QUALIFICATION FILE

Solar Panel Installation and Maintenance Technician (O-Level 'Solar Power Electronics')

☒ 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 ☐ OEM

NCrF/NSQF Level: 4

Submitted By:

National Institute of Electronics and Information Technology (NIELIT)

NIELIT Bhawan,
Plot No. 3, PSP Pocket, Sector-8,
Dwarka, New Delhi-110077,
Phone:- 91-11-2530 8300
e-mail:- contact@nielit.gov.in

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Section 1: Basic Details

<table>
<tr><td>1.</td><td>NOS-Qualification Name</td><td colspan="2">Solar Panel Installation and Maintenance Technician (O-Level 'Solar Power Electronics')</td></tr>
<tr><td>2.</td><td>Sector/s</td><td colspan="2">Electronics</td></tr>
<tr><td>3.</td><td>Type of Qualification ☒ New ☐ Revised ☐ Has Electives/Options
☐ OEM</td><td>NQR Code & version of the existing /previous qualification: NA</td><td>Qualification Name of the existing/previous version: NA</td></tr>
<tr><td>4.</td><td>a. OEM Name
b. Qualification Name
(Wherever applicable)</td><td colspan="2">-</td></tr>
<tr><td>5.</td><td>National Qualification Register (NQR) Code & Version</td><td>QG-04-EH-02597-2024-V1-NIELIT</td><td>6. NCrF/NSQF Level: 4</td></tr>
<tr><td>7.</td><td>Award (Certificate/Diploma/Advanced Diploma/ Any Other (Wherever applicable specify multiple entry/exits also & provide details in annexure)</td><td colspan="2">Certificate</td></tr>
<tr><td>8.</td><td>Brief Description of the Standalone NOS</td><td colspan="2">Nature:

The Certificate course is targeted for creating qualified professionals in the field of Solar Panel Installation. Qualification has been developed in consultation with industry experts in the domain, aiming at Empowering the future workforce with necessary skills for employment and entrepreneur development of the qualifier.

Purpose:
The objective of this O Level (Solar Panel Installation and Maintenance Technician) course is to equip candidates with the knowledge and practical skills needed to safely and effectively install and maintain photovoltaic systems for renewable energy generation.</td></tr>
<tr><td>9.</td><td>Eligibility Criteria for Entry for a Student/Trainee/Learner/Employee</td><td colspan="2">a. Entry Qualification & Relevant Experience:
<table><tr><th>S. No.</th><th>Academic/Skill Qualification (with Specialization - if applicable)</th><th>Relevant Experience (with Specialization - if applicable)</th></tr></table></td></tr>
</table>

<table>
<tr><td></td><td></td><td colspan="2">
<table>
<tr><td>1</td><td>12th or equivalent.</td><td>NA</td></tr>
<tr><td>2</td><td>2nd year of 3 year Diploma after 10th in Electronics and Commutation Engineering/ Electrical Engineering/CS/IT and allied branches</td><td>NA</td></tr>
<tr><td>3</td><td>NSQF Level 3 in Electronics and Commutation Engineering/ Electrical Engineering/CS/IT and allied branches</td><td>3 year relevant experience</td></tr>
<tr><td>4</td><td>NSQF Level 3.5 in Electronics and Commutation Engineering/ Electrical Engineering/CS/IT and allied branches</td><td>1.5 year relevant experience</td></tr>
</table>
b. Age: 18 years
</td></tr>
<tr><td>10.</td><td>Credits Assigned to this NOS-Qualification, Subject to Assessment (as per National Credit Framework (NCrF))</td><td>20 Credits</td><td>11. Common Cost Norm Category (I/II/III) (wherever applicable):
Category II</td></tr>
<tr><td>12.</td><td>Any Licensing Requirements for Undertaking Training on This Qualification (wherever applicable)</td><td colspan="2">NA</td></tr>
<tr><td>13.</td><td>Training Duration by Modes of Training Delivery (Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)</td><td colspan="2">☒ Offline ☐ Online ☐ Blended
<table>
<tr><th>Training Delivery Modes</th><th>Theory (Hours)</th><th>Practical (Hours)</th><th>OJT Mandatory (Hours)</th><th>ES (Hours)</th><th>Total (Hours)</th></tr>
<tr><td>Classroom (offline)</td><td>180</td><td>300</td><td>60</td><td>60</td><td>600</td></tr>
</table>
The mode of delivery shall be based on the regional demand and can be offered in any of the above modes mentioned.</td></tr>
<tr><td>14.</td><td>Aligned to NCO/ISCO Code/s (if no code is available, mention the same)</td><td colspan="2">NOS-1015/ 7421.1401 (Solar Panel Installation Technician)</td></tr>
<tr><td>15.</td><td>Progression path after attaining the qualification (Please show Professional and Academic progression)</td><td colspan="2">Lead Solar Panel Installer</td></tr>
</table>

