 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.

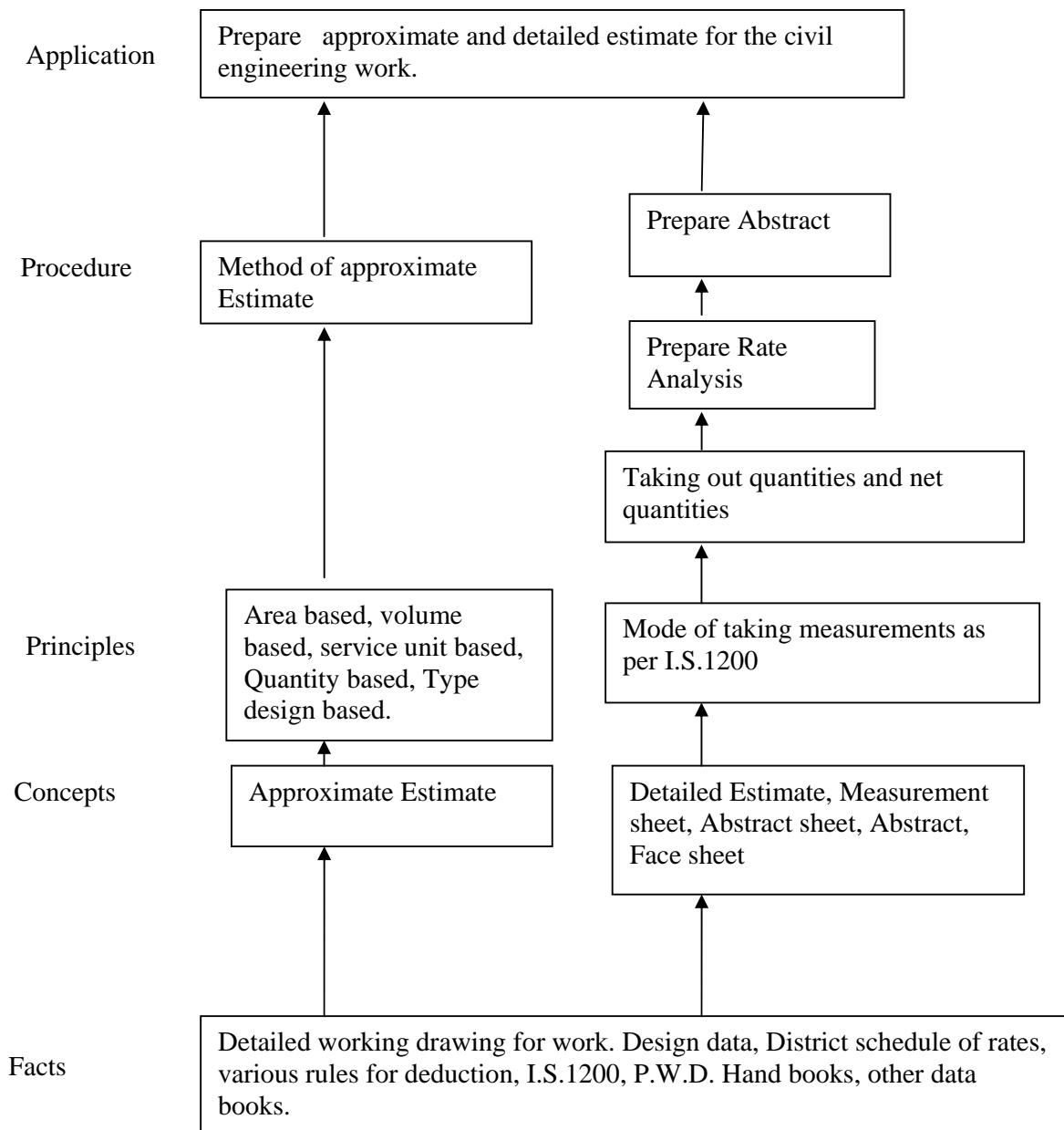
General Objectives:

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</p> <p>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</p> <p>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</p> <p>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

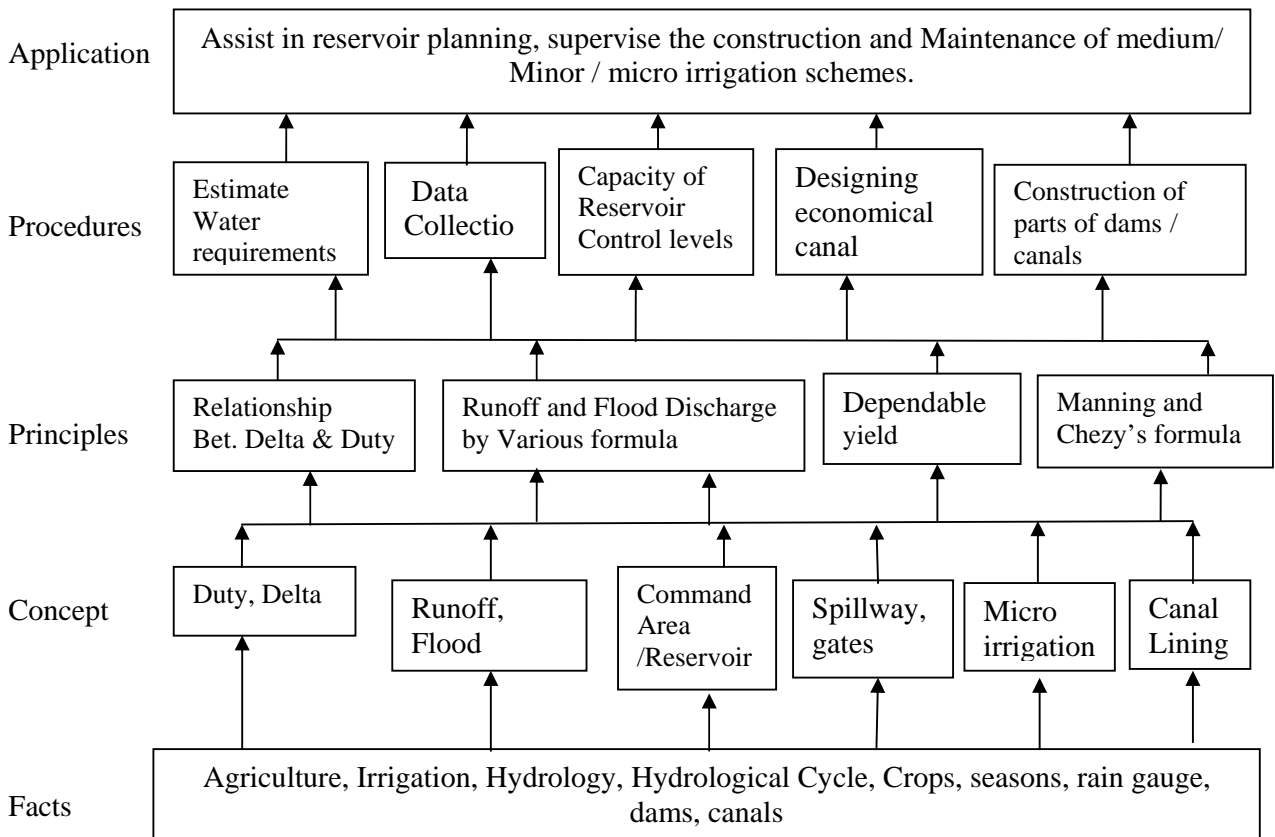
may aim at optimum use of water with minimum loss of water and achieve maximum productivity and yield.

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.

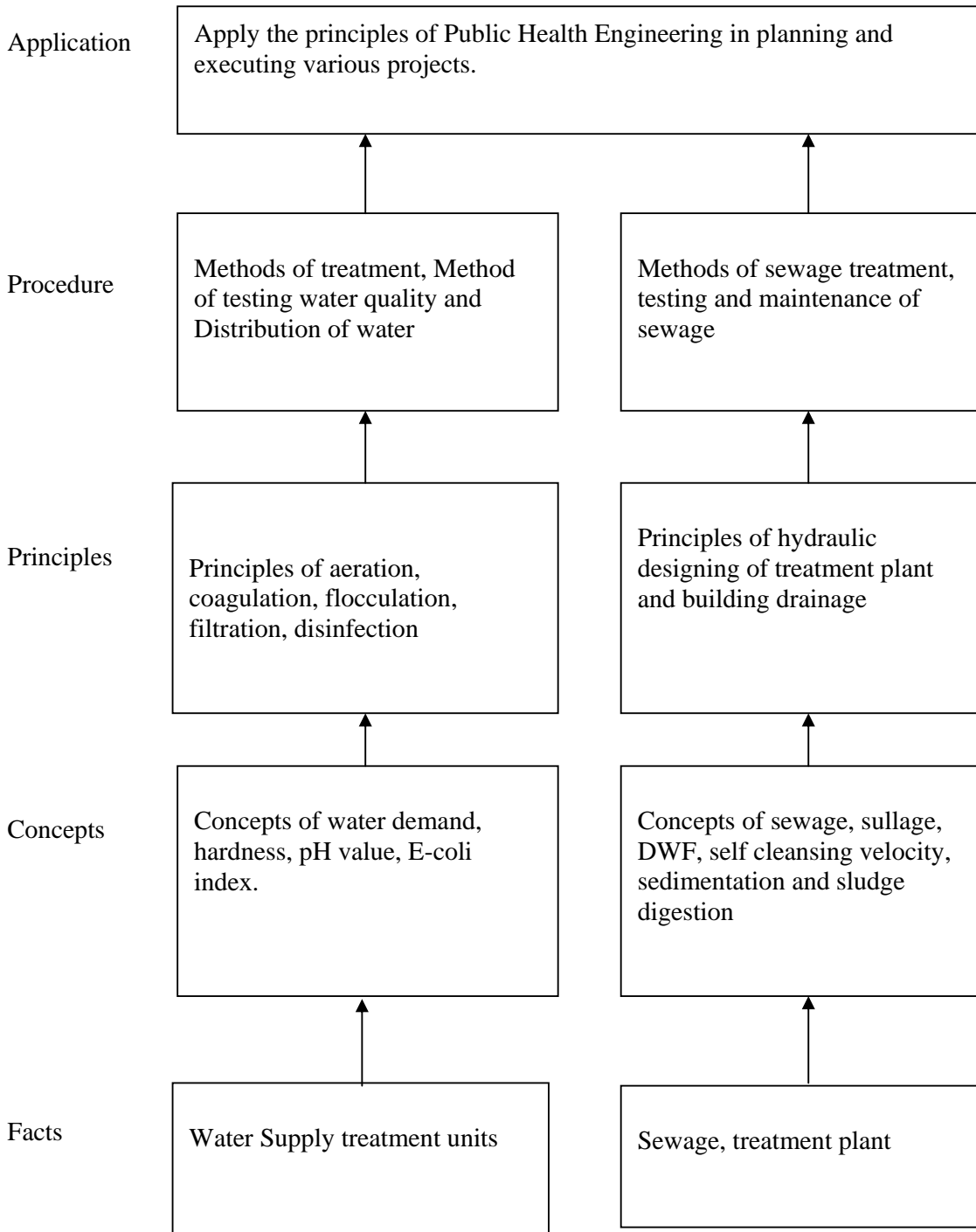
Emerging trends in sanitation and water supply will provide latest know to the students. Thus the subject will be helpful in bringing up general public health to desired safe level in respect of water supply and disposal of waste.

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</p> <p>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.</p> <p>Methods of distribution of water- Gravity, pumping, and combined system</p> <p>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</p> <p>Definitions - Sewage, sullage, types of sewage.</p> <p>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.</p> <p>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</p> <p>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.</p> <p>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.

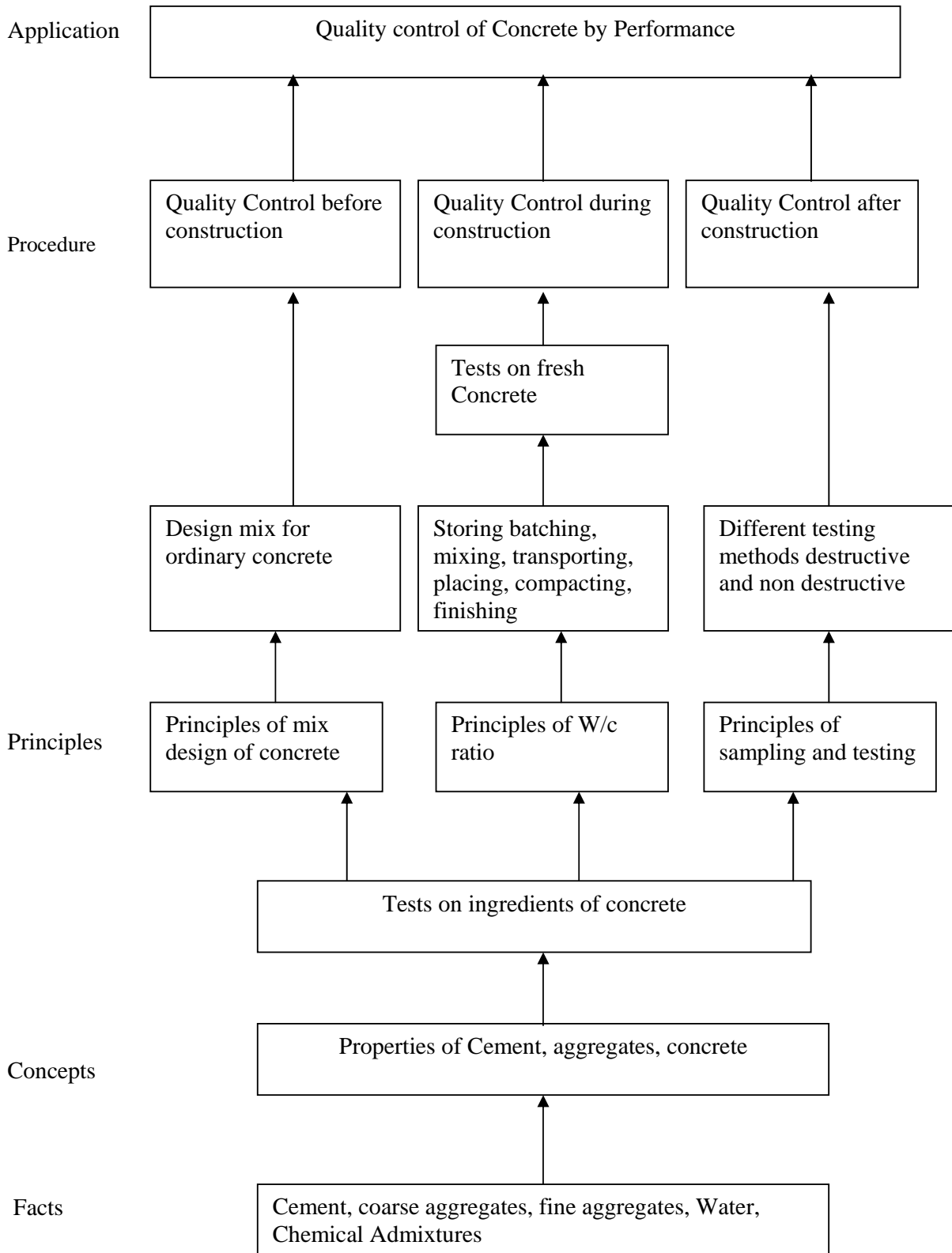
The content of this subject will enable a civil Engineering technician to acquire skills of carrying out various tests on concrete materials and concrete it self along with interpretation of test result.

