Model Curriculum

QP Name: LED Light Repair Technician

QP Code: ELE/Q9302

QP Version: 4.0

NSQF Level: 4

Model Curriculum Version: 4.0

Electronics Sector Skills Council of India || 155, 2nd Floor, ESC House, Okhla Industrial Area – Phase 3, New Delhi 110020

Table of Contents

Training Parameters

Sector	Electronics
Sub-Sector	Solar & LED
Occupation	LED Light Testing and Quality Assurance
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/3113.1002
Minimum Educational Qualification and Experience	12th grade or equivalent OR 10th grade or equivalent with 3 year relevant experience OR Certificate-NSQF (Level-3 in relevant domain) with 3 Years of relevant Experience # Relevant Experience in Solar & LED
Pre-Requisite License or Training	NA
Minimum Job Entry Age	NA
Last Reviewed On	07/10/2025
Next Review Date	07/10/2028
NSQC Approval Date	07/10/2025
QP Version	4.0
Model Curriculum Creation Date	07/10/2025
Model Curriculum Valid Up to Date	07/10/2028
Model Curriculum Version	4.0
Minimum Duration of the Course	480 Hours
Maximum Duration of the Course	480 Hours

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills:

- Demonstrate the process of diagnosing and repairing fault in LED Light.
- Explain the importance of following inclusive practices for all genders and PwD at work.
- Demonstrate various practices to be followed to maintain health and safety at work.

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Recommended)	On-the-Job Training Duration (Mandatory)	Total Duration
ELE/N9302: Diagnose and repair fault in LED Light	**30:00**	**60:00**	**00:00**	**90:00**	**180:00**
Module 1: Introduction to the role of an LED Light Repair Technician, including the process of diagnosing and repairing faults in LED lights.	30:00	60:00	00:00	90:00	180:00
ELE/N7502: Identify and Replace Faulty LED Strips and Ensure Product Quality	**90:00**	**120:00**	**00:00**	**60:00**	**270:00**
Module 2: Identify and Replace Faulty LED Strips and Ensure Product Quality	90:00	120:00	00:00	60:00	270:00
DGT/VSQ/N0101- Employability Skills (30 Hours)	**30:00**	**00:00**	**00:00**	**00:00**	**30:00**
Module 3: Employability Skills (60 Hours)	30:00	00:00	00:00	00:00	30:00
Total Duration	**150:00**	**180:00**	**00:00**	**150:00**	**480:00**

Module Details

Module 1: Introduction to the role of an LED Light Repair Technician, including the process of diagnosing and repairing faults in LED lights.

Mapped to ELE/N9302

Terminal Outcomes:

- Demonstrate the process of finding and repairing component-level fault.
- Demonstrate the process of finding and repairing LED strip-level fault.
- Explain the importance of achieving the quality standards.

Duration: 30:00	Duration: 60:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Introduction and orientation to the role of a LED Light Repair Technician • Describe the size and scope of the electronics industry and its sub-sectors. • Discuss the role and responsibilities of a LED Light Repair Technician. • Describe various employment opportunities for a LED Light Repair Technician. • Explain company's policies on incentives, testing & repairing standards and personnel management. • Explain company's standard operating procedures and processes related to LED Luminary product testing and repair. • Explain the importance of individual's role in the workflow. • Describe the reporting structure of the company. • State the safety and quality standards followed in the organization. • List various electronic & electrical components, materials and their specific properties & usages.	• Familiarization about the LED Lights • how to do soldering of wires and make connections in case of loose, de-soldered wires and connections or dismantle the LED light if no loose, de-soldered wires and connections are found externally. • Show how to check the LED light engine with DC supply as per the voltage / current requirements of the product and replace the LED light engine if it is found faulty. • Show how to check the supply unit with AC supply/multimeter to find out the voltage/current output in case LED light Engine is not found defective. • Demonstrate the use of a multimeter to check the voltage/current output at different sections of the supply unit and find out the damaged section in case of no voltage/current output is found in the supply unit. • Demonstrate how to use a multimeter and individually check the components of the section where voltage output is found to be less than desired or no output.

