Semester I												
Course Code	**Course**	**Teaching Scheme Hours / Week**			**Semester Examination Scheme of Marks**						**Credit**	
		Theory (TH)	**Tutorials (TUT)**	**Practical (PR)**	**In-Sem**	**End-Sem**	**TW**	**PR**	**OR**	**Total**	**TH / TUT**	**PR/OR/ TW**
201001	Building Technology and Materials	04	--	02	50	50	50	--	--	150	04	01
207001	Engineering Mathematics III	04	01	--	50	50	50	--	--	150	05	
201006	Surveying	04	--	02	50	50	--	50	--	150	04	01
201002	Strength of Materials	04	--	02	50	50	--	--	50	150	04	01
201003	Geotechnical Engineering	04	--	02	50	50	--	--	50	150	04	01
	Audit Course 1 Awareness to Civil Engineering Practices	--	--	--	--	--	--	--	--	--	Grade	
Total		**20**	**01**	**08**	**250**	**250**	**100**	**50**	**100**	**750**	**25**	

Note: For audit courses students are given certificate by the institutes based on the assignment submitted bythem.

Abbreviations: TW: Term Work, **OR:** Oral, **PP:** Passed (Only for non credit courses), **NP:** Not Passed (Only for non credit courses).

Savitribai Phule Pune University, Pune

S.E. (Civil Engineering) 2015 Course

Awareness to Civil Engineering Practices

Audit Course

(Certificate to be issued by institute based on performance assessment)

Civil Engineering is the oldest engineering profession comprising of a variety of sub-disciplines such as structural engineering, geotechnical, water resources, environmental engineering, construction, transportation etc. Undergraduate programmes are designed with different theoretical approaches on the application of basic sciences to solve different societal problems by engineering knowledge. However, there is a need to make the students aware about how the Civil Engineering industry operates and how theories taught in different courses are applied in practice. The students can learn from the experience gained from different workplaces such civil engineering consultancies, contracting companies, construction sites etc. The course aims to provide insight of the different practices followed by the industry such use of different contracts in civil engineering practice, local by-laws, duties and responsibilities of the Engineers, site records and diaries, Health and Safety practices on site, etc.

Course Objectives:

1) To provide basic overview of functioning of different civil engineering related industries / firms.
2) To provide awareness on application of different drawings, contract documents in civil engineering.
3) To provide insight of code of ethics, duties and responsibilities as a Civil Engineer.

Course Outcomes:

On completion of the course, learner will be able to understand

1) Different types of civil engineering industries and their functioning.
2) Applications of different documents, drawings, regulations in Civil Engineering industries.
3) Code of ethics to be practiced by a Civil Engineer and understand duties and responsibilities as a Civil Engineer
4) Different safety practices on the site.

Course Contents

1. Awareness lectures by professionals.
2. Visit to construction site/ architectural firms/ structural engineering firms etc.
3. Discuss on issues such as sustainability, eco-friendly techniques, use of locally available materials etc. directly related to techno economic development of society.

Savitribai Phule Pune University
S.E. (Civil Engineering) 2015 Course

Semester II													
Course Code	**Course**	**Teaching Scheme Hours / Week**			**Semester Examination Scheme of Marks**						**Credit**	
		Theory (TH)	**Tutorials (TUT)**	**Practical (PR)**	**In-Sem**	**End-Sem**	**TW**	**PR**	**OR**	**Total**	**TH / TUT**	**PR/OR/ TW**
201004	Fluid Mechanics I	04	--	02	50	50	--	--	50	150	04	01
201005	Architectural Planning and Design of Buildings	04	--	02	50	50	--	50	--	150	04	01
201008	Structural Analysis I	03	01	--	50	50	--	--	--	100	04	--
207009	Engineering Geology	04	--	02	50	50	50	--	--	150	04	01
201007	Concrete Technology	04	--	02	50	50	--	--	50	150	04	01
201010	Soft Skill	--		02	--	--	50	--	--	50	--	01
	Audit Course 2 Road Safety Management	--	--	--	--	--	--	--	--	--	Grade	
		19	**01**	**10**	**250**	**250**	**100**	**50**	**100**	**750**	**25**	

Note: For audit courses students are given certificate by the institutes based on the assignment submitted bythem.

Abbreviations: TW: Term Work, **OR:** Oral, **PP:** Passed (Only for non credit courses), **NP:** Not Passed (Only for non credit courses).

Savitribai Phule Pune University, Pune

S.E. (Civil Engineering) 2015 Course

201010: Soft Skill

Credits: 01

Teaching Scheme:
Practical: 02 hrs/week

Examination Scheme:
Term Work : 50 Marks

Prerequisites: Basic communication and writing skills in English.

Course Objectives:

1) To help the students in building interpersonal skills.
2) To develop skill to communicate clearly.
3) To enhance team building and time management skills.
4) To learn active listening and responding skills.

Course Outcomes:

On completion of the course, learner will be able to:

1) Make use of techniques for self-awareness and self-development.
2) Apply the conceptual understanding of communication into everyday practice.
3) Understand the importance of teamwork and group discussions skills.
4) Develop time management and stress management.
5) Apply business etiquette skills effectively an engineer requires.

Course Contents

UNIT I: Self Awareness & self Development (04 hrs)

a) Self Awareness: Self Assessment, Self Appraisal, SWOT, Goal setting: Personal & career: Self Assessment, Self-Awareness, Perceptions and Attitudes, Positive Attitude, Values and Belief Systems, Self-Esteem, Self appraisal, Personal Goal setting.

b) Self Development: Career Planning, Personal success factors, Handling failure, Depression and Habit, relating SWOT analysis & goal setting, prioritization.

UNIT II: Communication Skill **(06 hrs)**

a) Communication: Importance, types, barriers of communication, effective communication.

b) Speaking Skills: Public Speaking, Presentation skills, Group discussion: Importance of speaking effectively, speech process, message, audience, speech style, feedback, conversation and oral skills, fluency and self expression, body language phonetics and spoken English, speaking techniques, word stress, correct stress patterns, voice quality, correct tone, types of tones, positive image projection techniques.

c) Listening Skills: Law of nature: you have 2 ears and 1 tongue so listen twice and speak once is the best policy, Empathic listening, and Avoid selective listening.

d) Group Discussion: characteristics, subject knowledge, oral and leadership skills, team management, strategies and individual contribution and consistency.

e) Presentation skills: planning, preparation, organization, delivery.

f) Written Skills: Formal & Informal letter writing, Report writing, Resume writing: Sentence structure, sentence coherence, emphasis. Paragraph writing. Letter writing skills: form and structure, style and tone. Inquiry letters, Instruction letters, complaint letters, Routine business letters, Sales Letters etc.

UNIT III: Corporate / Business Etiquettes **(02 hrs)**

a) Corporate / Business Etiquettes: Corporate grooming & dressing, Email & telephone etiquettes, etiquettes in social & office setting: Understand the importance of professional behaviour at the work place, Understand and Implement etiquettes in workplace, presenting oneself with finesse and making others comfortable in a business setting.

b) Importance of first impression, Grooming, Wardrobe, Body language, Meeting etiquettes (targeted at young professionals who are just entering business environment) , Introduction to Ethics in engineering and ethical reasoning, rights and responsibilities.

UNIT IV: Interpersonal relationship **(04 hrs)**

a) Team work: Team effectiveness, Group discussion, Decision making : Team Communication. Team, Conflict Resolution, Team Goal Setting, Team Motivation Understanding Team Development, Team Problem Solving, Building the team dynamics. Multicultural team activity.

b) Group Discussion (GD): Preparation for a GD, Introduction and definitions of a GD, Purpose of a GD, Types of GD, Strategies in a GD , Conflict management, Do’s and Don’ts in GD.

UNIT V: Leadership skills **(02 hrs)**

a) Leadership: Leaders' role, responsibilities and skill required - Understanding good Leadership behaviors, Learning the difference between Leadership and Management, Gaining insight into your Patterns, Beliefs and Rules.

b) Leadership Qualities: Defining Qualities and Strengths of leadership, Determining how well you perceive what's going on around you, interpersonal Skills and Communication Skills, Learning about Commitment and How to Move Things Forward, Making Key Decisions, Handling Your and Other People's Stress, Empowering, Motivating and Inspiring Others, Leading by example, effective feedback.

UNIT VI: Other skills **(02 hrs)**

a) Time management: The Time management matrix, apply the Pareto Principle (80/20 Rule) to time management issues, to prioritise using decision matrices, to beat the most common time wasters, how to plan ahead, how to handle interruptions , to maximize your personal effectiveness, how to say "no" to time wasters, develop your own individualized plan of action.

b) Stress management: understanding the stress & its impact, techniques of handling stress

c) Skills: Problem solving skill, Confidence building Problem solving skill, Confidence building.

Books:

Text:

1. Communication Skills by Sanjay Kumar and Pushpa Lata, Oxford University Press.
2. Developing Communication Skill by Krishna Mohan, Meera Banerji, McMillan India Ltd.
3. English for Business Communication by Simon Sweeney, Cambridge University Press.