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.</p> <p>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.

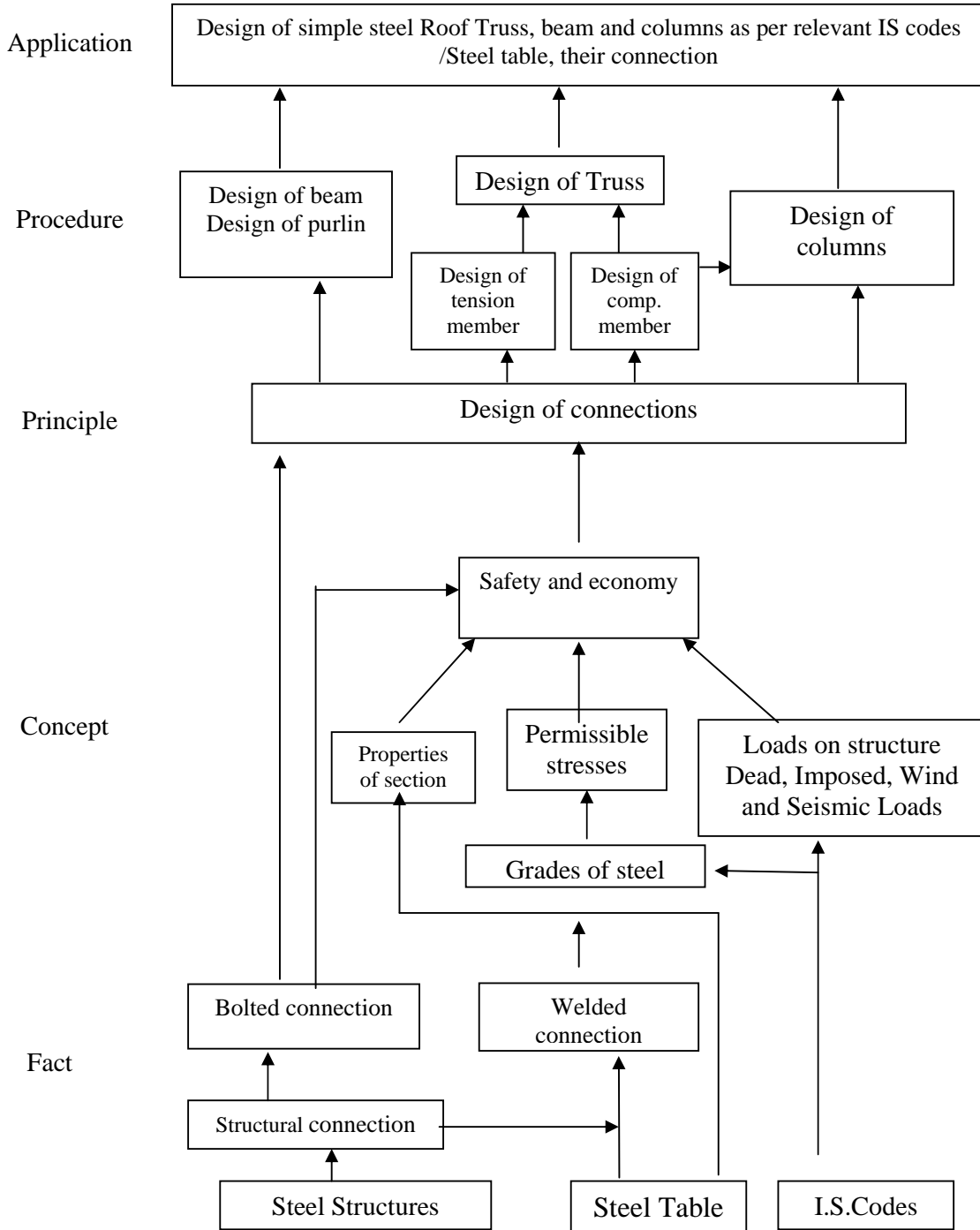
General Objectives:

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)</p> <p>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)</p> <p>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 consist 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.

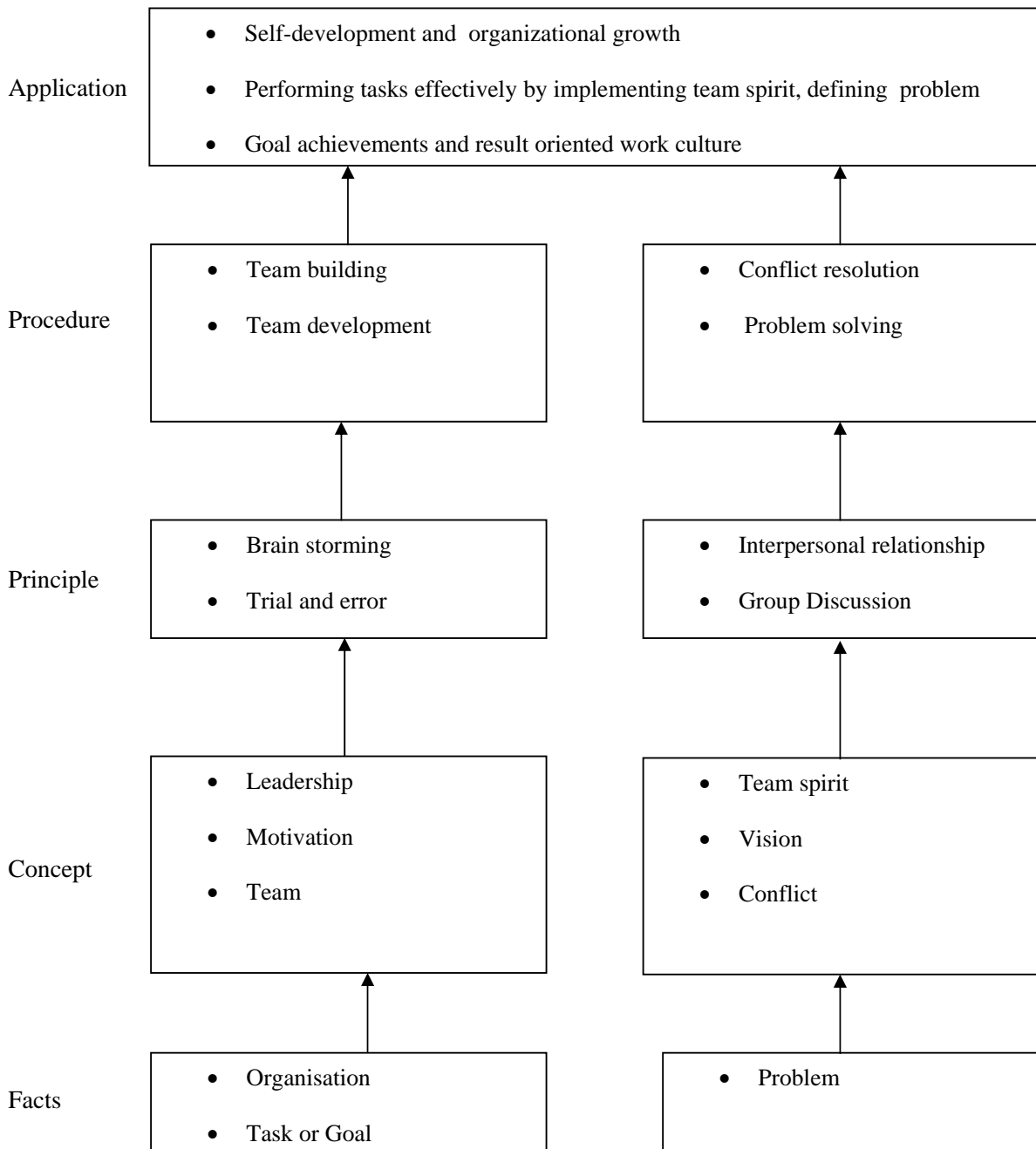
This subject of 'Behavioural Science' provides a broad base in which a technician can develop a successful career in the world of work.

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:

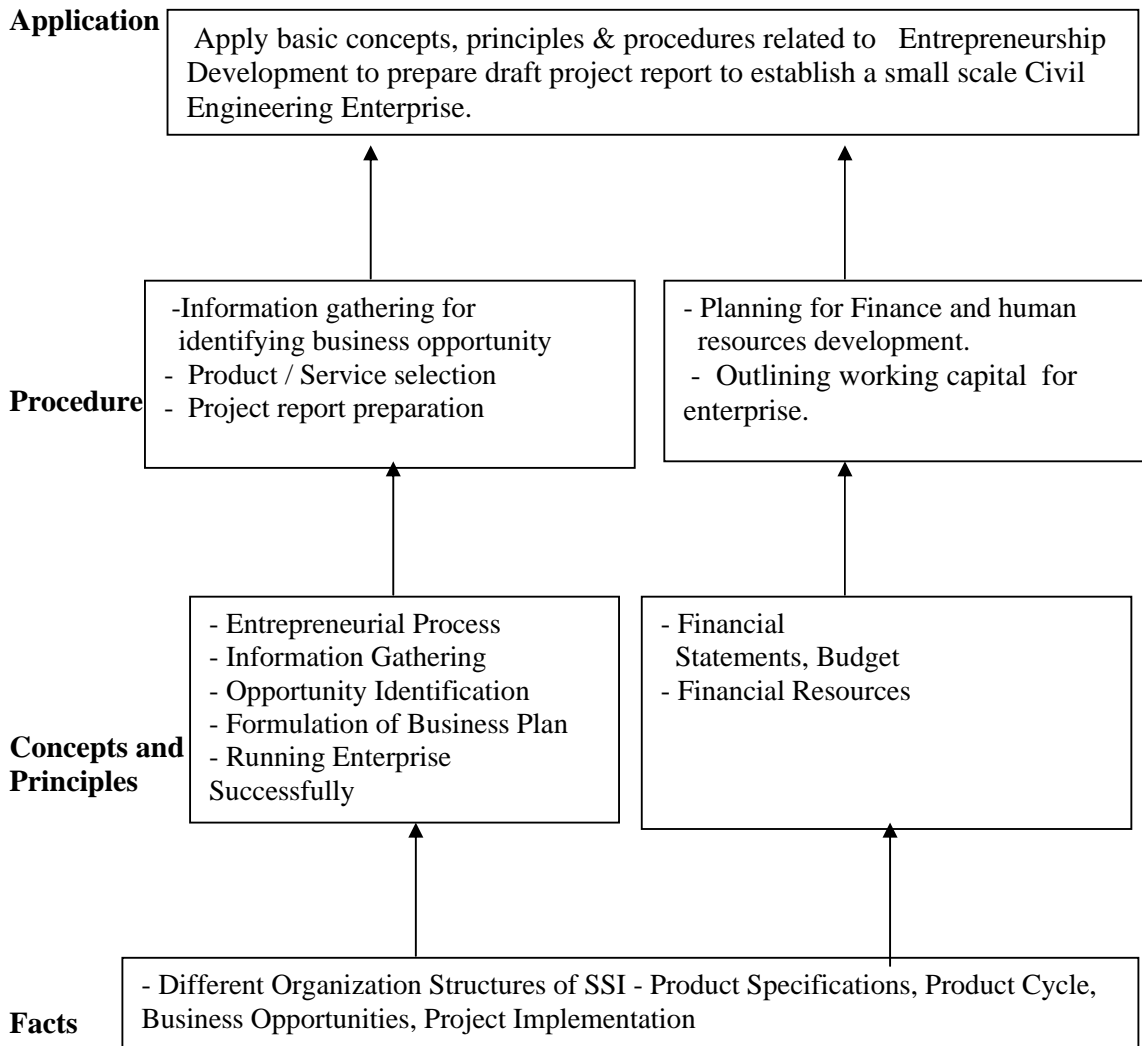
Globalization, liberalization and privatization along with revolution in Information Technology, have thrown up new opportunities that are transforming lives of the masses. Talented and enterprising personalities are exploring such opportunities and translating opportunities into business ventures such 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.

 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/CV																	
DURATION OF COURSE : 6 SEMESTERS for CE/CS (8 SEMESTERS for CV)										WITH EFFECT FROM 2012-13							
SEMESTER : SIXTH										DURATION : 16 WEEKS							
PATTERN : FULL TIME - SEMESTER										SCHEME : G							
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17600)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Management \$	MAN	17601	03	--	--	1&½	50#*	20	--	--	--	--	--	--	--	
2	Highway Engineering	HEN	17602	03	--	02	03	100	40	--	--	25#	10	25@	10	50	
3	Contracts and Accounts	CAA	17603	04	--	02	03	100	40	--	--	--	--	50@	20		
4	Design of R.C.C. Structures	DRS	17604	03	--	04	04	100	40	--	--	25#	10	50@	20		
5	Elective (Any One)																
	Solid Waste Management	SWM	17605	03	--	02	03	100	40	--	--	--	--	25@	10		
	Plumbing Services	PSE	17607	03	--	02	03	100	40	--	--	--	--	25@	10		
6	Project	PRO	17088	--	--	06	--	--	--	--	--	50#	20	50@	20		
Total				16	--	16	--	450	--	--	--	100	--	200	--	50	

Student Contact Hours Per Week: **32 Hrs.**
THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.
Total Marks : **800**
@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #* - Online Theory Examination.
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.

