QUALIFICATION FILE

Solar PV Installer (Suryamitra)

☒ Short Term Training (STT) ☐ Long Term Training (LTT) ☐ Apprenticeship

☐ Upskilling ☐ Dual/Flexi Qualification ☐ For ToT ☐ For ToA

☒ General ☐ Multi-skill (MS) ☐ Cross Sectoral (CS) ☐ Future Skills

NCrF/NSQF Level: 4

Submitted By:

Skill Council for Green Jobs

Chief Executive Officer
CBIP Building, Malcha Marg,
Chanakyapuri, New Delhi – 110021
Contact no. and mail: 9871119101, ceo@sscgj.in

Contents

Section 1: Basic Details 3
Section 2: Module Summary 6
NOS/s of Qualifications 7
Mandatory NOS/s: 7
Assessment - Minimum Qualifying Percentage 7
Section 3: Training Related 8
Section 4: Assessment Related 8
Section 5: Evidence of the need for the Qualification 9
Section 6: Annexure & Supporting Documents Check List 10
Annexure: Evidence of Level 11
Annexure: Tools and Equipment (Lab Set-Up) 18
Annexure: Industry Validations Summary 20
Annexure: Training & Employment Details 24
Annexure: Blended Learning 25
Annexure: Detailed Assessment Criteria 26
Annexure: Assessment Strategy 48
Annexure: Acronym and Glossary 51
Annexure: Annexure: Career Progression and OM 52

Section 1: Basic Details

1.	**Qualification Name**	**Solar PV Installer (Suryamitra)**	
2.	**Sector/s**	**Environment Science**	
3.	**Type of Qualification: ☐ New ☒ Revised ☐ Has Electives/Options ☐ OEM**	**NQR Code & version of existing/previous qualification: 2022/EHW/SCGJ/06724 & Version 3.0**	**Qualification Name of existing/previous version: Solar PV Installer (Suryamitra)**
4.	**a. OEM Name** **b. Qualification Name** (Wherever applicable)		
5.	**National Qualification Register (NQR) Code &Version**	New NQR Code Version 4.0	**6. NCrF/NSQF Level:** 4
7.	**Award (Certificate/Diploma/Advance Diploma/ Any Other**	Certificate	
8.	**Brief Description of the Qualification**	Solar PV Installer checks, adapts, implements, configures, installs, inspects, tests and commissions different components of photovoltaic systems, that meet the performance and reliability needs of customers by incorporating quality craftsmanship and complying with all applicable codes, standards and safety requirements	
9.	**Eligibility Criteria for Entry for Student/Trainee/Learner/Employee**	**a. Entry Qualification & Relevant Experience:**	

S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)
1.	12th grade pass with science stream or Equivalent	NA
2.	10th grade pass	3 years of Renewable energy/power sector experience
3.	10th grade pass with two years of any combination of NTC/NAC/CITS or equivalent in relevant trade	NA
4.	Previous relevant Qualification of NSQF Level 3.5 (Solar PV Site Survey Assistant)	1.5 years of Renewable energy/power sector experience

		b. Age: 18			
			5.	Previous relevant Qualification of NSQF Level 3.0 (Assistant Technician – Solar Panel Installation)	3 years of Renewable energy/power sector experience

10	**Credits Assigned to this Qualification, Subject to Assessment** (as per National Credit Framework (NCrF))	14	**10. Common Cost Norm Category:** **I**
11	**Any Licensing requirements for Undertaking Training on This Qualification** (wherever applicable)	NA	
12	**Training Duration by Modes of Training Delivery** (Specify **Total Duration** as per selected training delivery modes and as per requirement of the qualification)	☒**Offline** ☐**Online** ☐**Blended**	

Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandatory (Hours)	OJT Recommended (Hours)	Total (Hours)
Classroom (offline)	210	150	60	0	420
Online					

(Refer Blended Learning Annexure for details)

13	**Aligned to NCO/ISCO Code/s** (if no code is available mention the same)	NCO-2015/7421.1401 Solar Panel Installation Technician
14	**Progression path after attaining the qualification** (Please show Professional and Academic progression)	Vertical Progression: Solar Photovoltaic Entrepreneur/Solar PV Junior Engineer(Level 5)
15	**Other Indian languages in which the Qualification & Model Curriculum are being submitted**	**Nil**
16	**Is similar Qualification(s) available on NQR-if yes, justification for this qualification**	☐ **Yes** ☒ **No**

17	**Is the Job Role Amenable to Persons with Disability**	☒ **Yes** ☐ **No** **If "Yes", specify applicable type of Disability:** ☒ **Deaf** ☒ **Hard of Hearing** ☒ **Acid Attack Victims** ☒ **Dwarfism**	
18	**How Participation of Women will be Encouraged**	The programme would be proposed to be incorporated in women ITIs and diploma colleges to train women candidates on the job role. TPs shall be encouraged to onboard at least a certain number of female candidates in each batch	
19	**Are Greening/ Environment Sustainability Aspects Covered** (Specify the NOS/Module which covers it)	☒ **Yes** ☐ **No**	
20	**Is Qualification Suitable to be Offered in Schools/Colleges**	**Schools** ☒ **Yes** ☐ **No** **Colleges** ☒ **Yes** ☐ **No**	
21	**Name and Contact Details of Submitting / Awarding Body SPOC** (In case of CS or MS, provide details of both Lead AB & Supporting ABs)	**Name:** Dr. Praveen Saxena **Email:** ceo@sscgj.in **Contact No.:** 9871119101 **Website: https://sscgj.in/**	
22	**Final Approval Date by NSQC: 30/05/2024**	**23. Validity Duration:** 3 years	**24. Next Review Date: 29/05/2027**

Section 2: Module Summary

S. No	NOS/Module Name	NOS/Module Code & Version *(if applicable)*	Core/ Non-Core	NCrF/ NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT Recommended	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) *(if applicable)*
1.	SGJ/N0101: Site survey for installation of solar PV system	SGJ/N0101 Version 4.0	Core	4	2	30:00	30:00			60						
2.	SGJ/N0102: Procure Solar PV system components	SGJ/N0102 Version 4.0	Core	4	2	30:00	30:00			60						
3.	SGJ/N0103: Install civil and mechanical parts of Solar PV system	SGJ/N0103 Version 4.0	Core	4	1	15:00	15:00			30						
4.	SGJ/N0104: Installation of electrical components of a solar PV system	SGJ/N0104 Version 4.0	Core	4	1	15:00	15:00			30						
5.	SGJ/N0105: Test and commission Solar PV system	SGJ/N0105 Version 4.0	Core	4	1	15:00	15:00			30						
6.	SGJ/N0622: Maintain Solar Photovoltaic Power System	SGJ/N0622 Version 2.0	Core	4	1	15:00	15:00			30						
7.	SGJ/N0106: Maintain Personal Health & Safety at project site	SGJ/N0106 Version 5.0	Core	4	1	15:00	15:00			30						
8.	SGJ/N0107: Customer orientation for Solar PV System	SGJ/N0107 Version 3.0	Core	4	1	15:00	15:00			30						
9.	Employability Skills	DGT/VSQ/ N0102 Version 1.0	Non Core	4	2	60				60						
10.	On the Job Training			4	2					60						

S. No	NOS/Module Name	NOS/Module Code & Version *(if applicable)*	Core/ Non-Core	NCrF/ NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT Recommended	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) *(if applicable)*
Duration (in Hours) / Total Marks					14	210	150	60		**420**						

NOS/s of Qualifications
(In exceptional cases these could be described as components)

Mandatory NOS/s:

Specify the training duration and assessment criteria at NOS/ Module level. For further details refer curriculum document.

