



Soil, Water and Fertilizer Testing Lab Attendant



National Vocational Qualification level – 2

“Soil, Water and Fertilizer Testing Lab Attendant”



(Curriculum)

National Vocational and Technical Training Commission (NAVTTTC)



Soil, Water and Fertilizer Testing Lab Attendant



Government of Pakistan

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1. Introduction

The Technical and Vocational is a profession that is increasingly getting attention in Pakistan, not only among the youth seeking to enter the industry but also among adults who wish to polish their skills to develop a career out of it.

Soil and water are essential natural resources for our domesticated food production systems. Fertilizers are used to supplement soil nutrient stocks with minerals that can be easily absorbed and used by crops. Without fertilizers, agricultural production would be significantly reduced. Soil, water and fertilizer are intertwined in agriculture and are closely related to agricultural production and food security. Soil is a vital part of successful agriculture and a key source of crop nutrients. Irrigation water dissolves nutrients and other substances, transporting them from soil to plant. Irrigation water helps successful crop cultivation. Water scarcity along with quality limits crop production and can dramatically affect the survival of humans and living organisms on this planet.

In fact, no sphere in agriculture can be identified without the contribution of soil, water and fertilizer. The important knowledge regarding soil, water and fertilizer quality through the latest analysis protocols makes this diploma very valuable not only in agriculture but also enhance its usefulness in all areas of our daily life. Market demand for qualified workers in this qualification is a need of time and is very crucial for sustainable development of agriculture sector. This demand can only be addressed by developing specific skills standards in partnership with all stakeholders and industry experts. Recognizing this fact, the National Vocational and Technical Training Commission (NAVTTTC) has developed the National Vocational Qualifications Framework (NVQF) for Soil, Water and Fertilizer Testing Lab Attendant qualifications. These competency standards have been developed by the Qualifications Development Committee (QDC) and validated by the Qualifications Validation Committee (QVC) with representation from the country's leading departments (Soil Fertility Research Institute Punjab, UVAS, PCSIR, FMC and Cereal Crops Research Institute, Pirsabak Nowshera).

2. Purpose of the training program:

The qualifications mainly cover competencies along with related knowledge and professional attitude which is essential for getting a job or self-employed.



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The qualifications are also in line with the vision of Pakistan's National Skills Strategy (NSS), National TVET Policy and National Vocational Qualification Framework (NVQF). This provides policy directions, support and an enabling environment to the public and private sectors to impart training for skills development to enhance social and economic profile. The National Vocational & Technical Training Commission (NAVTTTC) has approved the Qualification Development Committee (QDC) for Soil, Water and Fertilizer Testing Lab Attendant. The QDC consists experts from the relevant industries from different geographical locations across Pakistan and academicians who were consulted during the development process to ensure input and ownership of all the stakeholders. The National Competency Standards could be used as a referral document for the development of curricula to be used by training institutions.

The purpose of the training is to provide skilled manpower to improve the quality of value-added products of industrial sector. This training will provide the basic skills to the trainees in the field of Agricultural and convert it into value added product which is acceptable by International market reducing the line losses and fit-in a skilled graduate into National Vocational Qualification Framework for his / her vertical career progression and qualification equivalencies at par with acceptable international standards.

Furthermore, the aim of this qualifications is to set high and applicable professional standards for all stake holders in agriculture sector. The basic goals of establishing these credentials are as follows:

1. Equip with the latest knowledge and skill regarding soil, water and fertilizer.
2. Assess soil fertility, water and fertilizer quality using appropriate laboratory techniques.
3. Macro and micronutrient status assessment and survey of farmers' fields
4. Improve trainees' professional competence
5. Provide opportunities for recognition of non-formal or informal skills
6. Raise standard and efficacy of scientific training and assessment
7. Improve crop production through soil, water and fertilizer test results
8. Application of site-specific fertilizers as needed by the crop contributes to lower costs and environmental impacts



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9. Enable existing workforce to learn new technologies and methods
10. Enable the skilled person of this qualification to validate test method attributes

3. Overall objectives of training program:

The main objectives of the **Soil, Water and Fertilizer Testing Lab Attendant** (Level-2) are as follows:

1. Maintain Occupational Health and Safety
2. Adopt Safety Regulations, Labour Protection Laws, Environmental Protection Laws at Workplace
3. Adhere to Lab Safety Rules
4. Apply Sampling Techniques
5. Execute Pre-Sampling Operations
6. Handle Basic Level Equipment
7. Process Sample for Analysis
8. Maintain Lab Record
9. Perform pH test for water by pH Meter
10. Perform pH Test of Soil by pH Meter
11. Perform Water conductivity test by EC Meter
12. Perform Soil Electrical Conductivity (EC) by EC Meter

4. Competencies to be gained after completion of course:

At the end of the course, the trainee has attained the following core competencies:



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National Qualification in the Soil, Water and Fertilizer Testing Lab Attendant (Level-2).

1. Adhere to Lab Safety Rules
2. Apply Sampling Techniques
3. Execute Pre-Sampling Operations
4. Handle Basic Level Equipment
5. Process Sample for Analysis
6. Maintain Lab Record
7. Perform pH test for water by pH Meter
8. Perform pH Test of Soil by pH Meter
9. Perform Water conductivity test by EC Meter
10. Perform Soil Electrical Conductivity (EC) by EC Meter

5. Entry level of trainees:

The entry for National Vocational Certificate level 2, in “**Soil, Water and Fertilizer Testing Lab Attendant**” are given below:

Title	Entry requirements
National Vocational Certificate level 2, in Soil, Water and Fertilizer Testing Lab Attendant	Entry for assessment for this qualification is open. However, entry into formal training institutes, based on this qualification is candidate having Matric / equivalent Certificate with Science



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6. Minimum qualification of trainer/instructor:

- Must be a holder of **BS (4 years) in Agriculture Sciences with specialization in Soil Sciences or Chemistry**
- Must be able to communicate effectively both orally and in written form.
- Must be able to perform all competences, given in **Soil, Water and Fertilizer Testing Lab Attendant**

7. Recommended trainer: trainee ratio

The recommended maximum trainer: trainee ratio for this program is 1 trainer for 20 to 25 trainees.

8. Medium of instruction i.e. language of instruction:

Instructions will be in Urdu/ English/ Local language.

9. Duration of the course (Total time, Theory & Practical time):

The distribution of contact hours is given below:

Total	-	600 hours
Theory	-	120 hours (20%)
Practical	-	480 hours (80%)



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10. Description and structure of the course

Following is the structure of the course:

Competency Standards	Occupations	NVQF Level	Category	Estimated Contact Hours			Cr Hr	
				Th	Pr	Total		
Level-2								
Health & Safety		Safety Supervisor						
Maintain Occupational Health and Safety			Level 2	Generic	6	24	30	3
Adopt Safety Regulations, Labour Protection Laws, Environmental Protection Laws at Workplace			Level 2	Functional	6	24	30	3
Occupation Total Hours				12	48	60	6	
Basics of Sampling		Jr. Lab Assistant						
Adhere To Lab Safety Rules			Level 2	Technical	12	48	60	6



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Apply Sampling Techniques		Level 2	Technical	18	72	90	9
Handle Basic Level Equipment		Level 2	Technical	9	51	60	6
Execute Pre-Sampling Operations		Level 2	Technical	12	48	60	6
Maintain Lab Record		Level 2	Technical	7	33	40	4
Process Sample for Analysis		Level 2	Technical	12	48	60	6
Occupation Total Hours				70	300	370	37
Performance of Basic Test							
Perform pH test for water by pH Meter	Jr. Lab Assistant	Level 2	Technical	14	36	50	5
Perform pH Test of Soil by pH Meter		Level 2	Technical	12	48	60	6



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Perform Water conductivity test by EC Meter		Level 2	Technical	6	24	30	3
Perform Soil Electrical Conductivity (EC) by EC Meter		Level 2	Technical	6	24	30	3
Occupation Total Hours				38	132	170	17
LEVEL-2 TOTAL HOURS				120	480	600	60



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Level 2 (Technical Competencies)

Module- 1: Adhere to Lab Safety Rules

Objective: This competency standard will provide skills and knowledge related to standard technical lab safety rules. The trainee will be equipped with standard rules for working in soil, water, and fertilizer testing lab.

