DETAILED SYLLABUS OF 1st SEMESTER

Course Code : **SEC145**

Title of the Course : **LED bulb repairing technician**

Nature of the Course : **Skill Enhancement Course (SEC)**

End Semester : **80 Marks**

In Semester : **20 Marks**

Total Credits : **03**

COURSE OBJECTIVES :

- The course is designed to develop an entrepreneurial mindset among the students. This course involves the practical application of Electronics .
- To boost the skill development credibility and improve the ability of the students in repairing electrical components used in day-to-day life .
- To provide opportunity for realizing one's potential through practical experiences .

UNITS	CONTENTS	L	T	P
1 **(20 Marks)**	**Basics of Electronics** • Differentiate between various electronic and electrical components, materials and their specific properties, types and usages . • Calculate resistance by identifying the colour codes . • Define capacitance of a capacitor. • List and define the parameters of an electric circuit such as voltage, current and resistance . • Ohm's law and implement it for calculations . • Understand the functionality of coil, winding of coil, diode and its uses, Transistor, Biasing of transistor. • Current amplification circuit, Designing of filter.	**08**	**02**	

	• Understand the functionality of multi-meter, Explain different modes of testing in multi-meter • Differentiate between alternating current (AC) and direct current (DC) . . • Handling of regulated power supply, precautious dealing with AC & DC current.			
2 **(10 Marks)**	• SMT machine, reflow oven, • Soldering of semiconductor devices, • Manual screen printer, • Soldering Iron, Soldering and Desoldering , Identify the types of solder and flux List the function of the different components of a soldering iron • AC to DC regulated power supply, AC to AC regulated power supply, • LED Driver Tester.	**08**	**02**	
3 **Basics of LED** **(25 Marks)**	• Principal of illumination from a LED, properties of LED, • various blocks of a LED • Identify the basics of power electronics and its usages in lighting controls or LED power supplies and LED drivers • Identify the selection criteria of a suitable tip • LED working principle • List the parameters which affect the overall life of LED. • Categorise LED into its various types such as indicator, illuminator and Chip on Board (COB) • List the advantages of LED light products • List the basic parameters of LEDs and their importance in an LED product • Distinguish between the different types of power sources used in LED lighting and their characteristics	**08**	**02**	

	• Illustrate the different ways LEDs can be connected in a circuit and list the advantages and disadvantages of each • Identify the steps of heat transfer procedure in an LED • List the components of passive thermal designs to maintain low junction temperature such as adhesive and heat sinks • Identify the use of constant current LED Driver			
4 **(25 Marks)**	**LED Luminary Assembly** • List the major components of an LED luminary such as LED light engine, LED Driver, LED heat sink and thermal pads • Identify the tools required for LED product assembly • List the materials used in LED product assembly • Basic knowledge of assembly of products such as spot light, LED bulb and LED tube light • Analyse the Importance of IP rating in Led products and its requirement for different products based on the product area of use • Steps of driver selection according to the LED • Identify the function and characteristics and application of a constant current LED driver and a constant voltage driver • Assess the reason for LED failure including hot environment, incorrect LED driver and incorrect polarity. • Identify and analyse the LED luminaire failure types such as LED failure modes, secondary optics failure modes, thermal management system failure and LED driver failure . • Steps to diagnose and repair fault in an LED light both at the component level and the strip level . • process of soldering if loose, de-soldered wires and connections are found	**08**	**02**	**10**
	Total	**32**	**6**	**10**

PRACTICALS:

- Demonstrate the process of soldering
- Demonstrate LED working principle
- Demonstrate basic knowledge of assembly of products such as spot light, LED bulb and LED tube light
- Demonstrate basic knowledge of product assembly
- Demonstrate driver selection according to the LED
- Check the LED light engine with DC supply as per the voltage / current requirements of the product
- Check the supply unit with AC supply / multimeter to find out the voltage /current output in case LED light engine is not found defective
- Check voltage / current output at different sections of the supply unit in case of no voltage / current
- Check the components with multimeter individually of the section where voltage output is found to be less than desired / no output
- Perform repair / replacement of the damaged components / SMPs
- Check and replace the burnt out / damaged LED strips

MODES OF IN-SEMESTER ASSESSMENT: (20 Marks)

- **One Test - =10 Marks**
- **Students have to choose any one of the following suggested activities in a semester for their in semester assessment =10 marks**

  - **Seminar presentation of any concept**
  - **Peer Teaching and Discussion**
  - **Writing report on study visits arranged by the institutes to organization practicing these skills.**

LEARNER OUTCOMES:

After the completion of this course, the learner will be able to:

- **Students will be able to assemble and repair an LED bulb on their own**.
- **course is bring about inclusive growth and enable the youth who have technical education to train and prepare to work in LED Lighting**.

READING LIST:

- Zhe Chun Feng (2019) **,** *Handbook of Solid- state Lighting and LEDs* , Taylor & Francis Ltd.
- Ron Lenk – Carol Lenk (2011) **,** *Practical Lighting Design with LEDs,* John Wiley and Sons Ltd.
- Gilbert held (2019) , *Introduction to light emitting diode technology and application*, Taylor and Francis