
 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES																	
COURSE NAME : DIPLOMA IN CIVIL ENGINEERING																	
COURSE CODE : CC																	
DURATION OF COURSE : EIGHT SEMESTERS										WITH EFFECT FROM 2013-14							
SEMESTER : SEVENTH										DURATION : 16 WEEKS							
PATTERN : CORRESPONDANCE - SEMESTER										SCHEME : G							
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17907)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Design of Steel Structures	DSS	21001	07	01	22	04	100	40	--	--	--	--	50@	20	50	
2	Public Health Engineering	PHE	21002	06	01	22	03	100	40	--	--	--	--	25@	10		
3	Contracts & Accounts	CAA	21003	07	01	22	03	100	40	--	--	--	--	25@	10		
4	Rural Engineering	REN	21004	05	--	26	--	--	--	--	--	--	--	50@	20		
Total				25	03	92	--	300	--	--	--	--	--	150	--	50	
TOTAL CONTACT HOURS DURING RESIDENT SESSION: 120 HRS [15 days * 8 hrs per day]																	
Total Marks : 500																	
@ Internal Assessment, # External Assessment, No Theory Examination, * Online Examination.																	
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.																	
NOTE:																	
1. HOURS MARKED BY * FOR INTERNAL PRACTICAL EXAMINATION TO BE CONDUCTED AT RESSIDENT SESSION.																	
2. ONE TEST OF 25 MARKS TO BE CONDUCTED AT RESIDENT SESSION AND MARKS TO BE SUBMITTED TO GPDL PUNE.																	
3. 240 HOURS FOR SELF STUDY AT HOME.																	
4. ALL PRACTICALS/ORAL EXAMS [EXTERNAL ASSESSMENT INDICATED BY #] TO BE CONDUCTED AT EXAM CENTRE.																	
5. ORAL EXAMINATION [INTERNAL ASSESSMENT @] TO BE CONDUCTED AT EXAM CENTRE.																	
6. INTERNAL ASSESSMENT @ OF TERM WORK WILL BE DONE AT RESIDENT SESSION.																	

 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES																	
COURSE NAME : DIPLOMA IN CIVIL ENGINEERING																	
COURSE CODE : CI																	
DURATION OF COURSE : EIGHT SEMESTERS										WITH EFFECT FROM 2013-14							
SEMESTER : SEVENTH										DURATION : 16 WEEKS							
PATTERN : PART TIME - SEMESTER										SCHEME : G							
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17907)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Design of Steel Structures	DSS	21001	03	--	02	04	100	40	--	--	--	--	50@	20	50	
2	Public Health Engineering	PHE	21002	03	--	02	03	100	40	--	--	--	--	25@	10		
3	Contracts & Accounts	CAA	21003	04	--	02	03	100	40	--	--	--	--	25@	10		
4	Rural Engineering	REN	21004	01	--	02	--	--	--	--	--	--	--	50@	20		
Total				11	--	08	--	300	--	--	--	--	--	150	--	50	

Student Contact Hours Per Week: **19 Hrs.**
THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.
Total Marks : **500**
@ Internal Assessment, # External Assessment, No Theory Examination, * Online 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 : Diploma in Civil Engineering

Course Code : CI / CC

Semester : Seventh

Subject Title : Design of Steel Structure

Subject Code : 21001

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.

