Qualification Pack

Food Lab Instrumentation Specialist

QP Code: FIC/Q7610

Version: 1.0

NSQF Level: 5

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Qualification Pack

FIC/Q7610: Food Lab Instrumentation Specialist

Brief Job Description

A Lab Instrumentation Specialist is responsible for writing and executing of validation documents for laboratory instrumentation in compliance with Good Manufacturing Practices (GMP). An individual coordinates with instrument vendors and works with a cross-functional team to deliver all system lifecycle documents for the laboratory. In addition, writing Standard Operating Procedures (SOPs) to support the running of the laboratory and supporting containment verification of the laboratory. An individual also participates in setting up the general running of the laboratory and supporting contaminent verification pf the lab. An individual also participates in setting up the general running of the lab- glassware,reagents, consumables, 5S, etc,. and ensure the safety, consistency and reliability of chemical testing following the Good Laboratory Practices (GLP)

Personal Attributes

The job requires the individual to have strong technical lab and documentation skills to maintain accurate records in compliance with Good Manufacturing Practices (GMP) expectations. An individual must have good written and verbal communication skills along with effective interpersonal skills. She/he should have knowledge of GLP and Laboratory safety standards. An individual must be focused and demonstrate attention to detail. In addition to managing time efficiently, ability to manage and coordinate multiple projects should be exhibited. An individual must have good hand/eye coordination when handling samples and lab equipment.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. FIC/N7629: Planning, Organizing, and Setting up of Food Analysis Laboratory
2. FIC/N7630: Carry out Physical, Chemical, and Instrumental Analysis
3. FIC/N7631: Carry out maintenance and decommissioning of equipment
4. FIC/N9904: Ensure food safety at the workplace
5. DGT/VSQ/N0101: Employability Skills (30 Hours)

Qualification Pack (QP) Parameters

Sector	Food Processing
Sub-Sector	Generic

Qualification Pack

Occupation	Quality Analysis/ Assurance
Country	India
NSQF Level	5
Credits	18
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2113.0500
Minimum Educational Qualification & Experience	B.Sc ((Chemistry, Physics, or related Life Science) or Diploma in a Science related program or equivalent experience or training) OR Completed 1st year of UG (UG Certificate) (3year/4years UG) with 1-2 Years of experience relevant experience OR 12th grade pass with 2 year NTC/ CITS/NAC (any combination of NTC/NAC/CITS or equivalent) OR 12th grade pass with 1 year NTC/ NAC with 1-2 Years of experience relevant experience OR Completed 3 year diploma after 10th with 1-2 Years of experience relevant experience OR Previous relevant Qualification of NSQF Level (4.5) with 1-2 Years of experience 1.5 years of Experience OR Previous relevant Qualification of NSQF Level (4) with 2-3 Years of experience of relevant experience
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	20 Years
Last Reviewed On	NA
Next Review Date	23/06/2026
NSQC Approval Date	23/06/2023
Version	1.0
Reference code on NQR	QG-05-AG-00577-2023-V1-FICSI
NQR Version	1.0

Qualification Pack

FIC/N7629: Planning, Organizing, and Setting up of Food Analysis Laboratory

Description

This OS is about planning and setting up the Food analysis laboratory considering ISO guidelines and safety guidelines.

Scope

The scope covers the following :

- Analyze requirements for setting up a laboratory
- Comply with measures to ensure Laboratory Safety
- Maintenance of equipment
- Calibration of instruments/equipment

Elements and Performance Criteria

Analyze requirement for setting up a laboratory

To be competent, the user/individual on the job must be able to:

PC1. • ensure laboratories are design to meet both the generic and specialized activities
• Generic activities - include wet chemistry, which requires extensive fixed benches with tprovision of water, power, sinks, cupboards, fume cupboards, reagent shelves, glassware cleaning and storage.
• Specialized activities - include specialised rooms are required for clean air work or for work on substances, which need special care for reasons of safety (e.g., working with radioactive materials or storage or work

PC2. arrange dust-free facilities, both from environmental sources or from other samples, which is likely to be missed by normal quality control checks

PC3. ensure ventilation intakes and fume cupboard exhaust must be placed carefully so as to avoid re-circulation of laboratory air and associated risk of contamination of test materials and hazard to laboratory staff

PC4. manage that work surfaces and floor shall be made of impervious, smooth, easy to clean materials

PC5. arrange that all slabs and work surfaces are levelled and not inclined in any way

PC6. administer that there is 300-lux light intensity at working surfaces other than those required for specified tests

PC7. arrange for segregation of trace analysis from highly concentrated formulations and from pure substances used in preparing analytical standards. The segregation must apply to all facilities for washing/ cleaning equipment, washing, and storage of glassware, use of protective clothing etc.

