Annexure I

Detailed Course Curriculum

Name of Unit of Qualification	**:**	Introduction of light sources and their characteristics
Duration	**:**	**40 hours Theory+30 hours Practical**

Outcome	**Contents**
Introduction	Introduction, light sources type of lighting, ,characteristics of light sources, ,glare, light colour and colour rendering,
Types of lighting sources	incandescent, fluorescent, HID, mercury vapour, metal halide.
Measurment of light-light units	efficacy, illumination, light quality, response timing, dimming, glare, light colour and colour rendering.
LED	working of LED,LED characteristics, LED as an indicator, advantage of LED"s, Disadvantage of LED"s
Types of LED	Miniature LED's, high power LED's, LED strips, AS-LED
Behaviour of LED	Behaviour of LEDs with junction temperature, junction temperature Vs relative forward voltage, junction temperature Vs luminous flux, junction temperature Vs colour shifts
Connection of LED s	Connection of Multiple LEDs, wiring of multiple LEDs in series and parallel, white light production from LEDs

Detailed Course Curriculum

Name of Unit of Qualification	**:**	Study of led and light sources
Duration	**:**	**40 hours Theory + 30 Hours Practical**

Outcome	Contents
Introduction	Introduction, basic calculation of current in the use of LED.
Basic idea of reliability	Heating problem, poor electronics, fitting types, environmental factors dimming of LED, space flexibility, enhanced safety, increased, productivity. efficacy, illumination, light quality, response timing, dimming, glare, light colour and colour rendering.
Operation	Mains operated LED lamps, general principal of working LED flash lights, LED flash drive principle, design of LED flash light Using Max660, working principle of USB lights.
Quality of white LED	Efficacy, colour temperature, colour rendering index.
Quality of LED lamps	LED light sources, LED driver processing, cooling, calculation of efficiency of light sources, benefits of LED light bulbs.

Detailed Course Curriculum

Name of Unit of Qualification	**:**	Design and assembly of LED based products.
Duration	**:**	**40 hours Theory + 30 Hours Practical**

Outcome	Contents
Design of constant circuit drive circuits	: single transistor constant current driver, single transistor Constant current driver with voltage regulation, an alternative To zener diode, LED switching using LDR.
Assembly of LED based lighting	Benefits of LED assembly, application of LED assembly, LED bulb light, LED spotlight assembly, LED tube light.
Potting materials	Potting of a PCB, types of potting compounds, potting compound selection, insulation tape, heat shrinks tubing, PCB cleaning, significance of optics.
Tools required in process control	Process of manufacture, weighing machine, temperature meter ,resistance thermometer, magnifying glasses. electrostatics discharge and work safety precautions.
IP ratings	Ip ratings code, ip number description, 5s standards, handlings and disposal of hazardous materials, impact of hazardous materials, status of e-waste managements in India, management regarding LED, capacity building, training and awareness programmes.

Detailed Course Curriculum

Name of Unit of Qualification	**:**	Renewable energy and SPV cells
Duration	**:**	**40 hours Theory + 30 Hours Practical**

Outcome	**Contents**
Basic concepts	Introduction to solar energy as renewable source, historical Perspective of using solar energy
Solar photo voltaic cells	Concepts of solar photo voltaic cells, basics principle and working of SPV"s ,ratings and specifications of SPV peak voltage And voltage/current on load, ratings of PV module, specification of PV module.
Types of photo voltaic cells	Mono crystalline silicon PV, polycrystalline silicon PV, amorphous silicon PV, Hybrid PV, solar PV systems, grid connected PV system, OFF grid solar PV systems
Area of SPV and energy	SPV efficiency, battery charge controllers, wiring of solar panels and batteries, storage battery size and autonomy of SPV system Solar system components, assembly of SPV chargeable light source-solar lamp.

Detailed Course Curriculum

Name of Unit of Qualification	**:**	Installation and maintenance of solar panel
Duration	**:**	**40 hours Theory + 30 Hours Practical**

Outcome	**Contents**
Topics	Tools involved in installation of systems ,occupational health and safety standards and waste management procedures, precautions To be taken while installation, solar PV system sizing, site surveying methods and evaluation parameters, sunlight's and direction assessment.
Assembly and placement of solar panel mounting	Installation of solar plates on holding clamp, wiring multiple PV module, wiring of solar panel to inverter, maintenance of solar panels