

## **Dept. of Electronics**

### **Dhemaji College**

Add-On Course

*in*

## **LED Bulb Assembling and Repairing**

**Duration:** 3 Months (12 Weeks)

**Total Hours:** 90 Hours (3 sessions/week, 2.5 hours/session)

**Eligibility:** Class 12 (Science) Passed.

**Mode:** Offline / Lab-Oriented

**Outcome:** Certificate + Hands-on Training + Mini Project

### **Course Objectives**

- Understand the working of basic electronic components and tools.
- Learn soldering and desoldering techniques.
- Study LED technology and circuits used in LED bulbs.
- Assemble, test, and troubleshoot LED bulb circuits.
- Develop entrepreneurial skills for self-employment.

### **Course Module-wise Syllabus**

#### **Module 1: Introduction to Electronics and Tools (Week 1 – 2)**

##### **Theory:**

- Basics of electricity: Voltage, Current, Resistance, Power
- Ohm's Law and basic circuit laws (KVL, KCL)
- Types of circuits: Series, Parallel
- Introduction to electronic components:
  - Resistors, Capacitors, Inductors
  - Diodes, Zener Diodes
  - LEDs, Transistors, ICs
- Overview of electrical and electronic tools

##### **Practicals:**

- Identification and testing of components using multimeter
- Use of power supply, multimeter, LCR meter, soldering iron

#### **Module 2: Soldering Techniques and PCB Handling (Week 3 – 4)**

##### **Theory:**

- Types of solder and flux
- Soldering safety and precautions
- PCB types (Single-layer, double-layer)
- Common faults in PCBs

##### **Practicals:**

- Soldering and desoldering of components
- Practice on dot board and actual PCBs
- Tracing and debugging PCB circuits

### **Module 3: Understanding LED Technology (Week 5 – 6)**

#### **Theory:**

- Working principle of LED
- Types of LEDs (SMD, DIP, COB, etc.)
- Lumen output, power rating, and efficiency
- Heat dissipation and importance of heat sinks
- Basics of power factor and driver circuits

#### **Practicals:**

- Testing LEDs using multimeter and power supply
- Identifying forward voltage and current of various LEDs
- Handling and mounting SMD LEDs

### **Module 4: LED Bulb Circuit Design & Assembling (Week 7 – 8)**

#### **Theory:**

- Basic structure of LED bulbs: Housing, diffuser, PCB, driver
- LED driver circuits: AC-DC converters, constant current drivers
- Protection elements: MOV, NTC, Fuse
- Thermal management

#### **Practicals:**

- Assembling complete LED bulb (3W, 5W, 9W, 12W)
- Soldering LED strips onto aluminum PCB
- Wiring LED driver circuits
- Testing completed bulbs with power supply

### **Module 5: Fault Detection & Repair of LED Bulbs (Week 9 – 10)**

#### **Theory:**

- Common faults: Flickering, Dim light, No light
- Causes: Open LED, Driver failure, dry solder, overheating
- Testing and troubleshooting techniques

#### **Practicals:**

- Fault simulation and troubleshooting of LED bulbs
- Replacing faulty LEDs and components
- Repairing driver circuits
- Heat sink paste application

### **Module 6: Mini Project & Entrepreneurship (Week 11 – 12)**

#### **Mini Projects:**

- Design and assemble custom LED bulbs
- Retrofit tube light to LED light
- Assemble LED emergency light

#### **Entrepreneurship & Industry Visit (if possible):**

- Cost analysis of LED bulb manufacturing
- Marketing and packaging
- Business opportunities in LED repair and sales

### Assessment & Certification

- **Internal Assessment:** 20 marks (Attendance + Practical performance)
- **Mini Project:** 30 marks (Assembly + Innovation)
- **Final Viva + Theory Test:** 50 marks
- **Certification:** Issued on successful completion

### Tools and Equipment Required

- Soldering Iron, Desoldering Pump
- Multimeter, DC Bench Supply
- PCB Kit, LED Modules, Drivers
- Heat Sink Compound, Flux, Solder Wire

### Deliverables to Students

- Printed Handout / Lab Manual
- Component kit (optional, if budget permits)
- Certificate of completion
- Support for entrepreneurship/placement (optional)

\*\*\*\*\*