***Th.**-Theory **Pr.**-Practical **OJT**-On the Job **Man.**-Mandatory Training **Rec.**-Recommended **Proj.**-Project*

Assessment - Minimum Qualifying Percentage

Minimum Pass Percentage – Aggregate at qualification level: 70 % *(Every Trainee should score specified minimum aggregate passing percentage at qualification level to successfully clear the assessment.)*

Section 3: Training Related

1.	**Trainer's Qualification and experience in the relevant sector (in years)** *(as per NCVET guidelines)*	ITI /Diploma Electrical, Electronics, Civil, Mechanical, Fitter, Instrumentation with Minimum 3 years of relevant industry experience for ITI/Diploma (Electrical, Electronics, Civil, Mechanical, Fitter, Instrumentation) Or B.Tech (Civil/Mechanical /Electrical/ Instrumentation / Electronics / Electrical and Electronics Eng.) or MSc Physics With Minimum 2 years of relevant industry experience for B.Tech (Civil/Mechanical/Electrical/ Instrumentation / Electronics / MSc Physics As per the Relevant Craft Instructor Training Scheme (CITS)
2.	**Master Trainer's Qualification and experience in the relevant sector (in years)** *(as per NCVET guidelines)*	Engineering Graduate with 5 years of experience in (Civil/Mechanical /Electrical/ Instrumentation / Electronics / Electrical and Electronics Eng.) post their ToT Certification.
3.	**Tools and Equipment Required for Training**	☒Yes ☐No (*If "Yes", details to be provided in Annexure)*
4.	**In Case of Revised Qualification, Details of Any Upskilling Required for Trainer**	Not Applicable

Section 4: Assessment Related

1.	**Assessor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	Engineering Graduate with 3 years of experience in (Civil/Mechanical /Electrical/ Instrumentation / Electronics / Electrical and Electronics Eng.) Or Certified under relevant Craft Instructor Training Scheme (CITS) course. *** The education qualification can be relaxed in case of extraordinary relevant field experience.**
2.	**Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	Engineering Graduate with 3 years of experience in (Civil/Mechanical /Electrical/ Instrumentation / Electronics / Electrical and Electronics Eng.) Or Certified under relevant Craft Instructor Training Scheme (CITS) course.

		*** The education qualification can be relaxed in case of extraordinary relevant field experience.**
3.	**Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	Engineering Graduate with 10 years of experience in (Civil/Mechanical /Electrical/ Instrumentation / Electronics / Electrical and Electronics Eng.) post their ToA Certification Or Certified under relevant Craft Instructor Training Scheme (CITS) course. *** The education qualification can be relaxed in case of extraordinary relevant field experience.**
4.	**Assessment Mode** *(Specify the assessment mode)*	Online and offline both
5.	**Tools and Equipment Required for Assessment**	☒ Same as for training ☒ Yes ☐ No *(details to be provided in Annexure-if it is different for Assessment)*

Section 5: Evidence of the need for the Qualification

Provide Annexure/Supporting documents name.

1.	**Latest Skill Gap Study (not older than 2 years) (Yes/No):** Yes available at https://sscgj.in/wp-content/uploads/2022/03/Green-Jobs-Report-Jan27.pdf
2.	**Latest Market Research Reports or any other source (not older than 2 years) (Yes/No):** yes Yes following key documents are available in the public domain a. https://sscgj.in/wp-content/uploads/2022/03/Green-Jobs-Report-Jan27.pdf b. https://solarrooftop.gov.in/knowledge/file-44.pdf c. https://jmkresearch.com/wp-content/uploads/2022/02/Photovoltaic-Manufacturing-Outlook-in-India_February-2022_JMK.pdf
3.	**Government /Industry initiatives/ requirement (Yes/No):** The Government of India has set the target to expand India's non fossil fuel based installed capacity to 500 GW by 2030. Out of this target over 300 GW is expected to be achieved exclusively through solar. India has promised to source nearly half its energy from non-fossil fuel sources by 2030 and, in the shorter term, source at least 60% of its renewable energy from solar power. National Solar Mission: It is a major initiative of the Government of India to promote ecologically sustainable growth while addressing India's energy security challenge. Key schemes of the Government on Solar energy • Solar Park Scheme: This plans to build a number of solar parks, each with a capacity of nearly 500 MW, across several states. • Rooftop Solar Scheme: The Rooftop Solar Scheme aims to harness solar power by installing solar panels on the roof of various consumers including residential, commercial and industrial. • SRISTI Scheme: Sustainable rooftop implementation of Solar transfiguration of India (SRISTI) scheme to promote rooftop solar power projects across residential consumers in India.

	• International Solar Alliance: International Solar Alliance is an action-oriented, member-driven, collaborative platform for increased deployment of solar energy technologies. • Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM): Launched by the Ministry of New and Renewable Energy (MNRE), it aims to support deployment of solar pumps in rural areas. This qualification aims to prepare the candidates on the knowledge and competencies required for performing the role of technicians for installing small grid interactive and off grid solar projects. This qualification also complements Solar PV Installer (Suryamitra) qualification which is being successfully utilized for delivering short term trainings across the country. It is proposed to introduce this qualification for vocationalisation in schools (in Grade XII) along with short term training to ensure a large number of learners/trainees are trained and certified in the concerned job role.
4.	**Number of Industry validation provided:** Up to 10 industry validations are expected to be received for the qualification.
5.	**Estimated nos. of persons to be trained and employed:** A large number of workforce shall be employed primarily at small solar project sites for performing various tasks related to installation of small solar projects. It is expected that every year over 20,000 candidates shall be trained and certified on this through Short Term Training mode. Further, thousands of Secondary school students shall also be certified on this if it is successfully introduced in schools.
6.	**Evidence of Concurrence/Consultation with Line Ministry/State Departments:** Concurrence has been requested from the Ministry of New and Renewable Energy

Section 6: Annexure & Supporting Documents Check List

Specify Annexure Name / Supporting document file name

1.	**Annexure:** NCrF/NSQF level justification based on NCrF level/NSQF descriptors *(Mandatory)*	Annexure: Evidence of Level
2.	**Annexure:** List of tools and equipment relevant for qualification *(Mandatory, except in case of online course)*	Annexure: Tools and Equipment (Lab Set-Up)
3.	**Annexure:** Detailed Assessment Criteria *(Mandatory)*	Annexure: Detailed Assessment Criteria (Mandatory)

4.	**Annexure:** Assessment Strategy *(Mandatory)*	Annexure: Assessment Strategy
5.	**Annexure:** Acronym and Glossary *(Optional)*	Annexure: Acronym and Glossary
6.	**Supporting Document:** Model Curriculum *(Mandatory – Public view)*	Attached
7.	**Supporting Document:** Career Progression *(Mandatory - Public view)*	Annexure: Career progression and OM
8.	**Supporting Document:** Occupational Map *(Mandatory)*	Annexure: Career progression and OM
9.	**Supporting Document:** Assessment SOP *(Mandatory)*	Annexure: Assessment Strategy

Annexure: Evidence of Level

Title/Name of qualification/component: Solar PV Installer (Suryamitra)			**Level:4**
NSQF Domain	**Outcomes of the Qualification/Component**	**How the outcomes relate to the NSQF level descriptors**	**NSQF Level**
Professional Theoretical Knowledge/ Process	The individual is expected to checks, adapts, implements, configures, installs, inspects, tests and commissions different components of photovoltaic systems, that meet the performance and reliability needs of customers by incorporating quality workmanship and complying with all applicable codes, standards and safety requirements.	The individual independently performs familiar, predictable, routine situation of clear choice such as periodically checking the integrity and working condition of all connection, fuses, cables, earthing and lightening protection systems, solar modules, inverters, etc. through visual inspection and by	4

