



Soil, Water and Fertilizer Testing Jr. Lab Assistant

National Vocational Qualification level – 3

“Soil, Water and Fertilizer Testing Jr. Lab Assistant”



(Curriculum)

**National Vocational and Technical Training Commission (NAVTTTC)
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 Jr. Lab Assistant 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:

Based upon this demand of industry these competency-based qualifications for Soil, Water and Fertilizer Testing Jr. Lab Assistant are developed under National Vocational Qualification Framework (Level 1 to 5). 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 Jr. Lab Assistant. The QDC consists of 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 Jr. Lab Assistant** (Level-3) are as follows:

1. Install Computer Operating Systems and Hardware
2. Operate basic Computer Functions
3. Develop Computer Application Skills
4. Operate Word-Processing Applications
5. Operate Spreadsheet Applications
6. Operate Presentation Packages
7. Perform Writing and Editing Skills
8. Prepare Reagents for analysis
9. Prepare Solutions
10. Prepare Culture Media
11. Perform Soil Texture Class Identification Through Hydrometer
12. Perform Soil Saturation Percentage Test
13. Perform Soil Organic Matter Test
14. Perform Humic acid contents in Solid Fertilizer by gravimetric method



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4. Competencies to be gained after completion of course:

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

National Qualification in the Soil, Water and Fertilizer Testing Jr. Lab Assistant (Level-3).

1. Prepare Reagents for analysis
2. Prepare Solutions
3. Prepare Culture Media
4. soil moisture
5. Perform Soil Texture Class Identification Through Hydrometer
6. Perform Soil Saturation Percentage Test
7. Perform Soil Organic Matter Test
8. Perform Humic acid contents in Solid Fertilizer by gravimetric method

5. Entry level of trainees:

The entry for National Vocational Certificate level 3, in “**Soil, Water and Fertilizer Testing Jr. Lab Assistant**” are given below:

Title	Entry requirements
National Vocational Certificate level 3, in Soil, Water and Fertilizer Testing Jr. Lab Assistant	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 AND National Vocational Certificate level 2, in Soil, Water and Fertilizer Testing Jr. Lab Assistant



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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 Jr. Lab Assistant**

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:

Level-3								
	Manage Digital Skills	Digital Skills						
1	Install Computer Operating Systems and Hardware		Level 3	Functional	6	24	30	3
2	Operate Basics Computer Functions		Level 3	Functional	10	30	40	4
3	Develop Computer Application skills		Level 3	Functional	7	33	40	4
4	Perform word-processing applications		Level 3	Functional	10	30	40	4
5	Operate Spreadsheet Application		Level 3	Functional	7	33	40	4
6	Operate Presentation Packages		Level 3	Functional	6	24	30	3



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7	Perform writing and editing skills		Level 3	Functional	6	24	30	3
Occupation Total Hours					52	198	250	25
	Performance of soil and fertilizer Test	Lab Assistant						
1	Prepare Reagents for analysis		Level 3	Technical	7	33	40	4
2	Prepare Solutions		Level 3	Technical	14	36	50	5
3	Prepare Culture Media		Level 3	Technical	8	42	50	5
4	Perform Soil Texture Class Identification Through Hydrometer		Level 3	Technical	8	42	50	5
5	Perform Soil Saturation Percentage Test		Level 3	Technical	7	33	40	4
6	Perform Soil Organic Matter Test		Level 3	Technical	12	48	60	6



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7	Perform humic acid contents in solid fertilizer by gravimetric method		Level 3	Technical	12	48	60	6
	Occupation Total Hours				68	282	350	35
	LEVEL-3 TOTAL HOURS				120	480	600	60



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Level 3 (Technical Competencies)

Module- 1. Prepare reagents for analysis

Objective: After the completion of this module, the trainee will be able to develop skills and knowledge related to preparation of basic lab reagents like buffers, indicators, coloring reagents etc.

Duration: 40 Hours

Theory: 7 Hours

Practice: 33 Hours

Credit Hours: 4

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Make Buffers	Trainee will be able to: <ul style="list-style-type: none"> • Arrange apparatus and chemicals required for buffer preparation as per requirement. • Make buffer solution as per SOP. • Handle buffer solution as per 	<ul style="list-style-type: none"> • Define buffer • Describe different types of buffers. • Define pH <u>Practical Activity:</u> <ul style="list-style-type: none"> • Calibrate pH meter • Measure pH of subjected 	Theory- 2 Hrs. Practical- 9 Hrs. Total- 11 Hrs.	<ul style="list-style-type: none"> • PPEs • Thermometer • Volumetric flask • Watch glass • Butter paper for weighing • Pipette • Beaker 	Classroom Lab/ Field Visit



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	<p>procedure.</p> <ul style="list-style-type: none"> • Store buffer solution as per requirement. • Check pH of buffer solutions with defined interval as per lab protocol. • Maintain records in lab logbooks as per lab format 	<p>solutions using pH strips</p>		<ul style="list-style-type: none"> • Burette • Analytical Balance • Filter paper • Indicator bottle • Wash bottle • Glass funnel • Calculator • Pipette filler • Reagent bottles • Marker • Sticker • Chemicals for preparation of solutions • Titration flasks • pH paper strips 	
LU2. Make Indicators for analysis	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Arrange apparatus and chemicals required for indicator preparation as per 	<ul style="list-style-type: none"> • Define indicator • Enlist different types of indicators 	<p>Theory- 3 Hrs.</p> <p>Practical- 12Hrs.</p> <p>Total- 15 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Thermometer • Volumetric flask • Watch glass 	Classroom/Lab



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	<p>requirement.</p> <ul style="list-style-type: none"> • Make indicator as per SOP. • Handle prepared indicator as per procedure. • Store prepared solution as per requirement • Maintain records in lab logbooks as per lab format 	<ul style="list-style-type: none"> • Explain storage requirements for indicators <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Arrange apparatus for preparation of indicators 		<ul style="list-style-type: none"> • Butter paper for weighing • Pipette • Beaker • Burette • Analytical Balance • Filter paper • Indicator bottle • Wash bottle • Glass funnel • Calculator • Pipette filler • Reagent bottles • Marker • Sticker • Chemicals for preparation of solutions • Titration flasks • pH paper strips 	
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<p>LU3. Make Reagents for Colorimetric testing</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Arrange apparatus and chemicals required for coloring reagents preparation as per requirement. • Make coloring reagent solution as per method. • Handle prepared coloring reagent as per lab protocol. • Store prepared reagents as per requirement. • Maintain records in lab logbooks as per lab format. 	<ul style="list-style-type: none"> • Explain colorimetric titration • What are indicators • Why we use indicators • Explain acid base titration • Define end point <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Arrange apparatus for preparation of phenolphthalein indicators • Perform acid base titration for standardization of prepared solution 	<p>Theory- 2 Hrs. Practical- 12 Hrs. Total- 14 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Thermometer • Volumetric flask • Watch glass • Butter paper for weighing • Pipette • Beaker • Burette • Analytical balance • Filter paper • Indicator bottle • Wash bottle • Glass funnel • Calculator • Pipette filler • Reagent bottles • Marker • Sticker • Chemicals for preparation of solutions 	<p>Classroom/ / Lab</p>
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				<ul style="list-style-type: none">• Titration flasks	
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Module-2. Prepare Solutions

Objective: After the completion of this module, the trainee will be able to prepare solutions, i.e., stock solutions, working solutions, molar solutions and normal solutions.

