



Hon. Shri Babanrao Pachpute Vichardhara Trust's GOI

Faculty of Engineering, Kashti

Criterion 1

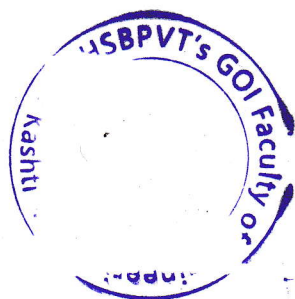
1.3: Curriculum Enrichment

1.3.1 Institution integrates crosscutting issues relevant to Professional Ethics, Gender, Human Values, Environment and Sustainability into the Curriculum.

In the curriculum provided by the SPP University of different Programs the following courses are addressing below mentioned cross-cutting issues:

1. Professional Ethics
2. Gender
3. Human Values
4. Environment and Sustainability

Sr. No	Program	Course Name	Course Code	1	2	3	4
1	FE (2019 Course)	AC1: Environmental Studies-I	101007				✓
		AC2: Environmental Studies-II	101014				✓
		AC2: Physical Education-Exercise and Field Activities	107015	✓	✓		
2	Computer Engineering (2019 Course)	Business Communication Skills Laboratory	210250	✓	✓	✓	
		AC3-IV: Smart Cities	210251				✓
		Code of Conduct	210259				
		AC4-IV: Yoga and Meditation	210261				✓
		AC5-I: Cyber Security	310250A	✓	✓	✓	
		AC6-III: Leadership and Personality Development	310259C	✓		✓	
3	E&TC Engineering (2019 Course)	AC3-Technical English For Engineers	204190	✓		✓	
		Employability Skill Development	204199	✓		✓	
		AC4-Speaking Effectively	204201	✓		✓	
		Skill Development	304190	✓			
		AC5-Developing Soft skills and Personality	304191A	✓		✓	
		AC6-Patent Law for Engineers and Scientists	304191 B	✓			
		AC7-Educational Leadership	404189	✓			
4	Electrical Engineering (2019 Course)	Soft Skill	203151	✓		✓	
		AC3-II: C Language Programming	203152B	✓			
		AC4-I: Installation & Maintenance of Electrical appliances	203153B	✓			✓
		AC5-I: Energy Storage System	303147A	✓			
		Energy Management	303151D	✓			✓
		AC6-I: Ethical Practices for Engineers	303153A			✓	
		AC7-III: Sustainability(IGBC)	403147C	✓			
		AC8-III: Green Building	403153C				✓



Principal

HSBPVT's GOI FOE
Principal

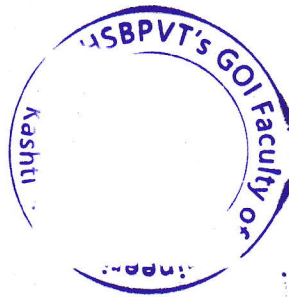
HSBPVT's GOI, Faculty of Engineering
Kashti, Tal. Shrigonda, Dist. Ahmednagar



Hon. Shri Babanrao Pachpute Vichardhara Trust's GOI

Faculty of Engineering, Kashti

Sr. No	Program	Course Name	Course Code	1	2	3	4
5	Mechanical Engineering (2019 Course)	AC3-IV: Developing soft skills and personality	202046	✓		✓	
		AC4-IV: Speaking Effectively	202053	✓			
		Skill Development	302047	✓		✓	
		AC5-I: Entrepreneurship and IP strategy	302048	✓			
		AC6-I: Business and Sustainable Development	302056	✓		✓	
6	Civil Engineering (2019 Course)	AC1-II: Road Safety Management	201007	✓			
		AC2-I: Disaster Management	201018	✓			✓
		Construction Management	301005 C	✓			✓
		Solid Waste Management	301015 F	✓			✓
		AC1-II: Sustainable Energy Systems	301011 B				✓
		AC2-II: Industrial Safety	301021	✓		✓	✓
		Air Pollution and Control	401004 A				✓
		AC1: Stress Management by Yoga	401010				✓
AC2: Social Responsibility	401019				✓		
7	All Program	Project Based Learning (PBL)	--	✓		✓	✓
8	All Program	Internships	--	✓		✓	✓
9	All Program	Mini Projects	--	✓		✓	✓
10	All Program	Skills Development Programs	--	✓	✓	✓	✓
11	NSS	Blood Donation, Gender Equality, Tree Plantation	--	✓	✓	✓	✓



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HSBPVT's GOI Faculty of Engineering
Kashti, Tal. Shrigonda, Dist. Ahmednagar.

Savitribai Phule Pune University
Faculty of Science & Technology



Curriculum

For

First Year

Bachelor of Engineering
(Choice Based Credit System)

(2019 Course)

(With Effect from Academic Year 2019-20)

TABLE -1 First Engineering _Structure for Semester-I

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credits			
		Theory	Practical	Tutorial	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
107001	Engineering Mathematics-I	03	--	01	30	70	25	--	--	125	03	--	01	04
107002/ 107009	Engineering Physics / Engineering Chemistry	04	02	--	30	70	--	25	--	125	04	01	--	05
102003	Systems in Mechanical Engineering	03	02	--	30	70	--	25	--	125	03	01	--	04
103004 / 104010	Basic Electrical Engineering / Basic Electronics Engineering	03	02	--	30	70	--	25	--	125	03	01	--	04
110005/ 101011	Programming and Problem Solving / Engineering Mechanics	03	02	--	30	70	--	25	--	125	03	01	--	04
111006	Workshop [@]	--	02	--	--	--	--	25	--	25	--	01	--	01
Total		16	10	01	150	350	25	125	--	650	16	05	01	22
101007	Audit Course 1 ^{&}	02	Environmental Studies-I											

Induction Program : 2 weeks at the beginning of semester-I and 1 week at the beginning of semester-II

TABLE -2 First Engineering _Structure for Semester-II

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credits			
		Theory	Practical	Tutorial	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
107008	Engineering Mathematics-II	04	--	01	30	70	25	--	--	125	04	--	01	05
107002/ 107009	Engineering Physics/ Engineering Chemistry	04	02	--	30	70	--	25	--	125	04	01	--	05
103004 / 104010	Basic Electrical Engineering / Basic Electronics Engineering	03	02	--	30	70	--	25	--	125	03	01	--	04
110005/ 101011	Programming and Problem Solving / Engineering Mechanics	03	02	--	30	70	--	25	--	125	03	01	--	04
102012	Engineering Graphics ^Ω	01	02	01	--	50	25	--	--	75	01	01	--	02
110013	Project Based Learning [§]	--	04	--	--	--	25	50	--	75	--	02	--	02
Total		15	12	02	120	330	75	125	--	650	15	05	02	22
101014	Audit Course 2 ^{&}	02	Environmental Studies-II											
107015		--	Physical Education-Exercise and Field Activities											

4.	Demonstration of Drilling machine Demonstration on construction of Radial drilling machine, Tool holding devices, Concept of speed, feed and depth of cut.
5.	Demonstration on Milling machine Demonstration on construction, table movements, indexing and tooling of milling machine.
6.	Demonstration of Shaper/Grinding machine (Any one) Shaper: Crank and slotted link mechanism, Work feed mechanism Grinding: Surface grinder/Cylindrical grinding machine, Mounting of grinding wheel
7.	Term work includes one job of Carpentry Introduction to wood working, kinds of woods, hand tools & machines, Types of joints, wood turning. Pattern making, types of patterns and its allowances.
8.	Term work to include one job involving fitting to size, male-female fitting with drilling and tapping operation on Mild Steel plate; Introduction to marking, cutting and sawing, sizing of metal, shearing, Concept of fits and interchangeability, selection of datum and measurements.
9.	Term work to include one utility job preferably using sheet metal (e.g. Tray, Funnel etc.) with riveting/welding/brazing/soldering (at least one temporary and one Permanent joint either using resistance welding/Arc welding); Introduction to sheet metal operations: punching, blanking, bending, drawing.
10.	Prepare a Layout of Workshop To prepare a work shop layout.
11.	Collection of information about safety norms in any one of the following type of industry: Metalworking/Chemical/Cement/Pharmaceuticals/Defense/Atomic energy/Aerospace /Marine/Construction/Railway etc.

Reference/Text Books

1. John, K. C., (2010), "Mechanical Workshop Practice, Prentice Hall Publication, New Delhi
2. Hazra and Chaudhary, Workshop Technology-I & II, Media promoters & Publisher Pvt. Ltd.

101007: Environmental Studies-I

TH:02 Hrs./week

(Mandatory Non-Credit Course)

Course Objectives:

1. To explain the concepts and strategies related to sustainable development and various components of environment.
2. To examine biotic and abiotic factors within an ecosystem, to identify food chains, webs, as well as energy flow and relationships.
3. To identify and analyze various conservation methods and their effectiveness in relation to renewable and nonrenewable natural resources.
4. To gain an understanding of the value of biodiversity and current efforts to conserve biodiversity on national and local scale.

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

CO1: Demonstrate an integrative approach to environmental issues with a focus on sustainability.

CO2: Explain and identify the role of the organism in energy transfers in different ecosystems.

CO3: Distinguish between and provide examples of renewable and nonrenewable resources & analyze personal consumption of resources.

CO4: Identify key threats to biodiversity and develop appropriate policy options for conserving biodiversity in different settings.

Course Contents

<p>Unit I Introduction to environmental studies (02 Hrs) Multidisciplinary nature of environmental studies; components of environment – atmosphere, hydrosphere, lithosphere and biosphere. Scope and importance; Concept of sustainability and sustainable development.</p>		
<p>Unit II Ecosystems (06 Hrs) What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chain, food web and ecological succession. Case studies of the following ecosystems: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)</p>		
<p>Unit III Natural Resources: Renewable and Non-renewable Resources (08 Hrs) Land Resources and land use change; Land degradation, soil erosion and desertification. Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water: Use and over-exploitation of surface and ground water, floods droughts, conflicts over water (international & inter-state). Heating of earth and circulation of air; air mass formation and precipitation. Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.</p>		
<p>Unit IV Biodiversity and Conservation (08 Hrs) Levels of biological diversity: genetic, species and ecosystem diversity; Biogeography zones of India; Biodiversity patterns and global biodiversity hot spots. India as a mega-biodiversity nation; Endangered and endemic species of India. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity; In-situ and Ex-situ conservation of biodiversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.</p>		
<p>Suggested Readings:</p> <ol style="list-style-type: none"> 1. Carson, R. 2002. Silent spring. Houghton Mifflin Harcourt. 2. Gadgil, M., & Guha, R.1993. This Fissured Land: An Ecological History of India. Univ. of California Press. 3. Gleeson,B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge. 4. Gleick, P.H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press. 5. Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll. Principals of Conservation Biology. Sunderland: Sinauer Associates, 2006. 6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India’s Himalaya dams. Science, 339:36-37. 7. McCully, P.1996. Rivers no more: the environmental effects of dams (pp.29-64). Zed Books. 8. McNeil, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century. 		
<p>107008 – Engineering Mathematics – II</p>		
<p>Teaching Scheme: TH : 4 Hrs./Week TUT : 1 Hr./Week</p>	<p>Credits 05</p>	<p>Examination Scheme: In-Semester : 30 Marks End-Semester : 70 Marks TW : 25 Marks</p>
<p>Prerequisites: Integration, Differential Equation, Three-dimensional coordinate systems</p>		

<p>Evaluation and Continuous Assessment: It is recommended that the all activities are to be record and regularly, regular assessment of work to be done and proper documents are to be maintained at college end by both students as well as mentor (you may call it PBL work book). Continuous Assessment Sheet (CAS) is to be maintained by all mentors/department and institutes. <u>Recommended parameters for assessment, evaluation and weightage:</u></p> <ul style="list-style-type: none"> • Idea Inception (5%) • Outcomes of PBL/ Problem Solving Skills/ Solution provided/ Final product (50%) (Individual assessment and team assessment) • Documentation (Gathering requirements, design & modeling, implementation/execution, use of technology and final report, other documents) (25%) • Demonstration (Presentation, User Interface, Usability etc) (10%) • Contest Participation/ publication (5%) • Awareness /Consideration of -Environment/ Social /Ethics/ Safety measures/Legal aspects (5%) <p>PBL workbook will serve the purpose and facilitate the job of students, mentorand project coordinator. This workbook will reflect accountability, punctuality, technical writing ability and work flow of the work undertaken.</p>		
<p>References:</p> <ul style="list-style-type: none"> • Project-Based Learning, Edutopia, March 14, 2016. • What is PBL? Buck Institute for Education. • www.schoolology.com • www.wikipedia.org • www.howstuffworks.com 		
<p>101014: Environmental Studies-II Mandatory Non-Credit Course</p>		
<p>TH: 02 Hr/week</p>		
<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To provide a comprehensive overview of environmental pollution and the science and technology associated with the monitoring and control. 2. To understand the evolution of environmental policies and laws. 3. To explain the concepts behind the interrelations between environment and the development. 4. To examine a range of environmental issues in the field, and relate these to scientific theory. 		
<p>Course Outcomes:On completion of the course, learner will be able to–</p> <p>CO1: Have an understanding of environmental pollution and the science behind those problems and potential solutions.</p> <p>CO2: Have knowledge of various acts and laws and will be able to identify the industries that are violating these rules.</p> <p>CO3: Assess the impact of ever increasing human population on the biosphere: social, economic issues and role of humans in conservation of natural resources.</p> <p>CO4: Learn skills required to research and analyze environmental issues scientifically and learn how to use those skills in applied situations such as careers that may involve environmental problems and/or issues.</p>		
<p>Course Contents</p>		
<p>Unit V</p>	<p>Environmental Pollution</p>	<p>(08 Hrs)</p>
<p>Environmental pollution : types, causes, effects and controls; Air, water, soil, chemical and noise pollution Nuclear hazards and human health risks Solid waste management: Control measures of urban and industrial waste</p>		

Pollution case studies.		
Unit VI	Environmental Pollution	(07 Hrs)
Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities & agriculture. Environment Laws : Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife protection Act; Forest Conservation Act; International agreements; Montreal and Kyoto Protocols and conservation on Biological Diversity (CBD). The Chemical Weapons Convention (CWC). Nature reserves, tribal population and rights, and human, wildlife conflicts in Indian context		
Unit VII	Human Communities and the Environment	(06 Hrs)
Human population and growth; Impacts on environment, human health and welfares. Carbon foot-print. Resettlement and rehabilitation of project affected persons; case studies. Disaster management: floods earthquakes, cyclones and landslides. Environmental movements: Chipko, Silent valley, Bishnios of Rajasthan. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).		
Unit VIII	Field work	(05 Hrs)
<ul style="list-style-type: none"> • Visit to an area to document environmental assets; river/forest/flora/fauna, etc. • Visit to a local polluted site – Urban/Rural/Industrial/Agricultural. • Study of common plants, insects, birds and basic principles of identification. • Study of simple ecosystems-pond, river Delhi Ridge, etc 		
Suggested Readings:		
<ol style="list-style-type: none"> 1. Carson, R. 2002. Silent spring. Houghton Mifflin Harcourt. 2. Gadgil, M., & Guha, R.1993. This Fissured Land: An Ecological History of India. Univ. of California Press. 3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge. 4. Gleick, P.H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press. 5. Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll. Principals of Conservation Biology, Sunderland: Sinauer Associates, 2006 6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339:36-37. 7. McCully, P.1996. Rivers no more: the environmental effects of dams (pp.29-64). Zed Books. 8. McNeil, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century. 		

**Faculty of Science and Technology
Savitribai Phule Pune University
Maharashtra, India**



**Curriculum
for
Second Year of Computer Engineering
(2019 Course)
(With effect from 2020-21)**

Savitribai Phule Pune University

Second Year of Computer 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	Mid-Sem	End-Sem	TW	PR	OR	Total	TH	PR	TUT	Total
210241	Discrete Mathematics	03	-	01	30	70	-	-	-	100	03	--	01	04
210242	Fundamentals of Data Structures	03	-	-	30	70	-	-	-	100	03	-	-	03
210243	Object Oriented Programming	03	-	-	30	70	-	-	-	100	03	-	-	03
210244	Computer Graphics	03	-	-	30	70	-	-	-	100	03	-	-	03
210245	Digital Electronics and Logic Design	03	-	-	30	70	-	-	-	100	03	-	-	03
210246	Humanity and Social Science	-	-	01	-	-	-	-	-	-	-	-	-	-
210247	Data Structures Lab	-	04	-	-	-	25	50	-	75	-	02	-	02
210248	OOP and Computer Graphics Lab	-	04	-	-	-	25	50	-	75	-	02	-	02
210249	Digital Electronics Lab	-	02	-	-	-	25	-	-	25	-	01	-	01
210250	Business Communication Skills Lab	-	02	-	-	-	25	-	-	25	-	01	-	01
210251	Audit Course 3	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Credit											15	06	01	22
Total		15	12	02	150	350	100	100	-	700	-	-	-	-

Semester-IV

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit			
		Theory	Practical	Tutorial	Mid-Sem	End-Sem	TW	PR	OR	Total	TH	PR	TUT	Total
210252	Mathematics III	03	-	01	30	70	-	-	-	100	03	--	01	04
210253	Data Structures and Algorithms	03	-	-	30	70	-	-	-	100	03	-	-	03
210254	Software Engineering	03	-	-	30	70	-	-	-	100	03	-	-	03
210255	Microprocessor	03	-	-	30	70	-	-	-	100	03	-	-	03
210256	Principles of Programming Languages	03	-	-	30	70	-	-	-	100	03	-	-	03
210257	Data Structures and Algorithms Lab	-	04	-	-	-	25	50	-	75	-	02	-	02
210258	Microprocessor Lab	-	04	-	-	-	25	50	-	75	-	02	-	02
210259	Code of Conduct	-	-	01	-	-	-	-	-	-	-	-	-	-
210260	Project Based Learning	-	04	-	-	-	50	-	-	50	-	02	-	02
210261	Audit Course 4	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Credit											15	06	01	22
Total		15	12	02	150	350	100	100	-	700	-	-	-	-



Savitribai Phule Pune University Second Year of Computer Engineering (2019 Course) 210250: Business Communication Skills Laboratory		
Teaching Scheme: PR: 02 Hours/Week	Credit 01	Examination Scheme: TW: 25 Marks
Guidelines for Instructor's Manual		
The instructor's manual is to be developed as a hands-on resource and reference. The instructor's manual needs to include prologue (about University/program/ institute/ department/foreword/preface), University syllabus, conduction & Assessment guidelines, topics under consideration concept objectives, outcomes, guidelines, references.		
Guidelines for Student's Laboratory Journal and Guidelines for Laboratory /TW Assessment		
The student must prepare the journal in the form of report elaborating the activities performed in the lab. Continuous assessment of laboratory work is to be done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, punctuality, neatness, enthusiasm, participation and contribution in various activities-SWOT analysis, presentations, team activity, event management, group discussion, Group exercises and interpersonal skills and similar other activities/assignments.		
Guidelines for Laboratory Conduction		
The instructor may frame assignments to enhance skills supporting career aspects. Multiple set of activity based assignments can be prepared and distributed among batches. Every student must be given adequate opportunity to participate actively in each activity. An exercise can be designed to allow multiple skills exposure for example a group task encouraging discussions, team building, value sharing, leadership and role play all at the same time.		
Suggested List of Laboratory Experiments/Assignments		
Sr. No.	Suggested List of Laboratory Experiments/Assignments	
1	SWOT analysis The students should be made aware of their goals, strengths and weaknesses, attitude, moral values, self-confidence, etiquettes, non-verbal skills, achievements. through this activity. SWOT Analysis, Confidence improvement, values, positive attitude, positive thinking and self-esteem. The concern teacher should prepare a questionnaire which evaluate students in all the above areas and make them aware about these aspects	
2	Personal & Career Goal setting – Short term & Long term The teacher should explain to them on how to set goals and provide template to write their short term and long term goals.	
3	Public Speaking Any one of the following activities may be conducted : 1. Prepared speech (Topics are given in advance, students get 10 minutes to prepare the speech and 5 minutes to deliver.) 2. Extempore speech (Students deliver speeches spontaneously for 5 minutes each on a given topic) 3. Story telling (Each student narrates a fictional or real life story for 5 minutes each) 4. Oral review (Each student orally presents a review on a story or a book read by them)	

