



# Model Curriculum

**Standalone NOS: Repair and maintenance of solar powered farm equipment/machinery**

**NOS Code: AGR/N1150**

**Version: 1.0**

**NSQF Level: 4**

**Model Curriculum Version: 1.0**

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# Table of Contents

Training Parameters.....	3
Program Overview .....	4
Training Outcomes.....	4
Compulsory Modules.....	4
Module 1: Carryout repair and maintenance of solar powered farm equipment/machinery.....	5
Trainer Requirements .....	7
Assessor Requirements.....	8
Assessment Strategy.....	9
References .....	14
Glossary.....	14
Acronyms and Abbreviations.....	15

## Training Parameters

Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Farm machinery, Equipment Operation and maintenance
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO/2015-NIL
Minimum Educational Qualification and Experience	12th or equivalent with 1-year of experience in Agriculture and allied sectors OR Completed 2 <sup>nd</sup> year of 3 year diploma in Agriculture/Horticulture/Forestry/Agriculture Engineering/Veterinary Sciences/Animal Husbandry/Diary Technology after 10th OR Previous relevant Qualification of NSQF Level 3.5 with 1.5-year of experience in in Agriculture and allied sectors OR Previous relevant Qualification of NSQF Level 3 with 3-year of experience in in Agriculture and allied sectors
Pre-Requisite License or Training	NA
Minimum Job Entry Age	NA
Last Reviewed On	30-04-2024
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NSQC Approval Date	30-04-2024
QP Version	1.0
Model Curriculum Creation Date	30-04-2024
Model Curriculum Valid Up to Date	30-04-2027
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Minimum Duration of the Course	37.5 Hours
Maximum Duration of the Course	37.5 Hours

## 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 to:

- Prepare for repair and maintenance work
- Carry out repair and maintenance work
- Complete repair and maintenance activities

### 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
<b>AGR/N1150: Repair and maintenance of solar powered farm equipment/machinery</b> NOS Version: 1.0 NOS Level: 4	22:30	15:00	0:00	0:00	37:30
Module 1: Carryout repair and maintenance of solar powered farm equipment/machinery	22:30	15:00	0:00	0:00	37:30
<b>Total Duration</b>	<b>22:30</b>	<b>15:00</b>	<b>0:00</b>	<b>0:00</b>	<b>37:30</b>

## Module Details

### Module 1: Carryout repair and maintenance of solar powered farm equipment/machinery

*Mapped to AGR/N1150*

#### Terminal Outcomes:

- Prepare for repair and maintenance work
- Carry out repair and maintenance work
- Complete repair and maintenance activities

Duration: 22:30	Duration: 15:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>● Explain about different types of solar-powered equipment/machinery used for agriculture</li> <li>● Explain about construction of solar powered equipment/machinery in agriculture and their maintenance requirements</li> <li>● Describe various components of solar-powered equipment/machinery, maintenance requirements and repair procedures and also about applicable warranty covers.</li> <li>● Discuss working principles of solar-powered equipment/machinery</li> <li>● Differentiate Alternating and direct current</li> <li>● Explain about AC and DC solar systems</li> <li>● Describe various types, characteristics, uses and limitations of solar-powered tools</li> <li>● Explain tools required for service and repair activities of solar-powered equipment/machinery</li> <li>● Explain about basic diagnostic processes and techniques</li> <li>● Explain environmental codes of practice with regard to maintenance activities</li> </ul>	<ul style="list-style-type: none"> <li>● Select and inspect tools, equipment and materials appropriate to job requirements</li> <li>● use personal protective equipment according to job requirements and task to be undertaken</li> <li>● apply basic diagnostic techniques to assess the fault</li> <li>● Carry out dismantling of solar powered applications appropriately</li> <li>● Identify hazards in the workplace, assess and control risks appropriately</li> <li>● Confirm machinery and equipment faults, malfunctions and deterioration of components</li> <li>● Estimate scope and cost for repair and maintenance activity.</li> <li>● Identify worn or damaged parts and remove or overhaul</li> <li>● Implement repair and replacement process for major repairs according to workplace requirements and manufacturers' specifications</li> <li>● Report complex faults and repairs and refer for specialist advice and remedial action appropriately</li> <li>● Retrieve lost equipment appropriately</li> </ul>