Duration: 60 Hours

Theory: 12 Hours

Practice: 48 Hours

Credit Hours: 6.0

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Ensure House-keeping Lab Safety Rules	Trainee will be able to: <ul style="list-style-type: none">• Ensure cleanliness of work Place as per requirement.• Ensure accessibility of all emergency points as per safety rules.	Knowledge based questions: <ul style="list-style-type: none">• Define various categories of items for storing.• Define housekeeping safety rules• Explain frequent cleaning	Theory- 2 Hrs. Practical- 9 Hrs. Total- 11 Hrs.	<ul style="list-style-type: none">• Lead testing kit/instrument• PPE• Chemical Safety data Sheet	Class Room/ Lab



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	<ul style="list-style-type: none">• Assort necessary materials according to need at workstation.• Store lightweight items on top and heavy items at base of cabinets• Ensure placement of acid containers at ground level according to prescribed standards.• Ensure frequent cleaning of laboratory sink to prevent choking.• Maintain aeration for equipment to prevent overheating.• Maintain environmental conditions as per given standards	<p>agents.</p> <p><u>Practical Activity:</u></p> <p>Assort basic safety materials</p>			
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<p>LU2. Follow dress code safety Rules</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Wear hair covering cap if required. • Ensure safety of loose clothing or jewelry. • Use completely covering footwear. • Wear full coverage clothes in lab. • Prohibit use of acrylic nails while working with burners, light splints, matches, etc. 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Describe Dress safety rules • Explain Prohibited elements • Enlist lab PPEs <p><u>Practical Activity:</u></p> <p>Demonstrate Lab dress as per safety rules</p>	<p>Theory- 2 Hrs. Practical- 6 Hrs. Total- 8 Hrs.</p>	<ul style="list-style-type: none"> • PPE 	<p>Class Room Lab</p>
<p>LU3. Adhere to Chemical Safety Rules</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Treat all Chemicals as per Material Safety Data Sheet (MSDS). • Use chemical resistant gloves while handling chemicals. 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Define MSDS • Define Relevant Standards, policies and procedures for handling chemicals • Explain Labelling of lab 	<p>Theory- 2 Hrs. Practical- 9 Hrs. Total- 11 Hrs.</p>	<ul style="list-style-type: none"> • Lead testing kit/instrument • PPE • Fume hood • Chemical 	<p>Class Room Lab/ Field Visit</p>



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	<ul style="list-style-type: none">• Label chemicals as per safety standards.• Ensure disposal of chemicals as per set safety rules.• Ensure proper selection of chemicals for your work.• Use fume hood for working with volatile and flammable chemicals.• Clean spillage according to protocols.• Ensure storage of chemicals according to compatibility list• Avoid leaving instruments unattended when analysis is in progress.	<p>chemicals</p> <p>Differentiate between flammable and non-flammable chemicals</p> <ul style="list-style-type: none">• Explain disposal process of chemicals. <p><u>Practical Activity:</u></p> <p>Assort flammable and non-flammable chemicals</p>		Safety data Sheet	
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<p>LU4.</p> <p>Ensure personal hygiene and Sanitation at workplace</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Ensure personal hygiene with clean lab coat, gloves, face masks, goggles, etc. • Refrain from eating, smoking & drinking in lab. • Ensure Cleanliness of lab as per lab requirement. • Undertake fumigation as per given standards • Ensure disposal of laboratory waste as per standard rules • Sterilize glassware before and after use as per test method requirement • Wash hands properly before and after each task as per safety standard • Place all equipment at 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Define fumigation and sterilization. • Describe SOP for safe disposal of waste • Describe importance of standard safety rules • Explain Don'ts of workplace • Explain Procedure related to Sanitation of lab • Define standard workplace environment <p><u>Practical Activity:</u></p> <p>Demonstrate disposal of subjected waste</p>	<p>Theory- 2 Hrs.</p> <p>Practical- 9 Hrs.</p> <p>Total- 11 Hrs.</p>	<ul style="list-style-type: none"> • PPE • Sterilizer • Dry heat oven • Waste Disposal bins • Lab cleanliness equipment • Fumigation reagents • Fume hood • Glass ware • Autoclave 	<p>Class Room</p> <p>Lab</p>
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	<p>designated sites after use</p> <ul style="list-style-type: none"> Maintain laboratory environment in accordance with lab standards. 				
<p>LU5.</p> <p>Follow electrical lab safety rules</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Ensure permission from Lab In-charge before using any high voltage equipment Avoid altering or modifying high-voltage equipment. Ensure high-voltage power supply is switched off when attaching switch. Using one hand only when adjusting high voltage devices. Ensure direct access to electrical panels in accordance with standard safety guidelines. Avoid extensions or loose wire in laboratory. 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> Define SOP using high voltage lab equipment Explain Role and responsibilities during electrical lab operations <p><u>Practical Activity:</u></p> <p>Assort lab equipment according to voltage requirements</p>	<p>Theory- 2 Hrs.</p> <p>Practical- 9 Hrs.</p> <p>Total- 11 Hrs.</p>	<ul style="list-style-type: none"> PPE 	<p>Class Room</p> <p>Lab/ Field Visit</p>



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	<ul style="list-style-type: none"> Avoid water and wet hands when working with electrical devices. 				
<p>LU6.</p> <p>Comply with Lab Procedures</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Follow lab layout Equip with standard protocols for Sampling Adopt standard procedures for each soil analysis Adopt standard procedures for each water analysis Follow the standard test method (STM) for each fertilizer analysis Ensure availability of standard laboratory manuals Display Lab emergency exit plan layout 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> Define Relevant Standards, policies and procedures in Lab Operations Explain Procedure related to Sanitation of lab Describe Health and safety requirements for workplace Describe Importance of Standard Safety rules <p><u>Practical Activity:</u></p> <p>Make a list of Lab Protocols.</p>	<p>Theory- 2 Hrs.</p> <p>Practical- 6 Hrs.</p> <p>Total- 8 Hrs.</p>	<ul style="list-style-type: none"> PPE Layout Charts Lab Manual 	<p>Class Room</p> <p>Lab</p>



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Module- 2: Apply Sampling Techniques

Objective: The competence standard will include expertise and information on the sampling techniques needed to collect representative soil and water samples from farmer's field under specific conditions and fertilizer samples from market.

Duration: 90 Hours

Theory: 18 Hours

Practice: 72 Hours

Credit Hours: 09

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<p>LU1.</p> <p>Apply Sampling Techniques for soil</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Arrange tools for sampling as per requirements. • Collect sub-samples of given site as per random sampling techniques • Collect sub-samples of given site as per Zone based 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Define Soil • Explain soil sampling. • Describe representative sample. • Explain zone-based sampling techniques. • Explain grid-based 	<p>Theory- 6 Hrs.</p> <p>Practical- 18 Hrs.</p> <p>Total- 24 Hrs.</p>	<ul style="list-style-type: none"> • Buckets • Cardboard box • First Aid Kit • GPS device • Thermo-Hygrometer • Marker • Measuring 	<p>Class Room</p> <p>Lab/ Field Visit</p>



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	<p>sampling techniques</p> <ul style="list-style-type: none">• Collect sub-samples of given site as per Grid sampling techniques• Collect sub-samples of given site as per stratified sampling techniques• Make a composite sample by mixing all site sub-samples, then draw a representative sample for laboratory testing• Transport sample to laboratory as per SOP	<p>sampling techniques.</p> <ul style="list-style-type: none">• Describe soil sampling tools.• <p><u>Practical Activity:</u></p> <p>Perform random soil sampling</p>		<p>tape</p> <ul style="list-style-type: none">• Metal ring• Personal protective equipment (PPE)• Plastic bags• Preservatives• Sacks• Sampling bottles• Shovel• Stainless steel Auger• Sterilized containers• Stop watch• Tags for labelling	
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				<ul style="list-style-type: none"> • Thermometer • Thread • Spade • Sample Probe • Sampling Stick 	
<p>LU2. Apply Sampling Techniques for Water</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Arrange tools for water sampling as per requirements. • Collect Surface water sample employing time-based technique as per test requirement. • Collect Surface water sample employing flow-based technique as per given standard. • Collect Surface water sample employing depth-based technique as per given 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Describe tools for water sampling. • Describe water sampling techniques. • Explain the different types of water sampling. • Describe Surface water sampling. • Describe SOP for water sampling. 	<p>Theory- 3 Hrs. Practical- 18 Hrs. Total- 21 Hrs.</p>	<ul style="list-style-type: none"> • Buckets • Cardboard box • First Aid Kit • Flow meter • GPS device • Thermo-Hygrometer • Ice box • Marker • Measuring tape 	<p>Class Room Lab/ Field Visit</p>



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	<p>standard.</p> <ul style="list-style-type: none">• Collect groundwater samples as per SOP and record all details on the bottle label.• Transport sample to laboratory as per SOP	<p><u>Practical Activity:</u></p> <p>Demonstrate given sampling technique for water</p>		<ul style="list-style-type: none">• Metal ring• Personal protective equipment (PPE)• Preservatives• Sampling bottles• Sterilized containers• Stop watch• Tags for labelling• Thermometer• Thread• Sample Probe• Sampling Stick	
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<p>LU3. Apply Sampling Techniques for Fertilizer</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Arrange tools for sampling as per requirement • Collect representative samples of fertilizer from the bag as per SOP. • Store sample in airtight jar • Label sample as per standard procedure • Transport sample to lab as per standard protocol 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Describe representative sampling of fertilizer. • Describe SOP for fertilizer sampling. • Explain the standard protocol of transportation for sampling . <p><u>Practical Activity:</u></p> <p>Demonstrate fertilizer sampling</p>	<p>Theory- 6 Hrs. Practical- 18 Hrs. Total- 24 Hrs.</p>	<ul style="list-style-type: none"> • First Aid Kit • Marker • Measuring tape • Personal protective equipment (PPE) • Plastic bags • Sampling bottles • Shovel • Sterilized containers • Tags for 	<p>Class Room Lab/ Field Visit</p>



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				labelling	
LU4. Adopt Safety Measures	Trainee will be able to: <ul style="list-style-type: none"> • Ensure First Aid Box • Ensure PPE for sampling • Adopt standard procedure for visiting out field 	Knowledge based questions: <ul style="list-style-type: none"> • Explain SOP for field visit. • Explain PPE for sampling <p>Practical Activity: Enlist the items in First Aid Box.</p>	<p>Theory- 3 Hrs.</p> <p>Practical- 18 Hrs.</p> <p>Total- 21 Hrs.</p>	<ul style="list-style-type: none"> • First Aid Kit • GPS device • Marker • Measuring tape • Metal ring • Personal protective equipment (PPE) • Preservatives 	Class Room Lab/ Field Visit



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Module- 3: Handle Basic Level Equipment

Objective: This competency standard will provide skills and knowledge related to maintain the basic level equipment. It will provide the ability to operate the equipment and maintain basic data of soil, water, and fertilizer samples in SI units.

