Model Curriculum

QP Name: Precision Farming Technician

QP Code: AGR/Q1007

Version: 1.0

NSQF Level: 5

Model Curriculum Version: 1.0

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

Table of Contents

Training Parameters

Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Precision Farming
Country	India
NSQF Level	5
Aligned to NCO/ISCO/ISIC Code	NCO-2015/NIL
Minimum Educational Qualification and Experience	Completed 2nd year of UG in Agriculture/ Horticulture/ Forestry/ Agriculture Engineering/ Agri-Business Management OR Pursuing 2nd year of UG in Agriculture/ Horticulture/ Forestry/ Agriculture Engineering/ Agri-Business Management and continuous education OR Completed 2nd year of diploma in Agriculture/ Horticulture/ Forestry/ Agriculture Engineering (after 12th) OR Pursuing 2nd year of 2-year diploma in Agriculture/ Horticulture/ Forestry/ Agriculture Engineering (after 12th) OR 12th pass with 1-year Vocational Education & training (NTC or NAC or CITS) OR Completed 3-year diploma in Agriculture/ Horticulture/ Forestry/ Agriculture Engineering (after 10th) with 1 year of experience in the relevant field OR 12th Grade pass with 2 Years of experience in the relevant field OR 10th Grade pass with 4 Years of experience in the relevant field OR Previous relevant Qualification of NSQF Level 4 and with minimum education as 8th Grade pass with 3 years of relevant experience OR

	Previous relevant Qualification of NSQF Level 4.5 with 1.5 years of relevant experience
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	05/01/2023
Next Review Date	05/01/2026
NSQC Approval Date	05/01/2023
QP Version	1.0
Model Curriculum Creation Date	05/01/2023
Model Curriculum Valid Up to Date	05/01/2026
Model Curriculum Version	1.0
Minimum Duration of the Course	480 Hours
Maximum Duration of the Course	480 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:

- Describe the process of collecting data from the field using precision farming technologies.
- Describe the process of analysing and utilising the data collected from the field.
- Demonstrate the process of carrying out maintenance of sensors and relevant equipment.
- Explain the importance of using the relevant mobile apps and e-payment methods.
- Demonstrate various practices to ensure health and safety at work.

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	**5:00**	**00:00**	**0:00**	**00:00**	**5:00**
Module 1: Introduction to the role of a Precision Farming Technician.	05:00	00:00	0:00	00:00	05:00
AGR/N1033: Collect data from the field using precision farming technologies **NOS Version- 1.0** **NSQF Level- 5**	**25:00**	**30:00**	**0:00**	**00:00**	**55:00**
Module 2: Process of collecting data from the field using precision farming technologies	25:00	30:00	0:00	00:00	55:00
AGR/N1034: Analyse and utilise the data collected from the field **NOS Version- 1.0** **NSQF Level- 5**	**30:00**	**30:00**	**0:00**	**00:00**	**60:00**
Module 3: Process of analysing and utilising the data collected from the field	30:00	30:00	0:00	00:00	60:00
AGR/N1035: Carry out maintenance of sensors and relevant equipment **NOS Version- 1.0** **NSQF Level- 5**	**30:00**	**30:00**	**0:00**	**00:00**	**60:00**

Module 4: Process of carrying out maintenance of sensors and relevant equipment	30:00	30:00	0:00	00:00	60:00
AGR/N1036: Use the relevant mobile apps and e-payment methods **NOS Version-1.0** **NSQF Level- 5**	**25:00**	**35:00**	**0:00**	**00:00**	**60:00**
Module 5: Process of using the relevant mobile apps and e-payment methods	25:00	35:00	0:00	00:00	60:00
AGR/N9903 Maintain health and safety at the workplace **NOS Version- 3.0** **NSQF Level- 4**	**05:00**	**25:00**	**0:00**	**00:00**	**30:00**
Module 6: Hygiene and cleanliness	02:00	10:00	0:00	00:00	12:00
Module 7: Safety and emergency procedures	03:00	15:00	0:00	00:00	18:00
DGT/VSQ/N0103: Employability Skills **NOS Version- 1.0** **NSQF Level- 5**	**90:00**	**00:00**	**0:00**	**00:00**	**90:00**
Module 8: Employability Skills	90:00	00:00	0:00	00:00	90:00
Total Duration	**210:00**	**150:00**	**0:00**	**00:00**	**360:00**
OJT (Mandatory): 120 hours					

Module Details

Module 1: Introduction to the role of a Precision Farming Technician
Bridge Module

Terminal Outcomes:

- Discuss the job role of a Precision Farming Technician.

