National Certificate DAE (Level -5) Sector Agriculture
Competency Standards
for
Soil, Water and Fertilizer Testing Lab Technician

National Vocational and Technical Training Commission (NAVTTC),
Government of Pakistan

ACKNOWLEDGEMENTS

National Vocational and Technical Training Commission (NAVTTC) extends its gratitude and appreciation to representatives of business, industry, academia, government agencies, provincial TEVTAs, sector skill councils and trade associations who spared time and extended their expertise for the development of National Vocational Qualifications for the trade of **Agriculture Soil, Water and Fertilizer Testing Lab Technician**. This work would not have been possible without the technical support of the above personnel.

NAVTTC initiated development of CBT&A based qualifications for 200 traditional / hi-tech trades under the **Prime Minister's Hunarmand Pakistan Program,** focusing on Development & Standardization of 200 Technical & Vocational Education & Training (TVET) Qualifications. NAVTTC efforts have received full support from the Ministry of Federal Education and Professional Training which highly facilitated progress under this initiative.

It may not be out of place to mention here that all the experts of Industry, Academia and TVET experts of TEVTAs, BTEs and PVTC work diligently for making this qualification worthy and error free for which all credit goes to them. However, NAVTTC accepts the responsibility of all the errors and omissions still prevailing in the Qualification document.

It is also noteworthy that development of Skill Standards is a dynamic and ongoing process, and the developed skill standards needs periodic review and updating owing to the constant technological advancements, development in scientific knowledge, and growing experience of implementation at the grass root level as well as the demand of industry. NAVTTC will ensure to keep the qualifications abreast with the changing demands of both national and international job markets.

Dr. Nasir Khan,
Executive Director,
NAVTTC

.

Contents

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 (NAVTTC) has developed the National Vocational Qualifications Framework (NVQF) for soil, water, and fertilizer testing Lab technician 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).

PURPOSE OF THE QUALIFICATION

Based upon this demand of industry these competency-based qualifications for Soil, Water and Fertilizer Testing Lab Technician 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.

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 (NAVTTC) has approved the Qualification Development Committee (QDC) for Soil, Water and Fertilizer Testing Lab Technician.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
9. Enable existing workforce to learn new technologies and methods
10. Enable the skilled person of this qualification to validate test method attributes

DATE OF VALIDATION

The level 5 of National DAE qualification on Agricultural Soil, Water and Fertilizer Testing Lab Technician has been validated by the Qualifications Validation Committee (QVC) members on 20-24 July, 2020 and will remain valid for 10 years

DATE OF REVIEW

The level 5 of National DAE qualification on Agricultural Soil, Water and Fertilizer Testing Lab Technician has been validated by the Qualifications Validation Committee (QVC) members on 20-24 July, 2020 and shall be reviewed after three years i.e. **2023**

CODES OF QUALIFICATIONS

The International Standard Classification of Education (ISCED) is a framework for assembling, compiling and analyzing cross-nationally comparable statistic on education and training. ISCED codes for these qualifications are assigned as follows**:**

ISCED Classification for Agricultural Sector Soil, Water and Fertilizer Testing Lab Technician level 5	
Code	Description
0000000	2nd Level DAE National Certificate of level-5, in Agricultural Sector "Soil, Water and Fertilizer Testing Jr. Lab Assistant"
0000000	3rd Level DAE National Certificate of level-5, in Agricultural Sector "Soil, Water and Fertilizer Testing Lab Assistant"
0000000	4th Level DAE National Certificate of level-5, in Agricultural Sector "Soil, Water and Fertilizer Testing Sr. Lab Assistant"
0000000	5th Level DAE National Certificate of level-5, in Agricultural Sector "Soil, Water and Fertilizer Testing Lab Technician"

MEMBERS OF QUALIFICATIONS DEVELOPMENT COMMITTEE

The following members participated in the qualification development of this qualification**:**

S #	Name	Designation	Organization
1	Dr. Farhan Ali	Senior Research Officer	Cereal Crops Research Institute, Peersabak Nowshera, Khyber Pakhtunkhwa
2	Dr. Yousaf Noor	Senior Research Officer	Cereal Crops Research Institute, Peersabak Nowshera, Khyber Pakhtunkhwa
3	Prof. Dr. Muhammad Arshad Javed	Professor	Institute of Agricultural Sciences, University of the Punjab, Lahore
4	Dr. Muhammad Sarfraz	Senior Research Officer	Soil Fertility lab Pindibhattian
5	Dr. Rabia Nazeer	Senior Scientific Officer	PCSIR, Lahore
6	Dr. Amina Mumtaz	Senior Scientific Officer	PCSIR, Lahore
7	Dr. Shafaq Mubarak	Scientific Officer	PCSIR, Lahore
8	Mr. Javed Hayyat	Manager Administrator	Technical Evaluation Research Network, Malakand
	Mr. Asim Ijaz	Lecturer	Agriculture University, Peshawar
	Mr. Saeed Ahmad	Agriculture Officer	UVAS, (Patoki), Lahore
	Mr. S. M Yaqoob Gharshin	Dy. director	NAVTTC, Islamabad
	Mr. Aftab Hussain	DACUM Facilitator	Govt. Technical Training Institute, Rawalpindi P-TEVTA

MEMBERS OF QUALIFICATION VALIDATION COMMITTEE

The following members participated in the qualification's validation of this qualification**:**

S#	Name	Designation	Organization
1	**Mr. Aftab Hussain**	DACUM Facilitator	Govt. Technical Training Institute, Rawalpandi
2	**Mr. Muhammad Saeed Ahmed**	Agriculture Officer	University of Veterinary & Animal Sciences, (UVAS), Lahore
3	**Mr. Abdul Rehman Akbar**	Agriculture Officer (Lab)	Soil and Water Testing Laboratory, Sargodha
4	**Dr. Yousaf Noor**	Senior Research Officer	Agriculture Research System Govt. of KPK (CCRI), Nowshera
5	**Dr. Farhan Ali**	Senior Research Officer	Agriculture Research System Govt. of KPK (CCRI), Nowshera
6	**Dr. Rabia Nazir**	Senior Scientific Officer	PCSIR Labs. Complex, Lahore
7	**Dr. Muhammad Akram Qazi**	Senior Instructor	Directorate of Soil Fertility Thokar Niaz, Lahore
8	**Mr. Adil Rasheed**	Representative	AJK-TEVTA
9	**Ms. Saadia Syed**	Representative	P-TEVTA
10	**Mr. Muhammad Ashfaq ur Rehman**	Representative	KP-TEVTA
11	**Mr. Amanullah Ch.**	Representative	PBTE
12	**S.M. Yaqoob Gharshin**	Deputy Director	NAVTTC, Islamabad

ENTRY REQUIREMENTS

The entry for D.A. E National Certificate level 5, in Agricultural Sector Soil, Water and Fertilizer Testing Lab Technician are

- A person having **Matric / equivalent Certificate with Science**

The entry for Level wise National certificate 1-5, in Agriculture Sector Soil, Water and Fertilizer Testing Lab Technician are

- For level-2 Matric / equivalent Certificate with Science
- For level-3 National Certificate level-2
- For level-4 National Certificate level-3
- For level-5 National Certificate level-4

REGULATION OF THE QUALIFICATION AND SCHEDULE OF UNITS

Not Applicable

SUMMARY OF COMPETENCY STANDARDS

Sr No	Competency Standards	Occupations	NVQF Level	Category	Estimated Contact Hours			Cr Hr
					Th	Pr	Total	
	Level-2							
	Health & Safety	**Safety Supervisor**						
1	Maintain Occupational Health and Safety		Level 2	Generic	6	24	30	3
2	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**						
1	Adhere To Lab Safety Rules		Level 2	Technical	12	48	60	6
2	Apply Sampling Techniques		Level 2	Technical	18	72	90	9
3	Handle Basic Level Equipment-I		Level 2	Technical	9	51	60	6
4	Execute Pre-Sampling Operations		Level 2	Technical	12	48	60	6
5	Maintain Lab Record		Level 2	Technical	7	33	40	4
6	Process Sample for Analysis		Level 2	Technical	12	48	60	6
	Occupation Total Hours				70	300	370	37
	Performance of Basic Test	**Jr. Lab Assistant**						
1	Perform pH test for water by pH Meter		Level 2	Technical	14	36	50	5
2	Perform pH Test of Soil by pH Meter		Level 2	Technical	12	48	60	6
3	Perform Water conductivity test by EC Meter		Level 2	Technical	6	24	30	3
4	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
	Level-3							
	Manage Digital Skills	**Digital Skills**						

1	Install Computer Operating Systems and Hardware		Level 3	Functional	6	24	30	3
2	Operate Basic 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
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							
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	**Lab Assistant**	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
7	Perform Humic acid contents in Solid fertilizer by gravimetric method		Level 3		12	48	60	6
	Occupation Total Hours				**68**	**282**	**350**	**35**
	LEVEL-3 TOTAL HOURS				**120**	**480**	**600**	**60**
	Level-4							
	Performance of water related test							
1	Handling of sophisticated level Equipment 1	**Sr. Lab Assistant for Water**	Level 4	Technical	24	96	120	12
2	Perform Calcium & Magnesium test of water by Titrimetric Method		Level 4	Technical	18	72	90	9

3	Perform Carbonates & Bicarbonates test by Titrimetric Method		Level 4	Technical	10	30	40	4
4	Perform Chloride (Cl) test by Titrimetric Method		Level 4	Technical	12	48	60	6
5	Perform Sodium (Na) test for water by Flame-Photometric Method		Level 4	Technical	17	63	80	8
6	Perform Potassium (K) test by Flame-Photometric Method		Level 4	Technical	17	63	80	8
	Occupation Total Hours				98	372	470	47
	Performance of Soil and Fertilizer related test	**Sr. Lab Assistant for soil**						
1	Handling of sophisticated level Equipment 1		Level 4	Technical	24	96	120	12
2	Perform Boron (Water-Soluble) in Fertilizers through Spectrophotometer		Level 4	Technical	18	72	90	9
3	Perform Soil Boron Test		Level 4	Technical	12	48	60	6
4	Perform Soil Extractable Phosphorus Test		Level 4	Technical	12	48	60	6
5	Perform Soil Extractable Potassium Test		Level 4	Technical	12	48	60	6
6	Perform Total phosphorus in Solid, liquid and mixed fertilizer by titrimetric method		Level 4	Technical	10	60	70	7
	Occupation Total Hours				88	372	460	46
	Manage Soft Skills	**Soft Skills**						
1	Develop Workplace Policy and Procedures for Sustainability		Level 4	Generic	6	24	30	3
2	Maintain Professionalism in the Workplace		Level 4	Generic	6	24	30	3
3	Manage Personal Work Priorities and Professional Development		Level 4	Generic	6	24	30	3
4	Manage Workforce Planning		Level 4	Generic	6	24	30	3
5	Undertake Project Work		Level 4	Generic	6	24	30	3
6	Prepare and Implement Negotiation		Level 4	Generic	6	24	30	3
7	Manage and Schedules Meetings		Level 4	Generic	6	24	30	3
8	Identify and Communicate Trends in Career Development		Level 4	Generic	6	24	30	3
9	Apply Specialist Interpersonal and Counseling Interview Skills		Level 4	Generic	6	24	30	3
	Occupation Total Hours				**54**	**216**	**270**	**27**

	LEVEL-4 TOTAL HOURS				**240**	**960**	**1200**	**120**
Level-5								
		Lab Technician						
1	Handling of sophisticated level Equipment 2		Level 5	Technical	40	60	100	10
2	Perform Ammonical Nitrogen In Solid, Liquid and Mixed Fertilizer By Kjeldahl Method		Level 5	Technical	40	60	100	10
3	Nitrate-N in Solid, liquid and mixed fertilizer by kjeldahl method		Level 5	Technical	48	72	120	12
4	Perform Uric/Urease nitrogen (n) in Solid, liquid and mixed fertilizer by kjeldahl method		Level 5	Technical	48	72	120	12
5	Perform Potassium (K) in Solid, Liquid and Mixed Fertilizer by Flame Photometery Method		Level 5	Technical	32	48	80	8
6	Perform water soluble micronutrients (Zn, Fe, Mn etc) in Fertilizers through AAS Method		Level 5	Technical	60	90	150	15
7	Perform Soil Micronutrient Test		Level 5	Technical	24	36	60	6
8	Perform Standard Test Method (STM) for Zinc chelated percentage		Level 5	Technical	32	48	80	8
9	Perform Standard Test Method (STM) to evaluate Gypsum Requirement in soil		Level 5	Technical	32	48	80	8
10	Generate test report		Level 5	Technical	4	6	10	1
11	Ensure Test Quality		Level 5	Technical	8	12	20	2
	Occupation Total Hours				368	**552**	920	**92**
	Develop Entrepreneur Skills	**Entrepreneur**						
1	Develop Entrepreneurial Skills		Level 5	Generic	12	18	30	3
2	Maintain Business Resources		Level 5	Functional	12	18	30	3
3	Develop A Sales Plan		Level 5	Functional	12	18	30	3
4	Plan And Implement Business-To-Business Marketing		Level 5	Functional	12	18	30	3
5	Address Customer Needs		Level 5	Generic	8	12	20	2
6	Solve Problems Which Jeopardize Safety And Security		Level 5	Generic	12	18	30	3

7	Apply problem solving techniques in the workplace using critical thinking		Level 5	Functional	12	18	30	3
8	Manage Personal Finances		Level 5	Functional	8	12	20	2
9	Coordinate A Work Team		Level 5	Functional	8	12	20	2
10	Lead Small Teams		Level 5	Functional	8	12	20	2
11	Manage Human Resource Services		Level 5	Functional	8	12	20	2
	Occupation Total Hours				**112**	**168**	**280**	**28**
	LEVEL-5 TOTAL HOUR				**480**	**720**	**1200**	**120**
	GRAND TOTAL HOURS OF ALL LEVELS (2-5).				**960**	**2640**	**3600**	**360**
	Overall (Level-5 Diploma) % Ratio of Theory and Practical				**27%**	**73%**	**100 %**	**Credit Hrs**

LEVELLING AND PACKAGING OF THE QUALIFCATION

The National Vocational Qualifications have been packaged as detailed below:

Level 2
(Safety Supervisor, Jr. Lab Assistant)

Safety Supervisor

1. Maintain Occupational Health and Safety
2. Adopt Safety Regulations, Labor Protection Laws, Environmental Protection Laws at Workplace

Jr. Lab Assistant

1. Adhere To Lab Safety Rules
2. Apply Sampling Techniques
3. Execute Pre-Sampling Operations
4. Handle Basic Level Equipment-I
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

Level 3

(Lab Assistant)

Digital Skills

1. Install Computer Operating Systems and Hardware

2. Operate Basics- Computer Functions
3. Develop Computer Application skills
4. Perform word-processing applications
5. Operate Spreadsheet Application
6. Operate Presentation Packages
7. Perform writing and editing skills

Lab Assistant

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

Level 4
*(*Sr. Lab Assistant for water, Sr. Lab Assistant for soil*)*

Sr. Lab Assistant for water

1. Handling of sophisticated level Equipment I
2. Perform Calcium & Magnesium test of water by Titrimetric Method
3. Perform Carbonates & Bicarbonates test by Titrimetric Method
4. Perform Chloride (Cl) test by Titrimetric Method
5. Perform Sodium (Na) test for water by Flame-Photometric Method
6. Perform Potassium (K) test by Flame-Photometric Method

Sr. Lab Assistant for soil

1. Handling of sophisticated level Equipment II
2. Perform Boron (Water-Soluble) in Fertilizers through Spectrophotometer
3. Perform Soil Boron Test
4. Perform Soil Extractable Phosphorus Test
5. Perform Soil Extractable Potassium Test
6. Perform Total phosphorus in solid, liquid, and mixed fertilizer by titrimetric method

Soft Skills

1. Develop Workplace Policy and Procedures for Sustainability
2. Maintain Professionalism in the Workplace
3. Manage Personal Work Priorities and Professional Development
4. Manage Workforce Planning
5. Undertake Project Work
6. Prepare and Implement Negotiation
7. Manage and schedule Meetings
8. Identify and Communicate Trends in Career Development
9. Apply Specialist Interpersonal and Counseling Interview Skills.

Level 5
(Lab Technician)

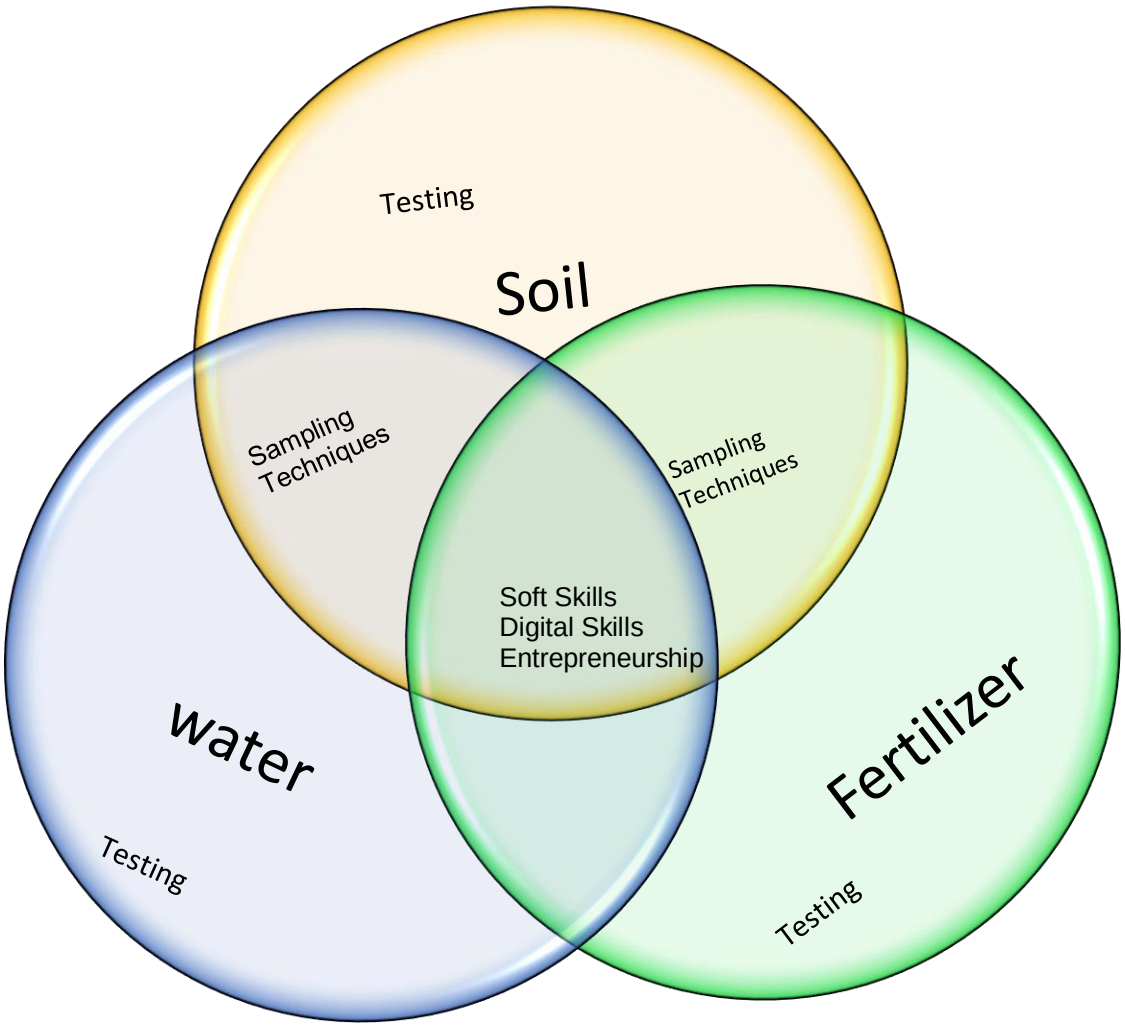
1. Handling of sophisticated level Equipment 2
2. Perform Ammonical Nitrogen In Solid, Liquid and Mixed Fertilizer By Kjeldahl Method
3. Nitrate-N In solid, Liquid and Mixed Fertilizer By Kjeldahl Method
4. Perform Uric/Urease Nitrogen (N) In solid, Liquid and Mixed Fertilizer By Kjeldahl Method
5. Perform Potassium (K) in Solid, Liquid and Mixed Fertilizer by Flame Photometery Method
6. Perform water soluble micronutrients (Zn, Fe, Mn etc) in Fertilizers through AAS Method
7. Perform Soil Micronutrient Test
8. Perform Standard Test Method (STM) for Zinc chelated percentage
9. Generate test report
10. Ensure Test Quality

Entrepreneur

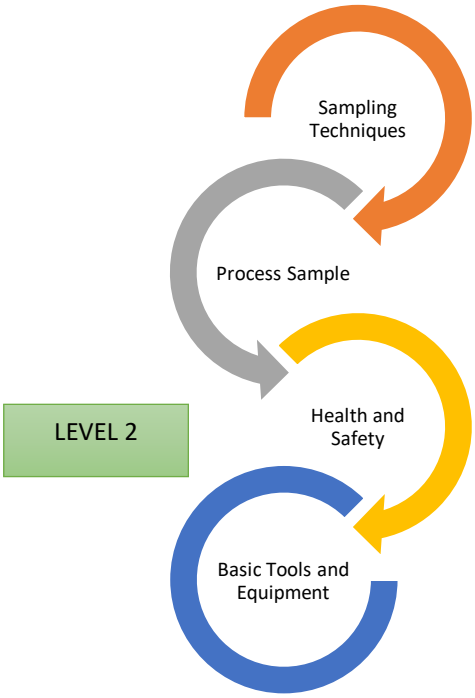
1. Develop Entrepreneurial Skills
2. Maintain Business Resources
3. Develop A Sales Plan
4. Plan And Implement Business-To-Business Marketing
5. Address Customer Needs
6. Solve Problems Which Jeopardize Safety And Security
7. Apply problem solving techniques in the workplace using critical thinking

8. Manage Personal Finances
9. Coordinate A Work Team
10. Lead Small Teams
11. Manage Human Resource Services

MAPPING OF THE QUALIFICATIONS



MAPPING OF OCCUPATIONS



LEVEL 2

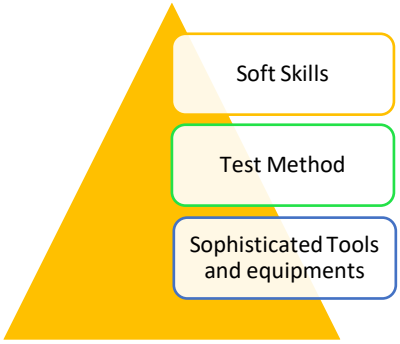
LEVEL 3

Digital Skills

Test Method

Adhere Lab safty Rules

Sophisticated tools and equipments



LEVEL 4

LEVEL 5

Level 2 (Technical competencies)

Module-1: Adhere to Lab Safety Rules

Overview

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.

