Model Curriculum

QP Name: Solar PV Installer (Suryamitra)

QP Code: SGJ/Q0101

QP Version: 4.0

NSQF Level: 4

Model Curriculum Version: 4.0

Skill Council for Green Jobs (SCGJ)
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Contents

Training Parameters 4

Program Overview 6

Training Outcomes 6

Compulsory Modules 6

Module 1: Introduction to Solar PV Installer Course 9

Mapped to SGJ/N0101: Site Survey for installation of solar PV system, V5.0 9

Module 2: Basics of Solar Energy and Electrical Concepts 10

Mapped to SGJ/N0101: Site survey for installation of solar PV system, V5.0 10

Module 3: Site Survey for Installation of Solar PV System and asses the customer's Solar PV Requirement 11

Mapped to SGJ/N0101: Site survey for installation of solar PV system, V5.0 11

Module 4: Basics of Solar Photovoltaic system and its Components 12

Module 5: Identification and Use of different tools and tackles used forinstallation of solar PV system 14

Mapped to SGJ/N0103: Install civil and mechanical parts of Solar PV system, V4.0 14

Module 6: Interpretation of Drawings, Material Handling and storage of components on-site **Error! Bookmark not defined.**

Mapped to SGJ/N0102: Procure Solar PV system components, V5.0 .. **Error! Bookmark not defined.**

Module 7: Installation of Electrical components of a Solar PV System 15

Mapped to SGJ/N0104: Installation of electrical components of a solar PV system, V4.0 15

Terminal Outcomes: 15

Module 8: Test and Commission Solar PV system 16

Terminal Outcomes: 16

Module 09: Maintain Solar Photovoltaic Power System 17

Mapped to SGJ/N0622: Maintain Solar Photovoltaic Power System, V2.0 17

Terminal Outcomes: 17

Module 10: Maintain Personal Health & Safety at project site 18

Mapped to SGJ/N0106: Maintain Personal Health & Safety at project site, V5.0 18

Terminal Outcomes: 18

Module 11: Completion and Handover Documentation 19
Mapped to SGJ/N0107: Customer orientation for Solar PV System, V3.0 19
Terminal Outcomes: 19
Module 12: Employability Skill(60 hours) 20
Annexure 24
Trainer Requirements 24
Assessor Requirements 25
Assessment Strategy 26
References 28
Glossary 28
Acronyms and Abbreviations 29

Training Parameters

Sector	Environment Science
Sub-Sector	Renewable Energy
Occupation	Solar Panel Installation Technician
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7421.1401
Minimum Educational Qualification and Experience	12th grade pass with science stream or Equivalent Or 10th grade pass with 3 years of Renewable energy/power sector experience Or 10th grade pass with 2 years of any combination of NTC/NAC/CITS or equivalent in relevant trade Or Previous relevant Qualification of NSQF Level 3.5 (Solar PV Site Survey Assistant) with 1.5 years of Renewable energy /power sector experience Or Previous relevant Qualification of NSQF Level 3.0 (Assistant Technician – Solar Panel Installation) with 3 years of Renewable energy/power sector experience
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 years
Last Reviewed On	30th May 2024
Next Review Date	29th May 2027
NSQC Approval Date	30th May 2024
QP Version	4.0
Model Curriculum Creation Date	30th May 2024

Model Curriculum Valid Up to Date	29th May 2027
Model Curriculum Version	4.0
Minimum Duration of the Course	Total 420 notional hours (including Theory : 210 +Practical: 150+OJT: 60)
Maximum Duration of the Course	Total 420 notional hours (including Theory : 210 +Practical: 150+OJT: 60)

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 will be able to:

- Carry out the site survey for installation of Solar PV system.
- Assess the customer's Solar PV requirement.
- Procure the Solar PV system components.
- Identify and use the tools & tackles used for Solar PV system installation.
- Install the Civil/Mechanical and Electrical components of a Solar PV system.
- Test and commission Solar PV system.
- Maintain Solar PV system.
- Maintain personal health & safety at project site.
- Employable at workplace.

