



# Model Curriculum

**QP Name: Solar LED Technician**

**QP Code: ELE/Q5903**

**QP Version: 3.0**

**NSQF Level: 4**

**Model Curriculum Version: 3.0**

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

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## Training Parameters

<b>Sector</b>	Electronics
<b>Sub-Sector</b>	Solar & LED
<b>Occupation</b>	Installation-S&L
<b>Country</b>	India
<b>NSQF Level</b>	4
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/7421.1401
<b>Minimum Educational Qualification and Experience</b>	8th Grade Pass + NTC (2 years after 8th) + 2 Year NAC/relevant Experience) OR 10th Grade pass + 2 Year NTC/NAC/ relevant experience OR Certificate-NSQF (Level-3 in Maintenance Technician) with 2 Years of relevant Experience OR 12th Class and 18 Years
<b>Pre-Requisite License or Training</b>	NA
<b>Minimum Job Entry Age</b>	18 Years
<b>Last Reviewed On</b>	27/01/2022
<b>Next Review Date</b>	27/05/2025
<b>NSQC Approval Date</b>	27/01/2022
<b>QP Version</b>	3.0
<b>Model Curriculum Creation Date</b>	27/01/2022
<b>Model Curriculum Valid Up to Date</b>	27/05/2025
<b>Model Curriculum Version</b>	3.0
<b>Maximum Duration of the Course</b>	600 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.

- Install & repair solar based LED -home lighting system and Street Lighting system.
- Prepare structures for panel installation.
- Fix PV panels on a roof and non-roof structure.
- Perform routine maintenance and repair.
- Identify and repair faults.
- Interact and coordinate with the supervisor and colleagues etc.
- Follow safe and healthy work practices.

### 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 (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
<b>Bridge Module</b>	<b>21:00</b>	<b>39:00</b>	<b>00:00</b>	<b>00:00</b>	<b>60:00</b>
Module 1: Introduction to the role of Solar LED Technician	21:00	39:00	00:00	00:00	60:00
<b>ELE/N5905 - Perform installation of Solar PV System</b>	<b>60:00</b>	<b>90:00</b>	<b>60:00</b>	<b>00:00</b>	<b>210:00</b>
Module 2: Perform installation of Solar PV System	60:00	90:00	60:00	00:00	210:00
<b>ELE/N5906 - Perform maintenance and repair of Solar PV System</b>	<b>60:00</b>	<b>90:00</b>	<b>90:00</b>	<b>00:00</b>	<b>240:00</b>
Module 3: Perform maintenance and repair of Solar PV System	60:00	90:00	90:00	00:00	240:00
<b>ELE/N1002 – Apply Health and Safety Practices at the Workplace</b>	<b>15:00</b>	<b>15:00</b>	<b>00:00</b>	<b>00:00</b>	<b>30:00</b>
Module 4: Basic Health and Safety Practices	15:00	15:00	00:00	00:00	30:00
<b>DGT/VSQ/N0102- Employability Skills (60 Hours)</b>	<b>24:00</b>	<b>36:00</b>	<b>00:00</b>	<b>00:00</b>	<b>60:00</b>
Module 5: Employability Skills (60 Hours)	24:00	36:00	00:00	00:00	60:00
<b>Total Duration</b>	<b>180:00</b>	<b>270:00</b>	<b>150:00</b>	<b>00:00</b>	<b>600:00</b>

# Module Details

## Module 1: Introduction to the role of Solar LED Technician

### *Bridge module*

#### Terminal Outcomes:

- List the role and responsibilities of a Solar LED Technician.