Competency Units	*Performance Criteria*
CU.1 Ensure House-keeping Lab Safety Rules	**P1.** Ensure cleanliness of work Place as per requirement. **P2.** Ensure accessibility of all emergency points as per safety rules. **P3.** Assort necessary materials according to need at workstation. **P4.** Store lightweight items on top and heavy items at base of cabinets **P5.** Ensure placement of acid containers at ground level according to prescribed standards **P6.** Ensure frequent cleaning of laboratory sink to prevent choking. **P7.** Maintain aeration for equipment's to prevent overheating. **P8.** Maintain environmental conditions as per given standards
CU.2 Follow dress code safety Rules	**P1.** Wear hair covering cap if required. **P2.** Ensure safety of loose clothing or jewelry. **P3.** Use completely covering footwear. **P4.** Wear full coverage clothes in lab. **P5.** Prohibit use of acrylic nails while working with burners, light splints, matches, etc.
CU.3 Adhere to Chemical Safety Rules	**P1.** Treat all Chemicals as per Material Safety Data Sheet (MSDS). **P2.** Use chemical resistant gloves while handling chemicals. **P3.** Label chemicals as per safety standards. **P4.** Ensure disposal of chemicals as per set safety rules. **P5.** Ensure proper selection of chemicals for your work. **P6.** Use fume hood for working with volatile and flammable chemicals. **P7.** Clean spillage according to protocols. **P8.** Ensure storage of chemicals according to compatibility list

		P9. Avoid leaving instruments unattended when analysis is in progress.
CU.4	Ensure personal hygiene and Sanitation at workplace	**P1.** Ensure personal hygiene with clean lab coat, gloves, face masks, goggles, etc. **P2.** Refrain from eating, smoking & drinking in lab. **P3.** Ensure Cleanliness of lab as per lab requirement. **P4.** Undertake fumigation as per given standards **P5.** Ensure disposal of laboratory waste as per standard rules **P6.** Sterilize glassware before and after use as per test method requirement **P7.** Wash hands properly before and after each task as per safety standard **P8.** Place all equipment's at designated sites after use **P9.** Maintain laboratory environment in accordance with lab standards.
CU.5	Follow electrical lab safety rules	**P1.** Ensure permission from Lab In-charge before using any high voltage equipment **P2.** Avoid altering or modifying high-voltage equipment. **P3.** Ensure high-voltage power supply is switched off when attaching switch. **P4.** Using one hand only when adjusting high voltage devices. **P5.** Ensure direct access to electrical panels in accordance with standard safety guidelines. **P6.** Avoid extensions or lose wire in laboratory. **P7.** Avoid water and wet hands when working with electrical devices.
CU.6	Comply with Lab Procedures	**P1.** Follow lab layout **P2.** Equip with standard protocols for Sampling **P3.** Adopt standard procedures for each soil analysis **P4.** Adopt standard procedures for each water analysis **P5.** Follow the standard test method (STM) for each fertilizer analysis **P6.** Ensure availability of standard laboratory manuals **P7.** Display Lab emergency exit plan layout

Knowledge & Understanding

This competency standard will provide knowledge related to:

K1 Relevant Standards, policies and procedures in Lab Operations
K2 Procedure related to Sanitation of lab

K3 Health and safety requirements for workplace
K4 Role and responsibilities during various Lab operations
K5 Importance of following Standard Safety rules
K6 Lab Layout information
K7 Standard procedures to operate different equipment's
K8 Categorization of lab equipment's and chemicals
K9 Labelling of lab chemicals
K10 Handling and storage of Lab chemicals

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Ensure lab safety rules
- Follow lab protocols
- Maintain personal hygiene and sanitation at workplace

Tools & Equipment required

- Lead testing kit/instrument
- PPE

MODULE- 2: Apply Sampling Techniques

Overview

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.

Competency Units	***Performance Criteria***
CU.1 Apply Sampling Techniques for soil	**P1.** Arrange tools for sampling as per requirements. **P2.** Collect sub-samples of given site as per random sampling techniques **P3.** Collect sub-samples of given site as per Zone based sampling techniques **P4.** Collect sub-samples of given site as per Grid sampling techniques **P5.** Collect sub-samples of given site as per stratified sampling techniques **P6.** Make a composite sample by mixing all site sub-samples, then draw a representative sample for laboratory testing **P7.** Transport sample to laboratory as per SOP
CU.2 Apply Sampling Techniques for Water	**P1.** Arrange tools for water sampling as per requirements. **P2.** Collect Surface water sample employing time-based technique as per test requirement. **P3.** Collect Surface water sample employing flow-based technique as per given standard. **P4.** Collect Surface water sample employing depth-based technique as per given standard. **P5.** Collect groundwater samples as per SOP and record all details on the bottle label. **P6.** Transport sample to laboratory as per SOP
CU.3 Apply Sampling Techniques for Fertilizer	**P1.** Arrange tools for sampling as per requirement

	P2. Collect representative samples of fertilizer from the bag as per SOP. **P3.** Store sample in airtight jar **P4.** Label sample as per standard procedure **P5.** Transport sample to lab as per standard protocol
CU.4 Adopt Safety Measures	**P1.** Ensure First Aid Box **P2.** Ensure PPE for sampling **P3.** Adopt standard procedure for visiting out field

Knowledge & Understanding

This competency standard will provide knowledge related to:

K1 Basic knowledge of agriculture soil, water and fertilizer

K2 Sampling techniques required under different conditions for sample collection

K3 Safety and generals' rules regarding field visits

K4 Tools and equipment required for sampling

K5 Precautions required during sampling

K6 Importance of sampling protocol

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Arrange tools for sampling as per requirements.
- Apply Sampling Techniques
- Handling of collected samples
- Follow health and safety rules

Tools and Equipments Required

- Buckets
- Cardboard box
- First Aid Kit
- Flow meter
- GPS device
- Thermo-Hygrometer
- Ice box
- Marker
- Measuring tape
- Metal ring
- Personal protective equipments (PPE)

- Plastic bags
- Preservatives
- Sacks
- Sampling bottles
- Shovel/spade
- Stainless steel Auger
- Sterilized containers
- Stop watch
- Tags for labelling
- Thermometer
- Thread
- Sample Probe and stick

MODULE- 3: Handle Basic Level Equipment

Overview

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.

Competency Units	***Performance Criteria***
CU.1 Maintain basic level equipment	**P1.** Clean basic level instruments as per manual instructions **P2.** Clean Glass apparatus as per protocols **P3.** Check power supply to the instrument voltage as mentioned in the manual. **P4.** Follow Safety standards as per requirement. **P5.** Implement instrument maintenance plan as per given lab procedure
CU.2 Operate basic level equipment	**P1.** Check pre-requisites before turning on the instruments as per given Manual **P2.** Turn on instrument as per instruction given in manual **P3.** Implement performance checks as per standard lab procedures **P4.** Run sample for a specific time as per given instructions. **P5.** Record data for required parameter of the sample in specific SI units as a standard.

	P6. Clean instruments after performing analysis as per given instructions **P7.** Ensure turn off of instruments as per manuals **P8.** Use glass apparatus according to given SOP **P9.** Follow safety standards of lab

Knowledge & Understanding

This competency standard will provide basic knowledge related to maintenance of basic level equipment:

K1 Maintenance of equipment

K2 Use of equipment

K3 Data recording

K4 Understanding of given performance check related to different instruments

K5 SI units to be used in sample analysis

K6 Handling of glass apparatus

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Implementation of SOP for instrument
- Use of volumetric glass wares as per given SOP
- Inter conversion of measuring unit according to standard formula

Tools & Equipment required

- Analytical Balance
- EC meter
- Exhaust hood
- Freezer
- Hot water bath tub
- Incubator
- Muffle Furnace
- Oven
- PH meter
- Refrigerator
- Shaker
- Vortex mixer
- Glass apparatus
- Hot Plate
- Magnetic hotplate

MODULE- 4: Execute Pre-Sampling Operations

Overview: 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.**

Competency Units	Performance Criteria
CU.1 Demonstrate Objectives of Sampling	**P1.** Demonstrate scope and objectives of sampling as per project/assessment objectives. **P2.** Figure out purpose for which various types of samples will be collected **P3.** Review site files and field folders. (Site location, description, and access, and review any previously collected physical, chemical, and biological data.) **P4.** Follow sampling design and sample size instructions as required **P5.** Follow standard methods for sampling
CU.2 Prepare sampling plan	**P1.** Plan field visits as per given task **P2.** Make checklist for pre-sampling, sampling, and post sampling preparations as per requirement **P3.** Select sampling tool kit as per Sampling plan **P4.** Check field equipment to perform Accurate Field Measurements **P5.** Check Maps, distance measuring equipment, global positioning systems, or other location determining equipment
CU.3 Observe Site Details	**P1.** Document all information regarding location, depth, type, previous crop, GPS coordinates and anything unusual/notable around the sampling site/source. **P2.** Note Point and nonpoint sources of contamination and depth for water sampling **P3.** Document physical and meteorological conditions**.** **P4.** Ensure Signatures or initials of appropriate field personnel with date on document.

Knowledge of Understanding

K1 Purpose of Sampling
K2 Procedure for Consistency and Representativeness of Sample
K3 Prevention of Deterioration and Contamination
K4 Location Selection
K5 Relevant local area geography
K6 Site details and other environmental factors
K7 Weather conditions (temperature, wind, rainfall)
K8 Presence of animals
K9 Other comments (e.g., system problems i.e., disinfection/filtration equipment)

Tools & Equipment required

- 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
- GPS device
- Water sampler
- Hand washer
- Protective equipment
- Sample bottles

MODULE- 5: Maintain Lab Record

Overview

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 complicacy of audit procedures.

Competency Units	***Performance Criteria***
CU.1 Register Sample	**P1.** Receive sample only at designated site **P2.** Examine physical conditions and quantity of received sample as per lab procedure **P3.** Issue sample receipt as per defined format **P4.** Assign tag number to sample as per serial pattern **P5.** Note sample details as per given particulars **P6.** Record name and address of client
CU.2 Label Sample	**P1.** Mention test requirements on prescribed Performa as per lab procedure **P2.** Mention allocated sample ID on label **P3.** Mark sample by using permanent marking tools **P4.** Mention type of analysis required on prescribed Performa **P5.** Mention date and time of sample as collected **P6.** Mention storage requirements on prescribed Performa as per requirement.
CU.3 Manage Inventory	**P1.** Maintain stock registers of consumable as per requirement. **P2.** Maintain Fixed assets/dead stock register as per requirements **P3.** Maintain instrument stock register as per requirements **P4.** Manage logbook of required equipment as per its utilization and schedule. **P5.** Prepare and Maintain History sheet for repair and maintenance of equipment's as per set standard. **P6.** Maintain sample log register

Knowledge & Understanding

This competency standard will provide basic knowledge related to

K1 Maintenance of stock

K2 Utilization of lab chemicals

K3 Record maintenance for dead and consumable stock

K4 Procedures related to registration of sample

K5 Inventory management

K6 Sample labeling and handling at reception

K7 Managing Lab chemicals

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Maintenance of stock registers of chemicals reagents.
- Keep the maintenance of stock register and logbook of equipment.
- Label sample

Tools & Equipment

- Lab registers
- Computer
- PPE
- Permanent marker

MODULE- 6: Process Sample for Analysis

Overview

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

Competency Units	***Performance Criteria***
CU.1 Process soil sample	**P1.** Homogenize collected soil sample by mixing and allow to attain equilibrium according to given instructions. **P2.** Dry soil sample as per required procedures **P3.** Remove the physical impurities from the samples i.e. Plant residues, gravel, soft chalk, limestone and stones **P4.** Grind the soil sample following standard protocols **P5.** Sieve the selected soil according to test requirement **P6.** Dispose-off impurities retained on sieve as per lab protocols **P7.** Ensure sample labeling for desired process as per given standard **P8.** Follow health and safety guidelines
CU.2 Process Water Sample	**P1.** Ensure cleanliness of glass wares to avoid contamination **P2.** Filter water sample for physical impurities/undesirable matters as per required standards **P3.** Process water sample in desired apparatus only according to set SOPs **P4.** Ensure sample labeling for desired process as per given standard **P5.** Ensure safety standards
CU.3 Process fertilizer sample	**P1.** Ensure seal and label of sample as per standard method **P2.** Open the collected sample as per prescribed procedure **P3.** Process sample as per lab procedure according to requirement **P4.** Ensure safety standards as required
CU.4 Handle prepared sample	**P1.** Ensure transportation of prepared sample according to prescribed standards **P2.** Prevent sample leakage or spillage **P3.** Ensure standard time period between collection and analysis of samples

	P4. Avoid mixing of collected and obtained sample **P5.** Follow health safety rules
CU.5 Store sample	**P1.** Ensure Standard labeling of prepared and obtained samples before storage **P2.** Record data for storage **P3.** Store samples as per given SOP **P4.** Ensure lab safety rules for handling glass wares

Knowledge & Understanding

This competency standard will provide knowledge related to:

- Processing of soil samples for analysis
- Processing of water samples for analysis
- Processing of fertilizer samples for analysis
- Protocols related to disposal of lab waste
- Handling and usage of lab apparatus related to processing of sample
- General standards for handling of samples
- Application of safety guidelines in lab processing of sample

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Ensure lab safety rules
- Follow standard protocols for processing

Tools and Equipments

- Cutter/scissor
- Fertilizer grinder/ Mortar and pestle
- Sieve 30 to 100 mesh as per requirement of the method
- 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

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

Overview:

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.

Competency Units	Performance Criteria
CU.1 Prerequisites for testing	**P1.** Check sample label for requirement of pH testing. **P2.** Ensure Laboratory room temperature according to lab requirement **P3.** Keep sample at room temperature for few minutes. **P4.** Prepare pH buffer solution as per requirement **P5.** Arrange equipment as per test method requirement. **P6.** Set up pH meter and/or reagents in accordance with the specified work instructions. **P7.** Conduct pre-use and safety checks.
CU.2 Perform test Procedure	**P1.** Turn on instrument as per manual **P2.** Rinse electrode with distilled water and check calibration by running known buffers as per method requirement. **P3.** Take sample in a beaker according to test method. **P4.** Immerse probe and stir it until instrument gives stable pH reading. **P5.** Perform test sample replicates as per SOP. **P6.** Store unused reagents and dispose of wastes as required by relevant regulations and codes. **P7.** Clean and store equipment as per lab protocol
CU.3 Quality Control Checks	**P1.** Perform pH meter intermediate checks as per lab quality assurance plan **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure. **P6.** Prepare quality control charts of quality assurance activities according to lab procedure.
CU.4 Record the results	**P1.** Calculate and Note down Results on analyst workbook. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU.5 Adopt precautions during work	**P1.** Ensure before taking any measurement that instrument has been calibrated.

	P2. Leave probe always in distilled water. **P3.** Submerge probe in sample to be tested while stirring it gently. **P4.** Rinse probe tip after use according to SOP.

Knowledge and Understanding

K1 Demonstration of an ability to prepare water samples and perform quality tests according to specified standards and parameters relevant to water quality standards including:

K2 Understanding the basic principle of electrometric pH measurement i.e., determination of activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode

K3 Identifying pH hazards in water samples

K4 Planning and organizing testing assignment

K5 Using appropriate testing equipment and personal protective clothing and equipment

K6 Understanding and applying procedures for testing

K7 Determining and reporting accurate and relevant pH results from testing

Tools & Equipment

- pH Meter
- pH buffers of pH 4, 7 & 10
- Deionized/ distilled water
- Glass Beaker (Class A)
- Glass rod
- thermometer

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 8: Perform pH Test of Soil by pH Meter

Overview: This competency standard covers 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test **P2.** Maintain required laboratory temperature **P3.** Keep sample at room temperature as required. **P4.** Prepare pH buffer solution as per requirement. **P5.** Arrange equipment as per test method. **P6.** Set up pH meter and/or reagents in accordance with the specified work instructions. **P7.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Turn on instrument as per instructions given in manual. **P2.** Calibrate pH meter by as per standard method. **P3.** Adjust meter with buffer solution of known pH according to SOP. **P4.** Weigh required sample and transfer into beaker as per standard method. **P5.** Add distilled water and stir it as per standard procedure. **P6.** Immerse electrode and stir it until instrument gives stable pH reading. **P7.** Perform test sample replicates as per SOP. **P8.** Store unused reagents and dispose of wastes as per standard protocols. **P9.** Clean and store equipment as per lab protocol
CU3. Quality Control Checks	**P1.** Perform pH meter intermediate checks as per lab quality assurance plan **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure. **P6.** Prepare quality control charts of quality assurance activities according to lab procedure.

CU4. Record results	**P1.** Calculate and note down the Results on analyst workbook. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Calibrate instrument before taking measurement as per requirement. **P2.** Leave probe always in distilled water. **P3.** Submerge probe in sample to be tested while stirring it gently. **P4.** Rinse probe tip after use according to SOP.

Knowledge and Understanding

- Demonstration of an ability to prepare Soil samples and perform quality tests according to specified standards and parameters relevant to soil quality standards including:
- Understanding the basic principle of electrometric pH measurement i.e. determination of activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode
- Identifying pH hazards in soil samples
- Planning and organizing testing assignment
- Using appropriate testing equipment and personal protective clothing and equipment
- Understanding and applying procedures for testing
- Determining and reporting accurate and relevant pH results from testing

Tools & Equipment

- pH Meter
- pH buffers of pH 4, 7 & 10
- Deionized/ distilled water
- Glass Beakers
- Glass rod

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

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

Overview:

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

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test. **P2.** Maintain Laboratory room temperature as per requirement. **P3.** Keep sample at room temperature for few minutes. **P4.** Check for availability of EC standard as per requirement. **P5.** Arrange equipment as per requirements. **P6.** Set up EC meter and/or reagents in accordance with the standard work instructions. **P7.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Turn on instrument as per manual. **P2.** Check calibration status and perform calibration if required. **P3.** Take sample in a beaker as per test method requirement **P4.** Immerse electrode and stir it until instrument gives stable reading. **P5.** Perform replicates as per requirement. **P6.** Store unused reagents and dispose of wastes as per SOP. **P7.** Clean and store equipment as per lab protocol.
CU3. Quality Control Checks	**P1.** Perform EC meter intermediate checks as per lab quality assurance plan **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure. **P6.** Prepare quality control charts of quality assurance activities according to lab procedure
CU4. Record the results/ Finalize work	**P1.** Calculate and note down the results on analyst workbook. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.