- Explain about work health and safety legislative requirements

- Reassemble and test solar powered farm equipment/machinery for full function
- Clean and store tools and equipment appropriately
- Collect, treat, dispose of or recycle waste from service and repair activities appropriately
- Clean, maintain and return work areas to operating condition
- Document information appropriately

#### Classroom Aids

White board, Marker, Overhead projector, Laptop, Internet access,

#### Tools, Equipment and Other Requirements

Different types of solar-powered farm equipment/machinery, Service and repair tools

## Annexure

### Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
<b>Diploma</b>	Electrical, Electronics, Civil, Mechanical, Fitter, Instrumentation, Agriculture engineering	3	solar powered farm equipment/machinery	0		
<b>ITI</b>	Electrical, Electronics, Civil, Mechanical, Fitter, Instrumentation	3	solar powered farm equipment/machinery	0		
<b>Graduate (B.Tech / BE)</b>	Civil/Mechanical/Electrical/Instrumentation /Electronics /Electrical and Electronics Eng./Agriculture engineering.	2	solar powered farm equipment/machinery	0		For the school Program minimum qualification of the Trainer should be Graduate (Agriculture/ Physics). Their Teaching experience will be considered industry experience
<b>Certificate</b>	CITS Pass- Electrician & Wireman Certificate	1	solar powered farm equipment/machinery			
Trainer Certification						
Domain Certification			Platform Certification			
Certified for NOS “Repair and maintenance of solar powered farm equipment/machinery”, mapped to NOS: “AGR/N1150, v1.0”, Minimum accepted score is 80%			Recommended that the Trainer is certified for the Job Role: “Trainer (Vet and Skills)”, mapped to the Qualification Pack: “MEP/Q2601, v2.0”. The minimum accepted score as per MEPSC guidelines is 80%.			

## Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	Specialization	Years	Specialization	
Graduate (B.Tech / BE)	Civil/Mechanical/Electrical/Instrumentation /Electronics /Electrical and Electronics Eng./Agriculture engineering.	2	solar powered farm equipment/machinery	0		For the school Program minimum qualification of the Trainer should be Graduate (Agriculture/Physics). Their Teaching experience will be considered industry experience
Certificate	CITS Pass- Electrician & Wireman Certificate	1	solar powered farm equipment/machinery			

Assessor Certification	
Domain Certification	Platform Certification
Certified for NOS “ <b>Repair and maintenance of solar powered farm equipment/machinery</b> ”, mapped to NOS: “AGR/N1150, v1.0”, Minimum accepted score is 80%	Certified for the Job Role: “Assessor (Vet and Skills)”, mapped to the Qualification Pack: “MEP/Q2701, v2.0”, with a minimum score of 80%.

## Assessment Strategy

### Assessment System Overview

In Agriculture Sector it is of ultimate importance that individuals dealing with crop production or livestock have the requisite knowledge and competencies to undertake the task. Based on the Assessment Criteria, SSC in association with empaneled AAs, define the test structure for the given job roles to cover the required skills and competencies. Assessment strategy consists of the following:



1. Multiple Choice Questions: To assess basic knowledge (Objective/Subjective)
2. Viva: To assess awareness on processes (Oral and/or written questioning)
3. Practical: To evaluate skills and identify competencies. (Observation)

Assessments for knowledge and awareness on processes may be conducted through ‘real-time’ internet-based evaluation or by conducting the same ‘offline’ through TABs. Skills and competencies are to be assessed by conducting ‘practical’ on the ground through qualified and ToA certified assessors.

