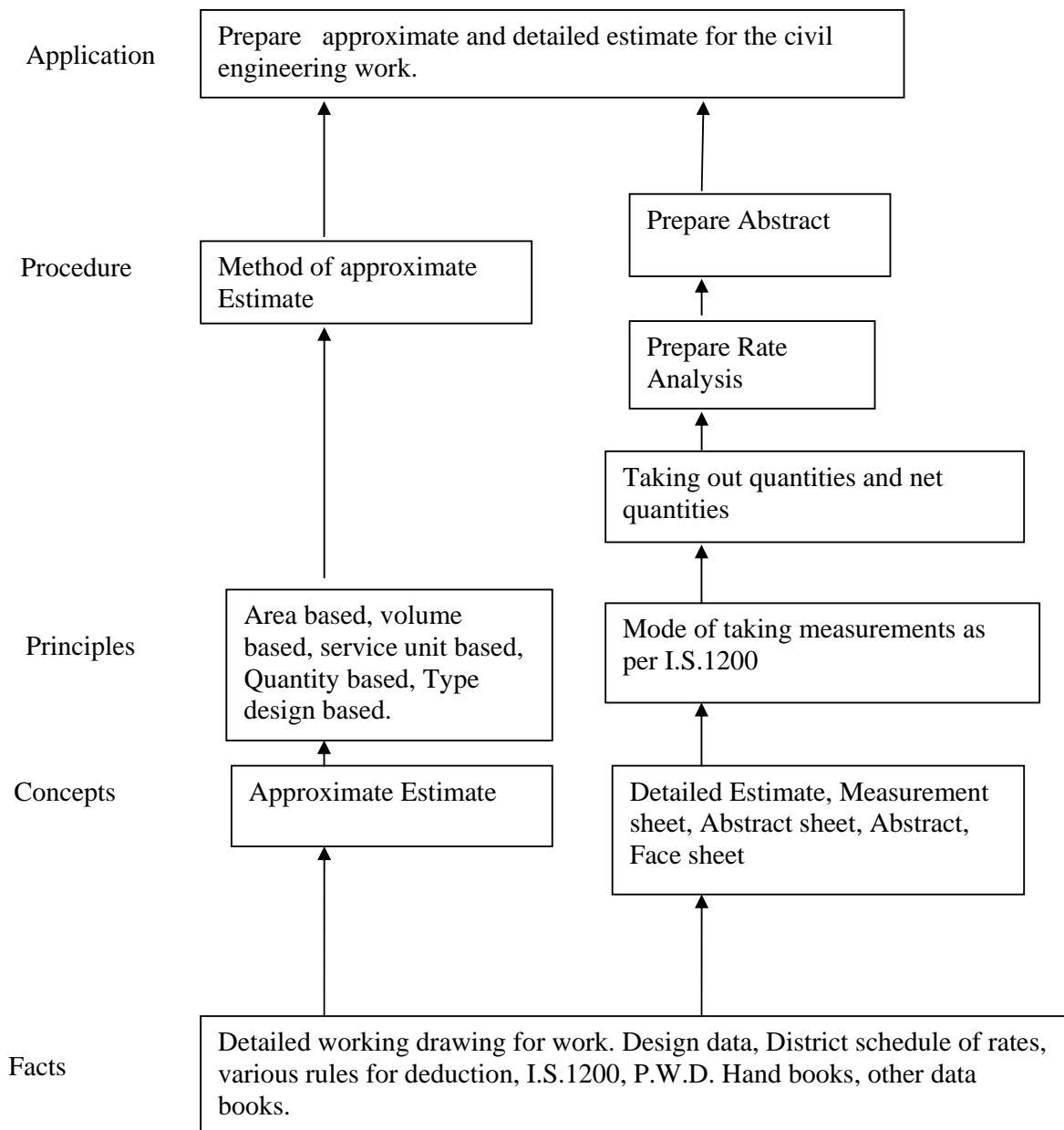
General Objectives:

Student will be able to:

- Understand units and modes of measurements of various items of work.
- Know the method of preparation of approximate estimates of various civil engineering works.

- Apply knowledge of preparation of check list of items of construction, rate analysis for preparation of detailed estimate of various civil engineering works.
- Understand the preparation of bill of quantities by taking measurements of completed item of work and rate of the item
- Apply computer software's to prepare estimate of building works.

Learning Structure:



Theory

Topic and Contents	Hours	Marks
<p>Topic 1. Introduction Specific objectives:</p> <ul style="list-style-type: none"> ➤ Define and state purpose of estimating and costing. ➤ List different methods of approximate estimate. ➤ Collect local rates of materials, labour and equipments along with local terms used. <p>Contents:</p> <ul style="list-style-type: none"> • Estimates- Meaning of the term estimating and costing, purpose of estimating and costing. Types of estimates and their purpose • Approximate estimate- Plinth area rate method, Cubical content method, Service unit method, Typical bay method, Approximate quantity method. • Problems on plinth area rate method and use of service unit method for selection of service units for different types of buildings. • Detailed estimate- Detailed estimate, revised estimate, supplementary estimate, revised and supplementary estimate, repair and maintenance estimate and their uses in practical situation. 	04	08
<p>Topic 2. Mode of measurement and brief specifications Specific objectives:</p> <ul style="list-style-type: none"> ➤ State units and modes of measurement and payments for various items of works. ➤ Apply rules of deductions for openings as per IS 1200. ➤ Use standard formats of measurement sheet, abstract sheet and face sheet. <p>Contents:</p> <ul style="list-style-type: none"> • Units of measurement and desired accuracy as per IS: 1200, Rules of deduction for openings as per IS:1200 for brick work, plastering and pointing. • Sequence of execution and brief description / specification of items of work as per PWD/GOVT. DSR, Standard formats of measurement sheet, Abstract sheet, face sheet. 	06	12
<p>Topic 3. Preparation of estimate Specific objectives:</p> <ul style="list-style-type: none"> ➤ Collect the data regarding cost/Sq.m for various types of buildings as per PWD and local rates. ➤ Prepare approximate estimates of various civil engineering works. ➤ Understand various items of works of different civil engineering structures. ➤ Prepare check list for civil engineering works. ➤ Apply methods of taking out quantities. ➤ Adopt procedure of preparing detailed estimate of RCC framed structures and Load bearing structures. ➤ Prepare bar bending schedule of RCC works. ➤ Apply various methods for earth work computation. ➤ Incorporate various provisions to be made in detailed estimate. 	22	40

Topic and Contents	Hours	Marks
<p>Contents:</p> <p>3.1 Approximate Estimate (16 Marks)</p> <ul style="list-style-type: none"> • Plinth area/carpet area/Super built up area of building by using PWD rates and local rates • Estimates of roads, highway, railways, bridges/culverts, irrigation projects and water supply projects. <p>3.2 Detailed Estimate (12 Marks)</p> <ul style="list-style-type: none"> • Data required for detailed estimate • Steps in preparation of detailed estimate • Preparing check list of RCC framed structure building/roads, listing of approximate % of steel required for various RCC members. • Methods for taking out quantities by Long wall and Short wall method, Centre line method. • Taking out quantities of various items of building (RCC framed structure and Load bearing structure), road work as per PWD method. <p>3.3 (12 Marks)</p> <ul style="list-style-type: none"> • Bar bending schedule and steel quantities calculation for footing, column, beam, slab and chajja. • Earthwork computation-Meaning and methods, calculation of earthwork quantity for roads and canal by average cross sectional area method, mid sectional method, Prismoidal formula method. • Provisions to be made in detailed estimate for contingencies, work charged establishment, centage charges, water supply and sanitary arrangements, internal electrification etc. • Meaning of the terms- Prime cost, Provisional sum, provisional quantities, Day work 		
<p>Topic 4. Rate Analysis</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ Understand definition, purpose and concept of rate analysis. ➤ Collect local rates of materials, labours and hiring charges of tools and plants with transportation charges. ➤ Understand the concept of lead and lift. ➤ Prepare rate analysis of various items of work. <p>Contents:</p> <p>4.1 (08 Marks)</p> <ul style="list-style-type: none"> • Definition, purpose, importance of rate analysis, factors affecting rate analysis, procedure of rate analysis. • Meaning of term lead, lift, task work, material rate and labour charges, conveyance capacity of different types of vehicle, transportation of materials and charges, categories of labours, their rates, overhead charges, contractors profit, work charge establishment and water charges. <p>4.2 (16 Marks)</p> <ul style="list-style-type: none"> • Preparing rate analysis of different items of work- excavation, PCC, RCC Footing, brick masonry, stone masonry, RCC work (column, beam, lintel, slab etc.), flooring, plastering, DPC, Wood work for doors and windows frames and shutters. 	10	24

Topic and Contents	Hours	Marks
Topic 5. Estimate for Civil Engineering works Specific objectives: <ul style="list-style-type: none"> ➤ Prepare estimate for different civil engineering works ➤ Prepare sample estimate by using computer software / Excel programme. Contents: <ul style="list-style-type: none"> • Preparation of detailed estimate for: 6 to10 users septic tank, and Community well. • Preparation of detailed estimate for a small RCC slab culvert. • Use of computer / software / programmes for detailed estimate preparation of building works. 	06	16
Total	48	100

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

1. List various items of work with the units in a civil engineering structures.
2. Calculate quantities of various items of works

Motor Skills:

1. Prepare rate analysis.
2. Prepare detailed estimate of civil engineering structures.

List of Assignments:

1. Prepare the checklist of the following Civil Engineering works.
 - i) RCC framed structure building.
 - ii) Bituminous pavement road with WBM as sub-base.
2. Collection of local rate of construction material, labours, tools and equipments.
3. Preparation of approximate estimate of the various types of buildings by PWD method / guide lines. **(Teacher shall provide required drawing/data)**
 - i) School Building.
 - ii) Hospital Building.
 - iii) Residential Building.
 - iv) Auditorium Building.
4. Taking out the quantities of various items of the work for the load bearing structure by **any one method** (Center line / Long wall and short wall)
(Teacher shall provide required drawing/data)
 - i) Excavation for foundation.
 - ii) Plain cement concrete for foundation.
 - iii) UCR masonry in foundation and plinth.
 - iv) Damp proof course.
 - v) Plinth filling.
 - vi) Burnt Brick masonry in superstructure.
 - vii) Flooring, skirting and dados.
 - viii) Plastering. (Internal , External and ceiling)
 - ix) Woodwork in door frame and shutter.
 - x) Painting (inside / outside and ceiling)
5. Taking out quantities of following items for a small RCC Hall.
(Teacher shall provide required drawing/data)

- i) Concrete work for footing , column, beam, slab, lintel and RCC chajja
 - ii) Schedule of reinforcement for structural members and computation of quantities of reinforcement.
 - iii) Calculation of formwork for all above items (5(i)
6. Preparing rate analysis of **any four** of the following items of building works.
- i) Excavation for the road.
 - ii) PCC for foundation trenches.
 - iii) UCR Masonry in foundation and plinth.
 - iv) Brickwork in super structure.
 - v) Plastering.
 - vi) Flooring.
 - vii) Teakwood frame for door / window.
 - viii) RCC beams / slab.
 - ix) RCC columns / footings.
 - x) Coloring / Painting.
7. Prepare detailed estimate of ground floor of a RCC, (G+1) Residential Building Framed Structure (2 BHKD with attached toilet to 1 bedroom with European type WC) with dog legged staircase.[The drawing prepared in 4th semester in CAD may be used] Calculate also the per square meter cost of the building (**This exercise is carried out by making batch of 5 to 6 students**). (**Teacher shall provide required drawing/data if necessary**)
8. Calculate quantity by field measurements for the following.
- i) Flooring.
 - ii) Plastering (Internal or External)
 - iii) Brickwork.
 - iv) RCC stairs.
- (Teacher shall arrange field visit batch wise)**
9. Taking out quantities of the earthwork for a road profile of 500 meter length by mid-section or mean area method. (Drawing of profile leveling prepared in 3rd semester may be used.)
10. Taking out quantities of the earthwork for a road profile of 500 meter length by using Excel / any other available software / program.

