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)
							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	--	--	--	--	--	--	
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	**50**
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	--	--	--	--	--	--	
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	**50**
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.

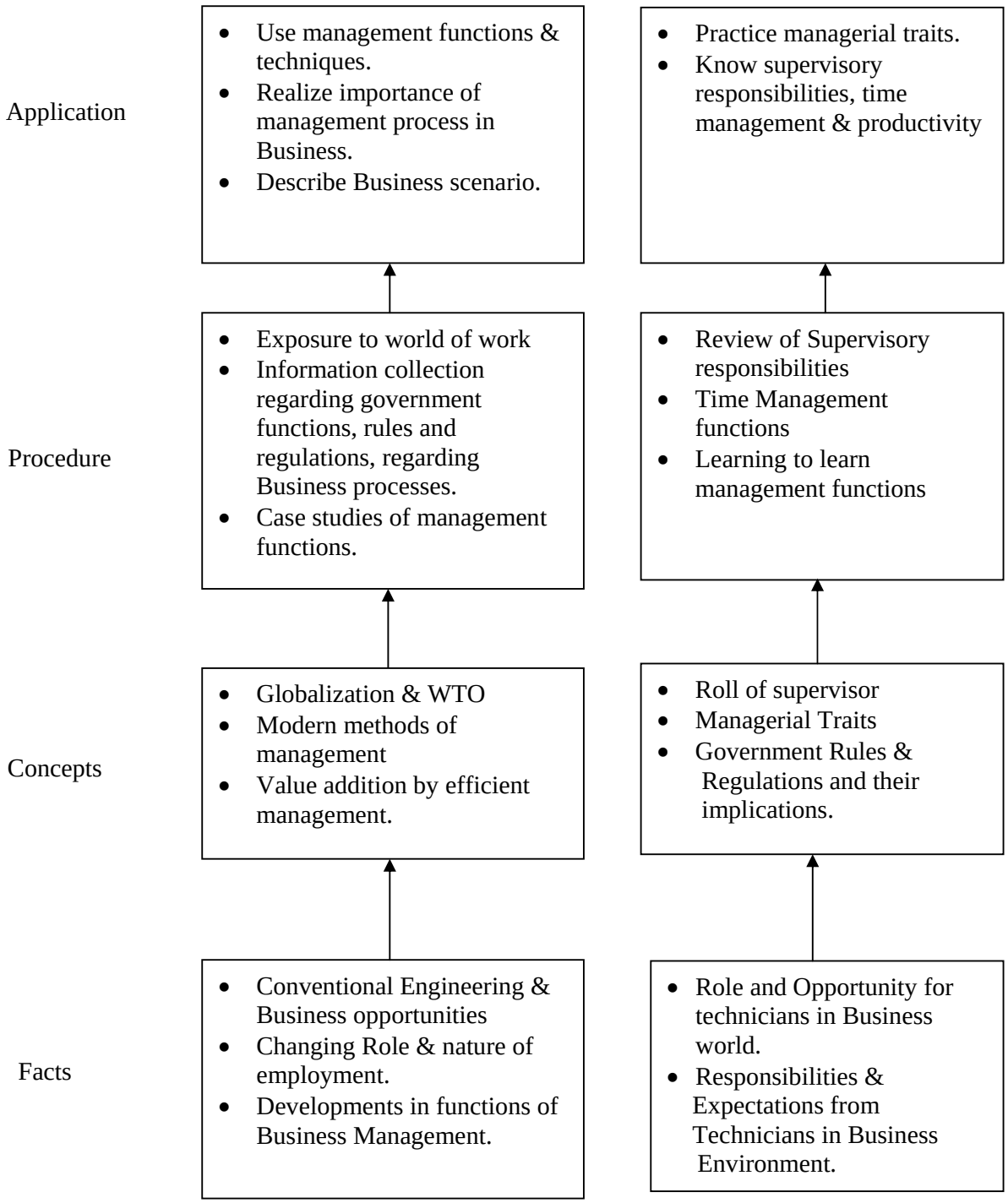
Contents of the this subject will enable the students to address various issues related to human resource, finance, materials, legislations etc. by use of basic principles of management. This will ensure that students will play their role effectively to enhance the quality of business output in total.

