



Model Curriculum

QP Name: Soil & Water Testing Lab Technician

QP Code: AGR/ Q8102

QP Version: 3.0

NSQF Level: 4

Model Curriculum Version: 2.0

Agriculture Skill Council of India || Agriculture Skill Council of India (ASCI), 6th Floor, GNG Tower, Plot No. 10, Sector -44

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Training Parameters

Sector	Agriculture
Sub-Sector	Agriculture Industries
Occupation	Research and Development
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/3111.0200
Minimum Educational Qualification and Experience	Minimum Educational Qualification: 12th grade pass OR Completed 2nd year of 3-year diploma (after 10th) and pursuing regular diploma OR 10th grade pass plus 2-year NTC OR 10th grade pass plus 1-year NTC plus 1 year NAC OR 8th pass plus 2-year NTC plus 1-Year NAC plus CITS OR 10th grade pass and pursuing continuous schooling OR 10th Grade Pass with 2-year relevant experience OR Previous relevant Qualification of NSQF Level 3.0 with minimum education as 8th Grade pass with 3- year relevant experience OR Previous relevant Qualification of NSQF Level 3.5 with 1.5- year relevant experience"
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	27/01/2022
Next Review Date	27/01/2025
NSQC Approval Date	27/01/2022
QP Version	3.0

Model Curriculum Creation Date	27/01/2022
Model Curriculum Valid Up to Date	27/01/2025
Model Curriculum Version	2.0
Minimum Duration of the Course	390 Hours
Maximum Duration of the Course	390 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.

- Identify the basic design and layout of the lab
- Practice personal hygiene and lab sanitation guidelines
- Follow safety guidelines at the lab
- Describe the process of registration of samples of soil, manure/compost, plant and water
- Prepare soil samples for analysis
- Handle and store water samples for analysis
- Prepare manure/compost and plant samples for analysis
- Identify lab-wares, equipment & chemicals/reagents and maintain their record
- Calibrate measuring and monitoring equipment
- Prepare solutions for analysis
- Demonstrate the process of record keeping
- Show how to upload Soil & Water Health Cards on the portal
- Use GPS instruments and cadastral map to identify the sample site
- Collect soil sample from the field
- Collect water samples from the irrigation source
- Demonstrate the process of packing and labelling the soil and water samples
- Demonstrate the use of Soil Testing Kit for soil nutrient analysis

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	05:00	00:00	00:00	00:00	05:00
Module 1: Introduction to the role of a Soil & Water Testing Lab Technician	05:00	00:00	00:00	00:00	05:00
AGR/N8101: Adhere to sanitation and safety guidelines of the lab NOS Version No. 2.0 NSQF Level 4	10:00	15:00	00:00	00:00	25:00
Module 2: Hygiene and cleanliness	03:00	05:00	00:00	00:00	08:00
Module 3: Lab sanitation	03:00	05:00	00:00	00:00	08:00
Module 4: Safety at the lab	04:00	05:00	00:00	00:00	09:00

AGR/N8112: Collect soil and water sample NOS Version No. 2.0 NSQF Level 4	10:00	20:00	00:00	00:00	30:00
Module 5: Identification of soil sampling site	03:00	05:00	00:00	00:00	08:00
Module 6: Collection of soil sample from the site	03:00	08:00	00:00	00:00	11:00
Module 7: Collection of water samples from the irrigation source	04:00	07:00	00:00	00:00	11:00
AGR/N8113: Pack, Label and Dispatch the soil and water samples to Soil & Water Testing Laboratory NOS Version No. 2.0 NSQF Level 4	10:00	20:00	00:00	00:00	30:00
Module 8: Packing, labeling and dispatch the soil and water samples to Soil & Water Testing Laboratory	10:00	20:00	00:00	00:00	30:00
AGR/N8105: Register and prepare samples for analysis in soil lab NOS Version No. 2.0 NSQF Level 4	10:00	20:00	00:00	00:00	30:00
Module 9: Preparation of soil samples for analysis	03:00	05:00	00:00	00:00	08:00
Module 10: Preparation of manure/compost and plant samples for analysis	03:00	08:00	00:00	00:00	11:00
Module 11: Handling and storage of water samples for analysis	04:00	07:00	00:00	00:00	11:00
AGR/N8106: Calibrate equipment and prepare solutions for analysis in the lab NOS Version No. 2.0 NSQF Level 4	20:00	40:00	00:00	00:00	60:00