Learning Resources:**1. Books:**

Sr. No.	Title	Author	Publisher
01	Estimating and Costing in Civil Engineering	B.N. Dutta	UBS Publishers Distributors Pvt. Ltd., New Delhi
02	Estimating and Costing, Specification and Valuation in Civil Engineering	M. Chakraborti	M. Chakraborti, Kolkata
03	Estimating and Costing	S.C. Rangwala	Charotar Publication, Anand
04	Estimating and Costing	G.S. Birdie	Dhanpat Rai and Sons.
05	Civil Engineering Estimating Vol. 1	B.S.Patil	Orient longman,mumbai
06	Estimating construction costs (fifth edition)	Robert L. Peurifoy Garold D. Oberlender	Tata McGraw Hill Education Private Ltd, New Delhi

2. CDs, PPTs Etc.:

Q.E. PRO software or any equivalent Software

3. IS, BIS and International Codes:

Sr. No.	Title
01	IS-1200- Method of measurement of building and civil engineering works
02	District Schedule of rate of PWD

4. Websites:

- a) www.maharashtra.gov.in
- b) www.mahapwd.com
- c) www.cpwd.com
- d) www.newtonindia.com
- e) www.ensoftindia.com

Course Name : Civil Engineering Group

Course Code : CE/CS/CR/CV

Semester : Fifth for CE/CS/CR and Sixth for CV

Subject Title : Irrigation Engineering

Subject Code : 17502

Teaching and Examination Scheme:

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

Agriculture is the main occupation of majority of Indian Population. But Agricultural productivity is very low because of uncertainty of rainfall. Scientifically planned and developed Irrigation systems have been ensuring enhanced productivity of agriculture sector due to assured water supply to crops. There are inherent huge amount water losses in major projects and major projects are complex from the view point of operation, management and maintenance. Medium, minor and micro irrigation schemes have proved to be easier to develop and maintain and are highly efficient also.

The topics on hydrology, rainfall, runoff, yield and maximum flood discharge will be useful for reservoir planning. Information on duty, delta, base period, crop pattern and command area will be used for ascertaining crop water requirement. Various topics on data collection for irrigation project will be useful for irrigation site investigation.

Topics on earthen, gravity dams and spillway will be useful during construction of medium, minor irrigation schemes. The contents on Bandhra Irrigation, Percolation Tank and micro irrigation will be useful, for construction, maintenance of minor irrigation scheme. Topics on Diversion headwork will be useful for efficient and effective planning of barrages and weirs

Topics on canals with their types, canal, CD works and canal maintenance will be guiding factor for deciding canal alignment, location of various CD works, various maintenance parameters for a canal including the prevailing field practices.

Thus the diploma engineer is exposed to understand various factors at the planning, construction, operation, maintenance and repairs of various irrigation schemes. This will further enable a learner to come up as resourceful professional in the area of irrigation engineering. This

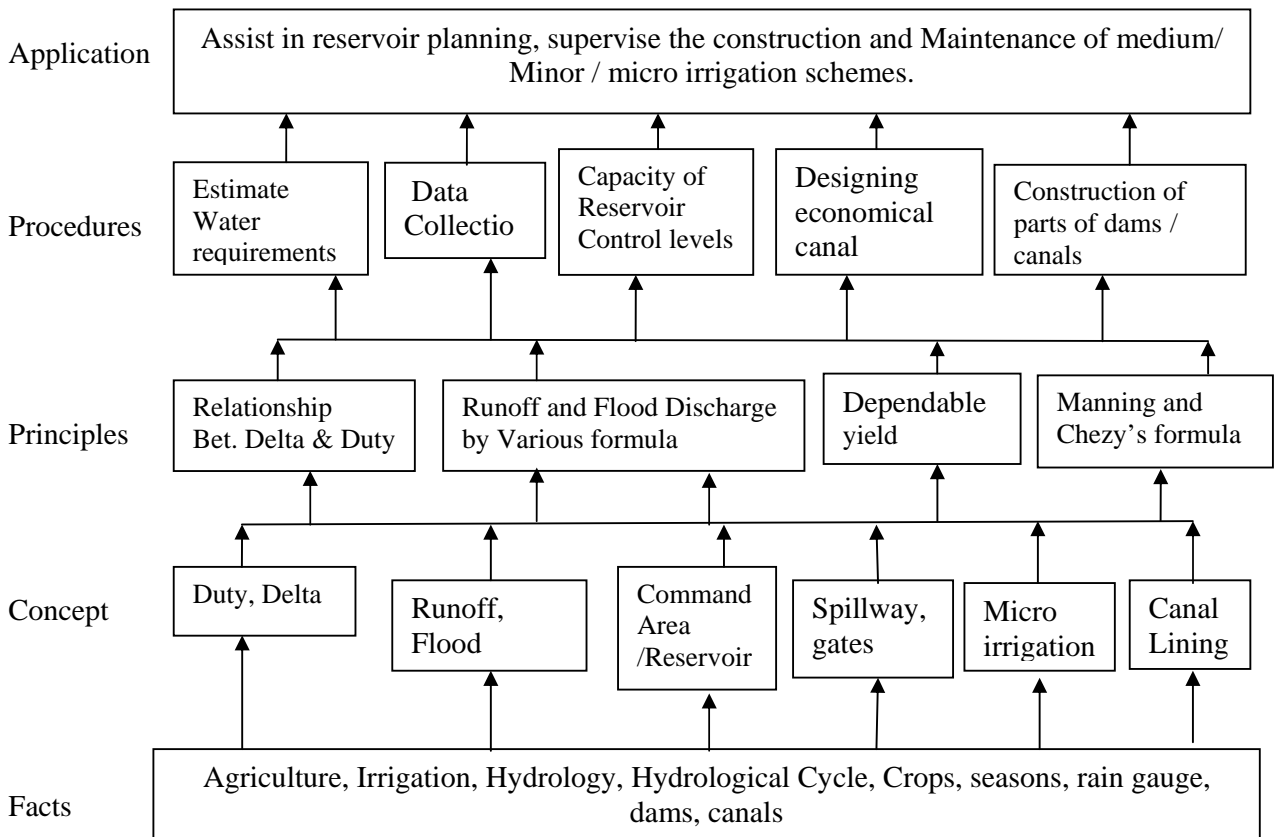
may aim at optimum use of water with minimum loss of water and achieve maximum productivity and yield.

General Objectives:

Students will be able to

1. Appreciate need of Irrigation
2. Understand Water Requirements of a command area
3. Understand aspects of Reservoir Planning.
4. Understand Construction and maintenance of Earthen and Gravity Dams
5. Understand Minor / Micro Irrigation Schemes.
6. Understand Construction and Maintenance of Canals and structures.

Learning Structure:



Theory

Topic and Contents	Hours	Marks
<p>Topic 1. Introduction to Irrigation and Hydrology: Specific Objectives</p> <ul style="list-style-type: none"> ➤ Classify irrigation projects. ➤ Classify irrigation. ➤ Estimate runoff and flood discharge. ➤ Calculate dependable yield from a catchment <p>1.1 Concept of Irrigation, Classification of irrigation on the basis of purpose and administration.</p> <p>1.2 Advantages and ill effects of irrigation, methods of irrigation-such as surface</p> <p>1.3 Concept of hydrology, Hydrologic cycle, Definition of rain fall ,rainfall intensity</p> <p>1.4 Rain Gauge-Symons rain gauge, automatic rain gauge, its construction and functioning average rainfall, methods of calculating average rainfall.</p> <p>1.5 Runoff, Factors affecting Run off, Computation of run off Using Inglis formula, Stranges and Binnie's tables.</p> <p>1.6 Concept of Maximum Flood Discharge (MFD), Computation of Maximum Flood Discharge by Physical indication of past floods and by flood discharge formulae-Inglis and Dicken;s formula. Simple numerical problems.</p> <p>1.7 Yield and Dependable yield of a catchment, determination of dependable yield.</p>	10	12
<p>Topic 2. Water Requirement of Crops And Reservoir Planning: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Estimate crop water requirement of a command area. ➤ Calculate reservoir capacity to meet the crop water demand of a command area. ➤ Enlist data required to be collected for the planning of a reservoir. ➤ Fix control levels of a reservoir. <p>2.1 (08)</p> <ul style="list-style-type: none"> • Cropping seasons in Maharashtra. • Definition of terms – Crop period, base period, Duty, Delta, CCA, GCA, intensity of irrigation, factors affecting duty , relation between duty, delta and base period. • Problems on water requirement and capacity of canal. Modified Penman method .Assessment of irrigation water. <p>2.2 (10)</p> <ul style="list-style-type: none"> • Survey for irrigation project, data collection for irrigation project. area capacity curve, • Silting of reservoir, rate of silting , factors affecting silting , • Fixing Control levels and respective storage in reservoir. Simple numerical problems on Fixing Control levels. 	12	18
<p>Topic 3. Dams And Spillways Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Classify dams. ➤ Describe construction and operation of Earthen and Gravity Dam. ➤ Describe operation of spillway and gates. ➤ List various repairs and maintenance works for an earthen dam. <p>3.1 (12)</p>	14	24

<p>➤ Dam, Types of dams - Earthen dams and Gravity dams (masonry and concrete) Comparison of earthen and gravity dams with respect to foundation, seepage, construction and maintenance</p> <p>➤ Earthen Dams - Components and their function, typical cross section seepage through embankment and foundation seepage control through embankment and foundation. Methods of constructions, types of failure of earthen dams and remedial measures.</p> <p>3.2 (12)</p> <p>➤ Gravity Dams Theoretical and practical profile, typical cross section, drainage gallery, joint in gravity dam, high dam and low dam</p> <p>➤ Spillways-Definition, function, location and components. Emergency and services, ogee spillway and bar type spillway, discharge over spillway. Energy dissipation Spillway with and with out gates, Gates- Radial and Vertical, procedure of maintenance and repairs of the gate (no numerical problems).</p>		
<p>Topic 4. Minor and Micro Irrigation Specific Objectives:</p> <p>➤ Describe construction and operation of Bandhara irrigation and Percolation tanks.</p> <p>➤ Describe construction and operation of Micro/Lift Irrigation systems.</p> <p>➤ Distinguish Bandhara irrigation with Percolation tanks/ Micro irrigation.</p> <p>4.1 Bandhara, construction and working Advantages and disadvantages of bandhara irrigation layout and component parts, solid and open bandhara.</p> <p>4.2 Percolation Tanks – Need, selection of site, construction</p> <p>4.3 Lift irrigation scheme-Components and their functions ,lay out</p> <p>4.4 Drip and Sprinkler Irrigation- Need, components, Layout, operation and Maintenance.</p>	10	16
<p>Topic 5. Diversion Head Works Specific Objectives</p> <p>➤ Describe construction and operation of Weirs.</p> <p>➤ Describe construction and operation of barrage.</p> <p>5.1 Weirs – components parts, types, layout of diversion head works with its components and their function,</p> <p>5.2 Barrages – components and their function. Difference between weir and barrage</p>	08	12
<p>Topic 6. Canals Specific Objectives</p> <p>➤ Classify canals</p> <p>➤ Describe construction of canal.</p> <p>➤ List various repairs and maintenance works for canals.</p> <p>➤ Design a most economical section for the designed discharge.</p> <p>6.1 (10)</p> <ul style="list-style-type: none"> • CANALS – Classification of canals according to alignment and position in the canal network. Cross section of canal in embankment and cutting, partial embankment and cutting, balancing depth. Design of most economical canal section. • Canal lining - Purpose, material used and its properties. Advantages of canal lining <p>6.2 (08)</p>	10	18

<ul style="list-style-type: none"> • CD works- Aqueduct , siphon aqueduct, super passage, level crossing • Canal regulators- Head regulator, Cross regulator, Escape, Falls and Oulets. • Canal maintenance. • Water logging- Causes, effects and Measures. 		
Total	64	100

Learning Resources:**1. Book:**

Sr. No	Author	Title	Publisher
1	S. K. Garg	Irrigation and Hydraulic Structure	Khanna Publisher, New Delhi
2	Dr. B.C.Punmia and Dr. B.B. Pande	Irrigation Engineering and Water Power Engineering	Standard Publisher
3	N.N.Basak	Irrigation Engineering	Tata Mcgraw Hill
4	J.G.Dahigaonkar	Text Book of Irrigation Engineering	Wheeler
5	A.M.Maichael	Irrigation Theory and Practice	Dhanpatrai and sons

2. CDs, PPTs Etc.:**3. IS, BIS and International Codes:**

1. IS: 4410-Part-V-1982-Canals
2. IS: 4410- Part-VI-1983-Reservoirs.
Part-VII-1968-Dams.
Part-XVII-1977-Water Requirement of Crops
3. IS: 5477-Part-II,III and IV -1969-71-Storage zones of reservoirs.