Duration: 60 Hours

Theory: 9 Hours

Practice: 51 Hours

Credit Hours: 6

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Maintain basic level equipment.	Trainee will be able to: <ul style="list-style-type: none"> • Clean basic level instruments as per manual instructions • Clean Glass apparatus as per protocols • Check power supply to the instrument voltage as mentioned 	Knowledge based questions: <ul style="list-style-type: none"> • Define working principle of given instrument. • Describe the importance of equipment cleanliness. • Explain the handling of laboratory equipment. 	Theory- 3 Hrs. Practical- 15 Hrs. Total- 18 Hrs.	<ul style="list-style-type: none"> • Analytical Balance • EC meter • Exhaust hood • Freezer • Hot water bath tub 	Class Room Lab/ Field Visit



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	<p>in the manual.</p> <ul style="list-style-type: none"> Follow Safety standards as per requirement. Implement instrument maintenance plan as per given lab procedure 	<ul style="list-style-type: none"> Explain periodic activities to maintain equipment. <p><u>Practical Activity:</u></p> <p>Perform calibration of weighing Balance</p>		<ul style="list-style-type: none"> Incubator Muffle Furnace Oven PH meter Refrigerator Shaker Vortex mixer Glass apparatus Chromic acid Hot Plate Magnetic hotplate Ethanol 	
<p>LU2.</p> <p>Operate basic level equipment</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Check pre-requisites before turning on the instruments as per given Manual 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> Define SOP . Describe importance of cleanliness of equipment. 		<ul style="list-style-type: none"> Analytical Balance EC meter Exhaust hood 	<p>Class Room</p> <p>Lab/ Field Visit</p>



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	<ul style="list-style-type: none">• Turn on instrument as per instruction given in manual• Implement performance checks as per standard lab procedures• Run sample for a specific time as per given instructions.• Record data for required parameter of the sample in specific SI units as a standard.• Clean instruments after performing analysis as per given instructions• Ensure turn off of instruments as per manuals• Use glass apparatus according to given SOP• Follow safety standards of lab	<ul style="list-style-type: none">• Explain Operating Procedure of Muffle Furnace• Explain usage of magnetic hot plate.• Explain trouble shooting of equipment. <p><u>Practical Activity:</u></p> <p>Demonstrate working of water bath.</p>	<p>Theory- 6 Hrs.</p> <p>Practical- 36 Hrs.</p> <p>Total- 42 Hrs.</p>	<ul style="list-style-type: none">• Freezer• Hot water bath tub• Incubator• Muffle Furnace• Oven• pH meter• Refrigerator• Shaker• Vortex mixer• Glass apparatus• Magnetic hotplate	
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Module- 4: Execute Pre-Sampling Operations

Objective: This competency standard covers the skill and knowledge required to demonstrate the objectives of the sampling, prepare sampling plan, identify types of samples, preservation, labeling and observe the site details.

Duration: 60 Hours

Theory: 12 Hours

Practice: 48 Hours

Credit Hours: 6.0

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Demonstrate Objectives of Sampling	Trainee will be able to: <ul style="list-style-type: none"> • Demonstrate scope and objectives of sampling as per project/assessment objectives. • Figure out purpose for which various types of samples will be collected • Review site files and field folders. (Site location, 	Knowledge based questions: <ul style="list-style-type: none"> • Define sampling. • Explain SOP for soil sampling. • Explain SOP for water sampling. • Explain different types of water sampling. • Explain different types for 	Theory- 4 Hrs. Practical- 15 Hrs. Total- 19 Hrs.	<ul style="list-style-type: none"> ○ Literature ○ Note pad ○ Laptop ○ Map of the sites 	Class Room Lab/ Field Visit



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	<p>description and access, and review any previously collected physical, chemical, and biological data.)</p> <ul style="list-style-type: none"> • Follow sampling design and sample size instructions as required • Follow standard methods for sampling 	<p>soil sampling.</p> <p>Practical Activity:</p> <p>Explain the objectives of water sampling</p>			
<p>LU2.</p> <p>Prepare sampling plan</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Plan field visits as per given task • Make checklist for pre-sampling, sampling and post sampling preparations as per requirement • Select sampling tool kit as per Sampling plan • Check field equipment to 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Explain planning of taking sample. • Describe requirements for sampling tool kit of water. • Describe requirements for sampling tool kit of soil. 	<p>Theory- 4 Hrs.</p> <p>Practical- 18 Hrs.</p> <p>Total- 22 Hrs.</p>	<ul style="list-style-type: none"> ○ Map of the sites ○ Polystyrene bottles of 0.5- and 1.5-liter capacities ○ For bacterial analysis, samples were collected in pre sterilized bottles of 200 ml volume ○ For analysis of trace elements and nitrate (nitrogen) nitric acid and boric acid respectively ○ Water sampling questionnaire 	<p>Class Room</p> <p>Lab/ Field Visit</p>



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	<p>perform Accurate Field Measurements</p> <ul style="list-style-type: none"> • Check Maps, distance measuring equipment, global positioning systems, or other location determining equipment; 	<p><u>Practical Activity:</u></p> <p>Enlist requirements for preparing plan for water/soil sampling</p>		<ul style="list-style-type: none"> ○ GPS device ○ Water sampler ○ Hand washer ○ Protective equipment ○ Sample bottles 	
<p>LU3.</p> <p>Observe Site Details</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Document all information regarding location, depth, type, previous crop, GPS coordinates and anything unusual/notable around the sampling site/source. • Note Point and nonpoint sources of contamination and depth for water sampling 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Define contamination • Explain geographical condition of site. • Describe physical condition of site. • Explain environmental conditions of site. <p><u>Practical Activity:</u></p>	<p>Theory- 4 Hrs.</p> <p>Practical- 15 Hrs.</p> <p>Total- 19 Hrs.</p>	<ul style="list-style-type: none"> ○ Map of the sites ○ Water sampling questionnaire ○ GPS device ○ Water sampler ○ Washing Bottle ○ Protective equipment ○ Sample bottles 	<p>Class Room</p> <p>Lab/ Field Visit</p>



Soil, Water and Fertilizer Testing Lab Attendant



	<ul style="list-style-type: none">• Document physical and meteorological conditions.• Ensure Signatures or initials of appropriate field personnel with date on document.	Collect site details			
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Soil, Water and Fertilizer Testing Lab Attendant



Module- 5: Maintain Lab Record

Objective: This competency standard will provide skills and knowledge related to registering and labeling of sample which are very critical in the analysis. It will provide further ability to maintain stock record of chemicals, reagents, glassware and other related equipment to avoid any complicity of audit procedures.

