Model Curriculum

Solar PV Structural Design Engineer

SECTOR: GREEN JOBS
SUB-SECTOR: RENEWABLE ENERGY
OCCUPATION: Designer
REF ID: SGJ/Q0109, V1.0
NSQF LEVEL: 5

Skill India

SCGJ SKILL COUNCIL FOR GREEN JOBS

N·S·D·C National Skill Development Corporation
Transforming the skill landscape

Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

SKILL COUNCIL FOR GREEN JOBS

for the

MODEL CURRICULUM

Complying to National Occupational Standards of Job Role/
Qualification Pack: '**Solar PV Structural Design Engineer**' QP No. '**SGJ/Q 0109 NSQF Level 5**'

Date of Issuance: **October 16th, 2017**

Valid up to: **September 30th, 2019**

** Valid up to the next review date of the Qualification Pack*

Authorised Signatory
(Skill Council for Green Jobs)

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Solar PV Structural Design Engineer

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Solar PV Structural Design Engineer", in the "Green Jobs" Sector/Industry and aims at building the following key competencies amongst the learner.

Program Name	**Solar PV Structural Design Engineer**		
Qualification Pack Name & Reference ID.	SGJ/Q0109, v1.0		
Version No.	1.0	**Version Update Date**	04th Aug 2017
Pre-requisites to Training	Diploma in Civil Engineering/Structural Engineering		
Training Outcomes	**After completing this programme, participants will be able to:** • **Prepare the civil and structural design of solar PV power plant** • **Maintain personal health & safety at project site** • **Work effectively with others**		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of "Solar PV Structural Design Engineer" Qualification Pack issued by "Skill Council for Green Jobs".

S. No	Module	Key Learning Outcomes	Equipment Required
1	**Introduction to Solar PV Sector in India** **Theory Duration** (hh:mm) 18:00 **Practical Duration** (hh:mm) 6:00 **Introduction Module**	• overview of solar PV technology • understand the various market research reports and industrial magazines present in the market • type of ground mount PV Power Plants and working principles • overview of Rooftop Solar Sector in India • type of Rooftop Solar PV Power Plants and working principles • solar energy and power sector landscape in the country • benefits of solar energy over conventional sources of energy • typical specifications, functioning, operating principle, maintenance requirements, handling procedures and warranties of different types of solar PV plant components like PV modules, inverters, cables, junction boxes, monitoring system and other components • types of foundations of various components depending on the roof structure and its appropriateness for installing a solar PV power plant • types of foundations of various components depending on the different types of soils and its appropriateness for installing a solar PV power plant • types of loads for doing structural load analysis • types of module mounting structures, its selection and design based on type of roof/ soil test report	
2	**Design of module mounting structure and foundations** **Theory Duration** (hh:mm) 12:00 **Practical Duration** (hh:mm) 42:00 **Corresponding NOS Code** SGJ/N0127	• carry out the structural load analysis of rooftop • design the module mounting structure for the solar PV power plants including trackers if required • decide the type of foundation suitable for module mounting structures, inverters, transformers, etc. based on the type of roof / soil test report • design the foundations for the module mounting structures • design the foundations for inverters, transformers, etc.	Licenced Structural Designing software
3.	**Design of solar PV power plant layout and allied civil/ structural works** **Theory Duration** (hh:mm)	• design the overall structural layout of the solar PV power plant • design the civil/ structural allied works of the solar PV power plant including o compound wall /entry gate o internal plant roads o walkways between different rows of modules	Site visit for practical learning, Licenced Structural Designing software.

