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.

Savitribai Phule Pune University		
Second Year of Electronics / E & Tc Engineering (2019 Course)		
204199: Employbility Skills Development		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Theory: 02 hrs. / week **Practical: 02 hrs. / week**	**02 + 01 = 03**	**Term work: 50 Marks**

Prerequisite Courses, if any: --

Companion Course, if any: --

Course Objectives:

- Develop good communication skills – both oral as well as written.
- Encourage creative and critical thinking among students.
- Nurture collaborative behavior to work efficiently in groups.

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

CO1: Define personal and career goals using introspective skills and SWOC assessment. Outline and evaluate short-term and long-term goals.

CO2: Develop effective communication skills (listening, reading, writing, and speaking), self- management attributes, problem solving abilities and team working & building capabilities in order to fetch employment opportunities and further succeed in the workplace.

CO3: Be a part of a multi-cultural professional environment and work effectively by enhancing inter-personal relationships, conflict management and leadership skills.

CO4: Comprehend the importance of professional ethics, etiquettes & morals and demonstrate sensitivity towards it throughout certified career.

CO5: Develop practically deployable skill set involving critical thinking, effective presentations and leadership qualities to hone the opportunities of employability and excel in the professional environment.

Course Contents		
Unit I	**Understanding Self and Soft Skills**	**(04 Hrs)**

Introduction to introspective methods, SWOC Analysis, Understanding the importance of soft skills, soft skill vs hard skill, interdisciplinary relevance, emotional quotient and emotional intelligence, personal and career goal setting, aligning aspirations with individual's skill sets, understanding self-esteem and critically evaluating oneself.

Mapping of Course Outcomes for Unit I	CO1: Define personal and career goals using introspective skills and SWOC assessment. Outline and Evaluate short-term and long-term goals.	
Unit II	Communication Skills	(04 Hrs)

Essentiality of good communication skills, Importance of feedback, Different types of communication, Barriers in communication and how to overcome these barriers, Significance of non-verbal messages as augmentation to verbal communication, Group Discussion, Listening Vs Hearing, Reading to comprehend, Learning to skim and scan to extract relevant information, Effective digital communication.

Mapping of Course Outcomes for Unit II	CO2: Develop effective communication skills (listening, reading, writing, and speaking), self - management attributes, problem solving abilities and team working & building capabilities in order to fetch employment opportunities and further succeed in the workplace.	
Unit III	Language & Writing Skills	(04 Hrs)

Fundamentals of English Grammar, improve Lexical resource, essential steps to improve spoken and written English, Business vocabulary, Writing - Email, Resume, Formal letter, Official Communication, Essay, Presentation – Planning, Organizing, Preparing and Delivering Professional presentation, Resume writing: Resume content, identification of carrier objective, characteristics of good resume, different formats of resume-chronological, Functional , Hybrid Effective letter and cover letter writing, Application writing, Report writing.

Mapping of Course Outcomes for Unit III	CO2: Develop effective communication skills (listening, reading, writing, and speaking), self - management attributes, problem solving abilities and team working & building capabilities in order to fetch employment opportunities and further succeed in the workplace.	
Unit IV	Leadership Skills and Group Dynamics	(04 Hrs)

Understanding Corporate Culture and Leadership skills, difference between a leader and a manager, Importance of resilience in a professional surrounding, Developing empathy and emotional intelligence, being assertive and confident, 4-Ds of decision making, Creative and solution-centric thinking, Resolving conflicts, Working cohesively as a team to achieve success, 5 Qualities of an Effective team - Positivity, respect for others, trust, goal-focused, supportiveness.

Mapping of Course Outcomes for Unit IV	CO3: Be a part of a multi-cultural professional environment and work effectively by enhancing inter- personal relationships, conflict management and leadership skills.	

Unit V	Professionalism & Ethics	(04 Hrs)

Understanding ethics and morals, Importance of Professional Ethics, hindrances due to absence of Work ethics, Professional etiquette – Introductions, with colleagues, attire, events, dinning, telephone, travelling, netiquette, social media, writing.

Stress as integral part of life, Identifying signs and sources of stress, Steps to cope with stress – open communication, positive thinking, Belief in oneself, ability to handle failure, Retrospective thinking for future learning, Organizing skills to enhance time management, Focusing on goals, smart work vs hard work, Prioritizing activities, Perils of procrastination, Daily evaluation of "to-do" list.