Duration: 05:00	Duration: 0:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Describe the size and scope of the agriculture industry and its sub-sectors. - Discuss the role and responsibilities of a Precision Farming Technician. - Identify various employment opportunities for a Precision Farming Technician.	
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films	
Tools, Equipment and Other Requirements	
NA	

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

Module 2: Process of collecting data from the field using precision farming technologies

Mapped to AGR/N1033 v1.0

Terminal Outcomes:

- Explain the importance of arranging the required field devices.
- Describe the process of installing and preparing the field devices.
- Explain ways to collect the soil data.
- Explain ways to collect data through geo-referencing, GPS, satellites and drones.
- Explain ways to collect the field sensor-based data.

Duration: 25:00	Duration: 30:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Explain the benefit of precision farming in eliminating volatility and relevant risks in agricultural operations. - Elucidate different components of precision farming, such as GPS based sensors, Geographical Information System (GIS)-based sensors, electrochemical sensors, mechanical sensors, soil moisture sensors, airflow sensors, yield monitoring sensors, Variable Rate Application (VRA) sensors, Differential Geo-positioning System (DGPS), etc. - Describe the process of identifying the appropriate locations in the field for the installation of field data recorders and remote sensors. - Explain how to position various farm machineries in the field using the GPS. - Describe the process of recording site-specific information through GPS via an interface with the satellites. - Describe the process of identifying sampling sites and developing soil sampling grids using geospatial technology for soil testing on characteristics such as nitrogen, phosphorus, and potassium content, pH, and micronutrients. - Elucidate how to determine the spatial and temporal variability in	- Demonstrate the process of installing and calibrating a variety of sensors, e.g. soil moisture sensors, appropriately at the identified locations in the field, as per the manufacturers' instructions. - Show how to attach the smart sensors and GPS receivers to farm machineries such as tractors, fertilizer/ pesticide sprayers, and combine harvesters. - Demonstrate the process of setting up the GPS-based vehicle guidance system along with the relevant mechanical controls. - Demonstrate the process of setting up the relevant mobile application and/or computer software for the collection and analysis of data. - Demonstrate the process of setting the drone appropriately to ensure it captures the required images using the attached camera. - Show how to use the appropriate flight planning software to plan a route in the area that needs to be covered, allowing the drones to follow the automated flight path created by the software. - Demonstrate how to develop soil sampling grids using geospatial technology for testing nitrogen, phosphorus, potassium content, pH,

8 | Precision Farming Technician

- agricultural systems, their effects on production, and relationships among the applicable factors.
- Explain the importance of using statistically valid sampling designs for collecting samples from the field.
- Explain the benefit and process of using the geo-mapping technology for collecting relevant information from the field regarding the soil, topography, terrain, moisture levels, organic matter, nitrogen and pH.
- Discuss the appropriate site-specific management practices to be followed to detect, measure and record the differences within the field.
- Describe the process of determining the crop nutrient requirements through sampling.
- Explain the benefit of using on-the-go soil pH sensors for determining the alkalinity and acidity levels in the soil.
- Explain the benefit and process of using GPS and GIS-based sensors, drones and satellite imagery to get a 3D analysis of the field and the composition of soil in the cultivated region.
- Elucidate various uses of drones, such as monitoring the effects of weather, the distribution of irrigation water, crop growth and yield, weed and pest/ insect infestation, etc.
- Explain the benefits of using optical sensors to determine the properties of soil and crop through.