Duration: 40 Hours

Theory: 07 Hours

Practice: 33 Hours

Credit Hours: 4.0

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Register Sample	Trainee will be able to: <ul style="list-style-type: none"> • Receive sample only at designated site • Examine physical conditions and quantity of received sample as per lab procedure 	Knowledge based questions: <ul style="list-style-type: none"> • Explain recording of physical condition of water sample as per lab protocols. • Explain use of tag/lab codes. 	Theory- 2 Hrs. Practical- 12 Hrs. Total- 14 Hrs.	<ul style="list-style-type: none"> ➤ Lab registers ➤ Computer ➤ PPE ➤ Permanent marker 	Class Room/ Lab /Field Visit



Soil, Water and Fertilizer Testing Lab Attendant



	<ul style="list-style-type: none"> • Issue sample receipt as per defined format • Assign tag number to sample as per serial pattern • Note sample details as per given particulars • Record name and address of client 	<p><u>Practical Activity:</u></p> <p>Tag sample as per SOP</p>			
<p>LU2.</p> <p>Label Sample</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Mention test requirements on prescribed Performa as per lab procedure • Mention allocated sample ID on label • Mark sample by using permanent marking tools • Mention type of analysis required on prescribed Performa • Mention date and time of sample as collected 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Explain significance of sample label. • Explain the label procedure of sample. <p><u>Practical Activity:</u></p> <p>Demonstrate sample labeling according to lab protocols</p>	<p>Theory- 2 Hrs.</p> <p>Practical- 12 Hrs.</p> <p>Total- 14 Hrs.</p>	<ul style="list-style-type: none"> ➤ Permanent marker ➤ Tape ➤ Marking Tags ➤ 	<p>Class Room</p> <p>Lab/ Field Visit</p>



Soil, Water and Fertilizer Testing Lab Attendant



	Mention storage requirements on prescribed Performa as per requirement.				
LU3. Manage Inventory	Trainee will be able to: <ul style="list-style-type: none"> • Maintain stock registers of consumable as per requirement. • Maintain Fixed assets/dead stock register as per requirements • Maintain instrument stock register as per requirements • Manage logbook of required equipment as per its utilization and schedule. • Prepare and Maintain History sheet for repair and maintenance of equipment as per set standard. • Maintain sample log register 	Knowledge based questions: <ul style="list-style-type: none"> • Explain the importance of maintaining dead stock register. • Define supplies consumable. • Explain procedure for preparing repair history sheets for instruments <u>Practical Activity:</u> Demonstrate record keeping in log register of chemicals	Theory- 3 Hrs. Practical- 9 Hrs. Total- 12 Hrs.	<ul style="list-style-type: none"> • Lab registers • Computer • PPE • Permanent marker 	Class Room Lab/ Field Visit



Soil, Water and Fertilizer Testing Lab Attendant



Module-6.: Process Sample for Analysis

Objective: This competency standard will provide skills and knowledge related to standard procedure for processing of soil, water and fertilizer samples according to set criteria.

Duration: 60 Hours

Theory: 12 Hours

Practice: 48 Hours

Credit Hours: 6.0

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Process soil sample	Trainee will be able to: <ul style="list-style-type: none"> • Homogenize collected soil sample by mixing and allow to attain equilibrium according to given instructions. 	Knowledge based questions: <ul style="list-style-type: none"> • Describe Processing of soil samples according to Protocols. 	Theory- 2 Hrs. Practical- 6 Hrs. Total- 08 Hrs.	<ul style="list-style-type: none"> • Cutter/scissor • Fertilizer grinder/ Mortar and pestle • Sieve 30 to 100 mesh as per 	Class Room Lab/ Field Visit



Soil, Water and Fertilizer Testing Lab Attendant



	<ul style="list-style-type: none"> • Dry soil sample as per required procedures • Remove the physical impurities from the samples i.e. Plant residues, gravel, soft chalk, limestone and stones • Grind the soil sample following standard protocols • Sieve the selected soil according to test requirement • Dispose-off impurities retained on sieve as per lab protocols • Ensure sample labeling for desired process as per given standard • Follow health and safety guidelines 	<ul style="list-style-type: none"> • Explain Handling and usage of lab apparatus related to processing of sample • Describe safety guidelines for processing the sample <p><u>Practical Activity:</u></p> <p>Demonstrate the use of sieve.</p>		<p>requirement of the method</p> <ul style="list-style-type: none"> • Sample sealing tape • Plastic bottles • Weighing boat or glaze paper • Analytical balance • Glass funnel • Filter paper Whatman No. 42 or as per requirement of method • 	
<p>LU2.</p> <p style="text-align: center;">Process Water Sample</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Ensure cleanliness of glass wares to avoid contamination 	<p>Knowledge Based Questions:</p> <ul style="list-style-type: none"> • Define the use of Filter 	<p>Theory- 2 Hrs.</p> <p>Practical- 12 Hrs.</p>	<ul style="list-style-type: none"> • Cutter/scissor • sealing tape • Plastic bottles 	<p>Class Room</p> <p>Lab/ Field Visit</p>



Soil, Water and Fertilizer Testing Lab Attendant



	<ul style="list-style-type: none"> • Filter water sample for physical impurities/undesirable matters as per required standards • Process water sample in desired apparatus only according to set SOPs • Ensure sample labeling for desired process as per given standard • Ensure safety standards 	<p>paper.</p> <ul style="list-style-type: none"> • Describe Protocols related to disposal of water waste. • Describe the safety guidelines in processing of sample <p><u>Practical Activity:</u></p> <p>Demonstrate the use of Glass funnel.</p>	Total- 14 Hrs.	<ul style="list-style-type: none"> • Weighing boat or glaze paper • Analytical balance • Glass funnel • Filter paper Whatman No. 42 or as per requirement of method 	
<p>LU3.</p> <p>Process fertilizer sample</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Ensure seal and label of sample as per standard method • Open the collected sample as per prescribed procedure • Process sample as per lab procedure according to requirement 	<p>Knowledge Based</p> <p>Questions:</p> <ul style="list-style-type: none"> • Explain standard Processing of fertilizer samples. • Describe Protocols related to disposal of fertilizer waste. 	<p>Theory- 3 Hrs.</p> <p>Practical- 12 Hrs.</p> <p>Total- 15 Hrs.</p>	<ul style="list-style-type: none"> • Cutter/scissor • Fertilizer grinder/ Mortar and pestle • Sieve 30 to 100 mesh as per requirement of the method 	<p>Class Room</p> <p>Lab/ Field Visit</p>



Soil, Water and Fertilizer Testing Lab Attendant



	<ul style="list-style-type: none"> Ensure safety standards 	<p>Explain safety guidelines for processing of sample</p> <p><u>Practical Activity:</u></p> <p>Demonstrate procedure of sample processing.</p>		<ul style="list-style-type: none"> Sample sealing tape Plastic bottles Weighing boat or glaze paper Analytical balance Glass funnel Filter paper Whatman No. 42 or as per requirement of method 	
<p>LU4.</p> <p>Handle prepared sample</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Ensure transportation of prepared sample according to prescribed standards Prevent sample leakage or spillage 	<ul style="list-style-type: none"> Knowledge Based Question: Describe Handling and usage of lab apparatus related to processing of sample 	<p>Theory- 3 Hrs.</p> <p>Practical- 9 Hrs.</p> <p>Total- 12 Hrs.</p>	<ul style="list-style-type: none"> Cutter/scissor Fertilizer grinder/ Mortar and pestle Sieve 30 to 100 mesh as per 	<p>Class Room</p> <p>Lab/ Field Visit</p>



Soil, Water and Fertilizer Testing Lab Attendant



	<ul style="list-style-type: none"> • Ensure standard time period between collection and analysis of samples • Avoid mixing of collected and obtained sample • Follow health safety rules 	<ul style="list-style-type: none"> • Explain safety guidelines required for handling of sample • Explain Protocols related to disposal of lab waste <p><u>Practical Activity:</u></p> <p>Enlist standard procedure for handling of prepared sample.</p>		<p>requirement of the method</p> <ul style="list-style-type: none"> • Sample sealing tape • Plastic bottles • Weighing boat or glaze paper • Analytical balance • Glass funnel • Filter paper Whatman No. 42 or as per requirement of method 	
<p>LU5.</p> <p>Store sample</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Ensure Standard labeling of prepared and obtained samples before storage • Record data for storage 	<ul style="list-style-type: none"> • Knowledge Based Question • Describe sample storage requirements. • Explain standard labeling procedure for sample 	<p>Theory- 2 Hrs.</p> <p>Practical- 9 Hrs.</p> <p>Total- 11 Hrs.</p>	<ul style="list-style-type: none"> • Sample sealing tape • Plastic bottles • Lab registers • Computer • PPE 	<p>Class Room</p> <p>Lab/ Field Visit</p>



Soil, Water and Fertilizer Testing Lab Attendant



	<ul style="list-style-type: none">• Store samples as per given SOP• Ensure lab safety rules for handling glass wares	<p><u>Practical Activity:</u></p> <p>Demonstrate store sample labelling</p>		<ul style="list-style-type: none">• Permanent marker	
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Soil, Water and Fertilizer Testing Lab Attendant



Module-7: Perform pH test for water by pH Meter

Objective: This competency standard covers the skill and knowledge required to prepare samples for laboratory testing, testing procedure for water pH, Quality checks, calculation of results and precautions adopted for performing test.