<b>Duration:</b> 21:00	<b>Duration:</b> 39:00
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>Describe the size and scope of the electronics industry and its various sub-sectors.</li> <li>Discuss the various opportunities for a Solar LED Technician in the industry.</li> <li>Define the basics of electronics and related concepts.</li> <li>Discuss the role and responsibilities of a Solar LED Technician.</li> <li>Discuss organisational policies on incentives, delivery standards, personnel management and public relations (PR).</li> </ul>	<ul style="list-style-type: none"> <li>Familiarization with the types of Solar LED</li> <li>Awareness about connections made</li> <li>Familiarization about inclination angle and Solar Panels</li> </ul>
<b>Classroom Aids:</b>	
Laptop, white board, marker, projector	
<b>Tools, Equipment and Other Requirements</b>	
NA	

## Module 2: Perform installation of Solar PV System

### Mapped to ELE/N5905

#### Terminal Outcomes:

- Perform steps for solar panel installation.

<b>Duration: 60:00</b>	<b>Duration: 90:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Describe renewable energy resources.</li> <li>• Discuss need of solar power and its application</li> <li>• Describe solar power generation system.</li> <li>• Describe fundamental of Solar PV Cells.</li> <li>• List parameters of Solar PV Panels.</li> <li>• Describe effect of environment in generation of electricity through solar PV modules</li> <li>• List components of Solar PV systems and their use.</li> <li>• Describe basics of LED &amp; its parameters.</li> <li>• Describe CCT &amp; CRI.</li> <li>• Discuss importance of Thermal Management in LED lighting products.</li> <li>• Elaborate Optical Management of LED Luminary.</li> <li>• Describe LED Driver.</li> <li>• Discuss necessity of earthing systems arrangements and requirements.</li> <li>• Describe methods and tools used to fix the solar led light system</li> <li>• List various types of Building materials used in roof structures, ground structures, interior and exterior of customer’s premises.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate use of different types of Solar PV Panels.</li> <li>• Demonstrate use and handling procedure of Solar PV Panels.</li> <li>• Apply appropriate ways to check output of Solar Panels on different angles.</li> <li>• Demonstrate how to prepare the work area for installation of solar led light.</li> <li>• Demonstrate procedure of fixing the solar led light system.</li> <li>• Show how to select the appropriate type of mounting system and conditions suitable for the required LED Lighting</li> <li>• Show how to terminate the wiring correctly in line with manufacturer’s instructions, operational and regulatory requirements.</li> <li>• Show how to fix Solar LED Lightings with safely.</li> <li>• Demonstrate post installation activities like:- leave the work area in clean and safe condition, handover the complete work to the customer as per company policies, etc.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, computer or laptop attached to LCD projector, scanner, computer speakers	
<b>Tools, Equipment and Other Requirements</b>	
Solar PV Panels, Batteries, Charge Controllers, Inverter, AC/DC Load, Wire Stripper, LED Products, LED Drivers, DC Power Supply, Thermal Pad, Thermal Greece, Connecting Wires, Mounting Structure, LED Lights, Drill Machine, Compass, Batteries, Digital Multi-meter, Screw Driver Set, Pliers, Wire Cutter, job sheets, report formats.	

## Module 3: Perform maintenance and repair of Solar PV System

*Mapped to ELE/N5906*

### Terminal Outcomes:

- Demonstrate maintenance and repair of Solar PV System.

<b>Duration: 60:00</b>	<b>Duration: 90:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Describe health and safety legislation, regulations and other relevant guidelines.</li> <li>• Discuss need of obtaining appropriate work order from responsible authority.</li> <li>• List resources and materials required during work.</li> <li>• List the steps to be performed for troubleshooting and repairing of solar panel system.</li> <li>• Discuss various problems and their remedies generally occur in solar PV panels.</li> </ul>	<ul style="list-style-type: none"> <li>• Show how to introduce self and organization correctly, and state the purpose of your visit to the customer.</li> <li>• Show how to obtain appropriate work order from responsible authority and confirm the type of system fault from the job specifications given.</li> <li>• Show how to identify and obtain resources and materials needed for the type of work in accordance with organizational standards and procedures</li> <li>• Show how to remove and replace faulty components using approved methods without causing damage.</li> <li>• Demonstrate organisational procedure of reporting any unprecedented problems identified in the work to responsible authority and seek advice on how to resolve them.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, computer or laptop attached to LCD projector, scanner, computer speakers	
<b>Tools, Equipment and Other Requirements</b>	
Solar PV Panels, Batteries, Charge Controllers, Inverter, AC/DC Load, Wire Stripper, LED Products, LED Drivers, DC Power Supply, Thermal Pad, Thermal Greece, Connecting Wires, Mounting Structure, LED Lights, Drill Machine, Compass, Batteries, Digital Multi-meter, Screw Driver Set, Pliers, Wire Cutter, job sheets, report formats.	