Mapping of Course Outcomes for Unit V	CO4: Comprehend the importance of professional ethics, etiquettes & morals and demonstrate sensitivity towards it throughout certified career. CO5: Develop practically deployable skill set involving critical thinking, effective presentations and leadership qualities to hone the opportunities of employability and excel in the professional environment.

Unit VI	Quantitative Ability & Logical Reasoning	(04 Hrs)

Numbers, HCF and LCM, Time and distance, Time and work, Clock, Simple interest and compound interest, Boats and steams, Number series, Ratio and proportion, probability, profit and loss, odd man out series, permutations, height and distance, square and cube rootmatching, selection, verbal reasoning, logical games, logical deductions, logical problems, cause and effect.

Mapping of Course Outcomes for Unit VI	CO2: Develop effective communication skills (listening, reading, writing, and speaking), self - management attributes, problem solving abilities and team working & building capabilities in order to fetch employment opportunities and further succeed in the workplace.

Learning Resources

Text Books:

1. R. S. Agarwal "Quantitative Aptitude for Competitive Examinations" S. Chand Publications.

2. R.Gajendra Singh Chauhan and Sangeeta Sharma, "Soft Skills-An integrated approach to maximize personality", Wiley Publication, ISBN: 987-81-265-5639-7

Reference Books:

1. Indrajit Bhattacharya, "An Approach to Communication Skills", Dhanpat Rai.

2. Simon Sweeney, "English for Business Communication", Cambridge University Press.

3. Sanjay Kumar and Pushpa Lata, "Communication Skills", Oxford University Press.

4. Atkinson and Hilgard's, "Introduction to Psychology", 14th Edition.

5. Kenneth G. Mcgee, "Heads Up: How to Anticipate Business Surprises & Seize Opportunities First", Harvard Business School Press, Boston, Massachusetts.

6. Krishnaswami, N. and Sriraman, "Creative English for Communication", Macmillan.

MOOC / NPTEL Courses:

1. NPTEL Course **"Developing Soft skills & Personality"**

   https://nptel.ac.in/courses/109/104/109104107/

2. NPTEL Course **"Communication Skills"**

   https://nptel.ac.in/courses/109/104/109104030/

3. NPTEL Course **"Effective Writing"**

   https://nptel.ac.in/courses/109/107/109107172/

4. NPTEL Course **"Interpersonal Skills"**

   https://nptel.ac.in/courses/109/107/109107155/

Savitribai Phule Pune University		
Second Year of Electronics / E & Tc Engineering (2019 Course) **204200: Project Based Learning**		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Practical: 04 hrs. / week	**02**	**Term Work: 50 Marks**

Preamble:

The main stream engineering education follows traditional classroom teaching, in which the major focus is mainly on the lecturer and the student has very little (if any) choice on the learning process. However rapid development in engineering and technology requires adopting a teaching approach that would assist students not only in developing a core set of industry relevant skills, but also enable them to adapt to changes in their professional career.

PBL is an approach to design Electronic Systems Curricula for making electronics more appealing to students. Since electronics is an important grounding for other disciplines (computer science, signal processing, and communications), this approach proposes the development of multidisciplinary projects using the PBL strategy for increasing the attractiveness of the curriculum. Promoting electronics as grounding for other disciplines can be done by defining a new curriculum that includes practical courses (laboratories) in which the students develop whole systems involving multidisciplinary knowledge.

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

- To emphasize project based learning activities that are long-term, interdisciplinary and student-centric.
- To inculcate independent and group learning by solving real world problem with the help of available resources.
- To be able to develop application based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge.
- To get practical experience in all steps in the life cycle of the development of electronic systems: specification, design, implementation, and testing.
- To be able to select and utilize appropriate hardware and software tools to design and analyze the proposed system.
- To provide every student the opportunity to get involved either individually or as a group so as to develop team skills and learn professionalism.

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

CO1: Identify the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aim and objectives.

CO2: Contribute to society through proposed solution by strictly following professional ethics and safety measures.

CO3: Propose a suitable solution based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge.

CO4: Analyze the results and arrive at valid conclusion.

CO5: Use of technology in proposed work and demonstrate learning in oral and written form.

CO6: Develop ability to work as an individual and as a team member.

Group Structure:

Working in supervisor/mentor –monitored groups. The students plan, manage and complete a task/project/activity which addresses the stated problem.