PC8. organize the separation of preparation of media and media/ glassware sterilization areas from testing areas

PC9. manage entry in laboratory areas for reasons such as security, safety or sensitivity to contamination

PC10. administer that eating, drinking, and smoking should be prohibited in the laboratory

PC11. arrange adequate fire safety measures at the laboratory

PC12. ensure a closed drainage system for all the discards and proper disposal procedure/system for all microbiological samples

PC13. manage proper gas/LPG supply system through pipelines to burners and a proper safety system for the same

PC14. ensure the appropriate negative air pressure is present in a lab compared to outside.

Comply measures to ensure Laboratory Safety

To be competent, the user/individual on the job must be able to:

PC15. administer that chemicals are not stored with an obscured or missing label, marked with the date of receipt before storing and arranged on the shelf in chemically compatible families, and not alphabetically in plastic or metal containers

PC16. arrange separate storage areas for highly toxic chemicals

PC17. manage empty and full cylinders storage in separate cages outside the laboratory on the ground floor

PC18. administer the supply of piped gas through clearly identifiable metal piping to instrument rooms and other equipment

PC19. monitor compressed gas cylinders must be firmly attached to a secure structure by a non-combustible material, such as a metal chain

PC20. organize the availability and use of a number and type of safety equipment in well-marked, highly visible, and easily accessible locations in or near all the laboratory rooms in the facility and must be maintained in working conditions

PC21. • arrange easy accessibility of all safety equipment
• (Safety Equipment - emergency showers, eyewashes, first-aid kits, and spill kits)

PC22. validate electrical apparatus, telephones, thermostats, electrical control panels, or power sockets are not located within 0.5 m of the emergency shower or eyewash or within any area that may be considered as a splash or flood zone

PC23. categorize waste by its identity, constituents, and hazards to handle and manage safely

PC24. identify and label all chemical and waste containers in their respective sections/laboratories

PC25. • incorporate a procedure for proper disposal of chemical waste basis the category of chemicals used
• Category - Chemicals that can be washed down the drains with excess water, such as CaCl2, MgSO4, Fine (TLC grade) silica, and alumina, etc.; Chemicals that cannot be washed down the drains, such as chloroform, dichloromethane, methanol, acetonitrile, Cyanides, and azides, etc.

PC26. arrange waste bins preferably color-coded and labeled for each laboratory

PC27. negotiate a contract with a commercial firm, licensed by the respective State Pollution Control Board, to remove and transport biological wastes to a designated disposal site for incineration

PC28. monitor all disposable petri-plates used for inoculation and enumeration of the microorganisms, should be autoclaved (steam sterilized) to inactivate the microorganisms for safety reasons. Once autoclaved, the wastes can be safely disposed off

PC29. administer that number of emergency exits must be in accordance with the building laws and codes

PC30. define an Emergency Evacuation Plan and route for all buildings floors, and areas, and post instructions in every laboratory section and corridor

PC31. manage Laboratory Information Card at the entrance door of each laboratory and ensure Emergency exits shall be marked accordingly

Maintain instrumentation equipment used

To be competent, the user/individual on the job must be able to:

PC32. devise and plan all analytical work adequately to indicate the starting and intended finishing point of the particular task together with the strategy for achieving the desired aims, considering the scope of the amendment.

