

Detailed Curriculum

<p>Qualifications Pack SECTOR SUB-SECTOR OCCUPATION REFERENCE ID</p> <p>Role Description</p> <p>NVEQF/NVQF level Minimum Educational Qualifications Maximum Educational Qualifications</p> <p>Duration</p>	<p>: PCB Design Engineer : ELECTRONICS : PCB Assembly : PCB Design : ELE/Q8702</p> <p>: Assisting R&D to research on new products, working with systems designer to create initial designs, library management for component building, testing and finalizing design.</p> <p>: Diploma : BE</p> <p>: 250 Hrs</p>
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Outcome	Course Content	Hrs.
<p>Acquire the basic level knowledge required to understand PCBs, history of PWBs/PCBs, types of PCBs, basic electronics and components values, polarities, packages of Electronic components, SMD type components and process of PCB design and product development flow</p>	<p>Printed circuit Board Design:</p> <p>History of Printed Circuit Boards. Various types of Printed Circuit Boards-Single Sided Boards, Double Sided Plated through Hole Boards, multilayer Boards. Study of Packages of Electronic Components. Study of SMD Components. Process of PCB design and product development flow</p>	15
<p>Understanding the flow of computer aided design packages.</p> <p>Understand the rules before PCB Designing.</p>	<p>Schematic Design:</p> <p>Study of PCB Design packages such as Or CAD, eagle, PADs, PCB123 software for schematic capture, PCB design and layout tools (any two).</p> <ul style="list-style-type: none"> • Starting a project • Working with schematic design tools • Schematic drawing from circuit • Rules for PCB Design • Standards for PCB Design • Placing, editing, and connecting parts and electrical symbols • About libraries and parts • Creating a net list • Exporting and importing schematic data • Basic Circuit simulation using EDA tool 	15

<p>Acquire the importance of manufacturing documents. Understanding how to design PCB for Manufacturing and assembly point of view.</p>	<p>PCB Layout Design:</p> <p>Study of technical terms in layout design.</p> <ul style="list-style-type: none"> • Board outline Design, • components placement, • Details of layers, • Routing methods, • Copper Pour, • Adding reference texts, • Build library parts (footprints, schematic symbols) • Generation of various Manufacturing Documents/Output files generation (Gerber file generation) • IPC standards for printed circuit board design 	15
<p>Acquire the basic level knowledge required to understand Film Master generation method, material used for manufacturing, cleaning methods of base material.</p>	<p>PCB Manufacturing Techniques:</p> <ul style="list-style-type: none"> • Fabrication methods <p>Film Master generation method : 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</p>	20
<p>Understand the methods for manufacturing of PCBS. Type of material used for manufacturing. Understand the mechanical method in manufacturing.</p>	<p>Printed Circuit Board Manufacturing Methods :</p> <p>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.</p>	20
<p>Understand the basic concept fault finding /repair and rework methods</p>	<p>Study of-Fault Finding methods of PCBs, Repairing Techniques. De-soldering techniques, replacement of Component /Solder Pad /Track repairing methods.</p>	15
<p>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.</p>	<p>PCB Assembly Techniques :</p> <p>Components Preparation Method- Lead identification of components Component mounting techniques 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.</p>	20

Understand the methods of soldering of PCBs, material used in soldering process. Understand the methods of soldering.	Soldering Techniques : Materials used in Soldering Process. Types of soldering techniques. 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:

- Students will acquire the basic level knowledge and will understand the packages of Electronic components, types of PCBs and history of PCBs.
- 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)
- Understand the basic concept of how to design PCB for Manufacturing and assembly point of view.
- Acquire the basic level knowledge required to understand Film Master Generation method, material used for manufacturing, cleaning methods of base material.
- Understand the methods for manufacturing of PCBS. Type of material used for manufacturing.
- Understand the mechanical method in manufacturing.
- Understand the basic concept of fault finding /repair and rework methods
- 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.
- Understand the methods of soldering of PCBs., material used in soldering process. Understand Methods of soldering.
- Understand the basic concept of SMD Soldering and understand repair and rework methods
- Understand the design and manufacturing Techniques of Printed Circuit Boards.