- and micronutrients in the soil.
- Demonstrate the use of field data recorders and basic Geographic Information Systems (GIS)
- Show how to use soil Electrical Conductivity (EC) sensors or Electro-Magnetic (EM) sensors to map soil properties, such as soil organic matter, clay, soluble salts, etc.
- Demonstrate the use of electrochemical sensors and dielectric soil moisture sensors, such as water-potential sensors and tensiometer sensors.
- Demonstrate the process of carrying out zone soil sampling to determine the patterns of residual crop nutrients in the soil.
- Show how to record site-specific information through GPS via an interface with the satellites.
- Show how to use geo-mapping, sensors, integrated electronic communications and variable rate technology to record the crop scouting data.
- Demonstrate how to use GPS and GIS-based sensors, along with drones and satellite imagery, to get a 3-Dimensional (3D) analysis of the field and the composition of soil in the cultivated region.
- Demonstrate how to use drones to monitor the effects of weather; crop growth and yield; weed and pest/ insect infestation; trespassing into the field by animals, preying by birds, and record the data.
- Show how to use the appropriate types of sensors with drones to monitor the distribution of irrigation water in different parts of the field and inspect the irrigation equipment.
- Demonstrate how to record the differences at specific locations within the field as per site-specific management.

	- Demonstrate the process of using yield monitors, optical sensors and mechanical sensors.
	- Show how to use field sensors integrated with image recognition technology to monitor the crops from remote locations.
	- Demonstrate the process of carrying out agriculture field mapping and transferring data from the field to the appropriate software via integrated electronic communications.

Classroom Aids

Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop

Tools, Equipment and Other Requirements

Drone, GIS based Sensors, Field Sensor, pH meter, GPS/GNSS etc.

Module 3: Process of analysing and utilising the data collected from the field

Mapped to ARG/N1034 v1.0

Terminal Outcomes:

- Explain how to prepare the data for analysis.
- Describe the process of analysing the collected data.
- Demonstrate the process of preparing reports and comparing data.
- Explain the importance of optimising the use of agricultural inputs.
- Explain ways to improve agricultural operations and production.

Duration: 30:00	Duration: 30:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Explain the benefit of using the IoT, drones, GPS and other technologies to collect data from agricultural fields to improve decision-making. - Explain the concept of geo-informatics, its tools and techniques and their application in precision farming. - Elaborate the integration of geo-informatics, Nano-technology and precision farming. - Explain the use of relevant image processing software. - Explain the benefits and use of automatic irrigation control system. - Describe the visual and digital interpretation of remote sensing images. - Describe modern field preparation method and techniques and planting methods. - Describe the process of mechanized harvesting of produce. - Explain the benefit of using geospatial technology to monitor crop stress (biotic/abiotic). - Explain the use of GPS for agricultural surveys. - Explain the importance and benefits of selecting advanced cultivation practices and good-performing crops	- Demonstrate how to consolidate the field data in the appropriate format. - Prepare sample reports in graphical or tabular form, summarising field productivity and profitability. - Demonstrate the use of GIS software. - Demonstrate the process of carrying out a comparison of the current and historical field data. - Demonstrate the process of installing and using the automatic irrigation control system to regulate the use of water and achieve water-use efficiency. - Show how to apply pesticides in the field using solar energy-operated precision sprayer. - Show how to identify weeds efficiently using the advanced weed identification system and remove them using agricultural robots. - Demonstrate the process of applying fertilizers, herbicides, pesticides and insecticides at the identified sites in the field, using drones, monitoring for their appropriate application.

based on the suitability of land.

- Explain the use of different types of sensors and devices, such as yield monitors, soil electrical conductivity or electro-magnetic sensors, remote imagery, satellite imagery, aerial photography, hand-held active sensors, soil compaction sensors, etc.

- Explain the use of relevant technologies for crop monitoring, irrigation management, nutrient application, disease and pest management, and yield prediction.

- Explain the importance and process of carrying out appropriate corrections in the collected data, such as the removal of outliers and correction of GPS inaccuracies.

- Explain how to identify spatial coordinates by analysing the remote sensing GPS data.

- Describe the process of analysing geospatial data to determine the impact of factors such as soil quality, terrain, field productivity, fertilizers, and weather conditions on agricultural production.

- Explain how to process the analysed data from harvester monitors to develop yield maps.

- Describe the process of developing the relevant 3D maps, such as soil characteristics, contour, plat, input application, terrain, and drainage patterns, using the appropriate computer software.

