Model Curriculum

QP Name: O&M Mechanical Technician-Wind Power Plant

QP Code: SGJ/Q1502

QP Version: 2.0

NSQF Level: 4

Model Curriculum Version: 1.0

Skill Council for Green Jobs
3rd Floor, CBIP Building, Malcha Marg, Chanakyapuri
New Delhi - 110021

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Training Parameters

Sector	Green Jobs
Sub-Sector	Renewable Energy
Occupation	Operation & Maintenance
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/3115.0102
Minimum Educational Qualification & Experience	Class 12th with science with 1 year relevant work experience or ITI after Class 10th (Electrician /Mechanical/ Fitter/Welder/ and related trades) with 1 year of relevant work experience or Government recognised 3 years Diploma (Electrical/ Mechanical/ Civil/Electronics & Communication / Control & Instrumentation)
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	
Next Review Date	
NSQC Approval Date	25th Nov 2021
Version	
Model Curriculum Creation Date	
Model Curriculum Valid Up to Date	
Model Curriculum Version	1.0
Minimum Duration of the Course	200 hours + 100 hours (Optional OJT)
Maximum Duration of the Course	200 hours + 100 hours (Optional OJT)

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills.

- Carry out operation of mechanical components of wind power plant
- Carry out maintenance of mechanical components of wind power plant
- Perform basic health and safety practices at project site (Ground and Height)
- Communicate, develop interpersonal skills and develop sensitization towards gender and person with disability

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
Bridge Module					
Introduction to Wind Power Sector *Module 1 (Bridge Module)*	12:00	00:00	-	-	12:00
SGJ/N1507: Operate mechanical components of Wind power plant **NOS Version No.** **NSQF Level 4**					
Module 2: Carry out operation of mechanical components of wind power plant	24:00	40:00	-	*50 Hours Recommended OJT/On Site Training*	64:00
SGJ/N1504: Carry out maintenance of mechanical components of wind power plant					

NOS Version No. **NSQF Level 4**					
Module 3: Carry out maintenance of mechanical components of wind power plant	24:00	34:00	-	*50 Hours Recommended OJT/On Site Training*	58:00
SGJ/N1201: Perform basic health and safety practices at project site (Ground and Height) **NOS Version No.** **NSQF Level 4**					
Module 4: Perform basic health and safety practices at project site (Ground and Height)	18:00	30:00	-	-	48:00
SGJ/N0120 – Work effectively with others **NOS Version No. 1.0** **NSQF Level 4**					
Module 5: Effective and Efficient Working Practices	06:00	12:00	-	-	18:00
Total Duration	**84:00**	**116:00**	-	-	**200:00 + 100 Hours (optional OJT)**

Module Details

Module 1: Introduction to Wind Power Sector

Mapped to Bridge Module

Terminal Outcomes:

- Provide overview of wind energy sector in India
- Explain the working principles of wind energy power plan and identify its key components
- Explain specification, functioning, maintenance requirements, warranties and handling procedures of wind power plant components

Duration: 12:00	**Duration:** 00:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Identify different types of Wind technology and overview of Wind energy sector in India • Understand key insights in the sector through various market research reports and magazines. • Identify different types of wind power plant, its components and working principles. • Understand basics of electrical concepts like voltage, current, power, energy, etc. • Explain the benefits of wind energy over conventional sources of energy. • Describe the typical specifications, functioning, operating principle, maintenance requirements, warranties, and safe operating & handling procedures of different Wind power plant components like Blades, towers, motors, monitoring system and other components. • Identify various ways to optimise material, energy/electricity consumption across processes and follow specified process for waste disposal.	
Classroom Aids:	
Whiteboard and Markers; Chart paper and sketch pens; LCD Projector and Laptop for presentations	
Tools, Equipment and Other Requirements	
PCs/Laptops; Internet with Wi-Fi (Min 2 Mbps Dedicated) ; Documents of standard operating procedures, code of conduct, checklists, schedules, tools and equipment, status report	

Module 2: Carry out operation of mechanical components of wind power plant

Mapped to SGJ/N1507

Terminal Outcomes:

- Demonstrate how to perform visual inspection of the mechanical components and record any defects
- Discuss how to prepare site and mechanical equipment and carry out inspection as per required schedule
- Explain to monitor working efficiency and measure and record real time parameters of WTG and associated components