4. Websites:

1. www.damsinternational.com
2. www.dams.org
3. www.narmada.org
4. www.guj.nwrws.gujrat.gov.in
5. www.rajirrigation.gov.in
6. www.mahairrigation.gov.in

Course Name : Civil Engineering Group

Course Code : CE/CR/CS/CV

Semester : Fifth for CE/CR/CS and Sixth for CV

Subject Title : Public Health Engineering

Subject Code : 17503

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).**

Rational:

Public Health Engineering is an integral part of life. It essentially comprises of our ambience, which gives us the zest and verve in all our activities. At present man is facing one of the most horrible ecological crises, the problem of pollution of his environment which sometimes in past was pure, virgin, undisturbed, uncontaminated and basically quite hospitable for him. To maintain better public health one must have safe quality of drinking water supply, effective methods for disposal of domestic and industrial waste and pollution free environment.

The detailed knowledge about various sources of water supply, quality parameters of public water purification and conveyance of water will be useful in planning suitable water supply scheme for town/city. Topics on domestic sewage, conveyance of sewage in sewers analysis and treatment of sewage will be useful for safe disposal of this waste.

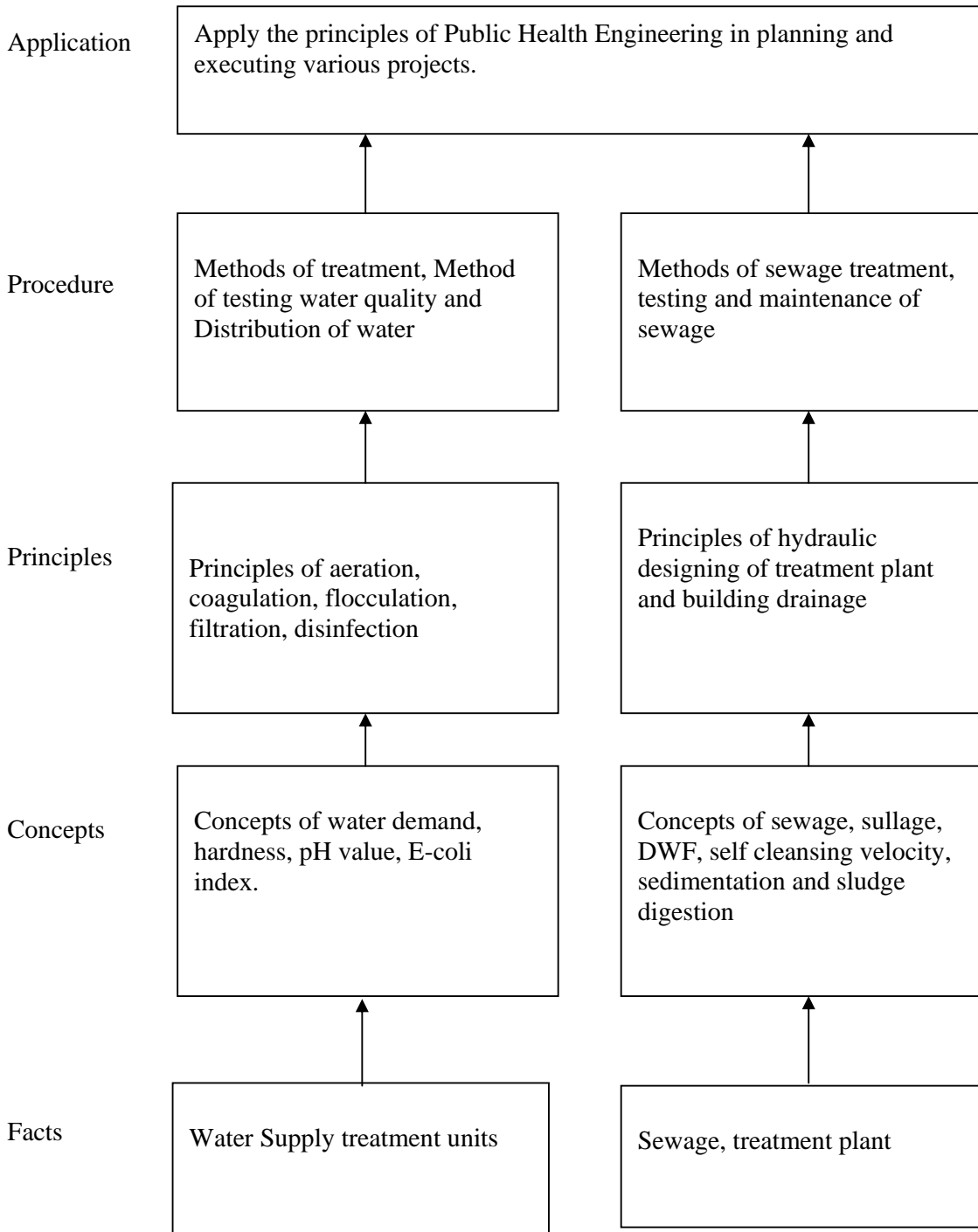
Emerging trends in sanitation and water supply will provide latest know to the students. Thus the subject will be helpful in bringing up general public health to desired safe level in respect of water supply and disposal of waste.

General Objectives:

The student will able to

1. Understand the terms involved in public water supply and domestic sewage.
2. Know different types of sources of water for public water supply.
3. Understand the methods for estimating.
4. Suggest the treatment required by knowing the quality of water.
5. Understand the hydraulic design of Units in treatment plant.
6. Understand different sewerage systems with their merits.
7. Analyze the quality of sewage and suggest suitable treatment of sewage.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
<p>Topic 1] Public Water Supply Specific objectives :</p> <ul style="list-style-type: none"> ➤ Draw layout of water supply scheme ➤ Calculate forecasted population ➤ Estimate quantity of water demand ➤ Understand working of water treatment units ➤ Know hydraulic design of water treatment units ➤ Describe functions and locations of different valves on pipes. ➤ Draw layouts of water distribution systems ➤ Draw hydraulic flow diagram of water treatment plant <p>1.1 Introduction and Quantity of water.....10 Importance of public Health Engineering, Need to protect water supplies, flow diagram of water supply scheme, function of units, Importance of water supply project, Layout of water supply project. Demands of water, Factors affecting rate of demand, Variations of water demands, Forecasting of population, Methods of forecasting of population,(Simple problems on forecasting of population), Design period, Estimating of quantity of water supply required for city or town, Types of water supply schemes.</p> <p>1.2 Sources and Quality of Water.....10 Surface and Subsurface sources of water, Intake Structures Definition and types, Factors governing the location of an intake structure, Types of intakes, Water conservation, Ground water recharging – Necessity Importance and advantages Need for analysis of water, Characteristics of water- Physical, Chemical and Biological, Testing of water for Total solids, hardness, chlorides, dissolved Oxygen, pH, Fluoride, Nitrogen and its compounds, Bacteriological tests, E coli, B coli index, MPN, Sampling of water, Water quality standards as per I.S.</p> <p>1.3Purification of Water.....18 Screening- Types of screens, Aeration- objects and methods of aeration, Plain sedimentation, Sedimentation with coagulation, principles of coagulation, types of coagulants, Jar Test, process of coagulation, types of sedimentation tanks,</p> <p>Clariflocculator, Filtration-theory of filtration, classification of filters: slow sand filter, rapid sand filter, pressure filter, domestic filter, filter media, construction and working of slow sand filter and rapid sandfilter. Disinfection: Objects, methods of disinfection, Chlorination- Application of chlorine, forms of chlorination, types of chlorination practices, residual chlorine and its importance, orthotolidine test, Miscellaneous water Treatments (Water softening, Defluoridation techniques), Advanced Water Treatments (Electrolysis, Reverse Osmosis), Flow diagram of water treatment plants, Low cost water Treatments: Necessity and importance in rural areas, Prevention of pollution of bores and bore wells.</p>	<p>04</p> <p>04</p> <p>08</p>	<p>48</p>

<p>1.4 Conveyance and Distribution of water.....10 Types of Pipes used for conveyance of water, choice of pipe material, Types of joints & Types of valves- their use, location and function on a pipeline. Methods of distribution of water- Gravity, pumping, and combined system Service reservoirs - functions and types , Layouts of distribution of water- Dead end system, grid iron system, circular system, radial system ; their suitability, advantages and disadvantages.</p>	06	
<p>Topic 2] Domestic Sewage</p> <p>Specific objectives :</p> <ul style="list-style-type: none"> ➤ State working of sanitary fitting and sewer appurtenances ➤ Draw sketches of sanitary fittings and sewer appurtenances ➤ Calculate the BOD and COD value of sewage ➤ Describe working of water treatment units ➤ Draw hydraulic flow diagram of sewage treatment plant <p>Contents:</p> <p>2.1 Introduction and Building Sanitation.....18</p> <p>Importance and necessity of sanitation, Necessity to treat domestic sewage, Recycling and Reuse of domestic waste Definitions - Sewage, sullage, types of sewage. Definitions of the terms related to Building Sanitation- Water pipe, Rain water pipe, Soil pipe, Sullage pipe, Vent pipe, Building Sanitary fittings- Water closet – Indian and European type, flushing cistern, wash basin, sinks, Urinals. Traps- types, qualities of good trap, Systems of plumbing - one pipe, two pipe, single stack, choice of system Principles regarding design of building drainage, layout plan for building sanitary fittings (drainage plan), inspection and junction chambers, their necessity, location, size and shape. Maintenance of sanitary units.</p> <p>2.2 Systems of Sewerage and Sewer Appurtenances.....12</p> <p>Types of Sewers, Systems of Sewerage. Design of sewers, self cleansing velocity and non scouring velocity Laying, Testing and maintenance of sewers.</p> <p>Manholes and Drop Manhole- component parts, location, spacing, construction details, Sewer Inlets, Street Inlets.</p> <p>2.3 Analysis and treatment of Sewage.....18</p> <p>Characteristics of sewage, B.O.D./ C.O.D. and significance. Aerobic and anaerobic process, Maharashtra Pollution Control Board Norms for the discharge of treated sewage Objects of sewage treatment, General layout and flow diagram, Screening, Grit removal, Skimming, Sedimentation of sewage, Sludge digestion, Trickling filters, Activated sludge process, Disposal of sewage, Oxidation pond, Oxidation ditch. Septic tank (details and design criteria), Design of septic tank to be done in practical. No numerical questions on design.</p>	10	48
	04	
	10	

Topic 3] Plumbing Specific objectives : <ul style="list-style-type: none"> • Describe of water supply arrangement • Describe rainwater and sewage collection system Contents: Line diagram with mountings/pipe specials/traps of water supply arrangement for residential and public building, Sanitary Plumbing, Layout, Rainwater and sewage collection systems, Rainwater harvesting	02	04
Total	48	100

Practicals:

Skills to be developed

Intellectual Skills:

1. Understand and identify the different methods for testing of water
2. Understand and identify the different methods for analysis of sewage.
3. Interpret the test result

Motor Skills:

1. Observe various chemical and physical reactions
2. Handle instruments carefully
3. Observe the digital reading on display panel
4. Observe and record the reading

List of Practicals:**Water Supply Engineering:**

1. To determine pH value of given water sample.
2. To determine the turbidity of the given sample of water.
3. To determine residual chlorine in a given sample of water.
4. To determine suspended solids, dissolved solids, and total solids of water sample
5. To determine the dissolved oxygen in a sample of water.
6. To determine the optimum dose of coagulant in the given sample by jar test.
7. a. Demonstration of water purifier, Aquaguard
b. Study of softners and contents of mineral water.