Title/Name of qualification/component: Solar PV Installer (Suryamitra)			**Level:4**
NSQF Domain	**Outcomes of the Qualification/Component**	**How the outcomes relate to the NSQF level descriptors**	**NSQF Level**
		measuring parameters like current, voltage output etc. Hence, role qualifies as a Level 4 role. Since the role does not involve several choices to be made even in a familiar context like creating the maintenance schedule, choosing amongst various types of equipment or products, taking decisions regarding replacement equipment, etc., the role does not qualify for Level 5. This role requires the job holder to work in a familiar, predictable, routine of clear choice and the activities that h/she is expected to perform are not limited in range. For example, s/he is expected to inspect and interpret the integrity of various electrical components in the solar PV power plant, measure the compare the current and voltage parameters and take steps like regular cleaning, tightening of connections, cleaning of inverter fans to ensure properfunctioning of electrical components, etc. S/he also has to ensure that the work area is safe and hygienic for working. Hence it cannot be placed at level 3.	
Professional and Technical Skills/ Expertise/ Professional Knowledge	The individual is expected to be exhibit the knowledge of basic electrical concepts, typical specifications, functioning, operating principle and installation procedures of various types of solar PV plant components, working drawings of electrical equipment, maintenance and operations requirement and handling procedures of electrical components of solar PV power plant and common methods of identifying and rectifying common faults that can occur in solar PV power plant.	The job holder is expected to exhibit an understanding factual knowledge of the field of electrical maintenance. For example, s/he is expected to know the various types of faults that can occur in any electrical component of solar PV power plant, various types of tools, measuring equipment involved in maintenance and troubleshooting of electrical parts of solar PV power plant, various methods of fault prevention like regular cleaning of	4

Title/Name of qualification/component: Solar PV Installer (Suryamitra)			**Level:4**
NSQF Domain	**Outcomes of the Qualification/Component**	**How the outcomes relate to the NSQF level descriptors**	**NSQF Level**
		modules and inverter fans, periodical tightening and checking of connections. Further, s/he should know about the risks and hazards/ safe working practices/ materials and equipment needed/ tasks and activities to the required standard. S/he should also have the ability to speak read and write in the local vernacular language and English. Since all the above mentioned areas are related to factual knowledge in the field of electrical, civil installation of solar PV power plant, the role qualifies for Level 4. The job holder is expected to know more than basic facts and principles, such as, understanding of the as built electrical drawings, the details of the manufacturer's instructions to use the equipment and tools, the various faults which can occur in the electrical equipment parts and their rectification, etc. Since this role requires factual knowledge of field of installation and O&M of solar PV power plant, it cannot be pegged at level 3. Further, since the job holder is not expected to be aware of principles/ process & general concepts in the field of installation and O&M as a whole, hence the role can't be pegged at level 5. For example, this role is not expected to have knowledge about the civil/mechanical installation and day to day operation of solar PV power plant	

Title/Name of qualification/component: Solar PV Installer (Suryamitra)			**Level:4**
NSQF Domain	**Outcomes of the Qualification/Component**	**How the outcomes relate to the NSQF level descriptors**	**NSQF Level**
Employment Readiness & Entrepreneurship **Skills & Mind-set/Professional Skill**	The job holder is expected to operate/ use screw driver, inspection fixtures, wire cutter, pliers, testers, spanner, etc., plan and organize the regular installation activities to be conducted at the solar PV power plant. Further, the job holder must be able to take the day to day decisions and solve problem/s at work. The job holder should also be able to critically analyse the information gathered from different channels like current, voltage readings, observations made by helpers, etc. to identify the possible faults which can occur and take pro-active action.	The job holder is expected to recall and demonstrate practical skills, which are routine and repetitive in a narrow range of application such as checking the integrity and working conditions of connections, fuses, circuit breakers through visual inspection and checking the working condition of cables, modules, inverters, earthing and lightening protection systems through measurement of the relevant parameters like string current, output voltages, etc. and carrying out routine cleaning and maintenance activities to ensure long life and stability of solar PV power plant. The incumbent further analyses the fault prone areas like connections, joints, earthing, etc., using standard techniques like measuring resistance, etc. takes steps to prevent faults. Further, the incumbent refers to and uses defined rules in SOP manual and tools as per organization's guidelines to conduct various types of maintenance activities Since all the above-mentioned professional skill are related to demonstrating practical skills, which are routine and repetitive in a narrow range and using appropriate rule and tool, the role qualifies for Level 4. The Job holder is expected to possess professional skills more than just demonstrating practical skills, which are routine and repetitive in a narrow range but also using appropriate rules & tools to analyse & interpret information. For example, S/he is	4

Title/Name of qualification/component: Solar PV Installer (Suryamitra)			**Level:4**
NSQF Domain	**Outcomes of the Qualification/Component**	**How the outcomes relate to the NSQF level descriptors**	**NSQF Level**
		expected to use quality concepts such as analysing the parameters like current, voltage and resistance to interpret working of electrical components. Also, the incumbent analyses the state of electrical equipment through visual inspection and other methods and takes steps to rectify the same. Hence, the job holder can't be placed at Level 3. Further the job holder doesn't require to use much cognitive skills to accomplish tasks and solve problems at the workplace. The activities performed primarily practical skill. Hence s/he can't be placed at level 5.	
Broad Learning Outcomes/ Core Skill	The individual is expected to exhibit effective communication skills by communicating clearly with the O&M Engineer and helpers and understanding the instructions given by the supervisors. Further, the individual is expected to perform respective record maintaining work and use basic arithmetic/ algebraic principles like summation, multiplication, etc. to compute resistance, voltages, etc. to identify common faults in the electrical equipment. The individual should also possess basic understanding of natural environment to understand the common faults and issues which can occur at the solar PV power plant.	The job holder is expected to exhibit effective oral communication skills (including awareness of vernacular language) so as to understand the instructions of the supervisor as well as clearly instruct helpers while carrying out day to day maintenance activities. The job holder is also expected to possess reading and writing skills so as to read and understand equipment manuals, health and safety instructions, various signage and standard code and concepts well as well as maintain records as per organisation policies. The job holder is also expected to display basic arithmetic/ algebraic awareness to analyse and interpret the evaluation parameters of electrical equipment such as the standard	4

Title/Name of qualification/component: Solar PV Installer (Suryamitra)			**Level:4**
NSQF Domain	**Outcomes of the Qualification/Component**	**How the outcomes relate to the NSQF level descriptors**	**NSQF Level**
		current, voltage level, the accepted resistance levels for different components, etc. The incumbent must understand the social, political of the local environment so as to communicate effectively with solar project helpers who primarily belong to the surrounding regions and natural environment so as to identify common issues and faults which can affect the health of electrical parts in the solar PV power plant. Since all the above mentioned core skills are related to exhibiting effective oral, written communication skills along with basic understanding of the arithmetic principles as well as understanding of the social, political and natural environment such as clarifying the client's understanding and expectation prior to commencement of treatment the role qualifies for Level 4. The Job holder expected to possess core skills more than just demonstrating minimum clarity in oral & written communication such as getting specific instructions from the supervisor and carrying out activity or reporting to supervisor specific observations from the solar PV power plant. Hence, the role can't be placed at Level 3.	