4	<p>Reading and Listening skills</p> <p>The batch can be divided into pairs. Each pair will be given an article (any topic) by the teacher. Each pair would come on the stage and read aloud the article one by one. After reading by each pair, the other students will be for correct answers and also for their reading skills. This will evaluate their reading and listening skills. The teacher should give them guidelines on improving their reading and listening skills. The teacher should also give passages asked questions on the article by the readers. Students will get marks on various topics to students for evaluating their reading comprehension.</p>
5	<p>Group discussion</p> <p>Group discussions could be done for groups of 5-8 students at a time Two rounds of a GD for each group should be conducted and teacher should give them feedback.</p>
6	<p>Letter/Application writing</p> <p>Each student will write one formal letter, and one application. The teacher should teach the students how to write the letter and application. The teacher should give proper format and layouts.</p>
7	<p>Report writing</p> <p>The teacher should teach the students how to write report .The teacher should give proper format and layouts. Each student will write one report based on visit / project / business proposal.</p>
8	<p>Resume writing- Guide students and instruct them to write resume</p>
9	<p>Presentation Skill</p> <p>Students should make a presentation on any informative topic of their choice. The topic may be technical or non-technical. The teacher should guide them on effective presentation skills. Each student should make a presentation for at least 10 minutes.</p>
10	<p>Team games for team building - Students should make to participate in team activity.</p>
11	<p>Situational games for role playing as leaders</p>
12	<p>Faculty may arrange one or more sessions from following:</p> <p>Yoga and meditation. Stress management, relaxation exercises, and fitness exercises. Time management and personal planning sessions.</p>
13	<p>Mock interviews- guide students and conduct mock interviews</p>
14	<p>Telephonic etiquettes -To teach students the skills to communicate effectively over the phone.</p> <p>Students will be divided into pairs. Each pair will be given different situations, such as phone call to enquire about job vacancy, scheduling a meeting with team members, phone call for requesting of urgent leave from higher authorities. Students will be given 10 min to prepare. Assessment will be done on the basis of performance during the telephone call.</p>
15	<p>Email etiquettes -To provide students with an in-depth understanding of email skills.</p> <p>Students will be made to send e-mails for different situations such as sending an e-mail to the principal for a leave, inviting a friend for a party, e-mail to enquire about room tariff of a hotel. Students will be assessed on the basis of e-mail such as clarity, purpose and proof reading of e-mail.</p>

AC3-IV: Smart Cities

We breathe in a world defined by urbanization and digital ubiquity, where mobile broadband connections outnumber fixed ones, machines dominate a new "internet of things," and more people live in cities than in the countryside. This course enables us to take a broad historical look at the forces that have shaped the planning and design of cities and information technologies from the rise of the great industrial cities of the nineteenth century to the present. This course considers the motivations, aspirations, and shortcomings of them all while offering a new civics to guide our efforts as we build the future together, one click at a time.

Course Objectives

- To identify urban problems
- To study Effective and feasible ways to coordinate urban technologies.
- To study models and methods for effective implementation of Smart Cities.
- To study new technologies for Communication and Dissemination.
- To study new forms of Urban Governance and Organization.

Course Outcomes

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

1. Better understanding of the dynamic behavior of the urban system by going beyond the physical appearance and by focusing on representations, properties and impact factors
2. Exploration of the city as the most complex human-made organism with a metabolism that can be modeled in terms of stocks and flows
3. Knowledge about data-informed approaches for the development of the future city, based on crowd sourcing and sensing
4. Knowledge about the latest research results in for the development and management of future cities
5. Understanding how citizens can benefit from data-informed design to develop smart and responsive cities

Course Contents

Urbanization and Ubiquity - The slow emergence of learning cities in an urbanizing world. Cities as collective learners, what do we know?- Framing a view -A gamut of learning types - Secrets of knowing and accelerating change - Why some cities learn and others do not.

References:

1. Anthony M. Townsend, W. W. Norton & Company- "Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia", ISBN: 0393082873, 9780393082876.
2. Tim Campbell, Routledge -Beyond Smart Cities: How Cities Network, Learn and Innovate , Routledge, ISBN: 9781849714266.
3. Stan Geertman, Joseph Ferreira, Jr. Robert Goodspeed, John Stillwell, "Planning Support System ms and Smart Cities", Lecture notes in Geo information and Cartography, Springer.



Savitribai Phule Pune University Second Year of Computer Engineering (2019 Course) 210259: Code of Conduct		
Teaching Scheme:	Credit	Examination Scheme:
TUT: 01 Hours/Week	00	---
<p>Preamble: Engineering is one of the important and cultured professions. With respect to any engineering profession, engineers are expected to exhibit the reasonable standards of integrity and honesty. Engineering is directly or indirectly responsible to create a vital impact on the quality of life for the society. Acceptably, the services provided by engineers require impartiality, honesty, equity and fairness and must give paramount importance to the protection of the public health, safety, and welfare. Engineers must perform under a standard of professional behavior that requires adherence to the principles of ethical conduct. Prime aim is to recognize and evaluate ethical challenges that they will face in their professional careers through knowledge and exercises that deeply challenge their decision making processes and ethics.</p>		
<p>Course Objectives:</p> <ul style="list-style-type: none"> • To promote ethics, honesty and professionalism. • To set standards that are expected to follow and to be aware that If one acts unethically what are the consequences. • To provide basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals and Virtues • To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards, Exposure to Safety and Risk, Risk Benefit Analysis • To have an idea about the Collegiality and Loyalty, Collective Bargaining, Confidentiality, Occupational Crime, Professional, Employee, Intellectual Property Rights. 		
<p>Course Outcomes: On completion of the course, learner will be able to–</p> <p>CO1: Understand the basic perception of profession, professional ethics, various moral & social issues, industrial standards, code of ethics and role of professional ethics in engineering field.</p> <p>CO2: Aware of professional rights and responsibilities of an engineer, responsibilities of an engineer for safety and risk benefit analysis.</p> <p>CO3: Understand the impact of the professional Engineering solutions in societal and Environmental contexts, and demonstrate the knowledge of, and need for sustainable development.</p> <p>CO4: Acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives.</p>		
Course Contents		
<p>The following are the certain guidelines as far as ethics and code of conduct are concerned to be clearly and elaborately explained to the students,</p> <p>Fundamental norms Engineers, in the fulfillment of their professional duties, should include paying utmost attention to the safety, health, and welfare of the society. Along with that engineers should execute the services only in their areas of competence. Whenever there is a need to issue public statements then such statements should be expressed in objective and truthful manner. Engineer should extend high sense of integrity by acting for each employer or client as faithful agents or trustees. Whatever may be the working scope engineer should conduct</p>		

themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

As far as ethical practices are concerned engineers should not reveal facts, data, or information without the prior consent of the client or employer except as authorized or required by law or Code. Engineers should not permit the use of their name or associate in business ventures with any person or firm that they believe is engaged in fraudulent or dishonest enterprise moreover he/she should not aid or abet the unlawful practice of engineering by a person or firm.

Engineers having knowledge of any alleged violation of the Code should report thereon to appropriate professional bodies and, when relevant, also to public authorities, and cooperate with the proper authorities in furnishing such information or assistance as may be required. Engineers should disclose all known or potential conflicts of interest that could influence or appear to influence their judgment or the quality of their services. Engineers should not accept compensation, financial or otherwise, from more than one party for services on the same project, or for services pertaining to the same project, unless the circumstances are fully disclosed and agreed to by all interested parties. Engineers should not solicit or accept financial or other valuable consideration, directly or indirectly, from outside agents in connection with the work for which they are responsible.

Engineers should never falsify their qualifications or permit misrepresentation of their or their associates' qualifications. They shall not misrepresent or exaggerate their responsibility in or for the subject matter of prior assignments. Brochures or other presentations incident to the solicitation of employment shall not misrepresent pertinent facts concerning employers, employees, associates, joint ventures, or past accomplishments.

Engineers should not offer, give, solicit, or receive, either directly or indirectly, any contribution to influence the award of a contract by public authority, or which may be reasonably construed by the public as having the effect or intent of influencing the awarding of a contract. They should not offer any gift or other valuable consideration in order to secure work. They should not pay a commission, percentage, or brokerage fee in order to secure work, except to a bona fide employee or bona fide established commercial or marketing agencies retained by them.

There are certain obligations accompanied with engineering profession. Engineers should acknowledge their errors and should not distort or alter the facts. Candid advises in special cases are always welcome. Engineers should not accept outside employment to the detriment of their regular work or interest. Before accepting any outside engineering employment, they will notify their employers.

Engineers should not promote their own interest at the expense of the dignity and integrity of the profession furthermore they should treat all persons with dignity, respect, fairness, and without discrimination. Engineers should at all times strive to serve the public interest. Engineers are encouraged to participate in civic affairs; career guidance for youths; and work for the advancement of the safety, health, and well-being of their community. Engineers are encouraged to adhere to the principles of sustainable development in order to protect the environment for future generations. Engineers shall continue their professional development throughout their careers and should keep current in their specialty fields by engaging in professional practice, participating in continuing education courses, reading in the technical literature, and attending professional meetings and seminar.

Engineers should not, without consent, use equipment, supplies, laboratory, or office facilities of an employer to carry on outside private practice. They should not attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects, practice, or employment of other engineers. Engineers who believe others are guilty of unethical or illegal practice shall present such information to the proper authority for action. "Sustainable development" is the challenge for the engineers meeting human needs for natural resources, industrial products, energy, food, transportation, shelter, and effective waste management while conserving and protecting environmental quality and the natural resource base essential for future development.

Following are contents to be covered in tutorial session-

1. Engineering Ethics : Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories.
2. Global Issues -Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct
3. Engineer's Responsibility for Safety - Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk
4. Responsibilities and Rights - Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

Global Issues- Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct

#Exemplar/Case Studies :

General Motors ignition switch recalls (2014), Space Shuttle Columbia disaster (2003), Space Shuttle Challenger disaster (1986), Therac-25 accidents (1985 to 1987), Chernobyl disaster (1986), Bhopal disaster (1984), Kansas City Hyatt Regency walkway collapse (1981)

Guidelines for Conduction:

The course will exemplify the budding engineers the Code of Conduct and ethics pertaining to their area and scope of their work. The Instructor/Teacher shall explain the students the importance and impact of the ethics and code of conduct.

Confined to various courses and project/mini-project development the possible vulnerabilities and threats need to be elaborated and the students' participation need to be encouraged in designing such document explicitly mentioning Code of Conduct and Disclaimers.

Learning Resources**Books:**

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York (2005).
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics –Concepts and Cases", Thompson Learning, (2000).
3. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, (1999).
4. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, (2003)
5. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, (2001)
6. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, (2004)

David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, (2003)

Web Links:

- <https://www.ieee.org/about/compliance.html>
- <https://www.cs.cmu.edu/~bmclare/ethics/casestudies/91-7.html>
- <https://www.nspe.org/>
- http://www.ewh.ieee.org/soc/pes/switchgear/presentations/tp_files/2017-1_Thurs_Shiffbauer_Singer_Engineering_Ethics.pdf

MOOC:

@The CO-PO mapping table

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	2	2	-	-	-	-
CO2	-	-	-	-	-	-	2	2	-	-	-	-
CO3	-	-	-	-	-	-	3	2	-	-	-	-
CO4	-	-	-	-	-	-	2	3	-	-	-	-

AC4-IV: Yoga and Meditation

The concepts and practices of Yoga originated in India about several thousand years ago. Its founders were great Saints and Sages. The great Yogis presented rational interpretation of their experiences of Yoga and brought about a practical and scientifically sound method within every one's reach. Yoga today, is no longer restricted to hermits, saints, and sages; it has entered into our everyday lives and has aroused a worldwide awakening and acceptance in the last few decades. The science of Yoga and its techniques have now been reoriented to suit modern sociological needs and lifestyles.

Yoga is one of the six systems of Vedic philosophy. The Yoga advocates certain restraints and observances, physical discipline, breathe regulations, restraining the sense organs, contemplation, meditation and Samadhi. The practice of Yoga prevents psychosomatic disorders and improves an individual's resistance and ability to endure stressful situations.

Course Objectives

- To impart knowledge about the basic technique and practice of yoga, including instruction in breath control, meditation, and physical postures
- To gain an intellectual and theoretical understanding of the principles embodied in the Yoga Sutras, the Bhagavad-Gita, and other important texts and doctrines
- Relaxation and stress reduction ,Personal insight and self understanding, Personal empowerment, Gaining wisdom and spiritual discernment
- Awakening the abilities or powers of the Super conscious mind

Course Outcomes:-

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

1. Students understanding of philosophy and religion as well as daily life issues will be challenged and enhanced.
2. Enhances the immune system.
3. Intellectual and philosophical understanding of the theory of yoga and basic related Hindu scriptures will be developed.
4. Powers of concentration, focus, and awareness will be heightened.

Course Contents

1. Meaning and definition of yoga – Scope of Yoga - Aims and Objectives of Yoga – Misconception about yoga.
2. Ayurveda: an introduction to this system of health care derived from the Vedic tradition
Anatomy and Physiology as they relate to Yoga
3. Yoga Philosophy and Psychology

References:

1. B.K.S. Iyengar, "BKS Iyengar Yoga The Path to Holistic Health" , DK publisher, ISBN-13: 978-1409343479
2. Osho, "The Essence of Yoga", Osho International Foundation, ISBN: 9780918963093

**Curriculum
for
Third Year of Computer Engineering
(2019 Course)**

(With effect from 2021-22)



<http://unipune.ac.in>

Faculty of Science and Technology

**Savitribai Phule Pune University
Maharashtra, India**

Savitribai Phule Pune University															
Third Year of Computer Engineering (2019 Course)															
(With effect from Academic Year 2021-22)															
Semester V															
Course Code	Course Name	Teaching Scheme (Hours/week)			Examination Scheme and Marks						Credit Scheme				
		Lecture	Practical	Tutorial	Mid-Sem	End-Sem	Term work	Practical	Oral	Total	Lecture	Practical	Tutorial	Total	
310241	Database Management Systems	03	-	-	30	70	-	-	-	100	03	-	-	03	
310242	Theory of Computation	03	-	-	30	70	-	-	-	100	03	-	-	03	
310243	Systems Programming and Operating System	03	-	-	30	70	-	-	-	100	03	-	-	03	
310244	Computer Networks and Security	03	-	-	30	70	-	-	-	100	03	-	-	03	
310245	Elective I	03	-	-	30	70	-	-	-	100	03	-	-	03	
310246	Database Management Systems Laboratory	-	04	-	-	-	25	25	-	50	-	02	-	02	
310247	Computer Networks and Security Laboratory	-	02	-	-	-	25	-	25	50	-	01	-	01	
310248	Laboratory Practice I	-	04	-	-	-	25	25	-	50	-	02	-	02	
310249	Seminar and Technical Communication	-	-	01	-	-	50	-	-	50	-	-	01	01	
Total		15	10	01	150	350	125	50	25	700	15	05	01	21	
310250	Audit Course 5											Grade			
Total Credit											15	05	01	21	
310245 Elective I Options:						310250 Audit Course 5 Options:									
310245(A) Internet of Things and Embedded Systems						310250 (A) Cyber Security									
310245(B) Human Computer Interface						310250 (B) Professional Ethics and Etiquettes									
310245(C) Distributed Systems						310250 (C) Learn New Skills									
310245(D) Software Project Management						310250 (D) Engineering Economics									
						310250 (E) Foreign Language									
Laboratory Practice I															
Assignments from Systems Programming and Operating System and Elective I															

Savitribai Phule Pune University														
Third Year of Computer Engineering (2019 Course)													Home	
(With effect from Academic Year 2021-22)														
Semester VI														
Course Code	Course Name	Teaching Scheme (Hours/week)			Examination Scheme and Marks						Credit Scheme			
		Lecture	Practical	Tutorial	Mid-Sem	End-Sem	Term work	Practical	Oral	Total	Lecture	Practical	Tutorial	Total
310251	Data Science and Big Data Analytics	04	-	-	30	70	-	-	-	100	03	-	-	03
310252	Web Technology	04	-	-	30	70	-	-	-	100	03	-	-	03
310253	Artificial Intelligence	04	-	-	30	70	-	-	-	100	03	-	-	03
310254	Elective II	04	-	-	30	70	-	-	-	100	03	-	-	03
310255	Internship**	-	-	-	-	-	100**	-	-	100	-	-	-	04**
310256	Data Science and Big Data Analytics Laboratory	-	04	-	-	-	50	25	-	75	-	02	-	02
310257	Web Technology Laboratory	-	02	-	-	-	25	-	25	50	-	01	-	01
310258	Laboratory Practice II	-	04	-	-	-	50	25	-	75	-	02	-	02
Total		12	10	-	120	280	225	50	25	700	12	09	-	21
310259	Audit Course 6											Grade		
Total											12	09	-	21
310254 Elective II Options:						310259 Audit Course 6 Options:								
310254(A) Information Security						310259(A) Digital and Social Media Marketing								
310254(B) Augmented and Virtual Reality						310259(B) Sustainable Energy Systems								
310254(C) Cloud Computing						310259(C) Leadership and Personality Development								
310254(D) Software Modeling and Architectures						310259(D) Foreign Language								
						310259(E) Learn New Skills								
Laboratory Practice II:														
Assignments from Artificial Intelligence and Elective II .														
** Internship:														
Internship guidelines are provided in course curriculum sheet.														
Hours/Week for Theory Course in Third Year of Engineering, Semester VI:														
As per the apex bodies' recommendations and guidelines, it is need of the day to train the pre-final year students for the industrial readiness through internship. As per the guidelines of AICTE, the duration of internship is 4-6 weeks after completion of semester V and before commencement of semester VI, so it is apparent that the contact hours of the TE students need to be managed meticulously. It becomes mandatory as per the structure that 4 credits for internship must be earned by the students. Per semester, 15 weeks duration that is suggested ideally by the affiliated university will eventually reduce to fruitful 12 weeks after the implementation of the revised curriculum (2019 Course). With the evaluatory introduction of internship in the structure, we are left with the choice of 4 theory courses in the sixth semester with 12 weeks instead of traditional 15 weeks. To balance the credits and to achieve the minimum required contact hours, it is the reasonable choice to allot 4 hours / week for each theory course of the sixth semester of Third year of Engineering. The additional one lecture/ week will definitely be instrumental in achieving the largest of minimum contact hours. As such there is no correspondence of weekly load and credits earned, the credit allotted per course remain intact despite of the change. So it is almost imperative that the commencement of VI Semester need to be approx. 3 weeks beyond the schedule.														

Savitribai Phule Pune University
Third Year of Engineering (2019 Course)
310250: Audit Course 5



In addition to credits, it is recommended that there should be audit course, in preferably in each semester starting from second year in order to supplement students' knowledge and skills. Student will be awarded the bachelor's degree if he/she earns specified total credit [1] and clears all the audit courses specified in the curriculum. The student will be awarded grade as AP on successful completion of audit course. The student may opt for one of the audit courses per semester, starting in second year first semester. Though not mandatory, such a selection of the audit courses helps the learner to explore the subject of interest in greater detail resulting in achieving the very objective of audit course's inclusion. List of options offered is provided. Each student has to choose one audit course from the list per semester. Evaluation of audit course will be done at Institute level itself. Method of conduction and method of assessment for audit courses are suggested.