Sanitary Engineering:

1. To determine pH value of given waste water sample.
2. To determine the dissolved Oxygen in a sample of waste water.
3. To determine B.O.D. of given sample of waste water.
4. To determine C.O.D. of given sample of waste water.
5. To determine suspended solids, dissolved solids and total solids of waste water sample.

List of Assignments:**Water Supply Engineering:**

- 1) Visit to water treatment plant

Sanitary Engineering:

- 1) Visit to sewage treatment plant.

Learning Resources:**1. Books:**

Sr. No.	Author	Title	Publisher
01	Environmental Engineering (Volume I & II)	SantoshGarg	Khanna Publishers,
02	Environmental Engineering	Kamla A. &KanthRao D. L.	Tata McGraw Hill,
03	Water Supply and Sanitary Engineering	Birdie G. S. Birdie J. S.	DhanpatRai& Sons
04	Plumbing - Design and Practice	Deolalikar S. G.	Tata McGraw Hill,
05	Industrial Water Treatment	M.N. Rao& R.L Datta	-----
06	Introduction to Environmental Engineering	Mackenzie Davis and David A Cornwell	Tata McGraw Hill Education Prvt. Ltd.,Delhi
07	Water Supply and Sanitary Engg	Rangwala	Charotar Publishing House Pvt. Ltd. Anand (Gujrat)

2. CDs, PPTs Etc.: Video CD on water treatment and sewage treatment, if available.**3. IS, BIS and International Codes:**

1. IS 14543:2004 IS Code for Testing of Drinking Water
2. IS 8403 : 1977 Code of Practice disposal of Effluent from Septic Tank
3. Drinking water specification (IS 10500:1991)
4. BIS standard for effluent disposal printed in 1963, revised in 1968

4. Websites:

1. <http://en.wikipedia.org/wiki/Bisleri>
2. http://en.wikipedia.org/wiki/Aircraft_lavatory

Course Name : Civil Engineering Group

Course Code : CE/CR/CS/CV

Semester : Fifth for CE/CR/CS and Sixth for CV

Subject Title : Concrete Technology

Subject Code : 17504

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:

Plain or reinforced cement concrete is extensively used as a construction material in almost all types of Civil engineering structures like buildings, roads flyovers, dams, bridges and water tanks etc. With advanced construction techniques and use of locally available ingredients of concrete, concrete has become very popular construction material.

The contents on cement and aggregate will be useful in deciding contents and quality of concrete during preparation and placing of concrete in position. Topic on quality control of concrete will be useful in execution of various items of works where concreting is involved. Thus the total contents of the subject will be useful for ensuring the quality of concrete during design preparation, transporting and placing in position for various structures. It will also provide guidelines for effective supervision and quality control of concreting work. With good knowledge of concrete materials namely cement, aggregates, water and admixtures and concreting operation namely selection of materials, mixed design, mixing, placing, compacting and finishing, curing, one can obtain concrete of desired workability and required strength.

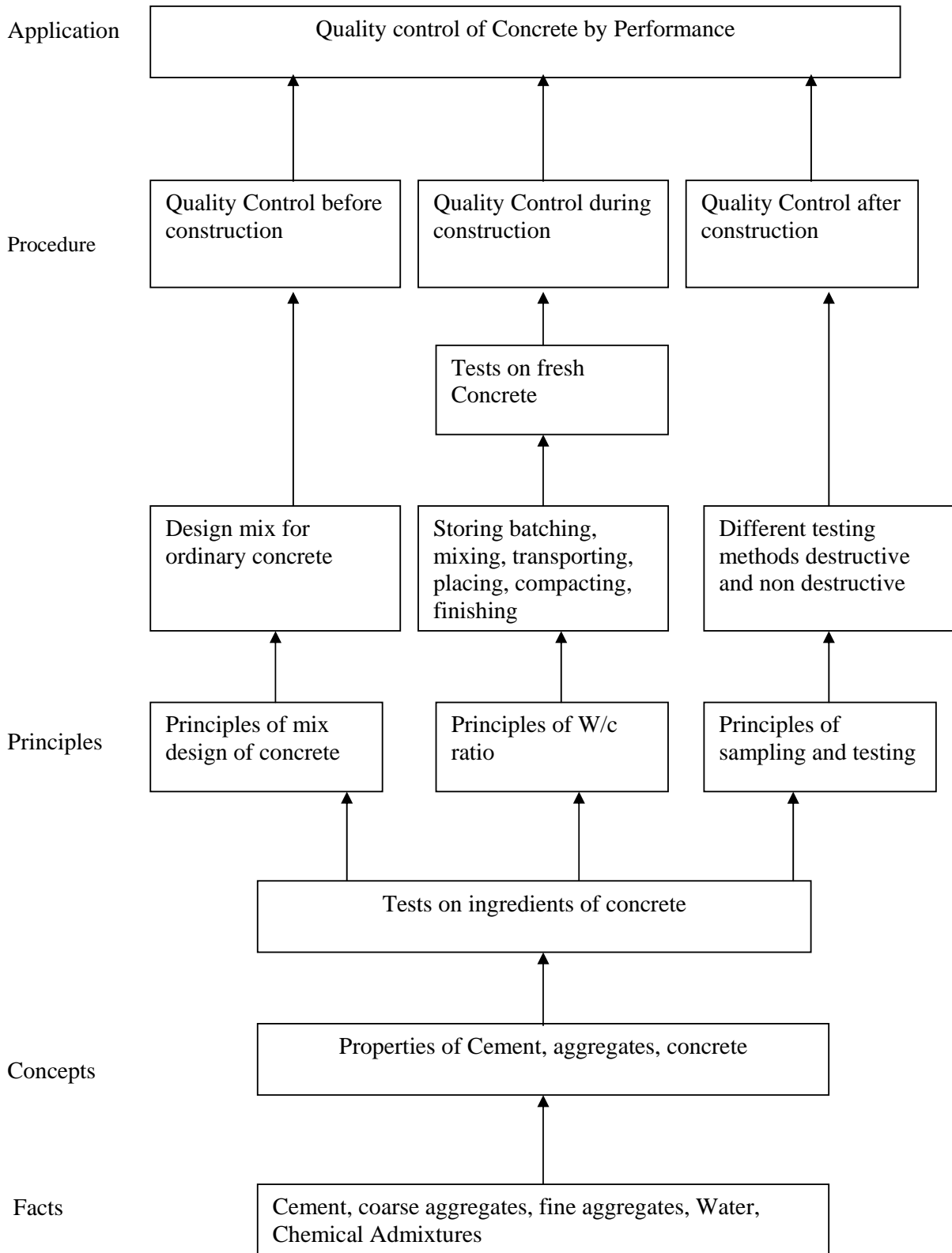
The content of this subject will enable a civil Engineering technician to acquire skills of carrying out various tests on concrete materials and concrete it self along with interpretation of test result.

General Objectives:

Student will be able to -

1. Ensure the quality of ingredients of concrete.
2. Design concrete mix.
3. Understand Techniques of quality control of concrete.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
<p>Topic 1: Cement Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State physical properties and tests of cement. ➤ State use of various types of cement. <p>Contents:</p> <p>1.1 Chemical Constituents of OPC and their effects on properties of OPC, Bogue's compounds and their properties, Hydration of cement. Physical properties of OPC-Fineness, setting, compressive strength and soundness. Different grades of OPC. 33, 43, and 53 with specifications of physical properties as per relevant IS codes. Testing of OPC –field tests and laboratory tests-fineness test, standard consistency test, setting time test, compressive strength test, soundness test. Storage of cement and effect of storage on properties of cement.</p> <p>1.2 Physical properties, I.S. Specifications and field application of following types of cement :- Rapid hardening cement, Low heat cement, Portland pozzolana cement, Sulphate resisting cement, Blast furnace slag cement, White cement.</p>	06	12
<p>Topics 2: Aggregates Specific Objectives:</p> <ul style="list-style-type: none"> ➤ List and describe different properties of Aggregates. ➤ Carry out various Tests on the Aggregates of concrete. <p>Contents:</p> <p>2.1: 04 Marks Requirement of Good Aggregate. Classification of Aggregate according to source, Size and Shape.</p> <p>2.2: Properties of fine aggregates : 08 Marks Concept of size, specific gravity, bulk density, water Absorption and Bulking. Determination of fineness modulus and grading zone of Sand by sieve analysis, determination of silt content in sand and their specification as per IS 383. Determination of Bulking of sand. Concept of crushed Sand.</p> <p>2.3 Properties of coarse aggregates: 08 Marks Concept of size, shape, surface texture, water absorption, soundness, specific gravity and bulk density Determination of fineness modulus of coarse aggregate by sieve analysis, grading of Coarse Aggregates. Determination of crushing value, impact value and abrasion value of coarse aggregate with specification.</p>	10	20
<p>Topics 3: Concrete Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Describe properties of concrete. ➤ Carry out various tests on concrete. <p>Contents:</p> <p>3.1 Introduction to concrete - 08 Marks Definition of concrete, necessity of supervision for concreting operation, different grades of concrete (ordinary Concrete, standard concrete and high strength concrete as per provisions of IS 456- 2000. Water cement ratio:- Definition of w/c ratio, Duff Abraham w/c law,</p>	12	24

<p>significance of w/c ratio, selection of w/c ratio for different grades of concrete prepared from different grades of OPC as per graphs specified in IS 10262 -1982, maximum w/c ratio for different grades of concrete for different exposure conditions.</p> <p>3.2 Properties of fresh and Hardened concrete.....08 Marks Definition of workability, factors affecting workability of Concrete. Determination of workability of concrete by slump cone test, compaction factor test. Range values of workability requirement for different types of concrete works. Segregation, bleeding. Definition of compressive strength, durability and Impermeability of concrete. Factor affecting compressive strength, durability and Impermeability of concrete.</p> <p>3.3 Concrete Mix Design and Testing of Concrete...08 Marks Objectives of mix design, list of different method of mix design, study of mix design procedure by I.S. method as per I.S. 10262-1982 (Only procedural steps) Testing of concrete:-Significance of testing, determination of compressive strength of concrete cubes at different ages, interpretation and co-relation of test results Non- destructive testing of concrete:- Importance of NDT, methods of NDT - rebound hammer test and ultrasonic pulse velocity test, working principle of rebound hammer and factor affecting the rebound index, specification for deciding the quality of concrete by Ultrasonic pulse velocity as per I.S. 13311 (part 1 and 2). Determination of compressive strength of concrete by rebound hammer test as per I.S. 13311, determination of Quality of concrete by ultrasonic pulse velocity test.</p>		
<p>Topics 4: Quality Control of Concrete Specific Objectives: ➤ Describe various concrete operations. Contents: 4.1: Concreting Operation.....16 Marks Batching- Definition and Types of Batching. Mixing- Types of Mixing and Types of mixers. Form work : Form work for concreting, different types of form works for members like beams, slabs, Columns, materials used for form work, requirement of good form work. Stripping time for removal of form works per IS 456-2000 provision for different structural members. Transportation: Modes of transportation of concrete, precautions to be taken during transportation. Placing: placing of concrete in form work, precautions to be taken while placing of concrete. Compaction of concrete: methods of compaction, care to be taken during compaction. Finishing of concrete: purpose of finishing, types of Finishing. Curing of concrete: definition of curing, necessity of curing, different methods of curing and their application</p> <p>4.2: Waterproofing and Joints of concrete:.....08 Marks Waterproofing: Importance and need of waterproofing, methods of Waterproofing and materials used for waterproofing. Joints in concrete construction: Types of joints, joining old and new concrete, methods of joining, Materials used for filling joints.</p>	12	24