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

 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES																		
COURSE NAME : DIPLOMA IN CIVIL AND RURAL ENGINEERING																		
COURSE CODE : CR																		
DURATION OF COURSE : 6 SEMESTERS								WITH EFFECT FROM 2012-13										
SEMESTER : SIXTH								DURATION : 16 WEEKS										
PATTERN : FULL TIME - SEMESTER								SCHEME : G										
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17600)	
							PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)				
				TH	TU	PR		Max	Min	Max	Min	Max	Min	Max	Min			
1	Management \$	MAN	17601	03	--	--	1&½	50#*	20	--	--	--	--	--	--	--	50	
2	Highway Engineering	HEN	17602	03	--	02	03	100	40	--	--	25#	10	25@	10			
3	Contracts And Accounts	CAA	17603	04	--	02	03	100	40	--	--	--	--	50@	20			
4	Design of R.C.C. Structures	DRS	17604	03	--	04	04	100	40	--	--	25#	10	50@	20			
5	Elective (Any One)																	
	Solid Waste Management	SWM	17605	03	--	02	03	100	40	--	--	--	--	25@	10			
	Plumbing Services	PSE	17607	03	--	02	03	100	40	--	--	--	--	25@	10			
6	Rural Engineering	REN	17087	--	--	02	--	--	--	--	--	--	--	50@	20			
7	Project	PRO	17088	--	--	06	--	--	--	--	--	50#	20	50@	20			
Total				16	--	18	--	450	--	--	--	100	--	250	--	50		

Student Contact Hours Per Week: **34 Hrs.**
THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.
Total Marks : **850**
@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #* - Online Theory Examination.
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.

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

Course Name : All Branches of Diploma in Engineering / Technology

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

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

Subject Title : Management

Subject Code : 17601

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	--	1&½	50#*	--	--	--	50

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:

Management concepts are universal and it is a multidisciplinary subject. They are equally applicable to different types industries like Manufacturing, Service and Trade as well as different kind of business activities like industry, army, school, hospital, retail shops etc. Also, at the end of diploma course polytechnic students are expected to enter in to the Industrial Environment. This environment is altogether different and new to the students. A proper introduction and understanding of management fundamentals is therefore essential for all these students.

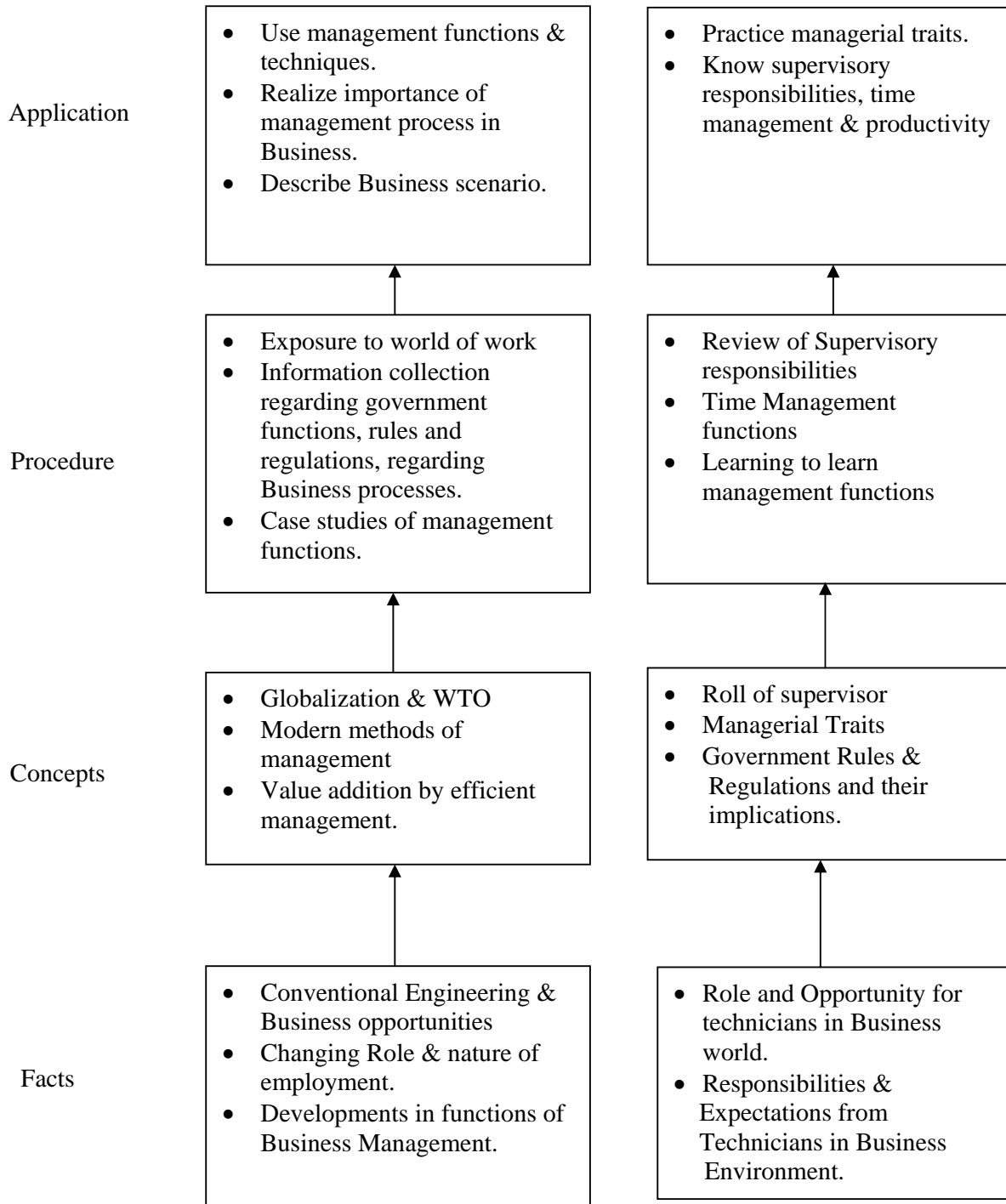
Contents of the this subject will enable the students to address various issues related to human resource, finance, materials, legislations etc. by use of basic principles of management. This will ensure that students will play their role effectively to enhance the quality of business output in total.

Objective:

The students will able to:

1. Get familiarized with environment related to business processes.
2. Know the management aspects of the organisations.
3. Understand Role & Responsibilities of a Diploma engineer.
4. Understand importance of quality improvement techniques.
5. Appreciate need and importance of safety in industries.
6. Understand process of Industrial finance and its management.
7. Know the latest trends in industrial management.

Learning Structure:



Contents: Theory

Topic and contents	Hours	Marks
<p>Topic 1: Overview of Business</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State various business types and sectors ➤ Describe importance of globalisation <p>1.1. Types of Business</p> <ul style="list-style-type: none"> • Service • Manufacturing • Trade <p>1.2. Industrial sectors Introduction to</p> <ul style="list-style-type: none"> • Engineering industry • Process industry • Textile industry • Chemical industry • Agro industry • IT industry • Banking, Insurance, Retail, Hospitality, Health Care <p>1.3 Globalization</p> <ul style="list-style-type: none"> • Introduction • Advantages & disadvantages with respect to India 	02	04
<p>Topic 2: Management Process</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State various management principles ➤ Describe different management functions <p>2.1 What is Management?</p> <ul style="list-style-type: none"> • Evolution • Various definitions of management • Concept of management • Levels of management • Administration & management • Scientific management by F.W.Taylor <p>2.2 Principles of Management (14 principles of Henry Fayol)</p> <p>2.3 Functions of Management</p> <ul style="list-style-type: none"> • Planning • Organizing • Directing • Controlling • Decision Making 	08	08
<p>Topic 3: Organisational Management</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Compare different forms of organisation , ownership for a specific business ➤ Describe types of departmentation <p>3.1 Organization :</p> <ul style="list-style-type: none"> • Definition 	08	08

<ul style="list-style-type: none"> • Steps in organization <p>3.2 Types of organization</p> <ul style="list-style-type: none"> • Line • Line & staff • Functional • Project <p>3.3 Departmentation</p> <ul style="list-style-type: none"> • By product • By process • By function <p>3.4 Principles of Organisation</p> <ul style="list-style-type: none"> • Authority & Responsibility • Span of Control • Effective Delegation • Balance ,stability and flexibility • Communication <p>3.5 Forms of ownership</p> <ul style="list-style-type: none"> • Proprietorship • Partnership • Joint stock • Co-operative Society • Govt. Sector 		
<p>Topic 4: Industrial Safety and Legislative Acts</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Describe types of accidents & safety measures ➤ State provisions of industrial acts. <p>4.1 Safety Management</p> <ul style="list-style-type: none"> • Causes of accidents • Types of Industrial Accidents • Preventive measures • Safety procedures <p>4.2 Industrial Legislation - Necessity of Acts</p> <p>Important Definitions & Main Provisions of following acts:</p> <ul style="list-style-type: none"> • Indian Factory Act • Workman Compensation Act • Minimum Wages Act 	08	06
<p>Topic 5: Financial Management (No Numerical)</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Explain functions of financial management ➤ State the sources of finance & types of budgets. ➤ Describe concepts of direct & indirect taxes. <p>5.1 Financial Management- Objectives & Functions</p> <p>5.2 Capital Generation & Management</p> <ul style="list-style-type: none"> • Types of Capitals - Fixed & Working • Sources of raising Capital - Features of Short term, Medium Term & Long Term Sources <p>5.3 Budgets and accounts</p> <ul style="list-style-type: none"> • Types of Budgets 	08	08

<ul style="list-style-type: none"> • Fixed & Variable Budget - Concept • Production Budget - Sample format • Labour Budget - Sample format • Profit & Loss Account & Balance Sheet - Meaning, sample format, meaning of different terms involved. <p>5.4 Meaning & Examples of -</p> <ul style="list-style-type: none"> • Excise Tax • Service Tax • Income Tax • Value Added Tax • Custom Duty 		
<p>Topic 6: Materials Management (No Numerical)</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Describe concept of inventory, ABC analysis & EOQ. ➤ Describe purchase functions & procedures ➤ State features of ERP & MRP <p>6.1 Inventory Concept, its classification, functions of inventory</p> <p>6.2 ABC Analysis - Necessity & Steps</p> <p>6.3 Economic Order Quantity Concept, graphical representation, determination of EOQ</p> <p>6.4 Standard steps in Purchasing</p> <p>6.5 Modern Techniques of Material Management</p> <ul style="list-style-type: none"> • Material Resource Planning (MRP) - Functions of MRP, Input to MRP, Benefits of MRP • Enterprise Resource Planning (ERP) - Concept, list of modules, advantages & disadvantages of ERP 	08	08
<p>Topic 7: Quality Management</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State Principles of Quality Management ➤ Describe Modern Technique & Systems of Quality Management <p>7.1 Meaning of Quality</p> <p>Quality Management System – Activities, Benefits</p> <p>Quality Control - Objectives, Functions, Advantages</p> <p>Quality Circle - Concept, Characteristics & Objectives</p> <p>Quality Assurance – Concept, Quality Assurance System</p> <p>7.2 Meaning of Total Quality and TQM</p> <p>Components of TQM – Concept, Elements of TQM, Benefits</p> <p>7.3 Modern Technique & Systems of Quality Management like Kaizen, 5'S, 6 Sigma</p> <p>7.4 ISO 9001:2000 - Benefits, Main clauses.</p>	06	08
Total	48	50

Learning Resources:**Books:**

Sr. No	Author	Name of Book	Publisher
01	Dr. O.P. Khanna	Industrial Engineering & Management	Dhanpat Rai & Sons New Delhi
02	Banga & Sharma	Industrial Engineering & Management	Khanna Publication
03	Dr. S.C. Saksena	Business Administration & Management	Sahitya Bhavan Agra
04	W.H. Newman E. Kirby Warren Andrew R. McGill	The process of Management	Prentice- Hall

E Source:

nptel.iitm.ac.in

<http://iete-elan.ac.in/subjects/amIndustrialMgmt.htm>

Course Name : Civil Engineering Group

Course Code : CE/CS/CR/CV

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

Subject Title : Highway Engineering

Subject Code : 17602

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:

Today's civil Engineering. Diploma Technician has to work on various civil Engineering. Projects like multistoried buildings, Industrial buildings, Roads, Water Supply, Sanitary Schemes & also on Various Irrigation Structures like Dams, Percolation tanks, Bridges etc. Infrastructural facility like Roads plays a major role in the development of the country.

Road is the important largest and basic mode of Transportation in India. Road Transportation is the most effective and economical means of Transportation. A large scope in Design, Construction and maintenance of Road is present in our country.