Duration: 50 Hours

Theory: 14 Hours

Practice: 36 Hours

Credit Hours: 5.0

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prerequisites for testing	Trainee will be able to: <ul style="list-style-type: none"> • Check sample label for requirement of pH testing. • Ensure Laboratory room temperature according to lab requirement • Keep sample at room temperature for few minutes. • Prepare pH buffer solution as per requirement 	Knowledge based questions: <ul style="list-style-type: none"> • Define pH. • Describe the role of deionized water in subjected test. • Explain the temperature requirement for performing test. • 	Theory- 2 Hrs. Practical- 3 Hrs. Total- 5 Hrs.	<ul style="list-style-type: none"> • pH Meter • pH buffers of pH 4, 7 & 10 • Deionized/ distilled water • Glass Beaker (Class A) • Glass rod • thermometer 	Class Room Lab/ Field Visit



Soil, Water and Fertilizer Testing Lab Attendant



	<ul style="list-style-type: none"> • Arrange equipment as per test method requirement.. • Set up pH meter and/or reagents in accordance with the specified work instructions. • Conduct pre-use and safety checks. 	<p><u>Practical Activity:</u></p> <p>Demonstrate pre-use and safety checks of pH meter.</p>			
<p>LU2.</p> <p>Perform procedure test</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Turn on instrument as per manual • Rinse electrode with distilled water and check calibration by running known buffers as per method requirement. • Take sample in a beaker according to test method. • Immerse probe and stir it until instrument gives stable pH reading. • Perform test sample replicates 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Define buffer. • Explain the principle of pH meter. • Describe the range of pH meter. • Describe the SOP for subjected test. <p><u>Practical Activity:</u></p> <p>Demonstrate the use of pH meter.</p>	<p>Theory- 3 Hrs.</p> <p>Practical- 6 Hrs.</p> <p>Total- 09 Hrs.</p>	<ul style="list-style-type: none"> • pH Meter • pH buffers of pH 4, 7 & 10 • Deionized/ distilled water • Glass Beaker (Class A) • Glass rod • Thermometer 	<p>Class Room</p> <p>Lab/ Field Visit</p>



Soil, Water and Fertilizer Testing Lab Attendant



	<p>as per SOP.</p> <ul style="list-style-type: none"> • Store unused reagents and dispose of wastes as required by relevant regulations and codes. • Clean and store equipment as per lab protocol 				
<p>LU3.</p> <p>Quality Control Checks</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Perform pH meter intermediate checks as per lab quality assurance plan • Run blank sample accordingly. • Run Laboratory Control samples as per standard. • Perform replicate/re-testing as per lab standards. • Record quality control data as per lab procedure. • Prepare quality control charts of 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Explain the purpose of intermediate checks. • Describe procedure for calibration of pH meter. • Explain quality control charts. <p><u>Practical Activity:</u></p> <p>Perform calibration of pH meter.</p>	<p>Theory- 3 Hrs.</p> <p>Practical- 12 Hrs.</p> <p>Total- 15 Hrs.</p>	<ul style="list-style-type: none"> • pH Meter • pH buffers of pH 4, 7 & 10 • Deionized/ distilled water • Glass Beaker (Class A) • Charts • Marker 	<p>Class Room</p> <p>Lab/ Field Visit</p>



Soil, Water and Fertilizer Testing Lab Attendant



	quality assurance activities according to lab procedure.				
LU4. Record the results	Trainee will be able to: <ul style="list-style-type: none"> Calculate and Note down Results on analyst workbook. Submit the results to lab In-charge Clear and restore work area. 	Knowledge based questions: <ul style="list-style-type: none"> Explain the purpose of record keeping. <p>Describe the method for recording pH meter results.</p> <ul style="list-style-type: none"> <u>Practical Activity:</u> <p>Perform the results of pH meter.</p>	Theory- 3 Hrs. Practical- 9 Hrs. Total- 12 Hrs.	<ul style="list-style-type: none"> Work book Markers duster 	Class Room Lab/ Field Visit
LU5. Adopt precautions during work	Trainee will be able to: <ul style="list-style-type: none"> Ensure before taking any measurement that instrument has been calibrated. Leave probe always in distilled 	Knowledge based questions: <ul style="list-style-type: none"> Define calibration. Explain precautionary measures for usage pH meter. 	Theory- 3 Hrs. Practical- 6 Hrs. Total- 09 Hrs.	<ul style="list-style-type: none"> Distilled water Beakers Glass rods Duster 	Class Room Lab/ Field Visit



Soil, Water and Fertilizer Testing Lab Attendant



	<p>water.</p> <ul style="list-style-type: none">• Submerge probe in sample to be tested while stirring it gently.• Rinse probe tip after use according to SOP.	<ul style="list-style-type: none">• Describe solvent of pH meter. <p><u>Practical Activity:</u></p> <p>Perform post handling requirements for pH meter.</p>			
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Soil, Water and Fertilizer Testing Lab Attendant



Module-: Perform pH Test of Soil by pH Meter

Objective: After the completion of this module, the Trainee will be able to cover the skill and knowledge required to Preparation of samples for laboratory testing, Sampling and testing procedures, Quality Control Checks, calculation of results maintenance of Record the results and precautions during work.

Duration: 60 Hours

Theory: 12 Hours

Practice: 48 Hours

Credit Hours: 06

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prerequisites for testing	Trainee will be able to: <ul style="list-style-type: none"> • Check sample label for required test • Maintain required laboratory temperature • Keep sample at room temperature as required. • Prepare pH buffer solution as per requirement. • Arrange equipment as per test 	Knowledge based questions: <ul style="list-style-type: none"> • Explain role of pH in water • Explain Working principle of pH meter • Describe pre-requisites of pH buffer solution <u>Practical Activity:</u> Arrange the tools/reagents as	Theory- 2 Hrs. Practical- 6 Hrs. Total- 8 Hrs.	<ul style="list-style-type: none"> ➤ pH Meter ➤ pH buffers of pH 4, 7 & 10 ➤ Deionized/ distilled water ➤ Glass Beakers ➤ Glass rod 	Class Room Lab/ Field Visit



Soil, Water and Fertilizer Testing Lab Attendant



	<p>method.</p> <ul style="list-style-type: none"> • Set up pH meter and/or reagents in accordance with the specified work instructions. • Conduct pre-use and safety checks. 	per test method			
<p>LU2.</p> <p>Perform test Procedure on samples</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Turn on instrument as per instructions given in manual. • Calibrate pH meter by as per standard method. • Adjust meter with buffer solution of known pH according to SOP. • Weigh required sample and transfer into beaker as per standard method. • Add distilled water and stir it as per standard procedure. • Immerse electrode and stir it 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Define alkalinity. • Explain basic principles of testing sample • Explain precautions during work <p><u>Practical Activity:</u></p> <p>Demonstrate pH of given sample</p>	<p>Theory- 2 Hrs.</p> <p>Practical- 9 Hrs.</p> <p>Total- 11 Hrs.</p>	<ul style="list-style-type: none"> • pH Meter • pH buffers of pH 4, 7 & 10 • Deionized/ distilled water • Glass Beakers • Glass rod 	<p>Class Room</p> <p>Lab/ Field Visit</p>



Soil, Water and Fertilizer Testing Lab Attendant



	<p>until instrument gives stable pH reading.</p> <ul style="list-style-type: none"> • Perform test sample replicates as per SOP.. • Store unused reagents and dispose of wastes as per standard protocols. • Clean and store equipment as per lab protocol 				
<p>LU3.</p> <p>Quality Control Checks</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Perform pH meter intermediate checks as per lab quality assurance plan • Run blank sample accordingly. • Run Laboratory Control samples as per standard. • Perform replicate/re-testing as per lab standards. • Record quality control data as per lab procedure. 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Define Blank sample • Describe the significance of storing electrode in pH 4. • Describe lab quality assurance standards <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Prepare quality control chart 	<p>Theory- 3 Hrs.</p> <p>Practical- 12 Hrs.</p> <p>Total- 15 Hrs.</p>	<ul style="list-style-type: none"> • pH Meter • pH buffers of pH 4, 7 & 10 • Deionized/ distilled water • Glass Beakers • Glass rod 	<p>Class Room</p> <p>Lab/ Field Visit</p>



Soil, Water and Fertilizer Testing Lab Attendant



	<ul style="list-style-type: none"> Prepare quality control charts of quality assurance activities according to lab procedure. 				
LU4. Record results	Trainee will be able to: <ul style="list-style-type: none"> Calculate and Note down the Results on analyst workbook. Submit the results to lab In-charge Clear and restore work area. 	Knowledge based questions: <ul style="list-style-type: none"> Differentiate between alkalinity and acidity. Explain the formula of pH. <p><u>Practical Activity:</u> Demonstrate the results according to test method</p>	Theory- 2 Hrs. Practical- 9 Hrs. Total- 11 Hrs.	<ul style="list-style-type: none"> pH Meter pH buffers of pH 4, 7 & 10 Deionized/ distilled water Glass Beakers Glass rod 	Class Room Lab/ Field Visit
LU5. Adopt precautions during work	Trainee will be able to: <ul style="list-style-type: none"> Calibrate instrument before taking measurement as per requirement. Leave probe always in distilled water. 	Knowledge based questions: <ul style="list-style-type: none"> Describe the importance of calibration. Explain the usage of distilled/ Deionized water. Explain the significance of 	Theory- 3 Hrs. Practical- 12 Hrs. Total- 15 Hrs.	<ul style="list-style-type: none"> pH Meter pH buffers of pH 4, 7 & 10 Deionized/ distilled water Glass Beakers 	Class Room Lab/ Field Visit



Soil, Water and Fertilizer Testing Lab Attendant



	<ul style="list-style-type: none">• Submerge probe in sample to be tested while stirring it gently.• Rinse probe tip after use according to SOP.	silver nitrate in pH probe. <u>Practical Activity:</u> <ul style="list-style-type: none">• Demonstrate precautionary measures during work		<ul style="list-style-type: none">• Glass rod	
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Soil, Water and Fertilizer Testing Lab Attendant



Module-9: Perform Conductivity test of water by EC Meter

Objective: After the completion of this module, the Trainee will be able to develop skill and competence covers the skill and knowledge required to prepare samples for laboratory testing, testing procedure for water electrical conductivity, Quality checks, calculation of results and precautions adopted for performing test.