PC33. • organize sampling plans to obtain quantitative or qualitative information, or to determine conformance or non-conformance with a specification
• Sampling plans - may be random, systematic or sequential

PC34. select an appropriate sample or samples, from a larger amount of material for chemical analysis

PC35. document measurement uncertainty associated with sub-sampling etc. in test results separately from measurement uncertainty associated with the basic sampling process

PC36. monitor that all of the terms used are clearly defined and understandable to others

PC37. • supervise that equipment used in laboratories should be of a specification, sufficient for an intended purpose, and kept in a state of maintenance and calibration consistent with its use
• Equipment - General service equipment not used for making measurements or with minimal influence on measurements (e.g., hotplates, stirrers, nonvolumetric glassware and glassware used for rough volume measurements such as measuring cylinders) and laboratory heating or ventilation systems; Volumetric equip

PC38. validate that quality of reagents and other consumable materials must be appropriate for the intended use. Consideration needs to be given to the selection, purchase, reception, and storage of reagents

PC39. • administer that grade of any critical reagent used (including water) should be stated in the method, together with guidance on any particular precautions which should be observed in its preparation, storage, and use
• Precautions - include toxicity, flammability, stability to heat, air, and light; reactivity to other chemicals; reactivity to particular containers; and other hazards.

PC40. monitor reagents and reference materials prepared in the laboratory should be labelled to identify substance, strength, solvent (where not water), any special precautions or hazards, restrictions of use, and date of preparation and/or expiry

PC41. • assess factors that make any analytical measurement result liable to deviate from true value as they influence the result
• Factors - temperature effects on volumetric equipment, reflection and stray light in spectroscopic instruments, variations in electrical supply voltages, individual analysts' interpretation of specified methods and incomplete extraction recoveries

PC42. identify relevant sources of uncertainty and assignment of value to each significant contribution

PC43. • administer the complete sequence of events necessary to achieve the purpose of the analysis in identifying relevant sources of uncertainty
• Sequence - includes sampling and sub-sampling, sample preparation, extraction, cleanup, concentration or dilution, instrument calibration (including reference material preparation), instrumental analysis, raw data processing, and transcription of the output result

PC44. • validate that the performance characteristics of a method are understood and capable of producing results and demonstrate that method is scientifically sound under the conditions in which it is to be applied.
• Performance characteristics - Selectivity & specificity (Description of the measurand), Measurement range Calibration and traceability, Bias, Linearity, Limit of detection (LOD)/ Limit of quantitation (LOQ), Ruggedness, Precision

PC45. administer that standard methods are developed and validated collaboratively by a group of experts and development should include consideration of all of the necessary aspects of validation and related uncertainty

PC1. administer that standard methods are developed and validated collaboratively by a group of experts and development should include consideration of all of the necessary aspects of validation and related uncertainty Conduct test and calibration of instruments / equipment

To be competent, the user/individual on the job must be able to:

PC46. work safely at all times, complying with health and safety, environmental and other relevant food and drink regulations, directives, and guidelines

PC47. obtain and use the correct issue of company and/or manufacturers' drawings and testing/calibration documentation

PC48. follow procedures for the use of tools and equipment to carry out the required tests and calibration

PC49. set up and carry out the tests and calibrations using organizational procedures and within agreed timescales

PC50. insert any relevant system trip defeats, including fire extinguishant, and emergency shutdown, in accordance with organizational procedures

PC51. • isolate instruments as recommended and per standards
• Instruments - including process, electrical, hydraulic, pneumatic, mechanical

PC52. check test equipment used is appropriate for the tests being carried out, is within current calibration dates, and is used within its specified range

PC53. maintain safe access and working arrangements for testing and calibration area to carry out required activities as per organisational procedures

PC54. administer electrostatic (ESD) precautions when handling sensitive components and circuit boards

PC55. re-connect and return equipment to service on completion of testing and calibration activities

PC56. record results of tests and calibrations in accordance with organisational procedures

PC57. review results and carry out further tests, if necessary, dispose of waste items and any spoilt products in a safe and environmentally acceptable manner, and leave the work area in a safe and clean condition in accordance with organisational procedures

PC58. maintain log book (digitally and manually) for each instrument /equipment and troubleshoot/adjust minor malfunctions in the instruments

PC59. account for any human or instrumental error in the test result

PC60. maintain repeatability and reproducibility of an analysis performed by him/her

PC61. • ensure precautionary instructions are adhered, to in the vicinity of an instrument
• Instructions - e.g. No mobile phones in the vicinity of NMR