	12:00 **Practical Duration** (hh:mm) 30:00 **Corresponding NOS Code** SGJ/N0127	o water distribution network o water drainage system, etc. • prepare the civil/ structural drawings for the solar PV power plant	
4.	**Preparation of structural design report** **Theory Duration** (hh:mm) 12:00 **Practical Duration** (hh:mm) 30:00 **Corresponding NOS Code** SGJ/N0127	• document the specifications of materials, components, etc. used for foundations, mounting structures, etc. • document the assumptions used for designing the foundations, mounting structures, etc. • prepare the structural design report	
5	**Maintain Personal Health & Safety at project site** **Theory Duration** (hh:mm) 06:00 **Practical Duration** (hh:mm) 06:00 **Corresponding NOS Code** SGJ/N0106	• identify corporate policies required for workplace safety • identify requirements for safe work area and create a safe work environment • identify contact person when workplace safety policies are violated • provide information about incident/violation • identify the location of first aid materials and administer first aid • identify the personal protection equipment required for specific locations on-site • identify expiry dates and wear & tear issues of specified equipment • demonstrate safe and accepted practices for personal protection • identify environmental hazards associated with the project site • identify electrical hazards • identify personal safety hazards or work site hazards and mitigate hazards • select tools, equipment and testing devices needed to carry out the work • demonstrate safe and proper use of required tools and equipment • check access from ground to work area to ensure it is safe and in accordance with requirements • re-assess risk control measures, as required, in accordance with changed work practices and/or site conditions and undertake alterations • inspect/install fall protection and perimeter protection equipment ensuring adequacy for work and conformance to regulatory requirements	Safety helmet, Safety souse, Safety belt, Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves

		• identify approved methods of moving tools and equipment to work area and minimize potential hazards associated with tools at heights • select and install appropriate signs and barricades • place tools and materials to eliminate or minimize the risk of items being knocked down • dismantle plant safely in accordance with sequence and remove from worksite to clear work area	
6	**Work effectively with others** **Theory Duration** (hh:mm) 06:00 **Practical Duration** (hh:mm) 12:00 **Corresponding NOS Code** SGJ/N0120	• accurately pass on information to the authorized persons who require it and within agreed timescale and confirm its receipt • assist others in performing tasks in a positive manner where required and possible • consult and assist others to maximize effectiveness and efficiency in carrying out tasks • display appropriate communication etiquette while working • display active listening skills while interacting with others at work • demonstrate responsible and disciplined behaviors at the workplace • escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict • identify the need for common grounds with clients, team members, etc. and negotiate in an effective manner to achieve the same • consider and respect the opinions, creativity, values, beliefs and perspectives of others • ensure collaboration and group participation to achieve common goals • promote a friendly, co-operative environment that is conducive to employee's sense of belonging • facilitate an understanding and appreciation of the differences among team members	
	Theory Duration (hh:mm) 80:00 **Practical Duration** (hh:mm) 120:00	Licenced Structural Designing software; Safety helmet, Safety souse, Safety belt, Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves, Site visit for practical learning	

Grand Total Course Duration: 200 **Hours, 0 Minutes**

*(This syllabus/ curriculum has been approved by **Skill Council for Green Jobs)***

Trainer Prerequisites for Job role: "Solar PV Structural Design Engineer" mapped to Qualification Pack: "SGJ/Q0109, v1.0"

Sr. No.	Area	Details
1	**Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack "SGJ/Q0109, Version 1.0".
2	**Personal Attributes**	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in the mentioned field.
3	**Minimum Educational Qualifications**	Diploma in Civil Engineering/Structural Engineering
4a	**Domain Certification**	Certified for Job Role: "Solar PV Structural Design Engineer" mapped to QP: "SGJ/Q0109, Version 1.0". Minimum accepted score as per respective as per SCGJ guidelines is 80%.
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/Q0102" or equivalent. Minimum accepted score as per SSC is 80%.
5	**Experience**	Three years of experience of designing civil foundations and mounting structures of Solar PV power plants Or Two years of experience designing civil foundations and mounting structures of Solar PV power plants with a valid certificate of any structural designing software.

CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role Solar PV Structural Design Engineer

Qualification Pack SGJ/Q0109

Sector Skill Council Green Jobs

Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion.
6. To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
7. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

Compulsory NOS **Total Marks: 200**			**Marks allocation**		
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
SGJ/N0127 Prepare the civil and structural design of solar PV power plant	PC1. carry out the structural load analysis of rooftop	**100**	15	6	9
	PC2. design the module mounting structure for the solar PV power plants including trackers if required		15	7	8
	PC3. decide the type of foundation suitable for module mounting structures, inverters, transformers, etc. based on the type of roof / soil test report		10	5	5
	PC4. design the foundations for the module mounting structures		10	4	6
	PC5. design the foundations for inverters, transformers, etc.		10	4	6
	PC6. design the overall structural layout of the solar PV power plant		15	6	9
	PC7. design the civil/ structural allied works of the solar PV power plant including: • compound wall /entry gate • internal plant roads • walkways between different rows of		10	4	6

	modules • water distribution network • water drainage system, etc.				
	PC8. document the specifications of materials, components, etc. used for foundations, mounting structures, etc.		5	3	2
	PC9. document the assumptions used for designing the foundations, mounting structures, etc.		5	3	2
	PC10. prepare and handover the structural design report		5	3	2
		TOTAL	**100**	**45**	**55**
SGJ/ N0106 Maintain personal health & safety at project site	PC1. identify corporate policies required for workplace safety	**50**	2	1	1
	PC2. identify requirements for safe work area and create a safe work environment		3	2	1
	PC3. identify contact person when workplace safety policies are violated		1	1	0
	PC4. provide information about incident/violation		1	1	0
	PC5. identify the location of first aid materials and administer first aid		2	1	1
	PC6. identify the personal protection equipment required for specific locations on-site		3	2	1
	PC7. identify expiry dates and wear & tear issues of specified equipment		2	1	1
	PC8. demonstrate safe and accepted practices for personal protection		3	2	1
	PC9. identify environmental hazards associated with the project site		2	1	1
	PC10. identify electrical hazards		4	2	2
	PC11. identify personal safety hazards or work site hazards and mitigate hazards		4	2	2
	PC12. select tools, equipment and testing devices needed to carry out the work		4	2	2
	PC13. demonstrate safe and proper use of required tools and equipment		4	2	2
	PC14. check access from ground to work area to ensure it is safe and in accordance with requirements		2	1	1

	PC15. reassess risk control measures, as required, in accordance with changed work practices and/or site conditions and undertake alterations		2	2	0
	PC16. inspect/install fall protection and perimeter protection equipment ensuring adequacy for work and conformance to regulatory requirements		4	2	2
	PC17. identify approved methods of moving tools and equipment to work area and minimize potential hazards associated with tools at heights		2	1	1
	PC18. select and install appropriate signs and barricades		2	1	1
	PC19. place tools and materials to eliminate or minimize the risk of items being knocked down		1	1	0
	PC20. dismantle plant safely in accordance with sequence and remove from worksite to clear work area		2	1	1
		TOTAL	**50**	**29**	**21**
SGJ/ N0120 Work effectively with others	PC1. accurately pass on information to the authorized persons who require it and within agreed timescale and confirm its receipt	**50**	4	2	2
	PC2. assist others in performing tasks in a positive manner where required and possible		4	2	2
	PC3. consult and assist others to maximize effectiveness and efficiency in carrying out tasks		4	2	2
	PC4. display appropriate communication etiquette while working		6	3	3
	PC5. display active listening skills while interacting with others at work		4	2	2
	PC6. demonstrate responsible and disciplined behaviors at the workplace		4	2	2
	PC7. escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict		3	1	2
	PC8. identify the need for common grounds with clients, team members, etc.		3	1	2

	and negotiate in an effective manner to achieve the same				
	PC9. consider and respect the opinions, creativity, values, beliefs and perspectives of others		4	2	2
	PC10. ensure collaboration and group participation to achieve common goals		6	3	3
	PC11. promote a friendly, co-operative environment that is conducive to employee's sense of belonging		4	2	2
	PC12. facilitate an understanding and appreciation of the differences among team members		4	2	2
		TOTAL	**50**	**24**	**26**