Compulsory Modules

The table lists the modules, their duration and mode of delivery.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
SGJ/N0101: Site survey for installation of solar PV system **NOS Version No.5** **NSQF Level 4**	**30:00**	**30:00**			**60:00**
Module 1: Introduction to Solar PV Installer Course	07:30	07:30			15:00
Module 2: Basics of Solar Energy and Electrical Concepts	07:30	07:30			15:00
Module 3: Site Survey for Installation of Solar PV System and asses the customer's Solar PV Requirement	15:00	15:00			30:00

SGJ/N0102: Procure Solar PV system components **NOS Version No.5** **NSQF Level 4**	**30:00**	**30:00**			**60:00**
Module 4: Basics of Solar Photovoltaic system and its Components	15:00	15:00			30:00
Module 5: Interpretation of Drawings, Material Handling and storage of components on-site	15:00	15:00	**60**		30:00
SGJ/N0103: Install civil and mechanical parts of Solar PV system **NOS Version No.4** **NSQF Level 4**	**15:00**	**15:00**			**30:00**
Module 6: Identification and Use of different tools and tackles used for installation of Solar PV system	15:00	15:00			30:00
SGJ/N0104: Installation of electrical components of a solar PV system **NOS Version No.4** **NSQF Level 4**	**15:00**	**15:00**			**30:00**
Module 7: Installation of Electrical components of a Solar PV System	15:00	15:00			30:00
SGJ/N0105: Test and commission Solar PV system **NOS Version No.4** **NSQF Level 4**	**15:00**	**15:00**			**30:00**
Module 8: Test and Commission Solar PV system	15:00	15:00			30:00
SGJ/N0622: Maintain Solar Photovoltaic Power System **NOS Version No.2** **NSQF Level 4**	**15:00**	**15:00**			**30:00**
Module 9: Maintain Solar Photovoltaic Power System	15:00	15:00			30:00

SGJ/N0106: Maintain Personal Health & Safety at project site NOS Version No.5 NSQF Level 4	**15:00**	**15:00**			**30:00**
Module 10: Maintain Personal Health & Safety at project site	15:00	15:00			30:00
SGJ/N0107: Customer orientation for Solar PV System NOS Version No.3 NSQF Level 4	**15:00**	**15:00**			**30:00**
Module 11: Completion and Handover Documentation	15:00	15:00			30:00
DGT/VSQ/N0102: Employability Skills (60 hours) NOS Version No.1					**60:00**
Module 12: Employability Skill	60				60:00
On the Job training					**60:00**
Total Duration	**210:00**	**150:00**	**60:00**	**00:00**	**420:00**

Module Details

Module 1: Introduction to Solar PV Installer Course

Mapped to SGJ/N0101: Site Survey for installation of solar PV system, V5.0

Terminal Outcomes:

- Discuss the role and responsibilities of a Solar PV Installer.
- Discuss the importance of doing this course.

Duration: *07:30*	**Duration**: *07:30*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the role of a Solar PV Installer and emerging jobs & entrepreneurial opportunities. • Illustrate the advantages of doing this course. • Explain the importance of basic skills for communication; along with how to work effectively with others while respecting gender and disability concerns. • Explain the importance of reading and interpreting signs, notices and/or cautions at project site.	• Demonstrate general discipline during the training program. • Demonstrate how to interpret signs, notices and/or cautions at project site.
Classroom Aids	
Laptop, white board, marker, projector, charts	
Tools, Equipment and Other Requirements	
Sample signs, notice, cautions used at project sites	

Module 2: Basics of Solar Energy and Electrical Concepts

Mapped to SGJ/N0101: Site survey for installation of solar PV system, V5.0

Terminal Outcomes:

- Describe the basics of solar energy along with various fundamental concepts in electrical energy supported with calculations

Duration: 15:*00*	**Duration**: 15:*00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain Ohm's Law. • Explain the basics of solar energy/ electricity and electrical concepts. • Explain the relevance of Diffused Normal Irradiance (DNI) and Global Horizontal Irradiance (GHI) along with differences in Irradiance & Irradiation. • Illustrate the movement of the sun and assess its effect on the performance of the solar power plant. •	• Perform simple calculations to illustrate the fundamental concepts of power and energy. • Demonstrate how the movement of sun affects the performance of the solar power plant.
Classroom Aids	
Laptop, white board, marker, projector, charts	
Tools, Equipment and Other Requirements	
Pyranometer, Multimeter, Clamp meter, Safety Gloves,Google Earth,PVsyst	

Module 3: Site Survey for Installation of Solar PV System and asses the customer's Solar PV Requirement

Mapped to SGJ/N0101: Site survey for installation of solar PV system, V5.0

Terminal Outcomes:

- Perform steps to conduct site survey for solar PV system installation.
- Discuss how to effectively assess customer's requirement and identify opportunities to meet those.