16.	**Other Indian languages in which the Qualification & Model Curriculum are being submitted**	Qualification files available in English & Hindi Language.	
17.	**Is similar NOS available on NQR-if yes, justification for this qualification**	**☐Yes ☒ No URLs of similar Qualifications:**	
18.	**Is the Job Role Amenable to Persons with Disability**	**☒ Yes ☐ No** **If "Yes", specify applicable type of Disability:** **a.** Loco motor Disability: Leprosy Cured Person, Dwarfism, Muscular Dystrophy and Acid Attack Victims **b.** Visual Impairment: Low Vision	
19.	**How will the participation of women be encouraged?**	Through funding from the Government under various schemes and projects	
20.	**Are Greening/ Environment Sustainability Aspects Covered** (Specify the NOS/Module which covers it)	**☐ Yes ☒ No**	
21.	**Is Qualification Suitable to be Offered in Schools/Colleges**	**Schools ☐ Yes ☒ No Colleges ☒ Yes ☐ No**	
22.	**Name and Contact Details Submitting / Awarding Body SPOC** *(In the case of CS or MS, provide details of both Lead AB & Supporting ABs)*	**Name:** Ripunjay Dinanath Singh **Email:** ripunjay@nielit.gov.in **Contact No.:** 011-25308300 **Website:** https://nielit.gov.in/	
23.	**Final Approval Date by NSQC: 30.05.2024**	**24. Validity Duration: 3 years**	**25. Next Review Date: 30.05.2027**

Section 2: Module Summary

Mandatory NOS of Qualification:

I. Solar Technology Fundamentals
II. Electric Fundamentals for Solar System
III. Solar Panel Installation
IV. Safety, Maintenance, and Repairs of Solar Panel

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

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.	Total	Th.	Pr.	Total	Weightage (%) *(if applicable)*
1.	NOS1: Solar Technology Fundamentals	NOS Code: NIE/ELE/N0910 NOS Version- 1.0	Core	4	4	45	75	120	50	22	72	14.4
2.	NOS2: Electric Fundamentals for Solar System	NOS Code: NIE/ELE/N0911 NOS Version- 1.0	Core	4	4	45	75	120	50	23	73	14.6
3.	NOS3: Solar Panel Installation	NOS Code: NIE/ELE/N0912 NOS Version- 1.0	Core	4	4	45	75	120	50	23	73	14.6
4.	NOS4: Safety, Maintenance, and Repairs of Solar Panel	NOS Code: NIE/ELE/N0814 NOS Version- 1.0	Core	4	4	45	75	120	50	22	72	14.4
5.	NOS5: Employability Skills	NOS Code: DGT/VSQ/N0102 NOS Version- 1.0	Non-Core	4	2	0	0	60	0	0	50	10
6.	OJT/Project*	NA	Core	4	2	0	0	60	0	0	60	12
7.	Major Project/Dissertation(Marks)*	NA	Core	4	-	-	-	-	-	-	100	20

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.	Total	Th.	Pr.	Total	Weightage (%) *(if applicable)*
Grand Total					**20**	**600**			**500**			**100**