Savitribai Phule Pune University

Syllabus for SE (Civil Engineering) 2019 course

(To be implemented from June 2020)

Board of Studies in Civil Engineering
Faculty of Science and Technology SPPU Jun 2020

SE Civil

Savitribai Phule Pune University, Pune SE(Civil Engineering) 2019 Course (With effect from Academic Year 2020-21)														
Semester-III														
Course Code	**Course Name**	**Teaching Scheme (Hours/Week)**			**Examination Scheme and Marks**						**Credit**			
		Theory	**Practical**	**Tutorial**	**IN-Sem**	**End-Sem**	**TW**	**PR**	**OR**	**Total**	**TH**	**PR**	**TUT**	**Total**
201001	Building Technology and Architectural Planning	03	-	-	30	70	--	-	-	100	03	--	--	03
201002	Mechanics of structure	03	-		30	70		-	-	100	03	-	-	03
201003	Fluid Mechanics	03	-	-	30	70	-	-	-	100	03	-	-	03
207001	Engineering Mathematics III	03	--	01	30	70	25	--	--	125	03		01	04
207009	Engineering Geology	03	-	-	30	70	-	-	-	100	03	-	-	03
201004	Building Technology and Architectural Planning **Lab**	-	04	-	-	-	50		-	50	-	02	-	02
201005	Mechanics of structure **Lab**	-	04	-	-	-	-	-	50	50	-	02	-	02
201006	Fluid Mechanics **Lab**	-	02	-	-	-	-		50	50		01		01
207010	Engineering Geology **Lab**	-	02	-	-	-	25		-	25	-	01	-	01
201007	**Audit Course 1 Awareness to civil Engineering Practices / Road Safety Management / Foreign Language**	--	01	-	-	Grade	-	-	-	Grade	--	--	-	--
Total		15	13	01	150	350	100	--	100	700	**15**	**06**	**01**	**22**

Abbreviations:
H : Theory TW: Term Work PR : Practical OR: Oral TUT : Tutorial

Note: Interested students of S.E. (Civil) can opt any one of the audit course from the list of audit courses prescribed by BoS (Civil Engineering)

Note: The Underlined portion of the syllabus will be covered by video lectures/ on-line lectures/ flip classroom, self study, NPTEL course lecture and/or using relevant ICT technique

Savitribai Phule Pune University, Pune
Second Year Civil Engineering (2019 Pattern)
Awareness to Civil Engineering Practices
Audit Course I

Teaching Scheme:
Practical: 01 hrs/week

(Certificate to be issued by institute based on performance assessment)

Civil Engineering is the oldest engineering profession comprising of a variety of sub-disciplines such as Structural Engineering, Geotechnical, Water resources, Environmental Engineering, Construction technology, Transportation Engineering etc. Undergraduate programs are designed with different theoretical approaches on the application of basic sciences to solve different societal problems by engineering knowledge. However, there is a need to make the students aware about how the Civil Engineering industry operates and how theories taught in different courses are applied in practice. The students can learn from the experience gained from different workplaces such Civil Engineering consultancies, contracting companies, construction sites etc. The course aims to provide insight of the different practices followed by the industry such as use of different documents & contracts in Civil Engineering practice, drawings required, engineering ethics, duties and responsibilities of the engineers, site records and diaries, health and safety practices on site.

Course Objectives:

1. To provide basic overview of functioning of different Civil Engineering related industries / firms.
2. To create awareness about application of different drawings, contract documents in Civil Engineering.
3. To provide insight of code of ethics, duties and responsibilities, health and safety as a Civil Engineer.

Course Outcomes:

On completion of the course, learner will be able to…

CO1: Describe functioning/working of different types of industries/sectors in Civil Engineering.

CO2: Describe drawings and documents required and used in different Civil Engineering works.

CO3: Understand the importance of Code of Ethics to be practiced by a Civil Engineer and also understand the duties and responsibilities as a Civil Engineer.

CO4: Understand different health and safety practices on the site.

Course Contents (During 1hr. Practical Session per week)

Unit I: Sectors in Civil Engineering **(03 Hours.)**

Details of different Sectors/sub-disciplines in Civil Engineering along with the following details: description, eminent institutes in India & abroad, related research institutes, noteworthy projects, higher education, latest & ongoing research in the domain, jobs opportunities in government as well as private sector.

Suggestion for effective content delivery:

Lecture cum interaction by alumni of your college working in different sectors of Civil Engineering

Unit II: Drawings and Documents **(03 Hours.)**

Types of drawings in different construction projects. Contract agreement & other documents in different construction projects.

Suggestion for effective content delivery:

i.] Visit to various construction sites/ architectural firms/ structural engineering firms etc. to understand drawings, documents & working culture.

ii.] Lecture by professional practitioner

Unit III: Engineering Ethics **(03 Hours.)**

Introduction, moral issues and moral dilemmas. Code of ethics in Civil Engineering followed by Construction Industry Development Council (CIDC) of India, national & international associations and institutes. Effective case studies (Minimum 2 case studies).

Suggestion for effective content delivery:

Case study based content delivery method, Lecture by professional practitioner

Unit IV: Construction Site Safety **(03 Hours.)**

Importance of site safety. Different health and safety parameters during actual execution of Civil Engineering constructions. Safety measures: conventional and modern.

Suggestion for effective content delivery:

On site visit & lecture by professional practicing Safety Engineer.

Savitribai Phule Pune University, Pune
Second Year Civil Engineering (2019 Pattern)
Road Safety Management
Audit Course I

Teaching Scheme:
Practical: 01 hrs/week

(Certificate to be issued by institute based on performance assessment)

Road transport remains the least safe mode of transport, with road accidents representing the main cause of death of people. The boom in the vehicle population without adequate road infrastructure, poor attention to driver training and unsatisfactory implementation of regulations have been responsible for increase in the number of accidents. India's vehicle population is negligible as compared to the world statistics; but the comparable proportion for accidents is substantially large. The need for strict enforcement of law to ensure greater safety on roads and an environment-friendly road transport operation is of paramount importance. Safety and security are growing concerns for businesses, governments and the traveling public around the world, as also in India. It is, therefore, essential to take new initiatives in raising awareness, skill and knowledge of students as one of the important stake holders who are expected to follow the rules and policies
of the government in order to facilitate safety of individual and safe mobility of others.

Course Objectives:

1. To provide basic overview on road safety & traffic management issues in view of the alarming increase in vehicular population of the country.
2. To explain the engineering & legislative measures for road safety.
3. To discuss measures for improving road safety education levels among the public.

Course Outcomes:

On completion of the course, learners will be able to…

CO1: Summarize the existing road transport scenario of our country

CO2: Explain the method of road accident investigation

CO3: Describe the regulatory provisions needed for road safety

CO4: Identify the safety issues for a road and make use of IRC's road safety manual for conducting road safety audit.

Course Contents (During 1hr Practical Session per week)

Unit I: Existing Road Transport Scenario **(02 Hours.)**

Introduction, national & international statistics related to road transport. Factors responsible for increase in vehicle growth. Share of public transport: importance and current scenario (national & international)

Suggestion for effective content delivery: Displaying updated and authentic statistics & real time scenario images during the session.

Unit II: Road Accidents & its Investigation **(03 Hours.)**

Definition of road accident. National & international statistics related to road accidents. Causes of road accident. Remedies / Measures for control road accidents. Methods for accident investigation. Condition diagram & collision diagram. Black spots & its identification based on accident data.

Suggestion for effective content delivery:

i.] Activity related to drawing condition & collision diagram based on actual accident data. ii.] Activity related to identification of black spots based on actual accident data

Unit III: Motor Vehicle Act & Central Motor Vehicle Rules (03 Hours.)

The Motor Vehicle Act of 1988. Central Motor Vehicle Rules (CMVR) of 1989. Amendments to CMVR – 2017 & 2019.

Suggestion for effective content delivery:

i.] Guest lecture by RTO Officer / Traffic Police Officer.

ii.] Public awareness campaign

Unit IV: Road Safety Audit (RSA) (04 Hours.)

Introduction & importance of RSA. Methodology, phases and checklists for Road Safety Audit as per IRC SP: 88 – 2010 (Manual on Road Safety Audit)

Suggestion for effective content delivery:

Mini project – Conducting Road Safety Audit on minimum 2 km (both directions included) road stretch in the nearby vicinity.