#### Terminal Outcomes:

- Apply health and safety practices at the workplace.

<b>Duration: 15:00</b>	<b>Duration: 15:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Discuss job-site hazards, risks and accidents.</li> <li>• Explain the organizational safety procedures for maintaining electrical safety, handling tools and hazardous materials.</li> <li>• Elaborate electronic waste disposal procedures.</li> <li>• Describe the process of disposal of hazardous waste</li> <li>• List the name and location of concerned people, documents and equipment for maintaining health and safety in the workplace.</li> <li>• Describe how to interpret warning signs while accessing sensitive work areas.</li> <li>• Explain the importance of good housekeeping.</li> <li>• Describe the importance of maintaining appropriate postures while lifting heavy objects.</li> <li>• List the types of fire and fire extinguishers.</li> <li>• Explain the importance of efficient utilisation of water, electricity and other resources.</li> <li>• List the common sources of pollution and ways to minimize it.</li> <li>• Describe the concept of waste management and methods of disposing hazardous waste.</li> <li>• Explain various warning and safety signs.</li> <li>• Describe different ways of preventing accidents at the</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate the use of protective equipment suitable as per tasks and work conditions.</li> <li>• Prepare a report to inform the relevant authorities about any abnormal situation/behaviour of any equipment/system.</li> <li>• Administer first aid in case of a minor accident.</li> <li>• Demonstrate the steps to free a person from electrocution safely.</li> <li>• Administer Cardiopulmonary Resuscitation (CPR).</li> <li>• Demonstrate the application of defined emergency procedures such as raising alarm, safe/efficient, evacuation, moving injured people, etc.</li> <li>• Prepare a sample incident report.</li> <li>• Use a fire extinguisher in case of a fire incident.</li> <li>• Demonstrate the correct method of lifting and handling heavy objects.</li> </ul>
<b>Classroom Aids</b>	
Training kit (Trainer guide, Presentations), White board, Marker, projector, laptop, flipchart.	
<b>Tools, Equipment and Other Requirements</b>	
Personal Protection Equipment: safety glasses, head protection, rubber gloves, safety footwear, warning signs and tapes, fire extinguisher, first aid kit, fire extinguishers and warning signs.	



## Module 5: Employability Skills (60 Hours)

### Mapped to DGT/VSQ/N0102

#### Terminal Outcomes:

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

<b>Duration: 24:00</b>	<b>Duration: 36:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Explain constitutional values, civic rights, responsibility towards society to become a responsible citizen</li> <li>• Discuss 21<sup>st</sup> century skills</li> <li>• Explain use of basic English phrases and sentences.</li> <li>• Demonstrate how to communicate in a well-behaved manner</li> <li>• Demonstrate how to work with others</li> <li>• Demonstrate how to operate digital devices</li> <li>• Discuss the significance of Internet and Computer/ Laptops</li> <li>• Discuss the need for identifying business opportunities</li> <li>• Discuss about types of customers.</li> <li>• Discuss on creation of biodata</li> <li>• Discuss about apprenticeship and opportunities related to it.</li> </ul>	<ul style="list-style-type: none"> <li>• List different learning and employability related GOI and private portals and their usage</li> <li>• Show how to practice different environmentally sustainable practices.</li> <li>• Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, etc.</li> <li>• Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone</li> <li>• Demonstrate how to communicate in a well-mannered way with others.</li> <li>• Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette</li> <li>• Utilize virtual collaboration tools to work effectively</li> <li>• Demonstrate how to maintain hygiene and dressing appropriately.</li> <li>• Perform a mock interview</li> </ul>
<b>Classroom Aids</b>	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
<b>Tools, Equipment and Other Requirements</b>	
Computer, UPS, Scanner, Computer Tables, LCD Projector, Computer Chairs, White Board	
OR	
Computer Lab	