<p>Topics 5: Chemical Admixture in concrete, Special Concrete and, Extreme weather concreting</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State the uses of admixture in concrete. ➤ Describe special concrete. <p>Contents:</p> <p>5.1: Chemical admixture in concrete:..... 08 Marks Purpose of using admixtures, Properties, and application for different types of admixture such as accelerating admixtures, retarding admixtures, water reducing admixture, air entraining admixture and super plasticizers.</p> <p>5.2: Special Concretes:- 08 Marks Properties, Advantages and Limitation of the following types of Special concrete: Ready mix Concrete, Fiber Reinforced Concrete, High performance Concrete, Self compacting concrete, Light weight concrete.</p> <p>5.3: Extreme weather concreting: 04 Marks Effect of cold weather and hot weather on Concrete, precautions to be taken while concreting in hot and cold Weather condition.</p>	08	20
Total	48	100

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

1. Analyze the given data
2. Select proper method for analysis
3. Interpret the results

Motor Skills:

1. Measure the quantities accurately
2. Handle instruments properly

Term work shall consist of

List of Practicals:

1. Determine fineness of cement preferably by Blaine's air permeability apparatus Or by sieving.
2. Determine standard consistency, initial and final setting times of OPC.
3. Determine compressive strength of ordinary Portland cement.
4. Determine silt content in sand by volume and bulking of sand.
5. Determine bulk density and water absorption of fine and coarse aggregates.
6. Determine Fineness modulus of fine and coarse aggregate by sieve analysis.
7. Determine aggregate impact value.
8. Determine aggregate abrasion value.

Mini Project:

Determination of design mix proportion by mass for M 20 grade of concrete using I.S. Method for given data (such as grading zone of sand, proportion of 20 mm and 12.5 mm metals, specific gravities of cement, sand and aggregate, water absorption of sand and aggregate, compacting factor and exposure condition).

Learning Resources:**1. Books:**

Sr. No.	Author	Title	Publisher
1	M. S. Shetty	Concrete Technology	S. Chand Publication
2	M. L. Gambhir	Concrete Technology	Tata Mc-Graw. Hill Publishing Co. Ltd. New Delhi
3	A. M. Neville and J. J. Brooks	Concrete Technology	Pearson Education Pvt. Ltd. New Delhi
4	A.R. Santhakumar	Concrete Technology	Oxford University Press.
5	A. M. Neville	Properties of Concrete	Pearson Education Pvt. Ltd. New Delhi

2. CDs, PPTs Etc.:

CD or PPT of above experiments developed by NITTTR and NPTEL (if available) shall be shown to the students on T. V. / L.C.D. projector prior to the conductance of above experiments.

3. IS, BIS and International Codes:

1. I.S.4031- (Part 1 to Part 6) Indian standard method of physical tests for hydraulic Cement, BIS, New Delhi.
 - I.S. 4031 (Part 1) - 1996 Part 1 - Determination of fineness by dry sieving.
 - I.S. 4031 (Part 2) - 1999 Part 2 - Determination of fineness by air permeability Method.
 - I.S. 4031 (part 3) - 1988 (reaffirmed 2000) Part 3– Determination of soundness
 - I.S. 4031 (part 4) - 1988 (reaffirmed 1995)
 - Part 4 - Determination of consistency of standard cement paste.
 - I.S.4031 (part 5) - 1988, (reaffirmed 2000) Part 5 - Determination of initial and final setting times
 - I.S: 4031 (part 6) - 1988, (reaffirmed 2000) Part 6 - Determination of Compressive strength of hydraulic cement other than masonry cement
2. I.S: 2386 (part i to part vi) – 1963 Indian standard methods of test for aggregate for Concrete. BIS, New Delhi.
 - Part i - Particle size and shape. (Reaffirmed 1997)
 - Part ii - Estimation of deleterious materials and organic impurities. (Reaffirmed 2002)
 - Part iii - Specific gravity, density, voids, absorption and bulking. (Reaffirmed 1997)
 - Part iv - Mechanical properties (reaffirmed 1997)
 - Part v - Soundness. (Reaffirmed 1997)

Part vi - Measuring mortar making properties of fine aggregate. (Reaffirmed 2002)

3. I.S: 383 - 1970 Indian standard specification for coarse and fine aggregates from Natural sources for concrete. B.I.S., New Delhi.
4. I.S: 1911 - 1959 (reaffirmed) Indian Standard methods of sampling and analysis of concrete), B.I.S., New Delhi.
5. I.S: 456 - 2000 Indian standard, plain and reinforced concrete – code of practice. (fourth revision), B.I.S., New Delhi.
6. I.S: 516 - 1959 Indian standard methods of tests for strength of concrete (xii reprint December 1987), B.I.S., New Delhi.
7. I.S.: 8112- 1989 Indian standard - 43 grade ordinary portland cement Specification
8. I.S: 12269 - 1987 (reaffirmed 1999) Indian standard specification for 53 grade O.P.C..
9. I.S: 9103 - 1999 Indian standard – concrete admixtures specification
10. I.S.: 455- 1989 (reaffirmed 1995) - Indian standard – Portland slag cement specification
11. I.S.: 1489 (part 1) 1991 - Portland - Pozzolana Cement – specification part 1 fly ash based
12. I.S.: 7861 (part 1) 1975 (reaffirmed 1997) - Indian standard of practice for extreme weather concreting part 1 recommended practice for hot weather concreting
13. I.S.: 7861 (part 2) - 1981 (reaffirmed 1997) - Indian standard of practice For extreme weather concreting part 2 - recommended practice for cold weather concreting
13. I.S : 8041 - 1990 - Indian standard - rapid hardening Portland Cement specification BIS- New Delhi
14. I.S: 12330 - 1988 (reaffirmed 1995) - Indian standard specification for sulphate resisting Portland cement
15. I.S. : 12600 - 1989 (reaffirmed 1995) - Portland cement, low heat Specification
16. I.S. : 10262 - 1982 Indian standard recommended guidelines for concrete mix Design
17. Sp 23 handbook on concrete mixes (based on Indian standards)
18. I.S. 13311 (part-1 and 2) - 1992 methods of non-destructive testing of concrete. part-1 ultrasonic pulse velocity, part-2 rebound hammer.

Course Name : Civil Engineering Group

Course Code : CE/CR/CS/CV

Semester : Fifth for CE/CR/CS and Sixth for CV

Subject Title : Design of Steel Structures

Subject Code : 17505

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	04	100	--	--	50 @	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:

Design of Steel Structures is a technological subject. Steel is commonly used as a construction material for various steel structures such as steel girders, steel bridges, steel trusses, columns, towers, gantry girders, chimney, railway bridges, industrial buildings, water tanks, etc. For the design of steel structures, the properties of steel, different steel sections, various grades and strength characteristics of steel are required. The analysis and design of the steel members in the curriculum is to be done as per IS:800-2007.

The topic on different types of loads will be useful for finding different stresses, members and then deciding the section for the members of the structures. The topic on design of joints will be useful for designing bolted and welded connections. The topic on design of tension and compression members will be useful for the design of relevant members in roof trusses.

The topic on design of beams, columns with column bases and steel roof truss will be useful for the complete design of steel structure.

The total content of this subject will be useful for developing insight for the design concepts and will help student in effective supervision and quality control on site.

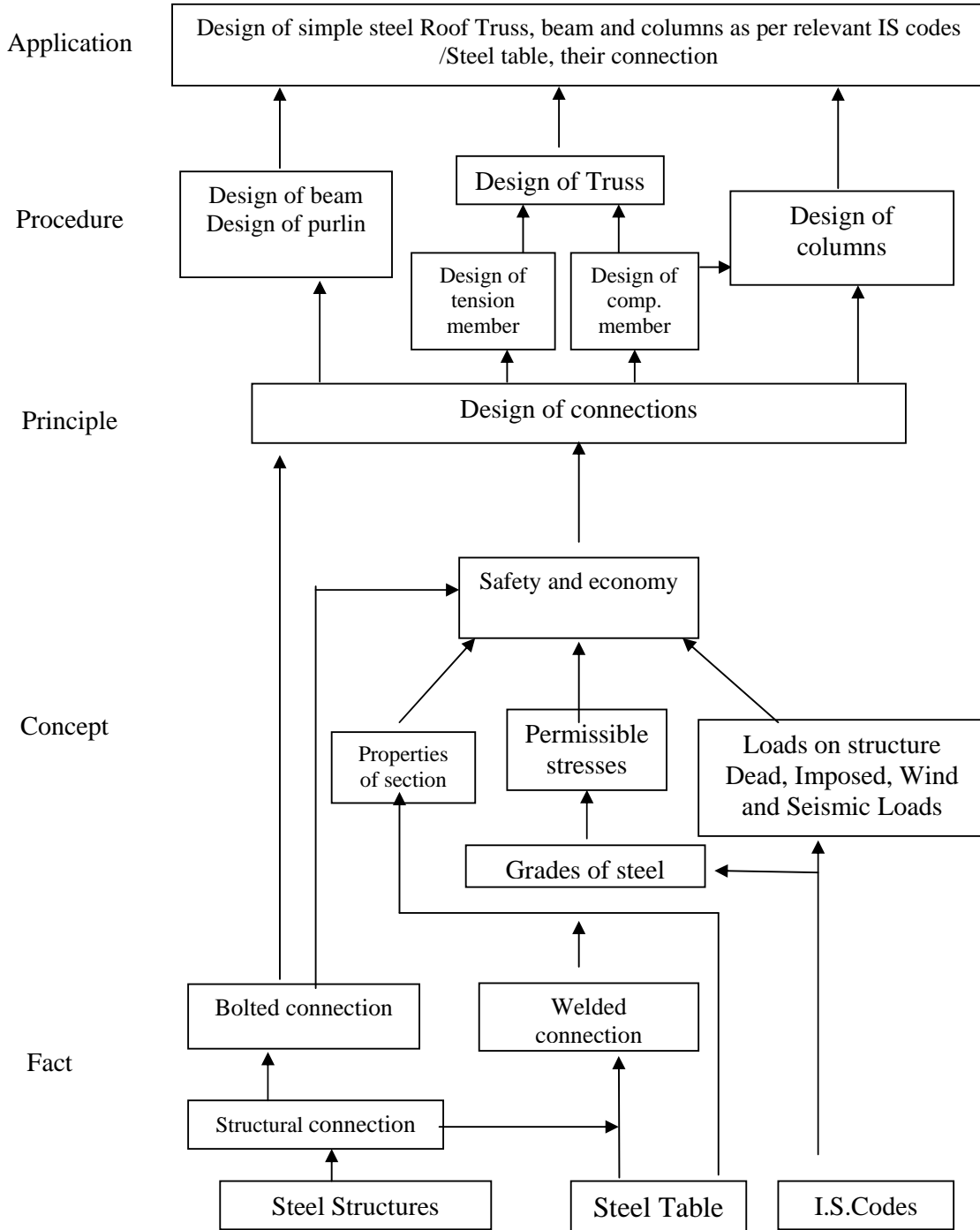
General Objectives:

Students will be able to:

- 1) Understand the analysis of forces acting on different members and select proper material and sections from steel table.
- 2) Understand the design of tension members, compression members, beams, purlins, column bases and steel roof trusses and understand design values for members using IS 800-2007.
- 3) Understand and interpret the fabrication drawings and structural drawings.
- 4) Understand the drawings of designed sections of steel roof truss and its connections.