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
Topic 1: Overview of Business **Specific Objectives:** ➢ State various business types and sectors ➢ Describe importance of globalisation 1.1. Types of Business • Service • Manufacturing • Trade 1.2. Industrial sectors Introduction to • Engineering industry • Process industry • Textile industry • Chemical industry • Agro industry • IT industry • Banking, Insurance, Retail, Hospitality, Health Care 1.3 Globalization • Introduction • Advantages & disadvantages with respect to India	02	04
Topic 2: Management Process **Specific Objectives:** ➢ State various management principles ➢ Describe different management functions 2.1 What is Management? • Evolution • Various definitions of management • Concept of management • Levels of management • Administration & management • Scientific management by F.W.Taylor 2.2 Principles of Management (14 principles of Henry Fayol) 2.3 Functions of Management • Planning • Organizing • Directing • Controlling • Decision Making	08	08
Topic 3: Organisational Management **Specific Objectives:** ➢ Compare different forms of organisation , ownership for a specific business ➢ Describe types of departmentation 3.1 Organization : • Definition	08	08

• Steps in organization 3.2 Types of organization • Line • Line & staff • Functional • Project 3.3 Departmentation • By product • By process • By function 3.4 Principles of Organisation • Authority & Responsibility • Span of Control • Effective Delegation • Balance ,stability and flexibility • Communication 3.5 Forms of ownership • Proprietorship • Partnership • Joint stock • Co-operative Society • Govt. Sector		
Topic 4: Industrial Safety and Legislative Acts **Specific Objectives:** ➢ Describe types of accidents & safety measures ➢ State provisions of industrial acts. 4.1 Safety Management • Causes of accidents • Types of Industrial Accidents • Preventive measures • Safety procedures 4.2 Industrial Legislation - Necessity of Acts Important Definitions & Main Provisions of following acts: • Indian Factory Act • Workman Compensation Act • Minimum Wages Act	08	06
Topic 5: Financial Management (No Numerical) **Specific Objectives:** ➢ Explain functions of financial management ➢ State the sources of finance & types of budgets. ➢ Describe concepts of direct & indirect taxes. 5.1 Financial Management- Objectives & Functions 5.2 Capital Generation & Management • Types of Capitals - Fixed & Working • Sources of raising Capital - Features of Short term, Medium Term & Long Term Sources 5.3 Budgets and accounts • Types of Budgets	08	08

• 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. 5.4 Meaning & Examples of - • Excise Tax • Service Tax • Income Tax • Value Added Tax • Custom Duty		
Topic 6: Materials Management (No Numerical) **Specific Objectives:** ➢ Describe concept of inventory, ABC analysis & EOQ. ➢ Describe purchase functions & procedures ➢ State features of ERP & MRP 6.1 Inventory Concept, its classification, functions of inventory 6.2 ABC Analysis - Necessity & Steps 6.3 Economic Order Quantity Concept, graphical representation, determination of EOQ 6.4 Standard steps in Purchasing 6.5 Modern Techniques of Material Management • 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
Topic 7: Quality Management **Specific Objectives:** ➢ State Principles of Quality Management ➢ Describe Modern Technique & Systems of Quality Management 7.1 Meaning of Quality Quality Management System – Activities, Benefits Quality Control - Objectives, Functions, Advantages Quality Circle - Concept, Characteristics & Objectives Quality Assurance – Concept, Quality Assurance System 7.2 Meaning of Total Quality and TQM Components of TQM – Concept, Elements of TQM, Benefits 7.3 Modern Technique & Systems of Quality Management like Kaizen,5'S',6 Sigma 7.4 ISO 9001:2000 - Benefits, Main clauses.	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.