Module 12: Identification of lab-wares, equipment & chemicals/reagents and maintain their record	07:00	15:00	00:00	00:00	22:00
Module 13: Calibration of measuring and monitoring Equipment	07:00	15:00	00:00	00:00	22:00
Module 14: Preparation of solutions for analysis	06:00	10:00	00:00	00:00	16:00
AGR/N8107: Assist the Lab Analyst in uploading and distribution of Soil and Water Health Card NOS Version No. 2.0 NSQF Level 4	15:00	15:00	00:00	00:00	30:00
Module 15: Upload and distribution of Soil and Water Health Card	15:00	15:00	00:00	00:00	30:00
AGR/N8114: Use soil testing kit for soil nutrient analysis NOS Version No. 2.0 NSQF Level 4	10:00	20:00	00:00	00:00	30:00
Module 16: Nutrient Analysis on the field by Soil Testing Kit	10:00	20:00	00:00	00:00	30:00
DGT/VSQ/N0102 Employability Skills NOS Version-1.0 NSQF Level-4	60:00	00:00	0:00	0:00	60:00
Module 17: Employability Skills	60:00	00:00	0:00	0:00	60:00
Total Duration	150:00	150:00	00:00	00:00	300:00
OJT : 90 Hours					

Module Details

Module 1: Introduction to the role of a Soil & Water Testing Lab Technician

Bridge Module

Terminal Outcomes:

- Describe the importance of soil & water testing in improving agricultural productivity.
- List the career options and key responsibilities of a Soil & Water Testing Lab Technician.

Duration: 05:00	Duration: 00:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Describe different types of soil-properties, classification, texture, etc. • Describe the water sources used for irrigation purpose • Explain the importance of soil & water quality for enhancing the farm productivity • Explain the work to be undertaken as a Lab Assistant in a Soil & Water testing Lab • Explain the responsibilities and duties as an assistant towards the Analyst • Describe the basic analysis procedures to be undertaken in the Soil & Water Testing Lab. • Explain the safety precautions to be taken for the use of chemicals and equipment used in lab. • Discuss personal strengths and value systems at work place for the business like safe work habits, achievement motivation, time management, anger management, stress management etc. 	<ul style="list-style-type: none"> • Show how to do SWOT analysis of personal strengths and workplace required value systems • Demonstrate different types of soils • Show chemicals/reagents required for conducting various soil physical and chemical tests. • Demonstrate lab tools and equipment's • Demonstrate requisite level of proficiency in verbal and non-verbal communication at the workplace. •
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Different soil samples, Different water samples with impurities & contaminants	

Module 2: Hygiene and cleanliness

Mapped to NOS AGR/N8101 v 2.0

Terminal Outcomes:

- Discuss how to adhere to personal hygiene practices
- Demonstrate ways to ensure cleanliness around the workplace

Duration: 03:00	Duration: 05:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Explain the requirements of personal health, hygiene and fitness at work. • Describe common health related guidelines laid down by the organizations/ Government at the workplace • Explain the importance of good housekeeping at the workplace. • Explain the importance of informing the designated authority on personal health issues related to injuries and infectious diseases. • Explain basic emergency and first aid procedure • Explain the good lab practices • Explain the methods of lab cleaning and mopping 	<ul style="list-style-type: none"> • Demonstrate personal hygiene practices to be followed at the workplace. • Demonstrate the correct way of washing hands using soap and water, and alcohol based hand rubs. • Demonstrate the steps to follow to put on and take off a mask safely. • Show how to sanitize and disinfect one's work area regularly. • Demonstrate adherence to the workplace sanitization norms. • Show how to ensure cleanliness of the work area.
Classroom Aids:	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Personal Protective Equipment, cleaning equipment and materials, sanitizer, soap, mask	

Module 3: Lab Sanitation

Mapped to NOS AGR/N8101 v 2.0

Terminal Outcomes:

- Explain the working of different chamber/rooms and equipment present in the lab.
- Describe the importance of lab sanitation.
- Describe the methods and techniques of cleaning the lab and equipment.
- Perform waste management.