- 5) Understand the use of IS 875-1987 part I to IV, provisions for dead loads, live loads and wind loads and seismic loads (Earthquake loads)

Learning Structure:



Contents: Theory

Topic and contents	Hours	Marks
<p>Topic 1. Introduction</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State various grades of steel and their strength parameters ➤ List various properties of steel sections used for steel structures. ➤ Use steel table and IS code for finding different properties of steel sections. <p>Contents :</p> <ul style="list-style-type: none"> • Advantages and disadvantages of steel as construction material. • Overview of common steel structures: Functions and components of common steel structures like steel towers, roof trusses, steel water tanks, steel bridges, gantry and crane girders, steel columns, steel chimney, building frames • Types of sections used, Grades of steel and strength Characteristics use of steel table IS 808-1989. Typical stress-strain graph for mild steel and salient points in it • Types of loads coming on steel structures according to IS 875-1987 part I to IV a) Dead loads b) Live loads c) Impact load d) Snow loads • Loads due to seismic forces - Definition, Methods of calculating seismic forces (IS 1893-2002), Zone factor (Z), Importance factor (I), Response reduction factor (R), Fundamental natural period (T). (No numerical problems) • Methods of Design: Working stress method, Limit State Method. • Introduction to Limit State Method of design: Meaning and types of limit states, loads, design criteria, limit states of strength, limit states of serviceability. Factors of safety and load factors. 	03	08
<p>Topic 2. Joints in Steel Structures (Limit State Method):</p> <p>Specific Objectives :-</p> <ul style="list-style-type: none"> ➤ State types of steel joints and their modes of failure. ➤ Design bolted and welded steel joints. <p>Content:</p> <p>a) Bolted connections :</p> <ul style="list-style-type: none"> • Type of bolts: Black bolts and High strength bolts and their use. Types of joints and failure modes. Specifications for cross-sectional area, pitch, spacing, gauge, end distance, edge distance, bolt holes for bolted connections • Design strength of bolt in shear, tension and bearing • Analysis and design of bolted joints for axially loaded single and double angle members • Diagrams of beam-to-beam and beam-to-column bolted connections (No numerical problems) <p>b) Welded connections :</p> <ul style="list-style-type: none"> • Introduction and types of welds – butt and fillet. Advantages and disadvantages of welded connections, size of weld, throat thickness • Analysis and design of welded joint (only fillet weld) for single and double angle members subjected to axial load. 	06	16
<p>Topic 3. Design of Tension Members (Limit State Method)</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ State different types of tension members. ➤ List types of steel sections used for tension members. 	08	16

<p>➤ Analyze and design tension member connected by bolted and welded joints</p> <p>Contents :-</p> <ul style="list-style-type: none"> • Design of Tension Members: Types of sections used. Design strength governed by yielding of section, rupture of net cross-section and block shear. • Analysis and design of axially loaded single angle and double angle tension members with bolted and welded connections. 		
<p>Topic 4. Design of Compression Members (Limit State Method)</p> <p>Specific Objectives :-</p> <ul style="list-style-type: none"> ➤ State different types of steel sections used for compression members ➤ Analyze and design compression member connected by bolted and welded joints <p>Contents :-</p> <ul style="list-style-type: none"> • Types of steel sections used for compression members, effective length, radius of gyration, slenderness ratio and its limits, design compressive stress. • Analysis and design of axially loaded continuous angle struts connected by bolted and welded connections with gusset plate. Limits of width to thickness ratios to prevent local buckling. • Stanchions and columns – Meaning and diagrams of simple and built-up sections (two angles, two I-sections, two channels placed back to back and toe to toe). No numerical problems. • Introduction to lacing and battening: Meaning and purpose. Diagrams of single and double lacing and battening system. No design. 	08	16
<p>Topic 5. Beams (Limit State Method)</p> <p>Specific Objectives :-</p> <ul style="list-style-type: none"> ➤ List different sections used for beams. ➤ Draw loading, shear force and bending moment diagram developed in beam due to udl ➤ Analyze and design of simple beam sections subjected to udl <p>Contents :-</p> <ul style="list-style-type: none"> • Different steel sections used for beams, simple and built-up sections. • Meaning of Plastic (Class-1), Compact (Class -2), Semi-compact (Class-3) and Slender (Class-4 sections). • Flexural analysis and design of simple beams (only for Class-4 sections) which are laterally supported and subjected to uniformly distributed load • Check for shear and deflections: Meaning and purpose. Diagrams of typical cross sections of bolted and welded plate girder. Diagrams showing components of plate girder. 	06	12

<p>Topic 6. Column Bases (Limit State Method) Specific Objectives :-</p> <ul style="list-style-type: none"> ➤ Draw components parts of steel foundations. ➤ Draw the sketch of slab base and gusseted base foundations ➤ Analysis and design slab base foundation. <p>Content :-</p> <ul style="list-style-type: none"> • Types of steel foundations- Slab Base foundations, Gusseted base foundations • Design of Slab base foundations • Introduction to Gusseted base Foundations: Meaning and purpose. No numerical problems on design of gusseted base foundations. 	06	12
<p>Topic 7. Steel Roof Truss (Limit State Method) Specific Objectives:</p> <ul style="list-style-type: none"> ➤ List types of Steel Roof trusses used in Industries. Analyze and design component parts of Steel Roof truss. ➤ Calculate dead load, live load and wind load acting on steel roof truss. ➤ Draw the detailed connections of different members at nodal points, connections at column supports. <p>Contents:</p> <ul style="list-style-type: none"> • Types of Steel Roof trusses for different spans (Simple and Compound Fink, Pratt, Howe, Fan, North Light roof truss) • Calculation of panel point loads for dead load, live load and wind load as per IS 875-1987. • Graphical method of finding forces in different members of truss due to dead load, live load and wind load • Force combination table, design of members of truss. • Design of angle purlin as per IS recommendations. • Arrangement of members at supports and at joints. 	11	20
Total	48	100

PRACTICALS:**Skills to be developed****Intellectual Skills:**

- i) Design of structural components of steel structures.
- ii) Interpretation of structural drawings for the components designed.

Motor Skills:

- i) Preparing structural drawings for execution of steel structures.

Term work is to be prepared by each student as below.

Term work shall consists of sketchbook and design report of steel roof truss for an industrial building, two full imperial size sheet shall be used for drawings.

1. Sketch Book:

Sketch book shall consist of any eight plates out of the below mentioned.

- 2) Types of steel sections (like angles, channels, girders, plates, etc)

- 3) Sketches of different types of built up sections used as tension and compression members.
- 4) Types of trusses for different span.
- 5) Lap bolted joint and butt bolted joint, bolt failure in single and double shear.
- 6) Gusseted base foundation,
- 7) Slab base foundation
- 8) Connections of beam to beam and beam to column.(Framed and seated connections using bolts and welds)
- 9) Cross section of bolted and welded plate girder, sketch of end bearing stiffener.
- 10) Lacing and Battening (Single and double Lacing system)
- 11) Effective length of compression members for different end connections.

2. Design of steel Roof truss:-

- 1) The student should draw two full imperial size sheets covering design of steel roof truss any one of the truss- Fink, Pratt, Fan, Howe truss for span 16 to 20 m , the design shall cover calculations for the dead load, live load, wind load with a design of various elements. The drawing shall include detailing the truss for below mentioned elements
 - a) Key plan showing the details of factory shed.
 - b) Graphical analysis of loads due to dead load live load and wind load.
 - c) Half section of designed roof truss showing details : Support connection, connection of ridge tile, connection of purlin, roof covering and cleat angle.

Learning Resources:

1. Books

Sr. No.	Author	Title	Publisher
1	Dr. V. L. Shah and Mrs. Veena Gore	Limit State Design of Steel Structures	Structures Publications, Pune
2	Dr. M. R. Shiyekar	Limit State Design of Steel Structures	PHI Learning
3	P. Dayarathnam	Design of Steel Structures	S. Chand and Company
4	Ghose	Analysis and Design Practices of Steel Structures	PHI Learning
5	Sairam	Design of Steel Structures	Pearson Publication

2. IS, BIS and International Code

1. IS800-2007 Indian Standard code of practice for use of structural steel in general building construction, BIS New Delhi.
2. IS-875-1987 Part-1 to 5: Indian Standard Code for Loading Standards.
3. IS hand book No. 1 Properties of structural steel rolled section.
4. Steel tables.

Course Name : All Branches of Diploma in Engineering & Technology

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

Semester : Fifth for EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/CE/CS/CR/CO/CM/IF/EE/EP/CH/PS/AU and Sixth for CD/MH/IU/CV/FE/FG/MI/ED/EI/DC/TC/TX

Subject Title : Behavioural Science

Subject Code : 17075

Teaching and Examination Scheme:

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

Rationale:

With increased globalization and rapid changing business expectations, employers are looking for wide cluster of skills to cater to the changing demand. Personality traits and soft skills are playing a key role in a student's career in this changing scenario. Corporate houses look for soft skills that supplement hard skills.

Addition of behavioural science in curriculum is intended to enhance the efficiency of a person so that he can contribute to overall growth of organisation. It aims at developing insight into leadership, team building, motivation, interpersonal relationship, problem solving, decision making and aspects of personality in a technician's profile. Addition of the topic of organizational culture will further mould him/ her in the organisational role.