• Explain the basics of power electronics and its usages in lighting controls, or LED power supplies and LED drivers. • State special safety and handling precautions to be taken during LED luminary testing. • Explain how to use multimeter, tester, LCR meter and power analyzer. • Understand the working principles of smart LED driver circuits and the role of IoT-enabled components (e.g., Bluetooth, Zigbee, Wi-Fi, DALI). • Learn how to identify common faults in sensors and wireless communication modules used in smart lighting systems. • Study the differences, advantages, and applications of high-efficiency LED technologies such as **COB** and **SMD**.	• Demonstrate the process of repairing or replacing the damaged components/SMPs as per the organisational standards and procedures. • Show how to check the output voltage/current of the supply unit again with a multimeter and reassemble the LED light if repaired/replaced supply unit is found okay. • Demonstrate the process of removing the glass shell from the LED light and replacing the burnt-out/damaged LED strips. • Demonstrate the process of replacing the glass shell on the LED Light and close it if all the strips are found operational. • Show how to document the fault diagnosis and repair process as per SOP. • Inspect smart LED driver circuits and diagnose faults in sensors and wireless communication (Bluetooth, Zigbee, Wi-Fi). • Test and verify the connectivity and performance of wireless-enabled LED drivers integrated in lighting systems. • Remove and replace damaged LED strips with high-efficiency COB or SMD LEDs following safety and installation protocols.
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Electric circuit components such as diode, transistor, IC, LED, transformer, resistor, capacitor, thermistor, inductor, timer, motor, starter, connector, switch, PCB, relay and circuit breaker, Multimeter, power source, Ammeter, voltmeter, Soldering Iron, soldering ware, desoldering pump	

Module 2: Identify and Replace Faulty LED Strips and Ensure Product Quality

Mapped to ELE/N7502

Terminal Outcomes:

- Identify faulty LED strips and associated components through systematic inspection and testing.
- Safely remove and replace damaged LED strips with appropriate high-efficiency alternatives.
- Verify functionality and quality of the replaced LED strips to meet operational and safety standards.

Duration: 90:00	Duration: 120:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Basics of LED technology: types (COB, SMD), efficiency, and light output • Working principles of smart LED testers, spectrum analyzers, and digital light meters • Understanding driver circuits and common embedded firmware faults in LED systems • Principles of color calibration, brightness control, and photometric testing • Connectivity protocols in smart LEDs (Bluetooth, Zigbee, Wi-Fi, DALI) • Common LED faults: flickering, dimming, overheating – causes and diagnostics • Use of thermal cameras for thermal profiling and fault localization • Repairing/reprogramming smart LED controllers and updating firmware • Final performance verification methods and benchmarking tools • Importance of maintaining digital service logs and compliance with BIS/IEC lighting standards • Safety protocols: PPE usage, safe handling of tools and live circuits • Ethical practices: team coordination, customer communication, and work discipline	• Using smart LED testers to identify faulty LED strips in various lighting fixtures • Replacing damaged LED strips with high-efficiency COB or SMD modules using proper soldering tool • Diagnosing driver circuit issues using microcontroller diagnostic kits (e.g., Arduino/ESP tools) • Calibrating LED brightness and color temperature using digital lux meters and spectrophotometers • Testing smart LED connectivity using smartphones/apps and protocol testers for Bluetooth, Zigbee, etc • Detecting heat issues using IR thermal cameras; applying thermal paste/pads to improve heat management • Repairing or flashing firmware on smart LED controllers with proper programmer tools • Performing complete system tests post-repair using digital diagnostic systems (e.g., LCR meter, oscilloscope) • Documenting repairs, firmware versions, and component replacements in digital logs • Wearing ESD-safe gloves, goggles, and following lockout/tagout procedures during repairing

	• Identifying and reporting issues like burnt wires, loose connections, or damaged PCB • Practicing careful handling of components, soldering stations, and diagnostic devices. • Demonstrating ethical behavior, punctuality, team coordination, and respectful communication
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Sample Of Escalation Matrix, Organization Structure.	

Module 3: Employability Skills (30 Hours)

Mapped to DGT/VSQ/N0101

Terminal Outcomes:

- Discuss about Employability Skills in meeting the job requirements
- Describe opportunities as an entrepreneur.
- Describe ways of preparing for apprenticeship & Jobs appropriately.