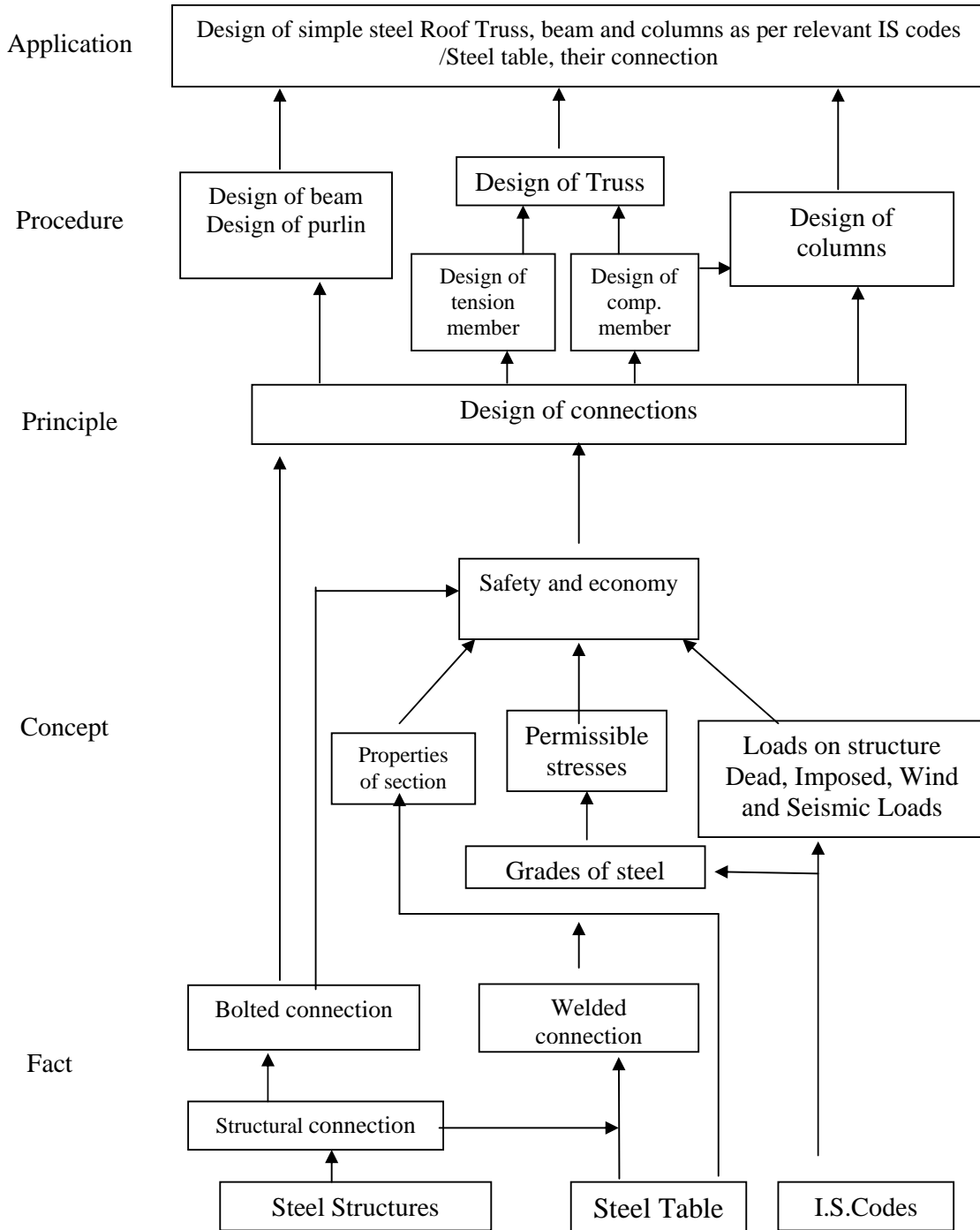
General Objectives:

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> <p>➤ State different types of steel sections used for compression members</p> <p>➤ Analyze and design compression member connected by bolted and welded joints</p> <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> <p>➤ List different sections used for beams.</p> <p>➤ Draw loading, shear force and bending moment diagram developed in beam due to udl</p> <p>➤ Analyze and design of simple beam sections subjected to udl</p> <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 consists of sketchbook and design report of steel roof truss for an industrial building, two full imperial size sheet shall be used for drawings.