- Explain the importance and process of evaluating the materials that affect soil characteristics and drainage patterns.

- Explain how to use GIS for spatial analysis and visualisation of interpolated maps.

- Explain how to analyse remote sensing imagery to identify relationships between soil quality, crop canopy densities, light

reflectance, and weather history.

- Explain how to develop and analyse computer-based images to research soils, fertilizers, pests, weather, and other agricultural elements.

- Explain how to use the advanced data analytics services to assess the impact of adverse weather conditions on the field and plan agricultural production accordingly.

- Describe the process of analysing the crop scouting data to be used for regulating the use of pesticides, insecticides and herbicides in the field.

- Explain how to identify geo-referenced zones in the agricultural field based on soil characteristics and production potential.

- Describe the process of determining patterns in the soil and weather conditions, seed viability, topography, nutrients, disease history, row distance and planting depth.

- Explain how to calculate the variable planting rates using the Variable Rate Technology (VRT).

- Describe the process of identifying the best crop varieties and seeding rate for specific field areas, based on the analysis of geospatial data.

- Describe the process of using the crop scouting data in programmable agricultural equipment.

- Explain the importance of adjusting the irrigation schedule and distribution of irrigation water based on the data obtained with the use of drones.

- State the recommended practices to be followed for avoiding waterlogging, mitigating unnecessary damage to sensitive crops, and achieving effective drainage.

- Explain the importance and process of regulating the use of fertilizers

based on the analysis of data obtained from optical sensors	
• Explain the importance and process of regulating the moisture levels in the soil to prevent damp conditions.	
• Explain how to optimise the tilling methodologies and the inflow of water in the field based on the data recorded by mechanical sensors.	
• Explain how to reduce the negative impacts of farming practices on the environment.	
• Describe the process of using GPS, high precision positioning system, and automated steering system to minimise the chances of human error experienced in manual driving mode.	
• Explain how to program farm equipment based on inputs from crop scouting analysis data regarding the variability of conditions in the field.	
• Explain the importance of managing irrigation in the field based on the analysis of the data provided by dielectric soil moisture sensors.	
• Explain the importance of following environmental and ecological best practices.	
• Explain the applications of LiDAR accurate remote sensing technique for various purposes in precision farming.	
• Explain the benefits of using a personalized crop calendar for farm needs.	
• Explain the benefits of using agronomic solutions services for quicker resolution of farm issues.	

Classroom Aids

Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop

Tools, Equipment and Other Requirements

IoT Drone, GIS Software, Computer, Crop Calendar, Pesticides, Solar System etc.

Module 4: Process of carrying out maintenance of sensors and relevant equipment
Mapped to AGR/N1035 v1.0

Terminal Outcomes:

- Describe the process of maintaining the sensors.
- Explain the importance of scheduling maintenance and maintaining the records.

Duration: 30:00	Duration: 30:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Explain the importance of checking all the sensors and equipment regularly for signs of wear and tear or damage. - Explain the importance of using the appropriate and recommended tools and equipment during the repair and maintenance activities. - Explain the importance of performing the relevant tests after replacing sensors to ensure they function as expected. - State common manufacturing defects are found in a variety of sensors used in precision farming. - Explain the importance of collecting and analysing test data using the relevant mobile application and the computer software to ensure their correct functioning - Explain the importance of scheduling the periodic maintenance of sensors and other equipment as per the maintenance schedule suggested by their manufacturers.	- Demonstrate how to examine all the sensors used in precision farming for signs of wear and tear or damage. - Demonstrate the process of testing the functioning of sensors and relevant equipment as per the testing procedures suggested by their respective manufacturers. - Show how to replace the faulty or damaged sensors with the new and authentic ones and calibrate them as per the manufacturer's instructions. - Demonstrate the use of various tools and equipment used for repair and maintenance activities. - Demonstrate the process of performing the relevant tests to ensure the expected functioning of the sensors and carrying out troubleshooting as required. - Demonstrate the use of relevant mobile applications and/or computer software to collect and analyse test data and ensure their correct functioning. - Prepare sample records manually and electronically using the physical registers and the relevant computer software, respectively.
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Mobile Devices, Robotics, Variable Rate Seeding, Weather Modeling,	

Module 5: Process of using the relevant mobile apps and e-payment methods

Mapped to NOS AGR/N1036 v1.0

Terminal Outcomes:

- Explain the use of mobile apps.
- Describe the process of carrying out app updates and minor troubleshooting.
- Explain the importance of using e-payment methods.