Duration: 50 Hours

Theory: 14 Hours

Practice: 36 Hours

Credit Hours: 5

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Safe usage of laboratory equipment, glassware chemicals and	Trainee will be able to: <ul style="list-style-type: none"> Follow safety precautions to handle laboratory equipment and harmful chemicals Use relevant laboratory glassware and equipment as per requirement of specific test Clean and re-place glassware and equipment as per SOPs 	<ul style="list-style-type: none"> Define SOPs for using volumetric flask Enlist PPEs for working with chemicals Describe equipment operational manual Explain cleaning SOPs for glass apparatus Enlist SOPs for house keeping <u>Practical Activity:</u>	Theory- 02 Hrs. Practical- 6 Hrs. Total- 08 Hrs.	<ul style="list-style-type: none"> PPEs Thermometer Volumetric flask Watch glass Butter paper for weighing Pipette Beaker Burette Analytical Balance Filter paper Indicator bottle 	Classroom/Lab



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		<ul style="list-style-type: none"> • Arrange required apparatus for preparation of solutions as per SOP 		<ul style="list-style-type: none"> • Wash bottle • Glass funnel • Calculator • Pipette filler • Reagent bottles • Marker • Sticker • Chemicals for preparation of solutions • Titration flasks 	
LU2. Make Standard Solutions	Trainee will be able to: <ul style="list-style-type: none"> • Arrange apparatus and chemicals required for preparation of standard solutions (Molar or Normal) as per requirement. • Perform calculation for preparation of standard solution according to procedure. 	<ul style="list-style-type: none"> • Define solution • Define standard solution and enlist its types • Describe following terms <ul style="list-style-type: none"> ➤ Molar and Milli molar solutions ➤ Molal and milli molal solution ➤ Normal solution • Explain equivalent and 	Theory- 03 Hrs. Practical- 9 Hrs. Total- 12 Hrs.	<ul style="list-style-type: none"> • PPEs • Thermometer • Volumetric flask • Watch glass • Butter paper for weighing • Pipette • Beaker • Burette • Analytical Balance 	Classroom/ Lab



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	<ul style="list-style-type: none"> • Make standard solution as per test procedure. • Standardize prepared solution as per requirement. • Determine concentration of unknown solutions using standard formula • Label prepared solution as per protocol. • Store prepared solution as per SOP. • Maintain records in lab logbooks as per lab format 	<ul style="list-style-type: none"> • percent solution • Describe deciliter • Define PPM solution <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Prepare molar, molal and normal solution as per SOP • Prepare 1M standard solution of NaOH 		<ul style="list-style-type: none"> • Filter paper • Indicator bottle • Wash bottle • Glass funnel • Calculator • Pipette filler • Reagent bottles • Marker • Sticker • Chemicals for preparation of solutions • Titration flasks • pH paper strips 	
LU3. Prepare stock solutions	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Arrange apparatus and chemicals required for preparation of stock solutions as per requirement. • Perform calculation using formula according to 	<ul style="list-style-type: none"> • Define stock solutions • Describe the significance of stock solutions • Explain SOPs for stock solutions <p><u>Practical Activity:</u></p>	<p>Theory- 03 Hrs.</p> <p>Practical- 06 Hrs.</p> <p>Total- 09 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Thermometer • Volumetric flask • Watch glass • Butter paper for weighing • Pipette 	Classroom/ Lab



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	<p>procedure.</p> <ul style="list-style-type: none"> • Make stock solution (ppm) as per test procedure. • Handle prepared solution as per protocol. • Store prepared solution as per SOP. • Maintain records in lab logbooks as per lab format. 	<ul style="list-style-type: none"> • Prepare 1M stock solution of NaCl/NaOH 		<ul style="list-style-type: none"> • Beaker • Burette • Analytical Balance • Filter paper • Indicator bottle • Wash bottle • Glass funnel • Calculator • Pipette filler • Reagent bottles • Marker • Sticker • Chemicals for preparation of solutions • Titration flasks 	
LU4. Make working solutions	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Identify standard protocol for making the solutions as per given procedure • Arrange laboratory equipment 	<ul style="list-style-type: none"> • Define working solution • Describe dilution phenomenon • Explain dilution factor 	<p>Theory- 03 Hrs.</p> <p>Practical- 09 Hrs.</p> <p>Total- 12 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Thermometer • Volumetric flask • Watch glass • Butter paper for 	Classroom/ Lab



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	<p>required for specific test.</p> <ul style="list-style-type: none"> • Arrange reagents for preparation of specific solution as per procedures of different tests. • Prepare working solutions of specified dilutions as per test method. • Prepare labels and record in laboratory registers as per format. • Label and store the solutions as per lab protocol. 	<ul style="list-style-type: none"> • Differentiate between stock and working solution <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Prepare working solution of 0.5M from 1M stock solution of NaCl/NaOH using following equation $M_1V_1 = M_2V_2$ 		<p>weighing</p> <ul style="list-style-type: none"> • Pipette • Beaker • Burette • Analytical balance • Filter paper • Indicator bottle • Wash bottle • Glass funnel • Calculator • Pipette filler • Reagent bottles • Marker • Sticker • Chemicals for preparation of solutions • Titration flasks 	
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<p>LU5.</p> <p>Monitor Prepared solution</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Check shelf life of prepared solutions as per standard method. • Conduct analysis for ensuring their concentration as per lab procedure. • Label the solution with concentration and date of monitoring using lab protocol. • Maintain records as per lab procedure. • Discard outdated solutions according to lab-waste disposal description. 	<ul style="list-style-type: none"> • Define shelf life of a solution • Describe label requirement for a prepared sample • Explain SOPs for safe disposal of expired chemical <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Perform standardization of 1M NaOH and record readings to check the decrease in its molarity of prepared solution 	<p>Theory- 03 Hrs.</p> <p>Practical- 06 Hrs.</p> <p>Total- 09 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Thermometer • Volumetric flask • Watch glass • Butter paper for weighing • Pipette • Beaker • Burette • Analytical balance • Filter paper • Indicator bottle • Wash bottle • Glass funnel • Calculator • Pipette filler • Reagent bottles • Marker • Sticker • Chemicals for preparation of solutions 	
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				<ul style="list-style-type: none">• Titration flasks	
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Module-3. Prepare Culture Media

Objective: After the completion of this module, the trainee will be able preparation of culture media, safely use all laboratory equipment, glassware and chemicals. Moreover, trainee will be able to sterilize, pour, mark and preserve media.