Duration: *15:00*	**Duration**: *15:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe how to observe Sun pathdiagram and explain the importance of shading analysis. • Explain the importance of assessing various site conditions for safeinstallation of solar PV system. • Assess the location, any site level pre-requisites and optimise the route plan. • Identify and list the load to be connected to the Solar PV system. • Describe load profile. • Explain the importance of engaging with customers for any specific requirement and budget constraints while identifying opportunities for deploying innovative energy solution like ''Plug and Play'' or ''Behind the Meter'' solution, where typical civil construction work may not be required. • Describe the importance of system sizing and explain its calculation with basic mathematical tools. • Explain how to prepare a site map. • Explain the use of Software tools/App for performing Site survey • Explain how to use Google Earth for generating KMZ file and estimating the Area for the solar installation. • Explain how to read the Electricity bill	• Demonstrate how to observe Sun path diagram and perform shading analysis. • Demonstrate how to assess the site conditions for safe installation of Solar PV system and optimise route plan. • Demonstrate how to assess the load to be connected to the Solar PV system and how to prepare the load profile. • Demonstrate how to engage with customers to meet their energy requirements, including through deploying innovative energy solutions like ''behind the meter'' system. • Perform system sizing calculations. • Show how to prepare a site map of the location where installation has to be carried out • Show how to decide on type of mounting to be created and explain customers about any civil work to be undertaken • Show how to identify processes where material/resource utilization including water can be optimized. • Demonstrate how to generate KMZ file • Demonstrate how to use PV Syst/Sketchup for Site survey and shadow analysis.
Classroom Aids	
Laptop, white board, marker, projector, charts	
Tools, Equipment and Other Requirements	
Tool kit, Measuring tape, wire gauge, Line Dori, Water testing instrument (TDS meter)	

Module 4: Basics of Solar Photovoltaic system and its Components

Mapped to SGJ/N0102: Procure Solar PV system components, V5.0

Terminal Outcomes:

- Discuss solar PV system operation along with the functions of different system components.
- Discuss the importance of emerging innovative technologies like ''Plug & Play'' or ''Behind the Meter'' energy system.
- Discuss the manufacturer's specification sheets of various components of solar PV system and their relevance.

Duration: *15:00*	**Duration**: *15:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain various terminologies used inthe solar industry. • Identify the different components of a Solar PV system and explain its basic operation. • Explain various Solar PV cell technologies ✓ **Mono & Poly Crystalline** • Explain the working of different types of Solar PV systems • Discuss the latest and innovative technologies used in system configurations like ''Plug & Play'' or ''Behind the Meter'' energy systems. • Describe the different types, sizes and specifications of modules, inverters, charge controllers, cables, conduits, junction boxes, solar batteries and allied accessories. • Explain about the manufacturing data specification sheets of different typesof solar PV components.	• Analyse the different types, sizes and specifications of solar modules, inverters, charge controllers, cables, conduits, junction boxes, solar batteriesand allied accessories. • Analyse the manufacturing data specification sheets of different types of solar PV components.
Classroom Aids	
Laptop, white board, marker, projector, charts	
Tools, Equipment and Other Requirements	
Pyranometer, Multimeter, Clamp meter, 1 kWp Solar PV system with 2 number of solar batteries	

Module 5: Interpretation of Drawings, Material Handling and storage of components on-site

Mapped to SGJ/N0102: Procure Solar PV system components, V5.0

Terminal Outcomes:

- Discuss to properly read and interpret various civil/mechanical and electrical drawings.
- Discuss safe handling of materials on site.
- Describe the process to prepare Bill of Materials (BoM) along with effectively reading and interpreting that to verify with the delivery of components on-site.