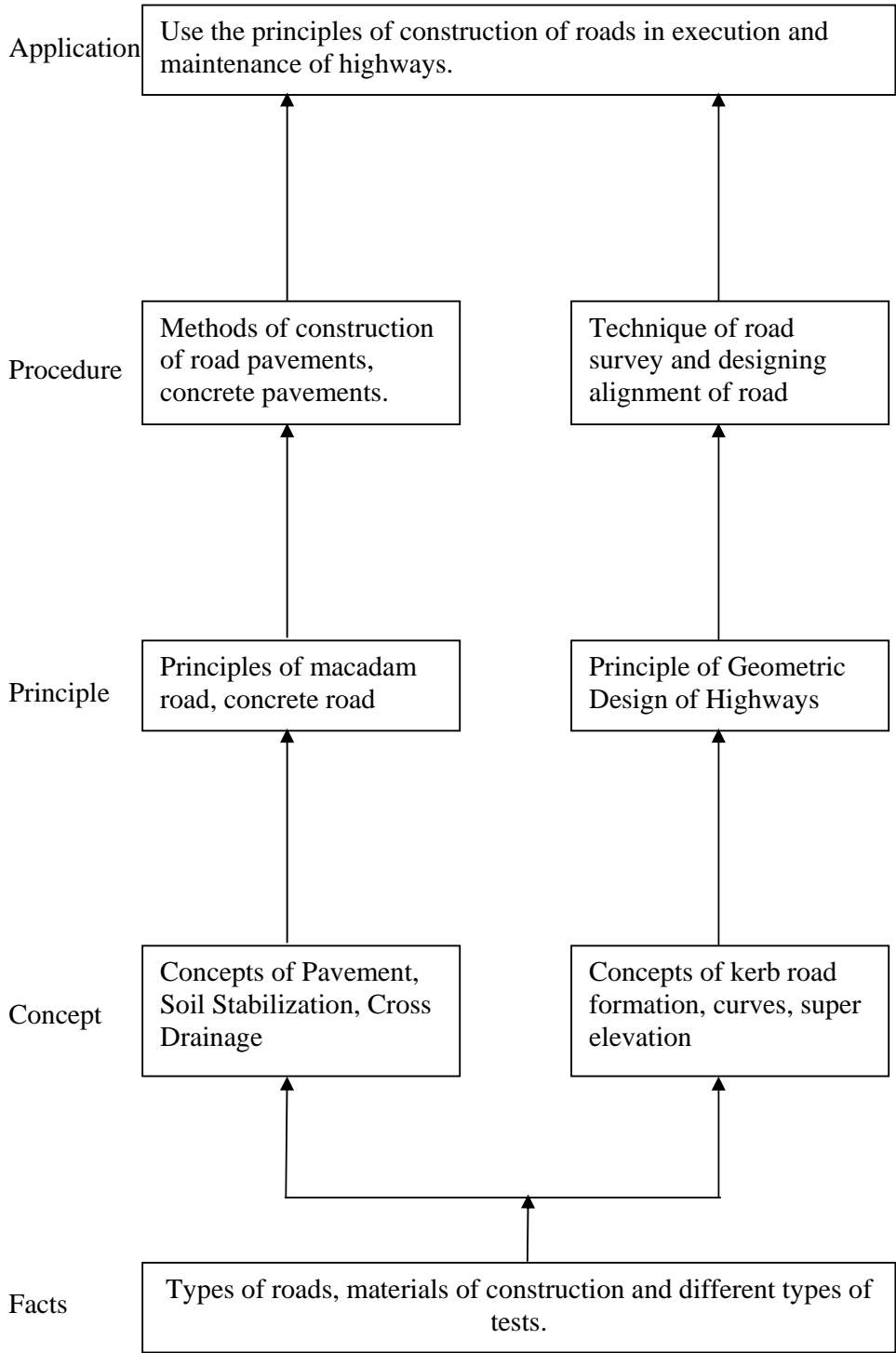
Diploma Engineering students have large scope in jobs as well as different Construction activities in Road Construction. This project gives the knowledge and skills required to carry out the survey, investigation, planning, design, construction and maintenance works related to Road Constructions.

General Objective:

Student should be able to:

- 1) Know the importance and classification of Road.
- 2) Understand the types of Surveys and Investigation for location of new Roads.
- 3) Understand the different methods of Road Construction.
- 4) Apply the Equipments used in Road Constructions.

Learning Structure:



Theory

Topic and Contents	Hours	Marks
<p>Topic 01: Importance and Classification of Roads.</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ State the importance of Transportation. ➤ List classification of Roads. <p>Contents :</p> <ul style="list-style-type: none"> • Importance of Transportation. • Different Modes of Transportation. • Classification of Roads. • Characteristics of Road Transport. 	02	04
<p>Topic 02: Investigation of Road Project</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Describe types of surveys ➤ Draw L section & C/S of roads. <p>Contents :</p> <ul style="list-style-type: none"> • Reconnaissance survey preliminary survey and location survey for road project. • Fixing the alignment of road, factors affecting road alignment. • 'L' section & cross section of roads. • Drawing required for road project. • Keymap, Index map, Preliminary survey plan, detailed location survey plan, 'L' section & C/s of C.D. works, Land acquisition plan. 	02	08
<p>Topic 03: Geometric design of Roads.</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ State the maximum and minimum I.R.C. specification for Camber, Kerbs, Gradient, Slight distance, Super elevation. ➤ Sketch standard cross section of Highway in cutting and embankment. <p>Contents :</p> <ul style="list-style-type: none"> • Camber- definition, types, IRC specification. • Kerbs, road margin, road formation, right of way. • Design speed- IRC specifications. • Gradient- Definition, types of IRC specifications. • Slight distance- Definition, types, IRC specifications. • Super elevation- Definition, minimum & maximum values of super elevation methods of providing super elevation. • Sketching of standards cross-sections of national highway in embankment & cutting. • Simple numerical problems on camber, side distance & superelevation. 	12	24
<p>Topic 04: Construction of Roads</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ List the different materials used in road construction. ➤ Describe the construction of earthen roads, soil stabilized roads, water bound macadam roads, bituminous roads & concrete roads. <p>Contents :</p> <ul style="list-style-type: none"> • Types pf road materials - soil, aggregates, bitumen, cement concrete. • Pavement- objective, structures and functions of pavement 	12	24

<p>components, types of pavements rigid and flexible</p> <ul style="list-style-type: none"> • Construction of earthen roads, general terms used, borrow pits, spoil bank lead & lift, balancing of earth work, construction procedure. • Soil stabilized roads- necessity, methods of soil stabilization. • Water bound macadam roads- materials used, size & grading of materials used, construction procedure including precautions rolling. • Construction- bitumen asphalt, emulsion, cutback tar, common grades, adopted for construction. • Types of bituminous surface, prime coat, tack coat, seal coat, surface dressing, procedure of construction , full grout , semi grout • Cement concrete pavements- Method of Construction ,Construction joints, joint filling, joint sealer. 		
<p>Topic 05: Traffic Engineering Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Define the traffic density, traffic capacity and traffic volume. ➤ State the traffic control devices. <p>Contents :</p> <ul style="list-style-type: none"> • Traffic Engg. Definition, Traffic characteristics. • PUC, Traffic density, traffic capacity. • Traffic volume study- objects and uses, counting of Traffic volumes, PCU. • Traffic control devices – road • Signs, Marking, Signals, Traffic Island and its types - Divisional, Channelizing, Pedestrian, Rotary. 	04	08
<p>Topic 06 : Hill Roads Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Describe the procedure for the alignment and geometric of hill roads. ➤ Sketch the drainage structures in hill roads. <p>Contents :</p> <ul style="list-style-type: none"> • Alignment survey for hill roads. • Geometric of hill road - width, formation, camber construction of hill roads. • Drainage structures in hill roads, side drains, catch water. • Land Sides- causes and prevention. 	02	08
<p>Topic 07: Drainage and maintenance of roads. Specific Objectives :</p> <ul style="list-style-type: none"> ➤ State the purpose of road drainage. ➤ State the importance and repairs of roads. <p>Contents :</p> <ul style="list-style-type: none"> • Purpose of high drainage. • Surface drainage system in urban roads, cross drainage. • Sub-Surface drainage- Longitudinal drains and cross drains. • Necessity of maintenance of roads. • Classification of maintenance operation – routine and periodic maintenance, special repairs and resurfacing. • Maintenance of W.B.M., bituminous and cement concrete roads. 	04	08
<p>Topic 08 : Earth Moving Equipments & High way Machineries Specific Objectives :</p> <ul style="list-style-type: none"> ➤ List the different types of Excavating Equipments ➤ State the use and Working of Compacting Equipments. <p>Contents :</p>	10	16

<ul style="list-style-type: none"> • Excavating Equipments: Bulldozers, Scrappers, Graders, Power Showels, JCB. • Use and Working of Excavating Equipments. • Compacting Equipments : Rollers, Plain Rollers, Sheep Tooted Roller, Vibratory Roller, Pneumatic Rollers • Use of Compacting Equipments. • Hot Mix Bitumen Plant : Bitumen Road Paver 		
Total	48	100

List of Assignments:

1. Prepare a Road Project of 1 km length for proposed MDR having one cross drainage work
2. Visit to road under construction to study the construction of W.B.M. road / tar road / concrete road
3. Develop detailed drawing of cross section of (1) M.D.R. (2) State Highway (3) National Highway (4) Express Highway in cutting & banking (Any two)
4. Understand the traffic volume at Road intersection in city/Town (Draw Traffic flow chart) at road intersection. No. of users using road
5. Visit to WBM. / Bituminous/concrete roads to observe the different defects in the road and suggest remedial measures
6. Test on Bitumen Penetration
7. Test on Bitumen (a) softening point (b) Flash and fire point
8. Visit to Road construction site for studying different equipments like Jcb, power shovel, dozer, rollers – Hot mix plant / paver.

Learning Resources:**Books:**

Sr. No.	Author	Title	Publisher Address
01	Khanna & Justo	Highway Engineering	Khanna Publication
02	L.R.Kadiyali	Traffic Engineering	----
03	N.L.Arora, S.P. Luthara	Transportation Engineering	I.P.H. New Delhi
04	Vazarani & Chandola	Transportation Engineering	Khanna Publication
05	Biridi & Ahuja.	Road, Highway, Bridges	S.B.H. New Delhi
06	Kamala.	Transportation Engineering	T.M.H. New Delhi
07	---	DATA Book of P.W.D.	----

1. **IS / International Codes:** IRC 36-1970, IRC 16-1965, IRC 20 - 1966.

2. **CDS and PPTS:** Search for google.

Mahindra heavy earthmoving equipments

BEML heavy earthmoving equipments

COSMOS Construction equipments

UNIVERSAL Construction equipments

Course Name : Civil Engineering Group

Course Code : CE/CS/CR/CV

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

Subject Title : Contracts and Accounts

Subject Code : 17603

Teaching and Examination Scheme:

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

For infrastructure development various construction projects are required to be undertaken. These projects are to be executed by entering into a legal contract. For this purpose the diploma student shall have adequate knowledge of different types of contract and accounting procedures for effecting the payments. .

Knowledge about the procedure of execution of work by P.W.D. will be useful while working as an engineer in P.W.D. and executing various works. The topic on different types of contract, conditions of contract will enable the student to use the specific type of contract for execution of work.

Concept of Tender and knowledge about preparation of tender documents, writing specification for different items of work will be helpful to prepare actual Tender papers and contract documents which are required before starting construction.

Topic on measurement book and nominal muster roll will be useful for execution of petty works at site. The information on various departmental procedures and different types of forms used by P.W.D. as well as various construction firms, will be useful to prepare bills and different modes of payment to contractors.

The knowledge of valuation will helpful in future while preparing valuation report for the purposes like buying, selling, for mortgage deed, for rent fixation, etc.

This subject will help the student in implementing actual field practices, this will make student further more competent in the execution of civil engineering works.

General Objectives:

The students shall be able to:

1. Understand various types of contract with the purpose of each type.
2. Understand different conditions of contract and its use in execution of work.
3. Appreciate importance of specification of various items of construction.
4. Understand the procedure and different forms for the preparation of tender documents.
5. Know techniques of evaluation.

Theory

Topic and Contents	Hours	Marks
<p>Topic: 1 Procedure of Execution of Work By P.W.D.</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ State the meaning and purpose of administrative approval and technical sanction. ➤ Draw organization structure of p.w.d. <p>Contents</p> <ul style="list-style-type: none"> • Organizational structure of p.w.d., functions of their personnel. P.w.d. Procedure of initiating the work, Administrative approval, technical sanction, budget provision. • Methods used in p.w.d. for carrying out works contract method and departmental method, rate list method, piece work method, day's work method, department method. 	06	12
<p>Topic: 2 Contracts</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ State purpose of different types of contracts ➤ State Advantages, Disadvantages with suitability of each contract. <p>Contents</p> <p>2.104</p> <ul style="list-style-type: none"> • Definition of contract, Objects of contract, requirements of valid contract <p>2.2 Types of engineering contract with advantages and disadvantages ,their suitabilities10</p> <ul style="list-style-type: none"> • Lump sum contract, item rate contract, percentage rate contract, cost plus percentage, cost plus fixed fee, cost plus variable percentage and cost plus variable fee contract, labour contract, demolition contract, target contract, negotiated contract. <p>2.306</p> <ul style="list-style-type: none"> • Classification of contractor, Registration of contractor, Built operate transfer (BOT) Project: Objectives, scope, advantages, disadvantages, examples. 	14	20
<p>Topic: 3 Tender and Tender Documents</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ Draft tender Notice. ➤ State procedure of submitting tender documents. <p>Contents</p> <p>3.112</p> <ul style="list-style-type: none"> • Definition of tender, necessity of tender, types-local and Global • Tender notice, points to be included while drafting tender Notice, drafting of tender notice. • Meaning of terms: earnest money, security deposit, validity period, right to reject one or all tenders, corrigendum to tender notice and its necessity. <p>3.2 Tender documents08</p> <ul style="list-style-type: none"> • List, schedule a, schedule b, schedule C • Terms related to tender documents - contract conditions: time limit, time extension, penalty, defective material and workmanship, 	14	20

Topic and Contents	Hours	Marks
<p>termination of contract, suspension of work, subletting of contract, extra items, escalation, arbitration, price variation clause, defect liability Period, liquidated and unliquidated damages.</p> <ul style="list-style-type: none"> • Filling the tender by contractor and points to be observed by Contractor. • Procedure of submitting filled in tender document, procedure of opening tender , comparative statement, scrutiny of tenders ,award of contract, acceptance letter and work order. • Unbalanced tender, ring formation. 		
<p>Topic: 4.Accounts In P.W.D.- Payment To Contractors Specific objectives ➤ State the use of Measurement book and Nominal muster roll. ➤ State different modes of payments and their use. Contents 4.1 Various account forms and their uses -----.(08) <ul style="list-style-type: none"> • Measurement Books, Nominal Muster Roll, Imprest Cash, Indent, Invoice, Bills, Vouchers, Cash Book, Temporary Advance. Heads of Accounts. 4.2 Mode of Payment to the contractor- -----(08) <ul style="list-style-type: none"> • Interim Payment and its necessity, Advance Payment, Secured Advance, on Account payment, Final Payment, First And Final Payment, Retention money, Reduced rate payment, Petty advance, Mobilization advance. </p>	06	16
<p>Topic: 5. Specification Specific objectives ➤ Prepare detail specifications of various items ➤ Write the rules for specification writing. Contents <ul style="list-style-type: none"> • Necessity and importance of specifications of an items, points to be observed in framing specifications of an item, Types of specification - Brief and Detailed, Standard and Manufacturers specification. • Preparing Detailed Specifications of items in civil engineering works from each of following: building construction, Irrigation Engineering ,Transportation Engineering , Public health Engineering • Legal Aspects of Specification. </p>	08	12
<p>Topic: 6.Valuation Specific objectives ➤ State factors affecting value of property. ➤ Calculate the capitalized value. Contents 6.108 <ul style="list-style-type: none"> • Definition and Necessity of Valuation. Definitions - Cost, Price, Value, Characteristics of Value, Factors Affecting Value. • Types of Value: - Book Value, Scrap Value, Salvage Value, Speculative Value , Distress Value, Market Value, onopoly Value, Sentimental Value, Factors Affecting Value. 6.212 <ul style="list-style-type: none"> • Depreciation, Obsolescence, Sinking Fund. Methods of Calculation of Depreciation – Straight Line Method, Sinking Fund Method, Constant Percentage Method Quantity Survey Method. </p>	16	20

Topic and Contents	Hours	Marks
<ul style="list-style-type: none"> Computation of Capitalized Value, Gross Income, Outgoing, Net Income, Years Purchase. Types of Outgoing and Their Percentages. Fixation of Rent as Per PWD Practice. Simple numerical problems. 		
Total	64	100

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

1. Draft brief tender notice for civil engineering constructions.
2. Prepare tender document for construction of a residential building and other civil engineering work.
3. Write the detailed specification.
4. Prepare valuation report for land and building.