Duration: 50 Hours

Theory: 8 Hours

Practice: 42 Hours

Credit Hours: 5

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Safe usage of laboratory equipment, glassware and chemicals	Trainee will be able to: <ul style="list-style-type: none"> Follow proper safety precautions to handle laboratory equipment and harmful chemicals Disinfect laboratory tools and equipment as per standards Use relevant laboratory glassware and equipment as per requirement of specific test 	<ul style="list-style-type: none"> Define disinfectants, name any three Describe safety procedure for handling of harmful chemicals <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Arrange required apparatus for preparation of culture media as per SOP 	<p>Theory- 02 Hrs.</p> <p>Practical- 06 Hrs.</p> <p>Total- 08 Hrs.</p>	<ul style="list-style-type: none"> PPE Petri dishes Micropipette Tong Culture media Incubator Oven Analytical balance Filter paper Dropper 	Classroom/ Lab/ Field Visit



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	<ul style="list-style-type: none">• Clean and re-place glassware and equipment as per SOPs			<ul style="list-style-type: none">• Cotton• Spatula• Disinfectant/ fumigants• Refrigerator• Thermometer• Autoclave• Laminar flow• Burner• Water bath• Wash bottles• Conical flasks• Measuring flasks• Beakers• Watch glass• Conical funnel• Reagent bottles• Pipette• Distilled water• Distillation unit	
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<p>LU2.</p> <p>Make culture media</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Mix media ingredients in solvent as per procedure • Label media to ensure tracking • Pour media into vessels as required • Cover the media as per procedure 	<ul style="list-style-type: none"> • Define culture media • Describe the procedure for preparing culture media <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Prepare culture media 	<p>Theory- 02Hrs.</p> <p>Practical- 12Hrs.</p> <p>Total- 14 Hrs.</p>	<ul style="list-style-type: none"> • PPE • Petri dishes • Micropipette • Tong • Culture media • Incubator • Oven • Analytical balance • Filter paper • Dropper • Cotton • Spatula • Disinfectant/ fumigants • Refrigerator • Thermometer • Autoclave • Laminar flow • Burner • Water bath • Wash bottles 	<p>Classroom/ Lab</p>
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				<ul style="list-style-type: none"> • Conical flasks • Measuring flasks • Beakers • Watch glass • Conical funnel • Reagent bottles • Pipette • Distilled water • Distillation unit 	
LU3. Sterilize media	Trainee will be able to: <ul style="list-style-type: none"> • Load sterilizers (autoclave) as per its capacity • Ensure fixation of sterilization unit as per requirement • Monitor sterilization process as per procedure • Add necessary additives before pouring as per procedure 	<ul style="list-style-type: none"> • Define sterilization • Describe role of additives in culture media <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Sterilize prepared media 	<p>Theory- 02Hrs.</p> <p>Practical- 12Hrs.</p> <p>Total- 14Hrs.</p>	<ul style="list-style-type: none"> • PPE • Petri dishes • Micropipette • Tong • Culture media • Incubator • Oven • Analytical balance • Filter paper • Dropper • Cotton 	Classroom/ Lab



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				<ul style="list-style-type: none"> • Spatula • Disinfectant/ fumigants • Refrigerator • Thermometer • Autoclave 	
LU4. Pour media	Trainee will be able to: <ul style="list-style-type: none"> • Pour media in specified container (Petri dish) under aseptic condition • Label media according to its composition and batch • Store media at required temperature 	<ul style="list-style-type: none"> • Define aseptic handling of media • Describe standard procedure for storing media <p><u>Practical Activity:</u></p> <p>Demonstrate storing of media</p>	<p>Theory- 02Hrs.</p> <p>Practical- 12 Hrs.</p> <p>Total- 14 Hrs.</p>	<ul style="list-style-type: none"> • PPE • Petri dishes • Micropipette • Tong • Culture media • Incubator • Oven • Analytical balance • Filter paper • Dropper • Cotton • Spatula • Disinfectant/ fumigants • Refrigerator • Thermometer 	Classroom/ Lab/ Field Visit



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				<ul style="list-style-type: none">• Autoclave	
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Module-4. Perform Soil Texture Class Identification Through Hydrometer

Objective: After the completion of this module, the trainee will be able prepare sample and perform Soil Texture Class Identification Through Hydrometer and record end results according to standard lab procedure.

Duration: 50 Hours

Theory: 08 Hours

Practice: 42 Hours

Credit Hours: 5

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prerequisites for testing	<ul style="list-style-type: none"> • Check sample label for required test. • Maintain Laboratory room temperature as per requirement. • Arrange equipment as per requirement. • Set up hydrometer in accordance with the standard work instructions. • Conduct pre-use and safety checks. 	<ul style="list-style-type: none"> • Define soil texture • Explain different types of soil texture • Describe hydrometer use <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Arrange required apparatus for soil texture class Identification as per SOP 	<p>Theory- 01 Hrs.</p> <p>Practical- 06 Hrs.</p> <p>Total- 07 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Hydrometer with plunger • Analytical Balance • Oven • Plastic Beaker • Paddle • Sieve • Textural Triangle chart • Deionized water 	Classroom/ Lab/ Field Visit



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LU2. Perform test on Procedure samples	<ul style="list-style-type: none"> • Set instrument as per standard method. • Take soil sample in beaker and add dispersing solution as per requirement. • Cover with watch glass and leave as per standard requirement. • Process sample as per standard test method. • Repeat process and note readings according to test requirement. 	<ul style="list-style-type: none"> • Describe working principle of hydrometer • Explain importance of soil texture identification <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Identify soil texture class through hydrometer as per SOP 	<p>Theory- 02 Hrs.</p> <p>Practical- 12 Hrs.</p> <p>Total- 14 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Hydrometer with plunger • Analytical balance • Oven • Plastic beaker • Paddle • Sieve • Textural triangle chart • Deionized water 	<p>Classroom</p> <p>Lab</p>
LU3. Quality Control Checks	<ul style="list-style-type: none"> • Check for any breakage in hydrometer. • 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 	<ul style="list-style-type: none"> • Describe significance of quality control checks • Explain SOP for hydrometer usage <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Measure different particle size of subjected sample and record observation 	<p>Theory- 02 Hrs.</p> <p>Practical- 09 Hrs.</p> <p>Total- 11 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Hydrometer with plunger • Analytical balance • Oven • Plastic beaker • Paddle • Sieve • Textural triangle chart • Deionized water 	<p>Classroom/</p> <p>Lab</p>



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LU 4. Record results	<ul style="list-style-type: none"> • Calculate and note down textural class using USDA textural triangle. • Submit the results to lab In-charge • Clear and restore work area 	<ul style="list-style-type: none"> • Describe USDA textural triangle system <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Calculate results using USDA texture triangle 	<p>Theory-02 Hrs.</p> <p>Practical- 09 Hrs.</p> <p>Total- 11 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Note books • Pencil • Lab registers • Prescribed format 	Classroom/ Lab
LU 5. Adopt precautions during work	<ul style="list-style-type: none"> • Ensure calibration of instrument if required. • Ensure temperature as per standard requirement • Ensure safety requirements as per lab analysis. 	<ul style="list-style-type: none"> • Describe importance of calibration • Explain ideal room temperature for subjected test <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Demonstrate precautionary measure during Soil texture class identification test 	<p>Theory- 01 Hrs.</p> <p>Practical- 06 Hrs.</p> <p>Total- 07 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Hydrometer with plunger • Analytical Balance • Oven • Plastic Beaker • Paddle • Sieve • Textural Triangle chart • Deionized water • Thermometer 	Classroom/ Lab



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Module-5. Perform Soil Saturation Percentage Test

Objective: After the completion of this module, the trainee will be able prepare sample and perform Soil saturation percentage test and record results according to standard lab procedure.