Assessment Components	NOS Included	Duration (in mins.)	Marks
Theory Paper 1 – Solar Technology & Electric Fundamentals	1,2	90	100
Theory Paper 2- Solar Panel Installation & Safety, Maintenance, and Repairs of Solar Panel	3,4	90	100
Practical Paper 1- Solar Panel Installation and Maintenance Technician	1,2,3,4	180	90
Employability Skills	5		50
OJT/Project*	1,2,3,4		60
Major Project/Dissertation(Marks)*	1,2,3,4		100
Total			**500**

* Along with the report on OJT, an additional dissertation has to be submitted by the trainee.

***Assessment strategy shall be as per NIELIT Norms prevailing at times.

Minimum Pass Percentage – The pass percentage is 50% in each assessment component (as mentioned in the above table) with the aggregate pass percentage be 50%

Section 3: Training Related

1.	**Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)**	B.E./B. Tech in Electronics/ Electronics & Communication/ Electrical/ Electrical and Electronics/Instrumentation/ Electronics & Instrumentation / Instrumentation & Control Minimum 1 year of experience in the field of Solar Panel Installation
2.	**Master Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)**	B.E./B. Tech in Electronics/ Electronics & Communication/ Electrical/ Electrical and Electronics/Instrumentation/ Electronics & Instrumentation / Instrumentation & Control

		Minimum 3 year of experience in the field of Solar Panel Installation
3.	**Tools and Equipment Required for the Training**	☒ Yes ☐No (If "Yes", details to be provided in Annexure) Available at Annexure-II
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)*	B.E./B. Tech or Equivalent as per NCrF + 3 years of relevant experience
2.	**Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines), (wherever applicable)*	The assessor carries out theory online assessments through the remote proctoring methodology. Theory examination would be conducted online and the paper comprises MCQ. Conduct of assessment is through trained proctors. Once the test begins, remote proctors have full access to the candidate's video feeds and computer screens. Proctors authenticate the candidate based on registration details, pre-test image captured and I-card in possession of the candidate. Proctors can chat with candidates or give warnings to candidates. Proctors can also take screenshots, terminate a specific user's test session, or re-authenticate candidates based on video feeds.
3.	**Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	External Examiners/ Observers (Subject matter experts) are deployed including NIELIT scientific officers who are subject experts for evaluation of Practical examination/ internal assessment / Project/ Presentation/ assignment and Major Project (if applicable). Qualification is generally B. Tech
4.	**Assessment Mode***(Specify the assessment mode)*	Centralized online examination will be conducted
5.	**Tools and Equipment Required for Assessment**	Same as for training ☒ Yes ☐ No

Section 5: Evidence of the Need for the Qualification

1.	**Latest Skill Gap Study (not older than 2 years) (Yes/No):** Yes, Available in Annexure-A: Evidence of Need
2.	**Latest Market Research Reports or any other source (not older than 2 years) (Yes/No):** Yes, Available at Annexure-A: Evidence of Need
3.	**Government /Industry initiatives/ requirement (Yes/No):** Yes.
4.	**Number of Industry validation provided**: 19
5.	**Estimated number of people to be trained**: 1000 persons per year shall be trained.
6.	**Evidence of Concurrence/Consultation with Line Ministry/State Departments:** NIELIT is recognized as AB and AA under Government Category. NIELIT is an HRD arm of MeitY, therefore, the Line Ministry Concurrence is not required.

Section 6: Annexure & Supporting Documents Check List

Specify Annexure Name / Supporting document file name.

