Dr. Annasaheb G. D. Bendale Mahila Mahavidyalaya, Jalgaon

Department of Electronics

CERTIFICATE COURSE IN PCB DESIGNING

(CCPCBD)

Structure of Course

CCPCBD – I	Basics of Electrical and Electronics Components and PCB	100 Marks
CCPCBD – II	EDA tools and PCB making Process	100 Marks
CCPCBD – III	Practical Based on CCPCBD – I & CCPCBD – II	100 Marks

Sr. No	Papers	Theory/ Practical	Teaching Hours	Maximum Marks Allotted	Passing
1.	CCPCBD – I	Theory	30	30	12
2.	CCPCBD – II	Theory	30	30	12
3.	CCPCBD - III	Practical	30	40	16

1. Objectives
   * To develop skill for PCB designing and manufacturing
   * To understand working of PCB making tools and Machines.
   * To acquire skills for making PCBs of different types.
2. Duration → 3 Months
3. Medium of Instruction → English
4. Eligibility → 12^{th}
5. Intake Capacity → 60
6. Mode → Part Time
7. Course Outcomes:
   - Appreciate the necessity and evolution of PCB, types and classes of PCB.
   - Understand the steps involved in schematic, layout, fabrication and assembly process of PCB design.
   - Understand basic concepts of transmission line, crosstalk and thermal issues
   - Design (schematic and layout) PCB for analog circuits, digital circuits and mixed circuits.
   - Design (schematic and layout) and fabricate PCB for simple circuits.

CERTIFICATE COURSE IN PCB DESIGNING

PAPER I
Basics of Electrical and Electronics Components and PCB

Unit 1: Active Components and Passive Components:
Active Components: Diode, Transistor, MOSFET, LED, SCR, Integrated Circuits (ICs)
Passive Components: Resistor, Capacitor, Inductor, Transformer, Speaker/Buzzer.

Unit 2: Component Package Types
Through Hole Packages : Axial lead, Radial Lead, Single Inline Package(SIP), Dual Inline Package DIP), Transistor Outline(TO), Pin Grid Array(PGA), Metal Electrode Face(MELF), Leadless Chip Carrier(LCC), Small Outline Integrated Circuit(SOIC), Quad Flat Pack(QPF) and Thin QFP (TQFP), Ball Grid Array(BGA), Plastic Leaded Chip Carrier(PLCC)

Unit 3: Introduction to PCB designing concepts
Introduction & Brief History: What is PCB, Difference between PWB and PCB, Types of PCBs: Single Sided (Single Layer), Multi-Layer (Double Layer).

Unit 4: PCB Materials
Standard FR-4 Epoxy Glass, Multifunctional FR-4, Tetra Functional FR-4, NelcoN400-6, GETEK, BT Epoxy Glass, Cyanate Aster, Plyimide Glass, Teflon

Unit 5: Introduction printed circuit board production techniques
Photo printing, filmmaster production, reprographic camera, basic process for double sided PCBs photo resists, Screen printing process, plating, relative performance and quality control, Etching machines, Solders alloys, fluxes, soldering techniques, Mechanical operations.

References –

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

PAPER II
EDA tools and PCB making Process

Unit 1: Introduction to Electronic design Automation (EDA)
Brief History of EDA, Latest Trends in Market, How it helps and Why it requires, Different EDA tools, Introduction to SPICE and PSPICE Environment, Introduction and Working of PROTEU

Unit 2: Introduction to Development Tools
Introduction to PCB Design using OrCAD tool, Introduction to PCB Design using PROTEUS tool

Unit 3: Detailed description and practical of PCB designing
PCB Designing Flow Chart, Schematic Entry, Net listing, PCB Layout Designing : Prototype Designing, Design Rule Check(DRC), Design For Manufacturing(DFM), PCB Making: Printing, Etching, Drilling, Assembly of components

Unit 4 : PCB Technology Trends
Multilayer PCBs. Multiwire PCB, Flexible PCBs, Surface mount PCBs, Reflow soldering, Introduction to High-Density Interconnection (HDI) Technology.

Unit 5: PCB design for EMI/EMC
Subsystem/PCB Placement in an enclosure, Filtering circuit placement, decoupling and bypassing, Electronic discharge protection, Electronic waste; Printed circuit boards Recycling techniques, Introduction to Integrated Circuit Packaging and footprints, NEMA and IPC standards,.

References –

1. Printed circuit board design , fabrication assembly and testing By R. S. Khandpur, Tata McGraw Hill, 2006
2. Printed circuit Board Design and technology, Walter C. Bosshart
3. EMC and Printed circuit board ,Design theory and layout, Mark I Montrose IEEE compatibility society
4. Complete PCB Design Using OrCAD Capture and PCB Editor,Kraig Mitzner Bob Doe Alexander Akulin Anton Suponin Dirk Müller, 2nd Edition 2009.

PAPER-III

Practical Based on Paper – I & Paper – II

Starting the PCB designing

- Understanding the schematic Entry
- Creating Library & Components
- Drawing a Schematic
- Flat Design / hierarchical Design
- Setting up Environment for PCB
- Design a Board

Auto routing

- Introduction to Auto routing
- Setting up Rules
- Defining Constraints
- Auto router Setup

PCB Designing Practice

- PCB Designing of Basic and Analog Electronic Circuits
- PCB Designing of Power Supplies
- PCB Designing of Different Sensor modules
- PCB Designing of Electronics Projects
- PCB Designing of Embedded Projects

Post Designing & PCB Fabrication Process

- Printing the Design
- Etching
- Drilling
- Interconnecting and Packaging electronic Circuits (IPC) Standards
- Gerber Generation
- Soldering and De-soldering
- Component Mounting
- PCB and Hardware Testing

Course Coordinator:
Dr. L. S. Patil

Head

HEAD
Dept. of Electronics
Dr. Annasaheb G. D. Bendale
Mahila Mahavidyalaya, Jalgaon