Duration: 03:00	Duration: 05:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Describe the layout of the lab. • Describe the requirements and workings of different chambers like Soil Sample Process room, Soil Store room, Physical & Chemical analysis room, Instrument room. • Explain the uses of equipment, tools, etc. and their placement in the lab. • Describe the use of clean lab coat, gloves, face masks, goggles, etc. • Explain the things which should be strictly avoided inside the lab such as eating, smoking & drinking. • Explain the safety precautions to be undertaken before cleaning of the lab. • Describe the cleaning techniques for the equipment in the lab. • Describe the importance of segregating the waste as recyclable and non-recyclable. • Describe different methods of disposing waste. • Explain the impact of pollution on the environment and how recycling waste helps. • Describe the environmental benefits of conserving electricity at the work place. • Discuss different chemicals, lab-wares, equipment and their use • List the disinfectants and fumigants used in the lab 	<ul style="list-style-type: none"> • Sketch a rough layout of the lab with proper labels. • Identify different tools and equipment used in the lab. • Demonstrate the use of PPEs. • Identify cleaning tools used for the rooms/equipment. • Classify different types of waste materials as recyclable and non-recyclable. • Show how to turn on and off the appliances and equipment in a proper manner. • Identify the different disinfectants and fumigants used in lab

Classroom Aids
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop ,Charts and posters for the lab hygiene and sanitation.
Tools, Equipment and Other Requirements
Different PPE kit materials like lab coat, gloves, face masks, goggles, Cleaning tools and equipment, Disinfectants/fumigants/chemicals

Module 4: Lab Safety

Mapped to NOS AGR/N8101 v 2.0

Terminal Outcomes:

- Describe the importance of following safety precautions at the workplace/lab.
- Describe the techniques to handle chemicals/reagents which can be hazardous in nature.

Duration: 04:00	Duration: 05:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • List the PPE required at the workplace. • Describe the common reported hazards at the workplace. • Describe the hazards caused due to chemicals/pesticides/fumigants. • Describe the basic safety checks to be done before the operation of any equipment/machinery. • Describe the techniques to dispose of hazardous chemical/physical waste keeping in mind the safety of others present inside the lab. • Explain how to safely store chemicals and reagents in the lab • Describe the common first aid procedures to be followed in case of emergencies. • State measures that can be taken to prevent accidents and damages at the workplace. • Explain the importance of reporting details of first aid administered, to the reporting officer/doctor, in accordance with workplace procedures • State common health and safety guidelines to be followed at the workplace. • Explain the operation and maintenance of various equipment of the lab 	<ul style="list-style-type: none"> • Demonstrate the use of first aid kit and the materials present inside it and when to apply what. • Demonstrate how to operate a fire extinguisher. • Demonstrate the proper technique of pouring and mixing of chemicals/reagents and the chemistry behind reactions. • Display the correct way of donning, doffing and discarding PPE such as face masks, hand gloves, face shields, PPE suits, etc. • Sanitize the tools, equipment and machinery properly. • Demonstrate safe disposal of waste. • Demonstrate procedures for dealing with accidents, fires and emergencies. • Demonstrate emergency procedures to the given workplace requirements. • Demonstrate the use of emergency equipment in accordance with manufacturers' specifications and workplace requirements. • Prepare a list of relevant hotline/emergency numbers
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
First Aid kit , Fire extinguisher, Chemicals and reagents such as Sulphuric Acid, hydrochloric Acid, PPE kit, Glass-wares, broken and intact.	

Module 5: Identification of soil sampling site

Mapped to NOS AGR/N8112 v 2.0

Terminal Outcomes:

- Describe the importance of sampling and testing for the benefit of farmers and other stakeholders.
- Use GPS instrument and cadastral map to identify the site

Duration: 03:00	Duration: 05:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Explain the importance of proper soil and water sampling to get the accurate results of soil and water testing. • Describe the use of Cadastral maps to locate and identify the site for sampling. • Explain the use of GIS and its utility to mark the geographical coordinates of the location from where the sample is to be collected. • Explain the method of grid sampling and how it is undertaken differently in various conditions such as irrigated land, rain-fed land, etc. • Explain the methods of soil collection and procedures • Explain about methods of soil sample preparation for soil analysis • Explain the importance of soil fertility maps 	<ul style="list-style-type: none"> • Demonstrate the use of Cadastral maps in locating and identifying the site for sampling. • Demonstrate the use and working of GIS to mark the geographical coordinates of a location. • Sketch a rough layout of land and demonstrate the grid sampling method to mark the sampling spots. • Collecting sample using appropriate methods and procedure • Demonstrate the preparation of soil fertility maps
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Cadastral maps, GIS software	

