PCB Designing

Course Modules & Topics

Module 1: Introduction to PCB Design

- What is a PCB?

- Types of PCBs: Single, Double, Multi-layer

- PCB Design Workflow

- Software Tools: KiCad, Eagle, Altium, EasyEDA

Module 2: Electronic Components & Symbols

- Passive Components: Resistors, Capacitors, Inductors

- Active Components: Diodes, Transistors, ICs

- Component Packaging (SMD vs Through-Hole)

- Footprints and Symbols Creation

Module 3: Schematic Design

- Circuit Design using CAD Tools

- Assigning Component Footprints

- Electrical Rule Check (ERC)

- Generating Netlist

📑 Module 4: PCB Layout Design

- Board Size and Shape Definition

- Placement of Components

- Routing Tracks and Vias

- Design Rule Check (DRC)

🌐 Module 5: Design Guidelines & Best Practices

- Trace Width & Clearance Calculations

- Grounding Techniques and Power Planes

- Signal Integrity, EMI/EMC Considerations

- Thermal Management

📤 Module 6: Generating Outputs for Fabrication

- Gerber File Generation

- BOM (Bill of Materials) Creation

- Drill Files and Pick & Place Files

- Uploading to Fabrication Services

🏭 Module 7: PCB Fabrication & Assembly Process

- Fabrication Process Overview

- PCB Etching and Layering

- Solder Mask, Silkscreen, Surface Finish

- PCB Assembly (Manual & SMT)

⚙ Module 8: Testing & Troubleshooting

- Visual Inspection and Continuity Testing

- Power Supply and Signal Testing

- Debugging Short Circuits

- Reworking Techniques

💡 Module 9: Advanced Topics (Optional)

- High-Speed Design Considerations

- Flexible and Rigid-Flex PCBs

- Introduction to HDI and Multilayer Designs

- Controlled Impedance Routing

🗌 Module 10: Capstone Project

- Design, simulate, and fabricate a real PCB

- Examples: Power Supply, Sensor Module, IoT Interface Board

- Submit design files, assembly plan, and test results