Duration: *24:00*	**Duration:** *40:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Identify the operation manuals of all mechanical components for inspection. • Explain how to prepare site and equipment for inspection. • Discuss how to carry out inspections of WTG, blade and associated mechanical components as per schedule. • Explain how to monitor working efficiency of WTG and associated components. • Explain to identify the location of the conduit, cables, pipes & other undergoing devices prior to performing maintenance work. • Explain to arrange for tools to carry out online testing of WTG and components. • Explain to measure and record real time parameters of WTG and associated components like vibration, torquing, temperature of bearings, grease level, alignment etc. • Discuss to measure and record real time parameters of wind turbine blades and associated components like temperature, vibration, alignment, etc.	• Demonstrate how to select the appropriate PPE (Personal Protective Equipment) to carry out the specific activity • Demonstrate how to acquire required approvals and permit to work (PTW) from the concerned authority. • Demonstrate if the equipment/machine is functioning normally before commencing work and rectify wherever required. • Show how to verify and record the operative parameters for all components as per design standards. • Demonstrate how to perform visual inspection of the surroundings and the mechanical components and record any defects. • Demonstrate how to maintain log of all systems condition (parameters). • Show how to prepare report and submit to site in-charge/plant head for further action.
Classroom Aids:	
Laptop, white board, marker, projector	
Tools, Equipment and Other Requirements	
Wind Sim, Google Earth, Global Mapper, Multimeter, Megger, Hydrometer, Magnetic Flux Meter, Pyranometer, Anemometer, Tool kit Box/bag portable, Electrical Symbol and Accessories Charts, Safety Kits	

Module 3: Carry out maintenance of mechanical components of wind power plant

Mapped to SGJ/N1504

Terminal Outcomes:

- Explain to perform visual inspection of the mechanical systems and record any defects
- Explain how to acquire required approvals and permit to work at the site from the concerned authority
- Explain how to perform repair or replacement of faulty equipment/components as per the standard operating procedures.
- Discuss how to conduct readiness test on post replacement of equipment

Duration: *24:00*	**Duration:** *34:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Identify required approvals and permit to work (PTW) from the concerned authority • Discuss to ensure that the system is shut down prior to carrying out work • Explain to carry out maintenance activities for mechanical components of WTG as per standard operating procedures • Explain how to carry out testing of WTG and associated components on universal testing machine (UTM), compression testing machine (CTM). • Arrange for tools and replacement equipment from the supervisor if required • Explain the importance of performing repair or replacement of faulty mechanical components of wind power plant as per standard operating procedures • Explain how to conduct readiness test on post replacement of equipment	• Demonstrate to select the appropriate PPE (Personal Protective Equipment) to carry out the specific activity • Demonstrate to perform visual inspection of the mechanical components of wind power plant and record any defects • Demonstrate to measure and record parameters post maintenance activities. • Demonstrate how to report to the supervisor in case of any deviations from standard values. • Demonstrate how to carry out repair or replacement of faulty mechanical components of wind power plant as per standard operating procedures.
Classroom Aids:	
Laptop, white board, marker, projector	
Tools, Equipment and Other Requirements	
Wind Sim, Google Earth, Global Mapper, Multimeter, Megger, Hydrometer, Magnetic Flux Meter, Pyranometer, Anemometer, Tool kit Box/bag portable, Electrical Symbol and Accessories Charts, Safety Kits	

Module 4: Perform basic health and safety practices at project site (Ground and Height)

Mapped to SGJ/N1201

Terminal Outcomes:

- Explain how to ensure safe working practices at project site
- Explain about the concerned documentation and people responsible for health and safety at project site
- Explain about the methods for accident preparation and how to inform appropriate authorities, in case of abnormal situation at project site

  Explain about implementing good housekeeping practices including appropriate waste disposal strategies as per organisational norms

Duration: 18:00	**Duration:** 30:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the importance of selecting the relevant protective clothing/equipment for specific tasks and work. • Discuss about relevant documents and people responsible for health and safety at project site. • Identify possible causes of risk at project site and their mitigation measures. • Explain how to identify and follow warning signs on site. • Discuss how to establish safe working procedures at the project site. • Discuss how to ensure safe working practices when working at heights, confined areas and trenches. • Identify methods of accident. prevention in the work environment. • Discuss how to follow safe operating procedures for lifting, carrying and transporting heavy objects & tools. • Inspect the project site on a regular basis for any signs of spillage. • Ensure safe storage of flammable materials and machine lubricating oil. • Explain how to apply good housekeeping practices at all times by removal/disposal of waste products. • Explain how to promptly inform relevant authorities about any	• Demonstrate how to use appropriate Personal Protective Equipment (PPE) while performing work. • Employ appropriate techniques while handling tools and equipment to ensure safety of self and others. • Demonstrate how to properly work while sitting or lifting heavy materials as per standards ergonomic principles to avoid injury. • Perform the steps to clean and disinfect material, tools, equipment and other supplies before starting work and after completing the job. • Demonstrate how to participate in emergency and evacuation drills to be able to take necessary action in case of accidents, fires and natural calamities • Demonstrate correct techniques to move an injured person during an emergency. • Demonstrate how to use appropriate fire extinguishers for different types of fire at workplace. • Show how to provide first aid to a victim in case of exposed wounds, cuts, burns, choking, electric shock,