## Module 6: On-the-Job Training

### Mapped to Solar LED Technician

<b>Mandatory Duration:</b> 150:00	<b>Recommended Duration:</b> 00:00
<b>Location: On Site</b>	
<b>Terminal Outcomes</b>	
<ol style="list-style-type: none"> <li>1. Explain the fundamental concepts of electronics and electronics components</li> <li>2. Read the drawing, component symbols and work orders for identifying work requirements, selecting and planning sequence of installation</li> <li>3. Arrange tools, measuring instruments and equipment from the store</li> <li>4. Install solar panels at appropriate area</li> <li>5. Perform maintenance and repair of Solar PV System</li> <li>6. Repair or replace faulty components of solar panel system</li> <li>7. Perform post-installation activities like cleaning, functionality check etc.</li> <li>8. Interact and coordinate with supervisor and colleagues</li> <li>9. Work as per the given timeline and quality standards</li> <li>10. Maintain a safe, healthy and secure work environment</li> </ol>	

## Annexure

### Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
Diploma/ ITI/ Certified in relevant CITS Trade	Electronics/ Electrical/ Mechanical	2	Solar and LED installation and repairing	1	Trainer	

Trainer Certification	
Domain Certification	Platform Certification
“Solar LED Technician, ELE/Q5903, version 3.0”. Minimum accepted score is 80%.	Recommended that the Trainer is certified for the <b>Solar LED Technician</b> “Trainer (VET and Skills)”, mapped to the Qualification Pack: “MEP/Q2601, V2.0”, with minimum score of 80%

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	Specialization	Years	Specialization	
Diploma/ ITI/ Certified in relevant CITS Trade	Electronics/ Electrical/ Mechanical	3	Solar and LED installation and repairing installation	2	Assessor	

Assessor Certification	
Domain Certification	Platform Certification
“Solar LED Technician, ELE/Q5903, version 3.0”. Minimum accepted score is 80%.	Recommended that the Assessor is certified for the <b>Solar LED Technician</b> “Assessor (VET and Skills)”, mapped to the Qualification Pack: “MEP/Q2701, V2.0”, with minimum score of 80%

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
  - Assessment agency deploys the ToA certified Assessor for executing the assessment
  - SSC monitors the assessment process & records
2. Testing Environment:
  - 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 as 10 a.m. and 5 p.m.
  - If the batch size is more than 30, then there should be 2 Assessors.
  - 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
  - Assessor must be ToA certified & trainer must be ToT Certified
  - 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:
  - Surprise visit to the assessment location
  - Random audit of the batch
  - Random audit of any candidate
6. Method for assessment documentation, archiving, and access
  - 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 in the Hard Drives

Glossary

<b>Sector</b>	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
<b>Sub-sector</b>	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
<b>Occupation</b>	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
<b>Job role</b>	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
<b>Occupational Standards (OS)</b>	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
<b>Performance Criteria (PC)</b>	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
<b>National Occupational Standards (NOS)</b>	NOS are occupational standards which apply uniquely in the Indian context.
<b>Qualifications Pack (QP)</b>	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
<b>Unit Code</b>	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
<b>Unit Title</b>	Unit title gives a clear overall statement about what the incumbent should be able to do.
<b>Description</b>	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
<b>Scope</b>	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

<b>Knowledge and Understanding (KU)</b>	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
<b>Organisational Context</b>	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
<b>Technical Knowledge</b>	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
<b>Core Skills/ Generic Skills (GS)</b>	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
<b>Electives</b>	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
<b>Options</b>	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.

## Acronyms and Abbreviations

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
IPR	Intellectual Property Rights