Duration: 40 Hours

Theory: 7 Hours

Practice: 33 Hours

Credit Hours: 4

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prerequisites for testing	<ul style="list-style-type: none"> • Check sample label for required test. • Maintain Laboratory room temperature as per requirement. • Arrange equipment as per requirement. • Set up hydrometer in accordance with the standard work instructions. • Conduct pre-use and safety checks. 	<ul style="list-style-type: none"> • Define soil saturation percentage • Describe importance of soil saturation percentage <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Perform pre use and safety checks for soil saturation test as per SOP 	<p>Theory- 01 Hrs.</p> <p>Practical- 03 Hrs.</p> <p>Total- 04 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Plastic beaker • Glass cylinder • Analytical balance • Spatula • Distilled water • oven 	<p>Classroom</p> <p>Lab/ Field Visit</p>



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LU2. Perform test Procedure on samples	<ul style="list-style-type: none"> • Take soil sample in beaker as per SOP. • Add distilled water as per test method. • Note down volume of water used as per standard testing method 	<ul style="list-style-type: none"> • Define distilled water • Explain importance of distilled water usage during soil saturation calculation <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Determine soil saturation percentage on prepared sample as per SOP 	<p>Theory- 02 Hrs.</p> <p>Practical- 09 Hrs.</p> <p>Total- 11 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Plastic beaker • Glass cylinder • Analytical balance • Spatula • Distilled water • Oven 	<p>Classroom/ Lab</p>
LU3. Quality Control Checks	<ul style="list-style-type: none"> • Check for volume of water carefully. • Perform replicate/re-testing as per lab standards. • Record quality control data as per lab procedure 	<ul style="list-style-type: none"> • Define evaporation • Explain working principle of oven <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Measure the volume of water used in test 	<p>Theory- 02 Hrs.</p> <p>Practical- 09 Hrs.</p> <p>Total- 11 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Plastic beaker • Glass cylinder • Analytical balance • Spatula • Distilled water • oven 	<p>Classroom/ Lab</p>



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LU 4. Record Results	<ul style="list-style-type: none"> • Calculate saturation percentage by recommended formula. • Submit the results to lab In-charge • Clear and restore work area. 	<ul style="list-style-type: none"> • Explain the formula of determining soil saturation percentage • Describe what information we obtained from soil saturation percentage data <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Calculate results using soil saturation percentage formula 	<p>Theory- 01 Hrs.</p> <p>Practical- 09 Hrs.</p> <p>Total- 10 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Notebooks • Pencil • Lab registers • Prescribed format 	Classroom/ Lab
LU 5. Adopt precautions during work	<ul style="list-style-type: none"> • Ensure calibration of equipment if required. • Rinse beaker and spatula according to SOP • Ensure safety protocols. 	<ul style="list-style-type: none"> • Describe importance of calibration • Explain precautions for measuring soil saturation percentage <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Demonstrate precautionary measure during and after Soil saturation percentage 	<p>Theory- 01 Hrs.</p> <p>Practical- 03 Hrs.</p> <p>Total- 04 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Hydrometer with plunger • Analytical balance • Oven • Plastic beaker • Paddle • Sieve • Textural triangle chart • Deionized water • Thermometer 	Classroom/ Lab



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Module-6. Perform Soil Organic Matter (OM) Test

Objective: After the completion of this module, the trainee will be able prepare sample and perform Soil Organic matter test and record results according to standard lab procedure.

Duration: 60 Hours

Theory: 12 Hours

Practice: 48 Hours

Credit Hours: 6

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prerequisites for testing	<ul style="list-style-type: none"> • Check sample label for required test. • Maintain laboratory room temperature as per requirement. • Arrange equipment as per requirement. • Perform standardization of ferrous sulphate solution as per standard method. • Set up hydrometer in accordance with the standard work instructions. • Conduct pre-use and safety 	<ul style="list-style-type: none"> • Define soil organic matter • Describe importance of soil organic matter • Explain various factors affecting soil OM <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Perform standardization of ferrous sulphate solution as per standard method. 	<p>Theory- 02 Hrs.</p> <p>Practical- 06 Hrs.</p> <p>Total- 08 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Analytical balance • Burette & conical flasks • Potassium dichromate, Sulfuric acid, Phosphoric acid, Ferrous sulfate solutions • Deionized water • Muffle furnace • Thermometer • Crucibles 	<p>Classroom</p> <p>Lab/ Field Visit</p>



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	checks.				
LU2. Perform test on Procedure samples	<ul style="list-style-type: none"> • Take required amount of soil sample as per standard procedure. • Add recommended amount of potassium dichromate and mix well as per procedure. • Add volume of sulfuric acid and allow to leave as per standard method. • Add distilled water and phosphoric acid into the sample as per standard method. • Add indicator and titrate against standard solution as per standard method 	<ul style="list-style-type: none"> • Define titration • Describe working principle of Walkley black method <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Perform titration as per SOP 	<p>Theory- 03 Hrs.</p> <p>Practical- 15 Hrs.</p> <p>Total- 18 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Analytical balance • Burette & conical flasks • Potassium dichromate, Sulfuric acid, Phosphoric acid, Ferrous sulfate solutions • Deionized water • Muffle furnace • Thermometer • Crucibles 	Classroom/ Lab
LU3. Quality Control Checks	<ul style="list-style-type: none"> • Use standardized ferrous sulphate solution as per SOP. • Check for volume used during titration. • Run blank sample accordingly. 	<ul style="list-style-type: none"> • Define oxidation reduction titration • Explain the reason to use 	<p>Theory- 03 Hrs.</p> <p>Practical- 12 Hrs.</p> <p>Total- 15 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Analytical balance • Burette & conical flasks • Potassium dichromate, Sulfuric acid, Phosphoric acid, Ferrous sulfate 	Classroom/ Lab



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	<ul style="list-style-type: none"> • Run laboratory control samples as per standard. • Perform replicate/re-testing as per lab standards. • Record quality control data as per lab procedure. 	<p>fresh ferrous sulphate solution</p> <p><u>Practical Activity:</u></p> <p>Prepare standards of subjected test</p>		<p>solutions</p> <ul style="list-style-type: none"> • Deionized water • Muffle furnace • Thermometer • Crucibles • Indicators 	
LU 4. Record results	<ul style="list-style-type: none"> • Calculate organic matter percentage as per recommended formula. • Submit the results to lab In-charge • Clear and restore work area. 	<ul style="list-style-type: none"> • Explain the formula of determining soil organic matter <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Calculate percentage organic matter using formula 	<p>Theory- 02 Hrs.</p> <p>Practical- 09 Hrs.</p> <p>Total- 11 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • Notebooks • Pencil • Lab registers • Prescribed format 	<p>Classroom</p> <p>Lab</p>
LU 5. Adopt precautions during work	<ul style="list-style-type: none"> • Perform digestion in fume hood as per standard method • Rinse apparatus as per SOP. • Ensure safety protocols. • Store solutions and reagents as per standard method. • Use acids as per MSDS. 	<ul style="list-style-type: none"> • Define digestion • Explain MSDS <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Demonstrate precautionary measure during and after use of solutions and 	<p>Theory- 02 Hrs.</p> <p>Practical- 06 Hrs.</p> <p>Total- 08 Hrs.</p>	<ul style="list-style-type: none"> • PPEs • MSDS charts • Deionized water • Thermometer 	<p>Classroom</p> <p>Lab</p>



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		reagents			
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Module-7. Perform Humic acid contents test in solid Fertilizer by gravimetric method

Objective: After the completion of this module, the trainee will be able prepare sample and perform Humic acid contents test in solid Fertilizer by gravimetric method and record results according to standard lab procedure.