Criteria

The student registered for audit course shall be awarded the grade AP (Audit Course Pass) and shall be included such AP grade in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the Savitribai Phule Pune University and satisfactory performance and secured a passing grade in that audit course. No grade points are associated with this 'AP' grade and performance in these courses is not accounted in the calculation of the performance indices SGPA and CGPA. Evaluation of audit course will be done at Institute level itself [1]

Guidelines for Conduction and Assessment (Any one or more of following but not limited to):

- | | |
|--|---|
| <ul style="list-style-type: none"> • Lectures/ Guest Lectures • Visits (Social/Field) and reports • Demonstrations or presentations | <ul style="list-style-type: none"> • Surveys • Mini-Project • Hands on experience on focused topic |
|--|---|

Course Guidelines for Assessment (Any one or more of following but not limited to):

- Written Test
- Demonstrations/ Practical Test
- Presentation or Report

Audit Course 5 Options

Audit Course Code	Audit Course Title
310250(A)	Cyber Security
310250(B)	Professional Ethics and Etiquette
310250(C)	Learn New Skills -Full Stack Developer
310250(D)	Engineering Economics
310250(E)	Foreign Language (one of Japanese/ Spanish/ French/ German). Course contents for Japanese (Module 3) are provided. For other languages institute may design suitably.

Note: It is permitted to opt one of the audit courses listed at SPPU website too, if not opted earlier.

<http://collegecirculars.unipune.ac.in/sites/documents/Syllabus%202017/Forms/AllItems.aspx>
http://www.unipune.ac.in/university_files/syllabi.htm

Savitribai Phule Pune University
Third Year of Engineering (2019 Course)

[Home](#)**Audit Course 5****310250(A): Cyber Security****Prerequisites:** Computer Network and Security (310244)**Course Objectives:**

- To motivate students for understanding the various scenarios of cybercrimes
- To increase awareness about the cybercrimes and ways to be more secure in online activities
- To learn about various methods and tools used in cybercrimes
- To analyze the system for various vulnerabilities

Course Outcomes : On completion of the course, learners will be able to**CO 1:** Understand and classify various cybercrimes**CO 2:** Understand how criminals plan for the cybercrimes**CO 3:** Apply tools and methods used in cybercrime**CO 4:** Analyze the examples of few case studies of cybercrimes**Course Contents**

- 1. Introduction to Cybercrime:** Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective.
- 2. Cyber offenses: How Criminals Plan Them:** Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.
- 3. Tools and Methods Used in Cybercrime :** Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks (**Expected to cover the introduction to all these terms**).
- 4. Cybercrime: Illustrations, Examples and Mini-Cases :** Introduction, Real-Life Examples, Mini-Cases, Illustrations of Financial Frauds in Cyber Domain, Digital Signature-Related Crime Scenarios, Digital Forensics Case Illustrations, Online Scams.

Text Books :

1. Nina Godbole, Sunit Belapure , “Cyber Security- Understanding Cyber Crimes”, Computer Forensics and Legal Perspectives, Wiely India Pvt. Ltd, ISBN- 978-81-265-2179-1
2. William Stallings, “Computer Security: Principles and Practices”, Pearson 6thEd, ISBN 978-0-13-335469-0

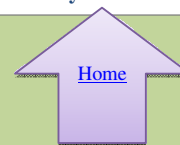
Reference Books :

1. Berouz Forouzan, “Cryptography and Network Security”, TMH, 2 edition, ISBN -978-00-707-0208-0. 5.
2. Mark Merkow, “Information Security-Principles and Practices”, Pearson Ed., ISBN- 978-81-317-1288-7
3. CK Shyamala et el., “Cryptography and Security”, Wiley India Pvt. Ltd, ISBN-978-81-265-2285-9

@The CO-PO Mapping Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1	1	1	1	1	2	1	-	3	-	1	-	2
CO2	1	1	1	1	1	1	-	3	-	1	-	2
CO3	1	1	1	1	1	1	-	3	-	1	-	2
CO4	1	1	1	1	1	1	-	3	-	1	-	2

Savitribai Phule Pune University
Third Year of Engineering (2019 Course)
310259: Audit Course 6



In addition to credits, it is recommended that there should be audit course, in preferably in each semester starting from second year in order to supplement students' knowledge and skills. Student will be awarded the bachelor's degree if he/she earns specified total credit [1] and clears all the audit courses specified in the curriculum. The student will be awarded grade as AP on successful completion of audit course. The student may opt for one of the audit courses per semester, starting in second year first semester. Though not mandatory, such a selection of the audit courses helps the learner to explore the subject of interest in greater detail resulting in achieving the very objective of audit course's inclusion. List of options offered is provided. Each student has to choose one audit course from the list per semester. Evaluation of audit course will be done at institute level itself. Method of conduction and method of assessment for audit courses are suggested.

Criteria

The student registered for audit course shall be awarded the grade AP (Audit Course Pass) and shall be included such AP grade in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the Savitribai Phule Pune University and satisfactory performance and secured a passing grade in that audit course. No grade points are associated with this 'AP' grade and performance in these courses is not accounted in the calculation of the performance indices SGPA and CGPA. Evaluation of audit course will be done at institute level itself [1]

Guidelines for Conduction and Assessment (Any one or more of following but not limited to):

- | | |
|---|---|
| <ul style="list-style-type: none"> • Lectures/ Guest Lectures • Visits (Social/Field) and reports • Demonstrations | <ul style="list-style-type: none"> • Surveys • Mini-Project • Hands on experience on focused topic |
|---|---|

Course Guidelines for Assessment (Any one or more of following but not limited to):

- Written Test
- Demonstrations/ Practical Test
- Presentations, IPR/Publication and Report

Audit Course 6 Options

Audit Course Code	Audit Course Title
310259(A)	Digital and Social Media Marketing
310259(B)	Sustainable Energy Systems
310259(C)	Leadership and Personality Development
310259(D)	Foreign Language (one of Japanese/Spanish/French/German). Course contents for Japanese (Module 4) are provided. For other languages institute may design suitably.
310259(E)	Learn New Skills - Software Development Using Agility Approach

Note: It is permitted to opt one of the audit courses listed at SPPU website too, if not opted earlier.
<http://collegecirculars.unipune.ac.in/sites/documents/Syllabus%202017/Forms/AllItems.aspx>
http://www.unipune.ac.in/university_files/syllabi.htm

Savitribai Phule Pune University
Third Year of Engineering (2019 Course)

[Home](#)

Audit Course 6
310259(C): Leadership and Personality Development

Prerequisites: General awareness of communication and relationship.

Course Objectives:

- To understand the importance of communication
- To create awareness about teamwork and people skills
- To know thyself
- To recognize current and possible future of new-age thinking

Course Outcomes:

On completion of the course, learners will be able to

CO1: Express effectively through communication and improve listening skills

CO3: Develop effective team leadership abilities.

CO4: Explore self-motivation and practicing creative/new age thinking.

CO5: Operate effectively in heterogeneous teams through the knowledge of team work, people skills and leadership qualities.

Course Contents

1. Communication :

Listening Skills, Communication - 7 C's, Vision and Charisma, Planning and Organizing - Complex Tasks and Ideas --> Actionable Tasks, Presentation Skills.

2. Teamwork and People Skills :

Talent Picking skills, Strong networking and Employee engagement, Coach and Mentor the team, Influencing, Delegate and Empower, Generous, open communicator, Patience and Clarity of Mind, Inspire and Motivate, Ensure Team Cohesion, Empathy, Trust and Reliability.

3. New-age Thinking :

Strategic Thinking, Critical and Lateral Thinking, Problem Solving Skills, Flexibility, Change Management – VUCA.

4. Self-Awareness :

What is Self? – Real, Ideal and Social Self, Concepts related to Self - Self Concept, Self-Presentation, Self-Regulation and Impression Management, Definition and Causes of Prejudice, Relationship between Prejudice, Discrimination and Exclusion, Application – Attitudinal Change and Reducing Prejudices, Self Esteem and Self Awareness, SWOT – JOHARI, Self Esteem Quiz, Introduce Your Partner, Self Introduction - How to sell yourself?-appearance, voice modulation, verbal(simple language), Motivation and Optimism, Positive Emotions and Success.

Reference Books :

1. Paul Sloane, “The Leader's Guide to Lateral Thinking Skills Unlocking the Creativity and Innovation in You and Your Team”, 2006
2. Ronald Bennett, Elaine Millam, “Leadership for engineers : the magic of mindset”
3. Urmila Rai and S.M. Rai, “Business Communication”, Himalay Publication House
4. Baron R, Byrne D, Branscombe N, BharadwajG (2009), “Social Psychology, Indian adaptation” , Pearson , New Delhi
5. Baumgartner S.R, Crothers M.K. (2009) “Positive Psychology”, Pearson Education.

@The CO-PO Mapping Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	2	-	1	1	3	-	2
CO2	-	-	-	-	-	-	-	1	-	2	1	2
CO3	-	-	-	-	-	1	-	-	2	1	-	1
CO4	-	-	-	-	-	-	-	1	-	-	2	1

Savitribai Phule Pune University
Faculty of Science and Technology



Syllabus for

**S.E (Electronics / Electronics & Telecommunication
Engineering)**

(Course 2019)

(w.e.f. June 2020)

Savitribai Phule Pune University, Pune
S.E. (Electronics / E&TC 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
207005	Engineering Mathematics III	04	-	01	30	70	25	-	-	125	04	-	01	05
204181	Electronic Circuits	03	-	-	30	70	-	-	-	100	03	-	-	03
204182	Digital Circuits	03	-	-	30	70	-	-	-	100	03	-	-	03
204183	Electrical Circuits	03	-	-	30	70	-	-	-	100	03	-	-	03
204184	Data structures	03	-	-	30	70	-	-	-	100	03	-	-	03
204185	Electronic Circuit Lab	-	02	-	-	-	-	50	-	50	-	01	-	01
204186	Digital circuits Lab	-	02	-	-	-	-	50	-	50	-	01	-	01
204187	Electrical Circuit Lab	-	02	-	-	-	25	-	-	25	-	01	-	01
204188	Data Structures Lab	-	02	-	-	-	-	-	25	25	-	01	-	01
204189	Electronic Skill Development	-	02	-	-	-	25	-	-	25	-	01	-	01
204190	Mandatory Audit Course 3 &	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		16	10	01	150	350	75	100	25	700	16	05	01	22

Savitribai Phule Pune University, Pune
S.E. (Electronics / E&TC Engineering) 2019 Course
(With effect from Academic Year 2020-21)

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
204191	Signals & Systems	03	-	01	30	70	25	-	-	125	03	-	01	04
204192	Control Systems	03	-		30	70		-	-	100	03	-	-	03
204193	Principles of Communication Systems	03	-	-	30	70	-	-	-	100	03	-	-	03
204194	Object Oriented Programming	03	-	-	30	70	-	-	-	100	03	-	-	03
204195	Signals & Control System Lab		02				50			50		01		01
204196	Principle of Communication Systems Lab	-	02	-	-	-	-	50	-	50	-	01	-	01
204197	Object Oriented Programming Lab	-	02	-	-	-	-	-	50	50	-	01	-	01
204198	Data Analytics Lab		02				-		25	25		01		01
204199	Employability Skill Development	02	02	-	-	-	50	-	-	50	02	01	-	03
204200	Project Based Learning ¹	-	04				50		-	50		02		02
204201	Mandatory Audit Course 4 ^{&}	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		14	14	01	120	280	175	50	75	700	14	07	01	22

Abbreviations:

In-Sem: In semester

End-sem: End semester

TH : Theory

TW : Term Work

PR : Practical

OR : Oral

TUT : Tutorial

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

Savitribai Phule Pune University Second Year of Electronics / E & Tc Engineering (2019 Course) 204190: Mandatory Audit Course - 3		
Teaching Scheme:	Credit	Examination Scheme:
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List of Courses to be opted (Any one) under Mandatory Audit Course 3

- Technical English For Engineers
- Ecology and Environment
- Ecology and Society
- German I
- Science, Technology and Society
- Introduction to Japanese Language and Culture

GUIDELINES FOR CONDUCTION OF AUDIT COURSE

In addition to credits courses, it is mandatory that there should be audit course (non-credit course) from second year of Engineering. The student will be awarded grade as AP on successful completion of audit course. The student may opt for two of the audit courses (One in each semester). Such audit courses can help the student to get awareness of different issues which make impact on human lives and enhance their skill sets to improve their employability. List of audit courses offered in the semester is provided in the curriculum. Student can choose one of the audit course from list of courses mentioned. Evaluation of audit course will be done at institute level.

The student registered for audit course shall be awarded the grade AP and shall be included such grade in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the Savitribai Phule Pune University and satisfactory in-semester performance and secured a passing grade in that audit course. No grade points are associated with this 'AP' grade and performance in these courses is not accounted in the calculation of the performance indices SGPA and CGPA. Evaluation of audit course will be done at institute level itself.

Selecting an Audit Course:

Using NPTEL Platform:

NPTEL is an initiative by MHRD to enhance learning effectiveness in the field of technical education by developing curriculum based video courses and web based e-courses.

The details of NPTEL courses are available on its official website www.nptel.ac.in

- Student can select any one of the courses mentioned above and has to register for the corresponding online course available on the NPTEL platform as an Audit course.
- Once the course is completed the student can appear for the examination as per the guidelines on the NPTEL portal.
- After clearing the examination successfully; student will be awarded with certificate.

Assessment of an Audit Course:

- The assessment of the course will be done at the institute level. The institute has to maintain the record of the various audit courses opted by the students. The audit course opted by the students could be interdisciplinary.
- During the course students will be submitting the online assignments. A copy of same students can submit as a part of term work for the corresponding Audit course.
- On the satisfactory submission of assignments, the institute can mark as “Present” and the student will be awarded the grade AP on the marksheet.

Recommended parameters for assessment, evaluation and weightage:

1. Idea Inception (kind of survey). (10%)
2. Outcome (Participation/ publication, copyright, patent, product in market). (50%)
3. Documentation (Gathering requirements, design & modeling, implementation/execution, use of technology and final report, other documents). (15%)
4. Attended reviews, poster presentation and model exhibition. (10%)
5. Demonstration (Poster Presentation, Model Exhibition etc). (10%).
6. Awareness /Consideration of - Environment/ Social /Ethics/ Safety measures/Legal aspects. (5%)

Learning Resources

Reference Books / Research Articles:

1. John Larmer, John R. Mergendoller, and Suzie Boss, "Setting the Standard for Project Based Learning".
2. John Larmer and Suzie Boss, "Project Based Teaching: How to Create Rigorous and Engaging Learning Experiences".
3. Erin M. Murphy and Ross Cooper, "Hacking Project Based Learning: 10 Easy Steps to PBL and Inquiry". M. Krašna, "Project based learning (PBL) in the teachers' education,"39th International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO), Opatija, 2016, pp. 852-856, doi: 10.1109/MIPRO.2016.7522258.
4. J. Macias- Guarasa, J.M. Montero, R. San-Segundo, A. Araujo and O. Nieto-Taladriz, "A project based learning approach to design electronic systems curricula", IEEE transactions on Education, vol.49, no. 3, pp. 389-397, Aug. 2006, doi: 10.1109/TE.2006.879784

Web resources:

- Project-Based Learning, Edutopia, March 14, 2016.
- What is PBL? Buck Institute for Education.
- www.howstuffworks.com
- www.wikipedia.org

Savitribai Phule Pune University

Second Year of **Electronics/E & Tc Engineering** (2019 Course)

204201: Mandatory Audit Course - 4

Teaching Scheme:

Credit

Examination Scheme:

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List of Courses to be opted (Any one) under Mandatory Audit Course 4

- Enhancing Soft Skills and Personality
- Language & Mind
- Emotional Intelligence
- German II
- Human Behaviour
- Speaking Effectively

GUIDELINES FOR CONDUCTION OF AUDIT COURSE

In addition to credits courses, it is mandatory that there should be audit course (non-credit course) from second year of Engineering. The student will be awarded grade as AP on successful completion of audit course. The student may opt for two of the audit courses (One in each semester). Such audit courses can help the student to get awareness of different issues which make impact on human lives and enhance their skill sets to improve their employability. List of audit courses offered in the semester is provided in the curriculum. Student can choose one of the audit course from list of courses mentioned. Evaluation of audit course will be done at institute level.

The student registered for audit course shall be awarded the grade AP and shall be included such grade in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the Savitribai Phule Pune University and satisfactory in-semester performance and secured a passing grade in that audit course. No grade points are associated with this 'AP' grade and performance in these courses is not accounted in the calculation of the performance indices SGPA and CGPA. Evaluation of audit course will be done at institute level itself.

Selecting an Audit Course:

Using NPTEL Platform:

NPTEL is an initiative by MHRD to enhance learning effectiveness in the field of technical education by developing curriculum based video courses and web based e-courses.

The details of NPTEL courses are available on its official website www.nptel.ac.in

- Student can select any one of the courses mentioned above and has to register for the corresponding online course available on the NPTEL platform as an Audit course.
- Once the course is completed the student can appear for the examination as per

the guidelines on the NPTEL portal.

- After clearing the examination successfully; student will be awarded with certificate.

Assessment of an Audit Course:

- The assessment of the course will be done at the institute level. The institute has to maintain the record of the various audit courses opted by the students. The audit course opted by the students could be interdisciplinary.
- During the course students will be submitting the online assignments. A copy of same students can submit as a part of term work for the corresponding Audit course.
- On the satisfactory submission of assignments, the institute can mark as “Present” and the student will be awarded the grade AP on the marksheet.

Savitribai Phule Pune University

Faculty of Science and Technology



Syllabus for

T.E (Electronics & Telecommunication Engineering)

(Course 2019)

(w.e.f. June 2021)

Savitribai Phule Pune University, Pune
T.E. (Electronics & Telecommunication Engineering) 2019 Course
 (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	PR	TUT	Total
304181	Digital Communication	03	-	-	30	70	-	-	-	100	03	-	-	03
304182	Electromagnetic Field Theory	03	-	01	30	70	25	-	-	125	03	-	01	04
304183	Database Management	03	-	-	30	70	-	-	-	100	03	-	-	03
304184	Microcontrollers	03	-	-	30	70	-	-	-	100	03	-	-	03
304185	Elective - I	03	-	-	30	70	-	-	-	100	03	-	-	03
304186	Digital Communication Lab	-	02	-	-	-	-	50	-	50	-	01	-	01
304187	Database Management Lab	-	02	-	-	-	-	-	25	25	-	01	-	01
304188	Microcontroller Lab	-	02	-	-	-	-	50	-	50	-	01	-	01
304189	Elective I Lab	-	02	-	-	-	-	25	-	25	-	01	-	01
304190	Skill Development	-	02	-	-	-	25	-	-	25	-	01	-	01
304191A	Mandatory Audit Course 5 &	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		15	10	01	150	350	50	125	25	700	-		-	-
Total Credit											15	05	01	21

Elective -I

- 1) Digital Signal Processing
- 2) Electronic Measurements
- 3) Fundamentals of JAVA Programming
- 4) Computer Networks

Savitribai Phule Pune University, Pune
T.E. (Electronics & Telecommunication Engineering) 2019 Course
 (With effect from Academic Year 2021-22)

Semester-VI

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
304192	Cellular Networks	03	-	-	30	70	-	-	-	100	03	-	-	03
304193	Project Management	03	-	-	30	70	-	-	-	100	03	-	-	03
304194	Power Devices & Circuits	03	-	-	30	70	-	-	-	100	03	-	-	03
304195	Elective-II	03	-	-	30	70	-	-	-	100	03	-	-	03
304196	Cellular Networks Lab	-	02	-	-	-	-	-	50	50	-	01	-	01
304197	Power Devices & Circuits Lab	-	02	-	-	-	-	50	-	50	-	01	-	01
304198	Elective-II Lab	-	02	-	-	-	-	25	-	25	-	01	-	01
304199	Internship**	-	-	-	-	-	100	-	-	100	-	-	04	04
304200	Mini Project	-	04	-	-	-	25	-	50	75	-	02	-	02
304191 B	Mandatory Audit Course 6 &	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		12	10	00	120	280	125	75	100	700				
Total Credit											12	05	04	21

Abbreviations:

In-Sem: In semester

End-Sem: End semester

TH: Theory

TW : Term Work

PR: Practical

OR: Oral

TUT: Tutorial

Note: Students of T.E. (Electronics & Telecommunications) have to opt any one of the audit course from the list of audit courses prescribed by BoS (Electronics & Telecommunications Engineering)

Elective -II

- 1) Digital Image Processing
- 2) Sensors in Automation
- 3) Advanced JAVA Programming
- 4) Embedded Processors
- 5) Network Security

Savitribai Phule Pune University		
Third Year of E & Tc Engineering (2019 Course)		
304190: Skill Development		
Teaching Scheme:	Credit	Examination Scheme:
Practical: 02 hrs. / week	01	Term work: 25 Marks
Prerequisite Courses, if any: <ol style="list-style-type: none"> 1. Basics of Electronics Components 2. Working of Operational amplifier 3. Basics of Electronics measurement instruments and Tools 		
Companion Course, if any: --		
Course Objectives: <ul style="list-style-type: none"> • To build and upgrade practical knowledge of an individual. • To make students Employable with required skill set. • To promote youth work to assist "Make in India" initiative. • To grow and build confidence among students on specific skill sets. • To cultivate Entrepreneur mindset after getting required experience. • To improve professional skills such as moral/ethics/team work/communication skill/lifelong learning etc. 		
Course Outcome: After Successfully completing the course, CO1: Student should recognize the need to engage in independent and life-long learning in required skill sets CO2: Student needs to experience the impact of industries on society by visiting different industries and understand the importance of industrial products for analog and digital circuits and systems. CO3: Student has to make use of the modern electronic and IT Engineering Tools and Technologies for solving electronic engineering problems. CO4: Student would be able to communicate effectively at different technical and administrative levels. CO5: Student will exhibit leadership skills both as an individual and as a member in a team in multidisciplinary environment.		

