



## DEPARTMENT OF PHYSICS

<b>CERTIFICATE COURSE CODE</b>	: SFAPHCC06
<b>CERTIFICATE COURSE NAME</b>	: Advanced LED Light Products, Design, Assembling, and Repairing
<b>DATE</b>	: 18-07-2023 to 14-11-2023
<b>COURSE TEACHER</b>	: Javed Ramzan T K
<b>DESCRIPTION</b>	: This certificate course is designed to equip undergraduate students with comprehensive knowledge and practical skills in advanced LED light products, including design, assembling, and repairing techniques. Through a combination of theoretical lectures, hands-on workshops, and practical exercises, students will gain a deep understanding of LED technology and its applications in various industries. By the end of the course, students will be proficient in designing, assembling, and repairing advanced LED light products, making them well-prepared for careers in the rapidly growing field of LED technology.

### **Objectives:**

1. **Understanding LED Technology:** Provide participants with a comprehensive understanding of Light Emitting Diode (LED) technology, including its principles of operation, components, and applications.
2. **Assembling Techniques:** Familiarize participants with techniques for assembling LED light products, including soldering, wiring, PCB (Printed Circuit Board) design, and component integration.
3. **Repair and Maintenance:** Equip participants with the skills to diagnose and repair common issues in LED light products, such as faulty LEDs, driver problems, and wiring issues.
4. **Advanced Design Concepts:** Explore advanced design concepts and techniques for LED light products, including dimming controls, color mixing, smart lighting systems, and customizations..
5. **Energy Efficiency and Sustainability:** Address the importance of energy efficiency and sustainability in LED lighting design, including techniques for optimizing energy usage and reducing environmental impact.

### **Outcomes:**

1. **Proficiency in LED Technology:** Participants will develop a deep understanding of LED technology, enabling them to design, assemble, and repair LED light products effectively..
2. **Assembling Expertise:** Participants will gain hands-on experience in assembling LED light products, mastering techniques for soldering, wiring, and PCB assembly.
3. **Repair and Troubleshooting Abilities:** Participants will be able to diagnose and repair common issues in LED light products, ensuring their functionality and longevity.
4. **Innovation and Customization:** Participants will be equipped to implement advanced design concepts and customization options in LED light products, enhancing their functionality and appeal.
5. **Sustainability Practices:** Participants will incorporate energy-efficient and sustainable design practices into LED light product development, contributing to environmental conservation and resource efficiency.

## SYLLABUS

### **Module I: Introduction to LED Technology (5 HOURS)**

- Understanding the fundamentals of LED technology
- Principles of LED operation and characteristics
- Comparison of LED lighting with traditional lighting technologies
- Overview of advanced LED applications in different sectors

### **Module II: LED Light Design Principles (5 HOURS)**

- Principles of LED light design
- Factors influencing LED light design (brightness, color temperature, beam angle, etc.)
- Introduction to lighting design software/tools
- Practical exercises on designing LED light fixtures for various applications

### **Module III: LED Components and Materials (5 HOURS)**

- Types of LED components (LED chips, drivers, heat sinks, etc.)
- Selection criteria for LED components
- Understanding LED materials and their properties
- Hands-on session on identifying and testing LED components

### **Module IV: LED Light Assembling Techniques (5 HOURS)**

- Techniques for soldering and connecting LED components
- PCB layout design for LED circuits
- Guidelines for efficient heat dissipation in LED fixtures
- Practical session on assembling LED light fixtures

### **Module V: LED Light Repairing Techniques (5 HOURS)**

- Common issues and faults in LED light products
- Troubleshooting techniques for LED lights
- Repairing methods for LED components and circuits
- Practical exercises on diagnosing and repairing faulty LED fixtures

### **Module VI: Advanced LED Applications (5 HOURS)**

- Overview of advanced LED applications (smart lighting, automotive lighting, horticultural lighting, etc.)
- Case studies of innovative LED projects
- Emerging trends in LED technology
- Discussion on career opportunities in the LED industry

### **References:**

1. "LED Lighting: Technology and Perception" by T. Q. Khan
2. "Solid State Lighting Reliability: Components to Systems" by Michael Pecht
3. "LED Packaging for Lighting Applications: Design, Manufacturing, and Testing" by Sheng Liu
4. "Principles of LED Light Communications: Towards Networked Li-Fi" by Zahid Hussain, Xudong Wang, and H. Le Minh
5. "LED Lighting for Urban Agriculture" by Toyoki Kozai, Genhua Niu, and Michiko Takagaki