Title/Name of qualification/component: Solar PV Installer (Suryamitra)			**Level:4**
NSQF Domain	**Outcomes of the Qualification/Component**	**How the outcomes relate to the NSQF level descriptors**	**NSQF Level**
		Further since the job holder doesn't require to use detailed mathematical skill or skill of collecting & organizing information such as collecting information regarding plant operating parameters, getting information from sub- ordinates and peers to identify possible issues and faults, s/he can't be placed at level 5.	
Responsibility	The individual is primarily responsible to gain knowledge about standard protocols and SOPs regarding installation and commissioning in solar PV power plant. S/he is also expected to update self with the solar PV power plant and functioning through equipment manuals, books, etc.	The solar PV maintenance technician is responsible for his/ her own work and learning. S/he is expected to update self with the standard protocols and SOPs using the available equipment manuals, etc. S/he is also expected to have significant on the job learning about the equipment and their maintenance procedures. S/he works under some supervision but primarily carries out his/her day to day activities independently. Thus s/he can be placed at level 4. Since s/he is neither expected to be responsible of other's work and learning , s/he can't be placed at level 5 Also as is evident from the above examples that the incumbent is fully responsible for responsible for his/ her own work and learning rather than being responsible in defined limit since s/he gathers the practical skills/ techniques required to perform a task in the on the job, s/he analyses & interprets how to utilize the acquired skills & techniques while executing the maintenance activities and enhances his/her knowledge base about	4

Title/Name of qualification/component: Solar PV Installer (Suryamitra)			**Level:4**
NSQF Domain	**Outcomes of the Qualification/Component**	**How the outcomes relate to the NSQF level descriptors**	**NSQF Level**
		use of several tools, equipments and materials for a given task therefore s/he can't even be placed at Level 3.	

Annexure: Tools and Equipment (Lab Set-Up)

List of Tools and Equipment

Batch Size: 30

S. No.	Tool / Equipment Name	Specification	Quantity for specified Batch size
1	SPV Module above 400 Wp	Nos	4
2	Ongrid Inverter 1.5 -2 KVA	Nos	1
3	Mounting structure in two tables	Nos	1
4	Battery 12V , 75 AH	Nos	2
5	Battery Stand	Nos	1
6	Battery Interconnection wires & Lugs	meter	10
7	Solar Irradiation Meter	Nos	1

8	MC 4 series connectors	Nos	50
9	MC 4 parallel connectors Branch	Nos	5
10	Solar Grade DC cable 4 SQ mm	meter	20
11	Green yellow Earthing wire 6 sq. mm	meter	20
12	Cable ties UV protected 50,100,mm	packs	2
13	ACDB	Nos	1
14	DCDB (3 in 3 out) with SPD	Nos	1
15	Solar Panel 75 W,12 V	Nos	4
16	Charge Controler (12 V ,5 A)	Nos	2
17	Battery (12V, 20Ah)	Nos	2
18	LED bulb (5 W)	Nos	4
19	Solar Lantern 5-10W	Nos	2
20	Connecting Wires (10 mtr)	meter	2
21	Mechanical Fixtures Required For Panel Installatio(Set)	set	2
22	AC wire 3 core ACDB to Inverter	Meter	5
23	AC 3 core cable 2.5 sq. mm	meter	30
24	Screw & PVC buffer for mounting ACDB & DCDB	Nos	100
25	Petroleum jelly for Battery terminal small	packs	10
26	Water level tube with holder	Meter	10
27	Sprit level Magnetic base	Nos	3
28	Inclinometer Magnetic base	Nos	3
29	30-meter fiber tape	Nos	3
30	Hammer screw driver	Nos	3
31	Tri square 8 inches	Nos	3
32	Metal measuring tape with level 5 m	Nos	3
33	Self adjusting Wire Stripping pliers 1.5 - 6mm²	Nos	5
34	30-meter (LNE three wire) Extension wire	Nos	2
35	Flat & Ring Spanner set	Nos	2
36	Torque wrench with adopter	Nos	1
37	Ball pin Hammer	Nos	3
38	Digital Multimeter	Nos	3

39	Digital AC & DC Clamp meter	Nos	2
40	Crimping Tool (0.5mm² to 16mm²)	Nos	2
41	Hammer Drill Machine 13mm 550Watt	Nos	2
42	Set of drill bit for Concrete	Set	3
43	Set of HSS drill bit for Metal	Set	3
44	Cutting wheel & Grinding wheel	Nos	3
45	Hot gun Gas / electric operated for sleeves	Nos	2
46	Pair of Solar MC 4 Connector Wrench Tools	Nos	3
47	Hydrometer	Nos	2
48	Battery Load tester	Nos	2
49	Digital Earth Tester	Nos	1
50	Cable Insulation tester (Megger)	Nos	1
51	Hand Gloves (PVC Gloves & Cotton Gloves)	Nos	10
52	Safety Jacket (PVC Coated & Reflective)	Nos	10
53	Safety Full body Harness	Nos	3
54	Anti-slip safety shoes	Nos	10
55	Safety Goggles (Spectacles, Goggles)	Nos	10
56	Head Helmet/Hard Hat	Nos	10
57	Anchor Lifeline	Nos	2
58	Safety Static Rope (9.0 mm)	Nos	2
59	First Aid Kit	Nos	3

Classroom Aids

The aids required to conduct sessions in the classroom are:

Marker, chart and visual aid, Pellet production flowchart, raw material supply chain flow chart, Schematics of Compressed biogas waste to energy plant;

Annexure: Industry Validations Summary

Provide the summary information of all the industry validations in table. This is not required for OEM qualifications.

S. No	Organization Name	Representative Name	Designation	Contact Address	Contact Phone No	E-mail ID	LinkedIn Profile *(if available)*

Solar PV Installer (Suryamitra)

1.	Ashlyn Solar Infra Private Limited	Arun Kumar	Director	C-44, Mansa Ram Park, Uttam Nagar, New Delhi - 110059	8130841685	arun@greenaffiliates.in	NA
2.	Danao Green Tech Private Limited	Dr. Sanjay Danao	Director	203, Sai Avenue, D-7, CIDCO Meghdoot, Butibori MIDC, Nagpur - 441122	9545648496	Danaogreentech@gmail.com	NA
3.	M/s Oriana Power Limited	Parveen	CEO	C-103, 1st Floor, Sec-2, Noida, U.P-201301	0120-4114695	Rupal.gupta@orianapower.com	NA
4.	PowerXP Consultants Private Limited	Puneet Sharma	GM	86, Marudhara Nagar, Bikaner, Rajasthan - 334003	7726884770	pxpsolar@gmail.com	NA
5.	Innodust Marketing Private Limited	Sunil Kumar Sahoo	Director	Plot No. A/63/1, Saheed Nagar, Bhubaneshwar, Odisha - 751007	7894412585	Sunil.innodust@gmail.com	NA
6.	Vacen Engineering and Solutions Private Limited	Vibhutinath Pandey	Director	H-72-A, Second Floor, Kh No. 80/14, Mahavir Enclave, Palam, New Delhi - 110045	7503208625	Vibhuti.vacen@gmail.com	NA
7.	Ayodhyawasi Corporation (OPC) Private Limited	Anurag Srivastava	CEO	D-2/101, Vibhuti Khand, Gomti Nagar, Lucknow - 226010	8887521559	ayodhyawasigroup@gmail.com	NA
8.	Gujarat Institute of Solar Energy	Dipti Shah	Principal Director	620, Sharan Circle Business Hub, Opp. Zundal BRTS, Zundal	9898167732	director@gise.in	NA

				Cross Road, Gandhinagar - 382421			
9.	GORenewable Technology	Japen Gor	Managing Partner	214, Devpath Complex, B/H Lal Bungalow, Off C.G Road, Navrangpura, Ahmedabad-380009	9099064348	japen@gorenewtech.com	NA
10.	SolarTech Saarthi Pvt. Ltd.	Lucky Agarwal	Managing Director	A-6/49, Sector 17, Rohini, Delhi - 110089	9711851306	solarsaarthi@gmail.com	NA
11.	Global Sustainable Energy Solutions India Pvt. Ltd.	Dwipen Boruah	Managing Director	FIEE Complex, A-46, Upper Ground Floor, Okhla Industrial Area, Phase II, New Delhi - 110020	9560550075	Dwipen.boruah@gses.in	NA
12.	ASW Projects Pvt. Ltd.	Uzma Ali	Assistant Manager	38 A,1st Floor, Surya Kiran Complex, Opposite Khureji Petrol Pump, West Laxmi Market, Delhi - 110051.	7011485393	aswprojects@gmail.com	NA
13.	Friends Power Solution	Hiren Thakkar	Partner	25/c Mahakant Complex, Opp. v.s. hospital Ellisbridge, Ahmedabad	9825431155	Friendspowersolution1121@gmail.com	NA