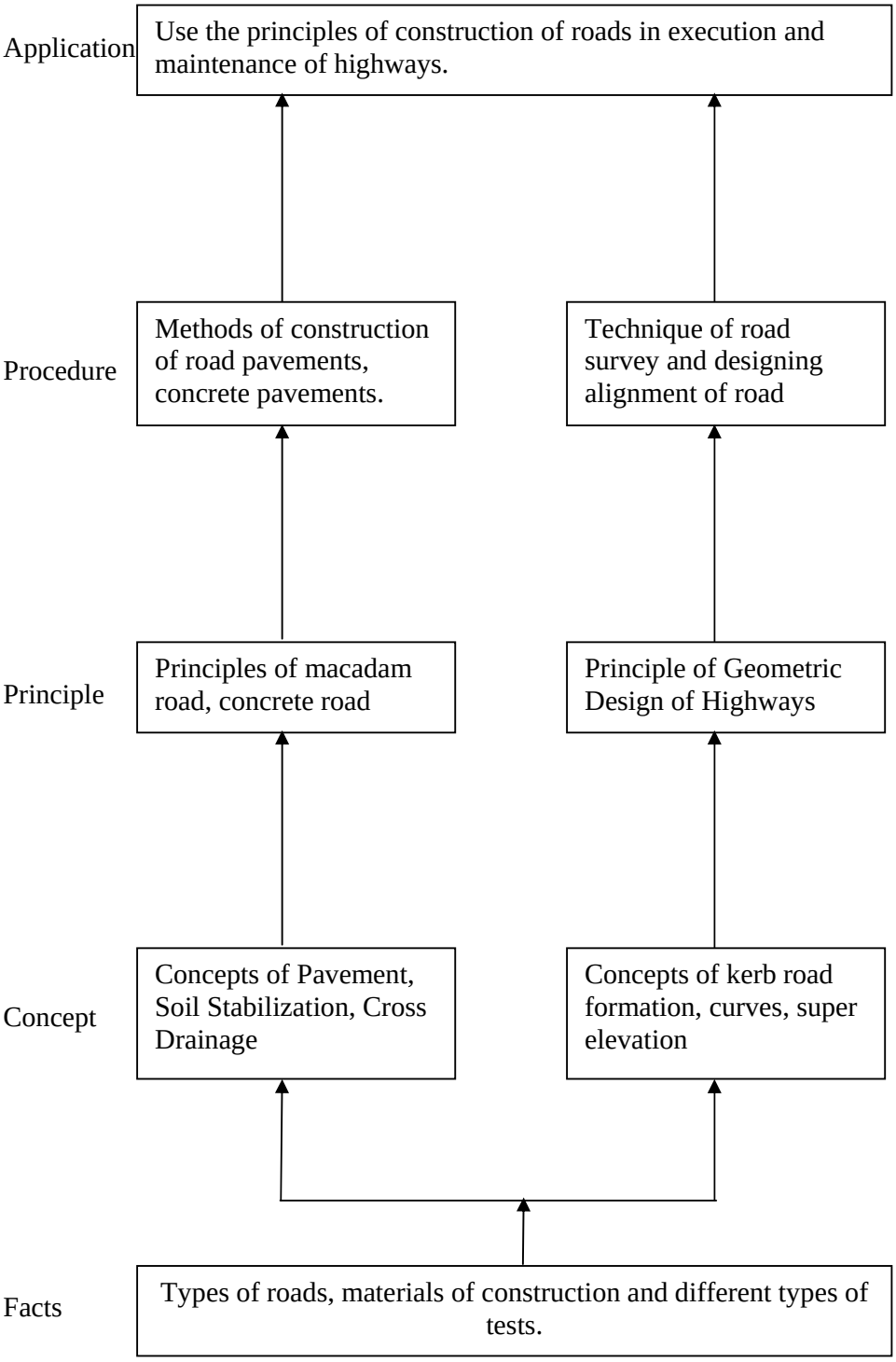
Diploma Engineering students have large scope in jobs as well as different Construction activities in Road Construction. This project gives the knowledge and skills required to carry out the survey, investigation, planning, design, construction and maintenance works related to Road Constructions.

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
Topic 01: Importance and Classification of Roads. **Specific Objectives :** ➢ State the importance of Transportation. ➢ List classification of Roads. **Contents :** • Importance of Transportation. • Different Modes of Transportation. • Classification of Roads. • Characteristics of Road Transport.	02	04
Topic 02: Investigation of Road Project **Specific Objectives :** ➢ Describe types of surveys ➢ Draw L section & C/S of roads. **Contents :** • 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
Topic 03: Geometric design of Roads. **Specific Objectives :** ➢ 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. **Contents :** • 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
Topic 04: Construction of Roads **Specific Objectives :** ➢ 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. **Contents :** • Types pf road materials - soil, aggregates, bitumen, cement concrete. • Pavement- objective, structures and functions of pavement	12	24

components, types of pavements rigid and flexible • 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.		
Topic 05: Traffic Engineering **Specific Objectives :** ➢ Define the traffic density, traffic capacity and traffic volume. ➢ State the traffic control devices. **Contents :** • Traffic Engg. Definition, Traffic characteristics. • PUC, Traffice 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
Topic 06 : Hill Roads **Specific Objectives :** ➢ Describe the procedure for the alignment and geometric of hill roads. ➢ Sketch the drainage structures in hill roads. **Contents :** • 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
Topic 07: Drainage and maintenance of roads. **Specific Objectives :** ➢ State the purpose of road drainage. ➢ State the importance and repairs of roads. **Contents :** • 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
Topic 08 : Earth Moving Equipments & High way Machineries **Specific Objectives :** ➢ List the different types of Excavating Equipments ➢ State the use and Working of Compacting Equipments. **Contents :**	10	16