List of Laboratory Experiments	
Group A (Any Three)	
Testing /Measurement/Calibration/Troubleshooting/Maintenance/Installation	
1.	Case studies on Study, Testing and maintenance of Batteries. A. Apply skill sets mentioned in #Group A Skills I and may be covered as per availability of lab or equipment's.
OR	

	<p>B. Apply Skill sets mentioned in #Group A Skills 1 may be covered by visiting any Automobile service centers/Battery maintenance service centers or related industry.</p> <p>Note: Batteries of e-Vehicle & Technology Involved (Lithium Batteries etc.)</p>
2.	<p>Case study on Automotive Electronics. (Sensors, Clusters, Controls, Semiconductor's devices etc.)</p> <p>A. Apply Skill set mentioned in #Group A Skills 1 and Group A Skills 2 which is related to automotive electronics may be covered as per availability of lab or equipment's.</p> <p style="text-align: center;">OR</p> <p>B. Apply Skill sets mentioned in #Group A Skills 1 may be covered by visiting any Automobile service centers or related industry.</p>
3.	<p>Case study on Biomedical Instrumentation</p> <p>A. Apply Skill set mentioned in #Group A Skills 3 which is related to automotive electronics may be covered as per availability of lab or equipment's.</p> <p style="text-align: center;">OR</p> <p>B. Visit biomedical instrument maintenance service centers</p> <p style="text-align: center;">OR</p> <p>C. Visit Hospitals or related industry.</p> <p>Note: Students are expected to know about sensors technology / Interface / maintenance / calibration of electronic instrumentation of some of these equipment's.</p>
4.	Troubleshooting and maintenance of PCB Boards & Controllers
5.	Troubleshooting and maintenance of Power supply
<p>Group B (Any Two)</p> <p>Software / Hardware Design</p>	
1.	<p>Design and Simulate dc-dc boost converter for battery-based applications</p> <p>Design a conventional dc-dc boost converter to step-up the battery voltage of 5 V to 10 V. Draw the circuit diagram and find required value of duty ratio. Implement the circuit in open-source TINA software. Plot the graphs of output voltage and PWM signal with respect to time.</p>

2.	<p>Design a web page(s)</p> <p>A. Using different text formatting tags</p> <p>B. With links to different pages and allow navigation between pages</p> <p>C. With Images, tables and frames</p> <p>D. Using style sheets to maintain uniform style for all web pages</p> <p>E. Using a form that uses all types of controls.</p> <p>F. Validate all the controls placed on the form using Java Script.</p>
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	Note: Use maximum above points while designing Web page.
3.	<p>SMPS Design</p> <p>A. Design and Simulate of SMPS of 24 V @ 1A.</p> <p style="text-align: center;">OR</p> <p>B. Design, simulate and Implement buck converter using ICs like LM3842 / LM 3524 and measure performance parameters like</p> <ol style="list-style-type: none"> 1. Load regulation 2. Line regulation 3. Ripple rejection 4. Output impedance and 5. Dropout voltage. 6. Note: Hardware based assignments: <p>Note : EDA tool (NI Multisim/ORCAD/PSPICE / Altium Designer suite etc.)</p>
4.	<p>Design and Simulate dc-dc boost converter for battery-based applications</p> <p>Design a conventional dc-dc boost converter to step-up the battery voltage of 5 V to 10 V. Draw the circuit diagram and find required value of duty ratio. Implement the circuit in open-source TINA software. Plot the graphs of output voltage and PWM signal with respect to time.</p>
5.	<p>Design and Simulate PID Controller based on OP-AMP</p> <p>Design an analog PID controller to track a reference voltage of 5 V in a circuit. Draw the circuit diagram of the controller and implement the circuit in open-source TINA software. Change the reference voltage to 10 V and show that the circuit can still track this changed reference voltage. Show the effect of 3 controller gains viz. proportional gain, integral gain and derivative gain on the output response.</p>
<p>Group C (Compulsory)</p> <p>Industrial Visit (Practical Visit)</p>	
1.	Industrial visit to Maintenance /Calibration/ service department of Electronics industry/Hospitals/Service centers etc. Student Should visit to related field and submit report in a predefined format.
2.	Industrial visit to software industry to understand the different processes and skills required as a software professional engineer

Group D (Compulsory)
Documentation/Specification /Manual

1.	Study of documentation/specification /Manual/SOP Note: Based on group B assignment, student need to prepare user manual / SOP and make and effective presentation.
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Learning Resources

Reference Books:

1. Ron Lenk, "Practical design of Power Supplies", John Wiley & Sons, 2005.
2. Abraham I. Pressman, "Switching Power Supply Design", McGraw-Hill, 3rd Edition, 2009.
3. Khandpur R.S., "Biomedical Instrumentation", TMH, 3rd Edition.
4. W Bosshart, "Printed Circuit Boards - Design & Technology", Tata McGraw Hill, 1st Edition.
5. D.Patranabis, "Principles of Industrial Instrumentation", TMH Publishing Co., 2nd Edition, 2008
6. R.K. Jain, "Mechanical and Industrial Measurement", Khanna Publishers, New Delhi, 11th Edition, 1999,
7. L.D. Goettsche, "Maintenance of Instruments and systems – Practical guides for measurement and control", International Society for Automation, 2nd Edition, 1995.
8. Henry W.Ott, "Noise Reduction Techniques in Electronic Systems", John Wiley & Sons, USA, 2nd Edition.
9. Kim R Fowler, "Electronic Instrument Design", Oxford University Press, 1997, 1st Edition.
10. Jiuchun Jiang, And Caiping Zhang, "Fundamentals and Applications of Lithium-Ion Batteries In Electric Drive Vehicles", Wiley Publication, 1st Edition.
11. Web Technologies: Black Book, 2018, Dreamtech Press (1 January 2018), ISBN-10: 9386052490, ISBN-13: 978-9386052490
12. Jennifer Robbins, "Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics", Shroff/O'Reilly, 5th Edition.
13. Thomas Powell, "Web Design: The complete Reference", Tata McGraw Hill; 2nd Edition.

Savitribai Phule Pune University Third Year of E & Tc Engineering (2019 Course) 304191 (A): Mandatory Audit Course - 5		
Teaching Scheme:	Credit	Examination Scheme:
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List of Courses to be opted (Any one) under Mandatory Audit Course 5

- Developing Soft skills and Personality
- Entrepreneurship and IP Strategy
- Urbanization and Environment
- Environmental & Resource Economics
- Environment and Development
- Globalization and Culture

GUIDELINES FOR CONDUCTION OF AUDIT COURSE

In addition to credits courses, it is mandatory that there should be audit course (non-credit course) from second year of Engineering. The student will be awarded grade as AP on successful completion of audit course. The student may opt for two of the audit courses (One in each semester). Such audit courses can help the student to get awareness of different issues which make impact on human lives and enhance their skill sets to improve their employability. List of audit courses offered in the semester is provided in the curriculum. Student can choose one of the audit course from list of courses mentioned. Evaluation of audit course will be done at institute level.

The student registered for audit course shall be awarded the grade AP and shall be included such grade in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the Savitribai Phule Pune University and satisfactory in-semester performance and secured a passing grade in that audit course. No grade points are associated with this 'AP' grade and performance in these courses is not accounted in the calculation of the performance indices SGPA and CGPA. Evaluation of audit course will be done at institute level itself.

Selecting an Audit Course:

Using NPTEL Platform:

NPTEL is an initiative by MHRD to enhance learning effectiveness in the field of technical education by developing curriculum based video courses and web based e-courses.

The details of NPTEL courses are available on its official website www.nptel.ac.in

- Student can select any one of the courses mentioned above and has to register for the corresponding online course available on the NPTEL platform as an Audit course.
- Once the course is completed the student can appear for the examination as per the guidelines on the NPTEL portal.
- After clearing the examination successfully; student will be awarded with certificate.

Assessment of an Audit Course:

- The assessment of the course will be done at the institute level. The institute has to maintain the record of the various audit courses opted by the students. The audit course opted by the students could be interdisciplinary.
- During the course students will be submitting the online assignments. A copy of same students can submit as a part of term work for the corresponding Audit course.
- On the satisfactory submission of assignments, the institute can mark as “Present” and the student will be awarded the grade AP on the marksheet.

Savitribai Phule Pune University Third Year of E & Tc Engineering (2019 Course) 304191 (B): Mandatory Audit Course - 6		
Teaching Scheme:	Credit	Examination Scheme:
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List of Courses to be opted (Any one) under Mandatory Audit Course 6

- Patent Law for Engineers and Scientists
- English language for competitive exams
- Energy Resources, Economics and Environment
- Principles of Human Resource Management
- Six Sigma
- Non-Conventional Energy Resources

GUIDELINES FOR CONDUCTION OF AUDIT COURSE

In addition to credits courses, it is mandatory that there should be audit course (non-credit course) from second year of Engineering. The student will be awarded grade as AP on successful completion of audit course. The student may opt for two of the audit courses (One in each semester). Such audit courses can help the student to get awareness of different issues which make impact on human lives and enhance their skill sets to improve their employability. List of audit courses offered in the semester is provided in the curriculum. Student can choose one of the audit course from list of courses mentioned. Evaluation of audit course will be done at institute level.

The student registered for audit course shall be awarded the grade AP and shall be included such grade in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the Savitribai Phule Pune University and satisfactory in-semester performance and secured a passing grade in that audit course. No grade points are associated with this 'AP' grade and performance in these courses is not accounted in the

calculation of the performance indices SGPA and CGPA. Evaluation of audit course will be done at institute level itself.

Selecting an Audit Course:

Using NPTEL Platform:

NPTEL is an initiative by MHRD to enhance learning effectiveness in the field of technical education by developing curriculum based video courses and web based e-courses.

The details of NPTEL courses are available on its official website www.nptel.ac.in

- Student can select any one of the courses mentioned above and has to register for the corresponding online course available on the NPTEL platform as an Audit course.
- Once the course is completed the student can appear for the examination as per the guidelines on the NPTEL portal.
- After clearing the examination successfully; student will be awarded with certificate.

Assessment of an Audit Course:

- The assessment of the course will be done at the institute level. The institute has to maintain the record of the various audit courses opted by the students. The audit course opted by the students could be interdisciplinary.
- During the course students will be submitting the online assignments. A copy of same students can submit as a part of term work for the corresponding Audit course.
- On the satisfactory submission of assignments, the institute can mark as “Present” and the student will be awarded the grade AP on the marksheet.

Savitribai Phule Pune University
Faculty of Science and Technology



Syllabus for

B.E (Electronics & Telecommunication Engineering)

(Course 2019)

(w.e.f. June 2022)

Savitribai Phule Pune University, Pune
B.E. (Electronics & Telecommunication) 2019 Course
 (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	PR	TUT	Total
404181	Radiation & Microwave Theory	03	-	-	30	70	-	-	-	100	03	-	-	03
404182	VLSI Design and Technology	03	-	-	30	70	-	-	-	100	03	-	-	03
404183	Cloud Computing	03	-	-	30	70	-	-	-	100	03	-	-	03
404184	Elective - 3	03	-	-	30	70	-	-	-	100	03	-	-	03
404185	Elective - 4	03	-	-	30	70	-	-	-	100	03	-	-	03
404186	Lab Practice - 1 (RMT & Cloud Computing)	-	04	-	-	-	25	-	50	75	-	02	-	02
404187	Lab Practice - 2 (VLSI Design & Elective -3)	-	04	-	-	-	25	50	-	75	-	02	-	02
404188	Project Stage - I	-	02	-	-	-	50	-	-	50	-	01	-	01
404189	Mandatory Audit Course 7	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		15	10	-	150	350	100	50	50	700	-	-	-	-
Total Credits											15	05	-	20

Elective - 3	Elective - 4
1. Speech Processing	1. Data Mining
2. PLC SCADA & Automation	2. Electronic Product Development
3. JAVA Script	3. Deep Learning
4. Embedded & RTOS	4. Low Power CMOS
5. Modernized IoT	5. Smart Antennas

Mandatory Audit Course - 7
1. Management Information System
2. Patent Search & Analysis
3. Knowledge Management
4. Energy Economics & Policy
5. Educational Leadership
6. Human Resource Development

Savitribai Phule Pune University, Pune
B.E. (Electronics & Telecommunication) 2019 Course
 (With effect from Academic Year 2022-23)

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	PR	TUT	Total
404190	Fiber Optic Communication	03	-	-	30	70	-	-	-	100	03	-	-	03
404191	Elective - 5	03	-	-	30	70	-	-	-	100	03	-	-	03
404192	Elective - 6	03	-	-	30	70	-	-	-	100	03	-	-	03
404193	Innovation & Entrepreneurship	-	-	02	-	-	50	-	-	50	-	-	02	02
404194	Digital Business Management	-	-	02	-	-	50	-	-	50	-	-	02	02
404195	Fiber Optic Lab	-	02	-	-	-	25	-	50	75	-	01	-	01
404196	Lab Practice - 3 (Elective - 5)	-	02	-	-	-	25	50	-	75	-	01	-	01
404197	Project Stage - II	-	10	-	-	-	100	-	50	150	-	05	-	05
Total		09	14	04	90	210	250	50	100	700	-	-	-	-
Total Credits											09	07	04	20

Elective - 5	Elective - 6
1. Biomedical Signal Processing	1. System on Chip
2. Industrial Drives & Automation	2. Nano Electronics
3. Android Development	3. Remote Sensing
4. Embedded System Design	4. Digital Marketing
5. Mobile Computing	5. Open Elective

Savitribai Phule Pune University Fourth Year of E & Tc Engineering (2019 Course) 404189: Mandatory Audit Course - 7		
Teaching Scheme:	Credit	Examination Scheme:
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GUIDELINES FOR CONDUCTION OF AUDIT COURSE

In addition to credits courses, it is mandatory that there should be audit course (non-credit course) from second year of Engineering. The student will be awarded grade as AP on successful completion of audit course. The student may opt for two of the audit courses (One in each semester). Such audit courses can help the student to get awareness of different issues which make impact on human lives and enhance their skill sets to improve their employability. List of audit courses offered in the semester is provided in the curriculum. Student can choose one of the audit course from list of courses mentioned. Evaluation of audit course will be done at institute level.

The student registered for audit course shall be awarded the grade AP and shall be included such grade in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the Savitribai Phule Pune University and satisfactory in-semester performance and secured a passing grade in that audit course. No grade points are associated with this 'AP' grade and performance in these courses is not accounted in the calculation of the performance indices SGPA and CGPA. Evaluation of audit course will be done at institute level itself.

Selecting an Audit Course:

Using NPTEL Platform:

NPTEL is an initiative by MHRD to enhance learning effectiveness in the field of technical education by developing curriculum based video courses and web based e-courses. The details of NPTEL courses are available on its official website www.nptel.ac.in

- Student can select any one of the courses mentioned above and has to register for the corresponding online course available on the NPTEL platform as an Audit course.
- Once the course is completed the student can appear for the examination as per the guidelines on the NPTEL portal.

- After clearing the examination successfully; student will be awarded with certificate.

Assessment of an Audit Course:

- The assessment of the course will be done at the institute level. The institute has to maintain the record of the various audit courses opted by the students. The audit course opted by the students could be interdisciplinary.
- During the course students will be submitting the online assignments. A copy of same students can submit as a part of term work for the corresponding Audit course.
- On the satisfactory submission of assignments, the institute can mark as “Present” and the student will be awarded the grade AP on the marksheet.

Savitribai Phule Pune University, Pune



Faculty of Science and Technology

Board of Studies
Electrical Engineering

Syllabus
Second Year Electrical Engineering
(2019 Course)

(w.e.f. AY: 2020-21)

Savitribai Phule Pune University

Syllabus: Second Year (SE) Electrical Engineering (2019 Course) w.e.f. AY:2020-2021

SEMESTER-I

Course Code	Courses Name	Teaching Scheme			Examination Scheme and Marks						Credits			
		TH	PR	TUT	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
207006	Engineering Mathematics-III	03	--	--	30	70	--	--	--	100	03	--	--	03
203141	Power Generation Technologies	03	--	--	30	70	--	--	--	100	03	--	--	03
203142	Material Science	03	04#	--	30	70	25	--	25	150	03	02	--	05
203143	Analog and Digital Electronics	03	02	--	30	70	--	50	--	150	03	01	--	04
203144	Electrical Measurement & Instrumentation	03	04#	--	30	70	25	25	--	150	03	02	--	05
203150	Applications of Mathematics in Electrical Engineering	--	02*	--	--	--	25	--	--	25	--	01	--	01
203151	Soft Skill	--	02	--	--	--	25	--	--	25	--	01	--	01
203152	Audit Course-III	--	--	--	--	--	--	--	--	--	Grade: PP/NP			
Total		15	14	--	150	350	100	75	25	700	15	07	--	22

SEMESTER-II

Course Code	Courses Name	Teaching Scheme			Examination Scheme and Marks						Credits			
		TH	PR	TUT	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
203145	Power System-I	03	--	--	30	70	--	--	--	100	03	--	--	03
203146	Electrical Machines-I	03	02	--	30	70	--	50	--	150	03	01	--	04
203147	Network Analysis	03	02	--	30	70	25	--	--	125	03	01	--	04
203148	Numerical Methods & Computer Programming	03	02	--	30	70	--	25	--	125	03	01	--	04
203149	Fundamental of Microcontroller and Applications	03	04\$	--	30	70	25	--	25	150	03	02	--	05
203152	Project Based Learning	--	04	--	--	--	50	--	--	--	--	02	--	--
203153	Audit Course-IV	--	--	--	--	--	--	--	--	--	Grade: PP/NP			
Total		15	14	--	150	350	100	75	25	700	15	07	--	22

* - Lab sessions on application of Mathematics in Electrical Engineering using professional software.

- Practical section will comprises of two Part : a) PART A : 2 hours per week : Regular curriculum listed practical total 12 numbers out of which conduction of 8 numbers will be mandatory b) PART B : 2 Hours a week :Practical/case studies/assignments to enable active learning based on advances related to subject to bridge gap between curriculum and enhance practical knowledge required in field .