Duration: *15:00*	**Duration**: *15:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the importance of reading and rightly interpreting Single Line Diagram (SLD), Layout Diagrams, Civil/Mechanical and Electrical Drawings. • Describe the DO's and Don'ts of material handling; • Explain how to read and interpret the Bill of Material to verify with the delivery of components on-site. • Explain how to ensure that all the components are handled and stored properly as per standard operating procedures. • Describe the importance of Preparing Bill of Materials (BoM) including for portable and innovative solutions like Plug & Play or Behind the Meter system. • Explain how to approach organization's warehouse/vendors, suppliers and/or manufacturers to place the order for components as per BoM • Discuss how to ensure quantity of modules / panels, inverters etc matches with the requirement of the system • Identify and list any variation is material specification and design and explain how to submit the documented variation to design team (if required) for approval or revised drawings. • Introduce basics of Inventory management tools and its importance.	• Demonstrate how to read and rightly interpret Single Line Diagram (SLD), Layout Diagrams, Civil/Mechanical and Electrical Drawings. • Demonstrate the process of safe material handling. • Demonstrate how to prepare Bill of Materials for solar PV system, including for innovative solutions like Plug & Play or Behind the Meter system. • Show how to check materials received as per final BoM to ensure that the correct material for the job arrives on site and is damage free. • Show how to ensure that all materials are QC passed. • Show how to report and document the status of material received at site and take appropriate action for replacements, if any • Identify materials which can be replaced by environment friendly substitutes and identify processes where material utilization can be optimized and accordingly suggest those to higher authority.
Classroom Aids	
LCD Projector and Laptop for presentations	
Tools, Equipment and Other Requirements	
First-aid kit, Fire extinguishers, Housekeeping tools and equipment	

Module 6: Identification and Use of different tools and tackles used for installation of solar PV system

Mapped to SGJ/N0103: Install civil and mechanical parts of Solar PV system, V4.0

Terminal Outcomes:

- Discuss the use of various tools and tackles in installation of solar PV system.
- Describe the process of safe and weather proof installation of mechanical and civil structure for mounting modules along with structural supports and accessories, as per site condition.

Duration: *15:00*	**Duration**: *15:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain about the different tools & tackles used for specific purpose in an installation of Solar PV system. • Explain the process of installing the mounting structure along with structural supports and accessories for safe & weatherproof installation as per site conditions. • Identify and describe various tools & tackles used for civil/mechanical installation. • Identify opportunities for material and energy conservation, along with use of environmentally friendly materials in civil/mechanical installation. • Explain and show how to follow waste management practices.	• Demonstrate the function of different tools & tackles used for specific purpose in an installation of Solar PV system. • Demonstrate how to use various tools and tackles for civil/mechanical installation and identify best practices. • Demonstrate the process of installing the entire mounting structure/system along with structural supports and accessories for safe & weatherproof installation as per site conditions. • Show how to install modules as per lay out diagram and fasten modules to structures. • Demonstrate how to install battery bank as per drawings/manuals. • Demonstrate process for optimising the usage of material and energy conservation, along with promoting the use of environmentally friendly
Classroom Aids	
Laptop, white board, marker, projector, charts	
Tools, Equipment and Other Requirements	
Tool kit, Double ended flat spanner, Double ended ring spanner, Combination pliers, Side cutting pliers, Nose pliers, Hack saw ,frame with blade, Screw driver, Water level Measuring tape, Centre punch, Standard wire gauge, Vanier calliper, Line Dori, Chisel, Drill m/c, Plumb bob, Sprit level, Flat file, Round file, Triangle file, Hand saw, PVC mallet, Ball pin, hammer, Safety helmet, Safety souse, Safety belt, Nose mask, Safety goggles, Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves	

Module 7: Installation of Electrical components of a Solar PV System

Mapped to SGJ/N0104: Installation of electrical components of a solar PV system, V4.0

Terminal Outcomes:

- Describe the installation of various electrical components of a solar photovoltaic system.