14.	Grun Green Power Private Ltd	Ramesh Shivanna	Director	99, 2nd Cross, 2nd Main, MLA Layout, R T Nagar, Bangalore	9845010306	ramesh@prideworld.in	NA
15.	Heemsol Energy System Pvt Ltd	Dipti Shah	Director	620, Sharan Circle Hub, Near Zundal BRTS Bus Stand, Zundal, Gandhinagar-382421, Gujarat	9898167732	dipti@heemenergy.com	NA
16.	MS Enterprises	Nitin Verma	Director	248-A, Veer Sawarkar Nagar, Kota (Raj.) - 324005	9001860235	Rajsingh.necessary@gmail.com	NA
17.	OM SAI SOLAR POWER SYSTEM	Rajendra Singh	Director	Plot No. C-183, Noida, Sector 63	9999596127	Omsaisolarpowersystem12@gmail.com	NA
18.	SAURGURU GREEN ENERGY SOLUTIONS	Manisha Anand Barbind	Proprietor	Plot No. 03, Peshwe Nagar, Satara Parisar, Aurangabad (M.S)	9422108057	mabarbind@gmail.com	NA
19.	Shri Rang Aditya Solar Power EPC Pvt Ltd	Atul Jani	Director	A-413, Fourth Floor, Maradia Plaza, Near Panchvati 5 Cross Road, C. G. Road, Ahmedabad	76328 50466	rangadityaaspepc@gmail.com	NA

Annexure: Training & Employment Details

Training and Employment Projections:

Year	Total Candidates		Women		People with Disability	
	Estimated Training #	Estimated Employment Opportunities	Estimated Training #	Estimated Employment Opportunities	Estimated Training #	Estimated Employment Opportunities
2024-25	2500		200			
2025-26	2500		200			
2026-27	2500		200			

Data to be provided year-wise for next 3 years

Training, Assessment, Certification, and Placement Data for previous versions of qualifications:

Qualification Version	Year	Total Candidates				Women				People with Disability			
		Trained	Assessed	Certified	Placed	Trained	Assessed	Certified	Placed	Trained	Assessed	Certified	Placed
1	2021-22	7187	7160	7160									
2	2022-23	4307	4281	4281									
3	2023-24	12657	12627	12627									

Applicable for revised qualifications only, data to be provided year-wise for past 3 years.

List Schemes in which the previous version of Qualification was implemented:

1. NA

Content availability for previous versions of qualifications:

Solar PV Installer (Suryamitra)

☒ **Participant Handbook** ☒ **Facilitator Guide** ☐ Digital Content ☐ Qualification Handbook ☐ Any Other:

Languages in which Content is available: Available in English

Annexure: Blended Learning

Blended Learning Estimated Ratio & Recommended Tools:

Refer NCVET "Guidelines for Blended Learning for Vocational Education, Training & Skilling" available on:
https://ncvet.gov.in/sites/default/files/Guidelines%20for%20Blended%20Learning%20for%20Vocational%20Education,%20Training%20&%20Skilling.pdf

S. No.	Select the Components of the Qualification	List Recommended Tools – for all Selected Components	Offline : Online Ratio
1	☒Theory/ Lectures - Imparting theoretical and conceptual knowledge	Not Applicable	Not Applicable
2	☒Imparting Soft Skills, Life Skills, and Employability Skills /Mentorship to Learners		
3	☒Showing Practical Demonstrations to the learners		
4	☒Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training		
5	☒Tutorials/ Assignments/ Drill/ Practice		

6	☒Proctored Monitoring/ Assessment/ Evaluation/ Examinations		
7	☒On the Job Training (OJT)/ Project Work Internship/ Apprenticeship Training		

Annexure: Detailed Assessment Criteria

Detailed assessment criteria for each NOS/Module are as follows:

NOS/ Module Name	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
SGJ/N0101: *Site survey for installation of Solar PV system*	*Roles and responsibilities of a Solar PV Installer*	**4**	**4**	-	-
	PC1. Explain about the roles and responsibilities ofa solar PV Installer along with emerging jobs & entrepreneurial opportunities the sector offers.	1	2	-	-
	PC2. Illustrate the advantages of doing the courseand opportunities for progression.	1	-	-	-
	PC3. Demonstrate how to maintain generaldiscipline during the training program.	-	1	-	-
	PC4. Explain the importance of basic skills for effective communication; along with how to workeffectively with others while respecting gender and disability concerns at project sites.	1	-	-	-

	PC5. Explain the importance of reading and interpreting signs, notices and/or cautions atproject site.	1	-	-	-
	PC6. Demonstrate how to read and interpret sign,notice and cautions at project site.	-	1	-	-
	Discuss solar energy concepts	**4**	**7**	**-**	**-**
	PC7. Explain Ohm's law and fundamentals ofpower and energy	1	2	-	-
	PC8. Explain the basics of solar energy/ electricityand electrical concepts.	1	-	-	-
	PC9. Show how to perform simple calculations to illustrate the fundamental concepts of power andenergy.	-	2	-	-
	PC10. Explain the relevance of diffused normal irradiance and global horizontal irradiance alongwith the differences in Irradiance & Irradiation.	1	2	-	-
	PC11. Illustrate the movement of the sun and assess its effect on the performance of the solarpower plant and overall solar generation.	1	-	-	-
	PC12. Demonstrate how the movement of sun affects the performance of the solar power plant.	-	1	-	-
	Assess the site conditions	**6**	**8**	**-**	**-**

	PC13. Assess the location of installations and optimize the route plan	1	1	-	-
	PC14. Assess the site level pre-requisites for solar panel installation	1	1	-	-
	PC15. Explain the importance of shading analysis and show hot to check for any shading obstacles	1	1	-	-
	PC16. Show how to perform system sizing calculations.	-	2	-	-
	PC17. Discuss how to decide on the type of mounting to be constructed and inform the customer for any civil construction to be undertaken for installing the panels	1	1	-	-
	PC18. Prepare a site map of the location where installation has to be carried out	1	1	-	-
	PC19. Perform feasibility for innovative energy solutions like portable, ''plug and play'' or ''behind the meter system'' for mounting solar panel where typical civil construction work is not required	1	1	-	-
	Identify load to be connected to solar PV system	**5**	**8**	**-**	**-**
	PC20. Assess the load to be run on solar power plant.	2	2	-	-

	PC21. Prepare a load profile.	1	2	-	-
	PC22. Document the site survey variables and complete the checklist/site survey form.	1	2	-	-
	PC23. Identify point of connection.	1	2	-	-
	Material conservation and use of environment friendly materials	**2**	**2**	**-**	**-**
	PC24. Identify processes where material utilization can be optimized and suggest that to relevant authority	1	1	-	-
	PC25. Identify and implement ways to monitor material use, conserve and re-use water.	1	1	-	-
NOS Total		**21**	**29**	**-**	**-**

NOS/ Module Name	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
SGJ/N0102: Procure Solar PV system components	*Discuss system components and manufacturerspecification sheet*	**9**	**10**	**-**	**-**
	PC1. Explain various terminologies used in the solar industry and identify different components ofSolar PV system and explain its basic operation.	2	3	-	-