An individual must have adequate knowledge and skills to perform a specific task, weightage for different aspects of the assessment is given as follows:

- Multiple Choice Questions: 20%-30%, depending on the specific QP
- Viva: 20%
- Practical: 50% - 60% (Involves demonstrations of applications and presentations of procedures/tasks and other components)
- Assessment will be carried out by certified assessors through empaneled assessment partners. Based on the results of the assessment; ASCI will certify the learners/candidates

### Testing Environment

Assessments are conducted on laptops, Mobiles and android tablets via both offline and online mode depending on the internet connectivity at the assessment location.

In remote locations/villages, assessments get delivered through tablets without the requirement of the Internet.

- Multilingual assessments (ASCI is conducting the assessments in 13 + languages pan India)
- Rubric driven assessments in Practical/Viva sections and responses recorded accordingly
- All responses, data, records and feedback are stored digitally on the cloud
- Advanced auto-proctoring features – photographs, time-stamp, geographic-tagging, toggle- screen/copy-paste disabled, etc.
- Android-based monitoring system
- End to end process from allocation of a batch to final result upload, there is no manual intervention
- Assessment will normally be fixed for a day after the end date of the training / within 7 days of completion of training.
- Assessment will be conducted at the training venue
- The room where assessment is conducted will be set with proper seating arrangements with enough space to curb copying or other unethical activities
- Question bank of theory and practice will be prepared by ASCI /assessment agency and approved ASCI. Only from approved Question Bank assessment agency will prepare the question paper. Theory testing will include multiple-choice questions,

pictorial questions, etc. which will test the trainee on his theoretical knowledge of the subject.

- The theory, practical and viva assessments will be carried out on the same day. In case of a greater number of candidates, the number of assessors and venue facilitation be increased and facilitated

Assessment			
Assessment Type	Formative or Summative	Strategies	Examples
Theory	Summative	MCQ/Written exam	Knowledge of facts related to the job role and functions. Understanding of principles and concepts related to the job role and functions
Practical	Summative	Structured tasks/Demonstration	Practical application /Demonstration /Application tasks
Viva	Summative	Questioning and Probing	Mock interviews on the usability of job roles/advantages /importance of adherence to procedures. Viva will be used to gauge trainee's confidence and correct knowledge in handling the job situation

The question paper is pre-loaded in the computer /Tablet and it will be in the language as requested by the training partner.

## Assessment Quality Assurance framework

### Assessment Framework and Design:

Based on the Assessment Criteria, SSC in association with AAs will define the test structure for the given roles to cover the required skills and competencies. ASCI offer a bouquet of tools for multi-dimensional evaluation of candidates covering language, cognitive skills, behavioural traits and domain knowledge.

**Theoretical Knowledge** - Item constructs and types are determined by a theoretical understanding of the testing objectives and published research about the item types and constructs that have shown statistical validity towards measuring the construct. Test item types that have been reported to be coachable are not included. Based on these, items are developed by domain experts. They are provided with comprehensive guidelines of the testing objectives of each question and other quality measures.

**Type** – Questions based on Knowledge Required, Case-based practical scenario questions and automated simulation-based questions.

**Practical Skills** - The practical assessments are developed taking into consideration two aspects: what practical tasks is the candidate expected to perform on the job and what aspects of the job cannot be judged through theoretical assessments. The candidates shall be asked to perform either an entire task or a set of subtasks depending on the nature of the job role

**Type** – Standardized rubrics for evaluation against a set of tasks in a demo/practical task

**Viva Voce** - Those practical tasks which cannot be performed due to time or resource constraints are evaluated through the viva mode. Practical tasks are backed up with Viva for thorough assessment and complete evaluation

**Type** – Procedural questions, dos and don'ts, subjective questions to check the understanding of practical tasks.

The assessor has to go through an orientation program organized by the Assessment Agency. The training would give an overview to the assessors on the overall framework of QP evaluation. The assessor shall be given a NOS and PC level overview of each QP as applicable. The overall structure of assessment and objectivity of the marking scheme will be explained to them. The giving of marks will be driven by an objective framework that will maintain the standardization of the marking scheme.

