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| **Savitribai Phule Pune University, Pune**  **Second Year of Electronics / E&Tc Engineering (2019 Course)**  **XXXXXX: Electronics Skill Development Laboratory** | | | |
| **Teaching Scheme:** | | **Credit** | **Examination Scheme:** |
| **PR: 02 hr/week** | | 01 | **TW: 25 Marks** |
| **Prerequisite Courses, if any:** Basic Electronics Engineering, Fundamentals of Programming, Open-source electronics platform based on easy-to-use hardware and software (preferably Arduino) | | | |
| **Companion Course, if any: Any one of the following:**   1. [Jeremy Blum PCB tutorials](https://www.google.com/search?rlz=1C1RLNS_enIN802IN802&sxsrf=ALeKk00WfBV1YrZQlquH-XMynFxNMBOJkw:1588428208233&q=jeremy+Blum+PCB+tutorials+and+it+will+help+you+.&spell=1&sa=X&ved=2ahUKEwjz-uiYrJXpAhVhyjgGHcXkA0MQkeECKAB6BAgNECY) 2. OrCAD basic Tutorials | | | |
| Course Objectives:   * To provide students practical knowledge of Electronic Circuit Component Specifications, Analogue and digital logic circuit and sensor circuit , AC and DC technology, Power, Wire and cables, Connectors, Displays * To make students aware about the application of electronic principles, Specialist (PCB design) software, Design fit for purpose, process of converting a design into actuality * To make students aware about the contexts in which the function of fault finding, testing, repair and measurement takes place, the limitations and applications of test equipment. * To provide hands on experience in PCB design and assembly of electronic components. | | | |
| **Course Outcomes:**  On completion of the course, learner will be able to–   * Identify and analyse the appropriate electronic principle for the task * Apply cognitive skills as appropriate to the task * Design small modifications to basic electronics blocks * Discuss professionally and interpret specifications * Design a Printed Circuit Board layout using E-CAD programme * Assemble components and Printed Circuit Board * Test the prototype * Use computer simulation as part of the design and testing process * Conduct circuit simulation using suitable software | | | |
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| **Guidelines for Instructor's Manual**  Design minimum 10 Assignments on the topics listed under Group A, B, C Below & prepare your own Instructor’s Manual. Minimum 3 assignments should be performed from each group. | | | | |
| **Guidelines for Student's Lab Journal**  The student’s Lab Journal can be assignments submitted in the form a hard copy. It should include following as applicable:  Assignment No, Title of Assignment, Date of Performance, Date of Submission, Aims & Objectives, Hardware & Software Used, Theory/Block diagram/Report, Results, Conclusion. | | | | |
| **Guidelines for Lab /TW Assessment**  The Term work assessment will be based on the work carried out by the student in the Lab. Suitable rubrics can be used by the instructor for assessment. | | | | |
| **Guidelines for Laboratory Conduction**  During each lab experiment the following activities will be carried out:  1. The instructor will explain the aims & objectives of the assignments  2. The instructor will explain the topics required to carry out the experiment  3. The students will do the hands on as per the Lab manual & Web resources provided.  4. The students will show the results to the instructor.  5. A field visit can be organized for one or two assignments and reports of the visit can be prepared by the students.  6. Study of various industry standards and specifications should be done as a part of the assignments. | | | | |
| **Suggested List of Laboratory Experiments/Assignments** | | | | |
| **Sr. No.** | **Group A : Application of Electronics Principles in Practice** | | | |
| **1** | Electronic Components and Connections (Bread boarding) | | | |
| **2** | Introduction and applications using Arduino and micro python | | | |
| 3 | Using Sensors & Actuators and their interfacing with Arduino  (Motor Driver with relays , Reversible motor, SSR) | | | |
| 4 | Wireless Connectivity to Arduino | | | |
|  | **Group B : Hardware Design, Fault Finding, Testing, Repair and Measuring** | | | |
| 5 | Drawing layout of PCB using PCB design software | | | |
| 6 | Single layer PCB design for a simple electronic Circuit | | | |
| 7 | Using test equipment for testing, fault finding & repair etc. | | | |
| 8 | Use of measuring equipment for measurement of signals. | | | |
| 9 | Using Simulation software for design & testing of electronic circuits. | | | |
|  | **Group C : Assembly, SMD Overview, Power Budgeting, Batteries (Lead Acid , LiPo), Solar** | | | |
| 9  (10) | Assemble and utilize mechanical parts such as DC Motor, AC Motor, Stepper motor Solenoid, sensors etc., Connect assemble mechanical parts to form a working unit , Wire and form cables, Assemble and use various types of parts and surface mounted devise parts, Assemble parts to standard determined by IPC-A-610, Work to correct sequences and tolerances, Accurately solder components using lead free solder to comply with industry standards | | | |
| 11 | Calculation of Power budget for an electronic circuit. | | | |
| 12 | Study & Use of various types of Batteries. | | | |
| 13 | Study of various solar power generation systems. | | | |

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| **Books & Other Resources:** |
| **Reference Books:** |
| 1. R S Khandpur, “Printed Circuit Boards: Design – Fabrication and Assembly”, Tata McGrawHill2. Simon Monk “Hacking Electronics”, McGrawHill |
| **Web Resources** |
| **1.** <https://github.com/arduino/Arduino>  **2.** <https://spoken-tutorial.org/tutorialsearch/?search_foss=Arduino&search_language=English>  **3.** <https://worldskillsindia.co.in/worldskill/file/2019/Electronics.pdf>  **4.** <https://worldskills.org/what/projects/wsss/> |