CU5. Adopt precautions during work	**P1.** Ensure calibration of instrument as per requirement. **P2.** Leave probe always in conductivity / storage solution. **P3.** Submerge probe in sample to be tested while stirring it gently. **P4.** Rinse probe tip after use according to SOP

Knowledge of Understanding

K1 Demonstration of an ability to prepare water samples and perform quality tests according to specified standards and parameters relevant to water quality standards including:

K2 Understanding the basic principle of electrical conductivity measurement i.e. ability of an aqueous solution to carry an electric current depending on the presence of ions, their total concentration, mobility, valence, and on the temperature of measurement.

K3 Identifying excessive EC in water samples

K4 Planning and organizing testing assignment

K5 Using appropriate EC meters and personal protective clothing and equipment

K6 Understanding and applying procedures for EC testing

K7 Determining and reporting accurate and relevant EC results from testing.

Tools & Equipment

- EC Meter with electrode and temperature probe
- EC Standard 1413 µS/cm.
- Deionized/ distilled water
- Glass Beaker (Class A)
- Glass rod
- Conductivity/ storage solution

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 10: Perform Soil Electrical Conductivity (EC) by EC Meter

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for the required test. **P2.** Maintain Laboratory room temperature as per requirement. **P3.** Keep sample at room temperature for few minutes. **P4.** Check for availability of EC standard as per requirement. **P5.** Arrange equipment as per requirements. **P6.** Set up EC meter and/or reagents in accordance with the standard work instructions. **P7.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Turn on instrument as per standard method. **P2.** Prepare soil: water suspension as per SOP. **P3.** Calibrate conductivity meter according to standard instructions. **P4.** Rinse cell/ electrode thoroughly as per SOP. **P5.** Measure electrical conductivity of the 0.01M KCl as per standard test method. **P6.** Measure EC of sample suspension as per standard test method **P7.** Rinse the conductivity cell in soil suspension as per test method. **P8.** Refill the conductivity cell as per SOP. **P9.** Perform replicates as per requirement. **P10.** Store unused reagents and dispose of wastes as required by relevant regulations and codes. **P11.** Clean and store equipment as per SOP
CU3. Quality Control Checks	**P1.** Perform EC meter intermediate checks as per lab quality assurance plan **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure. **P6.** Prepare quality control charts of quality assurance activities according to lab procedure

CU4. Record the results	**P1.** Calculate and note down the Results on analyst workbook. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Ensure calibration of instrument as per method requirement. **P2.** Leave probe always in conductivity/ storage solution. **P3.** Submerge probe in sample to be tested while stirring it gently. **P4.** Rinse probe tip after use according to SOP

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards and parameters relevant to Soil quality standards including:

K2 Understanding the basic principle of electrical conductivity measurement i.e., ability of an aqueous solution to carry an electric current depending on the presence of ions, their total concentration, mobility, valence, and on the temperature of measurement.

K3 Identifying excessive EC in soil samples

K4 Planning and organizing testing assignment

K5 Using appropriate EC meters and personal protective clothing and equipment

K6 Understanding and applying procedures for EC testing

K7 Determining and reporting accurate and relevant EC results from testing.

Tools & Equipment

- EC Meter with electrode
- EC Standard 1413 µS/cm.
- Deionized/ distilled water
- Storage solution
- Glass rod
- KCl 0.01M
- Glass Beaker (Class A)

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

Level 2 (Generic Competencies)

Module-1: Maintain Occupational Health and Safety

Overview: 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.

Competency Units	Performance Criteria
CU1. Maintain PPEs and First-aid Box.	**P1.** Arrange the required personal protective equipment **P2.** Check functional condition of PPE's **P3.** Ensure availability of first aid box **P4.** Check first aid box for requisite emergency **P5.** Perform first aid treatment against electric shocks **P6.** Perform first aid treatment/bandages against minor injuries .
CU2. Maintain Fire Extinguisher	**P1.** Check expiry of fire extinguisher **P2.** Operate fire extinguisher **P3.** Replace fire extinguisher
CU3. Ensure Safeguard of Machines.	**P1.** Maintain radiator shield **P2.** Maintain alternator fan shield **P3.** Maintain heat resistance material on silencer **P4.** Cover main circuit breaker **P5.** Lock canopy doors.

CU4. Adopt company policies and procedures.	**P1.** Ensure company's safety policy **P2.** Adopt company safety procedure **P3.** Educate worker with company safety policy **P4.** Implement Safety sign board as per standard.
CU5. Attain health & safety training.	**P1.** Take required health and safety training **P2.** Implement work hazardous material information system (WHMIS) **P3.** Adopt first aid cardio respiratory, resuscitation and CPR.
CU6. Prepare and respond to emergencies.	**P1.** Take emergency response training **P2.** Ensure practice of emergency exercises **P3.** Check the emergency alarms **P4.** Follow emergency plan **P5.** Communicate instructions to co workers **P6.** Assess risk and determine course of action **P7.** Operate emergency equipment and supplies **P8.** Ensure that the ambulance is at stand by (for emergency).

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

Overview: 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.

Competency Units	Performance Criteria
CU.1 Implement International Safety Standards in your work environment.	**P1.** Recognize Electrical Safety hazards as per International Electro-Technical Commission (IEC) Standards **P2.** Determine Environmental Pollution risk factors as per Protection Agency (EPA) standards **P3.** Identify Electrical Safety Hazards as per Institute of Electrical and Electronic Engineers (IEE) standards **P4.** Categorize the Electrical Safety Hazards as per Electrical Safety Foundation International (ESFI) standards **P5.** Identify Labor Protection Laws as per International Labor Organization (ILO) rules **P6.** Identify the steps to minimize the Electrical hazards and Environmental Pollution. **P7.** Prepare a report for all the above activity.
CU.2 Implement National Safety Standards in your work environment.	**P1.** Identify Factory associated hazard as per Chapter 3 of Factories Act, 1934 **P2.** Determine Environmental Pollution factors as per Pakistan Environmental Protection Act, 1997 **P3.** Recognize the Labor protection laws as per Labor Protection Policy 2006 **P4.** Identify the workplace hazards as per Occupational health and safety (OHS) standards **P5.** Identify the steps to minimize the Electrical hazards, Environmental Pollution and Labor Safety **P6.** Prepare a report for all the above activity.

CU.3 Implement International and National Labor Protection Laws	**P1.** Identify Labor Protection Laws as per International Labor Organization(ILO) rules **P2.** Recognize the Labor protection laws as per Labor Protection Policy 2006 **P3.** Identify the Bonded Labor and Child Labor policy. **P4.** Determine the leaves policy and compensation policy for the Labor. **P5.** Recognize the minimum wage for the Labor **P6.** Identify the remedial steps for protection and prosperity of Labor. **P7.** Prepare a report for all the above activity.
CU.4 Implement National and International Environmental protection laws.	**P1.** Determine Environmental Pollution risk factors as per Protection Agency (EPA) standards **P2.** Identify the steps to minimize the Electrical hazards and Environmental Pollution. **P3.** Determine Environmental Pollution factors as per Pakistan Environmental Protection Act, 1997 **P4.** Identify the requirements for Initial Environmental Examination (IEE) **P5.** Identify the requirements for Environmental Impact Assessment (EIA) **P6.** Prepare a report for all the above activity.

Level 3 (Technical competencies)

MODULE-1: Prepare Reagents for analysis

Overview

This competency standard will provide skills and knowledge related to preparation of basic lab reagents like buffers, indicators, coloring reagents etc. This will enable demonstration of analytical skills with respect to apparatus and chemicals selection to ensure preparation of reagents according to test methods.

Competency Units	*Performance Criteria*
CU.1 Make Buffers	**P1.** Arrange apparatus and chemicals required for Buffer preparation as per requirement. **P2.** Make buffer solution as per SOP. **P3.** Handle buffer solution as per procedure. **P4.** Store buffer solution as per requirement. **P5.** Check pH of buffer solutions with defined interval as per lab protocol. **P6.** Maintain records in lab log books as per lab format.
CU.2 Make Indicators for analysis	**P1.** Arrange apparatus and chemicals required for indicator preparation as per requirement. **P2.** Make indicator as per SOP. **P3.** Handle prepared indicator as per procedure. **P4.** Store prepared solution as per requirement **P5.** Maintain records in lab log books as per lab format.
CU.3 Make Reagents for Colorimetric testing	**P1.** Arrange apparatus and chemicals required for coloring reagents preparation as per requirement. **P2.** Make coloring reagent solution as per method. **P3.** Handle prepared coloring reagent as per lab protocol. **P4.** Store prepared reagents as per requirement. **P5.** Maintain records in lab log books as per lab format.

Knowledge & Understanding

This competency standard will provide knowledge related to:

K1 Basic lab protocols

K2 Cleaning of glassware

K3 Use of Balance

K4 Weighing of chemicals

K5 Selection of solvents

K6 preparation of solution and reagents

K7 Information of chemicals and reagents and bio-hazards

K8 Setting different temperature of oven

K9 Use of oven for drying of apparatus

K10 Use of magnetic hot plate

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Arrange tools as per requirements.
- Handling of chemicals and prepared regents
- Follow health and safety rule

Tools and equipment

- 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
- Titration flask

MODULE- 2: Prepare Solutions

Overview

This competency standard will provide skills and knowledge related to preparation of solutions i.e. stock solutions, working solutions, molar solutions and normal solutions as well as preparation different culture media for microbiological tests. It will also enable to apply analytical skills and quality assurance measures related to standardization and monitoring of the prepared standards.

Competency Units	***Performance Criteria***
CU.1 Safe usage of laboratory equipment, glassware, and chemicals	**P1.** Follow safety precautions to handle laboratory equipment and harmful chemicals **P2.** Use relevant laboratory glassware and equipment as per requirement of specific test **P3.** Clean and re-place glassware and equipment as per SOPs
CU.2 Make Standard Solution	**P1.** Arrange apparatus and chemicals required for preparation of standard solutions (Molar or Normal) as per requirement. **P2.** Perform calculation for preparation of standard solution according to procedure. **P3.** Make standard solution as per test procedure. **P4.** Standardize prepared solution as per requirement. **P5.** Determine concentration of unknown solutions using standard formula **P6.** Label prepared solution as per protocol.

	P7. Store prepared solution as per SOP. **P8.** Maintain records in lab log books as per lab format.
CU.3 Prepare stock solutions	**P1.** Arrange apparatus and chemicals required for preparation of stock solutions as per requirement. **P2.** Perform calculation using formula according to procedure. **P3.** Make stock solution (ppm) as per test procedure. **P4.** Handle prepared solution as per protocol. **P5.** Store prepared solution as per SOP. **P6.** Maintain records in lab log books as per lab format.
CU.4 Make working solutions	**P1.** Identify standard protocol for making the solutions as per given procedure **P2.** Arrange laboratory equipment required for specific test. **P3.** Arrange reagents for preparation of specific solution as per procedures of different tests. **P4.** Prepare working solutions of specified dilutions as per test method. **P5.** Prepare labels and record in laboratory registers as per format. **P6.** Label and store the solutions as per lab protocol.
CU.5 Monitor Prepared solution	**P1.** Check shelf life of prepared solutions as per standard method. **P2.** Conduct analysis for ensuring their concentration as per lab procedure. **P3.** Label the solution with concentration and date of monitoring using lab protocol. **P4.** Maintain records as per lab procedure. **P5.** Discard outdated solutions according to lab-waste disposal description.

Knowledge & Understanding

This competency standard will provide knowledge related to:

K1. Relevant soil, chemical, and laboratory terminology

K2. Basic knowledge of bases, acid and buffer

K3. Information about solution and solvent

K4. Balancing and weighing minute amount of chemical carefully

K5. Knowledge of handling and dealing with solution

K6. Know relevant safety measure to ensure personnel hygiene

K7. Chemical disposal information for environmental protection

K8. Handling and selection of volumetric apparatus

K9. Handling of chemicals

K10. Labeling

K11. Storage of Stock solutions

K12. Standardization protocols

K13. Use of indicators

K14. End point detection

K15. Apply formula for calculations in MS Excel

K16. Difference between normal and molar solutions

K17. Conversion between different units

K18. Primary and secondary standards

K19. Understanding about use of different reagents for various chemical testing.

K20. Safety standards during preparation of solutions

K21. Quality control and assurance protocols during preparation of solutions

K22. Molar and normal solutions

K23. Primary and secondary standards

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Follow procedure step wise with precision
- Operation of tool and equipment
- End point detection
- Standardization of solutions
- Make up of volume in measuring flasks
- Use of pipette and burettes
- Handling of chemicals and prepared regents
- Follow health and safety rule
- Calculation required for preparation of solutions

Tools & equipment

- 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
- Titration flasks

MODULE- 3: Prepare Culture Media

Overview

This competency standard will provide skills and knowledge to the laboratory assistants working in Agriculture Soil and Water Testing Laboratories related to preparation of culture media. The lab assistant will be able to safely use all laboratory equipment, glassware, and chemicals. Moreover, lab assistant will be able to sterilize, pour, mark and preserve media.

Competency Units	***Performance Criteria***
CU.1 Safe usage of laboratory equipment, glassware, and chemicals	**P1.** Follow proper safety precautions to handle laboratory equipment and harmful chemicals **P2.** Disinfect laboratory tools and equipment as per standards **P3.** Use relevant laboratory glassware and equipment as per requirement of specific test **P4.** Clean and re-place glassware and equipment as per SOPs
CU.2 Make Culture Media	**P1.** Mix media ingredients in solvent as per procedure **P2.** Label media to ensure tracking **P3.** Pour media into vessels as required **P4.** Cover the Media as per procedure
CU.3 Sterilize Media	**P1.** Load sterilizers (autoclave) as per its capacity **P2.** Ensure fixation of sterilization unit as per requirement **P3.** Monitor sterilization process as per procedure **P4.** Add necessary additives before pouring as per procedure
CU.4 Preserve media	**P1.** Pour media in specified container (Petri dish) under aseptic condition **P2.** Label media according to its composition and batch **P3.** Store media at required temperature

Knowledge & Understanding

This competency standard will provide knowledge related to:

K1. Media, chemical, and laboratory terminology

K2. Basic knowledge of agar, broth, solution and solvent

K3. Sterilization techniques and autoclaving

K4. Steam and membrane filtration

K5. Boiling, microwaving, radiation, high temperature, high pressure steam, gas and chemical treatments

K6. Reason, features, and purpose of culture media

K7. Streaking out of cultures to a single colony

K8. Micro-organisms and agents associated with soil and water

K9. Balancing and weighing minute amount of chemical carefully

K10. Mathematical expertise to determine volume and mass

K11. Knowledge of handling and dealing with solution

K12. Know relevant safety measure to ensure personnel hygiene

K13. Chemical disposal information for environmental protection

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Arrange tools and chemicals as per requirements
- Use suitable personal protective equipment
- Utilize vessel large enough to endure adequate mixing
- Ensure media sterility by using appropriate techniques of sterilization
- Step wise implementation of protocol
- Aseptic handling under laminar flow unit
- Follow health and safety protocol

Tools and Equipment

- 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
- Conical flasks
- Measuring flasks
- Beakers
- Watch glass
- Conical funnel
- Reagent bottles
- Pipette
- Distilled water
- Distillation unit

MODULE- 4: Perform Soil Texture Class Identification Through Hydrometer

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test. **P2.** Maintain Laboratory room temperature as per requirement. **P3.** Arrange equipment as per requirement. **P4.** Set up hydrometer in accordance with the standard work instructions. **P5.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Set instrument as per standard method. **P2.** Take soil sample in beaker and add dispersing solution as per requirement. **P3.** Cover with watch glass and leave as per standard requirement. **P4.** Process sample as per standard test method. **P5.** Repeat process and note readings according to test requirement.
CU3. Quality Control Checks	**P1.** Check for any breakage in hydrometer. **P2.** Run Laboratory Control samples as per standard. **P3.** Perform replicate/re-testing as per lab standards. **P4.** Record quality control data as per lab procedure. **P5.** Prepare quality control charts of quality assurance activities according to lab procedure
CU4. Record the results	**P1.** Calculate and note down textural class using USDA textural triangle. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Ensure calibration of instrument if required. **P2.** Ensure temperature as per standard requirement **P3.** Ensure safety requirements as per lab analysis.

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards.

K2 Understanding the basic principle of texture measurement.

K3 Determining and reporting accurate and relevant textural class results from chart.

K4 Planning and organizing testing assignment

K5 Using personal protective clothing and equipment

Tools & Equipment

- Hydrometer with plunger
- Analytical Balance
- Oven
- Plastic Beaker
- Paddle
- Sieve
- Textural Triangle chart
- Deionized water

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 5: Perform Soil Saturation Percentage Test

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test. **P2.** Maintain Laboratory room temperature as per requirement. **P3.** Keep sample at room temperature for few minutes. **P4.** Arrange equipment as per test requirements. **P5.** Set up apparatus in accordance with the standard work instructions. **P6.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Take soil sample in beaker as per SOP. **P2.** Add distilled water as per test method. **P3.** Note down volume of water used as per standard testing method.
CU3. Quality Control Checks	**P1.** Check for volume of water carefully. **P2.** Perform replicate/re-testing as per lab standards. **P3.** Record quality control data as per lab procedure.
CU4. Record the results	**P1.** Calculate saturation percentage by recommended formula. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Ensure calibration of equipment if required. **P2.** Rinse beaker and spatula according to SOP **P3.** Ensure safety protocols.

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards.

K2 Understanding the basic principle of saturation percentage measurement.

K3 Determining and reporting accurate and relevant results.

K4 Planning and organizing testing assignment

K5 Using personal protective clothing and equipment

Tools & Equipment

- Plastic Beaker
- Glass cylinder
- Analytical Balance
- Spatula
- Distilled water

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 6: Perform Soil Organic Matter Test

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test. **P2.** Maintain Laboratory room temperature as per requirement. **P3.** Arrange equipment as per required method. **P4.** Perform standardization of ferrous sulphate solution as per standard method. **P5.** Set up apparatus in accordance with the standard work instructions. **P6.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Take required amount of soil sample as per standard procedure. **P2.** Add recommended amount of potassium dichromate and mix well as per procedure. **P3.** Add volume of sulfuric acid and allow to leave as per standard method. **P4.** Add distilled water and phosphoric acid into the sample as per standard method. **P5.** Add indicator and titrate against standard solution as per standard method.
CU3. Quality Control Checks	**P1.** Use standardized ferrous sulphate solution as per SOP. **P2.** Check for volume used during titration. **P3.** Run blank sample accordingly. **P4.** Run Laboratory Control samples as per standard. **P5.** Perform replicate/re-testing as per lab standards. **P6.** Record quality control data as per lab procedure.
CU4. Record the results	**P1.** Calculate organic matter percentage as per recommended formula. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Perform digestion in fume hood as per standard method **P2.** Rinse apparatus as per SOP. **P3.** Ensure safety protocols. **P4.** Store solutions and reagents as per standard method. **P5.** Use acids as per MSDS.