	PC2. Explain the working of different types of SolarPV systems including innovative behind the meter or plug & play system.	2	2	-	-
	PC3. Explain manufacturer's specification sheet ofdifferent components	3	3	-	-
	PC4. Describe and analyse the different types,sizes and specifications of modules, inverters,charge controllers, cables, conduits, junction boxes, solar batteries and allied accessories.	2	2	-	-
	Prepare Bill of Material	**7**	**8**	-	-
	PC5. Read and interpret the Single Line Diagram(SLD), civil/mechanical and electrical drawings	3	3	-	-
	PC6. Prepare Bill of Materials (BoM) from single linediagram, civil/mechanical and electrical drawings	2	3	-	-
	PC7. Prepare bill of materials including for portableand innovative energy solutions like plug and play or behind the meter system	2	2	-	-
	Procure the components	**17**	**24**	-	-
	PC8. Approach organization's warehouse/vendors, suppliers and/or manufacturers to place the order for components as per BoM	2	2	-	-
	PC9. Ensure quantity of modules / panels, inverter and batteries matches with voltage requirement ofthe system	2	3	-	-
	PC10. Identify and list variation in equipmentspecifications, if any	2	3	-	-

	PC11. submit the documented variation to design team (if required) for approval or revised drawings	2	2	-	-
	PC12. arrange for tools and consumables required for mounting the solar panels	3	3	-	-
	PC13. Dispatch the equipment at site as per statutory and other requirements	2	4	-	-
	PC14. Ensure that all materials are QC passed	2	3	-	-
	PC15. Complete all documentation with respect to procurement and plan and receive the equipment at site	2	4	-	-
	Verify the components on-site	**8**	**13**	**-**	**-**
	PC16. Ensure that all the components are handled and stored properly as per standard operating procedures	2	3	-	-
	PC17. Check materials received as per final BoM to ensure that the correct material for the job arrives on site and is damage free	2	4	-	-
	PC18. Describe the DO's and Don'ts of material handling and demonstrate the process of safe material handling.	2	2	-	-
	PC19. Report and document the status of material received at site and take appropriate action for replacements, if any	2	4	-	-
	Material conservation and use of environment friendly materials	**2**	**2**	**-**	**-**
	PC20. 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.	2	2	-	-

NOS Total	**43**	**57**	**-**	**-**

NOS/ Module Name	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
SGJ/N0103: *Install Civil and Mechanical parts of Solar PV System*	*Construction of equipment foundation*	**5**	**7**	-	-
	PC1. identify type of footing or dead load required	1	1	-	-
	PC2. locate structural footings	1	1	-	-
	PC3. arrange tools and consumables required for civil/mechanical installation	1	1	-	-
	PC4. construct concrete forms to designspecifications with water and material conservation	1	2	-	-
	PC5. install mounting posts, roof attachments andanchors	1	2	-	-
	Install mounting system	**7**	**7**	-	-
	PC6. locate structural roof members and installstructural attachments	1	1	-	-
	PC7. install module support/racking frame	1	1	-	-
	PC8. plumb and level array structure	1	1	-	-

	PC9. install supplementary structural supports	1	1	-	-
	PC10. apply corrosion protection to cut surfaces	1	1	-	-
	PC11. apply weatherproofing and anchoring chemical to avoid any seepage and for properintegration with surface	1	1	-	-
	PC12. install tracking system or carport mountingsystem	1	1	-	-
	Install photovoltaic modules	**7**	**7**	**-**	**-**
	PC13. unpack PV modules	1	1	-	-
	PC14. inspect module for physical damage	1	1	-	-
	PC15. test PV modules electrical output	1	1	-	-
	PC16. install the modules as per layout diagrams	1	1	-	-
	PC17. secure module wiring	1	1	-	-
	PC18. fasten modules to structure	1	1	-	-
	PC19. torque module fasteners	1	1	-	-
	Install battery bank stand and inverter stand	**2**	**2**	**-**	**-**
	PC20. install battery bank stand and battery spill containment as per drawings / manuals	1	1	-	-
	PC21. install inverter stand as per drawings / manuals	1	1	-	-
	Material conservation practices	**2**	**2**	**-**	**-**
	PC22. identify ways to optimize usage of material including water in various tasks/activities/processes and suggest to higher authority	1	1	-	-

	PC23. check for spills/leakages in various tasks/activities/processes, plug spills/leakages and escalate to appropriate authority if unable to rectify	1	1	-	-
	Effective waste management/recycling practices	**1**	**1**	**-**	**-**
	PC24. segregate waste into different categories, dispose non-recyclable waste appropriately and deposit recyclable and reusable material at identified location	1	1	-	-
NOS Total		**24**	**26**	**-**	**-**

NOS/ Module Name	**Assessment Criteria for Performance Criteria/Learning Outcomes**	**Theory Marks**	**Practical Marks**	**Project Marks**	**Viva Marks**
SGJ/N0104: *Installation of electrical components of a Solar PV system*	*Prepare for solar Installation*	**9**	**9**	**-**	**-**
	PC1. implement the site safety plan, keep workarea clear and be aware of the situation at site	1	2	-	-
	PC2. ascertain the maximum working voltage	1	1	-	-
	PC3. identify tools and tackles and measure current and voltage through instruments beforeproceeding with work	2	2	-	-
	PC4. inspect and utilize electrical installationtoolkit	2	1	-	-
	PC5. select the location of DC combiner box	1	1	-	-
	PC6. install DC combiner box along withdisconnect protections	2	2	-	-
	Install electrical components	**14**	**20**	**-**	**-**

	PC7. install DC energy meters	1	1	-	-
	PC8. confirm battery bank location and installbatteries	2	2	-	-
	PC9. prepare battery terminals and installbattery interconnection cables	1	2	-	-
	PC10. terminate fine stranded cables	1	1	-	-
	PC11. test final assembled battery polarity andvoltage	1	1	-	-
	PC12. install charge controller (if required)	1	1	-	-
	PC13. install inverter	1	2	-	-
	PC14. install utility required disconnects	1	2	-	-
	PC15. install AC combiner box	1	1	-	-
	PC16. connect the solar system to the distribution box or transformer	1	2	-	-
	PC17. label components properly	1	1	-	-
	PC18. prepare conduit and cable routing plan	1	2	-	-
	PC19. select the correct cable type, color, and gauge	1	2	-	-
	Install conduits and cables ensuring minimum wastage of materials	**7**	**11**	**-**	**-**
	PC20. ensure that the conduits are properly supported and secured	2	2	-	-
	PC21. install the cables for modules, inverter and other components	1	2	-	-

	PC22. terminate cables	2	2	-	-
	PC23. check cables for continuity	1	2	-	-
	PC24. label conduits and cables properly	1	2	-	-
	PC25. locate underground hazards, if any	-	1	-	-
	Install battery bank (as required)	**4**	**8**	**-**	**-**
	PC26. confirm and install battery bank enclosure/racks	1	2	-	-
	PC27. install battery spill containment (if required)	1	2	-	-
	PC28. install batteries and prepare battery terminals (e.g. clean)	1	2	-	-
	PC29. install battery interconnection cables and apply anti-oxidant material	1	2	-	-
	Perform electrical grounding and install earthing and lightening arrestor	**6**	**8**	**-**	**-**
	PC30. perform the grounding work for modules/mounting system and inverters	2	3	-	-
	PC31. perform bonding work for all electrical equipment and apply anti-oxidant material	2	3	-	-
	PC32. explain the de-mounting of a solar PV power plant (after commissioning).	2	2	-	-
	Post work activities	**2**	**2**	**-**	**-**
	PC33. clean the work area after completing the installation work	1	1	-	-
	PC34. remove all the tools, consumables used from the work area	1	1	-	-
NOS Total		**42**	**58**	**-**	**-**