Semester-IV														
Course Code	**Course Name**	**Teaching Scheme (Hours/Week)**			**Examination Scheme and Marks**						**Credit**			
		Theory	**Practical**	**Tutorial**	**IN-Sem**	**End-Sem**	**TW**	**PR**	**OR**	**Total**	**TH**	**PR**	**TUT**	**Total**
201008	Geotechnical Engineering	03	-	-	30	70	--	-	-	100	03	--	--	03
201009	Survey	03	-		30	70		-	-	100	03	-	-	03
201010	Concrete Technology	03	-	-	30	70	-	-	-	100	03	-	-	03
201011	Structural Analysis	03	-	01	30	70	25	-	-	125	03	-	01	04
201012	Project management	03	--	-	30	70	--	--	--	100	03		-	03
201013	Geotechnical Engineering **Lab**	-	02	-	-	-	-	-	50	50	-	01	-	01
201014	Survey **Lab**	-	04	-	-	-	-	50	-	50		02		02
201015	Concrete Technology **Lab**	-	02	-	-	-	25		-	25	-	01	-	01
201017	Project Based Learning	-	04	-	-	-	50		-	50	-	02	-	02
Total		15	12	01	150	350	100	50	50	700	**15**	**06**	**01**	**22**

Abbreviations:
TH : Theory TW: Term Work PR : Practical OR: Oral TUT : Tutorial

Note: The Underlined portion of the syllabus will be covered by video lectures/ on-line lectures/ flip classroom, self study, NPTEL course lectures and/or using relevant ICT technique

Savitribai Phule Pune University, Pune

Second Year Civil Engineering (2019 Course)

201017: Project Based Learning

Credits: 02

Teaching Scheme:	**Examination Scheme:**
Practical : 04hrs/week	Term Work: 50 Marks

Preamble:

Project Based Learning (PBL) was introduced in curriculum of First Year Engineering in Semester II (Course code- 110013) in 2019 course. In that course, students in group might have planned, managed and completed a task/ project/ activity which addressed the stated problem. In a continuation with this, PBL is introduced in core course of Civil Engineering. PBL demonstrates the power of student projects to develop college, community connections, applied research skills and higher levels of student thinking. PBL is a dynamic approach to teaching in which students explore real-world problems and challenges simultaneously developing 21st century Civil Engineering skills while working in collaborative groups. The aim of this course is to demonstrate the important attributes like communication, presentation, organization, time management, research, inquiry, self-assessment, group participation, leadership and critical thinking. Performance assessed on an individual basis and takes into account the quality of task/project/activity completed, the depth of content understanding demonstrated and the contributions made to the ongoing process of project realization. PBL allows students to reflect upon their own ideas and opinions and make decisions that affect project outcomes and the learning process in general.

Course Objectives:

1. To engage students in constructive learning environment and develop self-learning abilities.
2. To develop critical thinking and solving civil engineering problems by exploring and proposing sustainable solutions.
3. To integrate knowledge and skills from civil and other engineering areas.
4. To develop professional skills and project management.

Course Outcomes:

After completion of course the students will be able to

1. Identify the community/ practical/ societal needs and convert the idea into a product/ process/ service.
2. Analyse and design the physical/ mathematical/ ICT model in order to solve identified problem/project.
3. Create, work in team and applying the solution in practical way to specific problem.

Course Content

- Introduction to Project Based Learning, Traditional vs. Cognitive Learning, Why PBL? , Principles of Problem Design Seven Steps of Problem Design, Online PBL, Applications and Research Trends Case Studies in Civil Engineering.

Group Structure:

- Working in mentor – monitored groups. The students identify, plan, manage and complete a task/ project/ activity which address the stated problem related to civil engineering.
- There should be team/group of maximum four students.
- A supervisor / mentor faculty teacher assigned to individual groups.

Selection of Project/Problem:

At start of course revision of PBL, significance, guidelines and evaluation parameters should be discussed commonly at start of semester. In this session basics PBL, in brief research methodology points relevant to PBL, sample case studies related to civil engineering and brief information about patent, copy right and publications should be given.

Selection of project/problem related to any technical aspect of civil engineering is recommendedor if any project/problem selected in first year engineering related to civil engineering can be continued if enough potential is there. Give preference to select project/problem related to solving any problem/ issue for which suitable model can be developed or software can be used. The project/problem selected could have different alternative solutions which could be theoretical, practical, working model, demonstration or software analysis. The project/problem selected may have multi-disciplinary approach to get the solution. Problem needs to refer back to a particular practical, scientific, or technical domain. It is recommended to include hands-on activities, organizational and field visits, expert consultation to make students aware with current use of technologies. Proper representation of project/problem, course work and report on the results and
conclusion is important for assessment of course.

Assessment:

The institution/head/mentor is committed to assessing and evaluating both students' performance and program effectiveness. Progress and review of PBL is monitored regularly on weekly basis. It is recommended to appoint one teaching faculty as a mentor per group/ batch and it will be duty of mentor to perform monitoring and continuous assessment of individual students as well as entire group for their performance. College/ Department is required to provide necessary assistance. It is the responsibility of students to follow guidelines of their group mentor, maintain self-discipline, authentic collaboration, peer learning and personal responsibility, motivation and adopt interactive learning environment. The institution/department should support students in this regard through guidance/orientation programs and the provision of appropriate resources and services. Supervisor/mentor and Students must actively participate in assessment and evaluation processes. Intermittent review and assessment of each group should be done after six weeks from the start of the semester. Each group has to submit their work at end of semester during the end review. Group may demonstrate their knowledge and skills through presentation by developing a model/product/poster and report. Individual assessment for each student (Understanding individual capacity, role and involvement in the project). Group assessment (roles defined, distribution of work, intra-team communication and togetherness).

which consists assessment made on weekly basis also performance made during mid-review and end-review. PBL log book must be maintained as a record even after completion of semester. It will serve as document which will reflect the punctuality, accountability, technical writing ability and project workflow.

Savitribai Phule University of Pune
Third Year Civil Engineering
(2015 Course)

Semester I

Course Code	Course	Teaching Scheme hour/week			Semester Examination Scheme of marks						Credit	
		Theory	Tutorial	Practical	In-Sem	End-Sem	T W	OR	PR	Total	TH/TUT	PR/OR/TW
301001	Hydrology andwater resource engineering.	03	--	02	30	70	--	50	--	**150**	04	01
301002	Infrastructure Engineering andConstruction Techniques	03	--	--	30	70	--	--	--	**100**	04	--
301003	StructuralDesign-I	04	--	04	30	70	50	50	--	**200**	04	02
301004	Structural Analysis-II	04	--	--	30	70	--	--	--	**100**	04	--
301005	Fluid Mechanics-II	04	--	02	30	70	--	50	--	**150**	04	01
301006	Employability Skills development	--	--	02	--	--	50	--	--	**50**	--	01
Total		18	--	10	**150**	**350**	**100**	**150**		**750**	**20**	**05**

Savitribai Phule Pune University TE Civil
(2015 Course) w.e.f. June 2017

301006: Employability Skills Development

Teaching scheme	Examination scheme
Practical: 2 hours/week	Term Work: 50 Marks

How to handle this course? (02 hours)

This course has been introduced with the objective of enhancing the employability of the students through development of their skills. Following topics and their contents are expected to be explored through following 10 activities.

1. Expert lectures
2. Group discussions
3. Case study analysis
4. Group presentations
5. Company and corporate visits
6. Mock interviews and exercises
7. Demo presentations
8. Audio-video shows
9. Use of e-resources
10. Games.

The term work will consist of detailed report of any 8 out of above 10 activities. The activities which need to be performed in a group will have a group of not more than 6 students. However, the report for the term work will be prepared at individual level.

Unit I **(02 hours)**

a) What is Employability? What are Employability Skills? Focus on what skills do employers expect from graduates? Career planning with action plan.

Unit –II **(02 hours)**

b) Interpersonal Skills-Critical Thinking, Assertiveness, Decision Making, Problem Solving, Negotiation, Building Confidence, Time Management, Personal Presentation,

c) Assertiveness, Negotiation, Avoiding Stress.

Unit –III **(02 hours)**

c) Presentation Skills-Presentation Skills What is a Presentation? Writing Your PresentationCoping with Nerves

Unit –IV **(02 hours)**

d) Communication Skills-Verbal Communication, Written Communication, Difference between C.V. Bio data and Resume

Unit –V **(02 hours)**

e) Commercial Awareness-Professional etiquettes and manners, Global negotiating andPersuading, Integrity. Global trends and statistics about civil engineering businesses.

Unit-VI **(02 hours)**

f) Personal skills-Leadership, Ability to work in a team, Conceptual ability, Subject Knowledgeand competence, Analysing and investigating, Planning, Flexibility, Self, Lifelong Learning, ,Stress Tolerance, Creativity

Semester II

CourseCode	Course	Teaching Scheme hour/week			Semester Examination Scheme of marks						Credit	
		Theory	Tutorial	Practical	In-Sem	End-Sem	T W	OR	PR	Total	TH/TUT	PR/OR/TW
301007	AdvancedSurveying	03	--	02	30	70	50	--	--	**150**	04	01
301008	Project Management and Engineering Economics	04	--	--	30	70	--	--	--	**100**	04	--
301009	Foundation Engineering	03	--	--	30	70	--	--	--	**100**	04	--
301010	Structural Design-II	04	--	04	30	70	50	50	--	**200**	04	02
301011	Environmental Engineering-I	04	--	02	30	70	--	--	50	**150**	04	01
301012	Seminar	--	--	01	--	--	--	50	--	**50**	--	01
Total		18	--	09	**150**	**350**	**100**	**100**	**50**	**750**	**20**	**05**

Savitribai Phule Pune University
TE Civil (2015 Course) w.e.f. June 2017

301008 : Project Management and Engineering Economics

Teaching scheme	Examination scheme
Lectures: 4 hours/week	In semester exam: 30 marks---1 hour Paper
	End semester exam: 70 marks—2.5 hours Paper