Duration: 25:00	Duration: 35:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Explain the benefits of using a variety of mobile apps for efficient exchange of information, and improvement in farming practices and production. - Explain the importance of using government-approved mobile apps to receive authentic information. - Explain the importance of planning agricultural activities based on the weather information provided by the relevant mobile app. - Elucidate the advantages of identifying the sellers of agricultural inputs such as seeds, fertilizers, pesticides, plant protection equipment and farm machineries through the relevant and government-approved mobile app. - List the relevant mobile app to be used to determine the prevalent prices of a variety of agricultural inputs in the registered and relevant markets. - List the relevant mobile app to be used for accessing guidelines on Integrated Pest and Disease Management (IPDM). - Explain the importance of using follow the best agricultural practices and package of practices for different crops suggested in the Agro Advisory mobile app. - Explain the importance of using the Soil Health Card (SHC) scheme provided by the government through	- Demonstrate the use of relevant and government-approved mobile applications such as Kisan Suvidha for receiving information about agricultural practices, relevant schemes, and the latest updates regarding the agriculture sector - Demonstrate the use of relevant and dedicated agricultural crop-related apps, such as Paddy Expert System, riceXpert, Cane Adviser, etc. - Show how to use the Pashu Poshan app for the effective health management of livestock. - Demonstrate the use of Soil Health Card (SHC) mobile app to monitor and maintain soil health in agricultural fields. - Show how to use the Crop Cutting Experiments (CCE) mobile app for capturing the relevant GPS coordinates from the field and crop cutting experiment data - Show how to use the relevant mobile app to identify the appropriate cold storage and godowns in the vicinity for storing the harvested agricultural produce appropriately - Demonstrate the use of Digital Mandi India mobile app to determine the prices of a variety of agricultural produce in different states and districts using the. - Demonstrate the use of relevant mobile app, such as National

the SHC mobile app to monitor and maintain soil health in agricultural fields.

- List the relevant mobile app to be used to identify the appropriate cold storage and godowns for storing the harvested agricultural produce.

- Explain the advantage of using the Digital Mandi India mobile app.

- Explain the benefits of using the Kisan Call Centre (KCC) service.

- Explain the importance of checking for mobile app updates and updating the mobile apps regularly.

- Explain the importance of maintaining the record of payments using the physical registers and the appropriate computer software.

Agriculture Market (eNAM), to identify and market agricultural produce to the relevant buyers.

- Demonstrate the use of relevant mobile app such as Pusa Krishi to get information regarding resource-conserving cultivation practices, farm machineries and their implementation, and production technologies.

- Demonstrate the process of installing the updates as per the instructions given in the app.

- Demonstrate the process of carrying out troubleshooting for common and minor issues experienced with mobile apps following the developers' instructions available in the relevant apps.

- Show how to use debit card to withdraw cash at the Automated Teller Machine (ATM).

- Demonstrate the use of appropriate electronic payment services, such as National Electronic Fund Transfer (NEFT), Aadhaar-Enabled Payment Services (AEPS), Immediate Payment Service (IMPS), Unified Payment Interface (UPI) mobile apps, etc.

- Prepare sample record of payments manually and/or electronically using the physical registers and the appropriate computer software.

Classroom Aids:
Training Kit (Trainer **G**uide, Presentations). Whiteboard, Marker, Projector, Laptop

Tools, Equipment and Other Requirements
e-payment mobile app, SHC Card etc.

Module 6: Hygiene and cleanliness
Mapped to NOS AGR/N9903 v3.0

Terminal Outcomes:

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

Duration: 02:00	Duration: 10:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- 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.	- 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 the cleanliness of the work area.
Classroom Aids:	
Computer, Projection Equipment, PowerPoint Presentation and Software, Facilitator's Guide, Participant's Handbook.	
Tools, Equipment and Other Requirements	
Personal Protective Equipment, Cleaning Equipment and Materials, Sanitizer, Soap, Mask	

Module 7: Safety and emergency procedures

Mapped to NOS AGR/N9903 v3.0

Terminal Outcomes:

- Describe how to adhere to safety guidelines.
- Show how to administer appropriate emergency procedures.