NOS/ Module Name	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
SGJ/N0105: *Test and commission Solar PV system*	*Test the system*	**14**	**17**	**-**	**-**
	PC1. describe the importance of conducting testing of all solar PV components and performfault findings and analysis	2	-	-	-
	PC2. perform visual inspection	1	1	-	-
	PC3. inspect mechanical, civil and electricalinstallation components	2	2	-	-
	PC4. verify system grounding and measureinsulation resistance	1	2	-	-
	PC5. check continuity of the system and verifypolarity	1	2	-	-
	PC6. measure solar irradiance, DC voltages, current for each string and array for properoperation of the system	2	2	-	-
	PC7. verify inverter operation including anti- islanding performance and measurement of ACsystem values	2	2	-	-
	PC8. verify calibration of data acquisition system	1	1	-	-

	PC9. verify workmanship and demonstrateproficiency in using tools	1	3	-	-
	PC10. prepare inspection report and takeappropriate action	1	2	-	-
	Commission the system	**9**	**10**	**-**	**-**
	PC11. verify labeling of solar PV systemincluding components and cabling	1	2	-	-
	PC12. initiate startup procedures as per manufacturer's instructions and record energymeter reading at startup	2	1	-	-
	PC13. measure and record voltage of energystorage system	1	2	-	-
	PC14. record and repair any anomalous conditions	1	1	-	-
	PC15. document design changes, if any and verify de-mounting of a solar PV power plant after commissioning	1	1	-	-
	PC16. examine concerned regulations & guidelines for grid interconnection.	1	1	-	-
	PC17. describe and demonstrate the commissioning process for the solar PV system.	2	2	-	-
NOS Total		**23**	**27**	**-**	**-**

NOS/ Module Name	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
SGJ/N0622: *Maintain Solar Photovoltaic Power System*	*Preventive maintenance of system*	**10**	**14**	-	-
	PC1. clean solar panels with water in low sunlightto remove dust, bird droppings, pollen, leaves, branches and snow for maximum energy output from the system	2	3	-	-
	PC2. wipe hard stains by wiping with sponge/cotton	2	2	-	-
	PC3. use cleaning agents such as detergents toclean the stains/dust on the aluminum framing	1	2	-	-
	PC4. clean without damaging modules by stepping on it or through mechanized method	1	1	-	-
	PC5. clean module periodically as per specification and document the date of cleaning	1	2	-	-
	PC6. explain and show how to prepare and execute preventive maintenance schedule andreactive maintenance activities.	3	4	-	-
	Inspection of the PV system	**8**	**15**	-	-
	PC7. inspect regularly solar power system andmark check points	1	2	-	-
	PC8. ensure modules are clean and not affectingpower output	1	1	-	-

	PC9. ensure that modules are free from any treeshades, construct or other disruption from receiving sunlight	1	2	-	-
	PC10. check all cables for loose connections andany mechanical damage	1	2	-	-
	PC11. check output voltage of the system andcompare with the expected output voltage generation	1	2	-	-
	PC12. check for any damage for the system byexternal elements	1	2	-	-
	PC13. ensure that electrical connections are as per specifications	1	2	-	-
	PC14. check for mechanical components and the condition and stability of mounting to hold solar panels	1	2	-	-
	Troubleshoot function	**12**	**21**	**-**	**-**
	PC15. identify the faults in the system when there is an interruption in power generation	1	3	-	-
	PC16. check current output for each string and identify the string which gives low/undesired power output	1	3	-	-
	PC17. identify the faulty module if any by shading and check current output	1	2	-	-
	PC18. perform standard troubleshoot measures as per diagnosed fault	2	3	-	-
	PC19. check working conditions of fuses and circuit breakers	2	2	-	-

	PC20. check the service panel connections and any damages in the cables	1	2	-	-
	PC21. check wire connection to inverter and identify damage if any	2	2	-	-
	PC22. inform the inverter service technician if there is a circuit board level fault for further repair	1	2	-	-
	PC23. escalate the issue to superiors if faults can not be identified	1	2	-	-
	Completion of work	**7**	**8**	**-**	**-**
	PC24. remove all the tools, consumables used from the installation area	1	2	-	-
	PC25. fill in the job completion form and get the signature of the customer	2	2	-	-
	PC26. inform customers about maintenance of solar panels	2	2	-	-
	PC27. document maintenance activities if performed	2	2	-	-
	Follow greening principles at workplace	**3**	**2**	**-**	**-**
	PC28. clean the work area after completing the maintenance activity	2	1	-	-
	PC29. dispose off any waste materials in accordance with safe working practices and procedure	1	1	-	-
NOS Total		**40**	**60**	**-**	**-**

NOS/ Module Name	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
SGJ/N0106: *Maintain Personal Health & Safety at Project Site*	*Adopt safe practices at workplace*	**13**	**19**	-	-
	PC1. explain the requirements for safe work area	2	-	-	-
	PC2. identify and report any hazards, risks orbreaches in site safety to the appropriate authority	2	3	-	-
	PC3. follow recommended safe practices in handling physical, chemical, electrical and firehazards and risk	1	2	-	-
	PC4. use appropriate Personal Protective Equipment (PPE) for head, eye, hand, ear, face, body and fall protection specific to work condition	2	4	-	-
	PC5. follow safe practices when working at heightand in confined space	1	1	-	-
	PC6. handle all required tools, tackles, materialsand equipment safely	1	2	-	-
	PC7. identify expiry dates, wear and tear issuesof specified equipment and accordingly inform supervisor and undertake corrective measures	1	2	-	-
	PC8. apply ergonomic principles whereverrequired	1	2	-	-
	PC9. use safety signs, labels, charts and noticesat workplace	1	1	-	-

	PC10. identify work safety procedures and instructions for handling heavy components	1	2	-	-
	Follow emergencies, rescue and first aid procedures	**4**	**4**	**-**	**-**
	PC11. follow emergency and evacuation procedures in case of accidents, fires and naturalcalamities	1	1	-	-
	PC12. use appropriate fire extinguishers fordifferent types of fire	1	1	-	-
	PC13. administer first aid to victim in case of various medical emergencies including bleeding, burns, choking, electric shock, cardiac arrest, etc.	1	1	-	-
	PC14. use correct method to move injured person during an emergency	1	1	-	-
	Follow good housekeeping practices and infection control guidelines	**4**	**6**	**-**	**-**
	PC15. follow recommended personal hygiene, workplace hygiene and sanitation practices	1	1	-	-
	PC16. clean and disinfect all material, tools and supplies before and after use	1	1	-	-
	PC17. report immediately to concerned authorities regarding sign and symptoms of illness of self and other colleagues	1	2	-	-
	PC18. follow processes specified for disposal of hazardous waste	1	2	-	-
NOS Total		**21**	**29**	**-**	**-**

NOS/ Module Name	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
SGJ/N0107: *Customer orientation for Solar PV system*	*Handover system completion documentation*	**15**	**17**	-	-
	PC1. explain and show how to prepare completeand final documentation	3	4	-	-
	PC2. record component serial numbers, file datasheet and complete equipment warranty registration	3	3	-	-
	PC3. record and document inspection andcommissioning certificates/forms	3	2	-	-
	PC4. deliver as-built documents along withproject photographs and permits	2	2	-	-
	PC5. deliver O&M documentation and customeroperation manual	2	3	-	-
	PC6. inform the customer about the type of battery used, its life of operation and to disposebattery after its useful life to a recycling facility	2	3	-	-
	Demonstrate working procedure of solar PV system	**9**	**9**	-	-
	PC7. demonstrate start-up, shutdown and safetyprocedures to the customer	3	3	-	-