Unit I **(8 hours)**

Introduction to project management

Importance, Objectives & Functions of Management , Principles of Management, Categories of Project, Project Failure, Project--- Life Cycle Concept and Cost Components, Project Management Book of Knowledge {PMBOK} – Different Domain Areas, Project management Institute and Certified Project Management Professionals (PMP). Importance of organizational Structure in Management- Authority / Responsibility Relation, Management by objectives (MBO)

Unit –II **(08 hours)**

Project planning and scheduling

WBS – Work Breakdown Structure, Gantt/Bar chart & its Limitations, Network Planning, Network analysis, C. P. M.- . Activity on Arrow (A.O.A.), Critical path and type of Floats, Precedence network analysis (A.O.N.), Types of precedence relationship, P. E. R.T. Analysis

Unit –III **(08 hours)**

Project Resources and Site Planning

Objectives of Materials Management – Primary and Secondary Material Procurement Procedures - Material requirement - raising of Indents, Receipts, Inspection, Storage, Delivery, Record keeping – Use of Excel Sheets, ERP Software, Inventory Control - ABC analysis, EOQ, Introduction to Equipment Management – Fleet Management, Productivity Studies, Equipment Down Time, Sizing

- Matching , Site Layout and Planning, Safety Norms – Measures and Precautions on Site, Implementation of Safety Programs

Unit –IV **(08 hours)**

Project Monitoring and Control

Resource Allocation – Resource Smoothening and Levelling, Network Crashing – Time- Cost – Resource optimization, Project Monitoring - Methods, Updating and Earned Value Analysis, Introduction to use of Project Management Softwares – MS Project / Primavera, Case study on housing project scheduling for a small project with minimum 25 activities.

Unit –V **(08 hours)**

Project Economics

Introduction to Project Economics - Definition, Principles, Importance in Construction Industry,

Difference between Cost, Value, Price, Rent, Simple and Compound Interest, Profit, Annuities, Demand, Demand Schedule, Law of Demand, Demand Curve, Elasticity of Demand, Supply, Supply Schedule, Supply Curve, Elasticity of Supply Equilibrium, Equilibrium Price, Equilibrium Amount, Factors affecting Price Determination, Law of Diminishing Marginal Utility, Law of Substitution, Concept of Cost of Capital, Time Value of Money, Sources of Project Finances Concepts of Debt Capital and Equity Capital. Types of Capital – Fixed and Working, Equity Shares and Debenture Capital, FDI in Infrastructure

Unit-VI **(08 hours)**

Project appraisal

Types of Appraisals such as Political, Social, Environmental, Techno-Legal, Financial and Economical, Criteria for Project Selection - Benefit - Cost Analysis, NPV, IRR, Pay-Back Period, Break Even Analysis [Fundamental and Application Component], Study of Project Feasibility report and Detailed Project Report (DPR), Role of Project Management Consultants in Pre-tender and Post-tender.

Savitribai Phule Pune University

TE Civil (2015 Course) w.e.f. June 2017

301011: Environmental Engineering-I

Teaching scheme	Examination scheme
Lectures: 4 hours/week	In semester exam: 30 marks--1 hour Paper
Practical: 2 hours/week	End semester exam: 70 marks—2.5 hours Paper
	Practical Exam: 50 Marks

Unit-I (08 hours)

A) Noise Pollution: Sound measurements – Sound pressure, Intensity, Sound pressure level, Loudness, Equivalent noise level and Cumulative noise level.

B) Air Pollution: Atmospheric stability, Mixing heights, Meteorological parameters.

Air pollution control mechanism. Equipment for particulate contaminants. Principle and working of Settling chamber, Cyclone, Fabric filter, ESP. Gaseous contaminants control by adsorption and absorption technique.

C) Municipal Solid Waste: Concept of Municipal Solid waste management, Sources, Classifications, Treatment (composting &anaerobic digestion) Disposal (sanitary land fill)

Unit -II **(08 hours)**

A) Introduction to water supply scheme: Data collection for water supply scheme, Components and layout. Design period, Factors affecting design period.

B) Quantity: Rate of water consumption for various purposes like domestic, Industrial, Institutional, Commercial, Fire demand and Water system losses, Factors affecting rate of demand, Population forecasting.

C) Quality: Physical, Chemical, Radioactivity and Bacteriological Characteristics, Heavy metals. Standards as per IS: 10500 (2012)

Unit –III **(08 hours)**

A) Water treatment: Principles of water treatment operations and processes, Water treatment flow sheets.

B) Aeration: Principle and Concept, Necessity, Methods, Removal of taste and odour. Design of aeration fountain.

C) Sedimentation: Plain and chemical assisted - principle, efficiency of an ideal settling basin, Settling velocity, Types of sedimentation tanks, Design of sedimentation tank. Introduction & design of tube settlers.

Unit -IV **(08 hours)**

A) Coagulation and flocculation: Principle of coagulation, Common coagulants alum & ferric salts, Introduction to other coagulant aids like bentonite clay, Lime stone, Silicates and Polyelectrolytes, Introduction of natural coagulants, Mean velocity gradient "G" and Power consumption, Design of Flocculation chamber, Design of Clari-flocculator.

B) Filtration: Theory of filtration, Mechanism of filtration, Filter materials, Types: Rapid, Gravity, Pressure filter, Multimedia and dual media filters, Components, Under drainage system, Working and cleaning of filters, Operational troubles, Design of Rapid sand Gravity filters.

Unit -V **(08 hours)**

A) Disinfection: Mechanism, Factors affecting disinfection, Types of disinfectants, Types andmethods of chlorination, Break point chlorination, Bleaching powder estimation.

B) Water softening methods and Demineralization : lime-soda, Ion-Exchange, R.O. andElectrodialysis

C) Fluoridation and defluoridation.

Unit-VI **(08 hours)**

A) Water distribution system: System of water supply- Continuous and intermittent system. Different distribution systems and their components. ESR- Design of ESR capacity. Wastage and leakage of Water- Detection and Prevention.

B) Rainwater harvesting: Introduction, need, methods and components of domestic rainwater harvesting system. Design of roof top rainwater harvesting system.

C) Introduction to Packaged WTP in townships, big commercial plants, necessity (On-site water treatment)

Savitribai Phule Pune University

TE Civil (2015 Course) w.e.f. June 2017

301012 : Seminar

Teaching scheme	Examination scheme
Practical: 1 hour/week	Oral Exam: 50 Marks

Oral examination shall be conducted based on a Seminar report to be prepared by each individual.The seminar report should contain the following.

1. Introduction of the topic, its relevance to the construction industry, need for the study, aimsand subjunctives, limitations.
2. Literature review from books, journals, conference proceedings, published reports / articles / documents from minimum 8 references.
3. Theoretical chapter on the topic of study, advantages and limitations.
4. Photographs from web search / experiments done / projects visited / organizations visitedfor studying documents / procedures/ systems / materials/ equipment/ technologies used.
5. Ongoing research areas, information, about commercial vendors, information on benefit –cost aspects.
6. Concluding remarks with respect to commercial/ practical and social applications.
7. References in standard format.

Note:- In order to arouse the interest of students and engage them in active learning, mini-projects/ complex problems may be given in groups of maximum 4students, covering different aspects involved in Civil engineering so as to also enable the students to submit separate individual reports as required above.

Internal guides may prepare a continuous evaluation sheet of each individual and refer it tothe external examiner for consideration.

The oral examination of each individual may then be conducted as per the practice adoptedfor other subjects.

Savitribai Phule Pune University, Pune
TE (Civil Engineering) 2019 Pattern
(With effect from Academic Year 2021-22)

SEMESTER: V

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit					
		Theory	Practical	Tutorial	IN-Sem	End-Sem	TW	PR	OR	Total	TH	TW	PR	OR	TUT	Total
301001	Hydrology and Water Resources Engineering	03	--	--	30	70	--	--	--	100	03	--	--	--	--	03
301002	Water Supply Engineering	03	--	--	30	70	--	--	--	100	03	--	--	--	--	03
301003	Design of Steel Structures	03	--	--	30	70	--	--	--	100	03	--	--	--	--	03
301004	Engineering Economics and Financial Management	03	--	--	30	70	--	--	--	100	03	--	--	--	--	03
301005	Elective I	03	--	--	30	70	--	--	--	100	03	--	--	--	--	03
301006	Seminar	--	--	01	--	-	50	--	--	50	--	--	--	--	01	01
301007	Hydrology and Water Resources Engineering **Lab**	--	02	--	--	--	25	--	--	25	--	01	--	--	--	01
301008	Water Supply Engineering **Lab**	--	02	--	--	--	--	50	--	50	--	--	01	--	--	01
301009	Design of Steel Structures **Lab**	--	04	--	--	--	--	--	50	50	--	--	--	02	--	02
301010	Elective I **Lab**	--	02	--	--	--	25	--	--	25	--	01	--	--	--	01
301011	Audit Course I: Professional Ethics and Etiquettes/ Sustainable Energy Systems	--	--	01	--	GR	--	--	--	GR	--	--	--	--	--	--
	Total	**15**	**10**	**02**	**150**	**350**	**100**	**50**	**50**	**700**	**15**	**02**	**01**	**02**	**01**	**21**

Abbreviations: TH : Theory, TW: Term Work, PR : Practical, OR: Oral, TUT : Tutorial, GR: Grade

Savitribai Phule Pune University, Pune
TE Civil (2019 Pattern) w. e. f. June 2021

301011 b: Audit Course I: Sustainable Energy Systems

Teaching scheme	Credit	Examination scheme
Tutorial: 01 Hours/week	--	Grade

Course objectives

01 To understand the impact of engineering solutions on a global, economic, environmentaland societal context.

02 To design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.

Course outcomes

On successful completion of this course, the learner will be able to:

01 To demonstrate an overview of the main sources of renewable energy.

02 To understand benefits of renewable and sustainable energy systems.

Course Contents

Unit I: Introduction and Energy Fundamentals

Sustainable energy systems: issues for the 21st century, the critical challenges for a sustainable energy future, sustainable energy system: definitions, indicators, physics ofenergy: laws of thermodynamics energy forms and conversion, first and second laws and efficiencies devices: heat engines, refrigerators and heat pumps instantaneous and average power.