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards.
K2 Understanding the basic principle of organic matter percentage calculation.
K3 Determining and reporting accurate and relevant results.
K4 Planning and organizing testing assignment
K5 Using personal protective clothing and equipment

Tools & Equipment

- Analytical Balance
- Burette & Conical Flasks
- Potassium dichromate, Sulfuric acid, Phosphoric acid, Ferrous sulfate
- Deionized water

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 7: Perform Humic acid contents in Solid Fertilizer by Gravimetric Method

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test. **P2.** Maintain Laboratory room temperature as per requirement. **P3.** Check for availability of standard solution as per requirement. **P4.** Set up equipment's in accordance with the standard work instructions. **P5.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Prepare sample according to requirement **P2.** Weight sample of according to requirement **P3.** Add extraction solution and shake the contents as per SOP. **P4.** Process sample as per standard testing method. **P5.** Record weight of precipitates as per SOP. **P6.** Perform calculations according to standard testing method. **P7.** Store unused reagents and dispose of wastes as required by relevant regulations and codes. **P8.** Clean and store equipment as per lab protocol
CU3. Quality Control Checks	**P1.** Run Laboratory Control samples as per standard. **P2.** Perform replicate/re-testing as per lab standards. **P3.** Record quality control data as per lab procedure. **P4.** Prepare quality control charts of quality assurance activities according to lab procedure **P5.** Always used valid standards
CU4. Record the results	**P1.** Note down the Results on analyst workbook. **P2.** Perform detail calculations **P3.** Submit the results to lab In-charge
CU5. Adopt precautions during work	**P1.** Ensure calibration before taking any measurement as per SOP. **P2.** Ensure complete desiccation of K-humate sample **P3.** Perform dilutions if required **P4.** Ensure safety protocols as per standard requirement.

Knowledge of Understanding

- **K1** Demonstration of an ability to prepare samples and perform quality tests according to specified standards and parameters relevant to Soil quality standards including:
- **K2** Understanding the basic principle of K measurement
- **K3** Planning and organizing testing assignment
- **K4** Understanding the centrifugation and filtration process
- **K5** Determining and reporting accurate and relevant K-humate/ humic acid results from testing.

Tools, Equipment and reagents

- Weighing balance
- Mechanical shaker
- Oven
- pH meter
- Desiccator
- Centrifuge machine
- Volumetric flask100 ml, 1000ml
- Beaker 100 ml
- Wash Bottle
- Filter paper Whatman No.42
- Funnel with stand
- Reagents/Chemicals:
  - Concentrated Nitric Acid
  - Sodium hydroxide
  - Ethanol
  - Diethylene triamine pentaacetic acid (DTPA)
  - Humic Acid Standard (Aldrich)
  - Extraction solution (NaOH, Ethanol and DTPA).

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

Level 3 (Generic Competencies)
MODULE- 1: Install computer operating systems and hardware

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

Competency Units	Performance Criteria
CU1. Identify operating system and hardware components	**P1.** Determine ICT organizational requirements and specifications **P2.** Identify and select operating system **P3.** Identify appropriate external hardware components **P4.** Identify internal hardware components.
CU2. Install and configure operating system and application software with hardware components	**P1.** Install and configure operating system to meet organizational requirements **P2.** Identify the functions associated with the operating system and associated boot process **P3.** Configure power-management settings to minimize power consumption as an environmentally sustainable measure **P4.** Use both the graphical user interface and the command line interface to perform basic tasks **P5.** Install or upgrade application software onto the operating system and hardware configuration **P6.** Determine the relationship between an application program, the operating system and hardware **P7.** Identify general differences between the different computer platforms and their respective operating systems
CU3. Optimize operating system and hardware components	**P1.** Optimize operating system using included tools or third-party utilities **P2.** Customize the graphical user interface **P3.** Use techniques unique to the command line interface **P4.** Set up and configure external hardware components and check functionality **P5.** Install drivers as appropriate and check functionality

MODULE- 2: Operate Basic Computer Functions

Overview:

This competency standard 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.

Competency Units	Performance Criteria
CU1. Plan and prepare for task to be undertaken	**P1.** Requirements of task are determined as per standard **P2.** operating procedures **P3.** Appropriate hardware and software are selected according to task assigned and required outcome **P4.** Task is planned to ensure
CU2. Input data into computer	**P1.** Data are entered into the computer using appropriate program/application in accordance with company procedures **P2.** Accuracy of information is checked, and information is saved in accordance with standard operating procedures **P3.** Inputted data are stored in storage media according to requirements **P4.** Work is performed within ergonomic guidelines
CU3. Access information using computer	**P1.** Correct program/application is selected based on job requirements **P2.** Program/application containing the information required is accessed according to company procedures **P3.** Desktop icons are correctly selected, opened and closed for navigation purposes **P4.** Keyboard techniques are carried out in line with OH & S requirements for safe use of keyboards

CU4. Produce/output data using computer system	**P1.** Entered data are processed using appropriate software commands **P2.** Data are printed out as required using computer hardware/peripheral devices in accordance with standard operating procedures **P3.** Files and data are transferred between compatible systems using computer software, hardware/ peripheral devices in accordance with standard operating procedures
CU5. Maintain computer equipment and systems	**P1.** Systems for cleaning, minor maintenance and replacement of consumables are implemented **P2.** Procedures for ensuring security of data, including regular back-ups and virus checks are implemented in accordance with standard operating procedures **P3.** Basic file maintenance procedures are implemented in line with the standard operating procedures

MODULE- 3: Develop Computer Application skills

Overview: This competency standard 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.

Competency Units	Performance Criteria
CU1. Use appropriate OHS office work practices	**P1.** Use safe work practices to ensure ergonomic, work organization, energy and resource conservation requirements are addressed **P2.** Use wrist rests and document holders where appropriate **P3.** Use monitors anti-glare and radiation reduction screens where appropriate
CU2. Install and remove software	**P1.** Select software to be installed **P2.** Follow installation instructions **P3.** Delete unrequired software
CU3. Use appropriate word-processing software	**P1.** Select word-processing software appropriate to perform activity **P2.** Identify document purpose, audience and presentation requirements, and clarify with personnel as required **P3.** Identify organizational requirements for text-based business documents and design document structure and layout to ensure consistency of style and image **P4.** Match document requirements with software functions to provide efficient production of documents **P5.** Use technical functions, other data and formatting to finalize documents **P6.** Ensure the naming and storing of documents in appropriate directories or folders and the printing of documents to the required specifications

CU4. Use appropriate spreadsheet software	**P1.** Select spreadsheet software appropriate to perform activity **P2.** Identify document purpose, audience and presentation requirements, and clarify with personnel as required **P3.** Enter simple formulas and functions using cell referencing where required **P4.** Customize spreadsheet settings and format documents to meet requirements **P5.** Ensure the naming and storing of documents in appropriate directories or folders and the printing of documents to the required specifications
CU5. Use appropriate presentation software	**P1.** Select software application package appropriate to perform activity **P2.** Identify purpose, audience and presentation requirements, and clarify with personnel as required **P3.** Use technical functions, other data and formatting to finalize documents **P4.** Ensure documents are named and stored in appropriate directories or folders and printed to required specifications **P5.** Make a presentation

MODULE- 4: Perform word-processing applications

Overview:
This competency standard 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.

Competency Units	Performance Criteria
CU1. Apply workplace health and safety (WHS) practices	**P1.** Use workplace ergonomic work practices and strategies **P2.** Organize work area to ensure an ergonomic work environment
CU2. Create documents	**P1.** Open word-processing application, create document and add data according to information requirements **P2.** Use document templates as required **P3.** Use simple formatting tools when creating the document **P4.** Save document to directory
CU3. Customize basic settings to meet page layout conventions	**P1.** Adjust page layout to meet information requirements **P2.** Open and view different toolbars **P3.** Change font format to suit document purpose **P4.** Change alignment and line spacing according to document information requirements **P5.** Modify margins to suit the document purpose **P6.** Open and switch between several documents
CU4. Format documents	**P1.** Use formatting features and styles as required **P2.** Highlight and copy text from another area in the document or from another active document **P3.** Insert headers and footers to incorporate necessary data **P4.** Save document in another file format **P5.** Save and close document to a storage device
CU5. Create tables	**P1.** Insert standard table into document **P2.** Change cells to meet information requirements **P3.** Insert and delete columns and rows as necessary

	P4. Use formatting tools according to style requirements
CU6. Add images	**P1.** Insert appropriate images into document and customize as necessary **P2.** Position and resize images to meet document formatting needs
CU7. Print documents	**P1.** Preview document in print preview mode **P2.** Select basic print settings **P3.** Print document or part of document from printer

MODULE- 5: Operate Spreadsheet Application

Overview: This competency standard 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.

Competency Units	Performance Criteria
CU1. Create spreadsheets	**P1.** Open the spreadsheet application, create spreadsheet files and enter numbers, text and symbols into cells according to information requirements **P2.** Enter simple formulas and functions using cell referencing when required **P3.** Correct formulas when error messages occur **P4.** Use a range of common tools during spreadsheet development **P5.** Edit columns and rows within the spreadsheet **P6.** Use the auto-fill function to increment data where required **P7.** Save the spreadsheet to a folder on a storage device
CU2. Customize basic settings	**P1.** Adjust page layout to meet user requirements or special needs **P2.** Open and view different toolbars **P3.** Change font settings so they are appropriate for the document purpose **P4.** Change alignment options and line spacing according to spreadsheet formatting features **P5.** Format cell to display different styles as required **P6.** Modify margin sizes to suit the purpose of the spreadsheets **P7.** View multiple spreadsheets concurrently
CU3. Format spreadsheet	**P1.** Use formatting features as required **P2.** Copy selected formatting features from another cell in the spreadsheet or from another active spreadsheet **P3.** Use formatting tools as required within the spreadsheet **P4.** Align information in a selected cell as required **P5.** Insert headers and footers using formatting features **P6.** Save spreadsheet as another file type **P7.** Save to storage device and close spreadsheet

CU4. Incorporate object and chart in spreadsheet	**P1.** Import an object into an active spreadsheet **P2.** Manipulate imported object by using formatting features **P3.** Create a chart using selected data in the spreadsheet **P4.** Display selected data in a different chart **P5.** Modify chart using formatting features
CU5. Print spreadsheet	**P1.** Preview spreadsheet in print preview mode **P2.** Select basic printer options **P3.** Print spreadsheet or selected part of spreadsheet **P4.** Submit the spreadsheet to appropriate person for approval or feedback

MODULE- 6: Operate Presentation Packages

Overview: This competency standard 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.

Competency Units	Performance Criteria
CU1. Create Presentations	**P1.** Open presentation package and create a simple design for a presentation according to organizational requirements **P2.** Open blank presentation and add text and graphics **P3.** Apply existing styles within a presentation **P4.** Use presentation template and slides to create a presentation **P5.** Use various tools to improve the look of the presentation **P6.** Save presentation to the appropriate storage device and folder
CU2. Customize basic settings	**P1.** Adjust display to meet user requirements **P2.** Open and view different toolbars to view options **P3.** Ensure font settings are appropriate for the presentation purpose **P4.** View multiple slides at once
CU3. Format Presentations	**P1.** Use and incorporate organizational charts and bulleted lists, and modify as required **P2.** Add objects and manipulate to meet presentation purposes **P3.** Import objects and modify for presentation purposes **P4.** Modify slide layout, including text and colors, to meet presentation requirements **P5.** Use formatting tools as required within the presentation **P6.** Duplicate slides within and across a presentation **P7.** Reorder sequence of slides and delete slides for presentation purposes **P8.** Save presentation in another format **P9.** Save to storage device and close presentation

CU4. Add slide show effects	**P1.** Incorporate pre-set animation and multimedia effects into presentation as required to enhance the presentation **P2.** Add slide transition effects to presentation to ensure smooth progression through the presentation **P3.** Test presentation for overall effect **P4.** Use onscreen navigation tools to start and stop slide show or move between different slides as required
CU5. Print presentation and notes	**P1.** Select appropriate print format for presentation **P2.** Select preferred slide orientation **P3.** Add notes and slide numbers **P4.** Preview slides and run spell check before presentation **P5.** Print selected slides and submit presentation to appropriate person for feedback

MODULE- 7: Perform writing and editing skills

Overview: This competency standard 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.

Competency Units	Performance Criteria
CU1. Apply clear and appropriate language and style to writing and editing tasks	**P1.** Use safe work practices including addressing ergonomic requirements when undertaking writing tasks **P2.** Use clear, concise and plain English in writing and editing tasks **P3.** Apply appropriate paragraph structure to written material to ensure clarity of meaning and ease of reading **P4.** Make clear and logical connections between sentences, paragraphs and sections **P5.** Determine and incorporate the language and style of the audience
CU2. Apply the appropriate voice, tone and tense	**P1.** Determine appropriate voice, tone and tense of the written materials according to audience requirements **P2.** Maintain consistent voice, tone and tense throughout written material
CU3. Apply appropriate grammar, spelling and punctuation	**P1.** Apply appropriate grammar conventions to a range of written contexts including use of numbers, quotations, and tables **P2.** Apply appropriate spelling and punctuation conventions in writing and editing tasks.
CU4. Perform editing and proofreading tasks to meet requirements	**P1.** Edit written material to ensure clear meaning through language and paragraphs, consistent voice, tone, and tense **P2.** Copyedit written material by checking grammar, spelling and punctuation using standard editing conventions **P3.** Proofreading using style guides and by monitoring written material for errors

Level 4 (Technical competencies)
MODULE- 1: Handling of sophisticated level Equipment-I

Overview

This competency standard will provide skills and knowledge related to standard operating procedure for maintenance of sophisticated level of equipment's used in different laboratory techniques for evaluating soil, water and fertilizer samples.

Competency Units	*Performance Criteria*
CU.1 Maintain sophisticated level equipment	**P1.** Ensure cleanliness of equipment before and after use **P2.** Ensure availability of standard operating procedure for every equipment **P3.** Maintain 'Repair and Maintenance history sheet' for each specific equipment as per given standard **P4.** Avoid self-repairing and adjustments of equipment without informing in-charge **P5.** Ensure proper placing of equipment after use as per lab protocols **P6.** Maintain list of sophisticated level of equipment following prescribed format **P7.** Periodically verify and update maintenance list according to plan **P8.** Follow safety guidelines as per equipment manual
CU.2 Operate sophisticated level equipment's	**P1.** Follow SOPs for operating specific equipment as given in manuals **P2.** Inspect equipment properly before and after use **P3.** Operate sophisticated level of equipment's only under presence of In-charge **P4.** Perform intermediate checks of equipment according to set instructions before use as per requirement **P5.** Inspect complete function of equipment **P6.** After completing standard procedure switch off all equipment's as instructed **P7.** Follow safety guidelines while operating equipment's
CU.3 Perform troubleshooting	**P1.** Monitor all errors and record data as instructed **P2.** Perform basic troubleshoot as prescribed **P3.** Follow safety guideline during troubleshooting **P4.** Report in-charge immediately as instructed

	P5. Maintain troubleshoot history sheet as instructed
CU.4 Calibrate lab equipment's	**P1.** Prepare document for calibrating equipment's as instructed **P2.** Maintain reference standard record as instructed **P3.** Calibrate instruments as per given procedures in manuals **P4.** Manage calibrations from authorized service provider if required as per given standard **P5.** Distinguish calibrated and non-calibrated instruments with labels as instructed

Knowledge & Understanding

This competency standard will provide knowledge related to:

K1 Handling and operating of sophisticated level of equipment's

K2 SOPs for operating of each specified equipment

K3 Undertake health and safety regulation

K4 Troubleshooting of equipment

K5 Calibration of equipment's to assure quality

K6 Use of different type of lab apparatus

K7 Manage records

K8 Intermediate checks

K9 Maintenance plan

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Ensure lab safety rules
- Follow standard protocols for operation
- Intermediate checks and troubleshooting

Tools and Equipment

- Atomic Absorption spectrophotometer
- Auto clave
- Block digestion
- Centrifuge machine
- Dispenser
- Flame Photo meter
- Flow injection analyser
- Kheldahl Unit
- Laminar flow

- Oscillator shaker
- Pressure plate apparatus
- Reciprocating Shakers
- Spectrophotometer
- Water Distillation Unit

MODULE- 2: Perform Calcium & Magnesium test of water by Titrimetric Method

Overview:

This competency standard covers the skill and knowledge required to prepare samples for laboratory testing, testing procedure for analyzing Calcium and Magnesium in Water, Quality checks, calculation of results and precautions adopted for performing test.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test. **P2.** Keep sample at required temperature. **P3.** Ensure availability of standard solutions according to test procedure. **P4.** Set equipment according to test requirement. **P5.** Wash all glassware as per lab procedure. **P6.** Standardize EDTA solution with specified work instructions. **P7.** Conduct pre-use and safety checks.
CU2. Perform calcium test	**P1.** Take sample in titration flask according to test procedure. **P2.** Add NaOH normal solution according to test procedure. **P3.** Add indicator according to test procedure. **P4.** Titrate it against EDTA till end point according to prescribed procedure. **P5.** Calculate end results according to defined procedure.
CU3. Perform Mg test	**P1.** Take sample in titration flask according to test procedure. **P2.** Add ammonia buffer according to test procedure. **P3.** Add indicator according to test procedure. **P4.** Titrate it against EDTA till end point according to prescribed procedure. **P5.** Calculate end results according to defined procedure.
CU4. Quality Control Checks	**P1.** Standardize EDTA as per lab quality assurance plan **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure.
CU5. Record the results/ Finalize work	**P1.** Note down Results on analyst workbook. **P2.** Record the results on result record form and submit to reporting section **P3.** Clear and restore work area.
CU6. Adopt precautions during work	**P1.** Maintain pH of sample at required value. **P2.** Store buffer solution according to procedural requirement. **P3.** Use acids as per MSDS. **P4.** Ensure safety protocols for required procedure.

Knowledge of Understanding

Understanding the basic principle of Calcium testing i.e. through titration when Ethylenediaminetetraacetic acid (EDTA) is added to water containing both calcium and magnesium, it combines first with calcium. Calcium can be determined directly, with EDTA, when pH is made sufficiently high that the magnesium is largely precipitated as the hydroxide and an indicator is used that combines with calcium only.

K1 Identifying excessive calcium in water samples
K2 Planning and organizing calcium testing.
K3 Using appropriate instrument and glassware
K4 Understanding and applying procedures for calcium testing
K5 Determining and reporting accurate and relevant calcium results from testing

Tools & Equipment

- Burette
- EDTA (0.01 M)
- NaOH (1M)
- Murexide Indicator
- Deionized/ distilled water
- Glass Beaker (Class A)
- Volumetric Flask 100 ml
- Auto-pipette 10 ml
- Calcium Standard solution of 100 ppm
- Titration flask
- Reagent bottles
- Erichrome black T Indicator
- Ammonia buffer

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 3: Perform Carbonates & Bicarbonates test by Titrimetric Method

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

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test. **P2.** Keep sample at required temperature. **P3.** Ensure availability of standard solutions according to test procedure. **P4.** Set equipment according to test requirement. **P5.** Wash all glassware as per lab procedure. **P6.** Standardize H_2SO_4 Normal solution with specified work instructions. **P7.** Conduct pre-use and safety checks.
CU2. Perform Carbonate and Bicarbonate test	**P1.** Take required amount of sample in titration flask according to procedural requirement. **P2.** Add phenolphthalein indicator and check for presence of carbonates as per procedure. **P3.** Titrate sample against known concentration of H_2SO_4 solution as per procedure. **P4.** Note down reading according to lab format for carbonate. **P5.** Add Methyl orange indicator and check for presence of bicarbonates as per procedure. **P6.** Perform replicate test as per standard procedure. **P7.** Calculate final reading according to procedure.
CU3. Quality Control Checks	**P1.** Standardize H_2SO_4 solution as per lab quality assurance plan **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure.
CU4. Record the results	**P1.** Calculate and note down results on analyst workbook. **P2.** Record results on result record form and submit to reporting section **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Handle sulphuric acid according to lab safety protocols. **P2.** Ensure use of desiccated Sodium Carbonate for standardization as per SOP. **P3.** Avoid loss of dissolved gasses during titration.

Knowledge and Understanding

Understanding the basic principle of Alkalinity testing i.e. Alkalinity is the opposite of acidity of the sample and determined by titration of the sample with a standard solution of a strong mineral acid.