1. Create groups of 5 (five) to 6 (six) students in each class

Project Selection:

Survey through journals, patents or field visit (A problem can be theoretical, practical, social, technical, symbolic, cultural and/or scientific), check the physibility of solution, analyze the problem, design and find the values of components.

There are no commonly shared criteria for what constitutes an acceptable project. Projects vary greatly in the depth of the questions explored, the clarity of the learning goals, the content and structure of the activity.

The problem-based project oriented model for learning is recommended. The model begins with the identifying of a problem, often growing out of a question or "wondering". This formulated problem then stands as the starting point for learning. A problem can be theoretical, practical, social, technical, symbolic, cultural and/or scientific and grows out of students' wondering within different disciplines and professional environments. As stated in the preamble as electronics is an important grounding for other disciplines (computer science, signal processing, and communications), the project topic can be Interdisciplinary in nature. However the chosen problem must involve the application of electronics and communication engineering fundamentals. Out of the total developed system setup, the project must involve minimum 40% electronic components. Although in a genuine case 100% software based project topic may be allowed.

Ethical Practices, team work and project management:

Use IEEE standards for project manufacturing, respect the time of others, attend the reviews, poster presentation and model exhibitions, strictly follow the deadline of project completion, comply with all legislation requirements that govern workplace health and safety practices.

Effective Documentation:

In order to make our engineering graduates capable to prepare effective documentation, it is required for the students to learn the effective writing skills. The PBL final report is expected to consist of the Literature Survey, Problem Statement, Aim and Objectives, System Block Diagram, System Implementation Details, Discussion and Analysis of Results, Conclusion, System Limitations and Future Scope. Many freely available software tools (for instance Medley (Elsevier), Grammerly) are expected to be used during the preparation of PBL synopsis and final report. It is expected that the PBL guides/mentors shall teach students about utilizing valid sources of information (such as reference papers, books, magazines, etc) related to their PBL topic.

Evaluation & Continuous Assessment:

The institution/head/mentor is committed to assessing and evaluating both student performance and program effectiveness. Progress of PBL is monitored regularly on weekly basis. Weekly review of the work is necessary. During process of monitoring and continuous assessment and evaluation the individual and team performance is to be measured. PBL is monitored and continuous assessment is done by supervisor /mentor and authorities. Students must maintain an institutional culture of authentic collaboration, self-motivation, peer-learning and personal responsibility. The institution/department should support students in this regard through guidance/orientation programs and the provision of appropriate resources and services. Supervisor/mentor and Students must actively participate in assessment and evaluation processes.

It is recommended that the all activities are required to be recorded and regularly. A regular assessment of PBL work is required to be maintained at the department in PBL log book by students. It is expected that the PBL log book must include following:

1. Weekly monitoring by the PBL guide,
2. Assessment sheet for PBL work review by PBL guide and PBL Evaluation Committee (PEC).

The PEC structure shall consist of Head of the department, 1/2 senior faculties of the department and one industry expert (optional). Continuous Assessment Sheet (CAS) is to be maintained by the department.

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:

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- 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)		
304190: Skill Development		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Practical: 02 hrs. / week	**01**	**Term work: 25 Marks**

Prerequisite Courses, if any:

1. Basics of Electronics Components
2. Working of Operational amplifier
3. Basics of Electronics measurement instruments and Tools

Companion Course, if any: --

Course Objectives:

- 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.

Group A: Any *three experiments* are expected to be done from the mentioned list.
Group B: Any *two experiments* are expected to be done from the mentioned list.
Group C: *Compulsory Industrial visit*
Group D: Compulsory to *prepare notes, assignments and other relevant documents* based on above work.

	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 1* and may be covered as per availability of lab or equipment's. **OR** 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. **Note: Batteries of e-Vehicle & Technology Involved (Lithium Batteries etc.)**
2.	**Case study on Automotive Electronics. (Sensors, Clusters, Controls, Semiconductor's devices etc.)** 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. **OR** B. Apply Skill sets mentioned in *#Group A Skills 1*may be covered by visiting any Automobile service centers or related industry.
3.	**Case study on Biomedical Instrumentation** 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. **OR** B. Visit biomedical instrument maintenance service centers **OR** C. Visit Hospitals or related industry. **Note: Students are expected to know about sensors technology / Interface / maintenance / calibration of electronic instrumentation of some of these equipment's.**
4.	Troubleshooting and maintenance of PCB Boards &Controllers
5.	Troubleshooting and maintenance of Power supply

Group B (Any Two)

Software / Hardware Design

1.	**Design and Simulate dc-dc boost converter for battery-based applications** 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.