\$ - Practical section will comprises of two Part : a) PART A : 2 hours per week : Regular curriculum listed practical total 12 numbers out of which conduction of 8 numbers will be mandatory b) PART B : 2 Hours a week : IOT application in Electrical Engineering using microcontroller and GSM module to bridge gap between curriculum and enhance application knowledge.

Abbreviation: TH: Theory, PR: Practical, TUT:Tutorial, ISE: Insem Exam, ESE: End Sem Exam, TW: Term Work, OR: Oral

203151: Soft Skill		
Teaching Scheme Practical : 02 Hrs/ Week	Credits Pr:01	Examination Scheme [Marks] Term Work: 25 Marks
<p>Course Objective: The course aims to:- □</p> <ul style="list-style-type: none"> ● To possess knowledge of the concept of Self-awareness and Self Development. □ ● To understand the importance of Speaking Skills, listening skills, Presentation Skills and leadership skills. □ ● To gain the knowledge of corporate grooming & dressing, Email & telephone etiquettes, etiquette in social & office setting. □ ● To get conversant with Team work, Team effectiveness, Group discussion, Decision making. ● To recognize the importance of time management and stress management. <p>Course Outcome: Students will be able to :- □</p> <p>CO1: DoSWOC analysis. □</p> <p>CO2: Develop presentation and take part in group discussion. □</p> <p>CO3: Understand and implement etiquette in workplace and in society at large. □</p> <p>CO4: Work in team with team spirit. □</p> <p>CO5: Utilize the techniques for time management and stress management.</p>		
<p>Unit 01 : Self-Awareness & self-Development: (4Hrs)</p> <p>A) 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,</p> <p>B) Career Planning, Personal success factors, Handling failure, Depression and Habit, relating SWOT analysis & goal setting and prioritization.</p>		
<p>Unit 02 : Communication Skill: (6 Hrs)</p> <p>A) Importance of communication, types, barriers of communication, effective communication.</p> <p>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.</p> <p>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, Avoid selective listening</p> <p>D) Group Discussion:Characteristics, subject knowledge, oral and leadership skills, team management, strategies and individual contribution and consistency.</p> <p>E) Presentation skills:Planning, preparation, organization, delivery.</p> <p>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.</p>		
<p>Unit 03 : Corporate / Business Etiquette: (2 Hrs)</p> <p>Corporate grooming & dressing, Email & telephone etiquette, etiquette in social & office setting: Understand the importance of professional behavior at the work place, Understand and Implement etiquette in workplace, presenting oneself with finesse and making others comfortable in a business setting. Importance of first impression, Grooming, Wardrobe, Body language, Meeting etiquette (targeted at young professionals who are just entering business environment), Introduction to Ethics in engineering and ethical reasoning, rights and responsibilities.</p>		
<p>Unit 04 : Interpersonal relationship: (4 Hrs)</p> <p>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.</p> <p>B) Group Discussion- 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</p>		
<p>Unit 05 : Leadership skills: (2 Hrs)</p>		

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, 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 06 : Other skills: (2 Hrs)

A) Time management- The Time management matrix, apply the Pareto Principle (80/20 Rule) to time management issues, to priorities 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) Problem solving skill, Confidence building Problem solving skill, Confidence building

Term Work/Assignments: Term work will consist the record of any 8 assignments of following exercises

1. SWOT analysis
2. Personal & Career Goal setting – Short term & Long term
3. Presentation Skill
4. Letter/Application writing
5. Report writing
6. Listening skills
7. Group discussion
8. Resume writing
9. Public Speaking
10. Stress management
11. Team Activity-- Use of Language laboratory

Teaching Methodology:

Each class should be divided into three batches of 20-25 students each. The sessions should be activity based and should give students adequate opportunity to participate actively in each activity. Teachers and students must communicate only in English during the session. Specific details about the teaching methodology have been explained in every activity given below.

Practical Assignments (Term work)

Minimum 8 assignments are compulsory and teachers must complete them during the practical sessions within the semester. The teacher should explain the topics mentioned in the syllabus during the practical sessions followed by the actual demonstration of the exercises. Students will submit report of their exercise (minimum 8) assignments as their term work at the end of the semester but it should be noted that the teacher should assess their assignment as soon as an activity is conducted. The continual assessment process should be followed.

1. **SWOT analysis:** The students should be made aware of their goals, strengths and weaknesses, attitude, moral values, self-confidence, etiquettes, non-verbal skills, achievements etc. through this activity. The teacher should explain to them on how to set goals, SWOT Analysis, Confidence improvement, values, positive attitude, positive thinking and self-esteem. The teacher should prepare a questionnaire which evaluate students in all the above areas and make them aware about these aspects.

2. **Personal & Career Goal setting** – Short term & Long term

3. **Presentation Skills:** Students should make a presentation on any informative topic of their choice. The topic may be technical or non-technical. The teacher should guide them on effective presentation skills. Each student should make a presentation for at least 10 minutes.

4. **Letter/Application writing:** Each student will write one formal letter, and one application. The teacher should teach the students how to write the letter and application. The teacher should give proper format and layouts.

5. **Report writing:** The teacher should teach the students how to write report. The teacher should give proper format and layouts. Each student will write one report based on visit / project /

business proposal etc.

6. **Listening skills:** The batch can be divided into pairs. Each pair will be given an article (any topic) by the teacher. Each pair would come on the stage and read aloud the article one by one. After reading by each pair, the other students will be asked questions on the article by the readers. Students will get marks for correct answers and also for their reading skills. This will evaluate their reading and listening skills. The teacher should give them guidelines on improving their reading and listening skills. The teacher should also give passages on various topics to students for evaluating their reading comprehension.

7. **Group discussion:** Each batch is divided into two groups of 12 to 14 students each. Two rounds of a GD for each group should be conducted and teacher should give them feedback.

8. **Resume writing:** Each student will write one formal letter, and one application. The teacher should teach the students how to write the letter and application. The teacher should give proper format and layouts.

9. **Public Speaking:** Any one of the following activities may be conducted : A) Prepared speech (topics are given in advance, students get 10 minutes to prepare the speech and 5 minutes to deliver. B) Extempore speech (students deliver speeches spontaneously for 5 minutes each on a given topic) C) Story telling (Each student narrates a fictional or real life story for 5 minute search) D) Oral review(Each student orally presents a review on a story or a book read by them)

10. **Team Activity--** Use of Language laboratory

Text Books:

[T1] Sanjay Kumar and PushpaLata, “Communication Skills”, Oxford University Press.

[T2] Krishna Mohan, MeeraBanerji, “Developing Communication Skill”, McMillan India Ltd.

[T3] Simon Sweeney, “English for Business Communication”, Cambridge University Press

Reference Books:

[R1] Accenture, Convergys, Dell et.al, “NASSCOM-Global Business Foundation Skills, Foundation Books, Cambridge University Press.

[R2] E. H. McGraw, “Basic Managerial Skills for all”, Eastern Economy Edition, Prentice hall

[R3] Barun K. Mitra, “Personality Development and Group Discussions”, Oxford University Press.

[R4] PriyadarshiPatnaik, “Group Discussions and Interview Skills: Foundation Books”, Cambridge University Press.

[R5] Napoleon Hill, “Thinks and Grow Rich”, Ebury Publishing, ISBN 9781407029252.

[R6] Tony Robbins, “Awaken the Giant Within”, Harper Collins Publishers, ISBN139780743409384. S.E. Electrical Engineering (2015 course) – Savitribai Phule Pune University 25

[R7] Wayne Dyer, “Change Your Thoughts, Change Your Life”, Hay House India, ISBN-139788189988050.

[R8] Stephen Covey, “Habits of Highly Effective People”, Pocket Books, ISBN139781416502494.

[R9] Dr. Joseph Murphy, “The Power of Your Subconscious Mind”, MaanuGraphics, ISBN-13 9789381529560.

[R10] Daniel Coleman, “The new Leaders”, Sphere Books Ltd, ISBN-139780751533811.

[R11] Richard Koch, “The 80/20 Principal”, Nicholas Brealey Publishing , ISBN-13 9781857883992.

[R12] Julie Morgenstern, “Time management from inside out”, Owl Books (NY), ISBN-13 9780805075908.

[R13] Shiv Khera, “You can win”, Macmillan, ISBN-139789350591932.

[R14] Gopalaswamy Ramesh, Mahadevan Ramesh, “The Ace of Soft Skills: Attitude, Communication and Etiquette for Success”

203152 : Audit Course-III

List of three audit course is provided. Students can choose any one from 203152(A)
203152(B) and 203152(C)

203152 (A) : Solar Thermal System

Teaching Scheme Lectures: 2hrs/week	Credits No credit	Examination Scheme [Marks] Grade: PP/NP Quiz and term paper
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Description: The course will introduce the basics of: solar energy, availability, applications, heat transfer as applied to solar thermal systems, various types of solar thermal systems, introduction to manufacturing of the systems, characterization, quality assurance, standards, certification and economics. The following topics may be broadly covered in the classroom. The field visits will be designed for first-hand experience and basic understanding of the system elements.

Course Objective:

- To understand basics and types of solar thermal systems.
- To get knowledge of various types of concentrators.
- To make students aware of different Standards and certification for Concentrator Solar Power.

Course Outcome: Student will be able to

CO1: Differentiate between types of solar Concentrators

CO2: Apply software tool for solar concentrators

CO3: Design different types of Solar collectors and balance of plant

Course Contents:

- Sun, Earth and seasons
- Solar Radiation
- Basics of heat transfer
- Absorption, reflection and transmission of radiation
- Types of Solar thermal systems
- Basic design of different types of systems
- Applications of solar thermal systems and their economics
- Need for solar concentration
- Various types of solar concentrators
- Movement of Sun and tracking
- Control systems for solar tracking
- Concentrating solar thermal (CSP)
- Concentrating solar PV (CPV)
- Balance of plant for CSP
- Critical points in concentrating solar system installation
- Operation and maintenance of CSP
- Typical financial analysis of CSP
- Software tools for concentrating solar power
- Environmental impact assessment
- Standards and certification for CSP
- Basics of solar thermal (STH) systems
- Elements of various STH systems
- Design, materials and manufacturing of
 - Flat plate solar collector
 - Evacuated tube solar collector
 - Parabolic trough collector
 - Dish type solar concentrators
 - Concentrating PV systems
 - Balance of plant
- Manufacturing standards

203152 (B) : C Language Programming		
Teaching Scheme Lectures: 2hrs/week	Credits No credit	Examination Scheme [Marks] Grade: PP/NP Quiz and term paper
<p>Course Objective:</p> <ul style="list-style-type: none"> • To give basic idea about C programming language • To prepare students for writing algorithm, draw flow chart and program in C language • To learn data types and syntax in C language. <p>Course Outcome: Student will be able to</p> <p>CO1: Elaborate data types, arithmetic, logical and conditional operators</p> <p>CO2: Apply control and looping statements in C programming</p> <p>CO3: Write programming using C language with functions, arrays and pointers.</p>		
<p>Course Contents:</p> <p>Unit 01: The language of C : Phases of developing a running computer program in C, Data concepts in C : Constants, Variables, Expressions, Operators, and operator precedence in C., Statements : Declarations, Input-Output Statements, Compound statements, Selection Statements. Conditions, Logical operators, Precedence. Repetitive statements, While construct, Do-while Construct, For construct., Data types, size and values. Char, Unsigned and Signed data types. Number systems and representations. Constants, Overflow., Arrays. Strings. Multidimensional arrays and matrices.</p> <p>Unit 02: Functions : The prototype declaration, Function definition. Function call : Passing arguments to a function, by value, by reference. Pointers : Pointer variables. Declaring and dereferencing pointer variables. Pointer Arithmetic. Examples. Accessing arrays through pointers. Pointer</p> <p>Assignment</p> <ul style="list-style-type: none"> • Write C program for arithmetic operations such as +, -, *, /, %. • Write C program for decision making statements such as if, else-if etc. • Write C program for Representative statements such as for, while, do-while. • Write C program to determine roots of a quadratic equation using functions. • Write C program to enter matrix data and printing its inverse. • Write C program to demonstrate use of pointers. <p>References:</p> <ol style="list-style-type: none"> 1. A.R. Bradley, "Programming for Engineers", Ringer, 2011 2. Hankering and Chitchat, "The C Programming Language", (2nd ed.) Prentice Hall, 1988 		

203153(B) Installation & Maintenance of Electrical appliances		
Teaching Scheme Lectures: 2hrs/week	Credits No credit	Examination Scheme [Marks] Grade: PP/NP Quiz and term paper
<p>Prerequisite: Completion of FE/DEE or equivalent</p> <p>Course Objective: This course has been designed to provide the knowledge of Repairing and Maintenance of home appliances. Students will be familiar with maintenance of everyday household necessities.</p> <p>Course Outcome: At the end of the course the students will be having knowledge of: -</p> <ul style="list-style-type: none"> • Observing the safety precautions while working, • Test line cord for continuity with test lamp/ multimeter • Dismantle and reassemble an electric iron • Heater, kettle, room heater, toaster, hair dryer, mixer grinder etc. • Install a ceiling fan and the regulator • Check a fluorescent lamp chock, starter and install it • Domestic installation testing before energizing a domestic installation 		
<p>Course Contents:</p> <ul style="list-style-type: none"> • General safety & electrical safety <ul style="list-style-type: none"> ➤ What is safety, Why safety is needed ➤ Tools for electrical safety ➤ Safety rules ➤ Precaution during electrical maintenance • Crimping & crimping tool, soldering <ul style="list-style-type: none"> ➤ What is crimping, crimping tool, How to use RJ-11 connector, telephone wire, UTP Cable ➤ crimping technique, precaution during crimping ➤ Soldering Iron, Soldering wire, Soldering Flux, ➤ Soldering method, Zero defect soldering • Earthing& types of Earthing <ul style="list-style-type: none"> ➤ Introduction of Earthing ➤ Need of Earthing, Hazard ➤ Types of Earthing ➤ Advantage of Earthing, working of Earthing • Simple house wiring circuit <ul style="list-style-type: none"> ➤ Introduction of Wiring ,types of wiring ➤ need of wiring, advantage of wiring ➤ wiring methods ➤ electrical panel ➤ cable type • Install, service and repair of automatic electric iron, mixer grinder, ceiling and table fan, heater, iron, kettle, washing machine etc <ul style="list-style-type: none"> ➤ Installation procedure of electric iron, ➤ Installation procedure mixer grinder ➤ Installation procedure of ceiling and table fan, ➤ Installation procedure heater, iron, kettle ➤ Installation procedure washing machine ➤ fault finding & removal of faulty component in electric iron, mixer grinder, ceiling and table fan ➤ fault finding & removal of faulty component in heater, iron, kettle, washing machine • Assemble and install of a fluorescent lamp <ul style="list-style-type: none"> ➤ Parts of fluorescent lamp, ➤ Working principle of fluorescent lamp 		

- Assembling procedure of lamp
- Thermostat heat controls of Automatic electric iron, steam iron, spray irons.
 - Thermostat, Bimetal, Wax Pallet , Gas Expansion, Pneumatic,
 - Bimetallic Switching thermostat, Simple two wire thermostats
 - Combination heating/Cooling regulation, Heat Control of Steam Iron, Electric Iron
- Maintenance of decorative serial lamp for a required supply voltage
 - What is decorative lamp, Working of decorative lamp
 - Description of decorative serial lamp,
 - Maintenance of decorative serial lamp
- Introduction to re- winding Insulating material used
 - Material, Types of Material
 - Insulating Material, Types of Insulating Material
 - Need of insulating material, winding, re-winding

References:

- [1] S. K. Shastri – Preventive Maintenance of Electrical Apparatus – Katson Publication House
- [2] B. K. N. Rao -Hand book of condition monitoring- Elsevier Advance Tech., Oxford (UK).
- [3] Eric Kleinert-Troubleshooting and Repairing Major Appliances / Edition 3- McGraw Hill
- [4] Service Manual of Electrical Home Appliances

Savitribai Phule Pune University, Pune



Faculty of Science and Technology

Board of Studies
Electrical Engineering

Syllabus
**Third Year Electrical Engineering
(2019 course)
(w.e.f. 2021-22)**

Savitribai Phule Pune University, Pune
Syllabus: Third Year (TE) Electrical Engineering (2019 course)
(w.e.f 2021-22)

SEMESTER-I

Course code	Course Name	Teaching Scheme				Examination Scheme						Credit				
		Th	Pr	Tu	SEM /PW /IN	ISE	ESE	TW	PR	OR	Total	Th	Pr	Tu	SEM /PW /IN	Total
303141	<u>Industrial and Technology Management</u>	3	0	0	0	30	70	0	0	0	100	3	0	0	0	3
303142	<u>Power Electronics</u>	3	4#	0	0	30	70	0	50	0	150	3	2	0	0	5
303143	<u>Electrical Machines-II</u>	3	2	0	0	30	70	25	25	0	150	3	1	0	0	4
303144	<u>Electrical Installation Design and Condition Based Maintenance</u>	3	4#	0	0	30	70	25	0	25	150	3	2	0	0	5
303145	<u>Elective-I</u>	3	0	0	0	30	70	0	0	0	100	3	0	0	0	3
303146	<u>Seminar</u>	0	0	0	1	0	0	50	0	0	50	0	0	0	1	1
303147	<u>Audit course-V</u>	2*	0	0	0	0	0	0	0	0	0	GRADE: PP/NP				0
Total		15	10	0	1	150	350	100	75	25	700	15	5	0	1	21

303145: Elective-I

303147 : Audit Course-V

303145A : Advanced Microcontroller and Embedded System

303147A : Energy storage systems

303145B : Digital Signal Processing

303147B : Start-up & Disruptive innovation

303145C : Open Elective

SEMESTER-II

Course code	Course Name	Teaching Scheme				Examination Scheme						Credit				
		Th	Pr	Tu	SEM /PW /IN	ISE	ESE	TW	PR	OR	Total	Th	Pr	Tu	SEM /PW /IN	Total
303148	<u>Power System-II</u>	3	2	1	0	30	70	25	50	0	175	3	1	1	0	5
303149	<u>Computer Aided Design of Electrical Machines</u>	3	4#	0	0	30	70	50	0	25	175	3	2	0	0	5
303150	<u>Control System Engineering</u>	3	2\$	1\$	0	30	70	25	0	25	150	3	1	0	0	4
303151	<u>Elective-II</u>	3	0	0	0	30	70	0	0	0	100	3	0	0	0	3
303152	<u>Internship</u>	0	0	0	4	0	0	100	0	0	100	0	0	0	4	4
303153	<u>Audit Course VI</u>	2*	0	0	0	0	0	0	0	0	0	GRADE: PP/NP				0
Total		12	8	2	4	120	280	200	50	50	700	12	4	1	4	21

303151: Elective-II

303153 : Audit Course-VI

303151A : IoT and its Applications in Electrical Engineering

303153A: Ethical Practices for Engineers

303151B : Electrical Mobility

303153B : Project Management

303 151C: Cybernetic Engineering

303151D: Energy Management

#Practical consists of Part A & part B. PART A; Regular experiments & part B; to bridge the gap between theory & actual industrial practices. For subject 303144; there will be auto cad drawing on Electrical installation, Electrical wiring, cabling etc. For 303149, Part A, Regular drawing by hand & part B same drawing by AutoCAD.

\$ tutorial credit merged with Practical.

* Conduct over and above these lectures.