• 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 () 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 it's 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
Topic: 1 Procedure of Execution of Work By P.W.D. **Specific objectives** ➢ State the meaning and purpose of administrative approval and technical sanction. ➢ Draw organization structure of p.w.d. **Contents** • 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
Topic: 2 Contracts **Specific objectives** ➢ State purpose of different types of contracts ➢ State Advantages, Disadvantages with suitability of each contract. **Contents** 2.1 …….04 • Definition of contract, Objects of contract, requirements of valid contract 2.2 Types of engineering contract with advantages and disadvantages ,their suitabilities ……..….10 • 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. 2.3 ……..06 • Classification of contractor, Registration of contractor, Built operate transfer (BOT) Project: Objectives, scope, advantages, disadvantages, examples.	14	20
Topic: 3 Tender and Tender Documents **Specific objectives** ➢ Draft tender Notice. ➢ State procedure of submitting tender documents. **Contents** 3.1 ……..12 • 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. 3.2 Tender documents ……08 • 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
termination of contract, suspension of work, subletting of contract, extra items, escalation, arbitration, price variation clause, defect liability Period, liquidated and unliquidated damages. • 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.		
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) • 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) • 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.	06	16
Topic: 5. Specification **Specific objectives** ➢ Prepare detail specifications of various items ➢ Write the rules for specification writing. **Contents** • 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.	08	12
Topic: 6.Valuation **Specific objectives** ➢ State factors affecting value of property. ➢ Calculate the capitalized value. **Contents** 6.1 ……..08 • 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. 6.2 ……..12 • Depreciation, Obsolescence, Sinking Fund. Methods of Calculation of Depreciation – Straight Line Method, Sinking Fund Method, Constant Percentage Method Quantity Survey Method.	16	20

Topic and Contents	Hours	Marks
• 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 od 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.

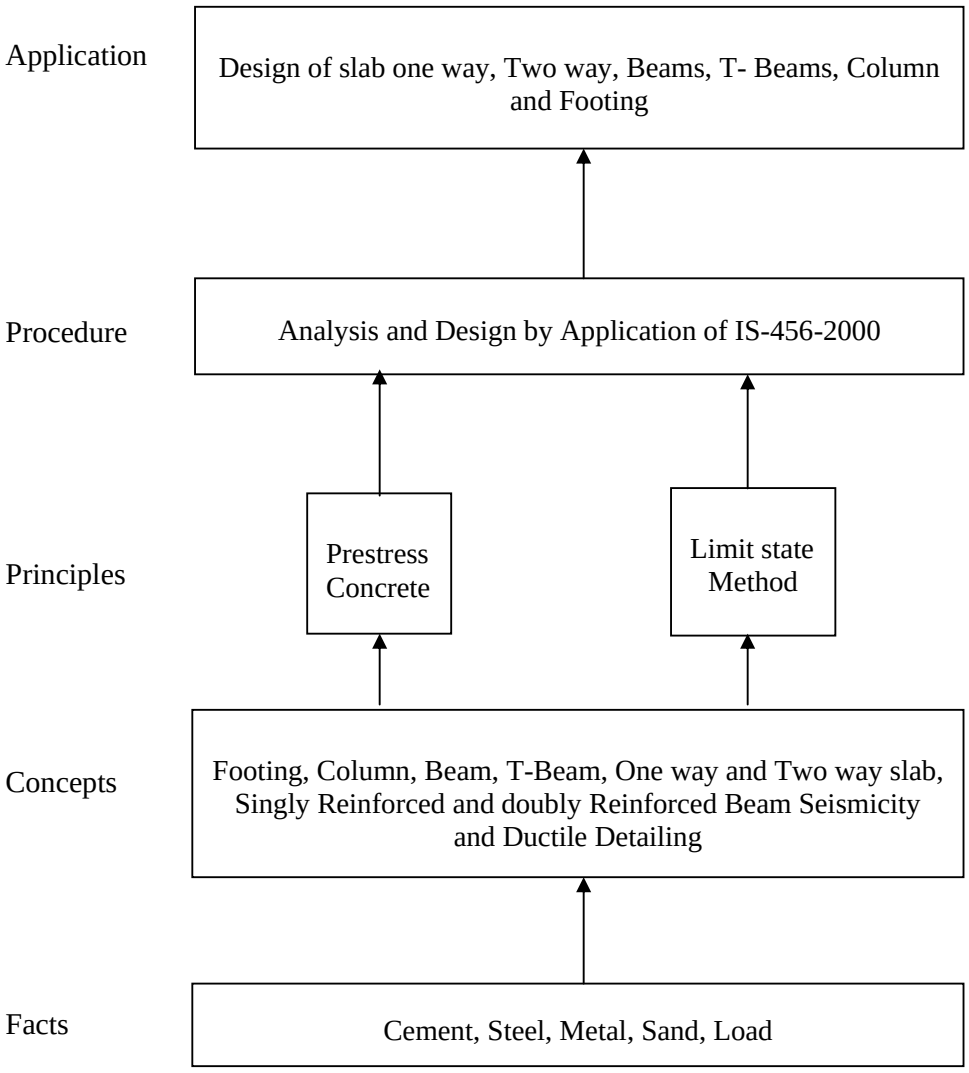
Thus the contents of the subject will be useful to the diploma technician in effective supervision and quality control on site.