Module 6: Collection of soil sample from the site

Mapped to NOS AGR/N8112 v 2.0

Terminal Outcomes:

- Demonstrate the method of collecting soil samples from the field

Duration: 03:00	Duration: 8:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Explain the importance of proper soil sampling. • Explain the effective way of demarcating the area for each sub-sample based on various parameters such as uniformity in colour, slope, drainage, etc. • List the various tools and equipment viz., khurpi, spade, auger, etc., which are necessary for collecting sample. • Explain the conditions which are to be avoided while collecting the sample, like periphery of the field, dead furrows, wet spots, etc. • Describe the method of taking soil sample and sub-samples to get the most homogenous and uniform soil sample of the location. • Explain the method of drying, cleaning and quartering the soil sample. 	<ul style="list-style-type: none"> • Demonstrate the process of demarcating the area and spots for taking soil samples. • Demonstrate the use of various tools such as khurpi, spade, auger, etc., in collecting soil samples. • Demonstrate the method of drying, cleaning and quartering the soil sample. • Demonstrate how to carry out sampling for various crops and reduce the bulk by quartering.
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Khurpi, spade, tube auger, screw auger, Trays, Soil samples, Core sampler , Sampling bags, Plastic tray or bucket	

Module 7: Collection of water samples from the irrigation source

Mapped to NOS AGR/N8112 v 2.0

Terminal Outcomes:

- Discuss how to adhere to personal hygiene practices
- Demonstrate ways to ensure cleanliness around the workplace

Duration: 04:00	Duration: 07:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • List different sources of irrigation water. • Explain the appropriate time for water sample collection. • Explain best sanitization practices for contaminant free water sample collection. 	<ul style="list-style-type: none"> • Demonstrate contaminant free collection of sampling water. • Demonstrate use of necessary PPE for maintaining health and safety
Classroom Aids:	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Water samples, bottles	

Module 8: Packing, labeling and dispatch the soil and water samples to Soil & Water Testing Laboratory

Mapped to NOS AGR/N8113 v 2.0

Terminal Outcomes:

- Pack and label the soil and water samples
- Dispatch the soil and water samples to the Soil & Water testing Lab

Duration: 10:00	Duration: 20:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Explain the procedure of storing the collected soil sample from the farmers' field. • Describe the method of sealing collected water sample without any contamination. • Describe the method and importance of labelling soil & water samples. • Explain the procedure of packing and dispatch of samples in coordination with Lab Assistant. 	<ul style="list-style-type: none"> • Demonstrate the method of storing and sealing the soil & water samples without any spillage or contamination. • Demonstrate the proper method of labelling and packing of the samples • Locate the nearest soil & water testing lab in the area.
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Soil & water samples, Plastic bags & bottles, Cartons/Gunny bags/sacks, Waterproof markers	

Module 09: Preparation of soil samples for analysis

Mapped to NOS AGR/N8105 v 2.0

Terminal Outcomes:

- Prepare and clean soil samples before the analysis.
- Label all the details of the tests to be done on the soil samples.

Duration: 03:00	Duration: 05:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Describe the method of preparing a soil sample by mixing for homogenisation, drying, breaking of clods and cleaning before it is ready for analysis. • Explain the importance of sieving and dividing the prepared soil sample using steel mesh. • Describe weighing and storing the sieved soil sample for analysis. • Describe the materials which are to be removed from the soil sample such as plant residues, gravel, stones, etc. • Explain the procedure how to collect the samples • Explain tools and equipment used for processing the samples for analysis 	<ul style="list-style-type: none"> • Demonstrate the mixing of soils sample homogenously and placing it on trays for drying. • Demonstrate how to break the clods with use of wooden pestle & mortar. • Prepare the soil samples by sieving them through different mesh size sieves. • Show how to remove the unwanted material. • Show how to accurately weigh the soil. • Label the samples with the required information.
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Different samples of soil, Storage bags, Hot air oven, Different mesh size sieves, Wooden pestle and mortar, Trays for drying soil, Weighing scale, Markers and labels	

Module 10: Preparation of manure/compost and plant samples for analysis

Mapped to NOS AGR/N8105 v 2.0

Terminal Outcomes:

- Demonstrate how to clean manure/compost and plant samples before the analysis.
- Prepare the sample for analysis
- Label the samples for various nutrient analysis.