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. health and safety and environmental requirements of the area in which the installation activity is to take place, and the responsibility these requirements place on you not to compromise food safety

KU2. isolation and lock-off procedure or permit-to-work procedure that applies, including critical control points

KU3. specific health and safety food precautions to be applied during the installation procedure, and their effects on others

KU4. specific requirements of your customer/client specifications in relationship to the installation activities

KU5. responsibility in relationship to Hazard Analysis and Critical Control Points (HACCP), Threat Assessment and Critical Control Points (TACCP), Vulnerability Assessment and Critical Control Points (VACCP) during the installation activities

KU6. importance of wearing protective clothing and other appropriate safety equipment (PPE) during the installation process

KU7. responsibility in relationship to Hazard Analysis and Critical Control Points (HACCP), Threat Assessment and Critical Control Points (TACCP), Vulnerability Assessment and Critical Control Points (VACCP) during the installation activities

KU8. what constitutes a hazardous voltage and how to recognize victims of electric shock

KU9. knowledge of waste characteristics and constituents by laboratory personnel who conduct the process, procedure, or experiment

KU10. chemical Waste can be in the form of solvents, aqueous solutions, dry powders, and unwanted old chemicals

KU11. health and Safety information should be posted on the door of each laboratory indicating accurately the hazards that could be there in the laboratory, personal protection required, and the emergency contacts

KU12. never store highly reactive chemicals for more than 6 months

KU13. gas cylinders must be transported on purpose-built trolleys within the laboratory

KU14. oxygen cylinders, full or empty should not be stored in close proximity to the flammable gases

KU15. labs should be organized with the highest hazards (e.g., fume hoods) farthest from the entry door and the least hazardous elements (e.g., write-up stations) closest to the door

KU16. write-up desks and benches should be accessible without having to cross in front of fume hoods

KU17. all safety equipment, such as emergency showers, eyewashes, first-aid kits, and spill kits should be readily accessible

KU18. emergency center in a central location on each floor provides easy access for everyone. This center should have reagent neutralizers, spill kits, first aid kits, etc.

KU19. there should be at least one ABC fire extinguisher either inside the lab or in close proximity. Extinguishers should not be covered up or block access

KU20. there should be an eyewash unit, provided at least 10 seconds away from any analyst, and should supply a multi-stream cross flow of water at 20-25 degrees C (65- 75 degree Fahrenheit)

KU21. safety showers should never be more than 100 ft. away from the analyst, along a clear and unobstructed path, and should be located in the corridor, clearly visible from the lab exits

KU22. that ISO/IEC 17025:1999 requires laboratories to evaluate their measurement uncertainty and to report measurement uncertainty under specific circumstances, for example, where it is relevant to the interpretation of the test result (which is often the case). Thus, statement of measurement uncertainty in test reports should become common practice in the future

KU23. elucidation of performance characteristics such as Selectivity & specificity (Description of the measurand), Measurement range Calibration and traceability, Bias, Linearity, Limit of detection (LOD)/ Limit of quantitation (LOQ), Ruggedness, Precision

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read and interpret information such as product labels, safety data sheets, instructions, procedures, and specifications to determine activities in the calibration of instruments/equipment

GS2. write and document using appropriate terminology and in the specified format