2.	**Design a web page(s)**
	
	    A. Using different text formatting tags
	    B. With links to different pages and allow navigation between pages
	    C. With Images, tables and frames
	    D. Using style sheets to maintain uniform style for all web pages
	    E. Using a form that uses all types of controls.
	    F. Validate all the controls placed on the form using Java Script.
	
	Note: Use maximum above points while designing Web page.

3.	**SMPS Design**
	
	    A. Design and Simulate of SMPS of 24 V @ 1A.
	 OR B. Design, simulate and Implement buck converter using ICs like LM3842 / LM 3524 and measure performance parameters like
	
	       1. Load regulation
	       2. Line regulation
	       3. Ripple rejection
	       4. Output impedance and
	       5. Dropout voltage.
	       6. Note: Hardware based assignments:
	Note : EDA tool (NI Multisim/ORCAD/PSPICE / Altium Designer suite etc.)

4.	**Design and Simulate PID Controller based on OP-AMP** 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.
Group C (Compulsory) **Industrial Visit (Practical Visit)**	
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. |
| --- | --- |

#Group A Skills 1

Testing / Measurement / Calibration / Troubleshooting / Maintenance / Installation

The knowledge and following skill may be developed among students.

- Fundamentals of Basic Electronics and interface, if any.
- Installation and Commissioning of Equipment's.
- Troubleshooting skills in analog circuits, digital circuits, and processors.
- Servicing of Electronics Parts, replacement of Components, if any.
- Knowledge of Auxiliary equipment's and Interface.
- Calibration of Equipment's / medical instrument used in healthcare.
- Basic Knowledge of mechanism operation and maintenance of equipment/system.
- Design and develop Controllers (e-vehicles).
- Knowledge of Motors and interface with Drive system considering Load conditions.
- Battery Servicing and rejuvenation technology.
- Battery Monitoring System.
- Servicing of EV.
- Battery Charging Technology, Installation and Servicing.
- Repair Maintenance of Battery Charging Stations.
- Knowledge of technical specification, make etc. for costing and purchasing.
- Knowledge of Testing of Motors, Controllers, Drives.
- Calibration of Drives.
- Testing of PCB's.

#Group A Skills 2

Testing / Measurement / Calibration / Troubleshooting / Maintenance / Installation

- Diagnosis of Ignition System Faults:
- Study of Automobile Electrical Wiring: -
- Study of Automotive cluster:
- Study of Automotive Powertrain etc.

#Group A Skills 3

Testing / Measurement / Calibration / Troubleshooting / Maintenance / Installation

- ECG
- Multi-para monitors
- Magnetic resonance imaging MRI
- X Ray
- Basic Measurement devices like BP, Sugar, Pulse rate etc
- Interface of protecting devices UPS or any other Auxiliary devices.
- Embedded System Boards, Controllers, Processors introduction (Motherboard etc.)

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:

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- Once the course is completed the student can appear for the examination as per the guidelines on the NPTEL portal.
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Assessment of an Audit Course:

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- 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)		
304199: Internship		
Teaching Scheme:	**Credit**	**Examination Scheme:**
**	04	**Term Work: 100 Marks**

Course Objective:
- Expose Students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
- Provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job.
- Expose students to the engineer's responsibilities and professional ethics from social, economic and administrative view.
- Familiarize with various materials, processes, products and their applications along with relevant aspects of quality control.
- Understand the psychology of the workers and their habits, attitudes and approach to problem solving.

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

CO1: To develop professional competence through internship.

CO2: To apply academic knowledge in a personal and professional environment.

CO3: To build the professional network and expose students to future employees.

CO4: Apply professional and societal ethics in their day to day life.

CO5: To become a responsible professional having social, economic and administrative considerations.

CO6: To make own career goals and personal aspirations.

Internships are educational and career development opportunities, providing practical experience in a field or discipline. Internships are far more important as the employers are looking for employees who are properly skilled and having awareness about industry environment, practices and culture. Internship is structured, short-term, supervised training often focused on particular tasks or projects with defined time scales.

