

“Printed Circuit Board (PCB) Designing”

Objective of the Course:

This is a basic course for designing of PCB using software. PCB (Printed Circuit Board) designing is an integral part of each electronics products and this program is designed to make students capable to design their own projects PCB up to industrial grade.

Target Audience: Diploma/B.E., B.Tech. From Electrical/Electronic branch

Batch Size: 30

Topics Covered:

1. Introduction to PCB designing concepts
2. Component introduction and their categories
3. Introduction to Development Tools
4. Detailed description and practical of PCB designing
5. Lab practice and designing concepts

Detailed Syllabus of the Course

Section 1: 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)
- PCB Materials

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 PROTEUS

Section 2: Component introduction and their categories

Types of Components

- Active Components
 - Diode
 - Transistor
 - MOSFET
 - LED
 - SCR
 - Integrated Circuits (ICs)
- Passive Components
 - Resistor
 - Capacitor
 - Inductor
 - Transformer
 - Speaker/Buzzer

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)
- Surface Mount Packages
 - Metal Electrode Face(MELF)
 - Leadless Chip Carrier(LCC)
 - Small Outline Integrated Circuit(SOIC)
 - Quad Flat Pack(QFP) and Thin QFP (TQFP)
 - Ball Grid Array(BGA)
 - Plastic Leaded Chip Carrier(PLCC)

Section 3: Introduction to Development Tools

- Introduction to PCB Design using OrCAD tool
- Introduction to PCB Design using PROTEUS tool

Section 4: 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

Description of PCB Layers

- Electrical Layers
 - Top Layer
 - Mid Layer
 - Bottom Layer
- Mechanical Layers
 - Board Outlines and Cutouts
 - Drill Details
- Documentation Layers
 - Components Outlines
 - Reference Designation
 - Text

Keywords & Their Description

- Footprint
- Pad stacks
- Vias
- Tracks
- Color of Layers
- PCB Track Size Calculation Formula

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

Rules for Track

- Track Length
- Track Angle
- Rack Joints
- Track Size

Study of IPC Standards

- IPC Standard For Schematic Design
- IPC Standard For PCB Designing
- IPC Standard For PCB Materials
- IPC Standard For Documentation and PCB Fabrication

Section 5: Lab practice and designing concepts

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

Project work

- Making the schematic of Academic and Industrial projects
- PCB Designing of these projects
- Soldering and De-soldering of components as per Design
- Testing and Troubleshooting Methods

Duration: 100 hrs.

Timing: 09:00 AM to 02:00 PM (Starting Date: 15-05-2018)

Venue & lab: NIELIT Chennai Centre

Course fee: Rs.6, 195/- (Six Thousand one hundred and ninety five only)

- Registration fee is non-refundable
- Full tuition fee is waived for limited no. of SC/ST candidates

Course in-charge: **Bharath P, Project Associate**

Email ID: bharath.nielit@gmail.com

Phone: 044-24421445

For special/weekend batches, contact course in-charge

How to apply:

- ❖ Registration needs to be done at our Centre before starting the course. To get the admission, fill the Registration form and bringing the following:
 1. Duly filled in registration form
 2. Course fees - in the form of DD or Online Transaction (Please see the Mode of payment details)
 3. Self-attested copy Minimum Qualification certificate
 4. Self-attested copy of identity proof
 5. Self-attested copy of community certificate (if availing SC/ST fee concession)

Mode of payment:

- ❖ Course fee may be paid by any one of the following modes:
 1. DD drawn from a nationalized bank (preferably SBI) in favor of “NIELIT Chennai” payable at Chennai.
 2. Online transaction: Account No: 31185720641 Branch: Kottur (Chennai), IFS Code: SBIN0001669.
 3. Pay through nationalized bank Debit card (Service charges applicable)