Duration: 03:00	Duration: 15:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- List the Personal Protective Equipment (PPE) required at the workplace. - Describe the commonly 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 common first aid procedures to be followed in case of emergencies. - State measures that can be taken to prevent accidents and damage s 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.	- Check various areas of the workplace for leakages, water-logging, pests, fire, etc. - Demonstrate how to safely use the PPE and implement it as applicable to the workplace. - 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 the 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. - Demonstrate the administration of first aid. - Prepare a list of relevant hotline/ emergency numbers
Classroom Aids:	
Computer, Projection Equipment, PowerPoint Presentation and Software, Facilitator's Guide, Participant's Handbook.	
Tools, Equipment and Other Requirements	
Personal Protective Equipment, First Aid Kit, Equipment used in Medical Emergencies.	

Module 8: On-the-Job Training

Mapped to Precision Farming Technician

Mandatory Duration: 120:00	Recommended Duration: 00:00
Location: On-Site	

Terminal Outcomes

1. Explain the benefit of precision farming in eliminating volatility and relevant risks in agricultural operations.

2. Install and calibrate a variety of sensors, e.g. soil moisture sensors, appropriately at the identified locations in the field, as per the manufacturers' instructions.

3. Set up the GPS-based vehicle guidance system along with the relevant mechanical controls.

4. Record site-specific information through GPS via an interface with the satellites.

5. Consolidate the field data in the appropriate format.

6. Apply pesticides in the field using solar energy-operated precision sprayer.

7. Test the functioning of sensors and relevant equipment as per the testing procedures suggested by their respective manufacturers.

8. Replace the faulty or damaged sensors with the new and authentic ones and calibrate them as per the manufacturer's instructions.

9. Prepare records manually and electronically using the physical registers and the relevant computer software, respectively.

10. Use of Soil Health Card (SHC) mobile app to monitor and maintain soil health in agricultural fields.

11. Use the relevant mobile app, such as National Agriculture Market (eNAM), Digital Mandi India, Pusa Krishi, etc.

Module 9: Employability Skills

Mapped to NOS DGT/VSQ/N0103 v1.0

Duration: 90:00
Key Learning Outcomes

Introduction to Employability Skills Duration: 3 Hours

After completing this programme, participants will be able to:

1. Outline the importance of Employability Skills for the current job market and future of work
2. List different learning and employability related GOI and private portals and their usage
3. Research and prepare a note on different industries, trends, required skills and the available opportunities

Constitutional values – Citizenship Duration: 1.5 Hours

4. 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
5. Demonstrate how to practice different environmentally sustainable practices

Becoming a Professional in the 21st Century Duration: 5 Hours

6. Discuss relevant 21st century skills required for employment
7. Highlight the importance of practicing 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
8. Create a pathway for adopting a continuous learning mindset for personal and professional development

Basic English Skills Duration: 10 Hours

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

Career Development & Goal Setting Duration: 4 Hours

12. Create a career development plan
13. Identify well-defined short- and long-term goals

Communication Skills Duration: 10 Hours

14. Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette
15. Write a brief note/paragraph on a familiar topic
16. Explain the importance of communication etiquette including active listening for effective communication
17. Role play a situation on how to work collaboratively with others in a team

Diversity and Inclusion Duration: 2.5 Hours

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

Financial and Legal Literacy Duration: 10 Hours

20. Discuss various financial institutions, products, and services
21. Demonstrate how to conduct offline and online financial transactions, safely and securely and check passbook/statement
22. Explain the common components of salary such as Basic, PF, Allowances (HRA, TA, DA, etc.), tax deductions
23. Calculate income and expenditure for budgeting
24. Discuss the legal rights, laws, and aids