303147A: Audit Course V: Energy Storage System						
Teaching Scheme			Credits		Examination Scheme	
Theory	02	Hr/Week	TH	00	GRADE	PP/NP
Prerequisite:						
Batteries, Inductor and Capacitor.						
Course Objectives:						
To elaborate various energy storage systems To be familiar with various aspects such as hybridization, selection of storage system.						
Course Outcomes: At the end of this course, student will be able to						
CO1	Explain and differentiate various types of energy storage for suitable applications					
CO2	Understand battery recycling techniques					
Unit 01	Energy Storage Fundamentals					12 hrs
(A) Battery: Energy Density, Power Density, Cycle life, C-rate, State of Charge (SoC), State of Health (SoH), Depth of Discharge (DoD), Characteristic.						
(B) Types of Batteries: Nickel Metal Hydrate, Nickel Cadmium, Lithium ion, Lithium Polymer, Flow Batteries (Vanadium, Zinc, Manganese)						
(C) Super capacitor, Superconducting Magnetic Energy Storage, Compressed Air Energy Storage, Flywheel storage						
(D) Hybridization of energy storage						
Energy storage sizing, Selection of storage as per application						
Unit 02	Recent Trends in Storage					12 hrs
Solid state batteries, Aluminum air and Aluminum ion batteries, Lithium ion Capacitor, Advances in Thermal energy storage systems. Batteries recycling techniques and policies, Case studies.						
Reference Books:						
[R1]	Handbook of Energy Storage: Demand, Technologies, Integration Michael Sterner, Ingo Stadler.					
[R2]	Energy Storage: Fundamentals, Materials and Applications, Robert Huggins.					
Industrial Visit: Manufacturing industry of battery or Capacitor.						

303151D: Elective-II Energy Management						
Teaching Scheme			Credits		Examination Scheme	
Theory	03	Hr/Week	TH	03	ISE	30 Marks
					ESE	70 Marks
Prerequisite:						
Various electrical equipment and specifications, Construction and operation of different equipment/process like HVAC, Pumps, Compressors etc.						
Course Objectives: The course aims to:-						
<ol style="list-style-type: none"> 1. Understand importance of energy Conservation and energy security and impact of energy use on environment. 2. Follow format of energy management, energy policy. 3. Understand demand side management tools and impact of tariff on demand management. 4. Importance of Data Analytics in Energy audit and audit process. 5. Calculate energy consumption and saving options with economic feasibility. 6. Use of appropriate energy conservation measure in field applications or industry. 						
Course Outcomes: At the end of this course, student will be able to						
CO1	Describe BEE Energy policies, Energy ACT.					
CO2	List and apply demand side management measures for managing utility systems.					
CO3	Explore and use simple data analytic tools.					
CO4	Use various energy measurement and audit instruments.					
CO5	Evaluate economic feasibility of energy conservation projects.					
CO6	Identify appropriate energy conservations methods for electric and thermal utilities.					
Unit 01	Energy Scenario					06 hrs
Classification of Energy resources, Commercial and noncommercial sources, primary and secondary sources, commercial energy production, final energy consumption. Energy needs of growing economy, short terms and long terms policies, energy sector reforms, energy security, importance of energy conservation, energy and environmental impacts, introduction to CDM, UNFCCC, Paris treaty, emission check standard, salient features of Energy Conservation Act 2001 and Electricity Act 2003. Latest amendments in Electricity Act. Indian and Global energy scenario. Introduction to IE Rules. Study of Energy Conservation Building Code (ECBC).						
Unit 02	Energy Management					06 hrs
Definition and Objective of Energy Management, Principles of Energy management, Energy Management Strategy, Energy Manager Skills, key elements in energy management, force field analysis, energy policy, format and statement of energy policy, Organization setup and energy management. Responsibilities and duties of energy manager under the latest Act. Energy Efficiency Programs. Energy monitoring systems.						
Unit 03	Demand Management					06 hrs
Supply side management (SSM), Generation system up gradation, constraints on SSM. Demand side management (DSM), advantages and barriers, implementation of DSM. Use of demand side management in agricultural, domestic and commercial consumers. Demand management through tariffs (TOD). Power factor penalties and incentives in tariff for demand control. Apparent energy tariffs. Role of renewable energy sources in energy management, direct use (solar thermal, solar air conditioning, biomass) and indirect use (solar, wind etc.) Introduction to ISO 50001- Energy Management.						
Unit 04	Energy Audit					06 hrs
Definition, need of energy audits, types of audit, procedures to follow, data and information analysis, Introduction to Data Analytics, data quality processing, clustering techniques, pattern mining, regression and classification. Relevance of Data Analytics in Audit, energy audit instrumentation,						

energy consumption – production relationship, pie charts. Sankey diagram, Cusum technique, least square method and numerical based on it. Outcome of energy audit and energy saving potential, action plans for implementation of energy conservation options. Bench- marking energy performance of an industry. Energy Audit reporting format – Executive Summary , Detailing of report.																							
Unit 05	Financial Analysis	06 hrs																					
Financial appraisals; criteria, simple payback period, return on investment, net present value method, time value of money, break even analysis, sensitivity analysis and numerical based on it, cost of energy, cost of generation Energy Audits case studies – Sugar Industry, Steel Industry, Paper and Pulp industry.																							
Unit 06	Energy Conservation	06 hrs																					
a) Motive power (motor and drive system). b) Illumination c) Heating systems (boiler and steam systems) d) Ventilation(Fan, Blower and Compressors) and Air Conditioning systems e) Pumping System f) Cogeneration and waste heat recovery systems g) Utility industries (T and D Sector) and Performance Assessments.																							
Test Books:																							
[T1]	Guide books for National Certification Examination for Energy Managers/Energy Auditors Book 1, General Aspects (available on line)																						
[T2]	Guide books for National Certification Examination for Energy Managers/Energy Auditors Book 2 – Thermal Utilities (available on line)																						
[T3]	Guide books for National Certification Examination for Energy Managers/Energy Auditors Book 3- Electrical Utilities (available on line)																						
[T4]	Guide books for National Certification Examination for Energy Managers/Energy Auditors Book 4 (available on line)																						
Reference Books:																							
[R1]	Success stories of Energy Conservation by BEE (www. Bee-india.org)																						
[R2]	Utilization of electrical energy by S.C. Tripathi, Tata McGraw Hill.																						
[R3]	Energy Management by W.R. Murphy and Mackay, B.S. Publication.																						
[R4]	Generation and utilization of Electrical Energy by B.R. Gupta, S. Chand Publication																						
[R5]	Energy Auditing made simple by Balasubramanian, Bala Consultancy Services.																						
[R6]	A General Introduction to Data Analytics by Andre Carvalho and Tomáš Horváth Wiley Inc First Edition 2019.																						
Online Resources:																							
[O1]	www.energymanaertraining.com																						
[O2]	www.em-ea.org																						
[O3]	www.bee-india.org																						
[O4]	https://www.iso.org/iso-50001-energy-management.html																						
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Unit</th> <th>Text Books</th> <th>Reference Books</th> </tr> </thead> <tbody> <tr> <td>Unit 1</td> <td>T1</td> <td>O1, O2</td> </tr> <tr> <td>Unit 2</td> <td>T1</td> <td>O1, O2</td> </tr> <tr> <td>Unit 3</td> <td>T1</td> <td>R4, O4</td> </tr> <tr> <td>Unit 4</td> <td>T1</td> <td>R4, R5 and O1 and O2, R6</td> </tr> <tr> <td>Unit 5</td> <td>T1 and T4</td> <td>R1, R2, R3, R5 O1 and O2</td> </tr> <tr> <td>Unit 6</td> <td>T2, T3 and T4</td> <td>R1, R5 and O1 and O2</td> </tr> </tbody> </table>			Unit	Text Books	Reference Books	Unit 1	T1	O1, O2	Unit 2	T1	O1, O2	Unit 3	T1	R4, O4	Unit 4	T1	R4, R5 and O1 and O2, R6	Unit 5	T1 and T4	R1, R2, R3, R5 O1 and O2	Unit 6	T2, T3 and T4	R1, R5 and O1 and O2
Unit	Text Books	Reference Books																					
Unit 1	T1	O1, O2																					
Unit 2	T1	O1, O2																					
Unit 3	T1	R4, O4																					
Unit 4	T1	R4, R5 and O1 and O2, R6																					
Unit 5	T1 and T4	R1, R2, R3, R5 O1 and O2																					
Unit 6	T2, T3 and T4	R1, R5 and O1 and O2																					

303153A: Audit Course IV: Ethical Practices for Engineers						
Teaching Scheme			Credits		Examination Scheme	
Theory	02	Hr/Week	TH	00	GRADE	PP/NP
Prerequisite:						
Basic understanding of business management						
Course Objectives: This course aims to						
Create awareness to serve the public by strictly adhering to codes of conduct and placing paramount the health, safety and welfare of public.						
Course Outcomes: At the end of this course, student will be able to						
CO1	Understand for their professional responsibilities as Engineers.					
CO2	Recognize and think through ethically significant problem situations that are common in Engineering.					
CO3	Evaluate the existing ethical standards for Engineering Practice.					
Unit 01	Introduction: Justice and Moral					12 hrs
Introduction to Ethical Reasoning and Engineer Ethic, Professional Practice in Engineering, Ethics as Design - Doing Justice to Moral Problems, Central Professional Responsibilities of Engineers.						
Unit 02	Rights and Responsibility					12 Hrs
Computers, Software, and Digital Information, Rights and Responsibilities Regarding Intellectual Property, Workplace Rights and Responsibilities, Responsibility for the Environment.						
Test Books:						
[T1]	Ethics in Engineering practice and Research (2nd Edition) by Caroline Whitbeck Cambridge					
[T2]	Ethics in Engineering MW Martin and R Schinzinger MC Graw Hill					
[T3]	Engineering Ethics and Environment P a Vesilind and AS Gunn Cambridge					
Online Resources:						
[O1]	NPTEL course on “Ethics in Engineering Practice”, By Prof. Susmita Mukhopadhyay, IIT Kharagpur https://onlinecourses.nptel.ac.in/noc19_hs35/preview					

SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE



Faculty of Science and Technology

Board of Studies

Electrical Engineering

Syllabus

**Final Year Electrical Engineering
(2019 Course)
(w.e.f. 2022-2023)**

BE Electrical (2019 Course)

SEM-I

Course Code	Course Name	Teaching Scheme				Examination Scheme						Credit				
		Th	Pr	Tu	PW	ISE	ESE	TW	PR	OR	Total	Th	Pr	Tu	PW	Total
403141	Power System Operation & Control	3	2	-	-	30	70	25	-	25	150	3	1	-	-	4
403142	Advanced Control System	3	2	-	-	30	70	-	-	50	150	3	1	-	-	4
403143	Elective-I	3	2	-	-	30	70	-	-	25	125	3	1	-	-	4
403144	Elective-II	3	-	2*	-	30	70	25	-	-	125	3	-	1	-	4
403145	Project Stage-I	-	-	-	4	-	-	50	-	50	100	-	-	-	2	2
403146	MOOCs	-	-	-	-	-	-	50	-	-	50	-	-	-	2	2
403147	Audit Course-VII	2#	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		12	6	2	4	120	280	150	-	150	700	12	3	1	4	20
403143: Elective-I				403144: Elective-II						403147: Audit Course-VII						
403143A: PLC and SCADA 403143B: Power Quality Management 403143C: High Voltage Engineering 403143D: Robotics and Automation				403144A : Alternate Energy System 403144B : Electrical & Hybrid Vehicle 403144C : Special-purpose Machines 403144D: HVDC & FACTS						403147 A: German Language I 403147B: Engineering Economics I 403147C: Sustainability(IGBC)						

SEM-II

Course Code	Course Name	Teaching Scheme				Examination Scheme						Credit				
		Th	Pr	Tu	PW	ISE	ESE	TW	PR	OR	Total	Th	Pr	Tu	PW	Total
403148	Switchgear and Protection	3	2	-	-	30	70	25	-	50	175	3	1	-	-	4
403149	Advanced Electrical Drives & Control	3	2	-	-	30	70	25	50	-	175	3	1	-	-	4
403150	Elective-III	3	-	-	-	30	70	-	-	-	100	3	-	-	-	3
403151	Elective-IV	3	-	-	-	30	70	-	-	-	100	3	-	-	-	3
403152	Project stage II	-	-	-	12	-	-	100	-	50	150	-	-	-	6	6
403153	Audit course VIII	2#	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		12	4	-	12	120	280	150	50	100	700	12	2	-	6	20
403150: Elective-III				403151: Elective-IV						403153: Audit Course-VIII						
403150 A : Digital Control System 403150 B : Restructuring and Deregulation 403 150 C: Smart Grid 403150 D: SensorTechnology (Open Elective)				403151A: EHV AC Transmission 403151B : Illumination Engineering 403151C: Electromagnetic Fields 403151D: AI and ML (Open Elective)						403153A: German Language II 403153B: Engineering Economics II 403153C: Green Building						

* For the tutorial, one credit is given. # Audit Course: Conduct over and above these lectures.

403147C: Sustainability

403147C: Sustainability							
Teaching Scheme			Credits			Examination Scheme	
Theory	02	Hrs/Week	Theory	–	ISE		–
Course Objectives:							
This course aims to: <ul style="list-style-type: none"> Increase awareness among students about sustainability. Understand role of engineering and technology within sustainable development. 							
Course Outcomes:							
At the end of this course, students will be able to: CO1: Understand different types of environmental pollution problem. CO2: Suggest solutions for sustainable development. CO3: Develop a broader perspective in thinking for sustainable practices by utilizing engineering principle and knowledge							
Unit 01	Sustainability Introduction						11 hrs
Introduction, need and concept of sustainability, social, environmental and economical sustainability concepts, sustainable development, 17 goals defined by UN, Nexus between technology and sustainable development and its challenges, multilateral environmental agreements and protocols-CDM, Environmental legislations in India-Water Act, Air Act. Air, water and solid waste pollution sources and impacts, Sustainable water treatment. Zero waste concept. Global environmental issues, climate change, global warming, ozone layer depletion.							
Unit 02	Sustainable Solution						11 hrs
Carbon credits and trading, carbon foot print, Green engineering, sustainable urbanization, industrialization and poverty reduction, Industrial process: Material selection, pollution preventions, industrial ecology and symbiosis, Global institutions: UNEP, IPCC, UNDP, WHO, Kyoto protocols. Certification and labelling in energy and carbon: Energy Star, Compliance and voluntary carbon credits, Green-e. Tools and techniques: ISO 14001, ISO26000, ABCD planning method. Assessment measurement: Indicators, F2B2, LCA, LCC, ROI.							
Text Books:							
[T1]	Allen D. T. and Shonnard D. R. “Sustainable Engineering: Concept design and case studies”, Prentice hall						
[T2]	Environmental Impact Assessment Guidelines, Notification of Government of India 2006						
[T3]	Mackenthun K. M. “Basic Concept of Environmental Management”, Lewis publication London 1998						
[T4]	ECBC code 2007, BEE, New Delhi, BEE publication, TERI publication						

[T5]	Ni Bin Chang, “Systems Analysis for sustainable engineering: Theory and Applications ”, Mc-Graw-Hill Professional
Reference Books:	
[R1]	“Sustainable Excellence Associate: Study Guide” International society of sustainability professional, https://community.sustainabilityprofessionals.org/store/viewproduct.aspx?id=13043928
Online Resources:	
[O1]	https://www.globalgoals.org/goals/

403153C: GREEN BUILDING

Teaching Scheme			Credits		Examination Scheme		
Theory	02	Hrs/Week	Theory	--	ISE		--
=====							
Course Objectives:							
This course aims to: <ul style="list-style-type: none"> ● To learn the principles of planning and orientation of buildings. ● To acquire knowledge on various aspects of green buildings. 							
Course Outcomes:							
At the end of this course, students will be able to: CO1:Design green and sustainable techniques for both commercial and residential buildings. CO2:Design water, lighting, energy efficiency plan using renewable energy sources. CO3:Explain the principles of building planning, its bylaws and provide facilities for rainwater harvesting CO4:Understand the concepts of green buildings							
Unit 01	Sustainability and Building design					06 hrs	
Sustainability, objectives of sustainable development, Sustainable aspects of habitat design, sustainable buildings, principles, approaches and characteristics, climate data, climate parameters and zones, comparative analysis of various climatic zones, site planning recommended checklist for identifying site characteristics, site development and layout. Efficient water management and waste water treatment, solid waste management.							
Unit 02	Energy efficiency					06 hrs	
Solar passive techniques in building design to minimize load on conventional systems i.e. heating, cooling, ventilation and lighting. Designing Energy efficient lighting and HVAC systems. Use of renewable energy systems to meet part of building load. Green building certification. Overview of various green buildings in India. Policy and regulatory mechanisms.							
Text Books:							
[T1]	Seven Wonders of Green Building Technology: Karen Sirvaitis, Twenty-First Century Books.						
[T2]	Jerry Yudelson Green building Through Integrated Design. McGraw Hill, 2009.						
[T3]	Osman Attmann Green Architecture Advanced Technologies and Materials. McGraw Hill, 2010.						
[T4]	Fundamentals of Integrated Design for Sustainable Building By Marian Keeler, Bill Burke						
Reference Books:							

[R1]	Sustainable Building Design Manual, Volume 2, TERI, New Delhi
[R2]	Energy Efficient Buildings in India, TERI, New Delhi
[R3]	Sustainable Building Design Manual, Volume 1 TERI, New Delhi
[R4]	Mili Majumdar, “Energy-efficient buildings in India” Tata Energy Research Institute, 2002.
[R5]	TERI “Sustainable Building Design Manual- Volume I & II” Tata Energy Research Institute, 2009.
Online Resources:	
[O1]	https://nptel.ac.in/courses/105102175
[O2]	https://theect.org/energy-efficiency-buildings-distance-learning/
[O3]	https://www.udemy.com/topic/energy-management/
[O4]	https://archive.nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce13/
[O5]	https://beeindia.gov.in/content/certification
[O6]	https://elearning.iea.org/
[O7]	https://onlinecourses.nptel.ac.in/noc20_ce08/preview

Savitribai Phule Pune University
Faculty of Science & Technology



Curriculum/Syllabus
for
Second Year
Bachelor of Engineering
(Choice Based Credit System)
Mechanical Engineering and Automobile Engineering
(2019 Course)

Board of Studies - Automobile and Mechanical Engineering
(With Effect from Academic Year 2020-21)

Savitribai Phule Pune University
Board of Studies - Automobile and Mechanical Engineering
Undergraduate Program - Automobile Engineering & Mechanical Engineering (2019 pattern)

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks					Credit				
		TH	PR	TUT	ISE	ESE	TW	PR	OR	TOTAL	TH	PR	TUT	TOTAL
Semester-III														
202041	Solid Mechanics	4	2	-	30	70	-	50	-	150	4	1	-	5
202042	Solid Modeling and Drafting	3	2	-	30	70	-	50	-	150	3	1	-	4
202043	Engineering Thermodynamics	3	2	-	30	70	-	-	25	125	3	1	-	4
202044	Engineering Materials and Metallurgy	3	2	-	30	70	25	-	-	125	3	1	-	4
203156	Electrical and Electronics Engineering	3	2	-	30	70	25	-	-	125	3	1	-	4
202045	Geometric Dimensioning and Tolerancing Lab	-	2	-	-	-	25	-	-	25	-	1	-	1
202046	Audit Course - III	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	16	12	-	150	350	75	100	25	700	16	6	-	22
Semester-IV														
207002	Engineering Mathematics - III	3	-	1	30	70	25	-	-	125	3	-	1	4
202047	Kinematics of Machinery	3	2	-	30	70	-	-	25	125	3	1	-	4
202048	Applied Thermodynamics	3	2	-	30	70	-	-	25	125	3	1	-	4
202049	Fluid Mechanics	3	2	-	30	70	-	-	25	125	3	1	-	4
202050	Manufacturing Processes	3	-	-	30	70	-	-	-	100	3	-	-	3
202051	Machine Shop	-	2	-	-	-	50	-	-	50	-	1	-	1
202052	Project Based Learning - II	-	4	-	-	-	50	-	-	50	-	2	-	2
202053	Audit Course - IV	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	15	12	1	150	350	125	-	75	700	15	6	1	22
<p>Abbreviations: TH: Theory, PR: Practical, TUT: Tutorial, ISE: In-Semester Exam, ESE: End-Semester Exam, TW: Term Work, OR: Oral</p>														
<p>Note: Interested students of SE (Automobile Engineering and Mechanical Engineering) can opt for any one of the audit course from the list of audit courses prescribed by BoS (Automobile and Mechanical Engineering)</p>														
<p>Instructions</p> <ul style="list-style-type: none"> • Practical/Tutorial must be conducted in three batches per division only. • Minimum number of required Experiments/Assignments in PR/ Tutorial shall be carried out as mentioned in the syllabi of respective subjects. • Assessment of tutorial work has to be carried out as a term-work examination. Term-work Examination at second year of engineering course shall be internal continuous assessment only. • Project based learning (PBL) requires continuous mentoring by faculty throughout the semester for successful completion of the tasks selected by the students per batch. While assigning the teaching workload of 2 Hrs/week/batch needs to be considered for the faculty involved. The Batch needs to be divided into sub-groups of 5 to 6 students. Assignments / activities / models/ projects etc. under project based learning is carried throughout semester and Credit for PBL has to be awarded on the basis of internal continuous assessment and evaluation at the end of semester. • Audit course is mandatory but non-credit course. Examination has to be conducted at the end of Semesters for award of grade at institute level. Grade awarded for audit course shall not be calculated for grade point & CGPA. 														