Term work will be prepared by each student in the form of following assignments.

List of Assignments:

1. Collect Tender notices published in Newspapers for various items of civil engineering works (At least 5) Write salient features of item.
2. Draft Tender notices for construction of a Civil engineering work (i.e. W.B.M. road & Residential building).
3. Collect Old set of tender document and write a report containing Name of work, location, estimated cost of work, conditions of contract etc.
4. Prepare Tender document for the Building. Teacher shall form group of FIVE students. Each group shall use independent drawing (Submission Drawing prepared in third semester can be used) Detailed estimate prepared for RCC building in Estimating & Costing shall be used.
5. Collect various Account Forms from PWD and write a report stating Name and numeric code of form with its use.
6. Write a report on PWD store procedure and PWD Account procedure with details of cash book, indent, petty advance etc. For it Guest lecture of PWD official may be arranged for providing the data for writing of above report.
7. Write Detailed specification for one item from each of following
 - a. Building construction
 - b. Irrigation Engineering.
 - c. Transportation engineering.
 - d. P. H. Engineering.
8. Visit to Valuators office to understand his/her profile and one case study of valuation of building.

Learning Resources:**1. Books:**

Sr. No.	Author	Title	Publisher
01	B. N. Datta	Estimating and Costing in Civil Engineering	UBS Publishers
02	S. C. Rangwala	Estimating and Costing, Specification and Valuation in Civil Engineering	Charotar Publication
03	B. S. Patil	Civil Engineering Contracts and Accounts Vol. I,II	Orient Longman
04	S. C. Rangwala	Valuation of Real Properties	Charotar Publication
05	Dr. V. K. Raina	Construction Management and Contract Practices	Shroff Publishers & Distributers Pvt. Ltd.

2. Web Sites: www.constructionmanagementprocess.com

Course Name : Civil Engineering Group

Course Code : CE/CR/CS/CV

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

Subject Title : Design of R.C.C. Structures

Subject Code : 17604

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	04	04	100	--	25#	50@	175

NOTE:

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

Rational:

Design of RCC Structures is the subject at Technology Level. The pre-requisite knowledge, skills and competencies for this subject are expected to be achieved by studying the subjects Mechanics of Structures and Theory of Structures in earlier semesters.

Limit State Method is to be used in the design of RCC structures. IS:456-2000 is to be used for analysis and design and IS:875-1987 is to be used for Loading Standards. Analysis and design of building elements like slabs, beams, columns, footings and dog-legged staircase will be useful in structural design of an RCC building. Emphasis is also on preparation and interpretation of structural drawing and detailing. An elementary terminology of earthquake engineering and exposure to ductile detailing as per IS:13920-2002 has been provided through a separate topic.

An introductory topic on prestressed concrete will be useful to acquaint the learner with the another common mode of use of concrete.

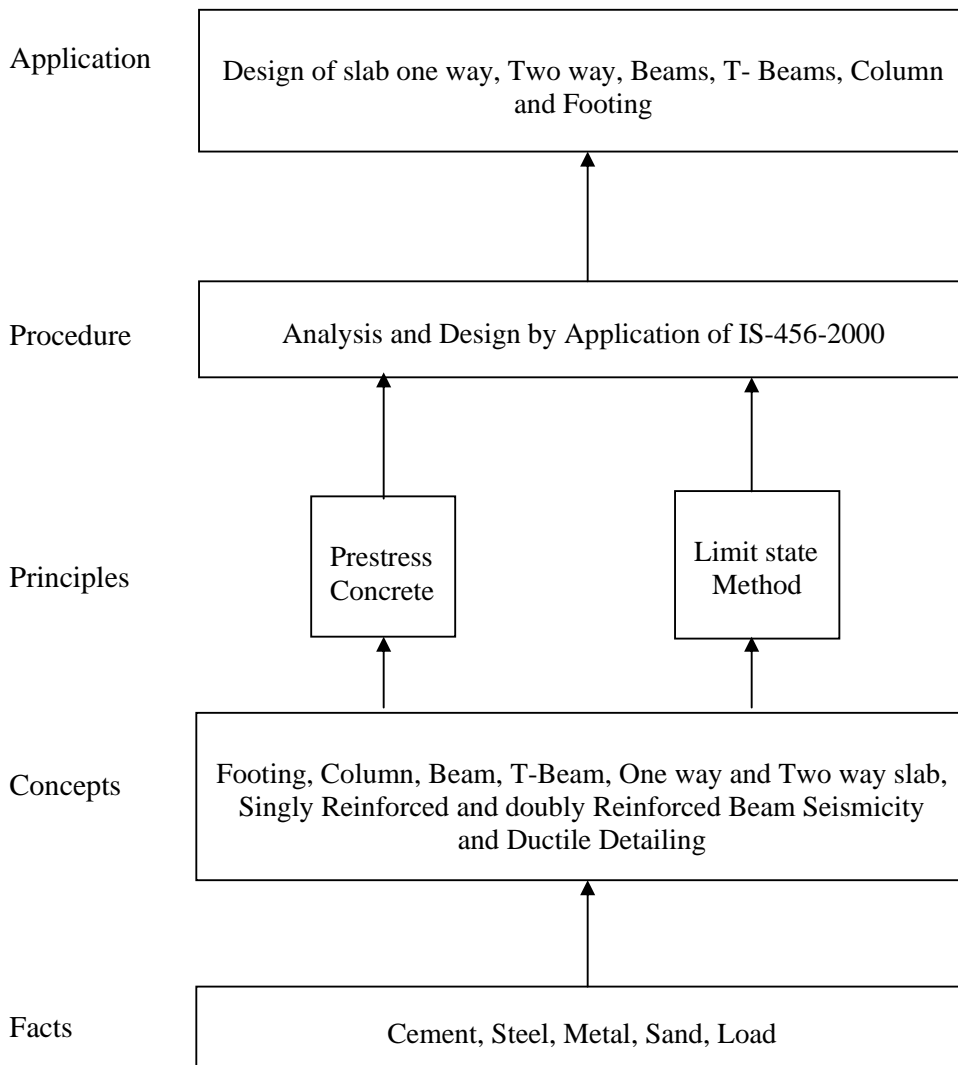
Thus the contents of the subject will be useful to the diploma technician in effective supervision and quality control on site.

Objectives:

Students will be able to:

1. Understand the basic principles and procedure of design of slab, beam, column and footing of RCC building as per IS:456-2000
2. Understand reinforcement detailing of RCC structural members.
3. Understand design of singly reinforced, doubly reinforced and flanged section of beams, simply supported one way & two way slabs, cantilevers slab, axially loaded columns and footings by limit state method.
4. Understand, read and interpret structural drawings.
5. Understand ductile detailing of structural components of buildings.

Learning Structure:



Theory

Topic and Contents	Hours	Marks
<p>Topic 1 : Introduction to Limit State Method</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ State purpose of reinforcement in RCC ➤ Define limit states ➤ Enlist various types of loads on structures <p>Content:</p> <ul style="list-style-type: none"> • Definition of RCC, functions of reinforcement, material properties, use of IS:456-2000 • Definition and types of limit states, partial safety factors for material strength, characteristic strength • Types of loads, use of IS:875-1987, characteristic load, design load 	02	04
<p>Topic 2 : Analysis and Design of Singly Reinforced Rectangular Sections by Limit State Method</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Draw strain and stress diagrams ➤ Calculate design constants and ultimate moment of resistance ➤ Design balanced and under-reinforced singly reinforced rectangular sections <p>Content :</p> <ul style="list-style-type: none"> • Limit State of collapse (flexure) : assumptions, stress-strain relationship for concrete and steel, strain diagram and stress block diagram for singly reinforced section, design parameters and constants, ultimate moment of resistance • Under- reinforced, over-reinforced and balanced sections : meaning and comparison • Analysis and design : Numerical problems on determination of design constants, ultimate moment of resistance, ultimate load carrying capacity, design of balanced and under-reinforced sections • IS specifications regarding spacing, cover, minimum reinforcement, effective span, etc. in beams 	06	16
<p>Topic 3 : Analysis and Design of Doubly Reinforced Rectangular Sections by Limit State Method</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Decide whether beam should be designed as doubly reinforced ➤ Draw strain and stress diagram for beams ➤ Calculate ultimate moment of resistance ➤ Design doubly reinforced balanced beams <p>Content :</p> <ul style="list-style-type: none"> • Meaning and conditions for providing doubly reinforced beams • Analysis of doubly reinforced sections : strain and stress diagrams, numerical problems on ultimate moment of resistance • Design of doubly reinforced sections : Numerical problems on 	06	16

balanced design		
<p>Topic 4 : Analysis and Design of Flanged Beams by Limit State Method</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Calculate effective flange width ➤ Determine ultimate moment of resistance ➤ Design flanged beam by carrying out load analysis <p>Content :</p> <ul style="list-style-type: none"> • Meaning and conditions for formation of flanged (T and L) beams, comparison with rectangular beams, effective width of flange • Analysis of singly reinforced flanged beams: Introduction to cases of neutral axis in i) flange and ii) web. Numerical problems on Moment of Resistance for the case of neutral axis in the flange only. 	06	12
<p>Topic 5: Shear and Bond by Limit State Method</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Calculate ultimate shear strength of beam ➤ Design beam for shear ➤ Draw reinforcement detailing diagram for shear ➤ Apply check for bond to beams and slabs <p>Content :</p> <p>5.1 Shear: ... (08 Marks) Meaning of shear in RCC beams and slabs. IS code specifications. Various forms of shear reinforcement in beams. Use of bent up bars. Zones of minimum shear reinforcement. Numerical problems on design of beams for shear</p> <p>5.2 Bond: ... (04 Marks) Meaning of bond in RCC. IS code provisions. Meaning and calculation development length in tension and compression.</p>	06	12
<p>Topic 6 : Design of Slabs by Limit State Method</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Decide type of slab from the given plan ➤ Design various types of slabs ➤ Draw reinforcement detailing diagram for slabs <p>Content :</p> <ul style="list-style-type: none"> • Definition and classification of slabs as one-way and two-way slabs, support conditions, main and distribution steel, I.S. specifications regarding spacing and cover for reinforcement, effective span, minimum reinforcement • Limit state of serviceability for slabs: Check for deflection • Design of slabs : Procedure and numerical problems on design of one-way simply supported slabs, cantilever slabs, two-way simply supported slabs with corners free to lift and waist slab of dog-legged staircase (No problem in the theory exam on design of dog legged staircase) 	08	16
<p>Topic 7: Design of Columns and Footings by Limit State Method</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Calculate ultimate load carrying capacity of a given axially loaded 	06	16

<p>column</p> <ul style="list-style-type: none"> ➤ Design a column and draw reinforcement detailing ➤ Design isolated sloped footing and draw reinforcement detailing <p>Content :</p> <p>7.1 Axially Loaded Short Columns ... (12 Marks)</p> <ul style="list-style-type: none"> • Limit state of collapse in compression : assumptions, minimum eccentricity, slenderness ratio, short and long columns, calculation of ultimate load carrying capacity of axially loaded short rectangular and circular columns • Load analysis for a column : calculation of load on an axially loaded column from beams at a floor and at various floor levels in a building • Design of axially loaded short rectangular and circular columns: problems on design as per IS specifications for minimum and maximum reinforcement, transverse reinforcement, cover, etc. <p>7.2 Axially Loaded Footings ... (04 Marks)</p> <ul style="list-style-type: none"> • Introduction to various types of RCC footings like isolated stepped and sloped footings, combined footings, piles • Design of isolated square sloped footing: Flexural design with checks for one-way shear, two-way shear and bond. (Problems on design of footing for bending moment only in theory examination paper) 		
<p>Topic 8 : Seismicity and Ductile Detailing</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Define basic terms in seismicity ➤ Draw ductile detailing diagrams for common RCC members as per IS:13920-2002 <p>Content :</p> <ul style="list-style-type: none"> • Definition, magnitude and intensity of earthquake. Zones • Earthquake damages to RCC Buildings like bond failure, shear cracking, slab tearing. Remedies • Ductile Detailing Provisions in IS:13920-200 	04	04
<p>Topic 9 : Introduction to Prestressed Concrete</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Compare prestressed concrete with RCC ➤ Distinguish between pre-tensioning and post-tensioning ➤ Enlist losses of prestress <p>Content :</p> <ul style="list-style-type: none"> ▪ Meaning of prestressed concrete, comparison with RCC. Advantages and disadvantages of prestressed concrete. ▪ Methods of prestressing, pretensioning and post-tensioning ▪ Losses of prestress : meaning and list of losses (No numerical problems shall be asked in written examination on this chapter) 	04	04
Total	48	100

Practicals:

Skills to be developed

Intellectual Skills:

1. Design of structural components
2. Interpretation of structural drawings

Motor Skills:

1. Preparing structural drawings

Term work shall consist of the following:

1. Mini-project on structural design of a G + 2 framed residential building:

Design of slabs, beams, columns and footings for a simple plan of a G + 2 residential building based on the contents taught in the theory. Students should be encouraged to prepare their own architectural plan otherwise teacher will provide separate data of plan, dimensions and material grades separate for separate groups or batches of students; maximum batch size not exceeding 20.

The students shall submit the design details in the following form:

- a) Design Report as included in the Lab. Manual prescribed by MSBTE.
- b) Two full imperial size drawing sheets finished in pencils containing i) key-plan ii) reinforcement detailing for sample slabs and beams, column, column footing of each type and staircase iii) schedules of slabs, beams, columns and footings iv) design notes

2. Study and Interpretation of Professional Structural Drawings:

Professional structural drawings including reinforcement detailing of the components slabs, beams, columns, footings and stair-case shall be collected from nearby consultants. Teacher shall set at least 10 objective questions on each of the five components based on the drawing sheets obtained. Each student shall write the answers in the corresponding exercise in the Lab. Manual of MSBTE.