Essential Digital Skills Duration: 20 Hours

25. Describe the role of digital technology in day-to-day life and the workplace
26. Demonstrate how to operate digital devices and use the associated applications and features, safely and securely
27. Demonstrate how to connect devices securely to internet using different means
28. Follow the dos and don'ts of cyber security to protect against cyber crimes
29. Discuss the significance of displaying responsible online behavior while using various social media platforms
30. Create an e-mail id and follow e- mail etiquette to exchange e -mails
31. Show how to create documents, spreadsheets and presentations using appropriate applications
32. utilize virtual collaboration tools to work effectively

Entrepreneurship Duration: 7 Hours

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

Customer Service Duration: 9 Hours

37. Classify different types of customers
38. Demonstrate how to identify customer needs and respond to them in a professional manner
39. Discuss various tools used to collect customer feedback
40. Discuss the significance of maintaining hygiene and dressing appropriately

Getting ready for apprenticeship & Jobs Duration: 8 Hours

41. Draft a professional Curriculum Vitae (CV)
42. Use various offline and online job search sources to find and apply for jobs

43. Discuss the significance of maintaining hygiene and dressing appropriately for an interview
44. Role play a mock interview
45. List the steps for searching and registering for apprenticeship opportunities

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	*Specialization*	*Years*	*Specialization*	
12th Class		4	Precision Farming	0		Ex-Service-Man including Ex-Paramilitary personnel: Minimum Qualification is 10+2 with an Honourable Discharge/ Pension. SSC would consider a relaxation/waiver of sector-specific experience on a case-to-case basis.
Diploma	Agriculture	3	Precision Farming	0		
Graduate	Graduate in any stream except Agriculture/ Horticulture/ Forestry	3	Precision Farming	0		For the school Program minimum qualification of the Trainer should be Graduate in Horticulture / Agriculture/ Forestry Sector with Teaching experience of minimum 2 years, (will be considered industry experience)
Graduate	Agriculture/ Horticulture/ Forestry	1	Precision Farming	0		
Post Graduate	Agriculture/ Precision Farming		Precision Farming	0		

Trainer Certification	
Domain Certification	**Platform Certification**

Certified for Job Role "**Precision Farming Technician**", mapped to QP: "AGR/Q1007, 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	
Graduation	BSc (Precision agriculture/Agronomy/ Horticulture and related streams) or B. E (Agriculture and irrigation Engineering and related streams)	5	In Precision farming	0		Practical skills and knowledge required in precision farming techniques
Graduation	B. Tech (Agriculture/ irrigation and drainage engineering and related streams)	5	In Precision farming	0		Practical skills and knowledge required in precision farming techniques
Post-graduation	M. Tech (Agriculture/ irrigation and drainage engineering and related streams)	2	In Precision farming	0		Practical skills and knowledge required in precision farming techniques
Post-graduation	M Sc. (Precision agriculture/agronomy/horticulture and related streams) Or M.E (Water Resource engineering/Water resources development and irrigation/irrigation water management and related streams)	2	In Precision farming	0		Practical skills and knowledge required in precision farming techniques

PhD	Ph. D (Precision agriculture/irrigation & drainage engineering/irrigation & water management Agriculture/Horticulture and related streams)	1	In Precision farming	0		Practical skills and knowledge required in precision farming techniques
PhD	Ph. D (Precision agriculture/irrigation & drainage engineering/irrigation & water management Agriculture/Horticulture and related streams)	1	In Precision farming	0		Practical skills and knowledge required in precision farming techniques

Assessor Certification	
Domain Certification	**Platform Certification**
Certified for Job Role "**Precision Farming Technician**", mapped to QP: "AGR/Q1007, 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. <u>Multiple Choice Questions</u>: To assess basic knowledge (Objective/Subjective)
2. <u>Viva:</u> To assess awareness on processes (Oral and/or written questioning)
3. <u>Practical:</u> 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 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

- o Assessment checklist for assessor
- o Candidate Aadhar/ID card verification
- o Pictures of the classroom, labs to check the availability of adequate equipment's and tool to conduct the training and assessment
- o 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
NOS	National Occupational Standard (s)
NSQF	National Skills Qualifications Framework
OJT	On-the-job Training
QP	Qualifications Pack
PwD	People with Disability
PPE	Personal Protective Equipment