Duration: 03:00	Duration: 08:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Describe the process of collecting and sealing the manure/compost and plant samples in clean plastic bags. • Explain the weighing of fresh and hot air oven dried sample for record keeping and further analysis. • Explain how to grind the dried sample in a porcelain mortar is important and how it helps in nutrient analysis. • Describe the method of labelling and storing of the samples. • Explain how to assign lot number to each sample. • Explain the methods to keep the samples from decontamination 	<ul style="list-style-type: none"> • Demonstrate the collection and sealing of sample in plastic bags properly. • Show how to grind oven dried samples in porcelain pestle and mortar • Show how to weigh and label the samples. • Calculate percent (%) dry matter of sample
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Different manure/compost and plant samples, Storage plastic bags, Porcelain pestle and mortar, Trays for oven drying, Hot air oven, 20 mm mesh size sieves ,Weighing scale	

Module 11: Handling and storage of water samples for analysis

Mapped to NOS AGR/N8105 v 2.0

Terminal Outcomes:

- Demonstrate proper handling and storage of water samples.

Duration: 04:00	Duration: 07:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Describe the importance of storing the collected water sample in glass bottles with tightly sealed lid. • Explain the refrigeration process of the samples without letting them freeze. • Explain the need of quick and efficient handling of water samples. • Describe the method of labelling and storing of the samples. 	<ul style="list-style-type: none"> • Demonstrate the pouring of collected water samples into the glass bottles and then sealing them properly. • Demonstrate the labelling of the samples with waterproof markers.
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Different water samples, Storage glass bottles, Waterproof markers and labels	

Module 12: Identification of lab-wares, equipment & chemicals/ reagents and maintain their record

Mapped to NOS AGR/N8106 v 2.0

Terminal Outcomes:

- Identify different lab-wares, equipment & chemicals/reagents and their uses.
- Explain the details of all the lab-wares, equipment & chemicals/reagents to be maintained in the lab.

Duration: 07:00	Duration: 15:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Describe the lab-wares, equipment & chemicals/reagents which are used in a Soil & Water Testing Lab and their uses in detail. • Explain the record keeping of all the equipment using a serial number, lab number/code and model number. • Describe the importance of maintenance and periodically updating the calibration reports of all the equipment. 	<ul style="list-style-type: none"> • Identify different lab-wares, equipment & chemicals/reagents. • Show how to maintain a register for the record of details of the lab-wares, equipment and chemicals/reagents available in the lab.
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Different lab-wares, equipment & chemicals/reagents, Record keeping register.	

Module 13: Calibration of measuring and monitoring equipment

Mapped to NOS AGR/N8106 v2.0

Terminal Outcomes:

- Demonstrate how to calibrate measuring and monitoring equipment to get accurate readings.

Duration: 07:00	Duration: 15:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Describe the method of optimization of lab equipment used for various analysis. • Explain the importance of calibration for getting accurate readings during the testing. • Discuss pre-activities done before processing like equipment required for process 	<ul style="list-style-type: none"> • Show how to calibrate different lab equipment to get the best results. • Demonstrate how to maintain records of the calibrated equipment. • identify different types of instruments, equipment, chemicals/reagents in the lab
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Different equipment used in the lab, Record keeping register.	

Module 14: Preparation of solutions for analysis

Mapped to NOS AGR/N8106 v 2.0

Terminal Outcomes:

- Prepare different standard solutions or reagents for the purpose of sample analysis.

Duration: 06:00	Duration: 10:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Describe the preparation of 1000ppm solutions of different elements according to the method of analysis being implemented. • Explain the preparation and storage of standard solutions. • Explain the standard to prepare the solutions • Explain the basic terminologies: Standard Solution, Normal Solution and Normality, Molar Solution and Molarity, Molal Solution and Molality, Titration, percentage composition by weight, percentage composition by volume, parts per million (ppm), milli equivalent per litre • List different types of chemicals/ reagents, their uses and safe handling • List different types of equipment & lab-wares and their working • Discuss about different registers to be maintained in the lab 	<ul style="list-style-type: none"> • Demonstrate the preparation of standard solutions, 1000ppm. • Show how to properly label and store the prepared solutions for easy access. • Practice entries in the registers maintained in the lab
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Different chemicals/reagents used in the lab, Glassware used for making of solutions, PPE kit, Record keeping register	

Module 15: Upload and distribution of Soil and Water Health Card

Mapped to NOS AGR/N8107 v2.0

Terminal Outcomes:

- Demonstrate how to take observations post experiments.
- Upload the analyzed data on the online portal.
- Print the Soil & Water Health Cards.