Unit II: Introduction to Renewable Energy

Wind energy, wind turbine technologies, wind resources and modeling, energy performance and environmental impacts, economics and economic development impacts, photovoltaic: PV and BIPV technologies, solar resources and modeling, energy performance and environmental impacts, economics and net metering.

Unit III: Biomass Electricity

Biomass technologies, introduction biomass productivity and modeling bio power: MSW, willows/switch grass/poplar, wood waste, bio-mass: transport fuels bio fuels, bio ethanol, biodiesel, algal, jatropha bio fuels and water land use impacts, food Vs fuel, renewable fuels standards.

Unit IV: Building Energy

Technologies and policy, smart buildings, lighting and LEDs, Heating/cooling, technologies

Savitribai Phule Pune University
TE Civil (2019 Pattern) w. e. f. June 2021

301011 a: Audit Course I: Professional Ethics and Etiquettes

Teaching scheme	Credit	Examination scheme
Tutorial: 01 Hours/week	--	Grade

Professional ethics is the underlying concept behind the successful accomplishment of any act of a professional towards achieving the individual and societal goals. These goals should ultimately result in morally, legally, ethically and even culturally acceptable good things for all. Engineers being special group of professionals need to be more conscious of their acts since their duties, rights and responsibilities permeate into the society and the surroundings. To practice professional ethics, understanding of values and concepts are essential.

Course objectives

01 To create awareness on professional ethics and human values.
02 To provide basic familiarity about Engineers as responsible experimenters, research ethics, codes of ethics, industrial standards.
03 To inculcate knowledge and exposure on safety and risk.
04 To expose students to right attitudinal and behavioral aspects.

Course outcomes

On successful completion of this course, the learner will be able to:

01 Understand the basic perception of profession, professional ethics, various moral issues and uses of ethical theories
02 Understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
03 Follow ethics as an engineering professional and adopt good standards and norms of engineering practice.
04 Apply ethical principles to resolve situations that arise in their professional lives

Course Contents

Unit I: Human Values and Engineering Ethics

Morals, values and ethics, integrity, work ethic, civic virtue, valuing time, cooperation, commitment, empathy, self-confidence, stress management, senses of engineering ethics, Kohlberg's theory, Gilligan's theory, models of professional roles, uses of ethical theories.

Unit II: Research Ethics and Codes of Ethics

Industrial standardization, ethical code and its importance, ethical accountability, law in engineering and engineering as social experimentation.

Unit III: Safety, Responsibilities and Rights

Safety and risk, assessment of safety and risk, risk benefit analysis and reducing risk collegiality, collective bargaining, confidentiality, conflicts of interest, professional rights, employee rights, intellectual property rights(IPR), discrimination and utilitarianism.

Unit IV: Professional Etiquette

Etiquette at meetings, public relations office (PRO)s etiquettes, technology etiquette phone etiquette, email etiquette, social media etiquette, video conferencing etiquette, interview etiquette, dressing etiquettes : for interview, offices and social functions, ethical values: importance of work ethics.

Savitribai Phule Pune University ,Pune

TE Civil (2019 Pattern)

w. e. f. June 2021

301006: Seminar

Teaching scheme	Credit	Examination scheme
Tutorial: 01 Hours/week	01	Term Work: 50 Marks

Pre-requisites

Fundamentals of Civil Engineering

Course objectives

01 Identify technical / practical problems in the field of civil engineering.

02 Inculcate the ability to describe, interpret and analyze technical content.

03 Develop competence in preparing report which will enhance critical thinking and develop the skill of technical writing along with presentation.

Course outcomes

On successful completion of this course, the learner will be able to:

01 Appraise the current civil engineering research / techniques / developments / interdisciplinary areas.

02 Review and organize literature survey utilizing technical resources, journals etc.

03 Evaluate and draw conclusions related to technical content studied.

04 Demonstrate the ability to perform critical writing by preparing a technical report.

05 Develop technical writing and presentation skills.

Savitribai Phule Pune University, Pune

TE Civil (2019 Pattern)

w. e. f. June 2021

301021 a: Audit Course II: Leadership and Personality Development

Teaching scheme	Credit	Examination scheme
Tutorial: 01 Hours/week	--	Grade

Personality is considered as one of the integral part of an individual‘s existence, where a student is concerned paying close attention to Personality which is extremely important. To enhance holistic development of students and improve their employability skills

Course objectives

01 To develop inter personal skills and bean effective goal oriented team player.
02 To develop professionals with idealistic, practical and moral values.
03 To develop communication and problem solving skills.
04 Tore-engineer attitude and understand its influence on behavior

Course outcomes

On successful completion of this course, the learner will be able to:

01 Enhanced holistic development of students and improve their employability skills

Course Contents

Unit I: Introduction to Personality and working towards developing it

Definition and basic of personality, analyzing strength & weaknesses, corporate the orison personality development, increasing vocabulary, body language, preparation of self introduction

Unit II: Communication skill and handling attitude

Communication skills, listening, communication barriers, overcoming these barriers, building self esteem and self confidence, working on attitudes .i.e. aggressive, assertive, and submissive

Unit III: Leadership Techniques in Personality development

Introduction to leadership, leadership styles, group dynamics, team building

Unit IV: Stress and time management skills

Interpersonal relationships, analysis of ego states, transactions, and life positions, stress management, causes, impact & managing stress, introduction to conflict management, time management, concept of time management, steps towards better time management

SAVITRIBAI PHULE PUNE UNIVERSITY

Board of Studies in Civil Engineering

Structure for B.E. Civil 2015 Course (w. e. f. June 2018)

	Semester-I										
Subject code	**Subject**	**Teaching Scheme Hrs/Week**			**In-Semester Assessment**	**TW**	**Pract /Or**	**End-Semester Exam**	**Total**	**Credit**	
		Lect	**Tu**	**Pr**						**Th**	**Lab**
401 001	Environmental Engineering II	3	--	2	30	--	50	70	150	3	1
401002	Transportation Engineering	3	--	2	30	50	--	70	150	3	1
401 003	Structural Design and Drawing III	4	--	2	30	--	50	70	150	4	1
401 004	Elective I	3	--	2	30	50	--	70	150	3	1
401 005	Elective II	3	--	--	30	--	--	70	100	3	--
401 006	Project (Phase-I)	--	2	--	--	--	50	--	50	--	2
Total :		16	2	8	150	100	150	350	750	16	6
										22 Credits	

	Semester-II										
Subject code	**Subject**	**Teaching Scheme Hrs/Week**			**In-Semester Assessment**	**TW**	**Or**	**End-Semester Exam**	**Total**	**Credit**	
		Lect	**Tu**	**Pr**						**Th**	**Pr**
401 007	Dams and Hydraulic Structures	3	--	2	30	--	50	70	150	3	1
401008	Quantity Surveying, Contracts and tenders	3	--	2	30	--	50	70	150	3	1
401 009	Elective III	3	--	2	30	50	--	70	150	3	1
401 010	Elective IV	3	--	2	30	50	--	70	150	3	1
401 006	Project	--	6	--	--	50	100	--	150	--	6
Total :		12	6	8	120	150	200	280	750	12	10
										22 Credits	

Following will be the list of electives.