Duration: 15*:00*	**Duration**: 15*:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Discuss how to implement site safety plan and inspect & utilise electrical installation toolkit • Identify tools and tackles for electrical component installation for Solar PV Power plant • Describe the process of installing the electrical components including inverter, batteries, junction boxes, energy meters, cables and conduits other electrical components. • Explain the Do's and Don'ts of DC wiring. • Identify tools & tackles used for cable and conduit installation. • Discuss and show how to ensure that the conduits and cables are properly supported, secured and labelled • Describe the importance of Earthing for the protection of solar PV system. • Explain the significance and types of earth faults as per standards • Explain the de-mounting of a solar PV power plant (after commissioning). • Discuss function and installation of Remote monitoring unit, Temperature and radiation sensor.	• Demonstrate how to install electrical components of solar PV system; including inverter, batteries, junction boxes, energy meters, cables and conduits other electrical components. • Analyse how to perform DC wiring. • Demonstrate the application of tools & tackles used for cable and conduit installation. • Show how to prepare battery bank enclosure/racks, containment (if required), install battery terminal and interconnection cables. • Demonstrate how to perform earthing and grounding work for the protection of solar PV system. • Demonstrate demounting of solar PV power plant. • Show how to clean the work area after completing the installation work
Classroom Aids	
Laptop, white board, marker, projector, charts	
Tools, Equipment and Other Requirements	
Tool kit, 1kWp Solar PV system, Side cutting pilers, Nose pliers, Wire stripper, Electrician knife, Hand crimpingtools, Cable cutter , Screw driver, Water level Measuring tape, Centre punch, Standard wire gauge, Vaniercalliper, Line Dori, Fuse puller, Safety helmet, Safety shoe,	

Module 8: Test and Commission Solar PV system

Mapped to SGJ/N0105: Test and commission Solar PV system, V4.0

Terminal Outcomes:

- Perform steps for testing and commissioning of solar photovoltaic system

Duration: 15:00	**Duration**: 15:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**

• Describe the importance of conducting visual inspection as part of pre commissioning activities.
• Measure the Electrical data of string voltage, earthing
• Perform the various test of all solar PV components:
  • Continuity Test,
  • Polarity check and other commissioning activities.
• Explain how to prepare testing and inspection report
• Explain the concerned regulations &standards for grid interconnection.
• Describe the commissioning process forthe solar PV system.
	• Demonstrate how to perform testing ofall components, along with fault finding& analysis, continuity checks, polarity check and other commissioning activities.
	• Show how to perform visual inspection, inspect mechanical, civil and electrical components.
	• Show how to verify polarity and check continuity of the system.
	• Show how to measure and verify inverter operation including anti islanding performance and measurement of AC system values, DC voltage, current in each string, and arrayfor system operation.
	• Show how to verify workmanship and proficiency is using tools and equipment
	• Show how to initiate system startup procedures, measure and record voltage and other parameters, record anomaly and document changes
	• Examine concerned regulations & standards for grid interconnection.
	• Demonstrate the commissioning process for the Solar PV System.

Classroom Aids	
Laptop, white board, marker, projector, charts	
Tools, Equipment and Other Requirements	
Tool kit, 1kWp Solar PV system, Side cutting pilers, Nose pliers, Wire stripper, Electrician knife, Hand crimping tools, Cable cutter ,Screw driver, Water level Measuring tape, Centre punch, Standard wire gauge, Vanier calliper, Line Dori, Fuse puller, Safety helmet, Safety shoe, Safety belt, Nose mask, Safety goggles, Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Clamp meter, Multimeter, Megger, Earth tester, Earthing Rod, Soldering Iron & Flux, Phase ,Sequence Meter, Safety Gloves, Pyranometer.	

Module 09: Maintain Solar Photovoltaic Power System

Mapped to SGJ/N0622: Maintain Solar Photovoltaic Power System, V2.0

Terminal Outcomes:

- Perform the maintenance of solar photovoltaic system for ensuring optimum performance.
- Describe typical faults and perform troubleshooting in solar photovoltaic system.

Duration: 15:*00*	**Duration**: 15:*00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**