GS3. communicate with others effectively

GS4. takes responsibility for planning, sequencing, and prioritizing tasks

GS5. analyse and report variances promptly

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Analyze requirement for setting up a laboratory	**7**	**7**	**-**	**7**
PC1. • ensure laboratories are design to meet both the generic and specialized activities • Generic activities - include wet chemistry, which requires extensive fixed benches with tprovision of water, power, sinks, cupboards, fume cupboards, reagent shelves, glassware cleaning and storage. • Specialized activities - include specialised rooms are required for clean air work or for work on substances, which need special care for reasons of safety (e.g., working with radioactive materials or storage or work	0.5	0.5	-	0.5
PC2. arrange dust-free facilities, both from environmental sources or from other samples, which is likely to be missed by normal quality control checks	0.5	0.5	-	0.5
PC3. ensure ventilation intakes and fume cupboard exhaust must be placed carefully so as to avoid re-circulation of laboratory air and associated risk of contamination of test materials and hazard to laboratory staff	0.5	0.5	-	0.5
PC4. manage that work surfaces and floor shall be made of impervious, smooth, easy to clean materials	0.5	0.5	-	0.5
PC5. arrange that all slabs and work surfaces are levelled and not inclined in any way	0.5	0.5	-	0.5
PC6. administer that there is 300-lux light intensity at working surfaces other than those required for specified tests	0.5	0.5	-	0.5
PC7. arrange for segregation of trace analysis from highly concentrated formulations and from pure substances used in preparing analytical standards. The segregation must apply to all facilities for washing/ cleaning equipment, washing, and storage of glassware, use of protective clothing etc.	0.5	0.5	-	0.5
PC8. organize the separation of preparation of media and media/ glassware sterilization areas from testing areas	0.5	0.5	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC9. manage entry in laboratory areas for reasons such as security, safety or sensitivity to contamination	0.5	0.5	-	0.5
PC10. administer that eating, drinking, and smoking should be prohibited in the laboratory	0.5	0.5	-	0.5
PC11. arrange adequate fire safety measures at the laboratory	0.5	0.5	-	0.5
PC12. ensure a closed drainage system for all the discards and proper disposal procedure/system for all microbiological samples	0.5	0.5	-	0.5
PC13. manage proper gas/LPG supply system through pipelines to burners and a proper safety system for the same	0.5	0.5	-	0.5
PC14. ensure the appropriate negative air pressure is present in a lab compared to outside.	0.5	0.5	-	0.5
Comply measures to ensure Laboratory Safety	**16**	**8.5**	**-**	**9**
PC15. administer that chemicals are not stored with an obscured or missing label, marked with the date of receipt before storing and arranged on the shelf in chemically compatible families, and not alphabetically in plastic or metal containers	1	0.5	-	0.5
PC16. arrange separate storage areas for highly toxic chemicals	1	0.5	-	0.5
PC17. manage empty and full cylinders storage in separate cages outside the laboratory on the ground floor	0.5	0.5	-	0.5
PC18. administer the supply of piped gas through clearly identifiable metal piping to instrument rooms and other equipment	0.5	0.5	-	0.5
PC19. monitor compressed gas cylinders must be firmly attached to a secure structure by a non-combustible material, such as a metal chain	1	0.5	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC20. organize the availability and use of a number and type of safety equipment in well-marked, highly visible, and easily accessible locations in or near all the laboratory rooms in the facility and must be maintained in working conditions	1	0.5	-	0.5
PC21. • arrange easy accessibility of all safety equipment • (Safety Equipment - emergency showers, eyewashes, first-aid kits, and spill kits)	1	0.5	-	0.5
PC22. validate electrical apparatus, telephones, thermostats, electrical control panels, or power sockets are not located within 0.5 m of the emergency shower or eyewash or within any area that may be considered as a splash or flood zone	1	0.5	-	0.5
PC23. categorize waste by its identity, constituents, and hazards to handle and manage safely	1	0.5	-	0.5
PC24. identify and label all chemical and waste containers in their respective sections/laboratories	1	0.5	-	0.5
PC25. • incorporate a procedure for proper disposal of chemical waste basis the category of chemicals used • Category - Chemicals that can be washed down the drains with excess water, such as CaCl2, MgSO4, Fine (TLC grade) silica, and alumina, etc.; Chemicals that cannot be washed down the drains, such as chloroform, dichloromethane, methanol, acetonitrile, Cyanides, and azides, etc.	1	0.5	-	0.5
PC26. arrange waste bins preferably color-coded and labeled for each laboratory	1	0.5	-	0.5
PC27. negotiate a contract with a commercial firm, licensed by the respective State Pollution Control Board, to remove and transport biological wastes to a designated disposal site for incineration	1	0.5	-	0.5
PC28. monitor all disposable petri-plates used for inoculation and enumeration of the microorganisms, should be autoclaved (steam sterilized) to inactivate the microorganisms for safety reasons. Once autoclaved, the wastes can be safely disposed off	1	0.5	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC29. administer that number of emergency exits must be in accordance with the building laws and codes	1	0.5	-	0.5
PC30. define an Emergency Evacuation Plan and route for all buildings floors, and areas, and post instructions in every laboratory section and corridor	1	0.5	-	0.5
PC31. manage Laboratory Information Card at the entrance door of each laboratory and ensure Emergency exits shall be marked accordingly	1	0.5	-	0.5
Maintain instrumentation equipment used	**7**	**7.5**	**-**	**7**
PC32. devise and plan all analytical work adequately to indicate the starting and intended finishing point of the particular task together with the strategy for achieving the desired aims, considering the scope of the amendment.	0.5	1	-	0.5
PC33. • organize sampling plans to obtain quantitative or qualitative information, or to determine conformance or non-conformance with a specification • Sampling plans - may be random, systematic or sequential	0.5	0.5	-	0.5
