Course Title: PCB designing& Fabrication	**Course Code: 24MJEL3S**
TotalContactHours:30	**No. of Credits: 02**
Internal Assessment Marks: 10	**Duration of SEE:2** Hours
SemesterEndExamMarks:40	

Course Outcomes: At the end of the Course the student will be able to

1. Determine appropriate components to make circuits. (L3)
2. Interpret test results and measurements on electric circuits. (L2)
3. Analyze the fabrication processes of printed circuit boards. (L4)
4. Apply the software and hardware for PCB Design. (L3)

Unit	Description	Hours
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 Component introduction and their categories Types of Components • Active Components o Diode o Transistor o MOSFET o LED o SCR o Integrated Circuits (ICs) • Passive Components o Resistor o Capacitor o Inductor o Transformer o Speaker/Buzzer Component Package Types • Through Hole Packages o Axial lead o Radial Lead o Single Inline Package(SIP) o Dual Inline Package(DIP) o Transistor Outline(TO) o Pin Grid Array(PGA) • Through Hole Packages o Metal Electrode Face(MELF) o Leadless Chip Carrier(LCC) o Small Outline Integrated Circuit(SOIC) o Quad Flat Pack(QPF) and Thin QFP (TQFP) o Ball Grid Array(BGA) o 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	16
2	PCB Designing Flow Chart • Schematic Entry • Net listing • PCB Layout Designing • Prototype Designing o Design Rule Check(DRC) o Design For Manufacturing(DFM) • PCB Making o Printing o Etching o Drilling • Assembly of components Description of PCB Layers • Electrical Layers o Top Layer o Mid Layer o Bottom Layer • Mechanical Layers o Board Outlines and Cutouts o Drill Details • Documentation Layers o Components Outlines o Reference Designation o 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	14

	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	