Learning Resources:**Books:**

Sr. No.	Author	Title	Publisher
1	Dr. V. L. Shah & Dr. S. R. Karve	Limit State Theory and Design of Reinforced Concrete Structures	Structures Publications, Pune
2	N.C.Sinha & S.K.Roy	Fundamentals of Reinforced Concrete	S. Chand & Co., New Delhi
3	N.Krishna Raju & R.N.Pranesh	Reinforced Concrete Design Principles and Practice	New Age International, Mumbai
4	S.U.Pillai & Devdas Menon	Reinforced concrete Design	Tata Mcgraw Hill
5	P. C.Varghase	Limit State Design of Reinforced Concrete	Prentice Hall of India,
6	N.Krishna Raju	Prestressed Concrete	Tata McGraw Hill, Mumbai
7	T.Y.Lin	Design of Prestressed Concrete	Wiley India

		Structures	
8	David Dowrick	Earthquake Resistant Design and Risk Reduction	Wiley India Pvt.Ltd., New Delhi
9	Steven L. Kramer	Geotechnical Earthquake Engineering	Pearson Education

I.S. Codes:

1. IS 456:2000 - Plain and Reinforced concrete code of Practice
2. SP16- Design Aids for reinforced concrete to IS 456
3. I.S. 875 (Part 1-5) - 1987 code of practice of design loads for Buildings and structures.
4. SP 24 - Explanatory Handbook on IS 456
5. IS 1343-1980 - Indian Standard code of (Reaffirmed 1990) Practice for Prestressed concrete.
6. SP34 : 1987 - Handbook on concrete reinforcement and Detailing.
7. IS 13920-1993 Ductile Detailing of R. C. Building subjected to Seismic forces.

Softwares:

1. Struds
2. Scadds/nucleus r(200)
3. Build master
4. Staad.pro.vsi
5. Etabs.9.5

1. Field Visits:

Structured field visits can be organized with proper planning to construction sites to view the following points:

- i) Reinforcement detailing of components like slabs, beams, columns, footing, staircase
- ii) Main concreting operations like batching, mixing, transporting, compacting and curing on site
- iii) Stacking of material like cement, sand, metal, steel, etc. on the site
- iv) Formwork for the various components
- v) Cutting and bending of bars on site
- vi) Verification of sample details in the structural drawing with the reinforcement actually provided on site

2. Development / Use of MS PowerPoint Slide Shows:

- i) Students can be asked to take digital photographs and videos of the details observed in the field visits. MS PowerPoint Slide Shows and MS Movie maker clips can be developed from the photographs and videos by the students as special credit assignments.
- ii) Slide shows on earthquake damages and ductile detailing can be screened

3. Experts' Lectures / Demonstrations:

Experts' lecture-demonstration presentations can be organized on the following topics :

- i) Modern site practices
- ii) Use of software packages for design
- iii) Case study of a major construction project

Course Name : Civil Engineering Group

Course Code : CE/CR/CS/CV

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

Subject Title : Solid Waste Management (Elective)

Subject Code : 17605

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:

Industrialization and Urbanization is increasing day by day. As a result of this the generation of solid waste is a major problem all over the country within the urban as well as rural area. In view of this the management of solid waste produced is of prime need to keep the environment safe and clean.

Information on classification and characteristics of solid waste will enable to decide appropriate decision about the collection and transportation of waste produced. Various disposal methods of solid waste will enable to recommend suitable method of disposal of solid waste with economy and acceptable environmental constraints including reuse and recycle wherever applicable.

Content on other types of solid waste such as biomedical waste, Construction waste, E-waste and plastic waste will be useful in deciding appropriate method for collection, transportation and disposal of these wastes.

Thus, the knowledge of solid waste management with the concept like recycling, recovering and reuse will lead to proper disposal with acceptability. This will further lead to keeping the natural resources condemnation free.

General Objectives:

Students will be able to

1. Understand various types of solid waste produced with their characteristics
2. Understand different methods of collection, transportation and disposal of solid waste.
3. Apply different method of disposal of solid waste for safe disposal.
4. Understand concept of Bio medical waste, E-waste and Industrial waste.
5. Understand recycling and reuse of solid waste.
6. Understand different transportation equipments with their limitations.

Theory:

Topic and Contents	Hours	Marks
<p>Topic 1: Introduction Specific objectives :</p> <ul style="list-style-type: none"> ➤ State meaning of solid waste ➤ List types of solid waste ➤ Write the impact of solid waste ➤ List characteristics of solid waste ➤ List waste management techniques <p>Content :</p> <ul style="list-style-type: none"> • Definition of solid waste • Meaning of different solid waste - Domestic waste, commercial waste, industrial waste, market waste, agricultural waste, biomedical waste, E-waste, hazardous waste, institutional waste, etc. • Sources of solid waste • Classification of solid waste - hazardous and non-hazardous waste. • Physical and Chemical characteristics. • Impact of solid waste on environment. • Solid waste management techniques - solid waste management Hierarchy, waste prevention and waste reduction. • Factors affecting on solid waste generation. 	08	16
<p>Topic 2: Storage, Collection and Transportation of Municipal Solid Waste. Specific Objectives :</p> <ul style="list-style-type: none"> ➤ State methods of storage of municipal solid waste. ➤ List methods of collection of municipal solid waste. ➤ List various transportation equipment ➤ Draw the organization pattern of solid waste management. <p>Content :</p> <ul style="list-style-type: none"> • Storage of municipal waste. • Collection methods of municipal waste. • Tools and Equipments - Litter Bin, Broom, Shovels, Handcarts, Mechanical road sweepers, Community Bin like movable and stationary Bin. • Transportation of municipal waste. • Transportation vehicles with their capacity and working-Animal carts, Auto vehicles, Tractors or Trailers, Trucks, Dumper, Compactor vehicles. Transfer station- meaning, necessity, location • Organization pattern of solid waste management. 	08	16
<p>Topic 3 : Disposal of Solid Waste Specific objectives :</p> <ul style="list-style-type: none"> ➤ List the types of disposal of solid waste ➤ Describe the process of composting. ➤ Describe the process of land filling. ➤ Describe the process of incineration. <p>Content :</p> <p>3.1 Composting of waste 08</p> <ul style="list-style-type: none"> • Principles of composting process • Factors affecting on composting process 	12	24

<ul style="list-style-type: none"> • Methods of composting - <ul style="list-style-type: none"> A) Manual Composting - Bangalore method, Indore Method B) Mechanical Composting - Dano Process C) Vermicomposting- Concept <p>3.2. Land filling technique 08</p> <ul style="list-style-type: none"> • Factors for site Selection • Land filling methods-Area method, Trench method and Ramp method • Leachate and its control • Biogas from landfill • Advantages and Disadvantages of landfill method <p>3.3 Incineration of waste 08</p> <ul style="list-style-type: none"> • Introduction of incineration process. • Types of incinerators-Multiple chamber incinerators and Municipal incinerators • Products of incineration process with their use • Pyrolysis of waste –Definition, methods, Advantages and Disadvantages of incineration process 		
<p>Topic 4: Special Types of Solid Wastes.</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ List various types of special waste. ➤ Describe method of collection and disposal of biomedical waste, E-waste and industrial waste. <p>Content:</p> <p>4.1 Biomedical Waste 06</p> <ul style="list-style-type: none"> • Definition of Biomedical Waste • Sources and generation of Biomedical Waste • Classification of Biomedical Waste Management technologies. <p>4.2 E-waste06</p> <ul style="list-style-type: none"> • Definition of E- waste • Varieties of E- waste • Dangers of E- waste • Disposal of E- waste • Recycling of E- waste <p>4.3 Industrial waste06</p> <ul style="list-style-type: none"> • Variety of industrial waste • Collection of disposal of industrial waste • Control measures of industrial waste. • Recycling of industrial waste. <p>4.4 Biomedical waste06</p> <p>Biomedical waste management & handling as per rule 1998.</p>	12	24
<p>Topic 5: Health aspect and public Involvement in solid waste management</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Know health aspect during handling and processing. ➤ State stages for public involvement <p>Content :</p> <ul style="list-style-type: none"> • Health aspect during handling and processing • Health problem during time of segregation, reuse, recovery, recycling of solid waste. 	04	10

<ul style="list-style-type: none"> Public Involvement and participation in Solid waste management. 		
Topic 6: Recycling of Solid Waste Specific objectives : <ul style="list-style-type: none"> Describe the process of recycling State marketing strategies for recyclables. Planning, Designing and implementation of recycling program. State benefits of recycling. Content : <ul style="list-style-type: none"> Introduction, purpose of recycling Benefits of recycling. Methods of collecting recyclables. Solid waste recycling in India. 	04	10
Total	48	100

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

1. Understand various types of solid waste.
2. Understand various methods of disposal of solid waste with their suitability.
3. Understand rules and regulation during handling and disposal.

Motor Skills:

1. Observe methods of disposal of solid waste.
2. Prepare PowerPoint presentation of disposal of special waste.
3. Collect information of solid waste management in local area.

Term work will be prepared by each student in the form of assignments as below.**List of Assignments:**

1. Visit report on solid waste disposal plant nearby city
2. Visit report on composting plant.
3. Visit report on Biogas plant.
4. Visit report on vermicomposting plant.
5. Visit report on biomedical waste treatment plant.
6. Visit report on Industrial solid waste treatment plant.
7. Collect information of various machinery used for collection and transportation of Solid waste.
8. Understand health aspect during handling and transportation of solid waste.
9. Visit report on transfer station.
10. Study organization pattern of solid waste management.

*Student should prepare visit report by considering following points

(For sr. no.1 to 6 above)

1. Name and Location of Site
2. Sketch showing elements of plant
3. Raw material
4. Process
5. Production and capacity of plant
6. Advantages and Disadvantages
7. Financial assistance by govt. or any other statutory body.
8. Any other information.
9. Minimum two photograph of each visit attached to visit report.

(Size of photo 10cmx12cm)

(For sr. no.7 above)

1. List of machinery
2. Working of machinery
3. Capacity of machinery
4. Feasibility of machinery.
5. Any other information.

Learning Resources:**Books:**

Sr. No	Author	Title	Publisher
1	Dr. A. D. Bhide	Solid Waste Management	--
2	Gorge Techobanoglous	Solid Waste	McGraw Hill
3	D.L. Manjunath	Environmental Studies	PEARSON Publication
4	Gottas	Composting	--
5	K.Sasikumar	Solid Waste Management	PHI learning
6	Khopkar S.M.	Environmental Pollution	New Age International limited
7	Edwards and Lofty	Earthworm Biology	--
8	Anindita Basak	Environmental Studies	PEARSON Publication
9	Rao C.S.	Environmental Pollution Control Engineering	Wiley Eastern Limited
10	B. B. Hosetti	Prospect and Perspectives of Solid Waste Management	NEW AGE International limited

Websites:

1. www.hsagolden.com
2. www.almitrapatel.com
3. www.yousee.in
4. www.skgsangha.org
5. www.epa.gov/epaoswer/non-hw/municipal/index.htm
6. En.wikipedia.org/waste-management

Course Name : Civil Engineering Group

Course Code : CE/CR/CS/CV

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

Subject Title : Plumbing Services (Elective)

Subject Code : 17607

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:

A properly systematic course in Plumbing is not available in India. Plumbing though crucial but remained as neglected subject. As a result, there is a great demand to well trained Plumbing Professionals in the building industry.

Plumbing service is necessary for proper water supply & efficient drainage facility in a building. As buildings are becoming more complex and more modern plumbing materials and systems are available in India, it is necessary to include the same in the Civil Engineering curriculum.

Plumbing services are important component of Civil Engineering. Internal plumbing contributes to around 15% of the construction cost.

Indian Plumbing Association (IPA) has adopted, reviewed and revised the Uniform Plumbing Code of International association of Plumbing and Mechanical officials to suit Indian practices, customs and Laws. The code is published as Uniform Plumbing Code – 2008 India (UPC1).

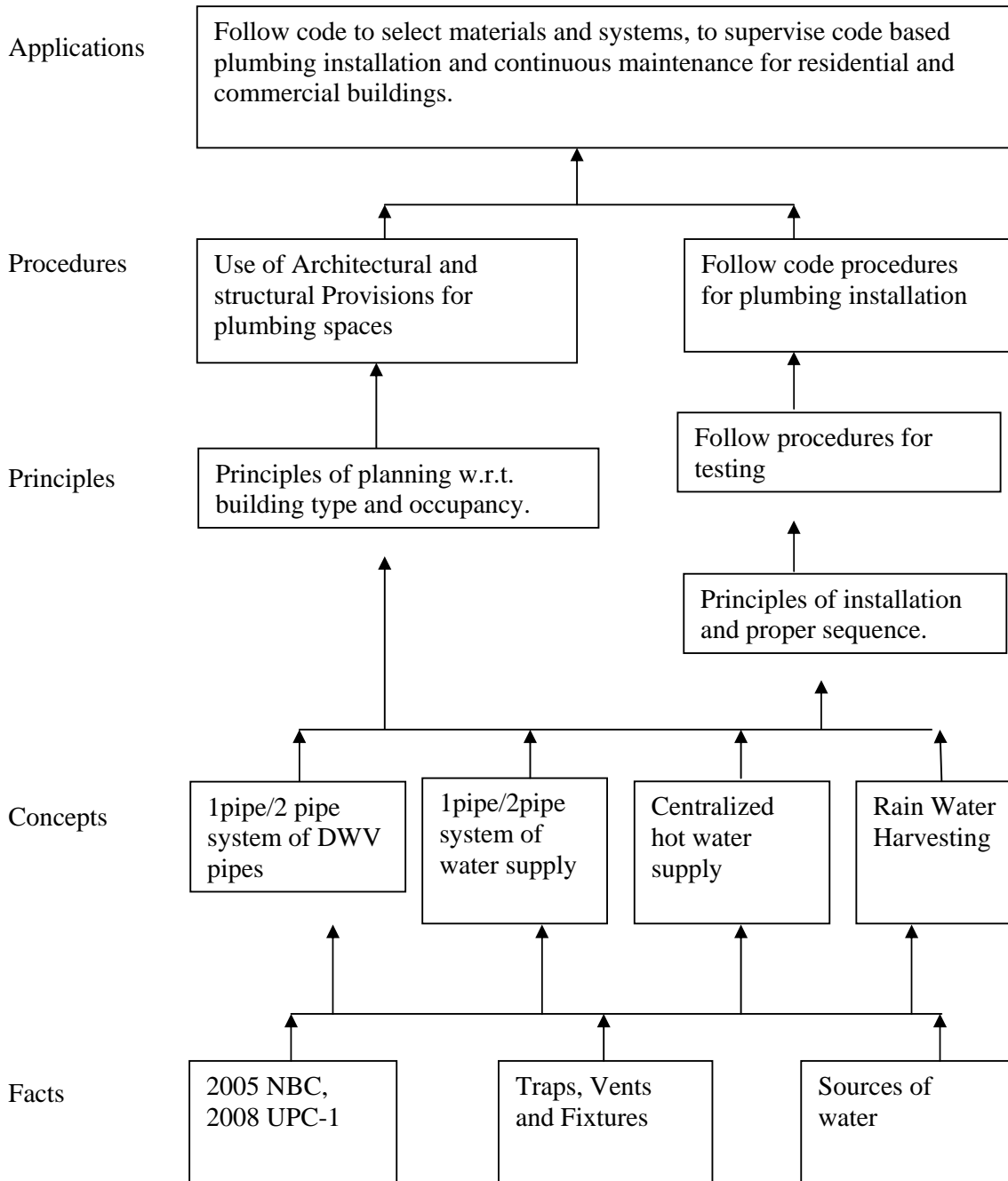
Need of proper use of Plumbing code must be code based education and training in Plumbing will have better job opportunities and improved income. The formal education in Plumbing will improve the plumbing system design and installation standards, thereby ensuring health and safety of people, structure and environment.