Duration: 60 Hours

Theory: 12 Hours

Practice: 48 Hours

Credit Hours: 6

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prerequisites for testing	<ul style="list-style-type: none"> Check sample label for required test. Maintain Laboratory room temperature as per requirement. Arrange equipment as per requirement. Check for availability of standard solution as per requirement Conduct pre-use and safety checks. 	<ul style="list-style-type: none"> Define micronutrient Describe importance of Humic acid in soil <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Arrange required apparatus as per SOP to conduct humic acid content test 	<p>Theory- 02 Hrs.</p> <p>Practical- 06 Hrs.</p> <p>Total- 08 Hrs.</p>	<ul style="list-style-type: none"> Weighing balance Mechanical shaker Oven pH meter Desiccator Centrifuge machine Volumetric flask 100 ml, 1000ml Beaker 100 ml Wash Bottle Filter paper Whatman No.42 Funnel with stand Reagents/Chemicals: <ul style="list-style-type: none"> Concentrated Nitric Acid Sodium hydroxide 	Classroom/ Lab



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				<ul style="list-style-type: none"> ▪ Ethanol ▪ Diethylene triamine pentaacetic acid (DTPA) ▪ Humic Acid Standard (Aldrich) ▪ Extraction solution (NaOH, Ethanol and DTPA). 	
LU2. Perform test Procedure on samples	<ul style="list-style-type: none"> • Prepare sample according to requirement • Weight sample according to requirement • Add extraction solution and shake the contents as per SOP. • Process sample as per standard testing method. • Record weight of precipitates as per SOP. • Perform calculations according to standard testing method. • Store unused reagents and dispose of wastes as required by relevant regulations and codes. • Clean and store equipment as per lab protocol 	<ul style="list-style-type: none"> • Define precipitate • Describe the role of reagents • Explain role of ethanol in test <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> • Prepare sample of required test according to SOP 	<p>Theory- 03 Hrs.</p> <p>Practical- 12 Hrs.</p> <p>Total- 15 Hrs.</p>	<ul style="list-style-type: none"> • Weighing balance • Mechanical shaker • Oven • pH meter • Desiccator • Centrifuge machine • Volumetric flask 100 ml, 1000ml • Beaker 100 ml • Wash Bottle • Filter paper Whatman No.42 • Funnel with stand • Reagents/Chemicals: <ul style="list-style-type: none"> ▪ Concentrated Nitric Acid ▪ Sodium hydroxide ▪ Ethanol ▪ Diethylene triamine pentaacetic acid (DTPA) ▪ Humic Acid Standard (Aldrich) 	Classroom/ Lab



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				<ul style="list-style-type: none"> Extraction solution (NaOH, Ethanol and DTPA). 	
LU3. Quality Control Checks	<ul style="list-style-type: none"> 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 Always used valid standards. 	<ul style="list-style-type: none"> Define control sample Describe the importance of quality control charts <p><u>Practical Activity:</u></p> <p>Prepare quality control charts as per SOP</p>	<p>Theory- 03 Hrs.</p> <p>Practical- 12 Hrs.</p> <p>Total- 15 Hrs.</p>	<ul style="list-style-type: none"> Weighing balance Mechanical shaker Oven pH meter Desiccator Centrifuge machine Volumetric flask 100 ml, 1000ml Beaker 100 ml Wash Bottle Filter paper Whatman No.42 Funnel with stand Reagents/Chemicals: <ul style="list-style-type: none"> Concentrated Nitric Acid Sodium hydroxide Ethanol Diethylene triamine pentaacetic acid (DTPA) Humic Acid Standard (Aldrich) Extraction solution (NaOH, 	Classroom/ Lab



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				Ethanol and DTPA).	
LU 4. Record results	<ul style="list-style-type: none"> Note down the results on analyst workbook. Perform detail calculations Submit the results to lab In-charge 	<ul style="list-style-type: none"> Define DTPA Elaborate working principle of subjected test <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Calculate humic acid content using formula 	<p>Theory- 02 Hrs.</p> <p>Practical- 09Hrs.</p> <p>Total- 11 Hrs.</p>	<ul style="list-style-type: none"> PPEs Notebooks Pencil Lab registers Prescribed format 	Classroom/ Lab
LU 5. Adopt precautions during work	<ul style="list-style-type: none"> Ensure calibration before taking any measurement as per SOP. Ensure complete desiccation of K-humate sample Perform dilutions if required Ensure safety protocols as per standard requirement. 	<ul style="list-style-type: none"> Define calibration Explain desiccation of K-humate sample Describe dilution <p><u>Practical Activity:</u></p> <ul style="list-style-type: none"> Demonstrate safety guideline required to conduct subjected test 	<p>Theory- 02 Hrs.</p> <p>Practical- 09 Hrs.</p> <p>Total- 11 Hrs.</p>	<ul style="list-style-type: none"> PPEs Weighing balance Mechanical shaker Oven pH meter Desiccator Centrifuge machine Volumetric flask 100 ml, 1000ml Beaker 100 ml Wash Bottle Filter paper Whatman No.42 Funnel with stand 	Classroom/ Lab



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				<ul style="list-style-type: none">• Reagents/Chemicals:<ul style="list-style-type: none">▪ Concentrated Nitric Acid▪ Sodium hydroxide▪ Ethanol▪ Diethylene triamine pentaacetic acid (DTPA)▪ Humic Acid Standard (Aldrich)• Extraction solution (NaOH, Ethanol and DTPA).	
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Level 3 (Generic Competencies)

Digital Skills

Module-1. Install computer operating systems and hardware

Objective: This module describes the performance outcomes, skills and knowledge required to select, configure and use computer operating systems and basic computer hardware.

Duration: 30 Hours

Theory: 6 Hours

Practice: 24 Hours

Credit Hours: 3

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Identify operating system and hardware components	Trainee will be able to: <ul style="list-style-type: none"> Determine ICT organizational requirements and specifications Identify and select operating system Identify appropriate external hardware components Identify internal hardware components 	<ul style="list-style-type: none"> Basic knowledge of current industry-accepted operating system, hardware and software products <u>Practical activity</u> <ul style="list-style-type: none"> Identify which operating system can be installed on the given hardware system 	Theory-02 Hrs. Practice-06 Hrs. Total- 08 Hrs.	Desktop Computer/Laptop	Computer Lab/ Classroom



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<p>LU2. Install and configure operating system and application software with hardware components</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Install and configure operating system to meet organizational requirements • Identify the functions associated with the operating system and associated boot process • Configure power-management settings to minimize power consumption as an environmentally sustainable measure • Use both the graphical user interface and the command line interface to perform basic tasks • Install or upgrade application software onto the operating system and hardware configuration • Determine the relationship between an application program, the operating system and hardware • Identify general differences between the different computer platforms and their respective operating systems 	<ul style="list-style-type: none"> • Compatibility of an operating system, in respect to other versions <p><u>Practical activity</u></p> <ul style="list-style-type: none"> • Install Microsoft office application in the given system. 	<p>Theory-02 Hrs. Practice-09 Hrs. Total- 11 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>
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LU3. Optimize operating system and hardware components	<ul style="list-style-type: none"> • Optimize operating system using included tools or third-party utilities • Customize the graphical user interface • Use techniques unique to the command line interface • Set up and configure external hardware components and check functionality • Install drivers as appropriate and check functionality 	<ul style="list-style-type: none"> • Function of single-user and multi-user operating systems • Interoperability between operating systems <p><u>Practical activity</u></p> <p>Check compatibility of the required drivers, install and check their functionality.</p>	<p>Theory-02 Hrs. Practice-09 Hrs. Total- 11 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>
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Module-2. Operate Basics Computer Functions

Objective: This module covers the knowledge, skills and attitudes and values needed to perform basic computer operations which include inputting, accessing, producing and transferring data using the appropriate hardware and software.

