

Detailed Curriculum

Name of Unit of Qualification : **Certificate Course on Printed Circuit Board Design , analysis and Manufacturing Techniques. 250 hrs.**

Duration : **250 Hours**

Outcome	Contents	Hrs.
Acquire the basic level knowledge required to understand packages of Electronic components, types of PCBs and history of PWBs/PCBs.	Printed circuit Board Design: Study of Packages of Electronic Components . History of Printed Circuit Boards . Various types of Printed Circuit Boards-Single Sided Boards, Double Sided Plated through Hole Boards, multilayer Boards.	10
Understand the rules before PCB Designing .Understanding the flow of computer aided design packages .Acquire the importance of manufacturing documents.	Printed Circuit Board Design Methods : Rules for single and Double Sided Board. Schematic diagram Entry in PCB Design tool/S/W. Layout Design , Routing methods .Guideline for Artwork Generation. Generation of various Manufacturing Documents/ Output file generation. Component Library management in PCB Design tool.	20
Understand the basic concept of thermal analysis .Understanding how to design PCB for Manufacturing and assembly point of view.	Study of- Thermal Analysis Signal Integrity Rule for Design for manufacturing . Rules for Design for assembly.	20

Outcome	Contents	Hrs.
Acquire the basic level knowledge required to understand Film Master generation method, material used for manufacturing ,cleaning methods of base material .	PCB Manufacturing Techniques: Film Master generation methods : Study of photographic Film, Exposing and Developing Process. Study of various material used in Manufacturing of Printed Circuit Boards and properties of material. Cleaning Method of base materials before pattern transfer-Manual and Mechanical Cleaning Methods.	20
Understand the methods for manufacturing of PCBS. Type of material used for manufacturing .Understand the mechanical method in manufacturing.	Printed Circuit Board Manufacturing Methods : Method of Screen Printing for pattern transfer. Method of Wet film and Dry film for single and Double Sided Board Manufacturing. Method of Solder-mask and Legend Printings. Plating and Etching Techniques. Mechanical methods required in manufacturing of PCBs like punching, drilling ,milling and routing. .	20
Understand the basic concept fault finding /repair and rework methods	Study of-Fault Finding methods of PCBs, Repairing Techniques. De-soldering techniques, replacement of Component /Solder Pad /Track repairing methods.	10

Outcome	Contents	Hrs.
Acquire the basic level knowledge required to understand assembly techniques for leaded and SMDs. Acquire the basic level knowledge of use of various tools during assembly..	PCB Assembly Techniques : Components Preparation Method-Lead Forming methods. Leaded through hole assembly and Surface Mount Assembly. Mixed Assembly Techniques of through hole and SMDs. Manual Assembly method, Semiautomatic and automatic Assembly method. Study of Tools used in assembly process.	20
Understand the methods of soldering of PCBs.,material used in soldering process. Understand Methods of soldering.	Study Soldering Techniques : Materials used in Soldering Process. Soldering Methods –Manual and Mass soldering Techniques. Tools for soldering and de-soldering. Study of soldering defect and rectification. Testing for quality Control.	15
Understand the basic concept of SMD Soldering and understand repair and rework methods	Introduction to SMD soldering methods, placing methods of SMDs ,study of material for SMD soldering. Rework and Repairing methods.	15
Practical/Tutorial	Based on theory- practical and Assignment in Design, Manufacturing and Assembly	100

Learning Outcome:

1. Students will acquire the basic level knowledge . and will understand the packages of Electronic components, types of PCBs and history of PCBs.
2. Students will understand the rules before PCB Designing , the flow of computer aided design packages and will Acquire the importance of manufacturing documents(output file generation)
3. Understand the basic concept of thermal analysis and understanding how to design PCB for Manufacturing and assembly point of view.
4. Acquire the basic level knowledge required to understand Film Master generation method, material used for manufacturing ,cleaning methods of base material.
5. Understand the methods for manufacturing of PCBS. Type of material used for manufacturing. Understand the mechanical method in manufacturing.
6. Understand the basic concept of fault finding /repair and rework methods
7. Acquire the basic level knowledge required to understand assembly techniques for leaded and SMDs. Acquire the basic level knowledge of use of various tools during assembly.
8. Understand the methods of soldering of PCBs., material used in soldering process. Understand Methods of soldering.
9. Understand the basic concept of SMD Soldering and understand repair and rework methods.
10. Understand the design and manufacturing Techniques of Printed Circuit Boards.

Reference Books:

Sr.No	Name	Author	Publisher
01.	Printed Circuit Boards: Design and Technology	Walter C Bosshart	Tata McGraw-hill
02	Printed Circuit Boards: Design, Fabrication, Assembly & Testing	R S Khandpur	Tata McGraw-hill
03	Electronic Drafting And Printed Circuit Board Design	James M. Kirkpatrick	Galgotia Publications
04	Handbook of Electronics Manufacturing Engineering	Bernard Matisoff	International Thomson Publishing
05	Handbook of Electronics Packaging	Charles A. Harper	McGraw- hill
06	Electronics Packaging Forum	James E. Morris	Van Nostrand Reinhold
07	Electronics Project Design And Fabrication	Ronalds A. Reis	Merrill Publishing
08	Printed Circuit Boards	Coombs Clyde F.	McGraw- hill
09	Electronics Engineer's Handbook	Christiansen D	McGraw- hill
10	Printed Circuit Boards: Design Techniques For EMC Compliance	Montrose Mark I	IEEE Press Series of Electronics Technology
11	The Design & Drafting of Printed Circuits	Darryl Lindsey	Bishop Graphics Inc
12	The Design & Drafting of Analog Printed Circuits Board	Darryl Lindsey	Bishop Graphics Inc
13	The Design & Drafting of Digital Circuits Boards	Darryl Lindsey	Bishop Graphics Inc