202046 - Audit Course - III		
Teaching Scheme	Credits	Examination Scheme
-	-	-
GUIDELINES FOR CONDUCTION OF AUDIT COURSE		
<p>Faculty mentor shall be allotted for individual courses and he/she shall monitor the progress for successful accomplishment of the course. Such monitoring is necessary for ensuring that the concept of self learning is being pursued by the students ‘in true letter and spirit’.</p> <ul style="list-style-type: none"> • If any course through Swayam/ NPTEL/ virtual platform is selected the minimum duration shall be of 8 weeks. • However if any of the course duration is less than the desired (8 weeks) the mentor shall ensure that other activities in form of assignments, quizzes, group discussion etc. (allied with the course) for the balance duration should be undertaken. <p>In addition to credits courses, it is mandatory that there should be an audit course (non-credit course) from second year of Engineering. The student will be awarded grade as AP on successful completion of the audit course. The student may opt for any one of the audit courses in each semester. Such audit courses can help the student to get awareness of different issues which make an impact on human lives and enhance their skill sets to improve their employability. List of audit courses offered in the semester is provided in the curriculum. Students can choose one of the audit courses from the list of courses mentioned. Evaluation of the audit course will be done at institute level.</p> <p>The student registered for audit course shall be awarded the grade AP and shall be included such grade in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the Savitribai Phule Pune University and satisfactory in-semester performance and secured a passing grade in that audit course. No grade points are associated with this 'AP' grade and performance in these courses is not considered in the calculation of the performance indices SGPA and CGPA. Evaluation of the audit course will be done at institute level itself.</p>		
Selecting an Audit Course		
List of Courses to be opted (Any one) under Audit Course III		
<ul style="list-style-type: none"> • Technical English For Engineers • Entrepreneurship Development • Developing soft skills and personality • Design Thinking • Foreign Language (preferably German/ Japanese) • Science, Technology and Society <p># The titles indicated above are subject to change in time to come and such an alteration (if any) should be brought to the notice of the BoS.</p>		
Using NPTEL Platform: (preferable)		
<p>NPTEL is an initiative by MHRD to enhance learning effectiveness in the field of technical education by developing curriculum based video courses and web based e-courses. The details of NPTEL courses are available on its official website www.nptel.ac.in</p> <ul style="list-style-type: none"> • Students can select any one of the courses mentioned above and has to register for the corresponding online course available on the NPTEL platform as an Audit course. • Once the course is completed the student can appear for the examination as per the guidelines on the NPTEL portal. • After clearing the examination successfully; student will be awarded with a certificate. 		
Assessment of an Audit Course		
<ul style="list-style-type: none"> • The assessment of the course will be done at the institute level. The institute has to maintain the record of the various audit courses opted by the students. The audit course opted by the students could be interdisciplinary. • During the course students will be submitting the online assignments. A copy of the same can be submitted as a part of term work for the corresponding Audit course. • On the satisfactory submission of assignments, the institute can mark as “Present” and the student will be awarded the grade AP on the marksheet. 		

202053 - Audit Course - IV		
Teaching Scheme	Credits	Examination Scheme
-	-	-
GUIDELINES FOR CONDUCTION OF AUDIT COURSE		
<p>Faculty mentor shall be allotted for individual courses and he/she shall monitor the progress for successful accomplishment of the course. Such monitoring is necessary for ensuring that the concept of self learning is being pursued by the students ‘in true letter and spirit’.</p> <ul style="list-style-type: none"> • If any course through Swayam/ NPTEL/ virtual platform is selected the minimum duration shall be of 8 weeks. • However if any of the course duration is less than the desired (8 weeks) the mentor shall ensure that other activities in form of assignments, quizzes, group discussion etc. (allied with the course) for the balance duration should be undertaken. <p>In addition to credits courses, it is mandatory that there should be an audit course (non-credit course) from second year of Engineering. The student will be awarded grade as AP on successful completion of the audit course. The student may opt for any one of the audit courses in each semester. Such audit courses can help the student to get awareness of different issues which make an impact on human lives and enhance their skill sets to improve their employability. List of audit courses offered in the semester is provided in the curriculum. Students can choose one of the audit courses from the list of courses mentioned. Evaluation of the audit course will be done at institute level.</p> <p>The student registered for audit course shall be awarded the grade AP and shall be included such grade in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the Savitribai Phule Pune University and satisfactory in-semester performance and secured a passing grade in that audit course. No grade points are associated with this 'AP' grade and performance in these courses is not considered in the calculation of the performance indices SGPA and CGPA. Evaluation of the audit course will be done at institute level itself.</p>		
Selecting an Audit Course		
List of Courses to be opted (Any one) under Audit Course IV		
<ul style="list-style-type: none"> • Language & Mind Emotional Intelligence • Advanced Foreign Language (preferably German/ Japanese) • Human Behaviour • Speaking Effectively • Business Ethics • Technical writing/ Research writing <p># The titles indicated above are subject to change in time to come and such an alteration (if any) should be brought to the notice of the BoS.</p>		
Using NPTEL Platform: (preferable)		
<p>NPTEL is an initiative by MHRD to enhance learning effectiveness in the field of technical education by developing curriculum based video courses and web based e-courses. The details of NPTEL courses are available on its official website www.nptel.ac.in</p> <ul style="list-style-type: none"> • Students can select any one of the courses mentioned above and has to register for the corresponding online course available on the NPTEL platform as an Audit course. • Once the course is completed the student can appear for the examination as per the guidelines on the NPTEL portal. • After clearing the examination successfully; student will be awarded with a certificate. 		
Assessment of an Audit Course		
<ul style="list-style-type: none"> • The assessment of the course will be done at the institute level. The institute has to maintain the record of the various audit courses opted by the students. The audit course opted by the students could be interdisciplinary. • During the course students will be submitting the online assignments. A copy of the same can be submitted as a part of term work for the corresponding Audit course. • On the satisfactory submission of assignments, the institute can mark as “Present” and the student will be awarded the grade AP on the mark sheet. 		

Savitribai Phule Pune University

Faculty of Science & Technology



Curriculum/Syllabus
For
Third Year
Bachelor of Engineering
(Choice Based Credit System)
Mechanical Engineering
(2019 Course)
Board of Studies – Mechanical and Automobile Engineering
(With Effect from Academic Year 2021-22)

Savitribai Phule Pune University
Board of Studies - Automobile and Mechanical Engineering
Undergraduate Program - Mechanical Engineering (2019 pattern)

Course Code	Course Name	Teaching Scheme (Hrs./week)			Examination Scheme and Marks					Credit				
		TH	PR	TUT	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
Semester-V														
302041	Numerical & Statistical Methods	3	-	1	30	70	25	-	-	125	3	-	1	4
302042	Heat & Mass Transfer	3	2	-	30	70	-	50	-	150	3	1	-	4
302043	Design of Machine Elements	3	2	-	30	70	-	-	25	125	3	1	-	4
302044	Mechatronics	3	2	-	30	70	-	-	25	125	3	1	-	4
302045	Elective I	3	-	-	30	70	-	-	-	100	3	-	-	3
302046	Digital Manufacturing Laboratory	-	2	-	-	-	50	-	-	50	-	1	-	1
302047	Skill Development	-	2	-	-	-	25	-	-	25	-	1	-	1
302048	Audit course - V ^s	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		15	10	1	150	350	100	50	50	700	15	5	1	21
Semester-VI														
302049	Artificial Intelligence & Machine Learning	3	2	-	30	70	-	-	25	125	3	1	-	4
302050	Computer Aided Engineering	3	2	-	30	70	-	50	-	150	3	1	-	4
302051	Design of Transmission Systems	3	2	-	30	70	-	-	25	125	3	1	-	4
302052	Elective II	3	-	-	30	70	-	-	-	100	3	-	-	3
302053	Measurement Laboratory	-	2	-	-	-	50	-	-	50	-	1	-	1
302054	Fluid Power & Control Laboratory	-	2	-	-	-	50	-	-	50	-	1	-	1
302055	Internship/Mini project *	-	4	-	-	-	100	-	-	100	-	4	-	4
302056	Audit course - VI ^s	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		12	14	-	120	280	200	50	50	700	12	9	-	21
Elective-I						Elective-II								
302045-A	Advanced Forming & Joining Processes					302052-A	Composite Materials							
302045-B	Machining Science & Technology					302052-B	Surface Engineering							

Abbreviations: TH: Theory, PR: Practical, TUT: Tutorial, ISE: In-Semester Exam, ESE: End-Semester Exam, TW: Term Work, OR: Oral

Note: Interested students of TE (Automobile Engineering and Mechanical Engineering) can opt for any one of the audit course from the list of audit courses prescribed by BOS (Automobile and Mechanical Engineering)

Instructions:

- Practical/Tutorial must be conducted in FOUR batches per division only.
- Minimum number of Experiments/Assignments in PR/Tutorial shall be carried out **as mentioned in the syllabi** of respective courses.
- Assessment of tutorial work has to be carried out similar to term-work. The Grade cum marks for Tutorial and Term-work shall be awarded on the basis of **continuous evaluation**.
- ^sAudit course is mandatory but non-credit course. Examination has to be conducted at the end of Semesters for award of grade at institute level. Grade awarded for audit course shall not be calculated for grade point & CGPA.

302048: Audit Course V		
Teaching Scheme	Credits	Examination Scheme
	Non-Credit	
GUIDELINES FOR CONDUCTION OF AUDIT COURSE		
<p>Faculty mentor shall be allotted for individual courses and he/she shall monitor the progress for successful accomplishment of the course. Such monitoring is necessary for ensuring that the concept of self-learning is being pursued by the students ‘in true letter and spirit’.</p> <ul style="list-style-type: none"> • If any course through Swayam/ NPTEL/ virtual platform is selected the minimum duration shall be of 8 weeks. • However if any of the course duration is less than the desired (8 weeks) the mentor shall ensure that other activities in form of assignments, quizzes, group discussion etc. (allied with the course) for the balance duration should be undertaken. <p>In addition to credits courses, it is mandatory that there should be an audit course (non-credit course) from third year of Engineering. The student will be awarded grade as AP on successful completion of the audit course. The student may opt for any one of the audit courses in each semester. Such audit courses can help the student to get awareness of different issues which make an impact on human lives and enhance their skill sets to improve their employability. List of audit courses offered in the semester is provided in the curriculum. Students can choose one of the audit courses from the list of courses mentioned. Evaluation of the audit course will be done at institute level.</p> <p>The student registered for audit course shall be awarded the grade AP and shall be included such grade in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the Savitribai Phule Pune University and satisfactory in-semester performance and secured a passing grade in that audit course. No grade points are associated with this 'AP' grade and performance in these courses is not considered in the calculation of the performance indices SGPA and CGPA. Evaluation of the audit course will be done at institute level itself.</p>		
Selecting an Audit Course		
List of Courses to be opted (Any one) under Audit Course V		
<ul style="list-style-type: none"> • Entrepreneurship and IP strategy • Engineering Economics • Mangment of Inventory Systems <p># The titles indicated above are subject to change in time to come and such an alteration (if any) should be brought to the notice of the BOS.</p>		
Using NPTEL Platform: (preferable)		
<p>NPTEL is an initiative by MHRD to enhance learning effectiveness in the field of technical education by developing curriculum based video courses and web based e-courses. The details of NPTEL courses are available on its official website www.nptel.ac.in</p> <ul style="list-style-type: none"> • Students can select any one of the courses mentioned above and has to register for the 		

corresponding online course available on the NPTEL platform as an Audit course.

- Once the course is completed the student can appear for the examination as per the guidelines on the NPTEL portal.
- After clearing the examination successfully; student will be awarded with a certificate.

Assessment of an Audit Course

- The assessment of the course will be done at the institute level. The institute has to maintain the record of the various audit courses opted by the students. The audit course opted by the students could be interdisciplinary.
- During the course students will be submitting the online assignments. A copy of the same can be submitted as a part of term work for the corresponding Audit course.
- On the satisfactory submission of assignments, the institute can mark as “Present” and the student will be awarded the grade AP on the mark-sheet.

302056: Audit Course VI		
Teaching Scheme	Credits	Examination Scheme
	Non-Credit	
GUIDELINES FOR CONDUCTION OF AUDIT COURSE		
<p>Faculty mentor shall be allotted for individual courses and he/she shall monitor the progress for successful accomplishment of the course. Such monitoring is necessary for ensuring that the concept of self-learning is being pursued by the students ‘in true letter and spirit’.</p> <ul style="list-style-type: none"> • If any course through Swayam/ NPTEL/ virtual platform is selected the minimum duration shall be of 8 weeks. • However if any of the course duration is less than the desired (8 weeks) the mentor shall ensure that other activities in form of assignments, quizzes, group discussion etc. (allied with the course) for the balance duration should be undertaken. <p>In addition to credits courses, it is mandatory that there should be an audit course (non-credit course) from third year of Engineering. The student will be awarded grade as AP on successful completion of the audit course. The student may opt for any one of the audit courses in each semester. Such audit courses can help the student to get awareness of different issues which make an impact on human lives and enhance their skill sets to improve their employability. List of audit courses offered in the semester is provided in the curriculum. Students can choose one of the audit courses from the list of courses mentioned. Evaluation of the audit course will be done at institute level.</p> <p>The student registered for audit course shall be awarded the grade AP and shall be included such grade in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the Savitribai Phule Pune University and satisfactory in-semester performance and secured a passing grade in that audit course. No grade points are associated with this 'AP' grade and performance in these courses is not considered in the calculation of the performance indices SGPA and CGPA. Evaluation of the audit course will be done at institute level itself.</p>		
Selecting an Audit Course		
List of Courses to be opted (Any one) under Audit Course VI		
<ul style="list-style-type: none"> • Business and Sustainable Development • Management Information System • International Business <p># The titles indicated above are subject to change in time to come and such an alteration (if any) should be brought to the notice of the BOS.</p>		
Using NPTEL Platform: (preferable)		
<p>NPTEL is an initiative by MHRD to enhance learning effectiveness in the field of technical education by developing curriculum based video courses and web based e-courses. The details of NPTEL courses are available on its official website www.nptel.ac.in</p> <ul style="list-style-type: none"> • Students can select any one of the courses mentioned above and has to register for the corresponding online course available on the NPTEL platform as an Audit course. • Once the course is completed the student can appear for the examination as per the guidelines on the NPTEL portal. • After clearing the examination successfully; student will be awarded with a certificate. 		

Assessment of an Audit Course

- The assessment of the course will be done at the institute level. The institute has to maintain the record of the various audit courses opted by the students. The audit course opted by the students could be interdisciplinary.
- During the course students will be submitting the online assignments. A copy of the same can be submitted as a part of term work for the corresponding Audit course.
- On the satisfactory submission of assignments, the institute can mark as “Present” and the student will be awarded the grade AP on the mark-sheet.

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

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

Note for all the courses: 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

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
201018	Audit Course II: Disaster Management	-	01	-	-	Grade	-	-	-	Grade	-	-	-	-
Total		15	13	01	150	350	100	50	50	700	15	06	01	22
Abbreviations: TH: Theory TW: Term Work PR : Practical OR: Oral TUT : Tutorial <u>Note for all the courses: 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</u>														

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.

Guidelines for Conduction (Any one or more of following but not limited to)

1. Guest Lectures.
2. Visits and reports.
3. Assist government authorities like Municipal corporations, RTO in Road Safety Audits
4. Mini Project

Guidelines for Assessment (Any one or more of following but not limited to)

1. Written Test
2. Practical Test
3. Presentation
4. Report

**Savitribai Phule Pune University, Pune Second
Year Civil Engineering (2019 Pattern)
201018 Disaster Management
Audit Course II**

Teaching Scheme:

Practical: 01 hrs/week

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

Objectives of the Course:

1. To provide basic conceptual understanding of disasters.
2. To understand approaches of Disaster Management
3. To build skills to respond to disaster

Unit: I

Definition and types of disaster Hazards and Disasters, Risk and Vulnerability in Disasters, Natural and Man-made disasters, earthquakes, floods drought, landside, land subsidence, cyclones, volcanoes, tsunami, avalanches, global climate extremes. Man-made disasters: Terrorism, gas and radiations leaks, toxic waste disposal, oil spills, forest fires

Unit: II

Study of Important disasters Earthquakes and its types, magnitude and intensity, seismic zones of India, major fault systems of India plate, flood types and its management, drought types and its management, landside and its managements case studies of disasters in Sikkim (e.g) Earthquakes, Landside). Social Economics and Environmental impact of disasters

Unit: III

Mitigation and Management techniques of Disaster Basic principles of disasters management, Disaster Management cycle, Disaster management policy, National and State Bodies for Disaster Management, Early Warning Systems, building design and construction in highly seismic zones, retrofitting of buildings.

Unit: IV

Training, awareness program and project on disaster management Training and drills for disaster preparedness, Awareness generation program, Usages of GIS and Remote sensing techniques in disaster management, Mini project on disaster risk assessment and preparedness for disasters with reference to disasters in Sikkim and its surrounding areas.

Text Books:

1. Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)
2. Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.
3. Gupta A.K., Niar S.S and Chatterjee S. (2013)
4. Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.
5. Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
6. Modh S. (2010) Managing Natural Disasters, Mac Millan publishers India LTD.