1.	**Annexure:** NCrF/NSQF level justification based on NCrF/NSQF descriptors *(Mandatory)*	*Available at* Annexure-I: Evidence of Level
2.	**Annexure:** List of tools and equipment relevant for qualification *(Mandatory, except in case of online course)*	*Available at* Annexure-II: Tools and Equipment
3.	**Annexure:** Industry Validation	*Available at* Annexure-III: Industry Validation
4.	**Annexure:** Training Details	*Available at* Annexure-IV: Training Details
5.	**Annexure:** Blended Learning *(Mandatory, in case the selected Mode of delivery is Blended Learning)*	*Available at* Annexure-V: Blended Learning
6.	**Annexure:** Detailed Assessment Criteria (Mandatory)	*Available at* Annexure-VI: Detailed Assessment Criteria
7.	**Annexure:** Assessment Strategy *(Mandatory)*	*Available at* Annexure-VII: Assessment Strategy
8.	**Annexure:** Acronym and Glossary *(Optional)*	*Available at* Annexure-VIII: Acronym and Glossary
9.	**Annexure:** Multiple Entry-Exit Details (Mandatory, in case qualification has multiple Entry-Exit)	*NA*

10.	**Supporting Document:** Model Curriculum	*Available at* Annexure-C: Model Curriculum
11.	**Any other document you wish to submit:**	*NA*

Annexure-I: Evidence of Level

NCrF/NSQF Level Descriptors	Key requirements of the job role/ outcome of the qualification	How the job role/ outcomes relate to the NCrF/NSQF level descriptor	NCrF/NSQF Level
Professional Theoretical Knowledge/Process	1. Understand the historical development of solar technology and its role in the context of environmental sustainability. 2. Demonstrate knowledge of preventive and corrective maintenance procedures for solar panels, including addressing failure patterns and conducting routine tasks.	1. Possesses specialized operational knowledge and understanding of the work. 2. Have complete knowledge of the concept of time required for delivery; and Quality for a range of issues	4
Professional and Technical Skills/ Expertise/ Professional Knowledge	1. Proficiency in assessing solar radiation and employing site assessment techniques to determine optimal panel placement. 2. Knowledge of different solar panel types, their materials, manufacturing processes, and factors influencing panel efficiency and lifespan.	1. Possesses specialized professional and technical skills; displays clarity of professional knowledge and technical skills in a broad range of activities/ tasks. 2. Have knowledge of collecting and interpreting the available information, drawing conclusions & communicating the same	4
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	1. Develop an in-depth understanding of renewable energy sources, particularly solar energy, and its historical development. 2. Gain knowledge about solar radiation, site assessment techniques, and optimal panel placement for efficient energy production.	1. Can explain Entrepreneurial Mindset and describe the importance of it in the context of opportunity curation for future jobs 2. Can comfortably use most of the basic software with proficiency 3. Have the ability to relate to the 5 pillars of Social Emotional Skills and describe the similarities between SES and Emotional Intelligence	4

Broad Learning Outcomes/ Core Skill	1. Understand the principles and physics of solar radiation, including global beam and diffuse radiation, essential for site assessment and optimal panel placement. 2. Understand the national and local regulations, safety protocols, and codes related to solar energy installations to ensure compliance and workplace safety.	1. Students are able to use, create, and design Multimedia solutions 2. Have knowledge of Multimedia Project Cycle and apply the understanding of Multimedia Project Pitfalls in improving solution	4
Responsibility	Ability to manage the system resources in the most effective manner by appropriate planning, estimation, coordination and control of the activities involved in the design & development of any drone applications /project	1. Takes complete responsibility for delivery and quality of own work and output as also the subordinates. 2. Shares responsibility for the group tasks.	4

Annexure II: Tools and Equipment (lab set-up)

LIST OF EQUIPMENT (For a batch of 30 students)

	Description	Qty	Specifications
1	Classroom	1	30 Sq.m
2	Student Chair	30	
3	Student Table	15	15 (2 students sharing 1 table)
4	LCD Projector	1	
5	Trainer Chair & Table	1	
6	Pin up Boards	1	
7	White Board	1	
	Computer Lab		
1	Desktop computer with accessories	30	Laptop with minimum specifications: Intel I3 or Celeron processor with at least 8GB RAM, 512GB SSD Hard disk integrated with graphics card, Display size 15.6-inch, Wi-Fi connectivity and Wired Optical Mouse.