List of Practicls:

1. Overview of commonly used steel structures from models, charts, internet, photographs and actual structures.

2. Understand standard rolled steel sections and use of steel table to determine their properties.
3. Understand the salient provisions of I.S. 800 – 2007
4. Understand salient provisions of I.S. 875 – 1987 and I.S.1893 – 2002
5. Perform analysis of loads on roof truss as per I.S.875 – 1987
6. Determine axial forces in the members of roof truss using graphical method.
7. Design members of steel roof truss as per I.S.800 – 2007
8. Design connections for members and supports of the roof truss as per I.S.800 – 2007.
9. Prepare detailed drawing of designed steel roof truss.
10. Understand the erecting procedure of steel structure.
11. Understand professional structural drawing of a steel structure.

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 : Diploma in Civil Engineering

Course Code : CI / CC

Semester : Seventh

Subject Title : Public Health Engineering

Subject Code : 21002

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).**

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.

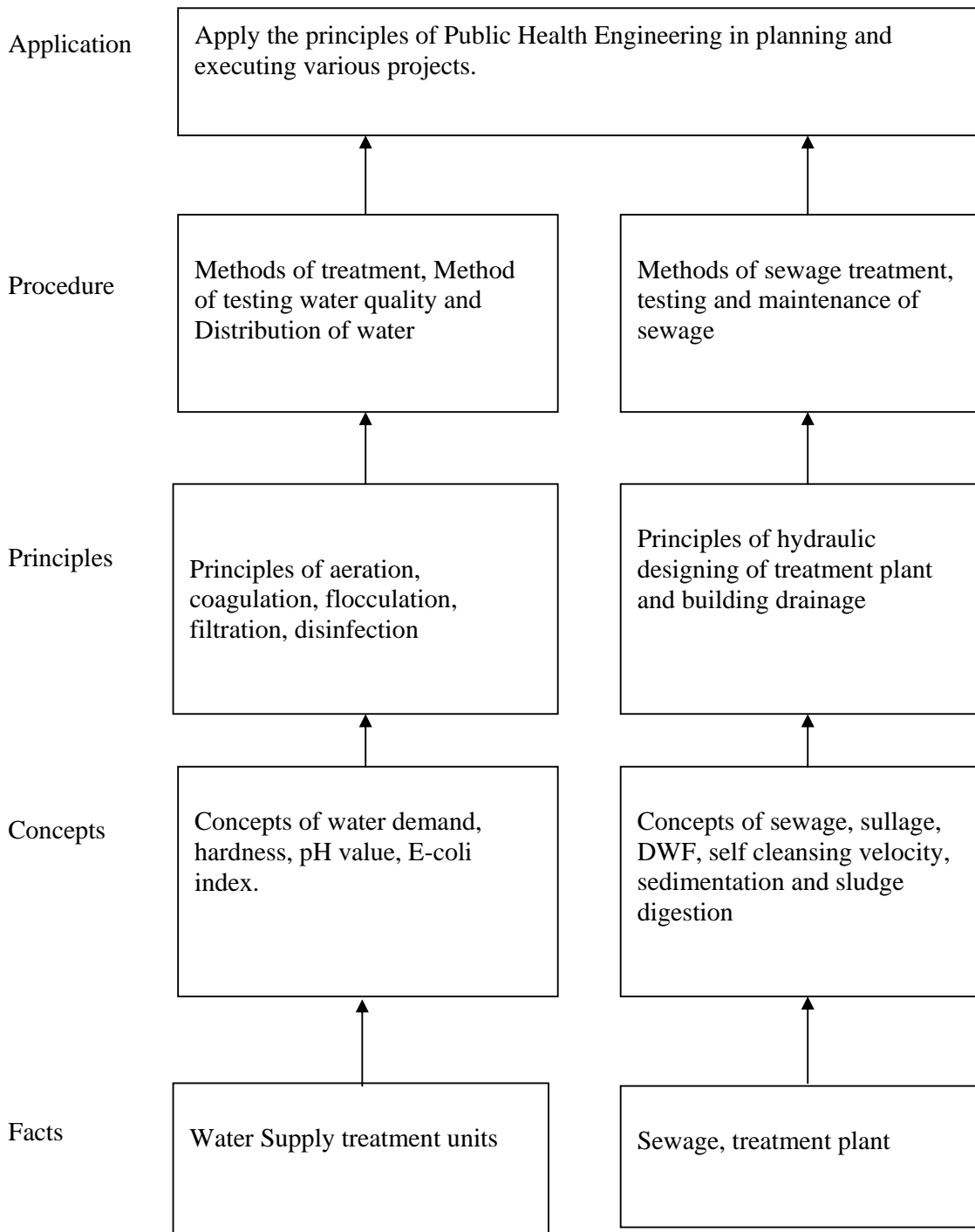
Emerging trends in sanitation and water supply will provide latest know to the students. Thus the subject will be helpful in bringing up general public health to desired safe level in respect of water supply and disposal of waste.