Duration: 30:00	Duration: 00:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain constitutional values, civic rights, responsibility towards society to become a responsible citizen • Discuss 21st century skills • Explain use of basic English phrases and sentences. • Demonstrate how to communicate in a well-behaved manner • Demonstrate how to work with others • Demonstrate how to operate digital devices • Discuss the significance of Internet and Computer/ Laptops • Discuss the need for identifying business opportunities • Discuss about types of customers. • Discuss on creation of biodata • Discuss about apprenticeship and opportunities related to it.	
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Computer, UPS, Scanner, Computer Tables, LCD Projector, Computer Chairs, White Board OR Computer Lab	

Module 4: On-the-Job Training

Mapped to LED Light Repair Technician

Mandatory Duration: 150:00	Recommended Duration: 00:00
Location: On Site	

Terminal Outcomes

1. Identify loose, de-soldered wires and connections if the light does not switch on when connecting the non-functional LED Light with the AC source.
2. Checking the LED light engine with DC supply as per the voltage / current requirements of the product and replace the LED light engine if it is found faulty.
3. Repairing or replacing the damaged components / SMPs as per the organizational standards and Procedures.
4. Checking the output voltage/current of the supply unit again with multimeter and reassemble the LED light if repaired / replaced supply unit is found okay.
5. Communicating effectively at the workplace.
6. Applying health and safety practices at the workplace.

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma/ ITI/ Certified in CITS Trade	Electrical/ Electronics/ Mechanical	1	LED Light Repairing	1	Electronics	

Trainer Certification	
Domain Certification	**Platform Certification**
"**LED Light Repair Technician**", "ELE/Q9302, v3.0", Minimum accepted score is 80%	Recommended that the Trainer is certified for the **LED Light Repair Technician** "Trainer (VET and Skills)", mapped to the Qualification Pack: "MEP/Q2601, V2.0", with minimum score of 80%

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training/Assessment Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma/ ITI Certified in CITS Trade	Electrical/ Electronics/ Mechanical	2	LED Light Repairing	1	Electronics	

Assessor Certification	
Domain Certification	**Platform Certification**
"**LED Light Repair Technician**", "ELE/Q9302, v3.0", Minimum accepted score is 80%	Recommended that the Assessor is certified for the **LED Light Repair Technician** "Assessor (VET and Skills)", mapped to the Qualification Pack: "MEP/Q2701, V2.0", with minimum score of 80%

Assessment Strategy

1. Assessment System Overview:
    - Batches assigned to the assessment agencies for conducting the assessment on SDMS/SIP or email
    - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
    - The assessment agency deploys the ToA certified Assessor for executing the assessment
    - SSC monitors the assessment process & records
2. Testing Environment

    To ensure a conducive environment for conducting a test, the trainer will:
    - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
    - Check the duration of the training.
    - Check the Assessment Start and End time to be 10 a.m. and 5 p.m. respectively
    - Ensure there are 2 Assessors if the batch size is more than 30.
    - Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
    - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
    - Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
    - Check the availability of the Lab Equipment for the particular Job Role.
3. Assessment Quality Assurance levels / Framework:
    - Question papers created by the Subject Matter Experts (SME)
    - Question papers created by the SME verified by the other subject Matter Experts
    - Questions are mapped with NOS and PC
    - Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
    - The assessor must be ToA certified and the trainer must be ToT Certified
    - The assessment agency must follow the assessment guidelines to conduct the assessment
4. Types of evidence or evidence-gathering protocol:
    - Time-stamped & geotagged reporting of the assessor from assessment location
    - Centre photographs with signboards and scheme-specific branding
    - Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
    - Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos
5. Method of verification or validation:

    To verify the details submitted by the training centre, the assessor will undertake:
    - A surprise visit to the assessment location
    - A random audit of the batch
    - A random audit of any candidate
6. Method for assessment documentation, archiving, and access

    To protect the assessment papers and information, the assessor will ensure:
    - Hard copies of the documents are stored

- Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage
- Soft copies of the documents & photographs of the assessment are stored on the Hard drive

References

Glossary

Term	Description
Declarative knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
OJT (R)	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do **upon the completion of the training**.
Terminal Outcome	Terminal outcome is a statement of what a learner will know, understand and be able to do **upon the completion of a module.** A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

Term	Description
ISO	International Organization for Standardization
NCO	National Occupational Standards
NOS	National Skills Qualification Committee
NSQF	National Skills Qualification Framework
OJT	On-the-Job Training
OMR	Optical Mark Recognition
PC	Performance Criteria
PwD	Persons with Disabilities
QP	Qualification Pack
SDMS	Skill Development & Management System
SIP	Skill India Portal
SME	Small and Medium Enterprises
SOP	Standard Operating Procedure
SSC	Sector Skill Council
TC	Trainer Certificate
ToA	Training of Assessors
ToT	Training of Trainers
TP	Training Provider