Duration: 15:00	Duration: 15:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Describe the proper method of taking the experimental observations. • Explain the procedure of uploading the analyzed data on the online portal for future reference. • Describe the procedure for getting the Soil & Water Health Cards printed and then distributing them to the farmers, customers, etc., while maintaining a proper record of the beneficiaries. • Explain how to analyse the gathered information from one's observation • Explain how to make error free data entry • Discuss about the soil & water health card and information provided in the Soil & Water Health card • Explain importance of Soil & Water Health card 	<ul style="list-style-type: none"> • Show how to take observations post experiments. • Perform data entry of the required parameters in computer • Show how to upload the data on the portal for generation of Soil & Water Health Card. • Demonstrate how to operate a printer to print the Soil & Water Health Card. • prepare soil & water analysis test report as per the relevant parameters under the supervision of analyst
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Data of different parameters for preparation of mock Soil & Water Health Card, Record keeping register, Printer	

Module 16: Nutrient Analysis on the field by Soil Testing Kit

Mapped to NOS AGR/N8114 v2.0

Terminal Outcomes:

- Demonstrate the use of a Soil Testing Kit for on-field nutrient analysis of the soil.

Duration: 10:00	Duration: 20:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Explain the importance of Soil Testing kit and its maintenance. • List down the reagents available in the soil testing kit. • Describe the method of preparing solutions and transferring into the kit for testing & analysing. • Describe the method of transferring data to mobile phone and generate the results. • Discuss about how to read the soil analysis chart 	<ul style="list-style-type: none"> • Demonstrate the procedure of using a Soil Testing Kit. • Prepare the soil sample solution with distilled water. • Analyse the result as per the analysis chart and nutrient level indicator scale in the kit. • Show how to transfer data to mobile phone and generate the results.
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Soil Testing Kit, Distilled water, Soil samples, Mobile phone, Analysis chart	

Module 17: Employability Skills (60 hours)

Mapped to NOS DGT/VSQ/N0102 v1.0

Duration: 60:00

Key Learning Outcomes

Introduction to Employability Skills Duration: 1.5 Hours

After completing this programme, participants will be able to:

1. Discuss the Employability Skills required for jobs in various industries
2. List different learning and employability related GOI and private portals and their usage

Constitutional values - Citizenship Duration: 1.5 Hours

3. Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen
4. Show how to practice different environmentally sustainable practices.

Becoming a Professional in the 21st Century Duration: 2.5 Hours

5. Discuss importance of relevant 21st century skills.
6. Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life.
7. Describe the benefits of continuous learning.

Basic English Skills Duration: 10 Hours

8. Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone
9. Read and interpret text written in basic English
10. Write a short note/paragraph / letter/e-mail using basic English

Career Development & Goal Setting Duration: 2 Hours

11. Create a career development plan with well-defined short- and long-term goals

Communication Skills Duration: 5 Hours

12. Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette.
13. Explain the importance of active listening for effective communication
14. Discuss the significance of working collaboratively with others in a team

Diversity & Inclusion Duration: 2.5 Hours

15. Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD
16. Discuss the significance of escalating sexual harassment issues as per POSH act.

Financial and Legal Literacy Duration: 5 Hours

17. Outline the importance of selecting the right financial institution, product, and service
18. Demonstrate how to carry out offline and online financial transactions, safely and securely
19. List the common components of salary and compute income, expenditure, taxes, investments etc.
20. Discuss the legal rights, laws, and aids

Essential Digital Skills Duration: 10 Hours

21. Describe the role of digital technology in today's life
22. Demonstrate how to operate digital devices and use the associated applications and features, safely and securely
23. Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely
24. Create sample word documents, excel sheets and presentations using basic features
25. utilize virtual collaboration tools to work effectively

Entrepreneurship Duration: 7 Hours

26. Explain the types of entrepreneurship and enterprises
27. Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan
28. Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement
29. Create a sample business plan, for the selected business opportunity

Customer Service Duration: 5 Hours

30. Describe the significance of analysing different types and needs of customers
31. Explain the significance of identifying customer needs and responding to them in a professional manner.
32. Discuss the significance of maintaining hygiene and dressing appropriately