PC34. select an appropriate sample or samples, from a larger amount of material for chemical analysis	0.5	0.5	-	0.5
PC35. document measurement uncertainty associated with sub-sampling etc. in test results separately from measurement uncertainty associated with the basic sampling process	0.5	0.5	-	0.5
PC36. monitor that all of the terms used are clearly defined and understandable to others	0.5	0.5	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC37. • supervise that equipment used in laboratories should be of a specification, sufficient for an intended purpose, and kept in a state of maintenance and calibration consistent with its use • Equipment - General service equipment not used for making measurements or with minimal influence on measurements (e.g., hotplates, stirrers, nonvolumetric glassware and glassware used for rough volume measurements such as measuring cylinders) and laboratory heating or ventilation systems; Volumetric equip	0.5	0.5	-	0.5
PC38. validate that quality of reagents and other consumable materials must be appropriate for the intended use. Consideration needs to be given to the selection, purchase, reception, and storage of reagents	0.5	0.5	-	0.5
PC39. • administer that grade of any critical reagent used (including water) should be stated in the method, together with guidance on any particular precautions which should be observed in its preparation, storage, and use • Precautions - include toxicity, flammability, stability to heat, air, and light; reactivity to other chemicals; reactivity to particular containers; and other hazards.	0.5	0.5	-	0.5
PC40. monitor reagents and reference materials prepared in the laboratory should be labelled to identify substance, strength, solvent (where not water), any special precautions or hazards, restrictions of use, and date of preparation and/or expiry	0.5	0.5	-	0.5
PC41. • assess factors that make any analytical measurement result liable to deviate from true value as they influence the result • Factors - temperature effects on volumetric equipment, reflection and stray light in spectroscopic instruments, variations in electrical supply voltages, individual analysts' interpretation of specified methods and incomplete extraction recoveries	0.5	0.5	-	0.5
PC42. identify relevant sources of uncertainty and assignment of value to each significant contribution	0.5	0.5	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC43. • administer the complete sequence of events necessary to achieve the purpose of the analysis in identifying relevant sources of uncertainty • Sequence - includes sampling and sub-sampling, sample preparation, extraction, cleanup, concentration or dilution, instrument calibration (including reference material preparation), instrumental analysis, raw data processing, and transcription of the output result	0.5	0.5	-	0.5
PC44. • validate that the performance characteristics of a method are understood and capable of producing results and demonstrate that method is scientifically sound under the conditions in which it is to be applied. • Performance characteristics - Selectivity & specificity (Description of the measurand), Measurement range Calibration and traceability, Bias, Linearity, Limit of detection (LOD)/ Limit of quantitation (LOQ), Ruggedness, Precision	0.5	0.5	-	0.5
PC45. administer that standard methods are developed and validated collaboratively by a group of experts and development should include consideration of all of the necessary aspects of validation and related uncertainty	0.5	0.5	-	0.5
PC1. administer that standard methods are developed and validated collaboratively by a group of experts and development should include consideration of all of the necessary aspects of validation and related uncertainty Conduct test and calibration of instruments / equipment	**8**	**8**	**-**	**8**
PC46. work safely at all times, complying with health and safety, environmental and other relevant food and drink regulations, directives, and guidelines	0.5	0.5	-	0.5
PC47. obtain and use the correct issue of company and/or manufacturers' drawings and testing/calibration documentation	0.5	0.5	-	0.5
PC48. follow procedures for the use of tools and equipment to carry out the required tests and calibration	0.5	0.5	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC49. set up and carry out the tests and calibrations using organizational procedures and within agreed timescales	0.5	0.5	-	0.5
PC50. insert any relevant system trip defeats, including fire extinguishant, and emergency shutdown, in accordance with organizational procedures	0.5	0.5	-	0.5
PC51. • isolate instruments as recommended and per standards • Instruments - including process, electrical, hydraulic, pneumatic, mechanical	0.5	0.5	-	0.5
PC52. check test equipment used is appropriate for the tests being carried out, is within current calibration dates, and is used within its specified range	0.5	0.5	-	0.5
PC53. maintain safe access and working arrangements for testing and calibration area to carry out required activities as per organisational procedures	0.5	0.5	-	0.5
PC54. administer electrostatic (ESD) precautions when handling sensitive components and circuit boards	0.5	0.5	-	0.5
PC55. re-connect and return equipment to service on completion of testing and calibration activities	0.5	0.5	-	0.5
PC56. record results of tests and calibrations in accordance with organisational procedures	0.5	0.5	-	0.5
PC57. review results and carry out further tests, if necessary, dispose of waste items and any spoilt products in a safe and environmentally acceptable manner, and leave the work area in a safe and clean condition in accordance with organisational procedures	0.5	0.5	-	0.5
PC58. maintain log book (digitally and manually) for each instrument /equipment and troubleshoot/adjust minor malfunctions in the instruments	0.5	0.5	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC59. account for any human or instrumental error in the test result	0.5	0.5	-	0.5
PC60. maintain repeatability and reproducibility of an analysis performed by him/her	0.5	0.5	-	0.5
PC61. • ensure precautionary instructions are adhered, to in the vicinity of an instrument • Instructions - e.g. No mobile phones in the vicinity of NMR	0.5	0.5	-	0.5
NOS Total	**38**	**31**	**-**	**31**