General Objectives:

The student will be able to,

1. Understand proper coordination of plumbing work with Architects and structural engineers.
2. Interpret plumbing drawings.
3. Select proper plumbing materials & systems.
4. Supervise plumbing installation as per UPC - 2008.
5. Understand methods to conserve water and energy.
6. Follow safety measures at site.
7. Follow standards for installation as per code practice.

Learning Structure:



Contents: Theory

Topic and contents	Hours	Marks
<p>Topic 1: Introduction to Codes, Architectural and Structural Coordination.</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ Use relevant Code (UPC – 2008). ➤ Maintain proper coordination amongst different agencies. ➤ Select proper materials for plumbing. ➤ Follow local municipal laws. <p>Contents:</p> <p>1.1 : Importance of plumbing, history of ancient plumbing, model code- roles, scope, purpose and use of codes and standards in building industry, approvals, AHJ(Authority Having Jurisdiction) general regulations, minimum standards, labeling, alternative materials, sewers required, damage to drainage system, improper location, workmanship, prohibited fitting and practices, engineered systems, water conservations, protection of pipes and structures, water proofing, rat proofing.</p> <p>1.2: Architectural and structural coordination (not included in UPC1 and ITM) Architectural and Structural provisions for Plumbing systems, coordination required during the planning stage, various agencies involved and their roles, policy decisions, schematic alternatives, planning spaces for plumbing systems, water tanks, pump room, centralized hot water system, toilet locations, toilet planning, plumbing shafts, basement and terraces planning. Structural parameters, sunken toilets, location of columns and beams, post tensioned slabs, importance of ledge walls, waterproofing. Local Municipal laws, domestic and fire static water requirements, water sources, prohibited fittings and systems.</p>	04	10
<p>Topic 2 : Plumbing Terminology</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ Define terms used in plumbing. ➤ List plumbing fixtures. ➤ List drainage system and their joints. ➤ List different valves used in water supply and drainage with their function. <p>Contents:</p> <p>Definition , use/ Location purpose and sketches of the following</p> <p>2.1: Plumber Plumbing fixture: accessible / readily accessible, aerated fitting, bathroom group, carrier, flood level rim, floor sink, flush tanks, lavatories, macerating toilet system, plumbing appliances, flushometer valve</p> <p>2.2: Traps, indirect waste, vent blow off, development length, parts of vent system - stack vent, branch vent, continuous vent, individual vent, dirty arm, FOG (Fat, Oil and Grease) disposal system receptors, slip joint.</p> <p>2.3: Drainage - adapter fitting, adjusted roof area, AAV (Air Admittance Valve), air break, air gap, area drain, bell and spigot joint, building drain, branch, DFU, grease interceptor, roof drain, smoke test, stack, joints.</p> <p>2.4: Water Supply: Angle valve, anti- scald valve, check valve, gate valve, PRE (Pressure Relief Valve), back flow, bypass, cross connection, ferrule, gray water, joints.</p>	06	16
<p>Topic 3: Plumbing Fixtures and Fixture Fittings.</p> <p>Specific objectives :</p>	08	14

<ul style="list-style-type: none"> ➤ State use of different plumbing fixtures. ➤ Draw plan and elevation of fixture and fitting with standard dimension. ➤ State use of different plumbing fittings required for specific situation. ➤ Know installation standard for fixtures as per code. <p>Contents: Different types of plumbing fixtures, shapes/ sizes, capacities, situation and where used: Ablution Fixtures - Wash basin, sinks (kitchen sinks cleaner sinks) bath tub, flushing cistern, drinking fountain. Soil Fixtures - water closets, urinal, mop sink, bidets, slop sinks plumbing fittings for Ablution fixtures and Soil fixtures Water Conserving Fixtures- Water cooler, cloth washer, hot and cold water system, display fountain. Installation standard for plumbing fixtures, dimension in plan and elevation</p>		
<p>Topic 4: Traps, Interceptors, Indirect Waste and Vents. Specific objectives :</p> <ul style="list-style-type: none"> ➤ State purpose of different traps and trap seals. ➤ Describe proper methods of installing indirect waste piping. ➤ State requirement and purpose of venting. ➤ State installation standard as per code. <p>Contents: 4.1:-----06 Traps- Definition, function, Requirement of good trap, trap arms, Development length, trap seals, venting to traps, trap primers, Classification of traps. prohibited traps, 4.2:-----06 System of plumbing for building drainage-Two pipe system, one pipe system, waste receptors, dish washers, drinking fountain. 4.3:-----08 Vent- purpose of venting, trap seal protection, materials, vent connection, flood rim level, , vent stacks, water curtain and hydraulic jump, cleanouts, venting of interceptors, vent sizing.</p>	10	20
<p>Topic 5: Sanitary drainage and storm drain. Specific objectives :</p> <ul style="list-style-type: none"> ➤ State purpose of single and two pipe systems of plumbing. ➤ List different pipe materials and joints. ➤ Draw sketches for protection of pipes and structures. ➤ State sizing of horizontal and vertical pipes. ➤ List storm drains requirements, roof drains, sub drains and sub soil drains. <p>Contents: 5.1: ----- 10 Preamble on single and two pipe systems, different pipe materials and jointing methods, special joints, hangers, and supports, protection of pipes and structures, alternative materials, workmanship, prohibited fittings and practices, hydraulic jump, change in direction of flow, T and Y fittings, cleanouts, pipe grading, fixtures below inverted level, suds relief, building sewers, trenching, testing sumps and pumps, sizing of horizontal and vertical pipes.</p>	10	20

<p>5.2: ----- 10</p> <p>storms drain required, prohibited connections, subsoil drains, sub drain, gutters/ channels/scuppers, roof drains, strainers, leaders, conductors and connections, collect/ capture storm water, discharging storm water, safety, traps required, prohibited installations.</p>		
<p>Topic 6: Water Supply, Gray and Reclaimed Water</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ State sources of water. ➤ Understand hot and cold water distribution system. ➤ Differentiate potable and non potable water. ➤ Learn gray water, reclaimed water and rain water harvesting. ➤ Understand gray water approvals, specification, drawing and safety signs used. ➤ Understand rain water harvesting. <p>Contents :</p> <p>6.1: -----12</p> <p>Preamble on municipal water, sources of water, potable and non potable water, reclaimed water, water storage , hot and cold water distribution system, backflow protection, air gap, cross connection control, pipe materials and jointing method, alternative materials, hangers, and supports, workmanship, prohibited fittings and practices, protection of pipes and structures, pressure control, unions, thermal expansion, types of valves, installation and testing, disinfection, protection of underground pipes, color codes and arrow marking, introduction to wsfu.</p> <p>6.2: -----08</p> <p>Definition of gray water, approvals, specification, and drawing, safety, total gray water discharge, holding tanks, valves and piping, reclaimed water system, definition of reclaimed water, pipe identification, installation, safety signs, valves, cross connection, approved uses, Rain water harvesting in plumbing systems.</p>	10	20
Total	48	100

Skills to be Developed:**Intellectual Skills:**

1. To identify plumbing fixtures and fittings.
2. To interpret plumbing installation with UPC-I and ITM.
3. To identify valves used in water supply and drainage system with their function.
4. To interpret plumbing drawings for multistoried buildings.

Motor Skills:

1. Ability to draw plan and elevation of fixtures and fittings with standard dimensions.
2. Ability to learn sizing of horizontal and vertical pipes used in drainage system.
3. Ability to draw toilet layouts, urinals and different manholes.

Practicals: Term work will be prepared by each student in the form of assignments as below.

List of Assignments:

1. Draw sketches of installation details of plumbing fixtures and fittings in plan, elevation and section; with standard dimensions (Minimum 4)
2. Interpretation of sample plumbing drawings for multistoried building.
3. Draw toilet layouts, plans, elevations and sections of selected case. Give dimensions.
4. Prepare layout of internal and external (outside the toilet) DWV pipes and fittings of a selected case. If possible, write pipe diameters.
5. **Seminar:** Students can select any topic from contents by referring codes, text book, professional magazines, technical papers published and websites of manufacturers and make a seminar presentation in 10 minutes using power point. Weightage is assigned for contents and presentation skills. (Students can work in a group of two.)
6. **Site visit report:** Visit any plumbing site and submit a report on observation on plumbing system, architectural and structural provisions, pipe materials work method, safety and recommendations based on the provisions of UPC-I and ITM.

Learning Resources:**1. Books:**

Sr. No.	Title	Author	Publisher
1	Plumbing Engineering	S. M. Patil	Seema Publication, Mumbai.
2	Plumbing Design and Practice	S. G. Deolalikar	Tata McGraw-Hill
3	Plumbing Technology Design and Practice	Lee Smith	Delmar Publication
4	Practical Plumbing Design Guide	James C. Church	Mcgraw-Hill (T)
5	Plumbing and Illustrated Guide to the Plumbing codes.	Michal Casey, Duglas Hannes, Redwood Kardon	--

2. IS, BIS AND INTERNATIONAL CODES:

- 2008 Uniform plumbing code – India (UPC-I)
- 2008 Illustrated training manual (ITM).
- Extracts from IAPMO India

3. Websites:

- www.plumbing services.com.
- www.cookandlees.com
- www.mepdesignservices.com
- www.plumbing.1800anytyme.com
- www.dyno.com/plumbing.

Course Name : Civil Engineering Group**Course Code : CE/CS/CR/CV****Semester : Sixth for CE/CR/CS and Seventh for CV****Subject Title : Rural Engineering****Subject Code : 17087****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
--	--	02	--	--	--	--	50@	50

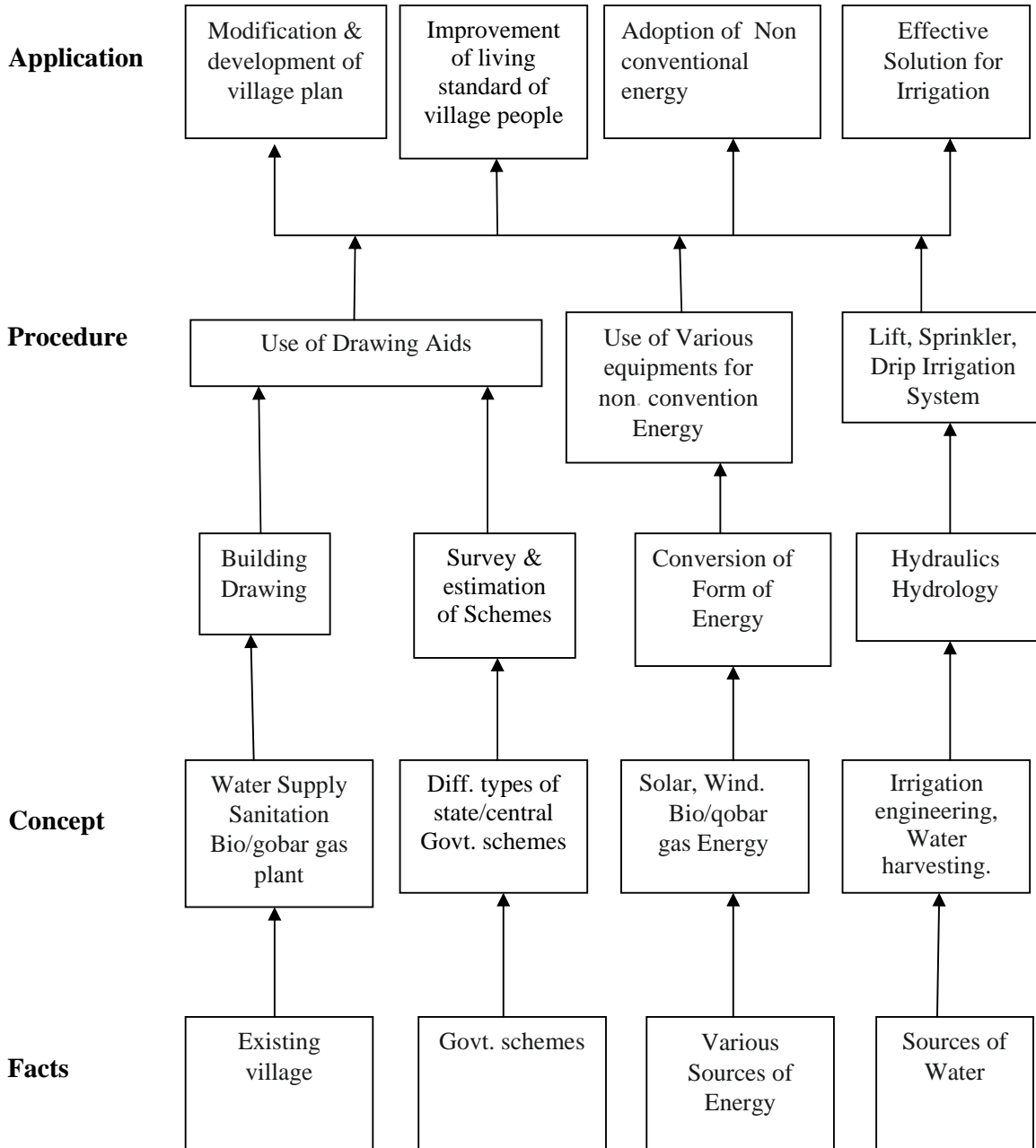
Rationale:

This subject is a means of the transfer of civil engineering technologies studied by the students in all semesters of the course towards rural development.