Guidelines for Conduction (Any one or more of following but not limited to)

1. Guest Lectures.
2. Visits and reports.
3. Studying reports of case studies

Guidelines for Assessment (Any one of following but not limited to)

1. Written Test
2. Practical Test
3. Presentation
4. Report

Savitribai Phule Pune University, Pune



Syllabus for TE Civil Engineering (2019 Pattern)

Implemented from Academic year 2021-22

Board of Studies in Civil Engineering

Faculty of Science and Technology

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

Elective I: 301005

S N	Course Code	Course Name
01	301005 a	Advanced Fluid Mechanics and Hydraulic Machines
02	301005 b	Research Methodology and IPR
03	301005 c	Construction Management
04	301005 d	Advanced Concrete Technology
05	301005 e	Matrix Methods of Structural Analysis
06	301005 f	Advanced Mechanics of Structures

SEMESTER-VI																
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
301012	Waste Water Engineering	03	--	--	30	70	--	--	--	100	03	--	--	--	03	
301013	Design of RC Structures	03	--	--	30	70	--	--	--	100	03	--	--	--	03	
301014	Remote Sensing and GIS	03	--	--	30	70	--	--	--	100	03	--	--	--	03	
301015	Elective II	03	--	--	30	70	--	--	--	100	03	--	--	--	03	
301016	Internship	--	--	--	--	--	100	--	--	100	--	04	--	--	04	
301017	Waste Water Engineering Lab	--	02	--	--	--	--	--	50	50	--	--	--	01	01	
301018	Design of RC Structures Lab	--	04	--	--	--	--	--	50	50	--	--	--	02	02	
301019	Remote Sensing and GIS Lab	--	02	--	--	--	50	--	--	50	--	01	--	--	01	
301020	Elective II Lab	--	02	--	--	--	50	--	--	50	--	01	--	--	01	
301021	Audit Course II: Leadership and Personality Development/ Industrial Safety	--	--	01	--	GR	--	--	--	GR	--	--	--	--	--	
Total		12	10	01	120	280	200	--	100	700	12	06	--	03	--	21

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

Elective II: 301015

S N	Course Code	Course Name
01	301015 a	Advanced Engineering Geology with Rock Mechanics
02	301015 b	Soft Computing Techniques
03	301015 c	Advanced Surveying
04	301015 d	Advanced Geotechnical Engineering
05	301015 e	Architecture and Town Planning
06	301015 f	Solid Waste Management

Savitribai Phule Pune University, Pune
TE Civil (2019 Pattern) w. e. f. June 2021
301005 c: Elective I: Construction Management

Teaching scheme	Credit	Examination scheme
Lectures: 03 Hours/week	03	In semester exam: 30 marks End semester exam: 70 marks

Prerequisite

Fundamental of Project Management

Course Objectives

- 01 To understand various construction activities and evaluating construction projects.
- 02 To handle all situations with knowledge of various labour laws and financial aspects of construction projects.
- 03 To know about risk management and value engineering
- 04 To utilize material and human resources efficiently with managerial skills interpersonal and intrapersonal skills.
- 05 To apply knowledge of artificial intelligence on construction project

Course Outcomes

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

- 01 Understand the overview of construction sector.
- 02 Illustrate construction scheduling, work study and work measurement.
- 03 Acquaint various labor laws and financial aspects of construction projects.
- 04 Explain elements of risk management and value engineering.
- 05 State material and human resource management techniques in construction.
- 06 Understand basics of artificial intelligence techniques in civil engineering.

Course Contents

Unit I: Overview of Construction Sector (06 Hours)

Role of construction industry in infrastructure development, components of infrastructure sector, construction industry nature, characteristics, size, structure, role in economic development, construction management: necessity, applications, project management consultants: role, types, selection and appointment process, project overruns and means to combat them, project monitoring and reporting systems, managerial correspondence and communications, generation and identification of project investment opportunities.

Unit II: Construction Scheduling, Work Study and BIM (06 Hours)

Construction project scheduling: definition, objectives factors affecting scheduling, work breakdown structure, project work break down levels, line of balance technique, project monitoring controlling, and introduction to building information modeling (BIM) based on software. Work study (time and motion study): definition, objectives, process of method study, symbols, multiple activity charts, two handed process chart, string diagram.

Unit III: Labour Laws and Financial Aspects of Construction Project (06 Hours)

Need and importance of labour laws, study of some important labour laws associated with construction sector, workman's compensation act 1923, building and other construction workers act 1996, child labour act, interstate migrant workers act, the minimum wages act 1948. Capital investments: importance and difficulties, means of finance, working capital requirements, project cash flow projections and statements, project balance sheet, profit loss account statements.

Unit IV: Risk Management and Value Engineering: (06 Hours)

Risk Management: introduction, principles, steps in risk management, risk in construction, origin, use of mathematical models: sensitivity analysis, break even analysis, simulation analysis (examples), decision tree analysis, risk identification, mitigation of project risks, role of insurance in risk management and case study on risk management. Value Engineering: meaning of value, types of value, value analysis, value engineering and its application, energy cost escalation and its impact on infrastructure project.

Unit V: Material Management (06 Hours)

Material: introduction, need, objectives and functions and scope of material management, integrated concept of material management, material management organization, various phases of material flow system, application of each phase, role of material manager, role of material management in construction management and its linkage with other functional areas, inventory control methods, EOQ Model, stores management and control, break even analysis, concept of logistics and supply chain management, role of ERP in material management and material resource information systems.

Unit VI: Human Resource Management (06 Hours)

Human resource: introduction, nature and scope of human resource management, human resource in construction sector, staffing policy and patterns, human resource management process, human resource development process, recruitment & selection, performance evaluation and appraisal, training & development, succession planning, compensation and benefits, career planning, human resources information systems, HR data and analytics, role of ERP in human resource management and human resource information system. Introduction to artificial intelligence technique, basic terminologies and applications in civil engineering: artificial neural network, fuzzy logic and genetic algorithm.

Text Books

- 01 Construction Management and Planning, B. Sengupta and H. Guha, Tata McGraw Hill Publications.
- 02 Total Project Management - The Indian Context, P. K. Joy, Mac Millian Publications.
- 03 Projects: Planning, Analysis, Selection, Implementation and Review, Prasanna Chandra, Tata Mc Graw Hill Publications.

Reference Books

- 01 Civil Engineering Project Management, C. Alan Twort and J. Gordon Rees, Elsevier Publications
 - 02 Principles of Construction Management, Roy Pilcher (Mc Graw Hill)
 - 03 Human Resource Management, Biswajeet Pattanayak, Prentice Hall Publishers.
 - 04 Materials Management, Gopalkrishnan & Sunderasan, Prentice Hall Publications.
 - 05 Labour and Industrial Laws, S. N. Mishra, Central Law Publications.
 - 06 Artificial Neural Network, Veganarayanan, Prentice Hall.
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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, environmental and 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 of energy: 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

Reference books

- 01 Sustainable Energy Systems and Applications, İbrahim Dinçer, Calin Zamfirescu, Springer
- 02 Fundamentals of Renewable Energy Systems, D. Mukherjee, Atlantic

03 An introduction to global warming, John R. Barker and Marc H. Ross Am. J. Phys.

Guidelines for Conduction (Any one or more of following but not limited to)

1. Guest Lectures.
2. Visits to sites
3. Studying reports of case studies

Guidelines for Assessment (Any one of following but not limited to)

1. Written Test
 2. Practical Test
 3. Presentation
 4. Report
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Savitribai Phule Pune University, Pune
TE Civil (2019 Pattern) w. e. f. June 2021
301015 f: Elective II: Solid Waste Management

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

Pre-requisites

Fundamentals of Environmental Studies, Engineering Chemistry and Waste Water Engineering

Course objectives

- 01 To understand problems of solid waste, estimate and characterize the solid waste and apply the knowledge of laws for municipal solid waste management for handling of MSW.
- 02 To understand government initiatives for management of solid waste, to apply the knowledge of mathematics, science, and engineering for effective solid waste collection systems, for waste collection route optimization and its economics.
- 03 To understand processing of solid waste, material recovery facility and to design composting systems, maintain and operate composting process for effective organic waste recycling.
- 04 To understand working of waste to energy system and to design of bio-methnation and incineration system.
- 05 To design & manage construction and operations of landfill facilities and management of legacy solid waste.
- 06 To understand management and legal requirements of special waste and reuse, recycle and material recovery from solid waste.

Course outcomes

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

- 01 Outline solid waste management systems with respect to its generation rate (quantity), sampling, characteristics and regulatory/legal requirements.
- 02 Explain and suggest relevant method of storage, collection and transportation of solid waste for the given site condition with justification.
- 03 Develop understanding of technological applications for processing and material recovery from solid waste with its economics and design composting system for organic waste.
- 04 Describe the fundamental and technological aspects of waste to energy systems from solid waste and to design anaerobic digester and incineration system.
- 05 Outline the design, operation, and maintenance of sanitary landfill and management of legacy waste.
- 06 Explain the functional element for management of special waste and suggest the relevant method of reuse and recycling for the given type of waste in the given situation.

Course Contents

Unit I: Introduction to Solid Waste Management (06 Hours)

Definition, objectives of SWM, impacts of improper SWM: soil, water and air, functional outlines of SWM, sources and types of solid waste. MSW: sampling, refuse analysis, composition, characteristics: physical, chemical, biological and generation rate, factors affecting generation rate, estimation of quantity of solid waste. Sustainable solid waste management for smart cities, role of urban local bodies in waste management, objectives and importance of MSW Rules 2016, rules and regulations of SWM in developed countries.

Unit II: Government Initiatives, Collection & Transportation of Solid Waste (06 Hours)

Swachh survekshan and its impact on the SWM scenario in India, national urban livelihood missions (NULM) and its role in SWM, social entrepreneurship, swachhta & rural engagement cell (SESREC): government of India initiatives, success stories of SWM in India. Integrated solid waste management, storage, different methods of collection, collection systems, transfer and transportation of solid waste, uses of radio frequency identification (RFI)/global positioning system (GPS) for tracking vehicles location, optimization of route, measurement and methods of measuring solid waste, economics of solid waste collection and transport.

Unit III: Processing and Transformation of Solid Waste (06 Hours)

Decentralised system Vs centralised system, three tier system, source reduction, segregation and salvage, material recovery facility centres, resource recovery of bye-products, recycling and reuse of solid waste, use of solid waste as raw materials in industry, value added products, recycling and carbon credits, economics of solid waste processing, circular economy in waste management. Theory of composting, processing before composting, types of composting (home composting, vermicomposting, organic waste converter, rotary drum, continuous flow reactor), explain methods: Indore method, Bangalore method, mechanical composting plant, factors governing composting and design of composting system.

Unit IV: Waste to Energy (06 Hours)

Bio-methnation: theory of anaerobic digestion, stages, factors affecting anaerobic digestion, recovery of bio-gas, applications/use of biogas, design of anaerobic digester. Energy content of MSW, estimation of low and high heating value (LHV, HHV), theory and types of incinerators, design of incineration plant. Pyrolysis, refused derived fuel (RDF), plasma gasification: working principle, energy recovery, advantages, limitations and applications, environmental impacts of waste to energy: dioxins, furans, heavy metals etc.

Unit V: Disposal of Solid Waste (06 Hours)

Landfill: Introduction, components of land filling, types of land filling, site selection, acceptable waste, construction techniques, maintenance and precautions, leachate and landfill gas: estimation, management, treatment and disposal/reuse, control of contamination of ground water, operation monitoring, closure and end-use, advantages and disadvantages of secured landfill facility (SLF), design of sanitary landfill, slope stability analysis, concept of

bioreactor landfill: principle, types, applications. Legacy waste management or biomining: concept, methods, applications, economics and time duration.

Unit VI: Special Waste Management and Regulations (06 Hours)

Sources, collection, transportation, treatment and disposal: biomedical waste, hazardous waste, construction and demolition waste, e-waste, sanitary napkin (flow chart and one case study of each). Slaughter waste management: concept of rendering plants. Objectives and key points of hazardous and other waste management rules, 2016, construction and demolition (C&D) waste management rules - 2016, E-waste management rules - 2016, plastic waste management rules – 2016, reuse and recycling of plastic waste in road construction, case studies of processing and reuse of construction & demolition waste, material recovered from e-waste, introduction to life cycle assessment (LCA) in solid waste management.

Text Books

- 01 Integrated Solid Waste Management: Engineering Principles and Management Issues, George Tchobanoglous, Hilary Theisen, Samuel Vigil, Tchobanoglous George, Vigil Samuel, McGraw-Hill Companies, Incorporated.
- 02 Solid waste management, Dr. A.D. Bhide
- 03 Solid Waste Management, Sasikumar K and Sanoop Gopi Krishna, PHI.

Reference Books

- 01 Solid waste Engineering, Vesilind P. A., Worrell W and Reinhart, Thomson Learning Inc., Singapore.
 - 02 CPHEEO, Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000.
 - 03 Hazardous Waste Management, Charles A. Wentz, Second Edition, McGraw Hill International Edition, New York.
 - 04 C for Environmental Scientists and Engineers, Y. Anjaneyulu and Valli Manickam, Wiley Publications.
 - 05 Standard Handbook of Hazardous Waste Treatment and Disposal, Harry Freeman, McGraw-Hill Education, 1998
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Savitribai Phule Pune University, Pune
TE Civil (2019 Pattern) w. e. f. June 2021
301021 b: Audit Course II: Industrial Safety

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

Course objectives

01 Health environment and security covers virtually every important area in administration

Course outcomes

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

01 Analyze the safety problem with its solution

Course Contents

Unit I: Introduction of safety

Elements of safety programming, safety management, upgrading developmental programmers: safety procedures and performance measures, education, training and development in safety.

Unit II: Safety Performance Planning Safety Performance

An overview of an accident, it is an accident, injury or incident, the safety professional, occupational health and industrial hygiene, understanding the risk, emergency preparedness and response, prevention of accidents involving hazardous substances.

Unit III: Accident Prevention

What is accident prevention, maintenance and inspection, monitoring techniques, general accident prevention, safety education and training.

Unit IV: Safety Organization

Basic elements of organized safety, duties of safety officer, safe work practices, safety sampling and inspection, job safety analysis (JSA), safety survey, on-site and off-site emergency plan, reporting of accidents and dangerous occurrences.

Reference books

- 01 Industrial Safety, Health Environment and Security, Basudev Panda, Laxmi Publications
- 02 Industrial safety and Environment, A. K. Gupta, Laxmi Publication
- 03 Industrial Safety Management, L. M. Deshmukh, Tata McGraw-Hill

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Guidelines for Assessment (Any one of following but not limited to)

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Savitribai Phule Pune University, Pune



Syllabus for BE Civil Engineering (2019 Pattern)

Implemented from Academic year 2022-23

Board of Studies in Civil Engineering

Faculty of Science and Technology

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	Transpiration 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	Application of Python in Civil Engineering Lab	01	02	--	--	--	50	--	--	50	--	02	--	--	--	02
401010	Audit Course I:	--	--	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 Resource 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 Structure	03	--	--	30	70	--	--	--	100	03	--	--	--	03	
401012	Quantity Surveying, Contract 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 Structure Lab	--	02	--	--	--	--	--	50	50	--	--	--	01	01	
401017	Quantity Surveying, Contract and Tenders Lab	--	02	--	--	--	--	--	50	50	--	--	--	01	01	
401018	Elective V Lab	--	02	--	--	--	50	--	--	50	--	01	--	--	01	
401019	Audit Course II:	--	--	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 Green Cities
06	401013 f	Structural Audit and Retrofitting of Structures	401014 f	Rural Water Supply and Sanitation

Savitribai Phule Pune University, Pune
B.E. Civil (2019 Pattern) w. e. f. July 2022
401 004 a Elective IV: Air Pollution and Control

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

Pre-requisites

Basic concepts of sciences, mathematics

Course objectives

- 01 Impart the knowledge and understanding of outdoor and indoor air pollution, its impact and existing legislation and regulation.
- 02 Make aware about the meteorology, measurement techniques, emission inventory and modeling aspects.
- 03 Provide the scientific and technical background of state of the art air pollution control technologies.

Course outcome

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

- 01 Recall air pollution, legislation and regulations.
- 02 Evaluate air pollutant concentrations as a function of meteorology.
- 03 Interpret sampling results with prescribed standards.
- 04 Assess emission inventory and air quality models.
- 05 Compare the air pollution control equipments.
- 06 Infer indoor air pollution and its mitigation.

Course Content

Unit 1: Air Pollution, Legislations and Regulations (06 hours)

Air Pollution: Layers of atmosphere, Atmospheric temperature and altitude, Composition of air, Definition of air pollution, Air pollution episodes and accidents (Donora Pennsylvania 1948, Great London Smog 1952, Bhopal Gas Tragedy 1984), Classification of air pollutants (Based on sources, origin and state of matter), Criteria and hazardous air pollutants, Greenhouse gases, Sources of air pollution, Scales (micro, meso, macro), Processes and fates (Advection, convection, Diffusion, dispersion), Impact on human health and its valuation, Ozone depletion, Acid rain, Global warming, Climate change, Estimation of Carbon footprints (Numerical Included). Legislations and regulations: A case study (Air Act 1981, The Air Rules 1982, Central Motor Vehicles Act 1988, Environmental Protection Act 1986, National Environment Tribunal Act 1995, National Green Tribunal Act 2010, Draft Notice for e-Vehicles in National Capital Region 2022), Major Government Initiatives for managing ambient air quality (NAMP-National Air Quality Program, AQI-Air Quality Index (Significance, calculation method adopted by CPCB), NCAP-National Clean Air Program).

Unit 2: Meteorological Aspects (06 hours)

Meteorology, Meteorological parameters and measuring instruments, Wind rose diagram, Environmental lapse rate (ELR) and adiabatic lapse rate (ALR), Inversion and its types, Atmospheric stability, Pasquill-Gifford classification, Plume behaviour, Horizontal and vertical dispersion coefficients, mixing height, Determination of mixing height using radio-soundings and remote sounding system, Stack height determination (Numerical included), CPCB recommendations, Plume rise estimation using Brigg's formula (Numerical included), Gaussian dispersion equation for point source; assumptions, advantages and limitations (Numerical included).

Unit 3: Ambient Air Sampling, Analysis and Standards (06 hours)

Ambient Air sampling and Analysis: Air pollution survey, basis and statistical considerations of sampling sites, Conversion of $\mu\text{g}/\text{m}^3$ to ppm, devices and methods used for sampling of particulates and gaseous air pollutants. Use of aerosol spectrometer and sensors, Stack emission monitoring for particulate and gaseous air pollutants, isokinetic sampling, Air Quality and Emission Standards: Components of air quality standards (Indicator, averaging time, form, level), National Ambient Air Quality Standards (NAAQS) 2009 and Emission standards in India, WHO air quality guidelines 2021, Interpretation of sampling results with case study.

Unit 4: Emission Inventory and Air Quality Modeling (06 hours)

Emission inventory: Definition, Role in air quality management, Utilization, Development approach (Bottom-up, Top-down), Basic equation of emission estimation, Types (Annual average, seasonal, forecasted and gridded), Emission inventory framework developed by CPCB, Air Quality Modeling: Introduction, Basic components, Importance, classification (Based on time period, pollutant type, coordinate system, level of sophistication), Types of air quality models (Physical, statistical, deterministic), AERMOD model USEPA (Assumptions, strengths and limitations).

Unit 5: Control of Air Pollution (06 hours)

Natural self-cleansing properties (Dispersion, gravitational settling, absorption, rainout, adsorption), Objectives, Control by process modification, change of raw materials, fuels, process equipment and process operation, Control of particulates from stationary sources: Removal Mechanism, collection efficiency, control equipment as Settling chamber, inertial separators, cyclone, fabric filter and electro Static precipitator. Scrubbers, Factors affecting selection of device (Numerical included). Control of gaseous pollutants from stationary sources: Absorption, adsorption, incineration/ combustion, carbon sequestration for CO_2 , Control of emissions from mobile sources: Emission sources, Control of emissions from each source.

Unit 6: Indoor Air Pollution (06 hours)

Causes, sources, health impacts, factors affecting indoor air quality, sick building syndrome, General aspects of exposure assessment, Sampling design, Active and Passive samplers, monitoring of ventilation rates, Mitigating technologies: Source control, Improved ventilation, air cleaning, Types of air cleaners, Air cleaning technologies, Practical considerations using portable and in-duct air cleaners, Use of plants for control, Radon removal technique, Sources and remedial measures for odour control.

Text books

- 01 Air Pollution: Its origin and control, 3rd Edition, Kenneth Wark, Cecil F. Warner, Wayne T. Davis, Addison-Wesley Longman. 1998.
- 02 Air Pollution: Health and Environmental Impacts, Gurjar, B.R., Molina, L., Ojha, C.S.P. (Eds.), CRC Press, 2010

Reference book

- 01 Air Pollution, M. N. Rao, H. V. N. Rao, McGraw Hill, 2004.
- 02 Air Pollution and Control, K.V.S.G. Murali Krishna, University Science Press, 2015.
- 03 Atmospheric Chemistry and Physics, Seinfeld, J.H., Pandis, S.N., John Wiley, 2006.
- 04 Fundamentals of Air Pollution, Boubel, R.W., Fox, D.L., Turner, D.B., Stern, A.C., Academic Press, 2005.
- 05 Methods of Air Sampling and Analysis, Lodge, J.P. (Ed.), CRC Press, 1988.