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
Topic 1 : Introduction to Limit State Method **Specific Objectives** : ➢ State purpose of reinforcement in RCC ➢ Define limit states ➢ Enlist various types of loads on structures **Content:** • 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
Topic 2 : Analysis and Design of Singly Reinforced Rectangular Sections by Limit State Method **Specific Objectives** : ➢ Draw strain and stress diagrams ➢ Calculate design constants and ultimate moment of resistance ➢ Design balanced and under-reinforced singly reinforced rectangular sections **Content :** • 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
Topic 3 : Analysis and Design of Doubly Reinforced Rectangular Sections by Limit State Method **Specific Objectives**: ➢ 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 **Content :** • 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		
Topic 4 : Analysis and Design of Flanged Beams by Limit State Method **Specific Objectives** : ➢ Calculate effective flange width ➢ Determine ultimate moment of resistance ➢ Design flanged beam by carrying out load analysis **Content :** • 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 Resistence for the case of neutral axis in the flange only.	06	12
Topic 5: Shear and Bond by Limit State Method **Specific Objectives** : ➢ Calculate ultimate shear strength of beam ➢ Design beam for shear ➢ Draw reinforcement detailing diagram for shear ➢ Apply check for bond to beams and slabs **Content :** **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 **5.2 Bond:** … (04 Marks) Meaning of bond in RCC. IS code provisions. Meaning and calculation development length in tension and compression.	06	12
Topic 6 : Design of Slabs by Limit State Method **Specific Objectives** : ➢ Decide type of slab from the given plan ➢ Design various types of slabs ➢ Draw reinforcement detailing diagram for slabs **Content :** • 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
Topic 7: Design of Columns and Footings by Limit State Method **Specific Objectives** : ➢ Calculate ultimate load carrying capacity of a given axially loaded	06	16

column ➢ Design a column and draw reinforcement detailing ➢ Design isolated sloped footing and draw reinforcement detailing **Content :** **7.1 Axially Loaded Short Columns** … (12 Marks) • 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. **7.2 Axially Loaded Footings** … (04 Marks) • 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)		
Topic 8 : Seismicity and Ductile Detailing **Specific Objectives** : ➢ Define basic terms in seismicity ➢ Draw ductile detailing diagrams for common RCC members as per IS:13920-2002 **Content :** • 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**
Topic 9 : Introduction to Prestressed Concrete **Specific Objectives :** ➢ Compare prestressed concrete with RCC ➢ Distinguish between pre-tensioning and post-tensioning ➢ Enlist losses of prestress **Content :** ▪ 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 PowePoint 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 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 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
Topic 1: Introduction **Specific objectives :** ➢ 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 **Content :** • 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
Topic 2: Storage, Collection and Transportation of Municipal Solid Waste. **Specific Objectives :** ➢ 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. **Content :** • 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
Topic 3 : Disposal of Solid Waste **Specific objectives** : ➢ List the types of disposal of solid waste ➢ Describe the process of composting. ➢ Describe the process of land filling. ➢ Describe the process of incineration. **Content :** 3.1 Composting of waste …….. 08 • Principles of composting process • Factors affecting on composting process	12	24

• Methods of composting - A) Manual Composting - Bangalore method, Indore Method B) Mechanical Composting - Dano Process C) Vermicomposting- Concept 3.2. Land filling technique **……** 08 • 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 3.3 Incineration of waste …….. 08 • 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		
Topic 4: Special Types of Solid Wastes. **Specific Objectives :** ➢ List various types of special waste. ➢ Describe method of collection and disposal of biomedical waste, E-waste and industrial waste. **Content:** 4.1 Biomedical Waste …….. 06 • Definition of Biomedical Waste • Sources and generation of Biomedical Waste • Classification of Biomedical Waste Management technologies. 4.2 E-waste ……..06 • Definition of E- waste • Varieties of E- waste • Dangers of E- waste • Disposal of E- waste • Recycling of E- waste 4.3 Industrial waste …….06 • Variety of industrial waste • Collection of disposal of industrial waste • Control measures of industrial waste. • Recycling of industrial waste. 4.4 Biomedical waste ……..06 Biomedical waste management & handling as per rule 1998.	12	24
Topic 5: Health aspect and public Involvement in solid waste management **Specific Objectives:** ➢ Know health aspect during handling and processing. ➢ State stages for public involvement **Content :** • Health aspect during handling and processing • Health problem during time of segregation, reuse, recovery, recycling of solid waste.	04	10

• Public Involvement and participation in Solid waste management.		
Topic 6: Recycling of Solid Waste **Specific objectives :** ➢ Describe the process of recycling ➢ State marketing strategies for recyclables. ➢ Planning, Designing and implementation of recycling program. ➢ State benefits of recycling. **Content :** • 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 repot 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 photo10cmx12cm)
(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/muncipal/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).