K1 Identifying excessive Alkalinity in water samples
K2 Planning and organizing Alkalinity testing.
K3 Using appropriate instrument and glassware
K4 Understanding and applying procedures for Alkalinity testing in water
K5 Determining and reporting accurate and relevant results from testing

Tools & Equipment

- Burette
- Sulfuric Acid solution
- Sodium carbonate solution (0.05N)
- Phenolphthalein + Methyl orange (color indicators)
- Deionized/ distilled water
- Glass Beaker (Class A)
- Volumetric Flask 100 ml
- Auto-pipette 50ml
- Titration flask
- Glass rod
- Reagent bottles

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 4: Perform Chloride (Cl) test by Titrimetric Method

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

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test. **P2.** Keep sample at required temperature. **P3.** Ensure availability of standard solutions according to test procedure. **P4.** Set equipment according to test requirement. **P5.** Standardize silver nitrate with sodium chloride solution according to test method. **P6.** Wash all glassware as per lab procedure.
CU2. Perform test Procedure on samples	**P1.** Take required amount of sample in titration flask according to procedural requirement. **P2.** Add potassium dichromate indicator as per test method. **P3.** Titrate sample against known concentration of $AgNO_3$ solution as per procedure. **P4.** Note down reading according to lab format. **P5.** Perform replicate test as per standard procedure. **P6.** Calculate results according to procedure.
CU3. Quality Control Checks	**P1.** Standardize $AgNO_3$ standard solution as per lab quality assurance plan **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure.
CU4. Record the results	**P1.** Note down the Results on analyst workbook. **P2.** Record the results on result record form and submit to reporting section **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Store Silver nitrate stock solution as per standard requirement. **P2.** Use washed and cleaned glassware for analysis **P3.** Weigh silver nitrate as per standard requirement. **P4.** Ensure PPE required for analysis.

Knowledge and Understanding

K1 Understanding the basic principle of Chloride testing i.e. Determined by titration of the sample with silver nitrate solution silver chloride is precipitated quantitatively before red silver chromate is formed.

K2 Identifying excessive Chloride level in water samples

a. Planning and organizing for testing.
b. Using appropriate instrument and glassware
c. Understanding and applying procedures for Chloride testing in water
d. Determining and reporting accurate and relevant results from testing

K3 The purpose of this method is to characterize the quality of potable water. Chlorides may impart salty taste of water. High concentration of chlorides may indicate pollution by sewage or industrial wastes or by the intrusion of seawater or saline water.

Tools & Equipment

- Burette
- Standard Silver Nitrate: (0.05 N)
- Sodium chloride standard solution
- Potassium chromate Indicator solution
- Deionized/ distilled water
- Glass Beaker (Class A)
- Volumetric Flask 100 ml
- Auto-pipette 10 ml
- Reagent bottles
- Glass rod
- Titration flasks

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 5: Perform Sodium (Na) test for water by Flame-Photometric Method

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

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for requirement of analysis of Sodium. **P2.** keep sample at room temperature for few minutes. **P3.** Check for availability of Sodium Standard solution of required concentration otherwise prepare as per standard procedure. **P4.** Arrange Glassware and related Equipment as per test requirements.
CU2. Perform test Procedure on samples	**P1.** Turn on instrument in accordance with the specified work instructions. **P2.** Conduct pre-use and safety checks as per manual. **P3.** Calibrate instrument as per lab protocol Aspire standard solutions as per test method. **P4.** Aspire sample as per standard test method. **P5.** Perform test sample replicates as per requirement. **P6.** Store unused reagents and dispose of wastes as required by relevant regulations and codes. **P7.** Clean and store equipment as per lab protocol.
CU3. Quality Control Checks	**P1.** Perform flame photometer intermediate checks as per lab quality assurance plan **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure. **P1.**
CU4. Record the results/ Finalize work	**P1.** Calculate and Note down the Results on analyst workbook. **P2.** Record the results on result record form and submit to reporting section **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Do not leave the instrument running unattended while flame is alight. **P2.** Ensure running of instrument in fume hood or under chimney unit Use deionized water after aspiring high concentration salt solution prior to shut down as per manual **P3.** Avoid using glass container to store calibration standards.

Knowledge and Understanding

K1 Demonstration of an ability to prepare water samples and perform quality tests according to specified standards and parameters relevant to water quality standards including:

a. Understanding the basic principle of Flam-photometric sodium measurement i.e. determination of sodium concentration through thermally dissociation of sodium atoms further excited to high energy level, returning to ground state energy, the emit radiation are proportional to sodium concentration
b. Identifying sodium conc. In accordance to the requirement and hazards in water samples
c. Planning and organizing testing assignment
d. Using appropriate testing equipment and personal protective clothing and equipment
e. Understanding and applying procedures for testing
f. Determining and reporting accurate and relevant results from testing

Tools & Equipment

- Flame-photometer
- Auto Pipette 10 ml
- Sodium Standard (20-100 ppm)
- Deionized/ distilled water
- Glass Beakers (Class A)
- Volumetric Flasks 100 ml
- Reagent bottles
- filter paper
- glass funnel

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 6: Perform Potassium (K) test by Flame-Photometric Method

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

Competency Units	Performance Criteria
CU.1 Prerequisites for testing	**P1.** Check sample label for requirement of analysis of Sodium. **P2.** keep sample at room temperature for few minutes. **P3.** Check for availability of potassium Standard solution of required concentration otherwise prepare as per standard procedure. **P4.** Arrange Glassware and related Equipment as per test requirements.
CU.2 Perform test Procedure on samples	**P1.** Turn on instrument in accordance with the specified work instructions. **P2.** Conduct pre-use and safety checks as per manual. **P3.** Calibrate instrument as per lab protocol Aspire standard solutions as per test method. **P4.** Aspire sample as per standard test method. **P5.** Perform test sample replicates as per requirement. **P6.** Store unused reagents and dispose of wastes as required by relevant regulations and codes. **P7.** Clean and store equipment as per lab protocol.
CU.3 Quality Control Checks	**P1.** Perform flame photometer intermediate checks as per lab quality assurance plan **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure.
CU.4 Record the results/ Finalize work	**P1.** Calculate and Note down the Results on analyst workbook. **P2.** Record the results on result record form and submit to reporting section **P3.** Clear and restore work area.

CU.5 Adopt precautions during work	**P1.** Do not leave the instrument running unattended while flame is alight. **P2.** Ensure running of instrument in fume hood or under chimney unit **P3.** Use deionized water after aspiring high concentration salt solution prior to shut down as per manual **P4.** Avoid using glass container to store calibration standards.

Knowledge and Understanding

K1 Demonstration of an ability to prepare water samples and perform quality tests according to specified standards and parameters relevant to water quality standards including:

K2 Understanding the basic principle of Flam-photometric potassium measurement i.e. determination of potassium concentration through thermally dissociation of potassium molecules into atoms further excited to high energy level, returning to ground state energy, the emit radiation are proportional to potassium concentration

K3 Identifying potassium conc. in accordance to the requirement and hazards in water samples

K4 Planning and organizing testing assignment

K5 Using appropriate testing equipment and personal protective clothing and equipment

K6 Understanding and applying procedures for testing

K7 Determining and reporting accurate and relevant results from testing

Tools & Equipment

- Flame-photometer
- Auto Pipette 10 ml
- Potassium Standard (5 &-10 ppm)
- Deionized water
- Glass Beakers (Class A)
- Volumetric Flasks 100 ml
- Reagent bottles
- Glass rod
- Filter paper
- Glass funnel

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks

- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 7: Handling of sophisticated level Equipment-II

Overview

This competency standard will provide skills and knowledge related to standard operating procedure for maintenance of sophisticated level of equipment's used in different laboratory techniques for evaluating soil, water and fertilizer samples.

Competency Units	*Performance Criteria*
CU1. Maintain sophisticated level equipment	**P1.** Ensure cleanliness of equipment before and after use **P2.** Ensure availability of standard operating procedure for every equipment **P3.** Maintain 'Repair and Maintenance history sheet' for each specific equipment as per given standard **P4.** Avoid self-repairing and adjustments of equipment without informing in-charge **P5.** Ensure proper placing of equipment after use as per lab protocols **P6.** Maintain list of sophisticated level of equipment following prescribed format **P7.** Periodically verify and update maintenance list according to plan **P8.** Follow safety guidelines as per equipment manual
CU2. Operate sophisticated level equipments	**P1.** Follow SOPs for operating specific equipment as given in manuals **P2.** Inspect equipment properly before and after use **P3.** Operate sophisticated level of equipment's only under presence of In-charge **P4.** Perform intermediate checks of equipment according to set instructions before use as per requirement **P5.** Inspect complete function of equipment **P6.** After completing standard procedure switch off all equipment's as instructed **P7.** Follow safety guidelines while operating equipment's
CU3. Perform troubleshooting	**P1.** Monitor all errors and record data as instructed **P2.** Perform basic troubleshoot as prescribed **P3.** Follow safety guideline during troubleshooting **P4.** Report in-charge immediately as instructed **P5.** Maintain troubleshoot history sheet as instructed
CU4. Calibrate lab equipment's	**P1.** Prepare document for calibrating equipments as instructed **P2.** Maintain reference standard record as instructed **P3.** Calibrate instruments as per given procedures in manuals

	P4. Manage calibrations from authorized service provider if required as per given standard **P5.** Distinguish calibrated and non-calibrated instruments with labels as instructed

Knowledge & Understanding

This competency standard will provide knowledge related to:

K1 Handling and operating of sophisticated level of equipments

K2 SOPs for operating of each specified equipment

K3 Undertake health and safety regulation

K4 Troubleshooting of equipment

K5 Calibration of equipments to assure quality

K6 Use of different type of lab apparatus

K7 Manage records

K8 Intermediate checks

K9 Maintenance plan

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Ensure lab safety rules
- Follow standard protocols for operation
- Intermediate checks and troubleshooting

Tools and Equipment

- Atomic Absorption spectrophotometer
- Auto clave
- Block digestion
- Centrifuge machine
- Dispenser
- Flame Photo meter
- Flow injection analyser
- Kjeldahl Unit
- Laminar flow
- Oscillator shaker
- Pressure plate apparatus
- Reciprocating Shakers
- Spectrophotometer
- Water Distillation Unit

MODULE- 8: Perform Boron (Water-Soluble) in Fertilizers through Spectrophotometric Method

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test. **P2.** Maintain Laboratory room temperature as per requirement. **P3.** Check for availability of standard solution as per requirement. **P4.** Set up equipments in accordance with the standard work instructions. **P5.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Prepare sample according to requirement **P2.** Weight sample of according to requirement. **P3.** Process sample as per standard testing method. **P4.** Take reading and prepare standard curve as required **P5.** Perform calculations as per standard procedure. **P6.** Store unused reagents and dispose of wastes as required by relevant regulations and codes. **P7.** Clean and store equipment as per lab protocol
CU3. Quality Control Checks	**P1.** Run Laboratory Control samples as per standard. **P2.** Perform replicate/re-testing as per lab standards. **P3.** Record quality control data as per lab procedure. **P4.** Prepare quality control charts of quality assurance activities according to lab procedure **P5.** Always used valid standards
CU4. Record the results	**P1.** Note down Results on analyst workbook. **P2.** Perform detail calculations **P3.** Submit results to lab In-charge **P4.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Ensure before taking any measurement that instrument has been calibrated. **P2.** Perform dilutions if required **P3.** Always use clean and transparent cuvettes

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards and parameters relevant to Soil quality standards including:

K2 Understanding the basic principle of B measurement
K3 Planning and organizing testing assignment
K4 Understanding the basic principal of spectrophotometry
K5 Determining and reporting accurate and relevant B results from testing.

Tools, Equipment's and reagents

- Weighing balance
- Spectrophotometer
- Volumetric flask 50, 100, 500, and 1000 ml
- Polypropylene tube with cap 15 ml
- Graduated pipette
- Automatic pipette 0.1ml, 5ml
- Glass beaker (Pyrex)
- Funnel
- Wash bottle
- Boron standard solution:
- Azomethine H color reagent:
- Ammonium Acetate,
- Potassium Acetate, Nitrilotriacetic acid,
- disodium salt
- Tetraacetic Acid,

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 9: Perform Soil Boron Test

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test. **P2.** Maintain Laboratory room temperature as per requirement. **P3.** Arrange equipment and safety requirements as per standard method. **P4.** Set up apparatus in accordance with the standard work instructions. **P5.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Take required amount of soil in extraction/reagent bottle as per recommended procedure. **P2.** Add HCl and shake as per standard method. **P3.** Transfer filtered sample to volumetric flask according to procedural requirement. **P4.** Add buffer solution and Azomethine-H color reagent as per standard method. **P5.** Prepare Boron standards as per requirement. **P6.** Observe reading on spectrophotometer and draw standard curve as per standard procedure.
CU3. Quality Control Checks	**P1.** Run blank sample accordingly. **P2.** Run Laboratory Control samples as per standard. **P3.** Perform replicate/re-testing as per lab standards. **P4.** Record quality control data as per lab procedure.
CU4. Record the results	**P1.** Calculate soil boron through standard curve. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Ensure calibration of equipment as per standard requirement. **P2.** Use clean and good quality cuvette **P3.** Ensure use of fresh color developing reagent for boron. **P4.** Use boron free glassware as per standard requirement.

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards.

K2 Understanding the basic principle of soil boron determination.

K3 Determining and reporting accurate and relevant results.

K4 Planning and organizing testing assignment

K5 Using personal protective clothing and equipment

Tools & Equipment

- Analytical Balance
- Spectrophotometer
- Extraction/Reagent Bottles, volumetric flasks, pipette
- Filter Paper
- HCL, Azomethine-H & Boron standard
- Deionized water
- Boron standard

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 10: Perform Soil Extractable Phosphorus Test

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check the sample label for the required test. **P2.** Ensure Laboratory room temperature as per requirement. **P3.** Arrange equipment and safety requirements as per standard method. **P4.** Set up apparatus in accordance with the standard work instructions. **P5.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Take required amount of soil in extraction/reagent bottle as per recommended procedure. **P2.** Add recommended amount of extracting solution as per standard method. **P3.** Transfer filtered sample to volumetric flask as per standard method. **P4.** Add recommended amount of color developing reagent, mix and leave as per standard method. **P5.** Prepare phosphorus standards as per requirement. **P6.** Observe reading on spectrophotometer as per standard method.
CU3. Quality Control Checks	**P1.** Ensure run time of instrument as per manual. **P2.** Run blank sample accordingly. **P3.** Perform replicate/re-testing as per lab standards. **P4.** Record quality control data as per lab procedure.
CU4. Record the results	**P1.** Calculate soil phosphorus through spectrophotometer reading using recommended formula. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Ensure calibration of equipment if required. **P2.** Use clean and good quality cuvette as per standard method. **P3.** Use fresh color developing reagent for phosphorus as per standard requirement. **P4.** Ensure safety protocols as per standard method.

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards.

K2 Understanding the basic principle of soil phosphorus determination.

K3 Determining and reporting accurate and relevant results.

K4 Planning and organizing testing assignment
K5 Using personal protective clothing and equipment

Tools & Equipment

- Analytical Balance
- Spectrophotometer
- Extraction/Reagent Bottles, volumetric flasks, pipette
- Filter Paper
- Ascorbic acid, Ammonium heptamolydate, Potassium antimony tartrate, sulfuric acid, Phosphorus standard
- Distilled water

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 11: Perform Soil Extractable Potassium Test

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check the sample label for the required test. **P2.** Maintain the Laboratory room temperature as per requirement. **P3.** Arrange equipment and safety requirements as per standard method. **P4.** Set up apparatus in accordance with the standard work instructions. **P5.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Take required amount of soil in conical flask as per recommended procedure. **P2.** Add recommended amount of extracting solution/reagent bottle and shake as per standard procedure. **P3.** Filter sample solution as per SOP. **P4.** Prepare potassium standards as per requirement. **P5.** Observe reading over Flame photometer as per manual.
CU3. Quality Control Checks	**P1.** Turn on instrument as per operating manual. **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure. **P6.** Calibrate instrument using potassium standards as per procedure.
CU4. Record the results	**P1.** Calculate soil potassium using Flame photometer by drawn calibration curve as per standard method. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Ensure calibration of equipment as per standard method. **P2.** Use clean and good quality glassware as per standard method **P3.** Always prepare fresh working standards for accurate results. **P4.** Ensure safety protocols as per standard method.

Knowledge of Understanding

- **K1** Demonstration of an ability to prepare samples and perform quality tests according to specified standards.
- **K2** Understanding the basic principle of soil potassium determination.
- **K3** Determining and reporting accurate and relevant results.
- **K4** Planning and organizing testing assignment

K5 Using personal protective clothing and equipment

Tools & Equipment

- Analytical Balance
- Flame Photometer
- Extraction/Reagent Bottles, conical flasks
- Filter Paper
- Ascorbic acetate, Potassium chloride/ K standard.
- Distilled water

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 12: Perform Total phosphorus in Solid, Liquid and Mixed Fertilizer by Titrimetric Method

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for the required test. **P2.** Maintain Laboratory room temperature as per requirement. **P3.** Check for availability of P standard as per requirement. **P4.** Set up equipment and reagents in accordance with standard work instructions. **P5.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Weigh sample in volumetric flask according to requirement. **P2.** Add concentrated nitric acid and citric acid solution as per standard procedure. **P3.** Process sample as per standard testing method. **P4.** Titrate against standardized sulphuric acid solution as per required SOP. **P5.** Perform test sample in replicates as per requirement. **P6.** Perform calculations according to standard testing method. **P7.** Store unused reagents and dispose of wastes as required by relevant regulations and codes. **P8.** Clean and store equipment.
CU3. Quality Control Checks	**P1.** Ensure use of Standardized Sulphuric acid as per SOP. **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure.
CU4. Record the results	**P1.** Calculate and Note down the Results on analyst workbook. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Ensure calibration of required equipment as per standard testing method. **P2.** Perform dilutions in case of liquid sample before running any batch sample **P3.** Critically observe the end point **P4.** Dispose-off waste as per SOP. **P5.** Handle acids as per MSDS. **P6.** Ensure safety protocols as per standard requirement.

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards and parameters relevant to Soil quality standards including:

K2 Understanding the basic principle of P measurement

K3 Planning and organizing testing assignment

K4 Using distillation units and titration and personal protective clothing and equipment
K5 Understanding the standardization procedure for sulfuric acid
K6 Determining and reporting accurate and relevant P results from testing.

Tools, Equipment's, and reagents

- Weighing balance
- Volumetric flask-100 ml, 500ml, 1000ml
- Beaker-100 ml, 500ml, 100ml
- Bulb type pipette 1ml, 2ml, 5ml,10ml
- Conical flask-250ml, 500ml
- Water bath
- Wash Bottle
- Filter paper Whatman No.42
- Funnel with stand
- Blue Litmus paper
- Filter paper sheet
- Thermometer
- Mechanical shaker
- Concentrated Nitric Acid
- Citric Acid Solution
- Ammonium Molybdate Solution/Ammonium Molybdate tetra hydrate.
- Ammonium Nitrate Solution/Ammonium Nitrate
- Phenolphthalein indicator,
- Sulphuric Acid.
- NaOH
- Potassium Hydrogen Phthalate Solution/Potassium Hydrogen Phthalate

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize workAdopt precautions during work

Level 4 (Generic competencies)

MODULE- 1: Develop workplace policy and procedures for sustainability

Overview: This competency standard covers the knowledge to develop and implement a workplace sustainability policy and to modify the policy to suit changed circumstances. It applies to individuals with managerial responsibilities who undertake work developing approaches to create, monitor and improve strategies and policies within workplaces and engage with a range of relevant stakeholders and specialists.

Competency Units	Performance Criteria
CU1. Develop workplace sustainability policy	**P1.** Define scope of sustainability policy **P2.** Gather information from a range of sources to plan and develop policy **P3.** Identify and consult stakeholders as a key component of the policy development process **P4.** Include appropriate strategies in policy at all stages of work for minimizing resource use, reducing toxic material and hazardous chemical use and employing life cycle management approaches **P5.** Make recommendations for policy options based on likely effectiveness, timeframes and cost **P6.** Develop policy that reflects the organizations commitment to sustainability as an integral part of business planning and as a business opportunity **P7.** Agree to appropriate methods of implementation, outcomes and performance indicators
CU2. Communicate workplace sustainability policy	**P1.** Promote workplace sustainability policy, including its expected outcome, to key stakeholders. **P2.** Inform those involved in implementing the policy about expected outcomes, activities to be undertaken and assigned responsibilities.
CU3. Implement workplace sustainability policy	**P1.** Develop and communicate procedures to help implement workplace sustainability policy **P2.** Implement strategies for continuous improvement in resource efficiency **P3.** Establish and assign responsibility for recording systems to track continuous improvements in sustainability approaches

CU4. Review workplace sustainability policy implementation	**P1.** Review workplace sustainability policy implementation. **P2.** Investigate successes or otherwise of policy. **P3.** Monitor records to identify trends that may require remedial action and use to promote continuous improvement of performance. **P4.** Modify policy and or procedures as required to ensure improvements are made

MODULE- 2: Maintain professionalism in the workplace

Overview: This competency standard covers the knowledge to maintain a professional image in the workplace, including behaving ethically, demonstrating motivation, respecting timeframes and maintaining personal appearance.