Semester I

Elective-I 401 004	Elective-II 401 005
1. Structural Design of Bridges	1. Matrix Methods of Structural Analysis
2. Systems Approach in Civil Engineering	2. Integrated Water Resources Planning and Management
3. Advanced Concrete Technology	3. TQM & MIS in Civil Engineering
4. Architecture and Town Planning	4. Earthquake Engineering
5. Advanced Engineering Geology with Rock Mechanics	5. Advanced Geotechnical Engineering

Semester-II

Elective-III 401 009	Elective-IV 401 010
1. Advanced Structural Design	1. Construction Management
2.Statistical Analysis and Computational Methods in Civil Engineering	2. Advanced Transportation Engineering
3. Hydropower Engineering	3. Advanced foundation Engineering.
4. Air Pollution and control	4. Coastal Engineering
5. Finite Element Method in Civil Engineering	**5. Open Elective**
6. Airport and Bridge Engineering	a) Plumbing Engineering
	b) Green Building Technology
	c) Ferrocement Technology
	d) Sub sea Engineering
	e) Geoinformatics

Savitribai Phule Pune University, Pune

BE Civil 2015 Course

Syllabus

Semester-I

401 001: Environmental Engineering – II

Teaching Scheme:
Lectures: 3 Hrs/week
Practical: 2 Hrs/week

Examination Scheme:
Paper In-sem : 30 Marks (1Hr.)
Paper End-sem : 70 Marks (2.5 Hrs.)
Oral : 50 Marks

Unit I **(6 Hrs.)**

Sewage quantity: Collection and conveyance of sewage, sources of sewage, variations insewage flow, Flow quantity estimation (sewage and storm water quantification), design of stormwater system, Design of circular sanitary sewers. Pumping of sewage, necessity, location. Effectof change of life style on sewage quality.

Characteristics of sewage: Methods of sampling, Physical, chemical and biological characteristics, Quality requirements for disposal and recycle/reuse of sewage as per CPCB norms.

Stream sanitation: Self-purification of natural streams, river classification as per MoEF & CC, Govt. of India; Oxygen Sag Curve, Streeter - Phelps equation and terminology (without derivation and numerical). National river cleaning plan.

Unit II (6Hrs.)

Sewage treatment: Pollution due to improper disposal of sewage, Introduction to sewage treatment, preliminary, primary, secondary and tertiary treatment, Unit operation and Process flow diagram for sewage treatment, Theory and design of screen chamber, Grit Chamber and Primary sedimentation tank as per the Manual of CPHEEO.

Unit III **(6 Hrs.)**

Theory & design of secondary treatment units: Introduction to unit operations and processes for secondary treatment. Principles of biological treatments, role of microorganism in wastewater treatment.

Activated sludge process: Theory and design of ASP, sludge volume index, sludge bulking & control, modifications in ASP. Operational problems and maintenance in ASP.
Concept of Sequential batch reactor (SBR) .

Trickling filter: Biological principle, different T.F media & their characteristics, design of standard rate and high rate filters using NRC formula, single stage & two stage filters, recirculation, ventilation, operational problems, control measures, theory of rotating biological contactors.

Unit IV **(6 Hrs.)**

Low cost treatment methods for rural areas

Oxidation pond: Bacteria – algae symbiosis, design of oxidation pond as per the manual of CPHEEO, advantages & disadvantages of oxidation ponds.

Aerated lagoons: Principle, aeration method, advantages & disadvantages of aerated Lagoons, design of aerated lagoon.

Introduction and theory of Phytoremediation technology for wastewater treatment. Introduction and theory of root zone cleaning system.

Unit V **(6 Hrs.)**

Onsite Sanitation Treatment systems: Septic tank**,** up-flow anaerobic filter. and Package Sewage Treatment Plant- Working principle, advantages and disadvantages. Introduction to MBR, MBBR and FMBR.

Anaerobic digester: Principle of anaerobic digestion, stages of digestion, bio – gas production its characteristics & application, factors governing anaerobic digestion,. Dewatering of sludge by gravity thickener, sludge drying bed, decanters. Methods of sludge treatment and disposal, advantages & disadvantages. Up-flow Anaerobic Sludge Blanket (UASB) Reactor– Principle, advantages & disadvantages.

Unit VI **(6 Hrs.)**

Industrial waste water treatment: Equalization and neutralization. Application of preliminary, primary and secondary treatment for industrial wastewater as per the CPCB norms.

Sources of waste water generation from manufacturing process, characteristics of effluent, different methods of treatment & disposal of effluent for the following industries: Sugar, dairy and distillery. Discharge standards as per CPCB norms.

Recycle & reuse of treated wastewater: Gardening, sewage farming, W.C. Flushing, reuse in industry.

401009 Elective III (3): Hydro Power Engineering

Teaching Scheme
Lectures: 3 hours/week
Practical: 2 hours/week

Examination Scheme
Theory Examination
In-sem: 30 marks (1 Hour)
End-sem:70 marks (2.5.Hours)
Term work: 50 Marks

Unit I **(6 Hrs.)**

Energy Resources – Planning and Potential:

Power resources – Conventional and Nonconventional, Need and advantages, Overview of World Energy Scenario, energy and development linkage, Environmental Impacts of energy use, Green House Effect, Trends in energy use patterns in India, Hydropower development in India, Hydropower potential basin wise and region wise, investigation in hydropower plants.

Unit II (6 Hrs.)

Hydropower Plants:

Hydrological Analysis, Classification of hydropower plants based on hydraulic characteristics - Run of river plants, Storage or Valley dam plants, Pumped storage plants, Classification based on head, Classification based on operating function, Classification based on plant capacity, Classification based on nature of topography, Introduction to micro hydro, advantages and disadvantages, Principle Components of hydropower plants.

Unit III (6 Hrs.)

Load Assessment:

Estimation of electrical load on turbines. Load factor, Plant factor, peak demand and utilization factor, installed capacity, diversity factor, firm power, secondary power, load curve, load duration curve, Prediction of load and significance, Tariffs, Hydro-Thermal Mix, Combined Efficiency of Hydro-Thermal-Nuclear Power Plants.

Unit IV (6 Hrs.)

Water Conductor System and Powerhouse:

Water Conductor System – Alignment, Intake Structures- Location and Types, Trash Rack. Headrace tunnel/ Canal, Penstock and pressure shaft, Types of Powerhouses, Typical layout of powerhouse, Components, Power plant equipments, Instrumentation and control.

Unit V (6 Hrs.)

Turbines:

Classification, Principles and design of impulse and reaction turbines, Selection of Turbine, Specific Speed, Governing of turbines, Water hammer, Hydraulic Transients and Surge tanks, Draft tubes, Cavitation.

Unit VI (6 Hrs.)

Economics of Hydroelectric Power:

Hydropower - Economic Value and Cost and Total Annual Cost. Economic considerations – pricing of electricity, laws and regulatory aspects, Policies, Electricity act – 2003, Investment in the power sector, Carbon credits, Participation of private sector.

401 005 Elective II (3) TQM and MIS in Civil Engineering

Teaching scheme:
Lectures: 3 Hrs/week

Examination scheme:
In semester exam: 30 marks---1 Hr.
End semester exam: 70 marks—2.5 Hrs.

Unit I: Quality in Construction **(6 Hrs)**

a) Quality – Various definitions and interpretation. Importance of quality on a project in the context of global challenges, Factors affecting quality of construction, Reasons for poor quality & measures to overcome, Contribution of various Quality Gurus(Juran, Deming, Crossby, Ishikawa).

b) Evolution of TQM- QC, TQC, QA, QMS, TQM.

Unit II: TQM & Six Sigma (6 Hrs)

a) TQM – Necessity, advantages , 7QC tools, Quality Function Deployment(QFD).

b) Six sigma – Importance, levels.

c) Defects & it‘s classification in construction. Measures to prevent and rectify defects.

Unit III: ISO & Quality Manual (6 Hrs)

a) Study of ISO 9001 principles.

b) Quality manual – Importance, contents, documentation. Importance of check-lists in achieving quality. Typical checklist for concreting activity, formwork activity, steel reinforcement activity.

c) Corrective and Preventive actions, Conformity and NC reports.

Unit IV: Management Control & Certifications (6 Hrs)

a) Benchmarking in TQM, Kaizen in TQM.

b) Quality Circle.

c) Categories of cost of Quality.

d) CONQAS, CIDC-CQRA certifications.

Unit V: Techniques in TQM Implementation and awards (6 Hrs)

a) 5 ‗S' techniques.
b) Kaizen.
c) Failure Mode Effect Analysis (FMEA).
d) Zero Defects.
e) National & International quality awards- Rajeev Gandhi Award, Jamuna lal Bajaj Award, Golden Peacock Award, Deming Prize, Malcolm Baldrize award.

Unit VI: MIS (6 Hrs)

a) Introduction to Management Information systems (MIS) Overview, Definition.
b) MIS and decision support systems, Information resources, Management subsystems of MIS, MIS based on management activity whether for operational control, management control, strategic control.
c) Study of an MIS for a construction organization associated with building works.

401 010 Elective IV: Open Elective: 5 (b): Green Building Technology

Teaching Scheme:
Lectures: 3 Hours/week
Practical: 2 Hours/week

Examination Scheme:
Theory Examination:
In-sem : 30 Marks (1 Hour)
End-sem:70 Marks (2.5 Hours)
Term work: 50 Marks

Unit I: **(6 Hrs.)**

Materials and Its Applicability, Indoor Environmental Quality, Reuse and Recycle of Construction Waste.

A) Eco Friendly/ Green Building Materials: To understand Environmental impact of building materials. Eco Friendly building materials, their composition, availability, production, physical properties etc. Application of the Eco Friendly/ Green Building materials for different components of the buildings at different level, both internally and externally.

B) Indoor environmental quality, Low VOC materials: Adhesives - Sealants, Paints- Coatings etc.