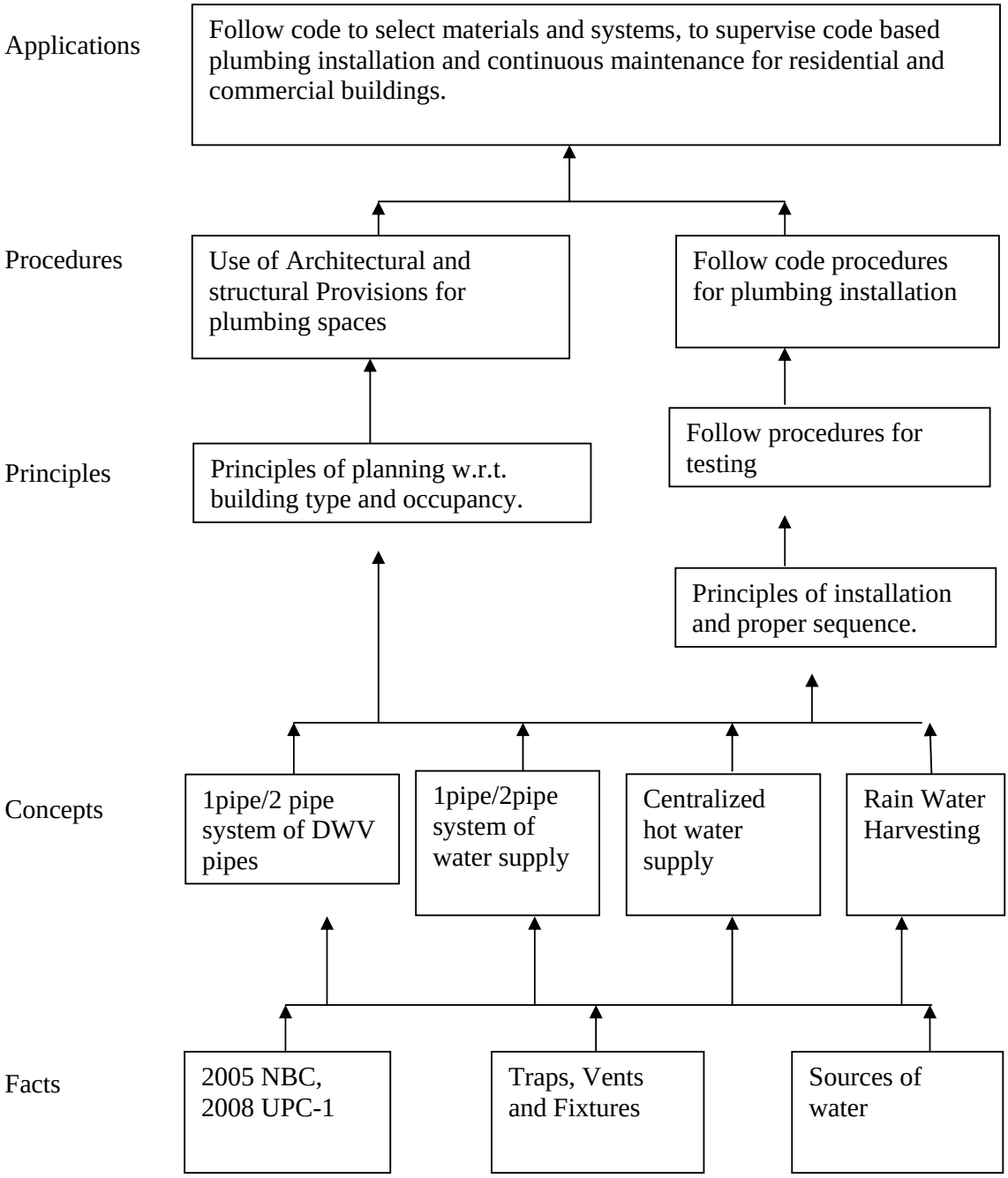
Need of proper use of Plumbing code must be code based education and training in Plumbing will have better job opportunities and improved income. The formal education in Plumbing will improve the plumbing system design and installation standards, thereby ensuring health and safety of people, structure 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
Topic 1: Introduction to Codes, Architectural and Structural Coordination. **Specific objectives:** ➢ Use relevant Code (UPC – 2008). ➢ Maintain proper coordination amongst different agencies. ➢ Select proper materials for plumbing. ➢ Follow local municipal laws. **Contents:** **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. **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.	04	10
Topic 2 : Plumbing Terminology **Specific objectives:** ➢ 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. **Contents:** Definition , use/ Location purpose and sketches of the following **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 **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. **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. **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.	06	16
Topic 3: Plumbing Fixtures and Fixture Fittings. **Specific objectives :**	08	14