	PC8. demonstrate normal operation procedure along with maintenance procedures of Solar PVsystem and provide basic training to maintain the system	3	3	-	-
	PC9. demonstrate work safety procedures andhow to follow instructions for handling heavy components at project site	3	3	-	-
NOS Total		**24**	**26**	**-**	**-**

NOS/ Module Name	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
DGT/VSQ/N0102: *Employability Skills*	*Introduction to Employability Skills*	**1**	**1**	**-**	**-**
	PC1. identify employability skills required for jobsin various industries	-	-	-	-
	PC2. identify and explore learning and employability portals	-	-	-	-
	Constitutional values – Citizenship	**1**	**1**	**-**	**-**
	PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. andpersonal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-	-
	PC4. follow environmentally sustainable practices	-	-	-	-
	Becoming a Professional in the 21st Century	**2**	**4**	**-**	**-**
	PC5. recognize the significance of 21st CenturySkills for employment	-	-	-	-

	PC6. practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
	Basic English Skills	**2**	**3**	-	-
	PC7. use basic English for everyday conversationin different contexts, in person and over the telephone	-	-	-	-
	PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
	PC9. write short messages, notes, letters, e-mailsetc. in English	-	-	-	-
	Career Development & Goal Setting	**1**	**2**	-	-
	PC10. understand the difference between job and career	-	-	-	-
	PC11. prepare a career development plan with short- and long-term goals, based on aptitude	-	-	-	-
	Communication Skills	**2**	**2**	-	-
	PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-	-
	PC13. work collaboratively with others in a team	-	-	-	-
	Diversity & Inclusion	**1**	**2**	-	-
	PC14. communicate and behave appropriately with all genders and PwD	-	-	-	-
	PC15. escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-

	Financial and Legal Literacy	**2**	**3**	-	-
	PC16. select financial institutions, products and services as per requirement	-	-	-	-
	PC17. carry out offline and online financial transactions, safely and securely	-	-	-	-
	PC18. identify common components of salary and compute income, expenses, taxes, investments etc.	-	-	-	-
	PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
	Essential Digital Skills	**3**	**4**	-	-
	PC20. operate digital devices and carry out basic internet operations securely and safely	-	-	-	-
	PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively	-	-	-	-
	PC22. use basic features of word processor, spreadsheets, and presentations	-	-	-	-
	Entrepreneurship	**2**	**3**	-	-
	PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
	PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
	PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
	Customer Service	**1**	**2**	-	-
	PC26. identify different types of customers	-	-	-	-
	PC27. identify and respond to customer requests and needs in a professional manner.	-	-	-	-

	PC28. follow appropriate hygiene and grooming standards	-	-	-	-
	Getting ready for apprenticeship & Jobs	**2**	**3**	-	-
	PC29. create a professional Curriculum vitae (Résumé)	-	-	-	-
	PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
	PC31. apply to identified job openings using offline/ online methods as per requirement	-	-	-	-
	PC32. answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
	PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
NOS Total		**20**	**30**	-	-

Annexure: Assessment Strategy

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

1. Assessment System Overview:

   - Batches assigned to the assessment agencies for conducting the assessment on SDSM/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

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.
- 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
   - Center 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

On the Job:

OJT Monitoring Report

- As in Green Jobs Sector, reproducing the evidence for assessment is not feasible due to constraints like cost, confidentiality and controlled environment, every
- Apprentice is required to record the evidences performed during the OJT and the same gets authorized by his/her supervisor.
- The evidence recording is done in a structured monitoring report, termed as OJT Monitoring report.
- During the OJT, every trainee is required to fill the OJT monitoring report which is required to be signed by his/her supervisor.
- Towards the end of OJT period these reports are submitted with the HR department of company
- These duly submitted reports are then verified by an Industry nominated assessor for verification of evidence.

Theory, Practical & Viva:

- Scope – Is used to test the knowledge and understanding and skills acquired during the OJT as well as to conform the OJT monitoring report.
- Some personality traits and generic skills (such as – promptness, sharpness, communication skills, depth of knowledge, comprehension, presentation, patience
- etc) can also be tested, which is also required for the QP.
- Tools – The assessment's questions should be aligned with the Qualification Pack, covering the PCs. There will be summative assessment at the end of the OJT.
- Method – Direct questions open and close ended questions, situation-based questions, analytical questions, and decision-making based questions for Viva,
- MCQ for the theory and performing QP related operations for practical. Different questions in theory, practical and viva are included to test relevant PCs from
- the QP
- Analysis – Assessor draws a spectrum of ready answers to be expected from trainee for Viva. This reduces effect of subjectivity of the assessor. Comparative
- Quality of trainees within a batch or different institutes can be gauged. The skill is gauged by observing the practical work.

Execution of OJT Assessment:

- HR department hands over the individual OJT monitoring report with Industry nominated assessor and schedules an assessment meeting for each trainee.
- Industry nominated assessor assesses each trainee based on OJT monitoring report, viva on each PC and also takes into account attendance of each trainee towards the end of the OJT period.
- The OJT marks are compiled for each NOS by the Industry nominated assessor and submitted with HR department of company.
- The OJT assessment results are then sent to SCGJ by HR department of company in a sealed envelope for compiling the assessment results in

case of offline assessment.

Annexure: Acronym and Glossary

Acronym

Acronym	Description
AA	Assessment Agency
AB	Awarding Body
ISCO	International Standard Classification of Occupations
NCO	National Classification of Occupations
NCrF	National Credit Framework
NOS	National Occupational Standard(s)
NQR	National Qualification Register
NSQF	National Skills Qualifications Framework
OJT	On the Job Training

Glossary

Term	Description
National Occupational Standards (NOS)	NOS define the measurable performance outcomes required from an individual engaged in a particular task. They list down what an individual performing that task should know and also do.
Qualification	A formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards
Qualification File	A Qualification File is a template designed to capture necessary information of a Qualification from the perspective of NSQF compliance. The Qualification File will be normally submitted by the awarding body for the qualification.
Sector	A grouping of professional activities on the basis of their main economic function, product, service or technology.
Long Term Training	Long-term skilling means any vocational training program undertaken for a year and above. https://ncvet.gov.in/sites/default/files/NCVET.pdf

Annexure: Annexure: Career Progression and OM

NSQF Level/domain	Solar Photovotaic Rooftop																
8	MD/Director																
6.5-7	Branch Manager		Solar PV BD Manager		Solar PV Designer				Solar PV Project Manager – E&C				Solar PV O&M Manager (Roof Top)				
5.5-6		Liaison Officer				Energy Modeller		Procurement Manager	Solar PV Site In-Charge								
4.5-5	Solar Proposal Evaluation Specialist		Market research analyst		Solar PV Site Surveyor	Solar PV Assistant Structural Design Engineer	Solar PV Assistant Electrical Design Engineer	Procurement Executive	Rooftop Solar Grid Junior Engineer	Solar PV Engineer			Solar Photovoltaic Entrepreneur/Solar Enterprise Assistant Manager	Solar PV O&M Supervisor			HSE Engineer
3.5-4					Solar PV Site Survey Assistant	CAD/Draughtsman (Mechanical)	CAD/Draughtsman (Electrical)		Solar Photovoltaic Technician	Solar PV Installer (Civil)	Solar PV Installer (Electrical)		Solar PV Installer (Suryamitra)	Solar PV Maintenance Technician (Electrical)	Solar PV Maintenance Technician (Civil/ Mechanical)	Solar PV Maintenance Technician (Suryamitra)	
2.5-3																	
2					Solar PV Project Helper					Solar PV Project Helper	Solar PV Project Helper	Solar PV Project Helper		Solar PV Project Helper	Solar PV Installation Helper	Solar PV Project Helper	
1																	

Solar PV Installer (Suryamitra)