Core objective is to expose technical students to the industrial environment, which cannot be simulated/experienced in the classroom and hence creating competent professionals in the industry and to understand the social, economic, and administrative considerations that influence the working environment of industrial organizations.

Engineering internships are intended to provide students with an opportunity to apply theoretical knowledge from academics to the realities of the field work/training. The following

guidelines are proposed to give academic credit for the internship undergone as a part of the Third Year Engineering curriculum.

A. Duration:

Internship to be completed after semester 5 and before commencement of semester 6 of at least 4 to 6 weeks; and it is to be assessed and evaluated in semester 6.

B. Framework of Internship:

✓ During the vacation after 5th semester, students are ready for industrial experience.

✓ Every student is required to prepare a file containing documentary proofs of the activities done by him. The evaluation of these activities will be done by Programmed Head / Cell In-charge / Project Head / TPO / faculty mentor or Industry Supervisor.

✓ Student can take internship work in the form of the following but not limited to:

✓ Working for consultancy / research project undertaken by department/Institute

✓ Development of VLABs

✓ Contribution or internship at Incubation/ Innovation /Entrepreneurship / Institutional Innovation Council /Start-up cells of the institute/ NGO's/ Government organizations/ Micro/ Small/ Medium enterprises/IPR/Rural internships to make themselves ready for industry

✓ Development of new product / Business plan / registration of start – up.

✓ Internship through Internshala.

✓ Research internship under Professors at institutes of National importance such as IISc's, IIT's, Research Organizations etc.

✓ Participate in Open Source development.

C. Internship Guidelines:

a) Guidelines to the Institute:

Department will arrange internship for students in industries / organization after fifth semester or as per AICTE/ affiliating University guidelines & managing internships. The general procedure for arranging internship is given below:

Step 1: Request Letter/ Email should go to industry to allot various slots of 4-6 weeks as internship periods for the students. Students request letter /profile / interest areas may be submitted to industries for their willingness for providing the training.

Step 2: Industry will confirm the training slots and the number of seats allocated for internships via Confirmation Letter/ Email. In case the students arrange the training themselves the confirmation letter will be submitted by the students.

Step 3: Students on joining Training at the concerned Industry / Organization, submit the Joining Report/ Letters / Email.

Step 4: Students undergo industrial training at the concerned Industry / Organization. In-between Faculty Member(s) evaluate(s) the performance of students once/twice by visiting the Industry/Organization and Evaluation Report of the students is submitted in department.

Step 5: Students will submit training report after completion of internship.

Step 6: Training Certificate to be obtained from industry.

Step 7: List of students who have completed their internship successfully will be issued by Training and Placement Cell.

b) Guidelines to the students:

Any absenteeism by students during their internship should be informed immediately to the mentor/reporting manager and the internal guide. No special considerations will be accepted. Students cannot take leave for college work or fest activities. The leave permission for any college related activities will be solely approved by the HOD. The monthly attendance format should be duly submitted to the internal guide by the intern.

c) Internal reporting Guidelines:

Every intern should send weekly report to their internal guide without fail. It is mandatory for the intern to send weekly reports to their respective guide on regular basis. Interns should have at least fortnightly verbal communication with the internal guide without fail. In cases where in the company wants to secure their confidential information in the project / internship report, the internal guide should duly co-ordinate with the respective mentor/reporting manager on the method of reporting to assure that no information will be leaked outside and is purely for academic purposes.

d) Internship Diary / Internship Workbook:

Students must maintain Internship Diary/ Internship Workbook. The main purpose of maintaining diary/workbook is to cultivate the habit of documenting. The students should record in the daily training diary account of the observations, impressions, information gathered and suggestions given, if any. The training diary/workbook should be signed after every day by the supervisor/ in charge of the section where the student has been working.

Internship Diary/workbook and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. Internship Diary / workbook may be evaluated on the basis of the following criteria:

- Proper and timely documented entries.
- Adequacy & quality of information recorded
- Data recorded.

- Thought process and recording techniques used.
- Organization of the information.

e) Internship Work Evaluation:

Every student is required to prepare a maintain documentary proofs of the activities done by him / her as internship diary or as workbook. The evaluation of these activities will be done by Programme Head/ Cell In-charge / Project Head / faculty mentor or Industry Supervisor based on-overall compilation of internship activities, sub-activities, the level of achievement expected, evidence needed to assign the points and the duration for certain activities.