➢ 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. **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		
Topic 4: Traps, Interceptors, Indirect Waste and Vents. **Specific objectives :** ➢ 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. **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.	10	20
Topic 5: Sanitary drainage and storm drain. **Specific objectives :** ➢ 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. **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.	10	20

5.2: ---------- 10 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.		
Topic 6: Water Supply, Gray and Reclaimed Water **Specific objectives:** ➢ 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. **Contents :** **6.1: ----------12** 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. **6.2: ----------08** 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.	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)
- 20080Illustrated 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

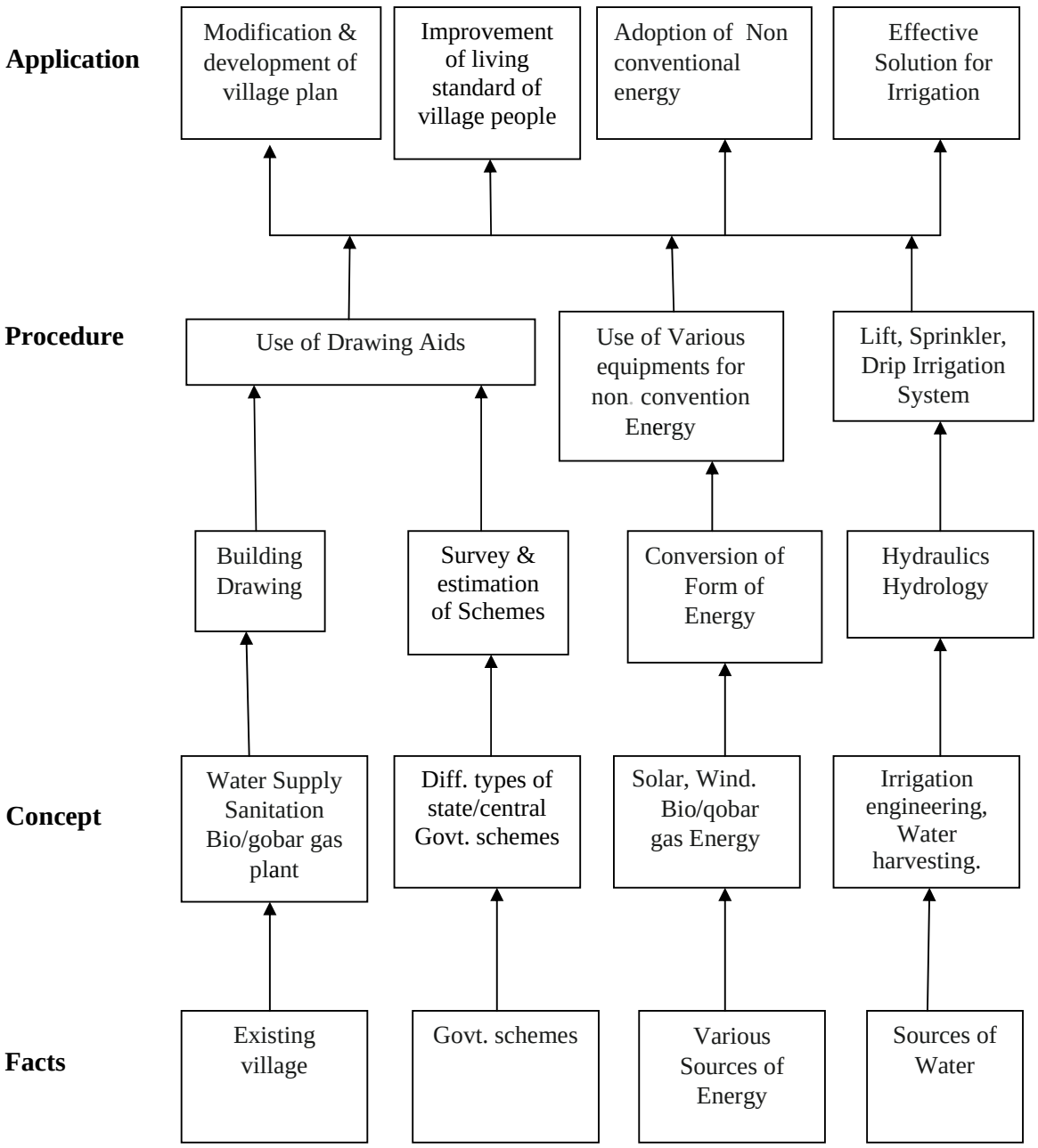
Rationale:

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
Topic 1: Introduction • 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.
Topic 2: Water shed management • 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
Topic 3: Irrigation Systems • Purpose • Types Drip irrigation, sprinkler irrigation, Lift irrigation • Sample layout, component parts, its effects
Topic 4: Cottage Industry • Importance of cottage industry in rural development E.g. Brick Manufacturing, cement block/ concrete block manufacturing. brief process, its impact
Topic 5: Different types of central Govt. and state Govt. Schemes • Need of Different types of schemes. • Role of civil Engg. Student in the development of rural area. • Different Schemes (The provisions- and purpose/ use) – Indira Awas Yojana – Swajal Dhara Yojana – Jawahar Well Yojana
Topic 6: Non conventional energy • 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 @ o.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.

