



Model Curriculum

QP Name: Solar Panel Installation Technician

QP Code: ELE/Q5901

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

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Training Parameters

Sector	Electronics
Sub-Sector	Solar & LED
Occupation	Installation
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7421.1401
Minimum Educational Qualification and Experience	1. 12th grade or equivalent 2. 10th grade or equivalent with 3 year relevant experience 3. 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:

- Describe the process of checking site conditions, collect tools and raw materials.
- Demonstrate the process of installing the solar panel.
- 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/N5901: Check site conditions, collect tool and raw materials	60:00	90:00	00:00	60:00	210:00
Module 1: Check site conditions, collect tool and raw materials	60:00	90:00	00:00	60:00	210:00
ELE/N5902: Install the Solar Panel	60:00	90:00	00:00	90:00	240:00
Module 2: Install the Solar Panel	60:00	90:00	00:00	90:00	240:00
DGT/VSQ/N0101- Employability Skills (30 Hours)	30:00	00:00	00:00	00:00	30:00
Module 3: Employability Skills (30 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: Check site conditions, collect tool and raw materials

Mapped to ELE/N5901

Terminal Outcomes:

- Introduction to renewable energy and solar PV technology.
- Describe the process of identifying and planning the work target.
- Describe the process of assessing the site condition.
- Describe the process of identifying the installation requirement.
- Explain the need of collecting recommended material for installation.
- Explain the importance of ensuring proper handling and storage of material.

Duration: 60:00	Duration: 90:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
- Briefly explain the concept of solar energy and photovoltaic (PV) technology: Introduce solar energy as a renewable source and explain how PV cells convert sunlight into electricity. - Describe the basic components and working of a solar PV system: Outline key parts like panels, inverter, battery, and how they function together in a solar setup. - Interact with the supervisor to understand the installation targets, individual work requirements, and areas of operation; conduct site surveys using GPS to identify installation locations, plan daily activities, and finalize the work plan for each installation. - Explain the importance of conducting site inspections to identify potential hazards. - Describe relevant safety signage, PPE (Personal Protective Equipment), and risk control measures. - Read and interpret site plans, drawings, or specifications related to the task. - Identify the scope of work and understand environmental and logistical constraints. - List different types of site conditions (e.g., wet, dry, sloped, obstructed). - Explain how varying site conditions impact work planning and preparation. - Match tools and equipment to specific tasks and materials. - Understand the correct use, maintenance, and	- Visually inspect a work site for hazards and record observations. - Communicate findings to relevant personnel or supervisors. - Choose appropriate tools based on the task and site conditions. - Conduct pre-start checks to ensure tools are safe and functional. - Identify and gather the correct materials for the job. - Use appropriate manual handling techniques or equipment to transport materials. - Set up tools and materials in a manner that ensures efficient workflow and safety. - Maintain cleanliness and order throughout preparation tasks.

storage of tools.

- Differentiate between types of raw materials and their suitability for specific tasks.
- Interpret material safety data sheets (MSDS) where applicable.

Classroom Aids

Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop

Tools, Equipment and Other Requirements

Different types of Solar Panels, Components of a Solar PV Installation Systems, Solar Lighting and other application systems, Inverters, Charge Controllers, Testing Equipment, Hand tools, Product Manuals of PV Panels, Charge Controllers, Inverters, Battery Bank, On Grid and Off Grid System components

Module 2: Install the Solar Panel

Mapped to ELE/N****

Terminal Outcomes:

- 🎬 Explain the need of understanding installation and material usage procedure.
- 🎬 Describe the process of assessing mounting and installing the panel.
- 🎬 Demonstrate the process of connecting the system and checking for functioning.
- 🎬 Explain the importance of completing the work.
- 🎬 Explain the importance of following quality and safety procedures.