• Explain how to carry out maintenance activities required for each component.
• Discuss how to clean solar panels with water in low sunlight to remove dust, bird droppings, pollen, leaves, branches and snow for maximum energy output from the system
• Explain different methods which are employed for cleaning modules/array including mechanical or robotic cleaning
• Explain how to prepare and execute preventive maintenance schedule and reactive maintenance activities.
• Discuss the role of AI & ML (Artificial Intelligence & Machine Learning) and IOT application for -
  • Predictive maintenance using AI algorithms
  • Pattern study
  • Fault detection and diagnosis
  • Performance optimization and energy forecasting
• Explain the typical faults, their causes and resolution for all components.
• Discuss how to check current output, identify faulty module and perform standard troubleshoot measure
• Explain how to identify faults and damages and how to escalate it to seniors
• Discuss how to collect monthly and yearly data from Remote monitoring unit
• Discuss how to perform and verify the CUF and PR of the solar plant
• Discuss and show how to clean the work area after completing the maintenance activity.
	• Demonstrate how to carry out maintenance work for each component.
	• Show how to clean solar panels with water in low sunlight to remove dust, bird droppings, pollen, leaves, branches and snow for maximum energy output from the system
	• Show how to wipe hard stains with sponge/cotton and use cleaning agents to wipe off stains from module framing
	• Demonstrate how to prepare and execute preventive maintenance schedule and reactive maintenance activities.
	• Show how to routinely inspect the system and check those for shading, loose connections, any external damages etc
	• Show how to check output voltage and compare with expected output voltage
	• Demonstrate how to check that electrical connections as per specifications and mountings are stable.
	• Demonstrate how to identify typical faults, their causes and resolution for allcomponents.
	• Show how to identify faults and performstandard troubleshooting
	• Show how to check working conditions of fuses, circuit breakers, cables, servicepanel connections, inverter etc and identify damage if any

Classroom Aids	

Laptop, white board, marker, projector, charts
Tools, Equipment and Other Requirements
Tool kit, 1kWp Solar PV system, Side cutting pilers, Nose pliers, Wire stripper, Electrician knife, Hand crimping tools, Cable cutter, Screw driver, Water level

Module 10: Maintain Personal Health & Safety at project site

Mapped to SGJ/N0106: Maintain Personal Health & Safety at project site, V5.0

Terminal Outcomes:

- Perform steps to maintain personal health, safety and hygiene at project site.

Duration: 15:*00*	**Duration**: 15:*00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the requirements for safe work area. • Explain the importance of administering first aid. • Identify the personal protective equipment used for the specific purpose. • Identify the hazards associated with photovoltaic installations; • Identify and report any hazards, risks or breaches in site safety to the appropriate authority • Identify work safety procedures and instructions for working at height. • Explain how to use safety signs, labels, charts and notices at workplace • Explain the importance of Occupational health & Safety standards and regulations for installation of Solar PV system. • Incorporate good housekeeping practices and infection control guidelines.	• Demonstrate how to administer first aid. • Demonstrate the usage of personal protective equipment for ensuring safety during installation and O&M work. • Show how to follow recommended safe practices in handling physical, chemical, electrical and fire hazards and risk • Show how to handle all required tools, tackles, materials and equipment safely • Demonstrate good housekeeping and infection control & prevention practices. • Show how to use appropriate fire extinguishers for different types of fire • Show how to administer first aid to a victim and use correct method to move injured person during an emergency • Show how to report immediately to concerned authorities regarding sign and symptoms of illness of self and other colleagues
Classroom Aids	
Laptop, white board, marker, projector, charts	
Tools, Equipment and Other Requirements	
Safety helmet, Safety souse, Safety belt, Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, SafetyGloves	

Module 11: Completion and Handover Documentation

Mapped to SGJ/N0107: Customer orientation for Solar PV System, V3.0

Terminal Outcomes:

- Perform steps for project completion and handover of documents to customer.

Duration: *15:00*	**Duration**: *15:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain how to prepare the checklist for handover of the solar power plant. • Explain how to prepare complete and final documentation including commissioning forms and operation procedure. • Explain how to record component serial numbers, file data sheet and complete equipment warranty registration. • Discuss to inform the customer about the type of battery used, its life of operation and to dispose battery after its useful life to a recycling facility • Discuss how to deliver built drawings, permits, O&M documentation, project photos and customer operation manual • Discuss work safety procedures and instructions for handling heavy components • Describe start- up and shutdown procedure of a Solar PV system;	• Demonstrate the process of filling in checklist and completing handover documentation process. • Demonstrate work safety procedures and instructions for handling heavy components at project site. • Demonstrate start- up and shutdown procedure of a solar PV system.
Classroom Aids	
Laptop, white board, marker, projector, charts	
Tools, Equipment and Other Requirements	
Safety helmet, Safety souse, Safety belt, , Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket,Safety Gloves	

Module 12: Employability Skill(60 hours)

Mapped to DGT/VSQ/N0102, v2

Terminal Outcomes:

- Discuss the key Employability Skills.