National Occupational Standards (NOS) Parameters

NOS Code	FIC/N7629
NOS Name	Planning, Organizing, and Setting up of Food Analysis Laboratory
Sector	Food Processing
Sub-Sector	Fruits and Vegetables, Food Grain Milling (Including oil seeds), Dairy Products, Meat and Poultry, Fish and Seafood, Bread and Bakery, Alcoholic Beverages, Aerated Water/Soft Drinks
Occupation	Quality Analysis/ Assurance
NSQF Level	5
Credits	5
Version	1.0
Last Reviewed Date	23/06/2023
Next Review Date	23/06/2026
NSQC Clearance Date	23/06/2023

FIC/N7630: Carry out Physical, Chemical, and Instrumental Analysis

Description

This OS is about the activities carried out for physical, chemical and Instrumental analysis

Scope

The scope covers the following :

- Carry out Sampling and Sample Preparation
- Perform analysis through classical analytical techniques
- Carry out quantitative and qualitative analysis
- Carry out reporting and documentation

Elements and Performance Criteria

Carry out Sampling and Sample Preparation

To be competent, the user/individual on the job must be able to:

PC1. apply specific methods as per national or sectoral standards for sampling as appropriate

PC2. enforce sampling through experience or adapt methods from similar applications or be treated as heterogeneous

PC3. carry out sampling stages with an understanding of overall context of analysis

PC4. administer that large laboratory sample is reduced test portion is homogeneous, thus reducing the particle size by grinding or milling. If the laboratory sample is large, it may be necessary to subdivide it prior to grinding or milling

PC5. • subdivide sample by following different mechanisms
• Mechanisms - coning and quartering, riffling, or by means of a rotating sample divider or a centrifugal divider

PC6. • take care of samples by avoiding cross-contamination, by ensuring equipment does not contaminate the sample and the composition of the sample is not altered during grinding
• Equipment – metals, etc.

PC7. • analyze problem necessitating sample extraction and design the sampling strategy considering the nature of problem
• Nature of problem - average analyte concentration in the material is required; analyte profile across the material is required; material is suspected of contamination by a particular analyte; contaminant is heterogeneously distributed (occurs in hot spots) in the material; there may be other, non-analytical factors to consider, including the nature of the area under examination

PC8. administer the use and value of the rest of the original material once a sample has been removed for analysis.