Duration: 40 Hours

Theory: 10 Hours

Practice: 30 Hours

Credit Hours: 4

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Plan and prepare for task to be undertaken	Trainee will be able to: <ul style="list-style-type: none"> Requirements of task are determined as per standard operating procedures Appropriate hardware and software is selected according to task assigned and required outcome Task is planned to ensure 	<ul style="list-style-type: none"> Main types of computers and basic features of different operating systems Main Parts of computer Calculating computer capacity <p><u>Practical activity</u></p> <ul style="list-style-type: none"> Select the appropriate hardware & software as per the requirement of task. 	Theory-02 Hrs. Practice-06 Hrs. Total- 08 Hrs.	Desktop Computer/Laptop	Computer Lab/ Classroom



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<p style="text-align: center;">LU2. Input data into computer</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Data are entered into the computer using appropriate program/application in accordance with company procedures • Accuracy of information is checked and information is saved in accordance with standard operating procedures • Inputted data are stored in storage media according to requirements • Work is performed within ergonomic guidelines 	<ul style="list-style-type: none"> • Storage devices and basic categories of memory • Basic ergonomics of computer use <p><u>Practical activity</u></p> <ul style="list-style-type: none"> • Select storage devices to store input data 	<p>Theory-02 Hrs. Practice-06 Hrs. Total- 08 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>
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<p>LU3. Access information using computer</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Correct program/application is selected based on job requirements • Program/application containing the information required is accessed according to company procedures • Desktop icons are correctly selected, opened and closed for navigation purposes • Keyboard techniques are carried out in line with OH & S requirements for safe use of keyboards 	<ul style="list-style-type: none"> • Relevant types of software • OH & S principles and responsibilities • Basic ergonomics of keyboard use <p><u>Practical activity</u></p> <ul style="list-style-type: none"> • Operate the computer and its different application 	<p>Theory-02 Hrs. Practice-06 Hrs. Total- 08 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>
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<p>LU4. Produce/output data using computer system</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Entered data are processed using appropriate software commands Data are printed out as required using computer hardware/peripheral devices in accordance with standard operating procedures Files and data are transferred between compatible systems using computer software, hardware/peripheral devices in accordance with standard operating 	<ul style="list-style-type: none"> Relevant types of software <p><u>Practical activity</u></p> <ul style="list-style-type: none"> Develop a required documents in MS word and take out print. 	<p>Theory-02 Hrs. Practice-06 Hrs. Total- 08 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>
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<p>LU5. Maintain computer equipment and systems</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Systems for cleaning, minor maintenance and replacement of consumables are implemented • Procedures for ensuring security of data, including regular back-ups and virus checks are implemented in accordance with standard operating procedures • Basic file maintenance procedures are implemented in line with the standard operating procedures 	<ul style="list-style-type: none"> • General security • Viruses <p><u>Practical activity</u></p> <ul style="list-style-type: none"> • Create a proper backup of computer data and install anti-virus software 	<p>Theory-02 Hrs. Practice-06 Hrs. Total- 08 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>
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Module-3. Develop Computer Application skills

Objective: This module describes the performance outcomes, skills and knowledge required to identify, select and operate three commercial software packages, including a word-processing, a spreadsheet and presentation application package.

Duration: 40 Hours

Theory: 07 Hours

Practice: 33Hours

Credit Hours: 4

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Use appropriate OHS office work practices	Trainee will be able to: <ul style="list-style-type: none"> Use safe work practices to ensure ergonomic, work organization, energy and resource conservation requirements are addressed Use wrist rests and document holders where appropriate Use monitor anti-glare and radiation reduction screens where appropriate 	<ul style="list-style-type: none"> OHS principles and responsibilities for ergonomics, such as work periods and breaks <p><u>Practical activity</u></p> <ul style="list-style-type: none"> Identify potential hazards in computer lab and use appropriate actions to mitigate 	Theory-01 Hrs. Practice-06 Hrs. Total- 07 Hrs.	Desktop Computer/Laptop	Computer Lab/ Classroom



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LU2. Install and remove software	Trainee will be able to: <ul style="list-style-type: none"> • Select software to be installed • Follow installation instructions • Delete unrequired software 	<ul style="list-style-type: none"> • Application software packages used by the organization • Basic knowledge of system usage • Basic knowledge of install and remove software • Import and export software functions <p><u>Practical activity</u></p> <ul style="list-style-type: none"> • Identify the required software, install and uninstall this software from the computer. 	Theory-02 Hrs. Practice-09 Hrs. Total- 11 Hrs.	Desktop Computer/Laptop	Computer Lab/ Classroom



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<p>LU3. Use appropriate word-processing software</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Select word-processing software appropriate to perform activity • Identify document purpose, audience and presentation requirements, and clarify with personnel as required • Identify organizational requirements for text-based business documents and design document structure and layout to ensure consistency of style and image • Match document requirements with software functions to provide efficient production of documents • Use technical functions, other data and formatting to finalize documents • Ensure the naming and storing of documents in appropriate directories or folders and the printing of documents to the required specifications 	<ul style="list-style-type: none"> • Current business practices related to <u>Practical activity</u> • using software to prepare reports • Functions and uses of word processing 	<p>Theory-02 Hrs. Practice-06 Hrs. Total- 08 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>
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LU4. Use appropriate spreadsheet software	Trainee will be able to: <ul style="list-style-type: none"> • Select spreadsheet software appropriate to perform activity • Identify document purpose, audience and presentation requirements, and clarify with personnel as required • Enter simple formulas and functions using cell referencing where required • Customize spreadsheet settings and format documents to meet requirements • Ensure the naming and storing of documents in appropriate directories or folders and the printing of documents to the required specifications 	<ul style="list-style-type: none"> • Functions and uses of Spreadsheet <p><u>Practical activity</u></p> <ul style="list-style-type: none"> • Prepare a spreadsheet using different functions and formulas. 	Theory-01 Hrs. Practice-06 Hrs. Total- 07 Hrs.	Desktop Computer/Laptop	Computer Lab/ Classroom
LU5. Use appropriate presentation software	Trainee will be able to: <ul style="list-style-type: none"> • Select software application package appropriate to perform activity • Identify purpose, audience and presentation requirements, and clarify with personnel as required 	<ul style="list-style-type: none"> • Functions and uses of presentation software <p><u>Practical activity</u></p> <ul style="list-style-type: none"> • Prepare a presentation using 	Theory-01 Hrs. Practice-06 Hrs. Total-07 Hrs.	Desktop Computer/Laptop	Computer Lab/ Classroom



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	<ul style="list-style-type: none">• Use technical functions, other data and formatting to finalize documents• Ensure documents are named and stored in appropriate directories or folders and printed to required specifications• Make a presentation	Microsoft power point application.			
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Module-4. Perform word-processing applications

Objective: This unit describes the skills and knowledge required to operate word- processing applications and perform basic operations, including creating and formatting documents, creating tables and printing labels. It applies to individuals in the workplace using fundamental knowledge of word-processing under direct supervision or with limited responsibility.

