

COURSE TITLE	PCB DESIGNING AND FABRICATION
COURSE CODE	01EE1306
COURSE CREDITS	1

Objective:

- 1 To provide hands-on skills in PCB design and fabrication using industry-standard tools, from circuit schematic to final board production.

Course Outcomes: After completion of this course, student will be able to:

- 1 Interpret electronic circuit diagrams and convert them into schematics.
- 2 Design single layer PCBs using CAD tools.
- 3 Apply design rules and layout practices to ensure manufacturability.
- 4 Fabricate and test basic PCBs using standard lab processes.

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
0	0	2	0	0	0	25	25

Contents : Unit	Topics	Contact Hours
1	Introduction to PCB Design Overview of PCBs: types, applications, advantages, PCB design process flow, Design considerations: size, layers, materials, , Introduction to EDA (Electronic Design Automation) tools, , Basics of schematic symbols, footprints, and netlists	6
2	Schematic Design and Component Selection Reading and creating electronic circuit diagrams, Selection of electronic components, Creating a bill of materials (BOM), Creating schematics using software, Net connectivity and electrical rule checks	6
3	PCB Layout Design PCB layout principles and guidelines, Component placement strategies, Routing techniques (manual vs auto-routing), Design Rule Check (DRC), Grounding, power planes, and signal integrity basics, Generating Gerber files for fabrication	7
4	PCB Fabrication Techniques Single and double-layer PCB fabrication processes, PCB board materials, etching, drilling, and masking, Safety precautions and handling chemicals, Soldering techniques: through-hole and SMD, Using basic tools: UV box, etching tank, hand drill	6

Contents : Unit	Topics	Contact Hours
5	Assembly, Testing, and Troubleshooting Component soldering and assembly practices, Continuity testing and short-circuit detection, Testing with multimeter and oscilloscope, Common fabrication defects and solutions, Mini project: Design, fabricate, and assemble a functional PCB	3
Total Hours		28

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Experiment No. 01 Identify and understand PCB types, layers, and basic terminology	2
2	Experiment No. 02 Create a basic circuit schematic in CAD software	2
3	Experiment No. 03 Add custom component footprints to the schematic	2
4	Experiment No. 04 Perform ERC (Electrical Rule Check) on the schematic	2
5	Experiment No. 05 Convert schematic to PCB layout	2
6	Experiment No. 06 Place components on the PCB with best layout practices	2
7	Experiment No. 07 Manual routing of signal traces & Apply design rule checks (DRC)	2
8	Experiment No. 08 Add ground plane and vias in double-layer boards	2
9	Experiment No. 09 Print PCB layout on transparent sheet for UV exposure	2
10	Experiment No. 10 Fabricate a single-layer PCB	2
11	Experiment No. 11 Drill component holes and prepare for assembly	2
12	Experiment No. 12 Solder components and test the assembled PCB for continuity and functionality	2
Total Hours		24

Textbook :

- 1 Complete PCB Design Using OrCAD Capture and PCB Editor, Mitzner Bob Doe
Alexander Akulin Anton Suponin Dirk Müller, Academic Press, 2009

References:

- 1 Printed circuit board design ,fabrication assembly and testing, Printed circuit board design ,fabrication assembly and testing, R. S. Khandpur, Tata McGraw Hill, 2006
- 2 Printed circuit Board Design and technology, Printed circuit Board Design and technology, Walter C. Bosshart, Tata McGraw-hill, 1983
- 3 Printed Circuits Handbook, Sixth Edition, Printed Circuits Handbook, Sixth Edition, Clyde F. Coombs, Jr, Happy T. Holden, McGraw-Hill Education, 2016

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
25.00	30.00	25.00	15.00	10.00	0.00

Supplementary Resources:

- 1 <https://www.nielit.gov.in/calicut/course-calendar?coursecode=PD503>
- 2 <https://hillmancurtis.com/nptel-pcb-design/>
- 3 https://onlinecourses.nptel.ac.in/noc24_ee127/preview