2	Desk jet printer	1	
3	Hardware's	15	Solar Panels,Mounting Structure,Inverters, Solar Charge Controller (for off-grid systems), Batteries (for off-grid systems),DC/AC Disconnects,Wiring and Conduit,Circuit Breakers and Fuses,Grounding Equipment, Monitoring System,Surge Protection Devices, Tools and Mounting Hardware

Annexure III: Industry Validations Summary

S. No	Organization Name	Representative Name	Designation	Contact Address	Contact Phone No	E-mail ID
1	AISECT Ltd.	Ms. Teena Panthi	Assistant Manager	1-1-387, 3rd Floor, Flat no. 403/404, GNR Heights, Above SBI, Bakaram Road, Musheerabad, Hyderabad - 500020	7879982075	teena.panthi@aisect.org
2	Aajivika Global Skill Private Limited	Mukesh Kumar Verma	Director		9507952882	aajivikaglobal@gmail.com
3	B. G. Infotech	Amal Das	Centre Head	Kakdihi, Mecheda, Purba, Medinipur, Pin-721137	9434996748	bginfotech2007@gmail.com
4	Computer Management Services	Sobhajeet Verma	Proprieter	20, Prima Plaza, Munshi Pulia, Indira Nagar, Lucknow-226016	9519134547	
5	EcoTec Industries	KSH Haimo	Proprieter	Khabam Lamkhai, Imphal East, Manipur-795002.	9436437574	ecoteckhabam@gmail.com
6	Elite Computers and Communications Pvt. Ltd.	Hrishikesh Sarma	Sr. Sales Executive	Sohum Residency, 1st Floor, R.G. Baruah Road, near Sundarpur Bus-Stop, above Jeep Show Room, Guwahati-781005, Assam	9854054283	info@eccpl.co.in

7	Inditech Software Wizard Pvt. Ltd.	Sandip Ghosh	Course Coordinator	Mohiari Chanpiritala, PO: Andul Mouri, PS: Domjur, Distt.: Howrah, West Bengal-711302.	9230027415	swizardrecruitment@gmail.com
8	Jharkhand Government Tool Room	M.K. Gupta	Principal	Plot No. 38, Phase-I, Tatisilwal Industrial Area, Tatisilwai, Pin: 835103, Ranchi	9431129589	principal@jgmsmetr.com
9	Maa Saraswati Pvt. Industrial Training Institute	Tanwir Hassan Ansari	Principal	Jainathpur, Lohardaga, Jharkhand 835302	9815107625	masaraswatipvtiti@gmail.com
10	Infoway IT Solutions	Prakash Chandra Tiwari	Director	UD Complex, Miao Singpho Village, Miao, an Distt. Changlang (A.P.)	8414859601	infowayitsolutionsmiao@gmail.com
11	M/s Placement cum Secuirty Agency	Bamang Taniang	Proprieter	near Tirap Festival Ground, Senki Park, Itanagar-791111, Arunachal Pradesh	9436050047	btaniang@gmail.com
12	Prasanthi Polytechnic	D. Prasad	Principal	Duppituru (Vill), Atchutapuram (Md), Visakhapatnam (Dist.), Andhra Pradesh-531011	9849952573	prasadreddy.1279@gmail.com
13	Samridhi Enterprises, Assam	Amarendro Singha	Proprieter	Dullabcherra, Hailakandi Assam-788736		samridhienterprise.as@gmail.com
14	Jan Samridhi Dumka	Gobind Nath Maji	Director	Near Gyan School, Dudhani Dumka, Jharkhand-814101	8789620133	gobind107@gmail.com
15	Nice Shiksha Vikas Kendra	Motilal Ohdar	Secretary	Moti House (NICE Computer Gali), Prince Chowk, Simdega, Jharkhand	7992489955	vtpnice13@gmail.com
16	Sidhi Vinayak Academy	Neha Verma	Director		8789837772	sidhiacademey@gmail.com