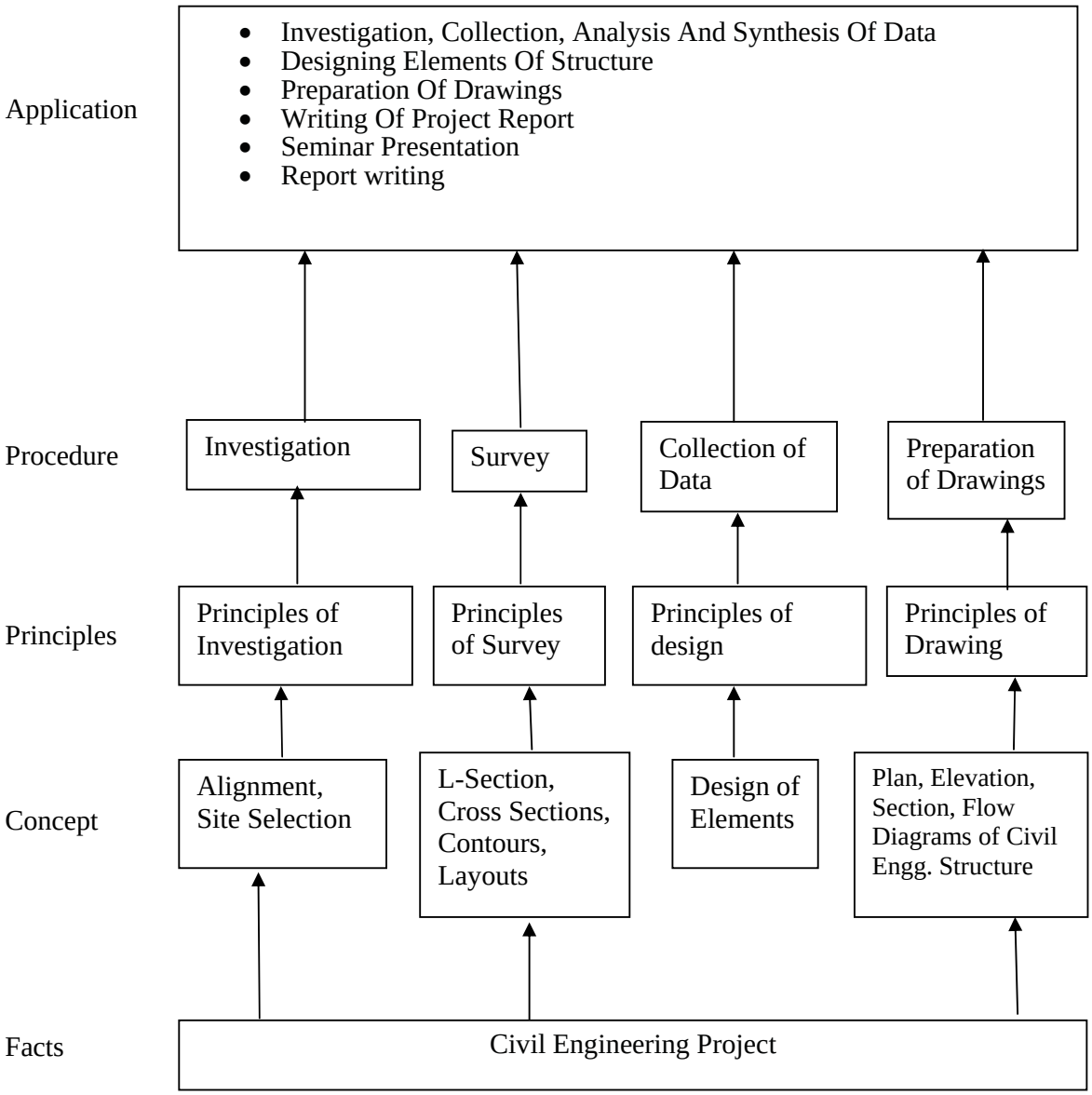
The project and seminar activities will provide students the exposure to handle real life problems and their solutions and prepare him/her to enter confidently in the world of work.

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