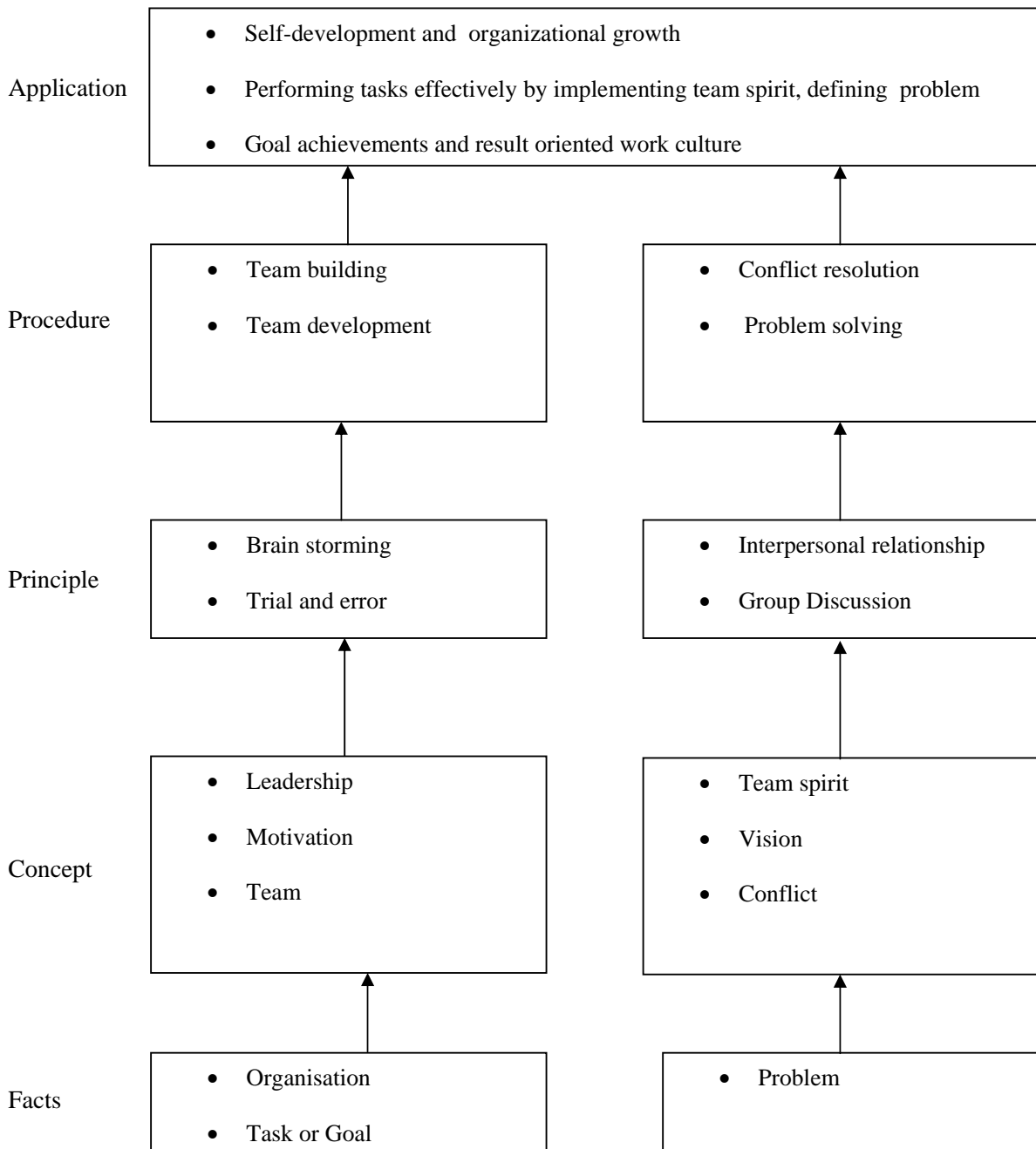
This subject of 'Behavioural Science' provides a broad base in which a technician can develop a successful career in the world of work.

General Objectives:

After studying this subject, the students will be able to:

1. Develop him/her as Team leader.
2. Use self-motivation and motivate others.
3. Build a team and develop team spirit among the team members.
4. Improve the interpersonal relationship skills.
5. Learn Problem solving and decision making skills.
6. Discuss a particular topic in a group and face the interview.

Learning Structure:



Theory:

Topic and Contents	Hours
<p>Topic 1: LEADERSHIP</p> <p>Contents:</p> <ol style="list-style-type: none"> 1.1 Introduction – Importance, examples of different types of leaders. 1.2 Meaning and Definition of Leadership. 1.3 Leadership qualities – Confidence, Vision, Communication Skills, influencing people etc. 1.4 Types of Leadership styles, their advantages and disadvantages – Autocratic, Democratic, Delegative, Bureaucratic and Laissez Fairie. 	02
<p>Topic 2: MOTIVATION</p> <p>Contents:</p> <ol style="list-style-type: none"> 2.1 Meaning and Definition of motivation. 2.2 Types of motivation. 2.3 Maslow’s Motivation theory. 2.4 Job characteristic model to enhance motivation. 	03
<p>Topic 3: TEAM BUILDING</p> <p>Contents:</p> <ol style="list-style-type: none"> 3.1 Definition of Team. 3.2 Difference between Group and Team. 3.3 Need for formation of good team (vision, trust, cooperation, initiative, etc.) 3.4 Approach to Team building (Personality based, activity based, skill based, problem solving based, etc.) 	02
<p>Topic 4: CONFLICT RESOLUTION</p> <p>Contents:</p> <ol style="list-style-type: none"> 4.1 Definition of Conflict. 4.2 Types of Conflict – Functional and Dysfunctional 4.3 Sources of Conflict – Ego, Authority, Frustration etc. 4.4 Positive and Negative effects of conflicts. 4.5 Methods of Conflict resolution – Compromising, withdrawal, forcing. 	04
<p>Topic 5: PROBLEM SOLVING AND DECISION MAKING</p> <p>Contents:</p> <ol style="list-style-type: none"> 5.1 Steps in Problem Solving. 5.2 Methods used for solving problems – trial and error method, brain storming, lateral thinking method. 5.3 Techniques used for Decision making- Decision tree, Decision Matrix, Mind Mapping etc. 	03
<p>Topic 6: GROUP DISCUSSION AND INTERVIEW TECHNIQUES</p> <p>Contents:</p> <ol style="list-style-type: none"> 6.1 GROUP DISCUSSION <ul style="list-style-type: none"> • Objectives of Group Discussion (ability to work in team, speaking and listening skills, leadership, creativity) • Does and Don’ts of Group Discussion. • How to conclude Group Discussion. 	02

6.2 INTERVIEW TECHNIQUES <ul style="list-style-type: none"> • Types of Interviews. (patterned, stress, behavioural) • Dress Code, Body Language and Communication Skill. • Probable questions for Interview. • Telephonic or Video Interview. 	
Total	16

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

1. Develop ability to find his strengths.
2. Select proper source of information.
3. Follow the technique of time and stress management.
4. Set the goal.

Motor Skills:

1. Follow the presentation of body language.
2. Work on internet and search for information.
3. Prepare slides / transparencies for presentation.

List of Practicals / activities:

1. Form a group of 4 or 5 students and discuss the topic 'Qualities of an effective leader'. Each group will prepare its list with justification to the entire class and write an assignment under the guidance of subject teacher.
2. Form a pair of student and each one from pair will ask each other questionnaire on motivation, self-motivation, experiences that motivated him or other which him for success in the past and write an assignment under the guidance of subject teacher based on discussion.
3. Form a group of 4 or 5 students and assign them a group activity such as 'making a shape from match stick (50 to 100 match sticks) without guidance and without group discussion.
4. The group as in activity 3 will now perform the same activity. After group discussion and under guidance of subject teacher, each student from a group will write an assignment for both the activities and write their inferences with reference to group discussion, team development, team building, etc.
5. Form a group of 8 to 10 student and arrange a group activity such as;
 - Industrial visit.
 - Visit to any historical place/fort/museum, etc
 - Housekeeping and cleaning of any laboratory/seminar hall for any function.

After the execution of activity student will write an assignment under guidance of teacher keeping in mind individual role, purpose of activity, inter dependency of work or task, coordination of person and task involved and final performance.
6. Write an assignment on interpersonal relationship and conflict management with student's personal experience of solving conflicts.
7. Form a group of 20 students and ask them to prepare a list of 8 to 10 problems affecting the institute. Subject teacher should analyze one such problem on black board using 'Fish bone technique' with the participation of students. Students will write an assignment consisting;
 - Apparent problem statement.
 - Analysis of the causes.
 - Definition of real problem.

8. The subject teacher starts the session with 'Statement of the problem' written on the black board. After ensuring that all the participants are at the same level of understanding the statement of problem, he initiates NGT (Normal Group Technique) to arrive at maximum possible number of creative solutions.

Based on ranking matrix the group will arrive at feasible solutions and students will write an assignment consisting of;

- Problem Statement.
 - Model of problem solving.
 - List of creative solution suggested by participants.
 - Write the most feasible solution based on given criteria.
9. Form a group of 4 to 5 students and give them a topic for GD for 10 to 15 minutes. Teacher should analyse GD on certain parameters and students will write an assignment on aspects of GD and prepare a format (suggested or designed by teacher) which gives details of GD carried out.
10. Arrange a guest lecture of H.R. Person from industry/expert in interview technique and conduct mock interview of each student. Student should write a report on this activity.
11. Arrange a visit to industry and gather information about organisation, product, turnover, work culture, vision/mission statement, quality policy, Corporate social responsibility etc and write a report on it.

Note - Subject teacher shall guide the students in completing the assignments based on above practicals.

Learning Resources:

Books:

Sr. No.	Author	Name of Book	Publication
1	Subject Experts-MSBTE	Handbook and assignment book on Development of Life Skills-II	MSBTE
2	Dr. Kumkum Mukherjee	Principles of management and organizational behaviour	Tata McGraw Hill Education Pvt Ltd.
3	Dr.T.Kalyana Chakravarti Dr.T.Latha Chakravarti	Soft Skills for Managers	Biztantra
4	Barun K Mitra	Personality Development and soft skills	Oxford University Press
5	Priyadarshini Patnaik	Group discussion and interview skills	Foundation Books

Course Name : Civil Engineering Group

Course Code : CE/CS/CR/CV

Semester : Fifth for CE/CR/CS and Sixth for CV

Subject Title : Entrepreneurship Development

Subject Code : 17057

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
--	--	02	--	--	--	--	25@	25

Rationale:

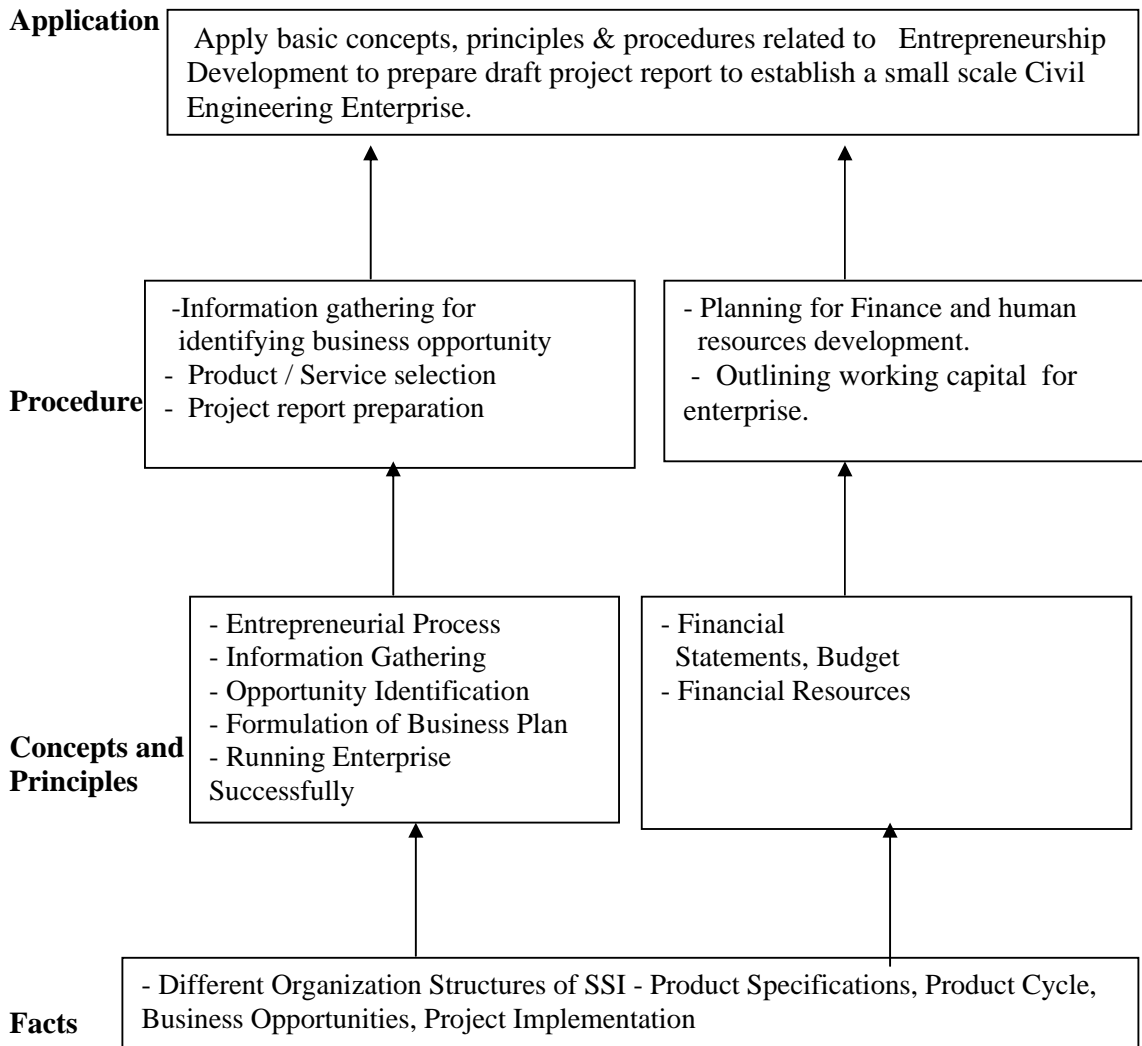
Globalization, liberalization and privatization along with revolution in Information Technology, have thrown up new opportunities that are transforming lives of the masses. Talented and enterprising personalities are exploring such opportunities and translating opportunities into business ventures such as- BPO, Contract Manufacturing, Trading, Service sectors etc. The student community also needs to explore the emerging opportunities. It is therefore necessary to inculcate the entrepreneurial values during their educational tenure. This will help the younger generation in changing their attitude and take the challenging growth oriented tasks instead of waiting for white-collar jobs. The educational institutions should also demonstrate their uniqueness in the creation of enterprising personalities in their colleges. This subject will help in developing the awareness and interest in entrepreneurship and create employment for others.