Duration: 30 Hours

Theory: 06 Hours

Practice: 24 Hours

Credit Hours: 3.0

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prerequisites for testing	Trainee will be able to: <ul style="list-style-type: none"> • Check sample label for required test. • Maintain Laboratory room temperature as per requirement. • Keep sample at room temperature for few minutes. 	Knowledge based questions: <ul style="list-style-type: none"> • Define EC. • Explain the role of EC in water. • Describe the function EC Meter 	Theory- 1 Hrs. Practical- 6 Hrs. Total- 7 Hrs.	<ul style="list-style-type: none"> • EC Meter with electrode and temperature probe • EC Standard 1413 $\mu\text{S}/\text{cm}$. • Deionized/ distilled water 	Class Room Lab/ Field Visit



Soil, Water and Fertilizer Testing Lab Attendant



	<ul style="list-style-type: none"> • Check for availability of EC standard as per requirement. • Arrange equipment as per requirements. • Set up EC meter and/or reagents in accordance with the standard work instructions. • Conduct pre-use and safety checks. 	<p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Set up EC meter in accordance with the standard work instructions. 		<ul style="list-style-type: none"> • Glass Beaker (Class A) • Glass rod • Conductivity/ storage solution 	
<p>LU2.</p> <p>Perform test Procedure on samples</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Turn on instrument as per manual. • Check calibration status and perform calibration if required. • Take sample in a beaker as per test method requirement • Immerse electrode and stir it until instrument gives stable reading. • Perform replicates as per 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Explain role of electrode. • Describe reagents. • Explain the working procedure of EC. <p><u>Practical Activity:</u></p> <p>Perform EC test of given sample.</p>	<p>Theory- 2 Hrs.</p> <p>Practical- 6 Hrs.</p> <p>Total- 8 Hrs.</p>	<ul style="list-style-type: none"> • EC Meter with electrode and temperature probe • EC Standard 1413 $\mu\text{S}/\text{cm}$. • Deionized/ distilled water • Glass Beaker (Class A) • Glass rod 	<p>Class Room</p> <p>Lab/ Field Visit</p>



Soil, Water and Fertilizer Testing Lab Attendant



	<p>requirement.</p> <ul style="list-style-type: none"> • Store unused reagents and dispose of wastes as per SOP. • Clean and store equipment as per lab protocol. 			<ul style="list-style-type: none"> • Conductivity/ storage solution 	
<p>LU3.</p> <p>Quality Control Checks</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Perform EC meter intermediate checks as per lab quality assurance plan • Run blank sample accordingly. • Run Laboratory Control samples as per standard. • Perform replicate/re-testing as per lab standards. • Record quality control data as per lab procedure. • Prepare quality control charts of quality assurance activities according to lab procedure. 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Define laboratory control standards. • Explain the factor affecting EC measurement. • Describe standard quality assurance procedure <p><u>Practical Activity:</u></p> <p>Run blank sample on EC meter.</p>	<p>Theory- 1 Hrs.</p> <p>Practical- 6 Hrs.</p> <p>Total- 7 Hrs.</p>	<ul style="list-style-type: none"> • EC Meter with electrode and temperature probe • EC Standard 1413 $\mu\text{S}/\text{cm}$. • Deionized/ distilled water • Glass Beaker (Class A) • Glass rod • Conductivity/ storage solution 	<p>Class Room</p> <p>Lab/ Field Visit</p>



Soil, Water and Fertilizer Testing Lab Attendant



<p>LU4.</p> <p>Record the results/ Finalize work</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Calculate and Note down the Results on analyst workbook. • Submit the results to lab In-charge. • Clear and restore work area. 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Define the units used in EC measurement. • Describe the formula of EC. • Differentiate between micro and milli Siemens <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Convert the results of given sample in micro and milli Siemens • 	<p>Theory- 1 Hrs.</p> <p>Practical- 3 Hrs.</p> <p>Total- 4 Hrs.</p>	<ul style="list-style-type: none"> • EC Meter with electrode and temperature probe • EC Standard 1413 $\mu\text{S/cm}$. • Deionized/ distilled water • Glass Beaker (Class A) • Glass rod • Conductivity/ storage solution • Lab registers • Computer • PPE • Permanent marker 	<p>Class Room</p> <p>Lab/ Field Visit</p>
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Soil, Water and Fertilizer Testing Lab Attendant



<p>LU5.</p> <p>Adopt precautions during work</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Ensure calibration of instrument as per requirement. • Leave probe always in conductivity / storage solution. • Submerge probe in sample to be tested while stirring it gently. • Rinse probe tip after use according to SOP. 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Explain Calibration of EC through KCl solution • Describe the importance of probe placement in Storage solution <p><u>Practical Activity:</u></p> <p>Demonstrate pre and post handling of probe</p>	<p>Theory- 1 Hrs.</p> <p>Practical- 3 Hrs.</p> <p>Total- 4 Hrs.</p>	<ul style="list-style-type: none"> • PPE • EC Meter with electrode and temperature probe • EC Standard 1413 $\mu\text{S}/\text{cm}$. • Deionized/ distilled water • Glass Beaker (Class A) • Glass rod • Conductivity/ storage solution 	<p>Class Room</p> <p>Lab/ Field Visit</p>
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Module-10: Perform Soil Electrical Conductivity (EC) by EC Meter

Objective: This competency standard covers the skill and knowledge required to Preparation samples for testing, test procedures, Quality Control Checks, results calculation, safety precautions and record data.



Soil, Water and Fertilizer Testing Lab Attendant



Duration: 30 Hours

Theory: 6 Hours

Practice: 24 Hours

Credit Hours: 3.0

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prerequisites for testing	Trainee will be able to: <ul style="list-style-type: none"> • Check sample label for the required test. • Maintain Laboratory room temperature as per requirement. • Keep sample at room temperature for few minutes. • Check for availability of EC standard as per requirement. • Arrange equipment as per requirements. • Set up EC meter and/or reagents in accordance with the standard work instructions. 	Knowledge based questions: <ul style="list-style-type: none"> • Describe the role of EC in soil • Explain the process for soil sample dilution • Describe EC standard. <u>Practical Activity:</u> Perform dilution of soil sample	Theory- 1 Hrs. Practical- 6 Hrs. Total- 7 Hrs.	<ul style="list-style-type: none"> • Analytical Balance • EC Meter with electrode • EC Standard 1413 $\mu\text{S}/\text{cm}$. • Deionized/ distilled water • Storage solution • Glass rod • KCl 0.01M • Glass Beaker (Class A) 	Class Room Lab/ Field Visit



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	<ul style="list-style-type: none"> Conduct pre-use and safety checks. 				
<p>LU2.</p> <p>Perform test Procedure on samples</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Turn on instrument as per standard method. Prepare soil-water suspension as per SOP. Calibrate conductivity meter according to standard instructions. Rinse cell/ electrode thoroughly as per SOP. Measure electrical conductivity of the 0.01M KCl as per standard test method. Measure EC of sample suspension as per standard test method 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> Explain the role of distilled water in test process Explain the working principle of EC test. Explain the calibration of conductivity meter. <p><u>Practical Activity:</u></p> <p>Perform EC measurement of soil sample.</p>	<p>Theory- 2 Hrs.</p> <p>Practical- 6 Hrs.</p> <p>Total- 8 Hrs.</p>	<ul style="list-style-type: none"> Analytical Balance EC Meter with electrode EC Standard 1413 $\mu\text{S}/\text{cm}$. Deionized/ distilled water Storage solution Glass rod KCl 0.01M Glass Beaker (Class A) 	<p>Class Room</p> <p>Lab/ Field Visit</p>



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	<ul style="list-style-type: none"> • Rinse the conductivity cell in soil suspension as per test method. • Refill the conductivity cell as per SOP. • Perform replicates as per requirement. • Store unused reagents and dispose of wastes as required by relevant regulations and codes. • Clean and store equipment as per SOP 				
<p>LU3.</p> <p>Perform Quality Control Checks</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Perform EC meter intermediate checks as per lab quality assurance plan • Run blank sample accordingly. • Run Laboratory Control samples as per standard. 	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Explain the conductivity meter intermediate checks. • Explain effect of temperature on EC measurement • Explain importance of blank 	<p>Theory- 1 Hrs.</p> <p>Practical- 6 Hrs.</p> <p>Total- 7 Hrs.</p>	<ul style="list-style-type: none"> • EC Meter with electrode • EC Standard 1413 $\mu\text{S}/\text{cm}$. • Deionized/ distilled water • Storage solution 	<p>Class Room</p> <p>Lab/ Field Visit</p>