Duration: *60:00*
Key Learning Outcomes
Introduction to Employability Skills • Discuss the Employability Skills required for jobs in various industries • List different learning and employability related GOI and private portals and their usage Constitutional values - Citizenship: • Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen • Show how to practice different environmentally sustainable practices Becoming a Professional in the 21st Century • Discuss importance of relevant 21st century skills. • Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life. • Describe the benefits of continuous learning. Basic English Skills Duration: • Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone • Read and interpret text written in basic English • Write a short note/paragraph / letter/e -mail using basic English Career Development & Goal Setting • Create a career development plan with well-defined short- and long-term goals Communication Skills Duration • Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette. • Explain the importance of active listening for effective communication • Discuss the significance of working collaboratively with others in a team Diversity and Inclusion

- Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD
- Discuss the significance of escalating sexual harassment issues as per POSH act.

Financial and Legal Literacy

- Outline the importance of selecting the right financial institution, product, and service
- Demonstrate how to carry out offline and online financial transactions, safely and securely
- List the common components of salary and compute income, expenditure, taxes, investments etc.

Essential Digital Skills Duration:

- Discuss the legal rights, laws, and aids
- Describe the role of digital technology in today's life
- Demonstrate how to operate digital devices and use the associated applications and features, safely and securely
- Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely
- Create sample word documents, excel sheets and presentations using basic features
- utilize virtual collaboration tools to work effectively

Entrepreneurship

- Explain the types of entrepreneurship and enterprises
- Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan
- Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement
- Create a sample business plan, for the selected business opportunity

Customer Service

- Describe the significance of analysing different types and needs of customers
- Explain the significance of identifying customer needs and responding to them in a professional manner.
- Discuss the significance of maintaining hygiene and dressing appropriately

Getting ready for apprenticeship & Jobs Duration:

- Create a professional Curriculum Vitae (CV)
- Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively
- Discuss the significance of maintaining hygiene and confidence during an interview
- Perform a mock interview
- List the steps for searching and registering for apprenticeship opportunities

Classroom Aids
Laptop, white board, marker, projector, charts
Tools, Equipment and Other Requirements

Module 13: On the Job Training

Mapped to SGJ/Q0101

Mandatory Duration: 60 hours
Module Name: On the Job Training **Location: Onsite**

Terminal Outcome

- Demonstrate how to interpret signs, notices and/or cautions at project site.
- Illustrate the movement of the sun and assess its effect on the performance of the solar power plant.
- Perform simple calculations to illustrate the fundamental concepts of power and energy.
- Demonstrate how the movement of sun affects the performance of the solar power plant
- Describe/Demonstrate how to observe Sun path diagram and explain the importance of shading analysis.
- Demonstrate how to assess the site conditions for safe installation of Solar PV system and optimize route plan.
- Demonstrate how to assess the load to be connected to the Solar PV system and how to prepare the load profile.
- Demonstrate how to engage with customers to meet their energy requirements, including through deploying innovative energy solutions like ''behind the meter'' system.
- Show how to prepare a site map of the location where installation has to be carried out
- Show how to identify processes where material/resource utilization including water can be optimized.
- Demonstrate how to read and interpret various specifications and technical information listed on all key solar PV components.
- Demonstrate how to read and rightly interpret Single Line Diagram (SLD), Layout Diagrams, Civil/Mechanical and Electrical Drawings.
- Demonstrate the process of safe handling of material
- Identify and demonstrate how to use various tools and tackles for civil/mechanical installation and identify best practices
- Demonstrate the process of installing the entire mounting structure/system along with structural supports and accessories for safe & weatherproof installation as per site conditions
- Identify opportunities for material and energy conservation, along with use of environmentally friendly materials in civil/mechanical installation
- Demonstrate how to install batter bank stand as per the drawings/manuals
- Demonstrate process for optimising the usage of material and energy conservation, along with promoting the use of environmentally friendly materials in solar PV installation
- Demonstrate the application of tools & tackles used for cable and conduit installation
- Demonstrate how to perform earthing and grounding work for the protection of solar PV system
- Explain the de-mounting of a solar PV power plant (after commissioning).
- Show how to clean the work area after completing the installation work