Duration: 40 Hours

Theory: 10 Hours

Practice: 30 Hours

Credit Hours: 4

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Apply workplace health and safety (WHS) practices	Trainee will be able to: <ul style="list-style-type: none"> Use workplace ergonomic work practices and strategies Organize work area to ensure an ergonomic work environment 	<ul style="list-style-type: none"> OHS principles and responsibilities for ergonomics, such as work periods and breaks <p><u>Practical activity</u></p> <ul style="list-style-type: none"> Identify potential hazards in computer lab and use appropriate actions to mitigate them* 	<p>Theory-01 Hrs. Practice-03 Hrs. Total- 04 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>



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LU2. Create documents	Trainee will be able to: <ul style="list-style-type: none"> • Open word-processing application, create document and add data according to information requirements • Use document templates as required • Use simple formatting tools when creating the document • Save document to directory 	<ul style="list-style-type: none"> • Create and save new file • Use of appropriate template as required <u>Practical activity</u> <ul style="list-style-type: none"> • Develop a documents in MS word using format tools as per the requirement of the task. 	<p style="text-align: center;">Theory-01 Hrs. Practice-03 Hrs. Total- 04 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>
LU3. Customize basic settings to meet page layout conventions	Trainee will be able to: <ul style="list-style-type: none"> • Adjust page layout to meet information requirements • Open and view different toolbars • Change font format to suit document purpose • Change alignment and line spacing according to document information requirements • Modify margins to suit the document purpose 	<ul style="list-style-type: none"> • Understand and edit page layout <u>Practical activity</u> <ul style="list-style-type: none"> • Open MS word and change select appropriate layout of the page as per the requirement adding header and footer in the document. 	<p style="text-align: center;">Theory-02 Hrs. Practice-06 Hrs. Total- 08 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>



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	<ul style="list-style-type: none"> • Open and switch between several documents 				
LU4. Format documents	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Use formatting features and styles as required • Highlight and copy text from another area in the document or from another active document • Insert headers and footers to incorporate necessary data • Save document in another file format • Save and close document to a storage device 	<p><u>Practical activity</u></p> <ul style="list-style-type: none"> • Formatting word document 	<p>Theory-03 Hrs. Practice-06 Hrs. Total- 09 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>
LU5. Create tables	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Insert standard table into document • Change cells to meet information requirements • Insert and delete columns and rows as necessary • Use formatting tools according to style 	<p><u>Practical activity</u></p> <ul style="list-style-type: none"> • Create and edit table 	<p>Theory-01 Hrs. Practice-03 Hrs. Total- 04 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>



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	requirements				
LU6. Add images	Trainee will be able to: <ul style="list-style-type: none"> • Insert appropriate images into document and customize as necessary • Position and resize images to meet document formatting needs 	<u>Practical activity</u> <ul style="list-style-type: none"> • Insert, position and resize images 	Theory-01 Hrs. Practice-03 Hrs. Total- 04 Hrs.	Desktop Computer/Laptop	Computer Lab/ Classroom
LU7. Print documents	Trainee will be able to: <ul style="list-style-type: none"> • Preview document in print preview mode • Select basic print settings • Print document or part of document from printer 	<u>Practical activity</u> <ul style="list-style-type: none"> • Printing document according to organization need 	Theory-01 Hrs. Practice-06 Hrs. Total- 07 Hrs.	Desktop Computer/Laptop	Computer Lab/ Classroom



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Module-5. Operate Spreadsheet Application

Objective: This module describes the skills and knowledge required to operate Spreadsheet and perform basic operations, including creating and formatting spreadsheet, creating tables, incorporating chart and object in it, and printing labels.

Duration: 40 Hours

Theory: 07 Hours

Practice: 33 Hours

Credit Hours: 4

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Create spreadsheets	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Open the spreadsheet application, create spreadsheet files and enter numbers, text and symbols into cells according to information requirements • Enter simple formulas and functions using cell referencing when required • Correct formulas when error messages occur • Use a range of common tools during spreadsheet development • Edit columns and rows within the spreadsheet • Use the auto-fill function to increment 	<p><u>Practical activity</u></p> <ul style="list-style-type: none"> • basic technical terminology related to reading help files and prompts • purpose, use and function of spreadsheet applications • create, edit and save spread sheet 	<p>Theory-01 Hrs. Practice-06 Hrs. Total- 07 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>



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	<p>data where required</p> <ul style="list-style-type: none"> • Save the spreadsheet to a folder on a storage device 				
LU2. Customize basic settings	<ul style="list-style-type: none"> • Adjust page layout to meet user requirements or special needs • Open and view different toolbars • Change font settings so they are appropriate for the document purpose • Change alignment options and line spacing according to spreadsheet formatting features • Format cell to display different styles as required • Modify margin sizes to suit the purpose of the spreadsheets • View multiple spreadsheets concurrently 	<p><u>Practical activity</u></p> <ul style="list-style-type: none"> • Formatting spread sheet 	<p>Theory-02 Hrs. Practice-09 Hrs. Total- 11 Hrs.</p>	Desktop Computer/Laptop	Computer Lab/ Classroom
LU3. Format spreadsheet	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Use formatting features as required • Copy selected formatting features from another cell in the spreadsheet or from 	<p><u>Practical activity</u></p> <ul style="list-style-type: none"> • effect of formatting and appearance on the readability and usability 	<p>Theory-02 Hrs. Practice-06 Hrs. Total- 08 Hrs.</p>	Desktop Computer/Laptop	Computer Lab Classroom



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	<p>another active spreadsheet</p> <ul style="list-style-type: none"> • Use formatting tools as required within the spreadsheet • Align information in a selected cell as required • Insert headers and footers using formatting features • Save spreadsheet as another file type • Save to storage device and close spreadsheet 	of spreadsheets			
LU4. Incorporate object and chart in spreadsheet	<ul style="list-style-type: none"> • Import an object into an active spreadsheet • Manipulate imported object by using formatting features • Create a chart using selected data in the spreadsheet • Display selected data in a different chart • Modify chart using formatting features 	<p><u>Practical activity</u></p> <ul style="list-style-type: none"> • Inserting and editing object in spread sheet • Inserting and modifying chart in spreadsheet 	<p>Theory-01 Hrs. Practice-06 Hrs. Total- 07 Hrs.</p>	Desktop Computer/Laptop	Computer Lab/ Classroom



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LU5. Print spreadsheet	<ul style="list-style-type: none">• Preview spreadsheet in print preview mode• Select basic printer options• Print spreadsheet or selected part of spreadsheet• Submit the spreadsheet to appropriate person for approval or feedback	<u>Practical activity</u> <ul style="list-style-type: none">• Preview and Print spread sheet	Theory-01 Hrs. Practice-06 Hrs. Total- 07 Hrs.	Desktop Computer/Laptop	Computer Lab/ Classroom
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Module-6. Operate Presentation Packages

Objective: This module describes the skills and knowledge required to operate power point processing applications and perform basic operations, including creating and formatting presentations, adding slide show effects and printing presentations and notes. It applies to individuals in the workplace using fundamental knowledge of PowerPoint processing under direct supervision or with limited responsibility.