C) Construction Waste as a Resource- Resource Economics, Disposable Materials, Recovery, Recycling, Collection, Processing, Governmental Role in Waste Management, Potential for Reuse.

Unit II (6 Hrs.)

Site / Building Planning

A) Sustainable Site planning: wind / sun path, water management , material use, landscape, topography.

B) Climate Responsive Architecture: orientation, solar- wind, Building envelope.

C) Thermal comfort indices. Heat flow through building materials. Thermal properties of common building materials available in India. Thermal performance of building envelope. Air movement and buildings. Ventilation and buildings. Wind and Stack effect. Mechanical ventilation. HVAC System, Day lighting. Passive and sustainable architecture. Passive and active systems.

Unit III **(6 Hrs.)**

Embodied Energy, Life Cycle Assessment, Environmental Impact Assessment, Energy Audit and Energy Management.

A) Embodied energy of various construction materials. Introduction to the Concept: –Life Cycle assessment of materials‖.

B) EIA : Introduction to EIA., Process of EIA and its application through a case study., EIA as a strategic tool for sustainable development.

C) Energy Management.

Unit IV **(6 Hrs.)**

Appropriate Technologies / Approaches for:

A) Water conservation / efficiency.

B) Sanitation (Grey water, black water management, SWM)

C) Treatments.

D) Biogas.

E) Composting.

F) Solar energy and its applicability through panels, photovoltaic cells etc.

G) Use of –LED, CFL, Fresnel Lens‖ etc.

H) Wind energy and its use.

I) Orientation aspects in site planning to achieve maximum daylight and natural ventilation.

UNIT V: **(6 Hrs.)**

A) Clean Development Mechanism.

B) Kyoto Protocol.

C) Energy Conservation Building Code.

UNIT VI **(6 Hrs.)**

Rating Systems: - Leadership in Energy and Environmental Design (LEED), Green Globes, National Association for Home Builders (NAHB) – For Homes, Building Research Establishment Environmental Assessment Method (BREEAM), Green Star by Green Building Council Australia (GBCA), LEED India, Comprehensive Assessment System for Built Environment Efficiency (CASBEE), Estimada -Abu Dhabi Urban Planning Council (UPC) etc.

Savitribai Phule Pune University, Pune
BE (Civil Engineering) 2019 Pattern
(With effect from Academic Year 2022-23)

SEMESTER: VII

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit					
		Theory	Practical	Tutorial	IN-Sem	End-Sem	TW	PR	OR	Total	TH	TW	PR	OR	TUT	Total
401001	Foundation Engineering	03	--	--	30	70	--	--	--	100	03	--	--	--	--	03
401002	Transportation Engineering	03	--	--	30	70	--	--	--	100	03	--	--	--	--	03
401003	Elective III	03	--	--	30	70	--	--	--	100	03	--	--	--	--	03
401004	Elective IV	03	--	--	30	70	--	--	--	100	03	--	--	--	--	03
401005	Project Stage I	--	04	--	--	--	50	--	50	100	--	01	--	02	--	03
401006	Transportation Engineering **Lab**	--	02	--	--	--	--	--	50	50	--	--	--	01	--	01
401007	Elective III **Lab**	--	02	--	--	--	--	--	50	50	--	--	--	01	--	01
401008	Elective IV **Lab**	--	02	--	--	--	50	--	--	50	--	01	--	--	--	01
401009	Computer Programming in Civil Engineering	01	02	--	--	--	50	--	--	50	--	02	--	--	--	02
401010	Audit Course I **Stress Management by Yoga / Communication Etiquette in Workplaces**	--	--	01	--	GR	--	--	--	GR	--	--	--	--	--	--
	Total	**13**	**12**	**01**	**120**	**280**	**150**	**--**	**150**	**700**	**12**	**04**	**--**	**04**	**--**	**20**

Abbreviations: TH : Theory, TW: Term Work, PR : Practical, OR: Oral, TUT : Tutorial, GR: Grade

Elective III and IV

S N	Course Code	Elective III: Course Name	Course Code	Elective IV: Course Name
01	401003 a	Coastal Engineering	401004 a	Air Pollution and Control
02	401003 b	Advanced Design of Concrete Structures	401004 b	Advanced Design of Steel Structures
03	401003 c	Integrated Water Resources Planning & Management	401004 c	Statistical Analysis and Computational Method
04	401003 d	Finite Element Method	401004 d	Airport and Bridge Engineering
05	401003 e	Data Analytics	401004 e	Design of Prestressed Concrete Structures
06	401003 f	Operation Research	401004 f	Formwork and Plumbing Engineering

SEMESTER-VIII																
Course Code	**Course Name**	**Teaching Scheme (Hours/Week)**			**Examination Scheme and Marks**						**Credit**					
		Theory	**Practical**	**Tutorial**	**IN-Sem**	**End-Sem**	**TW**	**PR**	**OR**	**Total**	**TH**	**TW**	**PR**	**OR**	**TUT**	**Total**
401011	Dams and Hydraulics Structures	03	--	--	30	70	--	--	--	100	03	--	--	--	--	03
401012	Quantity Surveying, Contracts and Tenders	03	--	--	30	70	--	--	--	100	03	--	--		--	03
401013	Elective V	03	--	--	30	70	--	--	--	100	03	--	--		--	03
401014	Elective VI	03	--	--	30	70	--	--	--	100	03	--	--		--	03
401015	Project Stage II	--	10	--	--	--	100	--	50	150	--	03	--	02	--	05
401016	Dams and Hydraulics Structures **Lab**	--	02	--	--	--	--	--	50	50	--		--	01	--	01
401017	Quantity Surveying, Contracts and Tenders **Lab**	--	02	--	--	--	--	--	50	50	--		--	01	--	01
401018	Elective V **Lab**	--	02	--	--	--	50	--	--	50	--	01	--	--	--	01
401019	Audit Course II **Social Responsibility / Human Rights**	--	--	01	--	GR	--	--	--	GR		--	--	--	--	--
	Total	**12**	**16**	**01**	**120**	**280**	**150**	--	**150**	**700**	**12**	**04**	--	**04**	--	**20**
Abbreviations: TH : Theory, TW: Term Work, PR : Practical, OR: Oral and TUT : Tutorial, GR: Grade																

Elective V and VI

S N	Course Code	Elective V: Course Name	Course Code	Elective VI: Course Name
01	401013 a	Earthquake Engineering	401014 a	TQM and MIS
02	401013 b	Structural Design of Bridges	401014 b	Advanced Transportation Engineering
03	401013 c	Irrigation and Drainage	401014 c	Geo Synthetic Engineering
04	401013 d	Design of Precast and Composite Structures	401014 d	Structural Design of Foundations
05	401013 e	Hydropower Engineering	401014 e	Green Structures and Smart Cities
06	401013 f	Structural Audit and Retrofitting of Structures	401014 f	Rural Water Supply and Sanitation

401010 Audit Course I b: Communication Etiquette in Workplaces

Teaching scheme	Credit	Examination scheme
Tutorial: 01 Hours/week	--	Grade

Pre-requisites

None

Course objectives

01 Develop an understanding of workplace codes, professionalism at workplace
02 Understand the workplace ethics
03 Develop an understanding of Business ethics, workplace privacy and ethics
04 Learn teamwork at workplace

Course outcome

On successful completion of this course, the learner will be able to,

01 Develop an understanding of workplace codes, professionalism at workplace
02 Learn the workplace ethics
03 Develop an understanding of Business ethics, workplace privacy and ethics
04 Learn teamwork at workplace

Course Content

Unit I: Ethics in engineering profession and roles of engineers, ethical codes and its need, codes from other profession, advertising standards of India, corporate codes, knowledge of ethical codes. Workplace ethics: needs, principles, development of personal ethics, workplace ethics for employees- ethical behaviour in workplace- professionalism, ethical violations by employees, employee attitude and ethics, employee etiquettes. Benefits of ethics in workplace employee commitment, investor loyalty, customer satisfaction, profits professionalism at workplace: unethical conduct for employees and employers. Factors leading to unethical behaviours, different unethical behaviours, measures to control unethical behaviours, rewarding ethical behaviour

Unit II: Business ethics: overview of business ethics, corporate governance, ethical issues in human resource management- the principal of ethical hiring, firing, worker safety, whistle blowing, equality of opportunity, discrimination, ethics and remuneration, ethics in retrenchment. Ethical dilemmas at workplace, ethical issues in global business, corporate responsibility of employers, workplace privacy & ethics: privacy at workplace, hardware, software and spyware, plagiarism and computer crimes, convenience and death of privacy, defence of employee privacy rights. Teamwork at workplace: teams, elements of team, stages of team development, team meetings, team rules, and teams work and professional responsibility, rules of professional responsibility, ASME code of ethics, discrimination, sexual harassment, creating awareness about workplace harassment, compulsory workplace guidelines, ethics of managing change in workshop.