Assessment and Evaluation is to be done in consultation with internship supervisor (Internal and External - a supervisor from place of internship).

f) Evaluation through Seminar presentation / Viva-voce at the institute:

The student will give a seminar based on his training report, before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria:

- ✓ Depth of knowledge and skills Communication & Presentation Skills.
- ✓ Team Work
- ✓ Creativity
- ✓ Planning & Organizational skills
- ✓ Adaptability and Analytical Skills
- ✓ Attitude & behavior at work.
- ✓ Societal Understanding
- ✓ Ethics
- ✓ Regularity and punctuality
- ✓ Attendance record
- ✓ Log book
- ✓ Student's Feedback from External Internship Supervisor

g) Internship Report:

The report shall be presented covering following recommended fields but limited to:

- ➢ Title/Cover Page
- ➢ Internship completion certificate.
- ➢ Internship Place Details- Company background-organization and activities/Scope and object of the study / personal observation.
- ➢ Index/Table of Contents
- ➢ Introduction
- ➢ Title/Problem statement/objectives
- ➢ Motivation/Scope and rationale of the study

- Methodological details
- Results / Analysis /inferences and conclusion
- Suggestions / Recommendations for improvement to industry, if any
- Attendance Record
- List of reference (Library books, magazines and other sources)

h) Feedback from internship supervisor (External and Internal):

Post internship, faculty coordinator should collect feedback about student with following recommended parameters:

- Technical knowledge
- Discipline
- Punctuality
- Commitment
- Willingness to do the work
- Communication skill
- Individual work

Savitribai Phule Pune University
Third Year of E & Tc Engineering (2019 Course)
304200: Mini Project

Teaching Scheme:	Credit	Examination Scheme:
Practical: 04 hrs. / week	02	Term Work: 25 Marks Oral: 50 Marks

Course Objectives:
- To understand the ―Product Development Process‖ including budgeting through Mini Project.

- To plan for various activities of the project and distribute the work amongst team members.

- To inculcate electronic hardware implementation skills by -

- Learning PCB artwork design using an appropriate EDA tool.

- Imbibing good soldering and effective trouble-shooting practices.

- Following correct grounding and shielding practices.

- To develop student‘s abilities to transmit technical information clearly and test the same by delivery of Seminar based on the Mini Project.

- To understand the importance of document design by compiling Technical Report on the Mini Project work carried out.

Course Outcome:

On completion of the course, student will be able to

CO1: Understand, plan and execute a Mini Project with team.

CO2: Implement electronic hardware by learning PCB artwork design, soldering techniques, testing and troubleshooting etc.

CO3: Prepare a technical report based on the Mini project.

CO 4: Deliver technical seminar based on the Mini Project work carried out.

A) Execution of Mini Project

- Project group shall consist of **not more than 3** students per group.

- Mini Project Work should be carried out in the Design / Projects Laboratory.

- Project designs ideas can be necessarily adapted from recent issues of electronic design magazines Application notes from well known device manufacturers may also be referred.

- Use of Hardware devices/components is mandatory.

- Layout versus schematic verification is mandatory.

- Bare board test report shall be generated.

- Assembly of components and enclosure design is mandatory.

B: Selection: Domains for projects may be from the following, but not limited to:

- Instrumentation and Control Systems

- Electronic Communication Systems

- Biomedical Electronics

- Power Electronics

- Audio , Video Systems

- Embedded Systems

- Mechatronic Systems

- Microcontroller based projects should preferably use Microchip PIC controllers / ATmega controller / AVR microcontrollers / Ardino / Rasberry Pi.

C. Monitoring: (for students and teachers both): Suggested Plan for various activities to be monitored by the teacher.

Week 1 & 2: Formation of groups, Finalization of Mini project & Distribution of work.

Week 3 & 4: PCB artwork design using an appropriate EDA tool, Simulation.

Week 5 to 8: PCB manufacturing through vendor/at lab, Hardware assembly, programming

(if required) Testing, Enclosure Design, Fabrication etc

Week 9 & 10: Testing of final product, Preparation, Checking & Correcting of the   Draft Copy of Report

Week 11 & 12: Demonstration and Group presentations.

Log book for all these activities shall be maintained and shall be produced at the time of examination.