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, 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

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:

1. Determine the p^H of a given water and wastewater sample by using digital p^H meter.
2. Determine the turbidity of a given sample by using Jackson turbidity meter / Nephelometric turbidity meter.
3. Determine the residual chlorine of given water sample by using chloroscope (Orthotolidine test)
4. Determine suspended solids, dissolved solids and total solids in water sample/waste water sample.
5. Determine the dissolved oxygen in a given water and wastewater sample by using digital D.O. meter or titration method (winker method)
6. Understand the erecting procedure of steel structure. Understand professional structural drawing of a steel structure. Determine the optimum dose of coagulant (alum) in the given sample of raw water by jar test.
7. Determine the biochemical oxygen demand (BOD, at 20^0c) of given sample of wastewater.
8. Determine the chemical oxygen demand (COD) of given wastewater sample by using COD reflux apparatus.
9. a) Demonstration of water purifier on the basis of its components and working, (Aqua guard).
b) Study softeners and contents of mineral water
10. a) Visit water treatment plant and write a report on it.
b) Visit sewage treatment plant and write a report on it.

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 : Diploma in Civil Engineering

Course Code : CI / CC

Semester : Seventh

Subject Title : Contracts and Accounts

Subject Code : 21003

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	02	03	100	--	--	25@	125

NOTE:

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

Rationale:

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
<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, 	14	20

Topic and Contents	Hours	Marks
<p>time extension, penalty, defective material and workmanship, 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</p> <ul style="list-style-type: none"> ➤ State the use of Measurement book and Nominal muster roll. ➤ State different modes of payments and their use. <p>Contents</p> <p>4.1 Various account forms and their uses -----.(08)</p> <ul style="list-style-type: none"> • Measurement Books, Nominal Muster Roll, Imprest Cash, Indent, Invoice, Bills, Vouchers, Cash Book, Temporary Advance. Heads of Accounts. <p>4.2 Mode of Payment to the contractor- -----(08)</p> <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. 	06	16
<p>Topic: 5. Specification Specific objectives</p> <ul style="list-style-type: none"> ➤ Prepare detail specifications of various items ➤ Write the rules for specification writing. <p>Contents</p> <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. 	08	12
<p>Topic: 6.Valuation Specific objectives</p> <ul style="list-style-type: none"> ➤ State factors affecting value of property. ➤ Calculate the capitalized value. <p>Contents</p> <p>6.108</p> <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. <p>6.212</p> <ul style="list-style-type: none"> • Depreciation, Obsolescence, Sinking Fund. Methods of Calculation of Depreciation – Straight Line Method, Sinking Fund Method, 	16	20

Topic and Contents	Hours	Marks
Constant Percentage Method Quantity Survey Method. • 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 : Diploma in Civil Engineering**Course Code : CI / CC****Semester : Seventh****Subject Title : Rural Engineering****Subject Code : 21004****Teaching and Examination Scheme:**