Competency Units	Performance Criteria
CU1. Respect work timeframes	**P1.** Demonstrate punctuality in meeting, set working hours and times. **P2.** Utilize working hours only for working and follow company regulations. **P3.** Complete work tasks within deadlines according to order of priority **P4.** Supervisors are informed of any potential delays in work times or projects
CU2. Maintain personal appearance and hygiene	**P1.** Clean hair, body, and nails regularly. **P2.** Wear suitable cloths for the workplace, and respect local and cultural contexts **P3.** Meet specific company dress code requirements
CU3. Maintain adequate distance with colleagues and clients	**P1.** Respect personal space of colleagues and clients with reference to local customs and cultural contexts. **P2.** Keep sufficient distance from others **P3.** Avoid cross transmission of infections (especially through respiration)
CU4. Work in an ethical manner	**P1.** Follow company values/ codes of ethics and/or conduct, policies and guidelines. **P2.** Use company resources in accordance with company ethical standards. **P3.** Conduct personal behavior and relationships in accord with ethical standards and company policies. **P4.** Undertake work practices in compliance with company ethical standards, organizational policy, and guidelines. **P5.** Instruct co-workers on ethical, lawful, and reasonable directives.

	P6. Share company values /practices with co-workers using appropriate behavior and language. **P7.** Report work incidents /situations and/or resolved in accordance with company protocol /guidelines.

MODULE- 3: Manage personal work priorities and professional development

Overview: This competency standard covers the knowledge to create systems and process to organize information and prioritize tasks. It applies to individuals working in managerial positions who have excellent organizational skills. The work ethic of individuals in this role has a significant impact on the work culture and patterns of behavior of others as managers at this level are role models in their work environment

Competency Units	Performance Criteria
CU1. Establish personal work goals	**P1.** Serve as a positive role model in the workplace through personal work planning **P2.** Ensure personal work goals, plans and activities reflect the organization s plans, and own responsibilities and accountabilities **P3.** Measure and maintain personal performance in varying work conditions, work contexts and when contingencies occur
CU2. Set and meet own work priorities	**P1.** Take initiative to prioritize and facilitate competing demands to achieve personal, team and organizational goals and objectives **P2.** Use technology efficiently and effectively to manage work priorities and commitments **P3.** Maintain appropriate work-life balance, and ensure stress is effectively managed and health is attended to
CU3. Develop and maintain professional competence	**P1.** Assess personal knowledge and skills against competency standards to determine development needs, priorities, and plans **P2.** Seek feedback from employees, clients and colleagues and use this feedback to identify and develop ways to improve competence **P3.** Identify, evaluate, select, and use development opportunities suitable to personal learning style/s to develop competence **P4.** Participate in networks to enhance personal knowledge, skills and work relationships **P5.** Identify and develop new skills to achieve and maintain a competitive edge

MODULE- 4: Manage workforce planning

Overview: This competency standard covers the knowledge to manage planning in relation to an organization's workforce including researching requirements, developing objectives and strategies, implementing initiatives, and monitoring and evaluating trends. It applies to individuals who are human resource managers or staff members with a role in a policy or planning unit that focuses on workforce planning.

Competency Units	Performance Criteria
CU1. Research workforce requirements	**P1.** Review current data on staff turnover and demographics **P2.** Assess factors that may affect workforce supply **P3.** Establish the organization's requirements for a skilled and diverse workforce
CU2. Develop workforce objectives and strategies	**P1.** Review organizational strategy and establish aligned objectives for modification or retention of the workforce **P2.** Consider strategies to address unacceptable staff turnover, if required **P3.** Define objectives to retain required skilled labor **P4.** Define objectives for workforce diversity and cross-cultural management **P5.** Define strategies to source skilled labor **P6.** Communicate objectives and rationale to relevant stakeholders **P7.** Obtain agreement and endorsement for objectives and establish targets **P8.** Develop contingency plans to cope with extreme situations
CU3. Implement initiatives to support workforce planning objectives	**P1.** Implement action to support agreed objectives for recruitment, training, redeployment and redundancy **P2.** Develop and implement strategies to assist workforce to deal with organizational change **P3.** Develop and implement strategies to assist in meeting the organization's workforce diversity goals **P4.** Implement succession planning system to ensure desirable workers are developed and retained **P5.** Implement programs to ensure workplace is an employer of choice
CU4. Monitor and evaluate workforce trends	**P1.** Review workforce plan against patterns in exiting employee and workforce changes **P2.** Monitor labor supply trends for areas of over- or under-supply in the external environment **P3.** Monitor effects of labor trends on demand for labor **P4.** Survey organizational climate to gauge worker satisfaction **P5.** Refine objectives and strategies in response to internal and external changes and make recommendations in response to global trends and incidents **P6.** Regularly review government policy on labor demand and supply

	P7. Evaluate effectiveness of change processes against agreed objectives

MODULE- 5: Undertake project work

Overview:
This competency standard covers the knowledge to undertake a straightforward project or a section of a larger project. It covers developing a project plan, administering, and monitoring the project, finalizing the project and reviewing the project to identify lessons learned for application to future projects. This unit applies to individuals who play a significant role in ensuring a project meets timelines, quality standards, budgetary limits and other requirements set for the project.

Competency Units	Performance Criteria
CU1. Define project	**P1.** Access project scope and other relevant documentation **P2.** Define project stakeholders **P3.** Seek clarification from delegating authority of issues related to project and project parameters **P4.** Identify limits of own responsibility and reporting requirements **P5.** Clarify relationship of project to other projects and to the organization's objectives **P6.** Determine and access available resources to undertake project
CU2. Develop project plan	**P1.** Develop project plan in line with the project parameters **P2.** Identify and access appropriate project management tools **P3.** Formulate risk management plan for project, including Work Health and Safety (WHS) **P4.** Develop and approve project budget **P5.** Consult team members and take their views into account in planning the project **P6.** Finalize project plan and gain necessary approvals to commence project according to documented plan

CU3. Administer and monitor project	**P1.** Take action to ensure project team members are clear about their responsibilities and the project requirements **P2.** Provide support for project team members, especially with regard to specific needs, to ensure that the quality of the expected outcomes of the project and document timelines are met **P3.** Establish and maintain required recordkeeping systems throughout the project **P4.** Implement and monitor plans for managing project finances, resources and quality **P5.** Complete and forward project reports as required to stakeholders **P6.** Undertake risk management as required to ensure project outcomes are met **P7.** Achieve project deliverables
CU4. Finalize project	**P1.** Complete financial recordkeeping associated with project and check for accuracy **P2.** Ensure transition of staff involved in project to new roles or reassignment to previous roles **P3.** Complete project documentation and obtain necessary sign-offs for concluding project

MODULE- 6: Prepare and implement negotiation

Overview: This competency standard covers the knowledge to prepare for and participate in a process of negotiation, Coordinate support services, restore order, Provide leadership direction and guidance to the work group.

Competency Units	Performance Criteria
CU1. Prepare for the negotiation	**P1.** Identify objectives and preferred outcome of the negotiation and determine minimum acceptable outcome **P2.** Understand in relation to what can be offered and what is needed from the other party **P3.** Gather information regarding the other party – objectives, needs, preferences, resources, what they want to achieve – in order to determine best negotiating points **P4.** List and rank the issues to consider concessions that may be made. **P5.** Find examples and refine negotiation argument **P6.** Check information to ensure it is correct and up-to-date. **P7.** Develop a negotiation plan that includes information about the other party and its interests and a set of responses and strategies to the anticipated tactics. **P8.** Prepare an agenda in advance, which includes discussion topics, participants, location and schedule
CU2. Participate in negotiations	**P1.** Develop project plan in line with the project parameters **P2.** Identify and access appropriate project management tools **P3.** Formulate risk management plan for project, including Work Health and Safety (WHS) **P4.** Develop and approve project budget **P5.** Consult team members and take their views into account in planning the project **P6.** Finalize project plan and gain necessary approvals to commence project according to documented plan
CU3. Coordinate support services	**P1.** Assess the need for support services in terms of the determined strategies and priorities **P2.** Negotiate the resources of support services according to established procedures and availability **P3.** Provide information on strategies to support services and maintain the communication **P4.** Delegate roles and responsibilities according to expertise and resources

CU4. Restore order	**P1.** Assess the incidents for degree of risk and take appropriate action to reduce and remove the impact of the incident and restore order **P2.** Take action designed to minimize risk and the preserve the safety and security of all involved **P3.** Take action to prevent the escalation of the incident appropriate to the circumstances and agreed procedures. **P4.** Carry out the use of force for the restoration of control and the maintenance of security in the least restrictive manner. **P5.** Complete reports accurately and clearly provided to the appropriate authority promptly **P6.** Review, evaluate and analyze the incident and the organizational response to it and report it promptly and accurately.
CU5. Provide leadership direction and guidance to the work group	**P1.** Link between the function of the group and the goals of the organization **P2.** Participate in decision making routinely to develop, implement and review work of the group and to allocate responsibilities where appropriate **P3.** Give opportunities and encouragement to others to develop new and innovative work practices and strategies **P4.** Identify conflict and resolve with minimum disruption to work group function **P5.** Provide staff with the support and supervision necessary to perform work safely and without risk to health **P6.** Allocate tasks within the competence of staff and support with appropriate authority, autonomy and training **P7.** Supervise appropriately the changing priorities and situations and takes into account the different needs of individuals and the requirements of the task

MODULE- 7: Manage Schedule and Meetings

Overview: This competency standard covers the knowledge to manage a range of meetings including overseeing the meeting preparation processes, chairing meetings, organizing the minutes, and reporting meeting outcomes. It applies to individuals employed in a range of work environments who are required to organize and manage meetings within their workplace, including conducting or managing administrative tasks in providing agendas and meeting material. They may work as senior administrative staff or may be individuals with responsibility for conducting and chairing meetings in the workplace

Competency Units	Performance Criteria
CU1. Prepare for meetings	**P1.** Develop agenda in line with stated meeting purpose **P2.** Ensure style and structure of meeting are appropriate to its purpose **P3.** Identify meeting participants and notify them in accordance with organizational procedures **P4.** Confirm meeting arrangements in accordance with requirements of meeting **P5.** Dispatch meeting papers to participants within designated timelines
CU2. Conduct meetings	**P1.** Chair meetings in accordance with organizational requirements, agreed conventions for type of meeting and legal and ethical requirements **P2.** Conduct meetings to ensure they are focused, time efficient and achieve the required outcomes **P3.** Ensure meeting facilitation enables participation, discussion, problem solving and resolution of issues **P4.** Brief minute-taker on method for recording meeting notes in accordance with organizational requirements and conventions for type of meeting
CU3. Follow up meetings	**P1.** Check transcribed meeting notes to ensure they reflect a true and accurate record of the meeting and are formatted in accordance with organizational procedures and meeting conventions **P2.** Distribute and store minutes and other follow-up documentation within designated timelines, and according to organizational requirements **P3.** Report outcomes of meetings as required, within designated timelines

CU4. Establish schedule requirements	**P1.** Identify organizational requirements and protocols for diaries and staff planning tools **P2.** Identify organizational procedures for different types of appointments **P3.** Determine personal requirements for diary and schedule items for individual personnel **P4.** Establish appointment priorities and clarify in discussion with individual personnel

MODULE- 8: Identify and communicate trends in career development

Overview: This competency standard covers the knowledge to identify and communicate career trends. It establishes the need to interact professionally with others in assessing career needs, to effectively assist clients identify competencies they require for a career and employability in a given context. It also examines how to maintain quality of career development services and professional practice. It applies to individuals seeking to identify and communicate trends in career development.

Competency Units	Performance Criteria
CU1. Research and confirm career trends	**P1.** Apply knowledge of changing organizational structures, lifespan of careers and methods of conducting work search, recruitment and selection processes **P2.** Analyze changing worker and employer issues, rights and responsibilities in context of changing work practices **P3.** Examine importance of quality careers development services **P4.** Maintain all research, documentation, sources and references (electronic or physical) to a high degree of currency and relevance **P5.** Analyze implications of relevant policy, legislation, professional codes of practice and national standards relating to worker and employer issues **P6.** Research changes and trends in theory of career development counseling and practice **P7.** Confirm clusters, levels and combinations of transferable employability skills and preferences that may open employment options spanning more than one occupation or career pathway

CU2. Assess and confirm ongoing career development needs of target group	**P1.** Analyze history and records in assessing needs of target group **P2.** Assess success of previous career development services and techniques used for individual or target group **P3.** Deploy other means to investigate appropriate care and counseling approaches as required **P4.** Maintain privacy, security of all data, research, personal records according to relevant policy, legislation, professional codes of practice & national standards **P5.** Establish existing work-life balance requirements, issues and needs
CU3. Maintain quality of career development services and professional practice	**P1.** Analyze and review relevance of career theories, models, frameworks, and research for target group **P2.** Incorporate into career development services and professional practice, major changes and trends influencing workplace and career-related options and choices **P3.** Comply with all relevant policy, legislation, professional codes of practice that influence delivery of career development services

MODULE- 9: Apply specialist interpersonal and counselling interview skills

Overview: This competency standard covers the knowledge to use advanced and specialized communication skills in the client-counselor relationship. This unit applies to individuals whose job role involves working with clients on personal and psychological issues within established policies, procedures, and guidelines.

Competency Units	Performance Criteria
CU1. Communicate effectively	**P1.** Identify communication barriers and use strategies to overcome these barriers in the client-counselor relationship **P2.** Facilitate the client-counselor relationship through selection and use of micro skills **P3.** Integrate the principles of effective communication into work practices **P4.** Observe and respond to non-verbal communication cues **P5.** Consider and respond to the impacts of different communication techniques on the client-counselor relationship in the context of individual clients **P6.** Integrate case note taking with minimum distraction

CU2. Use specialized counseling interviewing skills	**P1.** Select and use communication skills according to the sequence of a counseling interview **P2.** Identify points at which specialized counseling interviewing skills are appropriate for inclusion **P3.** Use specialized counseling communication techniques based on their impacts and potential to enhance client development and growth **P4.** Identify and respond appropriately to strong client emotional reactions
CU3. Evaluate own communication	**P1.** Reflect on and evaluate own communication with clients **P2.** Recognize the effect of own values and beliefs on communication with clients **P3.** Identify and respond to the need for development of own skills and knowledge

Level 5 (Technical competencies)

MODULE- 1: Handling of sophisticated level Equipment-III

Overview: After the completion of this module, the Trainee will be able to develop skill and competence required to use sophisticated equipment's that are used in different laboratory techniques for analysis of soil, water, and fertilizer samples.

Competency Units	Performance Criteria

CU1. Maintain sophisticated level equipment 3	**P1.** Ensure cleanliness of equipment before and after use **P2.** Ensure availability of standard operating procedure for every equipment **P3.** Maintain 'Repair and Maintenance history sheet' for each specific equipment as per given standard **P4.** Avoid self-repairing and adjustments of equipment without informing in-charge **P5.** Ensure proper placing of equipment after use as per lab protocols **P6.** Maintain list of sophisticated level of equipment by following prescribed format **P7.** Periodically verify and update maintenance list according to plan **P8.** Follow safety guidelines as per equipment manual
CU2. Operate sophisticated level equipment's.	**P1.** Follow SOPs for operating specific equipment as given in manuals **P2.** Inspect equipment properly before and after use **P3.** Operate sophisticated level of equipments only under presence of In-charge **P4.** Perform intermediate checks of equipment according to set instructions before use as per requirement **P5.** Inspect complete function of equipment **P6.** After completing standard procedure switch off all equipment's as instructed **P7.** Follow safety guidelines while operating equipment's
CU3. Perform troubleshooting	**P1.** Monitor all errors and record data as instructed **P2.** Perform basic troubleshoot as prescribed **P3.** Follow safety guideline during troubleshooting **P4.** Report in-charge immediately as instructed **P5.** Maintain troubleshoot history sheet as instructed
CU4. Calibrate lab equipment	**P1.** Prepare document for calibrating equipments as instructed **P2.** Maintain reference standard record as instructed **P3.** Calibrate instruments as per given procedures in manuals **P4.** Manage calibrations from authorized service provider if required as per given standard **P5.** Distinguish calibrated and non-calibrated instruments with labels as instructed

Knowledge & Understanding

This competency standard will provide knowledge related to:

K10 Handling and operating of sophisticated level of equipment's

K11	SOPs for operating of each specified equipment
K12	Undertake health and safety regulation
K13	Troubleshooting of equipment
K14	Calibration of equipment's to assure quality
K15	Use of different type of lab apparatus
K16	Manage records
K17	Intermediate checks
K18	Maintenance plan

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Ensure lab safety rules
- Follow standard protocols for operation
- Intermediate checks and troubleshooting

Tools and Equipment

- Atomic Absorption spectrophotometer
- Auto clave
- Block digestion
- Centrifuge machine
- Dispenser
- Flame Photo meter
- Flow injection analyser
- Kheldahl Unit
- Laminar flow
- Oscillator shaker
- Pressure plate apparatus
- Reciprocating Shakers
- Spectrophotometer
- Water Distillation Unit

MODULE- 2: Perform Ammonical Nitrogen in *Solid, Liquid* and Mixed Fertilizer by Kjeldahl Method

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test. **P2.** Maintain the Laboratory room temperature as per requirement. **P3.** Check for availability of N standard as per requirement. **P4.** Set up KJELDAHL apparatus and reagents in accordance with the standard work instructions. **P5.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Weigh accurately required amount of sample as required. **P2.** Place distillation tube on distillation apparatus and distillate. **P3.** Collect distillate on receiving end in volumetric flask containing boric acid as per standard method. **P4.** Titrate against standardized acid solution as per standard testing method. **P5.** Analyze in three replicates along with standard reference material.
CU3. Quality Control Checks	**P1.** Calibrate equipment as per lab quality assurance plan. **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure.
CU4. Record the results	**P1.** Calculate and note down the Results on analyst workbook. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Ensure calibration of equipment as per standard requirement. **P2.** Handle distillation unit as per SOP. **P3.** Ensure sample digestion in fume hood as per standard requirement. **P4.** Dispose-off waste as per SOP. **P5.** Handle acids as per MSDS. **P6.** Ensure safety protocols as per standard requirement.

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards and parameters relevant to Soil quality standards including:

K2 Understanding the basic principle of N measurement

K3 Planning and organizing testing assignment

K4 Using distillation units and titration and personal protective clothing and equipment

K5 Understanding the standardization procedure for sulfuric acid

K6 Determining and reporting accurate and relevant amonical-N results from testing.

Tools, Equipment's and reagents

- Digestion tubes
- Kjeldhal's distillation apparatus
- Conical flasks, 500 ml
- Pipette,1ml, 5ml, 10 ml (Bulb type)
- Measuring Cylinder, 50 ml
- Beaker glass 500 ml, 1000 ml
- Wash bottle
- Automatic burette
- Automatic Stirrer
- H_2SO_4.
- NaOH.
- potassium hydrogen phthalate
- Boric acid
- bromocresol green
- methyl red indicator
- ethyl alcohol
- digestion block
- distilled water
- reagent bottles
- titration flask

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 3: Perform Nitrate-N in Solid, Liquid and Mixed Fertilizer by Kjeldahl Method

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test. **P2.** Maintain Laboratory room temperature as per requirement. **P3.** Check for availability of N standard as per requirement. **P4.** Set up KJELDAHL apparatus and reagents in accordance with the standard work instructions. **P5.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Weigh accurately required amount of sample as required in distillation tube. **P2.** Add devarda's alloy as per standard procedure. **P3.** Place distillation tube on distillation apparatus and distillate. **P4.** Collect distillate on receiving end in volumetric flask containing boric acid as per standard method. **P5.** Titrate against standardized acid solution as per standard testing method. **P6.** Analyze in three replicates along with standard reference material. **P7.** Calculate results as per standard formula **P8.** Clean and store equipment.
CU3. Quality Control Checks	**P1.** Calibrate equipment as per lab quality assurance plan. **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure.
CU4. Record the results	**P1.** Calculate and note down the Results on analyst workbook. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Ensure calibration of equipment as per standard requirement. **P2.** Handle distillation unit as per SOP. **P3.** Ensure sample digestion in fume hood as per standard requirement. **P4.** Dispose-off waste as per SOP. **P5.** Handle acids as per MSDS. **P6.** Ensure safety protocols as per standard requirement.