- Demonstrate the commissioning process for the Solar PV System.
- Explain how to ensure that modules are routinely cleaned and inspect the system
- Explain the typical faults, their causes and resolution for all components
- Explain how to identify the faults in the system when there is an interruption in power generation
- Explain how to identify faults and damages and how to escalate it to seniors
- Demonstrate how to carry out maintenance work for each component
- Show how to check working conditions of fuses, circuit breakers, cables, service panel connections, inverter etc and identify damage if any
- Demonstrate the usage of personal protective equipment for ensuring safety during installation and O&M work.
- Show how to follow recommended safe practices in handling physical, chemical, electrical and fire hazards and risk
- Demonstrate good housekeeping and infection control & prevention practices
- Demonstrate the process of filling in checklist and completing handover documentation process.
- Demonstrate work safety procedures and instructions for handling heavy components at project site.
- Demonstrate start- up and shutdown procedure of a solar PV system.

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
ITI /Diploma Electrical, Electronics,Civil, Mechanical, Fitter, Instrumentation or B.Tech (Civil/Mechanical /Electrical/ Instrumentation / Electronics / Electrical and Electronics Eng.) or MSc Physics Or The education qualification can berelaxed in case of extraordinary relevant field experience.		Minimum 3 years of relevant industry experience for ITI /Diploma (Electrical, Electronics, Civil, Mechanical, Fitter, Instrumentation) Or 2. Minimum 2 years of relevant industry experience for B.Tech (Civil/Mechanical /Electrical/ Instrumentation / Electronics / MSc Physics				Personal Attributes: Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneselfupdated with the latest in the mentioned field.
As per the Relevant Craft Instructor Training Scheme (CITS)						

Trainer Certification	
Domain Certification	**Platform Certification**
Certified for Job Role: "Solar PV Installer (Suryamitra)" mapped to QP: "SGJ/Q0101, Version 4.0". Minimum accepted score as per SCGJ is 80%.	"Recommended that the Trainer is certified for the Job Role: "Trainer (VET and Skills)", mapped to the Qualification Pack: "MEP/Q2601, v2.0". Minimum accepted score is 80%"

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
ITI /Diploma Electrical, Electronics, Civil, Mechanical, Fitter, Instrumentation or B.Tech (Civil/Mechanical /Electrical/ Instrumentation / Electronics / Electrical and Electronics Eng.) or MSc Physics or The education qualification canbe relaxed in case of extraordinary relevant field experience.		Minimum 4 years of relevant industry experience for ITI /Diploma (Electrical, Electronics, Civil, Mechanical, Fitter, Instrumentation) Or 2. Minimum 3 years of relevant industry experience for B.Tech (Civil/Mechanica l /Electrical/ Instrumentation / Electronics / MSc Physics			Personal Attributes: Aptitude for conducting assessment. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in the mentioned field.	NA
As per the Relevant Craft Instructor Training Scheme (CITS)						

Assessor Certification	
Domain Certification	**Platform Certification**
Certified for Job Role: "Solar PV Installer (Suryamitra)" mapped to QP: "SGJ/Q0101, Version 4.0". Minimum accepted score as per SCGJ is 80%.	"Recommended that the Assessor is certified for the Job Role: "Assessor (VET and Skills)", mapped to the Qualification Pack: "MEP/Q2701, v2.0". Minimum accepted score is 80%"

Assessment Strategy

This section includes the processes involved in identifying, gathering and interpreting information to evaluate the learner on the required competencies of the program.

1. Assessment System Overview:

    - Batches assigned to the assessment agencies for conducting the assessment on SID or email
    - Assessment agencies send the assessment confirmation to VTP/TC looping SCGJ
    - Assessment agency deploys the ToA certified Assessor for executing the assessment
    - SCGJ monitors the assessment process & records
    - If the batch size is more than 30, then there should be 2 Assessors.

2. Testing Environment: Assessor must:

    - Confirm that the centre is available at the same address as mentioned on SID
    - Check the duration of the training.
    - Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
    - 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 should be verified by the other subject Matter Experts along with the approval required from SSC
    - Questions are mapped with NOS and PC
    - Question papers are prepared considering that level 1 to 3 is for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
    - Assessor must be ToA 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 and are stored in the Hard Drives

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 Outcome	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 task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
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
QP	Qualification Pack
NSQF	National Skills Qualification Framework
NSQC	National Skills Qualification Committee
NOS	National Occupational Standards