17	Surekha IT Services	Anjani K	Manager	Flat No. 301, Brrundavan Apartments, Plot No. 252 & 253, Kalyan Nagar, Phase-I, Hyderabad-500038	8125134134	infor@surekhaitservices.com
18	Tech Booster Education Private Limited	Monoj Dutta	Director	H/N-209, 2nd Floor, Opp. To Ambikagiri Nagar, Jonali, Zoo Road, Guwahati-24	8404049881	info@techbooster.co.in
19	Tin-Tin Powe LLP	S Kumudchandra Singh	Proprieter	Pishum Thong Ningom Leikai, Imphal West, Manipur	9862271561	--

Annexure IV: Training Details

Training Projections:

Year	Estimated Training # of Total Candidates	Estimated training# of Women	Estimated training# of People with Disability
2023-24	500	100	10
2024-25	1000	200	20
2025-26	1000	200	20

Data to be provided year-wise for the next 3 years.

Annexure V: Blended Learning

Blended Learning Estimated Ratio & Recommended Tools:

Refer NCVET "Guidelines for Blended Learning for Vocational Education, Training & Skilling" available on:

S. No.	Select the Components of the NOS	List Recommended Tools – for all Selected Components	Offline: Online Ratio
1	Theory/ Lectures - Imparting theoretical and conceptual knowledge	Online interaction platforms like Zoom, Google Meet	20:80
2	Imparting Soft Skills, Life Skills and Employability Skills /Mentorship to Learners	Online interaction platforms like JitSi Meet, Bharat VC, Google Meet, MS Teams, etc.	20:80

3	Showing Practical Demonstrations to the learners	Online interaction platforms like Zoom, Google Meet	80:20
4	Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training	Online interaction platforms like Zoom, Google Meet	80:20
5	Tutorials/ Assignments/ Drill/ Practice	Online interaction platforms like Zoom, Google Meet	00:100
6	Proctored Monitoring/ Assessment/ Evaluation/ Examinations	NIELIT Remote Proctored Software	Theory : 100% Online Practical : 100% Offline
7	On the Job Training (OJT)/ Project Work Internship/ Candidate Training	NA	100:00

Annexure VI: Detailed Assessment Criteria

Detailed PC-wise assessment criteria and assessment marks for the NOS are as follows:

NOS/Module Name	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Assignment/ Internal Marks
NOS1: Solar Technology Fundamentals NOS Code: NIE/ELE/N0910	• Acquire a deep understanding of solar energy, including its historical development, environmental significance, and its role in the global and Indian energy scenarios.	17	7	0	0
	• Proficiency in master the physics of solar radiation, measurement techniques, site assessment tools, and shade analysis to determine optimal panel placement for efficient solar energy generation.	17	7	0	0
	• Gain expertise in solar PV technology, including module types, cell technologies, concentrators, and system types like rooftop, ground mount, and floating panels.	16	8	0	0
	Total Marks	**50**	**22**	**0**	**0**
NOS2: Electric Fundamentals for Solar System NOS Code: NIE/ELE/N0911	• Demonstrate a deep understanding of basic electrical principles, including electron flow, current effects, circuit components (conductors, insulators, semiconductors), and fundamental electrical laws and definitions.	17	7	0	0
	• Develop skills in connecting PV modules, such as configuring series circuits, parallel circuits, and combined	17	8	0	0