Duration: 30 Hours

Theory: 06 Hours

Practice: 24 Hours

Credit Hours: 3

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Create Presentations	Trainee will be able to: <ul style="list-style-type: none">• Open presentation package and create a simple design for a presentation according to organizational requirements• Open blank presentation and add text and graphics• Apply existing styles within a presentation• Use presentation template and slides to create a presentation• Use various tools to improve the look of the presentation	<u>Practical activity</u> <ul style="list-style-type: none">• Basic technical terminology to read help files and prompts	Theory-01 Hrs. Practice-03 Hrs. Total- 04 Hrs.	Desktop Computer/Laptop	Computer Lab/ Classroom



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	<ul style="list-style-type: none"> • Save presentation to the appropriate storage device and folder 				
LU2. Customize basic settings	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Adjust display to meet user requirements • Open and view different toolbars to view options • Ensure font settings are appropriate for the presentation purpose • View multiple slides at once 	<p><u>Practical activity</u></p> <ul style="list-style-type: none"> • effect of formatting and appearance on the readability and usability of presentation 	<p>Theory-01 Hrs. Practice-03 Hrs. Total- 04 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>
LU3. Format presentations	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Use and incorporate organizational charts and bulleted lists, and modify as required • Add objects and manipulate to meet presentation purposes • Import objects and modify for presentation purposes • Modify slide layout, including text and colors, to meet presentation 	<p><u>Practical activity</u></p> <ul style="list-style-type: none"> • Insert objects and charts 	<p>Theory-02 Hrs. Practice-06 Hrs. Total- 08 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>



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	<p>requirements</p> <ul style="list-style-type: none"> • Use formatting tools as required within the presentation • Duplicate slides within and across a presentation • Reorder sequence of slides and delete slides for presentation purposes • Save presentation in another format • Save to storage device and close presentation 				
LU4. Add slide show effects	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Incorporate pre-set animation and multimedia effects into presentation as required to enhance the presentation • Add slide transition effects to presentation to ensure smooth progression through the presentation • Test presentation for overall effect • Use onscreen navigation tools to start and stop slide show or move between 	<p><u>Practical activity</u></p> <ul style="list-style-type: none"> • suitable presentation effects for different audiences 	<p>Theory-01 Hrs. Practice-06 Hrs. Total- 07 Hrs.</p>	<p>Desktop Computer/Laptop</p>	<p>Computer Lab/ Classroom</p>



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	different slides as required				
LU5. Print presentation and notes	Trainee will be able to: <ul style="list-style-type: none"> • Select appropriate print format for presentation • Select preferred slide orientation • Add notes and slide numbers • Preview slides and run spell check before presentation • Print selected slides and submit presentation to appropriate person for feedback 	<u>Practical activity</u> <ul style="list-style-type: none"> • Preview and print presentations 	Theory-01 Hrs. Practice-06 Hrs. Total- 07 Hrs.	Desktop Computer/Laptop	Computer Lab/ ClassroomClassroom



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Module-7. Perform writing and editing skills

Objective: This module describes the skills and knowledge required to apply the conventions of plain English to writing and editing tasks of different forms. It also includes editing and proofreading techniques. It applies to individuals in various writing contexts who write and edit texts using appropriate language, style, grammar, spelling, and standard conventions for editing and proofreading.

Duration: 30 Hours

Theory: 06 Hours

Practice: 24 Hours

Credit Hours: 3

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Apply clear and appropriate language and style to writing and editing tasks	Trainee will be able to: <ul style="list-style-type: none">• Use safe work practices including addressing ergonomic requirements when undertaking writing tasks• Use clear, concise and plain English in writing and editing tasks• Apply appropriate paragraph structure to written material to ensure clarity of meaning and ease of reading• Make clear and logical connections between sentences, paragraphs and sections• Determine and incorporate the	<u>Practical activity</u> <ul style="list-style-type: none">• Main features of clear, concise and plain English language for written material	Theory-01 Hrs. Practice-06 Hrs. Total- 07 Hrs.	Desktop Computer/Laptop	Computer Lab/ Classroom



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	language and style of the audience				
LU2. Apply the appropriate voice, tone and tense	Trainee will be able to: <ul style="list-style-type: none"> Determine appropriate voice, tone and tense of the written materials according to audience requirements Maintain consistent voice, tone and tense throughout written material 	<u>Practical activity</u> <ul style="list-style-type: none"> Appropriate use of tenses required in written material 	Theory-01 Hrs. Practice-06 Hrs. Total- 07 Hrs.	Desktop Computer/Laptop	Computer Lab/ Classroom
LU3. Apply appropriate grammar, spelling and punctuation	Trainee will be able to: <ul style="list-style-type: none"> Apply appropriate grammar conventions to a range of written contexts including use of numbers, quotations, and tables Apply appropriate spelling and punctuation conventions in writing and editing tasks. 	<u>Practical activity</u> <ul style="list-style-type: none"> Grammar, punctuation and spelling conventions that meet the task requirements 	Theory-02 Hrs. Practice-06 Hrs. Total- 08 Hrs.	Desktop Computer/Laptop	Computer Lab/ Classroom
LU4. Perform editing and proofreading tasks to meet	Trainee will be able to: <ul style="list-style-type: none"> Edit written material to ensure clear meaning through language and 	<u>Practical activity</u> <ul style="list-style-type: none"> Editing conventions used in substantive 	Theory-02 Hrs. Practice-06 Hrs. Total- 08 Hrs.	Desktop Computer/Laptop	Computer Lab/ Classroom



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requirements	<p>paragraphs, consistent voice, tone and tense</p> <ul style="list-style-type: none">• Copyedit written material by checking grammar, spelling and punctuation using standard editing conventions• Proofreading using style guides and by monitoring written material for errors	<p>editing and copyediting of written material</p> <ul style="list-style-type: none">• Basic software used to write and collect feedback			
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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
- Stopwatch



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- Tags for labelling
- Thermometer
- Thread
- Un-galvanized auger

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
- Vacuum extraction pump



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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
- Tong
- Wash bottles



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- Wash dishes

Equipment

- Analytical balance
- Auto clave
- Block digestion
- Dispenser
- EC meter
- Exhaust hood
- Flame Photo meter
- Flow injection analyser
- Freezer
- Hot Plate
- Hot water bathtub
- Hydrometer
- Incubator
- Atomic Absorption spectrophotometerKjeldahl Digestion Distillation Unit
- Laminar flow
- Muffle furnace



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- Oven
- PH meter
- Reciprocating shakers
- Refrigerator
- Shaker
- Shaker
- Spectro photometer
- 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	Principal 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
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) NAVTTC HQ



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13. Members of the Qualification Validation Committee

	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