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards and parameters relevant to Soil quality standards including:

K2 Understanding the basic principle of N measurement

K3 Planning and organizing testing assignment

K4 Using distillation units and titration and personal protective clothing and equipment

K5 Understanding the standardization procedure for sulfuric acid

K6 Determining and reporting accurate and relevant ammoniacal-N results from testing.

Tools, Equipment's, and reagents

- Digestion tubes
- Kjeldhal's distillation apparatus
- Conical flasks, 500 ml
- Pipette,1ml, 5ml, 10 ml (Bulb type)
- Cylinder, 50 ml
- Beaker glass 500 ml, 1000 ml
- Wash bottle
- Automatic burette
- Automatic Stirrer
- H_2SO_4.
- NaOH.
- potassium hydrogen phthalate
- Boric acid
- bromocresol green
- methyl red indicator
- ethyl alcohol
- Devarda's alloy (50% Cu, 45% Al, 5% Zn)
- digestion block
- distilled water
- reagent bottles
- titration flask
-

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 4: Perform Uric/Urease Nitrogen (N) in *Solid, Liquid* and Mixed Fertilizer by Kjeldahl Method

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test. **P2.** Maintain Laboratory room temperature as per requirement. **P3.** Check for availability of N standard as per requirement. **P4.** Set up KJELDAHL apparatus and reagents in accordance with the standard work instructions. **P5.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Weigh accurately required amount of sample as required. **P2.** Digest sample on digestion block and make volume as per standard procedure. **P3.** Process sample as per standard distillation method. **P4.** Process sample as per standard titration method. **P5.** Analyze replicates as per standard requirement. **P6.** Perform calculations according to SOP. **P7.** Store unused reagents and dispose of wastes as required by relevant regulations and codes. **P8.** Clean and store equipment.
CU3. Quality Control Checks	**P1.** Calibrate equipment as per lab quality assurance plan. **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure.
CU4. Record the results	**P1.** Calculate and note down the Results on analyst workbook. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Ensure calibration of equipment as per standard requirement. **P2.** Handle distillation unit as per SOP. **P3.** Ensure sample digestion in fume hood as per standard requirement. **P4.** Dispose-off waste as per SOP. **P5.** Handle acids as per MSDS. **P6**. Ensure safety protocols as per standard requirement.

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards and parameters relevant to Soil quality standards including:

K2 Understanding the basic principle of N measurement

K3 Planning and organizing testing assignment

K4 Using distillation units and titration and personal protective clothing and equipment
K5 Understanding the standardization procedure for sulfuric acid
K6 Determining and reporting accurate and relevant uric/ organic -N results from testing.

Tools, Equipment's, and reagents

- Digestion tubes
- Kjeldhal's distillation apparatus
- Digestion block
- Conical flasks, 500 ml
- Pipette,1ml, 5ml, 10 ml (Bulb type)
- Cylinder, 50 ml
- Beaker glass 500 ml, 1000 ml
- Wash bottle
- Automatic burette
- Automatic Stirrer
- H_2SO_4.
- NaOH.
- potassium hydrogen phthalate
- Boric acid
    - bromocresol green
    - methyl red indicator
    - ethyl alcohol
- digestion block
- distilled water
- reagent bottles
- titration flask

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 5: Perform Potassium (K) in Solid, Liquid and Mixed Fertilizer by Flame Photometery Method

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test. **P2.** Maintain Laboratory room temperature as per requirement. **P3.** Check for availability of P standard as per requirement. **P4.** Set up equipment's in accordance with the standard work instructions. **P5.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Prepare sample according to requirement. **P2.** Process sample as per standard testing method. **P3.** Analyze sample using flame photometer as per SOP. **P4.** Perform calculations as per standard procedure **P5.** Store unused reagents and dispose of wastes as required by relevant regulations and codes. **P6.** Clean and store equipment as per lab protocol
CU3. Quality Control Checks	**P1.** Ensure use of fresh working Standards as per SOP. **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure.
CU4. Record the results	**P1.** Note down the Results on analyst workbook. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Ensure calibration of required equipment as per standard testing method. **P2.** Perform dilutions in case of liquid sample before running any batch sample **P3.** Dispose-off waste as per SOP. **P4.** Ensure safety protocols as per standard requirement.

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards and parameters relevant to Soil quality standards including:
K2 Understanding the basic principle of K measurement
K3 Planning and organizing testing assignment
K4 Using distillation units and titration and personal protective clothing and equipment
K5 Understanding the standardization and calibration of flame photometer
K6 Determining and reporting accurate and relevant K results from testing.

Tools, Equipment's, and reagents

- Flame photometer
- Analytical balance
- Volumetric flask
- Beaker glass
- Bulb type pipette
- Wash bottle
- Funnel with stand
- Filter paper sheet/filter papers
- Potassium chloride
- sub stock solution
- Series of working standard solutions
- diluted acid
- filter paper

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 6: Perform water soluble micronutrients (Zn, Fe, Mn etc) in Fertilizers through Atomic Absorption Spectrometer (AAS) Method

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check sample label for required test. **P2.** Maintain Laboratory room temperature as per requirement. **P3.** Keep the sample at room temperature for few minutes. **P4.** Set up equipment and reagents in accordance with the standard work instructions. **P5.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Prepare sample according to test requirement **P2.** Weight sample according to test requirement **P3.** Take required aliquot from filtered sample as per STM. **P4.** Prepare standards solutions for micronutrient according to range. **P5.** Use relevant atomic lamp as per requirement. **P6.** Aspire standard working solutions of micronutrient in AAS as per SOP. **P7.** Aspire sample solution in AAS as per STM. **P8.** Read Absorbance and prepare standard curve according to SOP. **P9.** Perform calculations as per prescribed formula **P10.** Store unused reagents and dispose of wastes as required by relevant regulations and codes. **P11.** Clean and store equipment as per lab protocol
CU3. Quality Control Checks	**P1.** Run Laboratory Control samples as per standard. **P2.** Perform replicate/re-testing as per lab standards. **P3.** Record quality control data as per lab procedure. **P4.** Prepare quality control charts of quality assurance activities according to lab procedure **P5.** Always used valid standards
CU4. Record the results	**P1.** Calculate and note down the Results on analyst workbook. **P2.** Perform detail calculations **P3.** Submit the results to lab In-charge **P4.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Ensure before taking any measurement that instrument has been calibrated. **P2.** Perform dilutions if required **P3.** Always use perform pre and post acid washing

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards and parameters relevant to Fertilizer quality standards

K2 Understanding the basic principle of atomic absorption spectrophotometry

K3 Planning and organizing testing assignment
K4 Determining and reporting accurate and relevant micronutrient results from testing.

Tools, Equipment's and reagents

- Wash bottle
- Atomic Absorption Spectrophotometer
- Volumetric flask
- Funnel
- Filter Paper
- Pipette
- Standard solutions/ certified reference material (CRM) of desired micronutrient

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 7: Perform Soil Micronutrient Test

Overview: 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.

Competency Units	Performance Criteria
CU1. Prerequisites for testing	**P1.** Check the sample label for the required test. **P2.** Maintain the Laboratory room temperature as per requirement. **P3.** Arrange equipment and safety requirements as per standard method. **P4.** Set up equipment in accordance with the standard work instructions. **P5.** Conduct pre-use and safety checks.
CU2. Perform test Procedure on samples	**P1.** Take required amount of soil as per recommended procedure. **P2.** Add recommended amount of extracting solution and allow shaking as per standard method. **P3.** Filter solution to obtain clean filtrate as per standard procedure. **P4.** Prepare micronutrients (Zn, Cu, Fe, Mn) standards as per requirement. **P5.** Observe reading separately for each parameter on Atomic Absorption Spectrophotometer as per standard method.
CU3. Quality Control Checks	**P1.** Turn on instrument as per operating manual. **P2.** Run blank sample accordingly. **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure. **P6.** Calibrate instrument using metal standards as per procedure.
CU4. Record the results	**P1.** Calculate soil micronutrients using standard formula. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Ensure calibration of equipment as per standard method. **P2.** Use clean and good quality glassware as per standard method **P3.** Always prepare fresh working standards for accurate results. **P4.** Ensure safety protocols as per standard method.

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards.

K2 Understanding the basic principle of soil micronutrients determination.

K3 Determining and reporting accurate and relevant results.

K4 Planning and organizing testing assignment

K5 Using personal protective clothing and equipment

Tools & Equipment

- Analytical Balance
- Atomic Absorption Spectrophotometer.
- Extraction/Reagent Bottles, conical flasks
- Filter Paper
- DPTA, Calcium chloride, Triethanolamine (TEA).
- Deionized water

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 8: Perform Standard Test Method (STM) for Zinc chelated percentage

Overview

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.

Competency Units	Performance Criteria
CU1. Prepare samples for testing	**P1.** Check the sample label as per requirement of test **P2.** Keep the sample at room temperature **P3.** Prepare the sample as per test procedure **P4.** Ensure the availability of reagents/media as per test requirement **P5.** Arrange related equipment as per protocol **P6.** Ensure safe calibration of equipment as per requirement **P7.** Ensure safety requirements as per protocol
CU2. Perform test Procedure	**P1.** Weigh specific amount of sample as per requirement **P2.** Perform the test as per lab protocol **P3.** Calculate results as per prescribed formula **P4.** Analyze in three replicates **P5.** Store unused reagents **P6.** Dispose of wastes as required **P7.** Clean and store equipment.
CU3. Quality Control Checks	**P1.** Run blank sample accordingly. **P2.** Turn on equipment as per standard manual **P3.** Run Laboratory Control samples as per standard. **P4.** Perform replicate/re-testing as per lab standards. **P5.** Record quality control data as per lab procedure. **P6.** Ensure standardization of solution and reagents as per standard method
CU4. Record the results/ Finalize work	**P1.** Calculate as per standard formula. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Use clean and good quality glassware as per standard method **P2.** Always prepare fresh working standards for accurate results. **P3.** Ensure safety protocols as per standard method. **P4.** Ensure calibration as per standard requirements

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards.

K2 Understanding the basic principle of HPLC and atomic absorption.

K3 Understanding the basic idea of zinc chelation.

K4 Determining and reporting accurate and relevant results.
K5 Planning and organizing testing assignment
K6 Using personal protective clothing and equipment

Tools & Equipment

- Analytical Balance
- HPLC
- Atomic Absorption spectrophotometer
- Volumetric and conical flask
- Extraction/Reagent Bottles, conical flasks
- Mechanical shaker
- Pipette
- Burette
- Funnels
- Reference standard material

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 9: Perform Standard Test Method (STM) to evaluate Gypsum Requirement in soil

Overview

This competency standard will enable the trainee to Determination of Gypsum Requirement of saline sodic and sodic soil.

Competency Units	Performance Criteria
CU1. Prepare samples for testing	**P1.** Check the sample label as per requirement of test **P2.** Keep the sample at room temperature **P3.** Prepare the sample as per test procedure **P4.** Ensure the availability of reagents/media as per test requirement **P5.** Arrange related equipment as per protocol **P6.** Ensure safe calibration of equipment as per requirement **P7.** Ensure safety requirements as per protocol
CU2. Perform test Procedure	**P1.** Weigh specific amount of soil as per requirement **P2.** Perform the test as per lab protocol **P3.** Calculate as per prescribed formula **P4.** Analyze in three replicates **P5.** Convert the readings according to standard units **P6.** Store unused reagents **P7.** Dispose of wastes as required **P8.** Clean and store equipment.
CU3. Quality Control Checks	**P1.** Run blank sample accordingly. **P2.** Run Laboratory Control samples as per standard. **P3.** Perform replicate/re-testing as per lab standards. **P4.** Record quality control data as per lab procedure. **P5.** Ensure standardization of solution and reagents as per standard method
CU4. Record the results/ Finalize work	**P1.** Calculate as per standard formula. **P2.** Submit the results to lab In-charge **P3.** Clear and restore work area.
CU5. Adopt precautions during work	**P1.** Use clean and good quality glassware as per standard method **P2.** Always prepare fresh working standards for accurate results. **P3.** Ensure safety protocols as per standard method.

Knowledge of Understanding

K1 Demonstration of an ability to prepare samples and perform quality tests according to specified standards.

K2 Understanding the basic principle of soil gypsum requirement determination.

K3 Understanding the basic idea of salinity and sodicity.

K4 Determining and reporting accurate and relevant results.

K5 Planning and organizing testing assignment

K6 Using personal protective clothing and equipment

Tools & Equipment

- Analytical Balance
- Volumetric and conical flask
- Extraction/Reagent Bottles, conical flasks
- Mechanical shaker
- Pipette
- Burette
- Funnel with stand

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- Prepare samples for testing
- Perform test Procedure
- Quality Control Checks
- Record the results/ Finalize work
- Adopt precautions during work

MODULE- 10: Generate Test Report

Overview

This competency standard will provide skills and knowledge related to preparation of test report as per international standards. This will also help in development of communication skills required for preparation of test report and communicate test results to the customer.

Competency Units		***Performance Criteria***	
CU.1	Calculate results	**P1.**	Write entries as per Data log sheet
		P2.	Enter the data in computer systems
		P3.	Name the parameters accurately and explain abbreviation
		P4.	Use appropriate formula as per procedure
		P5.	Use software as per requirement
		P6.	Transfer the output in Performa as per results of each test
CU.2	Prepare report	**P1.**	Cross check the results
		P2.	Use proper unit of expression for results
		P3.	Provide reference range of each parameter as per requirement
		P4.	Specify Lab environment as per test report format
		P5.	Mention sample ID and description as per test report format
		P6.	Mention test method reference as test report format
		P7.	Report Conformity statement as per lab policy
		P8.	Ensure traceability to test sample, sampling details, lab detail and analyst as per lab policy.

	P9.	Date of test performed as per test report Format.
	P10.	Sign the test report.

Knowledge & Understanding

This competency standard will provide knowledge related to:

K1 Basic formatting: bold, italic & center

K2 Applying Formulas

K3 Short Keys

K4 Communication skills

K5 Test report format

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Use of Correct units
- Statement of conformity
- Use of reference standard for reference values
- Signature of analyst

Tools and equipment

- Printer
- Register
- Computer
- Calculator

MODULE-11: Ensure Test Quality

Overview

This competency standard will provide skills and knowledge related to preparation of test report as per international standards. This will also help in development of communication skills required for preparation of test report and communicate test results to the customer.

Competency Units	*Performance Criteria*
CU.1 Supervise test activity	**P1.** Ensure required temperature of the test as per test method. **P2.** Ensure the placement of all the equipment and instruments as per standard **P3.** Ensure the proper functioning of equipment **P4.** Ensure the availability of all the stock and working solutions **P5.** Ensure the quality assurance of all stock and working solutions **P6.** Implement safety parameters applicable for each test.
CU.2 Supervise Subordinates	**P1.** Assign task to subordinates as per requirement. **P2.** Train subordinates as per lab training plan. **P3.** Evaluate subordinated for task performed as per lab evaluation criteria, **P4.** Monitor the assigned activities as per requirement. **P5.** Prepare related records of evaluation and monitoring as per lab procedure. **P6.** Submit the records to the supervisor.
CU.3 Perform quality Check	**P1.** Plan activity as per lab quality assurance plan **P2.** Perform Quality assurance activity as per plan **P3.** Check the acceptance criteria as per lab standard protocol. **P4.** Employ statistical techniques (relative standard deviation, standard deviation, average/mean) as per lab procedure.

	P5. Prepare quality control charts following lab procedures. **P6.** Report deviations or outliers observed to the supervisor.

Knowledge & Understanding

This competency standard will provide knowledge related to:

K1 Statistical analysis relative standard deviation, standard deviation, average/mean

K2 Applying relative standard deviation, standard deviation, average/mean Formulas in Microsoft Excel

K3 Lab Quality assurance activities

K4 Preparation of Quality control charts using Microsoft Excel

K5 Acceptance criteria for quality assurance activities

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Formulas of relative standard deviation, standard deviation, average/mean
- Record deviations
- Use of reference standard and reference values

Tools and equipment

- Printer
- Register
- Computer
- Calculator
- Thermometer
- Thermo-hygrometer
- Equipment manual
- Chemicals as per quality assurance plan
- Apparatus as per quality assurance plan

Level 5 (Generic Competencies)

MODULE- 1: Develop Entrepreneurial Skills

Overview:

This Competency Standard identifies the competencies required to develop entrepreneurial skills by hotel manager, in accordance with the organization's approved guidelines and procedures. You will be expected to develop a business plan, collect information regarding revenue generation, develop a marketing plan and develop basic business communication skills. Your underpinning knowledge regarding entrepreneurial skills will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria
CU.1 Develop a business plan	**P1.** Conduct a market survey to collect following information **P2.** Select the best option in terms of cost, service, quality, sales, operational expenses **P3.** Compile the information collected through the market survey, in the business plan format
CU.2 Collect information regarding funding sources	**P1.** Identify the available funding sources based on their terms and conditions, maximum loan limit, payback time, interest rate **P2.** Choose the best available option according to investment requirement **P3.** Prepare documents according to the loan agreement requirement **P4.** Include the information of funding sources in the business plan
CU.3 Develop a marketing plan	**P1.** Make a marketing plan for the service products, price, placement, promotion, people, packaging and positioning **P2.** Include the information of marketing plan in the business plan
CU.4 Develop basic business communication skills	**P1.** Communicate with guests using effective communication skills **P2.** Use different modes of communication to communicate effectively e.g.: presentation, speaking, writing, listening, visual representation, reading etc. **P3.** Use specific business terms used in the market

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- 7Ps of marketing including product, price, placement, promotion, people, packaging and positioning
- 7Module- of business communication
- Different modes of communication and their application in the industry
- Specific business terms used in the industry
- Available funding sources
- Low interest loans to start a new business
- Market survey and its tools e.g: questionnaire, interview, observation etc
- Market trends for specific product offering
- State the main elements of business plan
- Business plan format

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

- List 7Ps
- List 7Module-

MODULE- 2: Maintain Business Resources

Overview: After the completion of this competency standard, the Trainee will be able to determine, administer and maintain resources and equipment to complete a variety of tasks. It applies to individuals who are skilled operators and apply a broad range of competencies in various work contexts. They may exercise discretion and judgment using appropriate theoretical knowledge of business resources and their basic maintenance to provide technical advice and support to a team.

Unit of Competency	Performance Criteria
CU.1 Advise on resource requirements	**P1.** Calculate estimates of future and present business resource needs in accordance with organizational requirements **P2.** Ensure advice is clear, concise and relevant to achieve organizational requirements. **P3.** Provide information on the most economical and effective choice of equipment, materials and suppliers. **P4.** Identify resource shortages and possible impact on operations
CU.2 Monitor resource usage and maintenance	**P1.** Ensure resource handling is in accordance with established organizational requirements including occupational health and safety requirements. **P2.** Use business technology to monitor and identify the effective use of resources. **P3.** Use consultation with individuals and teams to facilitate effective decision making on the appropriate allocation of resources. **P4.** Identify and adhere to relevant policies regarding resource use in the performance of operational tasks. **P5.** Routinely monitor and compare resource usage with estimated requirements in budget plans
CU.3 Acquire resources	**P1.** Ensure acquisition and storage of resources is in accordance with organizational requirements, is cost effective, and consistent with organizational timelines. **P2.** Acquire resources within available timelines to meet identified requirements.

	P3. Review resource acquisition processes to identify improvements in future resource acquisitions

MODULE- 3: Develop sales Plan

Overview:

This unit describes the skills and knowledge required to Plan and Implement Business-To-Business Marketing for a product or service for a team covering a specified sales territory based on strategic objectives and in accordance with established performance targets. It applies to individuals working in a supervisory or managerial sales role who develop a sales plan for a product or service.