abnormal situation/behavior of any equipment/system. • Exhibit the use of various appropriate fire extinguishers on different types of fires. • Identify rescue techniques applied during fire hazard. • Explain how to administer appropriate first aid to victims were required e.g. in case of bleeding, burns, choking, electric shock, poisoning etc. • Discuss how to respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments. • Explain how to report the accident to the relevant authority in the prescribed format.	poisoning, or any other situation such as a cardiac arrest. • Demonstrate how to dispose hazardous waste as per organisational norms.
Classroom Aids:	
Whiteboard and Markers; Chart paper and sketch pens; LCD Projector and Laptop for presentations	
Tools, Equipment and Other Requirements	
Safety tool kits (including gloves, mask, boots, safety harness etc.), first aid kit	

Module 5: Effective and Efficient Working Practices

Mapped to SGJ/N0120

Terminal Outcomes:

- Communicate effectively with others
- Work in a collaborative manner
- Respect diversity

Duration: 06:00	Duration: 12:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the legislation, standards, policies, and procedures to be followed at the workplace within one's own scope of work. • Identify the different types of communication and the basic etiquette involving verbal and non-verbal communication. • Explain how to collect complete information and instructions from concerned authority/person. • Discuss the importance of communicating without any personal, gender, disability, caste, religion, colour, sexual orientation and culture biases. • Distinguish between different types of disabilities with their respective consideration and limitations. • Elaborate how to assist others in their tasks using a positive attitude to maximize effectiveness and efficiency at work. • Describe the communication etiquette to be followed at workplace. • Explain the importance of listening actively while interacting with others at work. • Outline basic characteristics that define responsible and disciplined behaviour at the workplace. • Discuss the need to attain common grounds with clients, team members, and other working personnel to enable smooth efficient workflow while considering and	• Demonstrate how to communicate verbal, non-verbal and written information timely, accurately and clearly using an inclusive language that is gender, disability and culturally sensitive. • Show how to interact using appropriate behaviour and gestures/body language, taking gender and disability into consideration to depict equal treatment for all clients, colleagues and co-workers. • Outline various methods to escalate and report grievances and issues to concerned authority as per organizational procedure to resolve them and avoid conflict. • Demonstrate how to collaborate with others and participate in group activities and tasks.

respecting the opinions, creativity, values, beliefs and perspectives of others. • Elaborate the need of ensuring a friendly, co-operative environment that is conducive to employees' sense of belonging at workplace while understanding and appreciating the differences among team members.	
Classroom Aids	
LCD Projector and Laptop for presentations	
Tools, Equipment and Other Requirements	
Short-answer and fill-in-the blank, rubrics and quizzes, charts	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
BE/B.Tech [The education qualification can be relaxed in case of extraordinary relevant field experience]		2		0		NA

Trainer Certification	
Domain Certification	**Platform Certification**
Job Role: "O&M Mechanical Technician-Wind Power Plant" Level 4" "SGJ/Q1502" v1.0, Minimum accepted score is 70%	Job Role: "Trainer", "MEP/Q2601" v1.0, Minimum accepted score is 80%

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	*Specialization*	*Years*	*Specialization*	
BE/B.Tech [The education qualification can be relaxed in case of extraordinary relevant field experience]		3		0		**NA**

Assessor Certification	
Domain Certification	**Platform Certification**
Job Role: "O&M Mechanical Technician-Wind Power Plant" Level 4" "SGJ/Q1502" v1.0, Minimum accepted score is 70%	Job Role: "Assessor", "MEP/Q2701" v1.0, Minimum accepted score is 80%

Assessment Strategy

1. Assessment System Overview:

    - Batches assigned to the assessment agencies for conducting the assessment on SDSM/SIP or email
    - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
    - Assessment agency deploys the ToA certified Assessor for executing the assessment
    - SSC 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

References

Glossary

Term	Description
Declarative Knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning Outcome	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
OJT (R)	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do **upon the completion of the training**.
Terminal Outcome	Terminal outcome is a statement of what a learner will know, understand and be able to do **upon the completion of a module**. A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

Term	Description
QP	Qualification Pack
NSQF	National Skills Qualification Framework
NSQC	National Skills Qualification Committee
NOS	National Occupational Standards
SOP	Standard Operating Procedures