General objectives:

Students will be able to

1. Appreciate the need of Entrepreneurship development in the context of Globalization and Liberalization
2. Develop the entrepreneurial qualities.
3. Understand the enterprises establishment process.
4. Understand role of various agencies promoting Entrepreneurship development.
5. Understand financial and human resource management for an enterprise.
6. Draft a detailed project report to start a small enterprise.

Learning Structure:



Theory:

Topics and Contents
<p>Topic 1: Small Business Enterprise and Entrepreneurship Development</p> <p>Specific Objectives: Students will be able to,</p> <ul style="list-style-type: none"> ➤ State the need of Entrepreneurship development. ➤ Classify enterprises ➤ Prepare Profile of successful entrepreneur <p>Contents:</p> <ul style="list-style-type: none"> • Concept of Enterprise, Small Business Enterprise, Entrepreneurship, Entrepreneurship Development. • Need of Entrepreneurship Development- Growth of small scale industries and its role in economic development, Govt. Policy in development of SSI, recent industrial policy • Characteristics of entrepreneur, classification of entrepreneurs based on functional characteristics • Integrated model of Entrepreneurial development • Profile of successful entrepreneurs.
<p>Topic 2: Institution Supporting Enterprises</p> <p>Specific Objectives: Students will be able to,</p> <ul style="list-style-type: none"> ➤ Outline role of various agencies supporting Entrepreneurship development. ➤ Shortlist suitable financing agencies for financial assistance. ➤ Describe venture capital for establishing an enterprise. <p>Contents:</p> <ul style="list-style-type: none"> • Central level institutions- SSI board, KVIC, SIDO, NPC, NSIC, NISIET, NIESBUD, IIE, EDI, • State level institutions- DI'S,DIC,SFC'S,SIDC'S,SSIDC'S • Others- NABARD, Industry associations, NGOs and Research and Development labs • Concept of Venture capitals.
<p>Topic 3: Establishing Small Business Enterprise</p> <p>Specific Objectives: Students will be able to,</p> <ul style="list-style-type: none"> ➤ Identify business opportunity considering local needs. ➤ Select product/service for the enterprise. ➤ Prepare draft for project report. ➤ Outline for registration process. <p>Contents:</p> <ul style="list-style-type: none"> • Identifying the business opportunities in civil engineering field • Steps involved in establishing an enterprise-selection of a project-product/service selection, location selection, project feasibility study, business plan preparation, proforma for project report preparation • Deciding the constitution of enterprise-sole proprietorship, partnership, corporation, cooperatives and franchising • Registration-provisional and permanent, arrange for land, machinery and infrastructure
<p>Topic 4: Financial and Human Resources Management</p> <p>Specific Objectives: Students will be able to,</p>

- Estimate working capital for a small enterprise.
- Outline aspects of human resource development
- Enlist Laws related to environment and pollution control

Contents:

- Functions of financial management, Estimating working capital
- Functions of human resource development, aspects of human resource development
- Laws related to environment and pollution control

Intellectual Skills:

Skills to be developed.

- Gather information and interpret/ inference of the findings.
- Identify business opportunities.
- Prepare draft project proposal.
- Develop abilities like analysis, problem solving and decision making.
- Develop Risk taking abilities.

List of Assignments:

1. Identification of key traits for an entrepreneur (by administering self assessment questionnaire on students to identify strengths and weaknesses)
2. Preparation of profile of successful entrepreneur
3. Visit to a small civil Engineering business enterprise to interview the entrepreneur, study his business journey and prepare profile.
4. Prepare a draft of project report for a small Civil Engineering enterprise.
5. Prepare a chart showing various agencies to be contacted for starting an enterprise.

Note: Above assignments shall be completed in tutorial hours.

Learning Resources:**1. Books:**

Sr. No.	Title	Author	Publisher
1	Entrepreneurship and Small Business Management	P. M. Charantimath	Pearson Education, New Delhi
2	Entrepreneurship Development Small Business Enterprises	P. M. Charantimath	Pearson Education, New Delhi
3	India land of a Billion Entrepreneurs	Upendra Kachru	Pearson Education, New Delhi
4	Entrepreneurship Development	CPSC, Manila	Tata Mcgraw-Hill Publishing Company Limited, New Delhi
5	Entrepreneurship - Successfully Launching New Ventures	Bruce R.Barringer R.Daunce Ireland	Pearson Education, New Delhi
6	Stay Hungry Stay Foolish	Rashmi Bansal	CIIE, IIM,Ahmedabad
7	Entrepreneurship	Alpana Trehan	Wiley India, Delhi
8	Entrepreneurship	Robert Hisrich M.P.Peter D.A.Shephard	Tata Mcgraw-Hill Publishing Company Limited, New Delhi

2. CDs, PPTs Etc.:**Video Cassettes;**

- b. 5 Success stories of first generation Entrepreneur

- c. Assessing Entrepreneurial Competencies
- d. Business opportunity selection and guidance
- e. Planning for completion and growth
- f. Problem solving – an Entrepreneur skill.

Source : EDI study material , Ahmedabad(near village Bhat, via Ahmedabad Airport and Indira Bridge), P.O Bhat-382428, Gujrat
Phone No. 079-3969163, 3969153
Email: ediindia@sancharnet.in
Website: www.ediindia.org

3. Websites:

1. www.ssi.nic.in
2. www.lubindia.org
3. www.laghu-udyog.com
4. www.techsmall.com
5. www.gin.sme.ne.ip
6. www.enterweb.org
7. www.entrepreneur.com
8. www.ediindia.org
9. www.bplans.com
10. www.sba.gov
11. www.pipdic.com
12. www.opportunityindia.net

Course Name : Civil Engineering Group**Course Code : CE/CS/CR/CV****Semester : Fifth for CE/CS/CR and Sixth for CV****Subject Title : Professional Practices-III****Subject Code : 17058****Teaching and Examination Scheme:**

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

Rationale:

Due to globalization and competition in the private and service sectors, the employment is based either on campus interview competitive test. In such process of selection normally the competencies like general confidence, leadership, and communication and presentation skill, problem solving techniques are normally ascertained through various tests.

The topic on group discussion will provide an opportunity for development of confidence in the students and enhance the communication and presentation skills.

Through information the student will be trained in assessing the information from various means and presenting the information in the specific format.

Various industrial visits will provide an avenue to a student to observe and understand various construction processes in the construction industry. Visits will expose a student to newer and latest technology, material and use of various machines in the construction industry. This will further impose his theoretical knowledge and may encourage him to become versatile in the profession as a diploma engineer.

Practicals:**Objectives:****To develop the following skills****Intellectual Skills:**

1. Understand Leadership and problem solving skill through group discussion.
2. Understand the Preparation of legal documents of project.
3. Assess quality control parameters at site.
4. Give feasible solution for the burning problems for the benefit of society.

Motor Skills:

1. Do Information search?
2. Enlist information and data.
3. Take Field observations.
4. Prepare power point presentation.

Name of the activity	Hours
1. Group Discussion/ Expert Lecture (any one topic per batch) Suggested areas are, i) Safety measures at construction site ii) Green building iii) Disaster Management iv) New Trends in Civil Engineering as a service industry/Future challenges in Civil Engineering.	06
2. Information Search and Data Collection (Any one topic) i) Housing project ii) Legal documents required for an apartment building, such as P.R Card, 7/12, city survey map, sale-deed, N.A. order, building permission and completion certificate. (List and collect all sample documents)	12
3. Industrial Visit (Any one) i) RCC framed structure building for study of its detail. ii) Residential /Public building to study plumbing system iii) Dam/canal/spill-way and gates. iv) Water treatment/ sewage treatment plant.	12
4. Seminar / Power Point Presentation (Any one) The seminar topic should be related to the latest technology/problems pertaining to civil engineering. Each student shall submit a report of 10to20 pages and deliver seminar for 10 minutes.	18
Total	48

List of assignment to be done by each student as a term work.**1. Report on Group Discussion**

The report should consist of: Name of topic, date of discussion, group size, name of group leader, introduction of the topic, concept, need, procedure, causes, sequence / operation, new trends, preventive measures, benefits to the society, conclusion(report should be of 3 to 5 pages).

2. Report on information search and data collection

The report should consist of: Title, Introduction, Need list of documents / photos / information searched from internet / magazines / reference books / Xerox document from Government Office to be attached and conclusion of the exercise. Help of owner/contractor/site engineer/ architect etc. may be taken.

3. Report on industrial visit

The report should consist of: Title, date of visit, place of visit, address of the project, contact numbers, type of the project, cost of the project/unit, Material Management, Labour Management, Tools and plants management, advanced techniques used, out put of the project, safety measures, flow chart, Xerox copies of plans/layout/drawings and conclusion.

4. Seminar/power point presentation:

The report should consists of: Name of topic, introduction, concept, facts, principles, procedures, latest technology, problem, literature, solutions, benefits to the society, alternative methods, cost and benefit ratios, feasibility of the project, sample calculations and approximate costing, Xerox copies of drawings, layout, line plan, flow chart, pie chart or any graphical representation and conclusion etc. for the work / topic of the seminar. Presentation of 10 mints is expected.

Learning Resources:

1. Indian concrete journal.
3. Indian water works association journal.
4. Inside outside journal.
5. A to Z construction by Mantri Publishing House.
6. District Industries Centre - Project reports.
7. Building bye laws and rules of local bodies/ Town planning Acts.
8. Professional communication skills (Revised edition) by A.K. Jain, S. Chand & Co. Ltd New Delhi.
9. Technical communication with CD by Kogent Learning solutions by Wiley India Publications.
10. Effective Technical communication by Ashraf Rizvi, Tata McGrahill, New Delhi.
11. Guide to Presentations third editions by Mary Munter, Pearson Education.
12. The ACE of Soft Skills, Attitude, communication, and etiquettes for success, 1st edition by Gopalswamy Ramesh by Pearson Education.
13. Internet web sites.
www.slideshow.com
[www. Maharashtra.gov.in](http://www.Maharashtra.gov.in)

Industrial Training (Optional)

- Students who have completed industrial training in summer vacation after 4th Semester will be granted exemption for activities related to topic 1 to 4.
- These students shall submit report of Industrial training signed and certified by authorities from Industry. Student will give seminar on industry training attended by him.
- Evaluation will be done on seminar and report submitted by student.