D. Report writing: A project report with following contents shall be prepared:
- ➢ Title
- ➢ Specifications
- ➢ Block Diagram
- ➢ Circuit Diagram
- ➢ Selection of components, calculations
- ➢ Simulation Results
- ➢ PCB Art work
- ➢ Testing Procedures
- ➢ Enclosure Design
- ➢ Test Results & Conclusion
- ➢ References

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		
Fourth Year of E & Tc Engineering (2019 Course)		
404188: Project Phase – I		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Practical: 02 Hrs. / Week	**01**	**Term Work: 50 Marks**

Course Objectives:

- To understand the basic concepts & broad principles of projects.
- To understand the value of achieving perfection in project implementation & completion.
- To apply the theoretical concepts to solve real life problems with teamwork and Multidisciplinary approach.
- To demonstrate professionalism with ethics; present effective communication skills and relate engineering issues to broader societal context.

Course Outcomes:

CO1: Demonstrate a sound technical knowledge in field of E&TC in the form of project.

CO2: Undertake real life problem identification, formulation and solution.

CO3: Design engineering solutions to complex problems utilizing a systematic approach.

CO4: Demonstrate the knowledge, effective communication skills and attitudes as professional engineer.

Project phase 1 is an integral part of the project work. The project work shall be based on the knowledge acquired by the student during the graduation and preferably it should meet and contribute towards the needs of the society. The project aims to provide an opportunity of designing and building complete system or subsystems in the field of Electronics and communication where the student likes to acquire specialized skills. The student shall prepare the duly certified Fourth report of project work in standard format for satisfactory completion of the work by the concerned guide and head of the Department/Institute.

Guidelines:

1. Group Size: The student shall carry the project work individually or by a group of students. Optimum group size shall be 3 students. However, if project complexity demands a maximum group size of 4 students, the project committee should be convinced about such complexity and scope of the work. Projects selected should meet and contribute towards the needs of the society.

2. Selection and approval of topic: Topic should be related to real life application in the field of Electronics and Telecommunication engineering.

3. The topic may be based on : Investigation of the latest development in a specific field of Electronics or Communication / The investigation of practical problem in manufacture and / or testing of electronics or communication equipment/ Software based projects related to VHDL, Communication, Instrumentation, Signal Processing agriculture Engineering etc. with the justification for techniques used / any topic in the field of E&TC may be allowed.

4. Interdisciplinary projects should be encouraged. The examination of Interdisciplinary projects shall be conducted independently in respective departments.

5. The term work assessment of project phase 1 shall be based on Innovative Idea of selected project, literature survey, Depth of understanding, Applications, Individual contributions, presentation, project report, timely completion of work.

6. The department should prepare project planner and should follow accordingly

7. A log book of work carried out during the semester should be maintained with weekly review remarks by the guide and committee.

8. A certified copy of report preferably using LATEX is required to be presented to external examiner at the time of Fourth examination.

9. The project report must undergo by plagiarism check and the similarity index must be less than 15%. The plagiarism report should be included in the project report.

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		
Fourth Year of E & Tc Engineering (2019 Course)		
404193: Innovation and Entrepreneurship		
Examination Scheme:	**Credit**	**Examination Scheme:**
Tutorial: 02 Hrs. / Week	**02**	**Term Work: 50 Marks**

Prerequisite Courses, if any:
1. Project Management

Companion Course, if any:

Course Objectives:
1. To know innovation and entrepreneurship.
2. To be trained in design thinking.
3. To comprehend idea generation.
4. To gain knowledge of starting a venture.
5. To study about patents and patent filing.
6. To become skilled at digital marketing

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

CO1: Understand Innovation, Entrepreneurship and characteristics of an entrepreneur.

CO2: Develop a strong understanding of the Design Process and its application in variety of business settings.

CO3: Generate sustainable ideas.

CO4: Explore various processes required to be an entrepreneur.

CO5: Understand patents and its process of filing.

CO6: Choose and use appropriate social media for marketing.

Course Contents		
Unit I	**Introduction to Innovation and Entrepreneurship**	**3 Hrs.**
Role of innovation and entrepreneurship, what it takes to be an entrepreneur, Business fundamentals, Leadership & team building, relation between innovation and entrepreneurship.		
Mapping of Course Outcomes for Unit I	**CO1: Understand Innovation, Entrepreneurship and characteristics of an entrepreneur.**	
Unit II	**Design Thinking**	**3 Hrs.**
Introduction to Design Thinking, Design Research Strategies, Design Research - tools for observation and immersion, Visualizing ideas, Communicating ideas.		
Mapping of Course Outcomes for Unit II	**CO2: Develop a strong understanding of the Design Process and its application in variety of business settings.**	
Unit III	**Idea Generation**	**3 Hrs.**
The seed of innovation, Innovation domains, Innovation sustainable conditions, Design factors, Types of innovations and their market impact.		