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

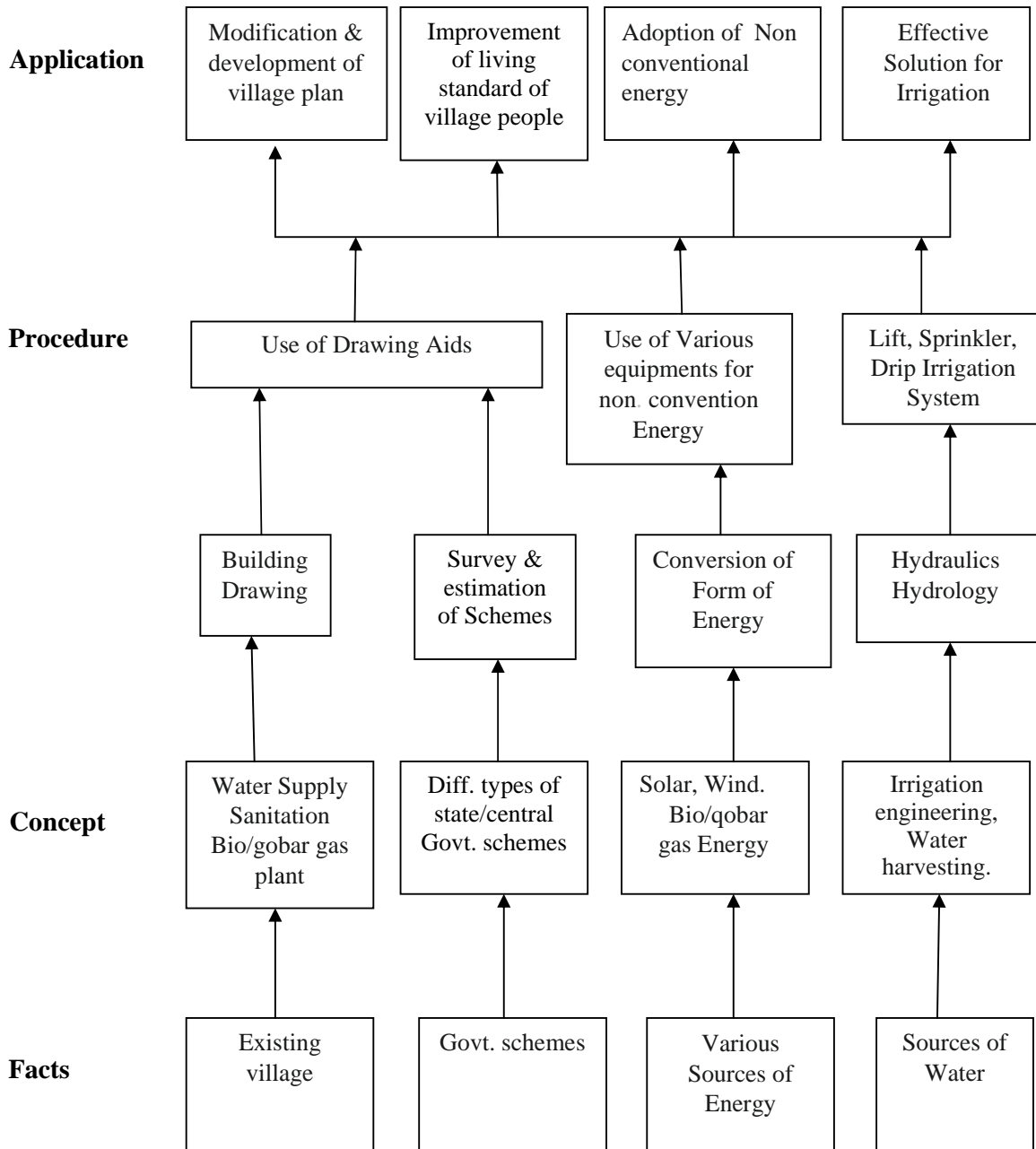
Rationale:

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 Hecter'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