### Type of Evidence and Evidence Gathering Protocol:

During the assessment the evidence collected by AAs and ASCI are:

- GeoTagging to track ongoing assessment
- AA's coordinator emails the list of documents and evidence (photos and videos) to the assessor one day before the assessment. The list is mentioned below:
  - Signed Attendance sheet
  - Assessor feedback sheet

- Candidate feedback sheet
  - Assessment checklist for assessor
  - Candidate Aadhar/ID card verification
  - Pictures of the classroom, labs to check the availability of adequate equipment's and tools to conduct the training and assessment
  - Pictures and videos of Assessment, training feedback and infrastructure.
- Apart from the Assessor, a Technical assistant is popularly known as Proctor also ensures the proper documentation and they verify each other's tasks.
  - To validate their work on the day of the assessment, regular calls and video calls are done.
  - On-boarding and training of the assessor and proctor are done on a timely basis to ensure that the quality of the assessment should be maintained.
  - Training covers the understanding of QP, NSQF level, NOS and assessment structure

### **Methods of Validation**

- Morning Check (Pre-Assessment): Backend team of AA calls and confirms assessor/technical SPOC event status. Assessor/Technical SPOC are instructed to reach the centre on time by 9:30 AM / as decided with TC and delay should be highlighted to the Training Partner in advance.
- Video Calls: Random video calls are made to the technical SPOC/assessor so as to keep a check on assessment quality and ensure assessment is carried out in a fair and transparent manner
- Aadhar verification of candidates
- Evening Check (Post Assessment): Calls are made to the ground team to ensure the event is over by what time and the documentation is done properly or not.
- TP Calling: To keep a check on malpractices, an independent audit team calls the TP on a recorded line to take confirmation if there was any malpractice activity observed in the assessment on part of the AA/SSC team. If calls are not connected, an email is sent to TP SPOC for taking their confirmation
- Video and Picture Evidence: Backend team collects video and pictures for assessment on a real-time basis and highlights any issue such as students sitting idle/ trainer helping the candidates during the assessment.
- Surprise Visit: Time to time SSC/AA Audit team can visit the assessment location and conduct a surprise audit for the assessment carried out by the ground team.
- Geo Tagging: On the day of the assessment, each technical SPOC is required to login into our internal app which is Geotagged. Any deviation with the centre address needs to be highlighted to the assessment team on a real-time basis.

### **Method for assessment documentation, archiving, and Access:**

- ASCI have a fully automated result generation process in association with multiple AAs
- Theory, Practical and Viva marks form the basis of the results and encrypted files generated to avoid data manipulation. All responses were captured and stored in the

System with Time-Stamps at the end of AAs and SSC. NOS-wise and PC-wise scores can be generated.

- Maker Checker concept: One person prepares the results and another audit result which is internally approved by AA at first and then gets vetted at the end of SSC
- All softcopies of documents are received from the on-ground tech team over email. The same is downloaded by our internal backend team and saved in Repository. The repository consists of scheme-wise folders. These scheme-wise folders have two job role-specific folders. These specific folders have Year wise and Month wise folders where all documents are saved in Batch specific folders. All Hard copies are filed and stored in the storeroom.

#### ***Result Review & Recheck Mechanism –***

- Time-stamped assessment logs
- Answer/Endorsement sheets for each candidate
- Attendance Sheet
- Feedback Forms: Assessor feedback form, Candidate feedback form, TP feedback form
- The results for each of the candidates shall be stored and available for review (retained for 5 years/ till the conclusion of the project or scheme)

## References

### Glossary

Term	Description
<b>Declarative Knowledge</b>	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.
<b>Key Learning Outcome</b>	The 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).
<b>OJT (M)</b>	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on-site
<b>OJT (R)</b>	On-the-job training (Recommended); trainees are recommended the specified hours of training on-site
<b>Procedural Knowledge</b>	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.
<b>Training Outcome</b>	Training outcome is a statement of what a learner will know, understand and be able to do upon the completion of the training.
<b>Terminal Outcome</b>	The 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
AGR	Agriculture
NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
OJT	On-the-job Training
PwD	People with Disability
PPE	Personal Protective Equipment