Agriculture Industry is the largest industry in India. The economy of the country largely depends upon the agricultural productions. Transfer of technology will enable the farmers to increase the yield of different crops. This will aim at sustainable development of villages which is necessary for nation building. About 65% of the population resides in villages. The development of village through different contents of this subject like water shed management, irrigation system, cottage industries, various central and state government schemes is possible due to techniques of transfer of technology.

Thus the upliftment of villages due to rural engineering contents may reduce the migration of rural population to urban population.

Learning Structure:



Theory:

Topics and Contents
<p>Topic 1: Introduction</p> <ul style="list-style-type: none"> • Importance of Rural Engg. • Role of Civil Engg. Student in Rural development • Socio-Economical Survey- Purpose • Need assessment Survey-Use • Existing living in rural area- Residential accommodation, communication (Roads), light, drinking water, facility sanitary arrangements, Electrical Power, Health, medical facility. • Modification and improvement Suggested through Survey.
<p>Topic 2: Water shed management</p> <ul style="list-style-type: none"> • Definition • Different types of water shed management structure eg. Gabian structure, Underground Bandhara , Kolhapur type weir , Cement Plug, Contour Bunding, Terracing, Rain Water Harvesting (mention types) • Their use and importance
<p>Topic 3: Irrigation Systems</p> <ul style="list-style-type: none"> • Purpose • Types Drip irrigation, sprinkler irrigation, Lift irrigation • Sample layout, component parts, its effects
<p>Topic 4: Cottage Industry</p> <ul style="list-style-type: none"> • Importance of cottage industry in rural development <p>E.g. Brick Manufacturing, cement block/ concrete block manufacturing. brief process, its impact</p>
<p>Topic 5: Different types of central Govt. and state Govt. Schemes</p> <ul style="list-style-type: none"> • Need of Different types of schemes. • Role of civil Engg. Student in the development of rural area. • Different Schemes (The provisions- and purpose/ use) <ul style="list-style-type: none"> – Indira Awas Yojana – Swajal Dhara Yojana – Jawahar Well Yojana
<p>Topic 6: Non conventional energy</p> <ul style="list-style-type: none"> • Scope of non Conventional energy • Different types Solar enrage, bio gas, wind mill etc. • Use, advantages and disadvantages

❖ **Reference Books :** Govt. Publication/ Hand Books

Practicals:**Skill's to be developed****Intellectual Skills**

- 1) Use knowledge of civil engineering for solving the problems of rural population.
- 2) Inspire the villagers for using non conventional energy appliances.
- 3) Provide support services as a Civil Engineer for rural population.

Motor Skills

- 1) Spare their services for various development schemes of state/central Govt.
- 2) Provide guidance to start cottage industries related to Civil Engineering.
- 3) Provide services for developing and propagating the programmes of water shed management

Term work shall consist of reports on of the following assignments:

1. Socio Economic and Educational survey of village: write a report to identify the need of village. The following is the suggested format (may be detailed further) for collection of factual information at village level. Additional to home to home information may also be collected by devising a suitable format to collect relevant personal and family information. Carryout chain and compass survey along the roads of village locating homes and main features. Draw plan and show on it the proposed development.
 - **Short village profile**
 - Name of Village
 - Block
 - District
 - **Total Population**
 - **Population** Caste wise/ Male-Female/Age.
 - **Total Houses :-** (a) Properly built (b) Unproperly built
 - **Existing facilities available:-** eg. School, College, Hospital, Bank, Post office, Sanitation system, Approach road, Internal road, Drinking water etc.
 - Total Below Poverty Line Card holder
 - Total Above Poverty Line member's (Above Rs. 18,000/- Per year)
 - Total White card holder (Above Rs. One lakh)
 - Natural resources available- Ponds / River/ Well/ Tube well
 - Number of Wells/ Bore wells
2. Visit to the Structures built under water shed management program (at least two structures) Prepare neat labeled sketches and report with the following points: site selection, materials required/ procurement of material, process of construction, use, conclusion.
 1. Gabian structure
 2. Underground Bandhara
 3. Kolhapur type weir
 4. Cement Plug, Contour Bunding, Terracing.
 5. Rain Water Harvesting
3. Report writing on the following with neat labeled sketches/ layout (Minimum area considered @ 0.5 Hector's) Minimum One
 - 3.1 Sprinkler Irrigation System, with capacity calculation, head and discharge calculation, power calculation for pump, pressure calculation for pipe.
 - 3.2 Drip Irrigation System with capacity calculation, head and discharge calculation, Power calculation for pump, pressure calculation for pipe.
 - 3.3 Layout of Lift Irrigation, with capacity calculation, head and discharge calculation, power calculation for pump, pressure and diameter calculation for pipe.
4. Report writing under the guidance of teacher on any one of the cottage industries related to civil engineering regarding.
(Report consists of raw marital required, processes of molding / casting, equipment required, etc.)
 - 4.1 Brick Manufacturing.
 - 4.2 Cement Block /concrete precast block and pole manufacturing.
 - 4.3 Stone Crusher /Artificial sand.
 - 4.4 M. S. fabrication.
5. Collecting information regarding schemes declared by State / Central Govt. in which Civil Engineer has effective participation. (at least one)
 1. Indira Awas Yojna
 2. Walmiki Awas Yojna
 3. Swajal Dhara Yojna
 4. Jawahar Well Yojna
 5. Village / Farm Tank.

6. Collecting information regarding use of non-conventional energy source like - Solar energy, Bio / Gobar Gas plant, wind mill etc.
7. A Study report on Concept of Community Polytechnic in India regarding its role in upliftment of rural population, its area of working, such as manpower development, transfer of technology, technical support services, information dissemination, community services. A visit to nearest Community Polytechnic shall be arranged. A visit report shall be prepared covering all aspects.

Learning Resources

1. Books

Sr. No.	Title	Author	Publisher
1	Irrigation Engg.	S. K. Gurg	Laxmi
2	Building construction	S. Chand	Valey

2. Websites:

www.rural.nic.in
www.lgd.gov.bd
www.rurdev.usda.gov
www.nabard.org
www.ldeorg.org

Course Name : Civil Engineering Group

Course Code : CE/CS/CR/CV

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

Subject Title : Project

Subject Code : 17088

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	06	--	--	--	50#	50@	100

Rationale:

Apart from supervising construction and maintenance of civil engineering works a Diploma Engineer has to carry out survey, collect, analyze and synthesize the data. He / She has also to refer handbooks, I. S. Codes and design small structures on the basis of knowledge of different subjects.

Due to changing scenario the role of Diploma Engineer is becoming more prominent and has to acquire professional abilities and develop confidence to face civil engineering problems.

This subject is intended to apply civil engineering principles, rules and regulations to solve a real life problem and to provide a feasible solution. For this He / She will collect data through survey work and referring various information resources and prepare drawings, designs, estimate and write a detailed project report.

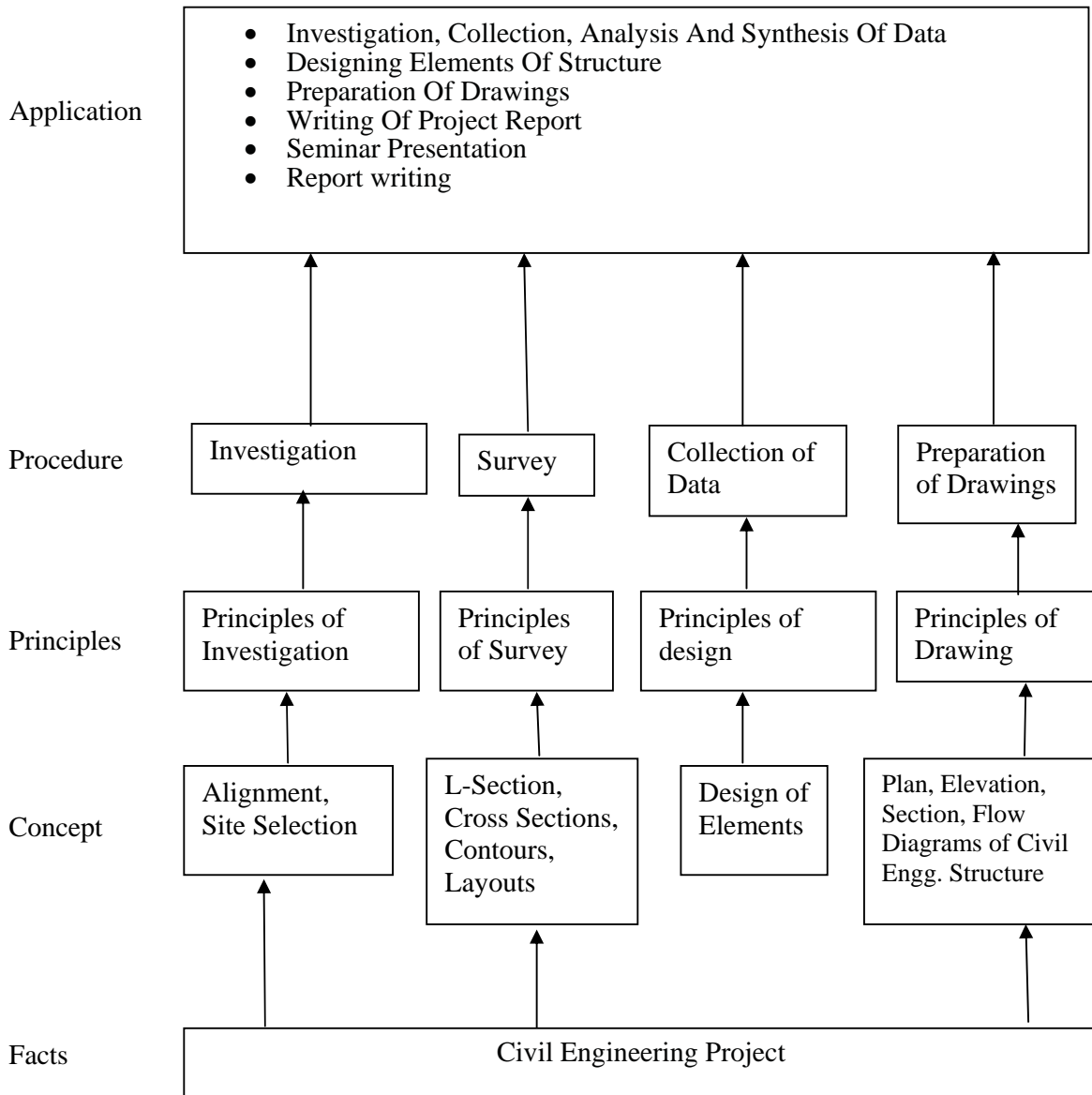
The project and seminar activities will provide students the exposure to handle real life problems and their solutions and prepare him/her to enter confidently in the world of work.

Objectives:

Students will be able to:

- 1) Collect the information for a given project.
- 2) Apply principles, theorems and bye-laws in the project planning and design.
- 3) Interpret and analyze the data.
- 4) Develop professional abilities such as persuasion, confidence, perseverance and Communication skill.
- 5) Develop presentation skill.
- 6) Enhance creative thinking.
- 7) Report writing.

Learning Structure:



Notes: The batch of students for the project shall be limited to 06 students.

Project:

Skills to be developed:

Intellectual Skills:

- 1) Decide and collect data for projects.
- 2) Read and interpret the drawing, data.
- 3) Apply the principles, rules, regulations and bye-laws.
- 4) Design the components.
- 5) Prepare format for reports.

Motor Skills:

- 1) Prepare drawings for project.
- 2) Use of computer for drawing, networking.
- 3) Work in a group for a given task.
- 4) Prepare a report.

List of Projects:

Following are the areas of suggested civil engineering projects to be undertaken by a group of students. The project can be selected from the following civil engineering systems like

- Building construction system
- Transportation Engineering
- Irrigation Engineering
- Public health Engineering
- Management

The project report should preferably be in the following format:

- Topic and objectives.
- Collection of data.
- Literature Survey.
- Required survey work.
- Design of components.
- Preparation of required drawing, if any.
- Preparation of Estimate.
- Management and construction procedure.
- Resources scheduling and networking.
- Benefits to society.
- Conclusion.

List of Civil Engineering Projects:

- 1) K.T. Weir.
- 2) Lift Irrigation scheme.
- 3) Micro irrigation -Drip/Sprinkler Irrigation.
- 4) Junction planning for city roads/planning for roads for congested area/parking studies etc.
- 5) Watershed development of small catchments.
- 6) Rain water harvesting for domestic or public building.

- 7) Campus development.
- 8) Interior design and decoration.
- 9) Concrete mix design.
- 10) Bridge design.
- 11) Structural Audit
- 12) NDT of any RCC building.
- 13) Solid waste management.
- 14) Hospital waste disposal.
- 15) Recycling of resources.
- 16) Manufacturing of pre-cast concrete products.
- 17) Prestressed concrete.
- 18) Non conventional sources of energy.
- 19) Concrete pipe manufacturing unit.
- 20) Advance construction techniques.
- 21) Transfer of technology to villages.
- 22) Planning and design for residential apartments/commercial complex.
- 23) Planning and design of water treatment plant for given data.
- 24) Planning and design of water supply scheme for given layout.
- 25) Planning and design of sewage treatment plant for given data.
- 26) Planning and design of sanitary scheme for given layout.
- 27) Concrete materials.

Any other similar project can be selected.

Term Work: Shall consist of -- Detailed project report in above format.
Separate drawing sheets covering details of the project, if any shall also be prepared.

Learning Resources:

- 1) Civil Engineering Hand Books / Reference books.
- 2) Civil Engineering Magazines/Journals.
- 3) Relevant IS / International codes.
- 4) PWD Handbooks / M.I. Manuals.
- 5) Material/Machinery / Product Catalogues.
- 6) Related Websites for technological information.
- 7) www.projectreport.com
- 8) www.howstuffworks.com