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	<ul style="list-style-type: none"> • Perform replicate/re-testing as per lab standards. • Record quality control data as per lab procedure. • Prepare quality control charts of quality assurance activities according to lab procedure. 	<p>sample</p> <ul style="list-style-type: none"> • Explain importance error indicator in EC measurements. <p><u>Practical Activity:</u></p> <p>Prepare quality control charts</p>		<ul style="list-style-type: none"> • Glass rod • KCl 0.01M • Glass Beaker (Class A) • Lab registers • Computer • PPE • Permanent marker 	
<p>LU4.</p> <p>Record the results</p>	<p>Trainee will be able to:</p> <p>P1. Calculate and Note down the Results on analyst workbook.</p> <p>P2. Submit the results to lab In-charge</p> <p>Clear and restore work area.</p>	<p>Knowledge based questions:</p> <ul style="list-style-type: none"> • Describe the conductance formula • Explain factors effecting the results of subjected results <p><u>Practical Activity:</u></p> <p>Prepare the results of given sample of soil.</p>	<p>Theory- 1 Hrs.</p> <p>Practical- 3 Hrs.</p> <p>Total- 4 Hrs.</p>	<ul style="list-style-type: none"> • EC Meter with electrode • EC Standard 1413 $\mu\text{S}/\text{cm}$. • Deionized/ distilled water • Storage solution • Glass rod • KCl 0.01M • Glass Beaker 	<p>Class Room</p> <p>Lab/ Field Visit</p>



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				(Class A) <ul style="list-style-type: none"> • Lab registers • Computer • PPE • Permanent marker 	
LU5. Adopt precautions during work	Trainee will be able to: <ul style="list-style-type: none"> • Ensure calibration of instrument as per method requirement. • Leave probe always in conductivity/ storage solution. • Submerge probe in sample to be tested while stirring it gently. • Rinse probe tip after use according to SOP 	Knowledge based questions: <ul style="list-style-type: none"> • Explain the importance of cleanliness of tools • Explain the precautions while measuring EC. • Describe storage solution for conductivity meter. <u>Practical Activity:</u> Prepare 0.01 M KCl solution	Theory- 1 Hrs. Practical- 3 Hrs. Total- 4 Hrs.	<ul style="list-style-type: none"> • EC Meter with electrode • EC Standard 1413 $\mu\text{S}/\text{cm}$. • Deionized/ distilled water • Storage solution • Glass rod • KCl 0.01M • Glass Beaker (Class A) 	Class Room Lab/ Field Visit



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Level 2 (Generic Competencies)

Module1: Maintain Occupational Health and Safety.

Objective: After the completion of this module, the Trainee will be able to develop skill and competence required to maintain Occupational Health and Safety and take remedial measures to deal with the emergencies in a professional manner, thus minimizing the losses and providing a safe and healthy working environment.

Duration: 30 Hours

Theory: 06 Hours

Practice: 24 Hours

Credit Hours: 3.0

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Maintain PPEs and First-aid Box.	Trainee must be able to: <ul style="list-style-type: none">Arrange the required personal protective equipmentCheck functional condition of PPE's	<ul style="list-style-type: none">Define PPEDescribe Importance of first aid box. <u>Practical Activity:</u>	Theory: 1 Hr Practical: 6 Hrs.	<ul style="list-style-type: none">First Aid boxFirst aid kitSafe guard device	Class Room Training



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	<ul style="list-style-type: none"> • Wear personal protective equipment • Ensure availability of first aid box • Check first aid box for requisite emergency • Check expiry of medicines • Perform first aid treatment against electric shocks • Perform first aid treatment/bandages against minor injuries. 	Demonstrate the use of First aid box in case of emergency	Total: 7 Hrs.	<ul style="list-style-type: none"> • Safety goggles • Safety harness belt • Safety helmet • Safety mask • Safety Shoes 	Workshop. Lab/ Field Visit
LU2. Maintain Fire Extinguisher.	Trainee must be able to: <ul style="list-style-type: none"> • Check expiry of fire extinguisher • Operate fire extinguisher • Replace fire extinguisher • Ensure that the fire brigade is at stand by (for major emergency). 	<ul style="list-style-type: none"> • Fire Extinguisher and its application. • Operating technique of fire extinguisher. <p><u>Practical Activity:</u></p> <p>Demonstrate the use of fire extinguisher</p>	Theory: 1 Hrs. Practical: 3 Hrs. Total: 4 Hrs.	<ul style="list-style-type: none"> • Fire Extinguisher 	Classroom Training Workshop. Lab/ Field Visit



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<p>LU3.</p> <p>Ensure Safeguard of Machines.</p>	<p>Trainee must be able to:</p> <ul style="list-style-type: none"> • Maintain radiator shield • Maintain alternator fan shield • Maintain heat resistance material on silencer • Cover main circuit breaker • Lock canopy doors. 	<ul style="list-style-type: none"> • Various protective mechanisms in machines • Insulation methods <p><u>Practical Activity:</u></p> <p>Demonstrate the precautionary measures in order to safeguard a machine.</p>	<p>Theory: 1 Hrs.</p> <p>Practical: 3 Hrs.</p> <p>Total: 4 Hrs.</p>	<ul style="list-style-type: none"> • Safety goggles • Safety harness belt • Safety helmet • Safety mask • Safety Shoes 	<p>Classroom</p> <p>Training Workshop.</p> <p>Lab/ Field Visit</p>
<p>LU4.</p> <p>Adopt company policies and procedures.</p>	<p>Trainee must be able to:</p> <ul style="list-style-type: none"> • Ensure company's safety policy • Adopt company safety procedure • Educate worker with company safety policy • Implement Safety sign board as per standard. 	<ul style="list-style-type: none"> • Company's safety policy • Safety signs and symbols <p><u>Practical Activity:</u></p> <p>Prepare a chart of safety symbols and display in your classroom</p>	<p>Theory: 1 Hrs.</p> <p>Practical: 3 Hrs.</p> <p>Total: 4 Hrs.</p>	<ul style="list-style-type: none"> • Safety Manual • SOP manual 	<p>Classroom</p> <p>Training Workshop.</p> <p>Lab/ Field Visit</p>
<p>LU5.</p> <p>Attain health & safety training.</p>	<p>Trainee must be able to:</p> <ul style="list-style-type: none"> • Take required health and safety training • Implement work hazardous material 	<ul style="list-style-type: none"> • Safety training • WHMIS • Respiratory, Resuscitation and CPR. 	<p>Theory: 1 Hrs.</p> <p>Practical: 3 Hrs.</p>	<ul style="list-style-type: none"> • Safety symbols • Respiratory process display charts 	<p>Classroom</p> <p>Training Workshop.</p>



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	<p>information system (WHMIS)</p> <ul style="list-style-type: none"> • Adopt first aid cardio respiratory, resuscitation and CPR. 	<p><u>Practical Activity:</u></p> <p>Demonstrate the safety training.</p>	<p>Total: 4 Hrs.</p>		<p>Lab/ Field Visit</p>
<p>LU6.</p> <p>Prepare and respond to emergencies.</p>	<p>Trainee must be able to:</p> <ul style="list-style-type: none"> • Take emergency response training • Ensure practice of emergency exercises • Check the emergency alarms • Follow emergency plan • Communicate instructions to co workers • Assess risk and determine course of action • Operate emergency equipment and supplies • Ensure that the ambulance is at stand by (for emergency). 	<ul style="list-style-type: none"> • Describe emergency response training • Explain assembly area and its requirements • Describe emergency exit plan <p><u>Practical Activity:</u></p> <p>Demonstrate the procedure to exit in case of emergency</p>	<p>Theory: 1 Hr</p> <p>Practical: 6 Hrs.</p> <p>Total: 7 Hrs.</p>	<ul style="list-style-type: none"> • Emergency alarms • Fire detector • Emergency response Plan • Fall Protection Plan 	<p>Classroom Training Workshop.</p> <p>Lab/ Field Visit</p>



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Module-2: Adopt Safety Regulation, Labor Protection Laws, and Environmental Protection Laws at Workplace.

Objective: After the completion of this Module, the Trainee will be able to develop skill and competence required to maintain Occupational Safety, Health and Environment at the workplace according to the National and International Protection Agencies Standards and take remedial measures for Personal, Occupational and Environmental Protection. The Trainee will be able to deal with the emergencies in a professional manner, thus minimizing the losses and providing a safe and healthy working environment.

Duration: 30 Hours

Theory: 06 Hours

Practice: 24 Hours

Credit Hours: 3.0

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Implement International Safety Standards in your work environment.	Trainee will be able to: <ul style="list-style-type: none"> • Recognize Electrical Safety hazards as per International Electro-Technical Commission (IEC) Standards • Determine Environmental Pollution risk factors as per Protection Agency (EPA) standards 	<ul style="list-style-type: none"> • Various International Industrial standards and its details, such as: <ul style="list-style-type: none"> ➤ IEC Standards ➤ EPA Standards ➤ IEE Standards ➤ ESFI Standards ➤ ILO Standards • Electrical Hazards and the risk associated with it. 	Theory: 1 Hr Practical: 6 Hrs. Total: 7 Hrs.	<ul style="list-style-type: none"> • Safety manual • PC • Internet 	Classroom Training Workshop. Lab/ Field Visit.