Teaching scheme	Credit	Examination scheme
Tutorial: 01 Hours/week	--	Grade

Pre-requisites

None

Course objectives

01 Develop understanding of social responsibility
02 Understand the International framework for Social Responsibility
03 Know the drivers of social responsibility in India
04 Identify the key stakeholders of social responsibility

Course outcomes

On successful completion of this course, the learner will be able to:

01 Develop understanding of social responsibility
02 Learn the International framework for Social Responsibility
03 Know the drivers of social responsibility in India
04 Identify the key stakeholders of social responsibility

Course Contents

Unit 1: Introduction to social responsibility meaning and definition, history of social responsibility, concepts of charity, social philanthropy, citizenship, sustainability and stakeholder management, environmental aspects of social responsibility. International framework for social responsibility: millennium development goals, sustainable development goals, relationship between corporate social responsibility and millennium development goals, OECD corporate social responsibility policy tool.

Unit 2: Drivers of social responsibility in India: market based pressure and incentives, civil society pressure, the regulatory environment in India counter trends, review of current trends and opportunities in social responsibility, review of successful corporate initiatives and challenges of social responsibility. Identifying key stakeholders of social responsibility: role of public sector in corporate, government programs, non-profit and local self-governance in implementing social responsibility, global compact self-assessment tool, national voluntary guidelines by govt. of India, roles and responsibilities of corporate foundations.

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401013 e Elective V: Hydropower Engineering

Teaching scheme	Credits	Examination scheme
Lectures: 03 Hours/week	03	In semester exam: 30 Marks End semester exam: 70 Marks

Pre-requisites

Basics of fluid mechanics, hydrology

Course objectives

01 Introduce the energy resources planning and potential concept.
02 Estimate the load factor and study the power house components and layout.
03 Understand the design of hydraulic turbines and study the economic consideration of hydroelectric power.

Course outcomes

On successful completion of this course, the learner will be able to,

01 Understand the classification of power resources & trends in energy use patterns.
02 Identify the components of hydro power plant.
03 Analyze the load assessment for turbines.
04 Prepare the layout of power house based on the various structures need for it.
05 Design the turbines and surge tanks.
06 Understand the laws and regulatory aspects of hydroelectric power.

Course Content

Unit 1: Hydropower Plants & Its Classification (06 hours) Introduction: sources and forms of energy, types of power plants, and elements of hydropower scheme, hydropower development in India. Power house structures-substructure and superstructure layout and dimensions, deign considerations. Hydropower plants classification: surface and underground power stations, low medium-high head plants-layout and components, pumped storage plants, tidal power plants, micro tidal units.

Unit 2: Energy Resources and Load Assessment (06 hours)
Estimation of electrical load on turbines, load factor, plant factor, peak demand and utilization factor,load curve, load duration curve, prediction of load, tariffs, hydro-thermal mix, combined efficiency ofhydro-thermal-nuclear power plants.

Unit 3: Power and Energy Potential study (06 hours)
Processing of hydrological data, use of extreme and long term hydrological data, mass and elevationvolume curves, flow duration curves, gross and net head and estimation, reservoirs and theirregulation, need for flow regulation, source of sediment, sediment yield in rivers, life of thereservoirs, methods of fixing installed capacity of a hydropower plant, estimation of power andenergy potential, mean and peak load, load curve, load factor.

Unit 4: Water Conductor System and Powerhouse (06 hours)

Water conductor system, alignment, intake structures, location and types, trash rack, penstock andpressure shaft, types of powerhouses, typical layout of powerhouse, components, power plantequipment's, instrumentation and control.

Unit 5: Design of Hydraulic Turbines (06 hours)

Components of hydraulic turbines, standardization and selection of turbine, Pelton turbine design,Francis turbine runner design, design of axial turbine runner including bulb turbine, draft tube theory,standardization and applications draft tube. Water hammer and surge tanks: rigid and elastic watercolumn theories, water hammer pressure, behavior of surge tanks, types of surge tanks, hydraulicdesign, design of simple surge tank-stability

Unit 6: Economics of Hydroelectric Power: (06 hours

Hydropower, economic value and cost and total annual cost. economic considerations – pricing of electricity, laws and regulatory aspects, policies, electricity act- 2003, investment in the power sector, carbon credits, participation of private sector.

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401014 e: Elective VI: Green Structures and Smart Cities

Teaching scheme	Credits	Examination scheme
Lectures: 3 hours/week	03	In semester exam: 30 marks End semester exam: 70 marks

Pre-requisites

Understanding of basic civil and environmental engineering

Course objectives

01 To understand green structures and energy efficient materials and their impacts on sustainability
02 To describe different terminologies and engineering concepts involved in smart city.
03 To understand the importance of smart cities with available case studies from India.

Course outcomes

On successful completion of this course, the learner will be able to,

01 Students should be able to describe the importance of energy and minimization by altering the building materials.
02 Students should be able to understand the importance green construction and green rating system
03 Students should be able to introduce the applications of energy conservation and efficiency practices in buildings.
04 Students should be able to understand phases and approval involved in smart city project.
05 Students should be able to assess the national and global experience of smart cities.
06 Students should be able to understand the importance of sustainable development and current protocol of sustainable development goals.

Course contents

Unit 1: Introduction to Embodied Energy (06hours)

Introduction to embodied energy, operational energy in building and life cycle energy, ecological foot print, bio-capacity and calculation of planet equivalent, introduction to civil engineering materials with embodied energy minimization concept and utilization

Unit 2: Green Construction Practices (06 hours)

Introduction to green construction practices, operational energy reduction and net zero building, introduction to optimization for design of building for energy efficiency, examples of optimization, introduction to radiation budget, surface water balance, effects of trees and microclimatic modification through greening, importance of rating and rating systems.

Unit 3: Building Integrated Photo Voltaic (06 hours) Introduction to use of building integrated photo voltaic (BIPV) and other renewable energy in buildings their basic concepts and efficiency, introduction to energy conservation building code (ECBC-2017), mandaroty requirement for comfort system and control and electrical and renewable energy system, introduction to concepts of overall thermal transfer value (OTTV) etc.

Unit 4: Introduction to Smart Cities (06 hours)

Introduction to smart cities, introduction to city planning, dimensions of smart cities, phases, stages ofproject & their approval status, conventional Vs. smart city components, energy demand, green approach to meet energy demand, index of Indian cities towards smartness, introduction to statistical analysis.

Unit 5: Singular-Hybrid Smart Cities (06 hours)

Conventional cities, consequences, alternative resources, reliability on predictability scale, solar options, PV and thermal; singular or hybrid, global experience of smart cities, smart cities, global standards and performance benchmarks, practice codes, India "100 smart cities" policy and mission, smart city planning and development.

Unit 6: Sustainable Smart City (06 hours)

Swachh Bharat mission and smart cities program, financing smart cities development, smart city case studies, governance of smart cities, introduction to artificial intelligence (AI) in smart cities, introduction to (sustainable development goal) SDG, the importance of SDG 11.

B. E. Civil (2019 Pattern) w. e. f. June 2022

401 015: Project Stage II

Teaching scheme	Credits	Examination scheme
Practical: 04 Hours/week	03	Term Work: 100 Marks Oral: 50 Marks

Pre-requisites

Fundamentals of Civil Engineering

Course objectives

01 Identify latest technical/practical problems in the field of Civil Engineering.

02 Inculcate the ability to describe, interpret and analyze technical content.

03 Develop competence in preparing report which will enhance critical thinking and develop the skill of technical writing along with presentation.

Course outcomes

On successful completion of this course, the learner will be able to:

01 Appraise the current Civil Engineering research/techniques/developments/interdisciplinary areas.

02 Review and organize literature survey utilizing technical resources, journals etc.

03 Evaluate and draw conclusions related to technical content studied.

04 Demonstrate the ability to perform critical writing by preparing a technical report.

05 Develop technical writing and presentation skills.

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w. e. f. July 2022 401019 Audit Course II b: Human Rights

Teaching scheme	Credit	Examination scheme
Tutorial: 01 Hours/week	--	Grade

Pre-requisites
None

Course objectives

01 Understand the concept of Human rights and Human rights Movement
02 Understand the Human rights and Indian Constitution
03 Gather Knowledge about Human Rights of the Different Sections and contemporary issues
04 Gather knowledge about international scene towards human rights with reference to engineering Industry

Course outcomes
On successful completion of this course, the learner will be able to,

01 Gather Knowledge about Human rights and Human rights Movement
02 Develop understanding of Human rights and Indian Constitution
03 Discuss Human Rights of the Different Sections and contemporary issues
04 Discuss International scenario towards human rights with reference to engineering Industry

Course Content

Unit 1: Human rights: concept, development, evolution-philosophical, sociological and political debates, benchmarks of human rights movement. Human rights and the Indian constitution: constitutional framework, fundamental rights and duties, directive principles of state policy, welfare state and welfare schemes. Human rights and state mechanisms: police and human rights, judiciary and human rights, prisons and human rights, national and state human rights commissions.

Unit 2: Human rights of the different sections and contemporary issues: unorganized sector, right to environment, particularly industrial sectors of civil engineering and mechanical engineering, globalization and human rights, right to development, citizens' role and civil society: social movements and non-governmental organizations, public interest litigation. Role of non-government organizations in implementation of human rights: right to information. Human rights and the international scene: primary information with reference to engineering. Industry: UN documents, International mechanisms (UN & Regional), International criminal court.