Duration: 60:00	Duration: 90:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
- Explain the basic components of a solar photovoltaic (PV) system (solar panels, inverters, batteries, charge controllers, etc.). - Differentiate between off-grid, on-grid, and hybrid solar systems. - Describe the fundamentals of DC and AC electricity relevant to solar panel systems. - Identify electrical hazards and outline safety precautions and PPE requirements when working with live or potentially live systems. - Read and interpret technical drawings, manufacturer manuals, and wiring diagrams. - Understand system design parameters, including tilt angle, orientation, and shading analysis. - List common tools and installation hardware used in smart mounting and wiring solar panels. - Explain the function and handling of cables, connectors, mounts, and safety gear and also use smart accessioned. - Describe national or local electrical codes, standards (such as IEC, IS, NEC), and compliance requirements. - Basics of masonry work in solar installations (roof-top & ground-mounted systems) - Types of mounting structures and foundation requirements - Tools and materials used in masonry (drill machine, grouting mix, anchors, etc.) - Safety precautions while working at heights or with tools	- Evaluate the site for shading, structural integrity of smart mounting surface, and optimal panel orientation. - Record and report measurements for array layout planning. - Select appropriate mounting hardware for the roof type or ground-mount application. - Assemble and securely fix the mounting structure in line with safety and design specifications. - Lift, place, and fasten solar panels onto the mounting structure using safe manual handling techniques. - Align and secure panels according to specified tilt and orientation. - Connect panels in series and/or parallel as per the system configuration. - Terminate cables using appropriate tools and connect to junction boxes, inverters, and other system components. - Use a multi meter and other testing equipment to check voltage, current, and continuity. - Identify and troubleshoot any issues in the installation (e.g., loose connections, incorrect polarity). - Marking layout points as per site plan - Surface cleaning and preparation of installation area - Using tools like drill machine, hammer, chisel, and level - Mixing and applying grout for anchor bolts or

● Layout marking techniques and importance of leveling ● Introduction to civil drawings and site plans ● Types of roofing (RCC, asbestos, metal) and suitable fixing methods ● Understanding load-bearing capacity and structural integrity Understand basic environmental and site assessment regulations related to solar installation.	base plates ● Fixing and aligning mounting structures ● Ensuring structure stability and verifying vertical/horizontal alignment ● Practicing safe handling of materials and tools ● Performing post-work checks for strength and finish
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Classroom Aids

Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop

Tools, Equipment and Other Requirements

Different types of Solar Panels, Components of a Solar PV Installation Systems, Solar Lighting and other application systems, Inverters, Charge Controllers, Testing Equipment, Hand tools, Product Manuals of PV Panels, Charge Controllers, Inverters, Battery Bank, On Grid, Off Grid System components and Steel Mounting bolt, Module attachment and grounding clip, Module spacer, Anodized aluminum mounting foot, Integrated butyl tape sealant

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 Solar Panel Installation Technician

Mandatory Duration: 150:00	Recommended Duration: 00:00
Location: On Site	
Terminal Outcomes 1. Explain the use and handling procedure of solar panels. 2. Assess the degree of inclination and angle of tilt of PV module for the specific area, locality or region to enable the system absorb maximum annual sunlight. 3. set the mounting fixture firmly at the desired location. 4. Install spare fuse to avoid any short circuits as per company policy. 5. Connect multiple PV modules in combination to generate the desired voltage and current. 6. Connect the system and check its functioning. 7. Dispose-off any waste materials in accordance with safe working practices and procedures. 8. Develop a sample plan to achieve organisational goals and targets. 9. Demonstrate the use of professional language and behaviour that is respectful of PwD and all genders. 10. Use the protective equipment suitable as per tasks and work conditions. 11. Administer first aid in case of a minor accident. 12. Use a fire extinguisher in case of a fire incident.	

Annexur

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
Diploma/ ITI/ Certified in relevant CITS course	Electrical/ Electronics/ Mechanical	1	Solar Panel Installation	1 year preferably	Electronics	

Trainer Certification	
Domain Certification	Platform Certification
"Solar Panel Installation Technician", "ELE/Q5901, v4.0", Minimum accepted score is 80%	Recommended that the Trainer is certified for the Solar Panel Installation 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 relevant CITS course	Electrical/ Electronics/ Mechanical	2	Solar Panel Installation	1 year preferably	Electronics	

Assessor Certification	
Domain Certification	Platform Certification
“Solar Panel Installation Technician”, “ELE/Q5901, v4.0”, Minimum accepted score is 80%	Recommended that the Assessor is certified for the Solar Panel Installation 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 driv

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