Getting Ready for apprenticeship & Jobs Duration: 8 Hours

33. Create a professional Curriculum Vitae (CV)
34. Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively
35. Discuss the significance of maintaining hygiene and confidence during an interview
36. Perform a mock interview
37. List the steps for searching and registering for apprenticeship opportunities

Module 18: On-the-Job Training

Mapped to QP AGR/Q8102 v2.0

Mandatory Duration: 90:00	Recommended Duration: 00:00
Location: On Site	
Terminal Outcomes	
<ul style="list-style-type: none"> • Demonstrate how to maintain personal hygiene and undertake sanitation and safety measures in the Lab • Show method of collection of soil and water samples using cadastral map and GPS/GIS instruments for analysis. • Demonstrate process of packing, labelling & dispatching the collected soil and water samples to the Soil and Water Testing Laboratory • Show process of registration and preparation of soil, manure/compost, plant and water samples for analysis in the lab • Demonstrate methods and process of calibration of measuring and monitoring equipment, preparing solutions and document maintenance. • Show how individual will assist the Lab Analyst in taking observations, uploading and distributing Soil & Water Health card • Demonstrate process of conducting analysis of the soil nutrients using soil testing kit, on the field. 	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
Certificate-NSQF	Soil & Water Testing Lab Analyst	5	Soil & Water Testing	0		Soil & Water Testing Lab Analyst with 5 Years of Experience with Registered Organizations
Diploma	Agriculture/Horticulture	3	Soil & Water Testing	0		
Graduate	Chemistry/Bio-Technology/Botany/Bio-Chemistry	2	Soil & Water Testing	0		For school Program minimum qualification of Trainer should be Graduate(Chemistry/Bio-Technology/Botany/Bio-Chemistry). Their Teaching experience will be considered industry experience
Graduate	Agriculture / Horticulture / Forestry	0		0		

Trainer Certification	
Domain Certification	Platform Certification
Certified for Job Role “ Soil & Water Testing Lab Technician ”, mapped to QP: “AGR/Q8102, v3.0”, Minimum accepted score is 80%	Recommended that the Trainer is certified for the Job Role: “Trainer (Vets 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	
Graduation	Biochemistry/Chemistry/ Agricultural Chemistry/Environmental Science/Water Management/Soil & Water Management	5	In Geoscience/Soil Science/ Soil conservation & Water Resource Management			Practical skills and knowledge required in soil and water related field work, such as analysing soil fertility, nutritional status and Water Resource management
Graduation	Agriculture/ Horticulture	5	In Geoscience/Soil Science/ Soil conservation & Water Resource Management			Practical skills and knowledge required in soil and water related field work, such as analysing soil fertility, nutritional status and Water Resource management
Graduation	Soil & Water Conservation Engineering	2	In Geoscience/Soil Science/ Soil conservation & Water Resource Management			Practical skills and knowledge required in soil and water related field work, such as analysing soil fertility, nutritional status and Water Resource management

Post-graduation	Agronomy/ Soil Science /Agriculture Chemistry/ Soil and Water Management/ Soil and Water Conservation/ Soil and Water Conservation Engineering/Environmental Science	2	In Geoscience/ Soil Science/ Soil conservation & Water Resource Management		Practical skills and knowledge required in soil and water related field work, such as analysing soil fertility, nutritional status and Water Resource management
PhD	Agriculture Chemistry/Agriculture /Agriculture Biochemistry/Agriculture Chemistry & Soil Science	1	In Geoscience/ Soil Science/ Soil conservation & Water Resource Management		Practical skills and knowledge required in soil and water related field work, such as analysing soil fertility, nutritional status and Water Resource management

Assessor Certification	
Domain Certification	Platform Certification
Certified for Job Role “ Soil & Water Testing Lab Technician ”, mapped to QP: “AGR/Q8102, V3.0”, Minimum accepted score is 80%	Certified for the Job Role: “Assessor (Vets 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 empanelled 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 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 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 tool 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 assessor and proctor is 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 candidate shall be stored and available for review (retained for 5 years/ till the conclusion of the project or scheme)

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
AGR	Agriculture
FYM	Farm Yard Manure
NOS	National Occupational Standard (s)
NSQF	National Skills Qualifications Framework
OJT	On-the-job Training
PwD	People with Disability
PPE	Personal Protective Equipment
QP	Qualifications Pack