	series-parallel circuits. They will also understand the nuances of cell connections, arrays, and the integration of inverters and batteries in solar installations.				
	● Apply their knowledge of magnetism, electromagnetism, electromagnetic induction, and mutual induction to effectively design and troubleshoot solar power systems, enhancing their practical skills as solar installers.	16	8	0	0
	Total Marks	**50**	**23**	**0**	**0**
NOS3: Solar Panel Installation NOS Code: NIE/ELE/N0912	● Demonstrate the ability to design and configure solar PV systems by selecting appropriate mounting and racking systems, understanding structural considerations, choosing solar tracking options, sizing PV cells, selecting energy storage components, and determining cable and earthing requirements.	17	7	0	0
	● Learners will gain technical expertise in selecting and sizing key components of solar energy systems, including PV cells, batteries, DC-DC converters, charge controllers, inverters (grid-connected and off-grid), and cables, ensuring optimal system performance and reliability.	17	8	0	0
	● Acquire knowledge of safety practices and compliance standards related to solar energy installations, including structural integrity for mounting systems, electrical safety considerations for inverters and cables	16	8	0	0
	Total Marks	**50**	**23**	**0**	**0**
NOS4: Safety, Maintenance, and Repairs of Solar Panel NOS Code: NIE/ELE/N0814	● Acquire the knowledge and skills required to perform preventive and corrective maintenance on solar panels and associated components, identify failure patterns, use appropriate tools and equipment for maintenance tasks	17	7	0	0
	● Learners will understand safety protocols for working with high-voltage PV systems, implement safety measures to mitigate risks, adhere to national and local electrical codes and regulations.	17	7	0	0
	● Through hands-on training, students will learn how to commission solar energy systems, conduct performance testing to assess system efficiency, troubleshoot solar panel issues, protect and maintain batteries.	16	8	0	0

	Total Marks	**50**	**22**	**0**	**0**
	Sub-Total	**200**	**90**	**0**	**0**
Employability Skills NOS Code: DGT/VSQ/N0102	Employability Skills	0	0	0	50
Project / OJT*		0	0	0	60
Major Project /Dissertation(Marks)*	Project	0	0	100	0
		200	**90**	**100**	**110**
	Grand Total	**500**			

Annexure VII: 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.

Assessment of the qualification evaluates candidates to ascertain that they can integrate knowledge, skills and values for carrying out relevant tasks as per the defined learning outcomes and assessment criteria. The underlying principle of assessment is fairness and transparency. The evidence of the outcomes and assessment criteria. Competence acquired by the candidate can be obtained by conducting Theory (Online), Practical assessment, internal assessment, Project/Presentation/ Assignment, Major Project. The emphasis is on the practical demonstration of skills & knowledge gained by the candidate through the training. Each OUTCOME is assessed & marked separately. A candidate is required to pass all OUTCOMES individually based on the passing criteria.

About Examination Pattern:

1. The question papers for the theory exams are set by the Examination wing (assessor) of NIELIT HQS.
2. The assessor assigns the roll number.
3. The assessor carries out theory online assessments through remote proctoring methodology. Theory examination would be conducted online and the paper comprise of MCQ. Conduct of assessment are through trained proctors. Once the test begins, remote proctors have full access to candidate's video feeds and computer screens. Proctors authenticate the candidate based on registration details, pre-test image captured and I-

card in possession of the candidate. Proctors can chat with candidates or give warnings to candidates. Proctors can also take screenshots, terminate a specific user's test session, or re-authenticate candidates based on video feeds.

4. An External Examiner/ Observer may be deployed including NIELIT officials for evaluation of Practical examination/ internal assessment / Project/ Presentation/. Major Project (if applicable) would be evaluated preferably by external/ subject expert including NIELIT officials.

5. Pass percentage would be 50% marks in each component.

6. Candidates may apply for re-examination within the validity of registration (only in the assessment component in which the candidate failed).

7. For re-examination prescribed examination fee is required to be paid by the candidate only for the assessment component in which the candidate wants to reappear.

8. There would be no exemption for any paper/module for candidates having similar qualifications or skills.

9. The examination will be conducted in English language only.

Quality assurance activities: A pool of questions is created by a subject matter expert and moderated by other SME. Test rules are set beforehand. Random set of questions which are according to syllabus appears which may differ from candidate to candidate. Confidentiality and impartiality are maintained during all the examination and evaluation processes.

Annexure VIII: Acronym and Glossary

Acronym

Acronym	Description
AA	Assessment Agency
AB	Awarding Body
NCrF	National Credit Framework
NOS	National Occupational Standard(s)
NQR	National Qualification Register
NSQF	National Skills Qualifications Framework

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.