Unit of Competency	Performance Criteria
CU.1 Identify organizational strategic direction	**P1.** Obtain and analyze assessment of market needs and strategic planning documents **P2.** Review previous sales performance and successful approaches to identify factors affecting performance **P3.** Analyze information on market needs, new opportunities, customer profiles and requirements as a basis for decision making
CU.2 Establish performance targets	**P1.** Determine practical and achievable sales targets **P2.** Establish realistic timelines for achieving targets **P3.** Determine measures to allow for monitoring of performance **P4 .** Ensure objectives of the sales plan and style of the campaign are consistent with organizational strategic objectives and corporate image
CU.3 Develop a sales plan for a product	**P1.** Determine approaches to be used to meet sales objectives **P2.** Identify additional expertise requirements and allocate budgetary resources accordingly **P3.** Identify risks and develop risk controls **P4.** Develop advertising and promotional strategy for product **P5.** Identify appropriate distribution channels for product **P6.** Prepare a budget for the sales plan **P7.** Present documented sales plan to appropriate personnel for approval

CU.4 Identify support requirements	**P1.** Identify and acquire staff resources to implement sales plan **P2.** Develop an appropriate selling approach **P3.** Train staff in the selling approach selected **P4.** Develop and assess staff knowledge of product to be sold
CU.5 Monitor and review sales plan	**P1.** Monitor implementation of the sales plan **P2.** Record data measuring performance versus sales targets **P3.** Make adjustments to sales plan as required to ensure required results are obtained

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Outline principles and techniques for selling
- Outline methods for monitoring sales outcomes
- Statistical techniques for analyzing sales and market trends
- Internal and external sources of information that are relevant to identifying organizational strategic direction and developing a product sales plan.
- Competitor's intelligence

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

A person who demonstrates competency in this unit must be able to provide evidence of the ability to develop a sales plan. The evidence should integrate employability skills with workplace tasks and job roles and verify competency is able to be transferred to other circumstances and environments.

- analyze information from a range of sources to develop a sales plan for a product and sales territory that meets organizational strategic direction including:
  - resource requirements and budget
  - achievable sales targets
  - performance measures
  - approaches to be used to meet objectives
  - risk management
  - advertising and promotional strategy
  - product distribution channels
- acquire staff, develop selling approach and provide training support on product knowledge and sales approach
- Monitor and evaluate performance and adjust the plan as appropriate

MODULE- 4: Plan and Implement Business-To-Business Marketing

Overview: After the completion of this competency standard, the Trainee will be able to plan and implement business-to-business (B2B) marketing. It applies to individuals who work in a supervisory capacity in a team environment, who possess a sound theoretical knowledge base and demonstrate a range of managerial skills to ensure business activities are conducted effectively. In this role, individuals may work in small, medium, or large enterprises across a variety of industries.

Competency Units	Performance Criteria
CU1. Identify and evaluate business -to-business marketing strategies	**P1.** Identify B2B markets in an industry context **P2.** Research characteristics of business markets in an industry context **P3.** Identify and analyze factors influencing business buyers in an industry context **P4.** Analyze the business buying process and its implications in the industry context **P5.** Research and analyze a range of B2B marketing strategies appropriate for the organization **P6.** Identify key personnel in buying decision process in the organizations business markets
CU2. Select business-to business marketing strategies	**P1.** Analyze trends within business markets and identify B2B marketing opportunities for the organization **P2.** Identify and analyze success of the organization s previous B2B marketing strategies **P3.** Select most appropriate B2B marketing strategies and activities that fit with organization s strategic & marketing plans
CU3. Plan and develop business-to-business marketing activities	**P1.** Record B2B marketing objectives and purpose **P2.** Calculate costs of B2B marketing activities with assistance of appropriate personnel **P3.** Select methods to report and measure effectiveness of B2B marketing activities **P4.** Assign responsibilities to team members for B2B marketing activities **P5.** Record B2B marketing plan and present to relevant stakeholders **P6.** Assemble required resources to implement B2B marketing plan

CU4. . Implement and monitor business-to business marketing plan	**P1.** Schedule work on each B2B marketing campaign element, according to lead times required and marketing plan **P2.** Brief staff and suppliers on their budgets, timelines, roles and responsibilities, and legal and ethical requirements **P3.** Plan implementation of B2B marketing activities according to marketing plan **P4.** Identify & use evaluation criteria and evaluation methods to determine effectiveness of marketing plan **P5.** Analyze success indictors of B2B marketing plan and record performance according to organizational reporting requirements

MODULE- 5: Address Customer Needs

Overview:

This unit describes the skills and knowledge required to manage an ongoing relationship with a customer over a period of time. This includes helping customers articulate their needs and managing networks to ensure customer needs are addressed. It applies to individuals who are expected to have detailed product knowledge in order to recommend customized solutions. In this role, individuals would be expected to apply organizational procedures and be aware of, and apply as appropriate, broader factors involving ethics, industry practice and relevant government policies and regulations.

Unit of Competency	Performance Criteria
CU.1 Assist customer to articulate needs	**P1.** Ensure customer needs are fully explored, understood and agreed **P2.** Explain and match available services and products to customer needs **P3.** Identify and communicate rights and responsibilities of customers to the customer as appropriate
CU.2 Satisfy complex customer needs	**P1.** Explain possibilities for meeting customer needs **P2.** Assist customers to evaluate service and/or product options to satisfy their needs **P3.** Determine and prioritize preferred actions **P4.** Identify potential areas of difficulty in customer service delivery and take appropriate actions in a positive manner
CU.3 Manage networks to ensure customer needs are addressed	**P1.** Establish effective regular communication with customers **P2.** Establish, maintain and expand relevant networks to ensure appropriate referral of customers to products and services from within and outside the organization **P3.** Ensure procedures are in place to ensure that decisions about targeting of customer services are based on up-to-date information about the customer and the products and services available **P4.** Ensure procedures are put in place to ensure that referrals are based on the matching of the assessment of customer needs and availability of products and services **P5.** Maintain records of customer interaction in accordance with organizational procedures
CU.4 Convert customer enquiries into sales	**P1.** Use information provided by customers or accessed from the customer relationship management (CRM) system to identify any needs **P2.** Identify suitable products/services to meet needs **P3.** Make convincing sales pitches to customers following standard scripts **P4.** Handle customer queries, objections and rebuttals following standard scripts **P5.** Adapt your approach and style to customer preferences, within the limits of your competence and authority

	P6. Refer issues outside your area of competence and authority to appropriate people, following your organization's procedures **P7.** Identify and act on opportunities to up-sell or cross-sell other products/services to customers **P8.** Confirm customer wishes and needs in order to close sales **P9.** Obtain required financial information from customers, following your organization's procedures **P10.**Complete your organization's post-sales procedures in order to complete/ fulfill sales **P11.** Comply with relevant standards, policies, procedures and guidelines when converting customer enquiries into sales

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Organizational procedures and standards for establishing and maintaining customer service relationships
- Consumer rights and responsibilities
- Ways to establish effective regular communication with customers
    - Outline details of products or services including with reference to:
    - possible alternative products and services
    - Variations within a limited product and service range.

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

A person who demonstrates competency in this unit must be able to provide evidence of the ability to address customer needs. The evidence should integrate employability skills with workplace tasks and job roles and verify competency is able to be transferred to other circumstances and environments.

. Demonstrated evidence is required of the ability to:

- address customer s needs
- check your work is complete and free from errors
- use organizational procedures to document customer satisfaction
- develop and maintain networks to support meeting customer needs
- Identify potential difficulties in meeting customer needs and taking appropriate action.
- communicate effectively with customers including
    - helping customers to articulate their needs and evaluate options
    - explaining products/services and how they match customer needs
    - establishing regular communication
    - explaining customer rights and responsibilities

MODULE- 6: Solve problems Which Jeopardize Safety and Security

Overview:

This unit is focus on negotiation in critical incidents and the development of strategic responses designed to resolve threatening incidents.

Unit of Competency	Performance Criteria
CU.1 Identify a problem	**P1.** Form a problem statement and analyze root cause. **P2.** Take initiative in tackling problems rather than relying solely on directives **P3.** Follow logic steps in understanding root cause and analyzing potential solutions.
CU.2 Determine strategies fora required solution	**P1.** Analyze all aspects of the incident for degree of hazard, priorities, optional outcomes, and appropriate strategies **P2.** Analyze and determine strategies and priorities on the incident sought from a range of sources **P3.** Assess long term objectives against resources and priorities **P4.** Apply a range of communication techniques to make and maintain contact with the key people **P5.** Provide clear and factual information to enable an honest and realistic assessment of the interests of the key people and their positions **P6.** Resolve the conflict and express their likely consequences clearly and do an analysis of the benefits **P7.** Reassess points of disagreements for common positive Positions
CU.3 Coordinate support services	**P1.** Assess the need for support services in terms of the determined strategies and priorities **P2.** Negotiate the resources of support services according to established procedures and availability **P3.** Provide information on strategies to support services and maintain the communication **P4 .** Delegate roles and responsibilities according to expertise and resources
CU.4 Restore order	**P1 .** Assess the incidents for degree of risk and take appropriate action to reduce and remove the impact of the incident and restore order **P2 .**Take action designed to minimize risk and the preserve the safety and security of all involved **P3 .**Take action to prevent the escalation of the incident appropriate to the circumstances and agreed procedures. **P4 .** Carry out the use of force for the restoration of control and the maintenance of security in the least restrictive manner.

	P5 . Complete reports accurately and clearly provided to the appropriate authority promptly **P6 .** Review, evaluate and analyze the incident and the organizational response to it and report it promptly and accurately.
CU.5 Provide leadership. direction and guidance to the work group	**P1.** Link between the function of the group and the goals of the organization **P2 .**Participate in decision making routinely to develop, implement and review work of the group and to allocate responsibilities where appropriate **P3 .**Give opportunities and encouragement to others to develop new and innovative work practices and strategies **P4.** Identify conflict and resolve with minimum disruption to work group function **P5.**Provide staff with the support and supervision necessary to perform work safely and without risk to health **P6 .**Allocate tasks within the competence of staff and support with appropriate authority, autonomy and training **P7 .**Supervise appropriately the changing priorities and situations and takes into account the different needs of individuals and the requirements of the task

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Organization's policies, guidelines and procedures related to control and surveillance, safety and preventing and responding to incidents and breaches of orders covered in the range of variables.
- Organization's management and accountability systems
- Teamwork principles and strategies
- Principles of effective communication
- Guidelines for use of equipment and technology
- Code of conduct

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

A candidate who demonstrates competency in this unit must be able to provide evidence of the ability to resolve problems which jeopardize safety and security. The evidence should integrate employability skills with workplace tasks and job roles and verify competency is able to be transferred to other circumstances and environments.

MODULE- 7: Apply Problem Solving Techniques in The Workplace Using Critical Thinking

Overview: After the completion of this competency standard, the Trainee will be able to apply the process of problem solving for problems beyond those associated directly with the process unit.

Competency Units	Performance Criteria
CU1. Analyze the problem	**P1.** Evaluate issues/concerns are evaluated based on data gathered. **P2.** Identify possible causes of problem are identified within the area of responsibility as based on experience and the use of problem solving tools/analytical techniques. **P3.** Develop possible cause statements based on findings. **P4.** Use analogies to support reasoning. **P5.** Identify cause and effects are identified based on the criteria or information provided to support reasoning.
CU2. Identify possible solutions	**P1.** Consider all possible options for solution of the problem in accordance with safety and operating procedures. **P2.** Determine strengths and weaknesses of possible options. **P3.** Take corrective action to solve the problem and determine its possible future causes. **P4.** Analyze past experience **P5.** Provide samples to support generalization. **P6.** Implement simulations as needed.
CU3. Recommend solution to higher management	**P1.** Prepare report or documentation. **P2.** Present recommendations to appropriate personnel. **P3.** Follow up recommendations, if required.
CU4. Implement solution	**P1.** Identify measurable objectives **P2.** Identify resource needs **P3.** Prepare timelines in accordance with plan.
CU5. Evaluate / monitor results and outcome	**P1.** Identify processes and improvements based on evaluative assessment of problem. **P2.** Prepare recommendations and submit to superiors

MODULE- 8: Manage Personal Finances

Overview:

This unit of competency describes the outcomes required to develop, implement, and monitor a personal budget in order to plan regular savings and manage debt effectively.

Unit of Competency	Performance Criteria
CU.1 Develop a personal budget	**P1.** Calculate current living expenses using available information to prepare a personal budget. **P2.** Keep a record of all income and expenses for a short period of time to help estimate ongoing expenses. **P3.** Subtract total expenses from total income to determine a surplus or deficit budget for the specified period. **P4.** Find reasons for a deficit budget and ways to reduce expenditure identified. **P5.** Identify ways to increase income, if possible
CU.2 Develop longer term personal budget	**P1.** Analyze income and expenditure and set longer term personal, work and financial goals. **P2.** Develop a longer-term budget based on the outcomes of short-term budgeting, and adjust to meet living, work and future career requirements. **P3.** Identify obstacles that might affect finances such as job loss, sickness or unexpected expenses contingency savings **P4.** Formulate a regular savings plan based on budget, using secure savings products and services. **P5.** Monitor expenditure against budget and identify areas of possible expenditure saving
CU.3 Identify ways to maximize future finances	**P1.** Determine sources and ways to maximize personal income, including from work, investments or available government payments/allowances. **P2.** Get further education or training to maintain or improve future income. **P3.** Identify the need for debt to finance living and other expenses, and determine the appropriate levels of debt and repayment. **P4.** Consolidate existing debt, where possible, to minimize interest costs and fees. **P5.** Seek professional money management services, where available, to ensure financial plans are effective and achievable.

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Abilities to plan and organize to keep records and monitor a personal budget
- Abilities to set and review goals
- Basic financial management and record keeping to enable development and management of a personal budget
- Benefits of financial goal setting and personal budgeting to enable effective management of personal finances
- Numeracy skills to compare income and expenditure

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

A candidate who demonstrates competency in this unit must be able to provide evidence of the ability to manage personal finances. The evidence should integrate employability skills with workplace tasks and job roles and verify competency is able to be transferred to other circumstances and environments.

Demonstrated evidence is required of the ability to:

- develop a personal budget based on analysis of expenditure and income;
- formulate goals and identify financial contingency plans; and
- Monitor expenditure for a period of up to 2 weeks.

MODULE- 9: Coordinate a Work Team

Overview:

After the completion of this competency standard, the Trainee will be able to achieve operational outcomes and effective working relationships through managing and developing individuals and teams.

Unit of Competency	Performance Criteria
CU.1 Develop and maintain a cooperative work group	**P1.** Work contributions and suggestions from staff are continually sought and encouraged **P2.** Contributions to work group operations are acknowledged and suggestions are dealt with constructively **P3.** Develop staff skills according to work requirements **P4.** Implement new work practices **P5.** Address conflict between staff members in accordance with current personnel practices.
CU.2 Communicate objectives and required standards	**P1.** Inform the staff of the objectives and standards required **P2.** Commit to objectives and standards **P3.** Practices of safe, fair and participative work principals are and promote to staff
CU.3 Provide feedback on performance	**P1.** Give constructive feedback on all aspects of work performance provided to individuals and team **P2.** Access and address performance in a fair and timely manner in accordance with relevant guidelines, procedures and natural justice
CU.4 Support and participate in development activities	**P1.** Assess training needs of all staff, implemented and promoted **P2.** Devise an action plan to meet individual and group training and development needs is collaboratively developed, agreed to and implemented **P3.** Identify specific training needs of individuals **P4.** Encourage staff in applying skills and knowledge in the workplace **P5.** Provide training to the required standard on the job **P6.** Support and encourage staff to attend training courses and to take up other development opportunities.

CU.5 Provide leadership. direction and guidance to the work group	**P1.** Link between the function of the group and the goals of the organization **P2.** Participate in decision making routinely to develop, implement and review work of the group and to allocate responsibilities where appropriate **P3.** Give opportunities and encouragement to others to develop new and innovative work practices and strategies **P4.** Identify conflict and resolve with minimum disruption to work group function **P5.** Provide staff with the support and supervision necessary to perform work safely and without risk to health **P6.** Allocate tasks within the competence of staff and support with appropriate authority, autonomy and training **P7.** Supervise appropriately the changing priorities and situations and takes into account the different needs of individuals and the requirements of the task

MODULE- 10: Lead Small Teams

Overview: After the completion of this competency standard, the Trainee will be able to lead small teams including setting and maintaining team and individual performance standards.

Unit of Competency	Performance Criteria
CU.1 Facilitate team development	**P1.** Identify work requirements, standards, and purpose to team members. **P2.** Assist team to develop objectives, targets, and key performance indicators relevant its purpose and workplace goals. **P3.** Allocate duties regard to the skills required to properly undertake the assigned task and according to company policy. **P4.** Identify roles, responsibilities, and expectations of each team member. **P5.** Disseminate and discuss performance expectations to individual team members.
CU.2 Motivate and build the team	**P1.** Develop positive and constructive relationships with and between team members **P2.** Facilitate team communication processes **P3.** Involve team members in the process of examining risks and options and making decisions, to ensure acceptance and support. **P4.** Encourage individual and team efforts and contributions. **P5.** Strengths and weaknesses of team members are determined and sharing of work tasks is promoted to up skill team members. **P6.** Recognize team members' queries and discuss and deal with it.
CU.3 Facilitate and monitor team effectiveness	**P1.** Monitor the implementation of work plan and team and individual performance against agreed strategies, targets and standards, according to workplace policies and procedures. **P2.** Monitor performance against defined performance criteria and/or assignment instructions and corrective action taken if required. **P3.** Support team in identifying and resolving problems that may impede performance and to suggest improvements in team Performance. **P4.** Consult team members in any review and revision of team objectives and goals.

	P5. Address performance issues which cannot be rectified within the team to appropriate personnel according to employer policy. **P6.** Refer concerns of a team and individual are referred to next level of management or appropriate specialist and conduct negotiations on their behalf. **P7.** Keep team members inform of any changes in the priority allocated to assignments, or tasks which might impact on client/customer needs and satisfaction. **P8.** Monitor team operations to ensure that internal or external employer/client needs and requirements are met. **P9.** Provide follow-up communication on all issues affecting the team **P10.** Conduct team meetings to review work operations and address issues according to workplace policies and procedures. **P11.** Support team in identifying and resolving problems that may impede performance and to suggest improvements in team performance. **P12.** Consult team members in any review and revision of team objectives and goals. **P13.** Raise any inappropriate values and standards exhibited in the workplace with the person concerned.

MODULE- 11: Manage Human Resource Services

Overview:

After the completion of this competency standard, the Trainee will be able to plan, manage and evaluate delivery of human resource services, integrating business ethics. It applies to individuals with responsibility for coordinating a range of human resource services across an organization. They may have staff reporting to them.

Unit of Competency	Performance Criteria
CU.1 Determine strategies for delivery of human resource services	**P1.** Analyze business strategy and operational plans to determine human resource requirements. **P2.** Review external business environment and likely impact on organization's human resource requirements. **P3.** Consult line and senior managers to identify human resource needs in their areas. **P4.** Review organization's requirements for diversity in the workforce. **P5.** Develop options for delivery of human resource services that comply with legislative requirements, organizational policies and business goals. **P6.** Develop and agree on strategies and action plans for delivery of human resource services. **P7.** Agree and document roles and responsibilities of human resource team, line managers, and external contractors
CU.2 Manage the delivery of human resource services	**P1.** Develop and communicate information about human resource strategies and services to internal and external stakeholders. **P2.** Develop and negotiate service agreements between the human resource team, service providers and client groups. **P3.** Document and communicate service specifications, performance standards and timeframes. **P4.** Document and communicate service specifications, performance standards and timeframes. **P5.** Agree on, and arrange monitoring of quality assurance processes. **P6.** Ensure that services are delivered by appropriate providers, according to service agreements and operational plans.

	P7. Identify and rectify underperformance of human resource team or service providers. **P8.** Identify appropriate return on investment of providing human resource services.
CU.3 Evaluate human resource service delivery	**P1.** Establish systems for gathering and storing information needed to provide human resource services. **P2.** Survey clients to determine level of satisfaction. **P3.** Analyze feedback and surveys and recommend changes to service delivery. **P4.** Capture ongoing client feedback for the review processes. **P5.** Obtain approvals to variations in service delivery from appropriate managers. **P6.** Support agreed change processes across the organization.
CU.4 Manage integration of business ethics in human resource practices	**P1.** Ensure personal behavior is consistently ethical and reflects values of the organization. **P2.** Ensure code of conduct is observed across the organization, and its expectations are incorporated in human resource policies and practices. **P3.** Observe confidentiality requirements in dealing with all human resource information. **P4.** Deal promptly with unethical behavior. **P5.** Ensure all persons responsible for human resource functions understand requirements regarding their ethical behavior.

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
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