Mapping of Course Outcomes for Unit III	CO3: Generate sustainable ideas.	
Unit IV	**Becoming an Entrepreneur**	**4 Hrs.**
Creating a business plan, Preparing a Pitching presentation, Building business strategy		
Mapping of Course Outcomes for Unit IV	CO4: Explore various processes required to be an entrepreneur.	
Unit V	**Creating a Startup**	**3 Hrs.**
Types of companies, legal processes for registering companies, registering as startup		
Mapping of Course Outcomes for Unit V	CO5: Understand patents and its process of filing.	
Unit VI	**Indian Patents**	**2 Hrs.**
Fundamentals of IP, Patent basics, Patent analytics, Role in R&D and business planning, Patents to profits, IP asset management, Technology transfer.		
Mapping of Course Outcomes for Unit VI	CO6: Choose and use appropriate social media for marketing.	
Learning Resources		

Reference Books:

1. Badhai, B, "Entrepreneurship for Engineers", Dhanpat Rai & Co. (p) Ltd.
2. "The Field Guide to Human-Centered Design", by IDEO.org
3. Kalyan C. Kankanala, A.K. Narasani, V. Radhakrishnan, "Indian Patent Law and Practice", Oxford Press.
4. Eric Ries, "The Lean Startup", Penguin Books Limited **(E-Book).**

MOOCs / NPTEL:

1. Swayam Course on "**Entrepreneurship**" by Prof. C. Bhaktvatsala Rao IIT Madras
    Link of the Course: https://onlinecourses.nptel.ac.in/noc21_mg70/preview

2. Swayam Course on "**Design Thinking-A Primer**" by Prof. A. Mahalingam, Prof. B. Ramadurai IIT Madras
    Link of the Course: https://onlinecourses.nptel.ac.in/noc22_mg32/preview

3. Swayam Course on "Patent Law for Scientists and Engineers" by Prof. Feroz Ali IIT Madras
    Link of the Course: https://onlinecourses.nptel.ac.in/noc20_hs55/preview

4. NPTEL Course on " Innovation, Business Models and Entrepreneurship" by Prof. Rajat Agarwal, Prof. Vinay Sharma IIT Roorkee
    Link of the Course: https://nptel.ac.in/courses/110107094

List of Tutorials to be carried out

1.	Design a strategy by writing steps to market the project you are building.
2.	Generate an idea having novelty.
3.	Prepare a business plan.
4.	Create a pitching deck.
5.	Preparing a business strategy.
6.	Write a patent draft.

Savitribai Phule Pune University		
Fourth Year of E & Tc Engineering (2019 Course)		
404197: Project Phase – II		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Practical: 10 Hrs. / Week	**05**	**Term Work: 100 Marks** **Oral: 50 Marks**

Project phase 2 is extension of Project phase 1 carried out in seventh semester. The student shall prepare the duly certified Fourth report of project work in standard format preferably in LATEX for satisfactory completion of the work by the concerned guide and head of the Department/Institute.

GUIDELINES

1.	The project TW/OR assessment shall be based on Live Project Demonstration and presentation by the students. The assessment parameters shall be Innovative Idea of selected project, literature survey, Depth of understanding, Applications, Individual contributions, presentations, project report, timely completion of work (Project review presentations), participation in project competition, publication of research work in journal/conference, publication in the form of patent and copyright etc. The college can prepare the rubrics based on these parameters
2.	Certified hard bound project report to be submitted by the students in prescribed format.
3.	Students must preferably publish at least one technical paper on project work in the conference or peer reviewed Journals or publish patent or copyright or should participate into one of the project competition at university/State/National/International level.
4.	A log book of work carried out during the semester should be maintained with weekly review remarks by the guide and committee.
5.	A certified copy of report preferably using LATEX is required to be presented to external examiner at the time of Fourth examination.
6.	The project report must undergo by plagiarism check and the similarity index must be less than 10%. The plagiarism report should be included in the project report.