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	<ul style="list-style-type: none"> • Identify Electrical Safety Hazards as per Institute of Electrical and Electronics Engineers (IEEE) standards • Categorize the Electrical Safety Hazards as per Electrical Safety Foundation International(ESFI) standards • Identify Labor Protection Laws as per International Labor Organization (ILO) rules • Identify the steps to minimize the Electrical hazards and Environmental Pollution. • Prepare a report for all the above activity. 	<ul style="list-style-type: none"> • Environmental Pollution <p><u>Practical Activity:</u></p> <p>Prepare a chart for International Safety Standards ,applicable in your working environment</p>			
<p>LU2. Implement National Safety Standards in your work</p>	<p>Trainee must be able to:</p> <ul style="list-style-type: none"> • Identify Factory associated hazard as per Chapter 3 of Factories Act, 1934 	<ul style="list-style-type: none"> • National safety standards such as: <ul style="list-style-type: none"> ➤ Factories act,1934 ➤ Pakistan Environmental Protection Act, 1997 ➤ Labor Protection Policy 2006 	<p>Theory: 1 Hr</p> <p>Practical: 6 Hrs.</p>	<ul style="list-style-type: none"> • Safety Manuals 	<p>Classroom Training Workshop. Lab/ Field</p>



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environment.	<ul style="list-style-type: none"> • Determine Environmental Pollution factors as per Pakistan Environmental Protection Act, 1997 • Recognize the Labor protection laws as per Labor Protection Policy 2006 • Identify the workplace hazards as per Occupational health and safety (OHS) standards • Identify the steps to minimize the Electrical hazards, Environmental Pollution and Labor Safety • Prepare a report for all the above activity. 	<ul style="list-style-type: none"> ➤ Occupational Health and safety (OHS) standards • Professional report writing. <p><u>Practical Activity:</u></p> <p>Prepare a chart for National Safety Standards ,applicable in your working environment</p>	Total: 7 Hrs.		Visit.
<p>LU3.</p> <p>Implement International and National Labor Protection Laws</p>	<p>Trainee must be able to:</p> <ul style="list-style-type: none"> • Identify Labor Protection Laws as per International Labor Organization(ILO) rules • Recognize the Labor protection laws as per Labor Protection Policy 2006 • Identify the Bonded Labor and Child 	<ul style="list-style-type: none"> • International and national labor policies such as: • International Labor Organization(ILO) rules • Child Labor policy. • Leaves and Compensation policy • Remedial steps for protection and prosperity of Labor 	<p>Theory: 2 Hrs.</p> <p>Practical: 6 Hrs.</p> <p>Total: 8 Hrs.</p>	<ul style="list-style-type: none"> • Safety Manual 	<p>Classroom</p> <p>Training Workshop.</p> <p>Lab/ Field Visit.</p>



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	<p>Labor policy.</p> <ul style="list-style-type: none"> • Determine the leaves policy and compensation policy for the Labor. • Recognize the minimum wage for the Labor • Identify the remedial steps for protection and prosperity of Labor. • Prepare a report for all the above activity. 	<ul style="list-style-type: none"> • Professional report writing. <p><u>Practical Activity:</u></p> <p>Prepare a chart for International and National Labor Protection Laws ,applicable in your working environment</p>			
<p>LU4.</p> <p>Implement National and International Environmental protection laws.</p>	<p>Trainee must be able to:</p> <ul style="list-style-type: none"> • Determine Environmental Pollution risk factors as per Protection Agency (EPA) standards • Identify the steps to minimize the Electrical hazards and Environmental Pollution. • Determine Environmental Pollution factors as per Pakistan Environmental Protection Act, 1997 • Identify the requirements for Initial 	<p>National and International Environmental protection laws. such as:</p> <ul style="list-style-type: none"> ➤ EPA Standards ➤ Environmental Pollution ➤ Electrical Hazards ➤ Environmental protection act <p><u>Practical Activity:</u></p>	<p>Theory: 2 Hrs.</p> <p>Practical: 6 Hrs.</p> <p>Total: 8 Hrs.</p>	<ul style="list-style-type: none"> • Safety Manual 	<p>Classroom</p> <p>Training Workshop.</p> <p>Lab/ Field Visit.</p>



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	<p>Environmental Examination (IEE)</p> <ul style="list-style-type: none">• Identify the requirements for Environmental Impact Assessment (EIA)• Prepare a report for all the above activity.	<p>Prepare a chart for National and International Environmental protection laws</p>			
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11. List of Tool & Equipment:

- Buckets
- Cardboard box
- First Aid Kit
- Flow meter
- GPS device
- Hygrometer
- Ice box
- Marker
- Measuring tape
- Metal ring
- Personal protective equipment (PPE)
- Plastic bags
- Preservatives
- Sacks
- Sampling bottles
- Shovel
- Stainless steel Auger
- Sterilized containers



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- Stop watch
- Tags for labelling
- Thermometer
- Thread
- Un-galvanized Auger
- Spade
- Sample Probe
- Sampling Stick

Processing Tools

- Crusher (Manual and mechanical)
- Different mesh sieves
- Pestle and mortar
- Sample Storage containers
- Sample Splitter
- Spatula
- Registers
- Filtration assembly
- Labelling materials
- Trowel
- Oven



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- Vacuum extraction pump

Analytical Tools and glass wares

- Beaker
- Burette
- China Dish
- Conical flask
- Crucible
- Cylinder (From 10 ml to 1L)
- Dropper
- Filter Paper
- Funnel
- Indicator dropper
- Measuring Flask
- Petri dishes
- Pipette
- PPE
- Stirring rod
- Test Tube racks
- Test Tubes



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- Tong
- Wash bottles
- Wash dishes

Equipment

- Analytical Balance
- Autoclave
- Block digestion
- Dispenser
- EC meter
- Exhaust hood
- Flame Photo meter
- Flow injection analyser
- Freezer
- Hot Plate
- Hot water bath tub
- Hydrometer
- Incubator
- Atomic Absorption spectrophotometer



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- Kjeldahl Unit
- Laminar flow
- Muffle Furnace
- Oven
- PH meter
- Reciprocating Shakers
- Refrigerator
- Shaker
- Shaker
- Spectrophotometer
- Vortex mixer
- Water Distillation Unit

PPE

- Lab coat
- Goggle
- Gloves
- Dust mask
- Full face shield
- Safety Shoes



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12. Members of the Curriculum Development Committee

S#	Name	Designation
1	Mr. Muhammad Saeed Ahmed	Agriculture Officer, UVAS Pattoki
2	Dr. Asma Saeed	Chief Scientific Officer, PCSIR Labs. Complex Lahore
3	Dr. Amina Mumtaz	Sr. Scientific Officer, PCSIR Labs. Complex Lahore
4	Dr. Naeem Abbas	Sr. Scientific Officer, PCSIR Labs. Complex Lahore
5	Ms. Saadia Syed	DACUM Expert GCTW, Lahore
6	Ms. Mahnoor Atique	MPhil Scholar, UET Lahore



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7	Ms. Iqra Haider Khan	PhD Scholar, PU
8	Ms. Shagufta Perveen	PhD Scholar, PU
9	Engr. Aijaz Ahmed Zia	DACUM Facilitator
10	Mr. Muhammad Yasir	Deputy Director/ Coordinator – (Skills Standards and Curricula) NAVTTTC HQ



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13. Members of the Qualification Validation Committee

S#	Name	Designation
1	Ms. Saadia Syed	DACUM Expert, PTEVTA Lahore
2	Mr. Muhammad Hashim	Training & Development officer, Agrilla Seeds Faisalabad
3	Dr. Sumaira Maqsood	Associate professor, Punjab University, Lahore
4	Ms. Hina Ashraf	Phd Scholar , Punjab University Lahore
5	Mr. Muhammad Saeed Ahmed	Agriculture Officer, UVAS, Pattoki
6	Mr Abid Mahmood	Scientific Officer, Agriculture Department, KPK Peshawar
7	Mr. Tariq Ullah	Lecturer GCT D.I.Khan, KPK TEVTA
8	Mr Farhan Mahmood	Assistant Director, Parks & Horticulture Authority (PHA), Rawalpindi
9	Dr. Naeem Abbas	Senior Scientific officer, CEPS lab Lahore
10	Ms. Iqra Haider Khan	Phd Scholar, Punjab University, Lahore



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11	Dr Asma Saeed	Chief Scientific Officer, PCSIR Lahore
12	Engr. Liaqat Ali jamhroo	Director, Academics, STEVTA
13	Mr. Zia ur Rehman	Dy. Director, KPK TEVTA
14	Mr. Abdur Rehman	PBTE Representative, Lahore
15	Ms. Saima Akhtar	NRSP, UPAP, Faisalabad