PC9. maintain record of procedures followed in order that sampling process may be repeated exactly irrespective of strategy used for sampling

Perform analysis through classical analytical techniques

To be competent, the user/individual on the job must be able to:

PC10. identify whether the analyte is either organic or inorganic prior to qualitative analysis of any given compound

PC11. perform classical qualitative analysis by adding one or a series of chemical reagents to the analyte

PC12. draw inferences about the identity of analyte by observing the chemical reactions and their products

PC13. administer the result of the assay between added chemical reagents and functional groups of organic molecules

PC14. • identify molecules by following measurements in addition to chemical reactions between chemical reagents and functional groups
• Measurements - including those of boiling points, melting points, and densities, etc.

PC15. examine during gravimetric analysis an excess of added reagent reacts with the analyte to form a precipitate

PC16. handle precipitate by filtering, drying, and weighing as its mass is used to calculate the concentration or amount of assayed substance in the analyte

PC17. examine during titrimetric (Volumetric) analysis, the reagent (the titrant) is added gradually or stepwise to the analyte from a buret

PC18. • administer equivalence point of the titration, typically observed as a colour change
• Point of titration - the point at which the quantities of the two reacting species are equivalent

PC19. supervise if no spontaneous colour change occurs during the titration, a small amount of a chemical indicator is added to the analyte prior to the titration

PC20. calculate the amount or concentration of the analyte by accessing the end point with the concentration of the titrant

Carry out quantitative and qualitative analysis

To be competent, the user/individual on the job must be able to:

PC21. • instill the sample manually into carrier gas with a syringe, via a sample loop and analytical valve which are in-line with the carrier stream
• Carrier Gas – nitrogen, helium, argon, and hydrogen or air

PC22. ensure in automated instruments, the carrier gas is switched in line with the sample loop for a precise, pre-determined period of time, injecting the sample onto the column administer the cycle is repeated continuously in the process Gas Chromatography (GC)/ Mass spectrometry (MS) analysis

PC23. mount columns in an oven with precise temperature and carrier gas flow control

PC24. monitor that under tightly controlled conditions, analysis is repeated; the same gas component will exit the column (elute) with the same timing as the previous analysis

PC25. regulate separated gasses leave (or elute from) the column(s), and pass through a detector which, in turn, responds with an output signal

PC26. observe that signal generates the characteristic GC peaks in a chromatogram and peaks are proportional in area to the concentration of gases of interest

PC27. instill a medium into which the target analytes can be preferentially partitioned followed by the separation of the analyte-containing phase from the remainder of the sample

PC28. administer sample is heated, have its pH adjusted, or be otherwise treated to make analytes more accessible to the partitioning medium

PC29. • place solid analytes in solution for chromatographic separation irrespective of the extraction process
• Solution - additional pretreatments, such as liquid/liquid extraction (LLE) or solid-phase extraction (SPE), to remove substances that might interfere with the chromatographic separation and the detection of the target analytes
• Extraction Process – Liquid extraction, Ultrasonic simulation, Steam distillation

PC30. employ Liquid-liquid extraction, on- and offline solid-phase extraction, and gel permeation chromatography (GPC) in the partitioning of target analytes in liquid samples or liquid extracts of solid samples

PC31. filter turbid or otherwise opaque liquids to remove particulates prior to extraction

PC32. install guard columns at the head of the analytical column to prevent contamination of the stationary phase by the sample matrix

PC33. ensure the guard column is connected to the precolumn by means of a transfer valve

PC34. administer automated sampling system instead of manual injectors to get highly reproducible injection volume, low carryover, and increased sample throughput

PC35. assemble HPLC pumps to deliver pulse-free flow with high precision over a wide flow rate range with low dead volume

PC36. maintain a limit of detection (LOD) and limit of quantification (LOQ) as two to three and 10 to 20 times the noise level. LOD for food additives can be as low as 100 parts per trillion

PC37. • administer other important detection parameters are appropriate, as per defined standards
• Parameters - dynamic range, calibration linearity, chromatographic selectivity, and qualitative information

PC38. automate derivatization and integrate online within the analysis to improve sensitivity and/or selectivity of an optical detector (UV, visible, or fluorescence) when analytes lack chromophores or an adequate optical response

PC39. administer to install of a lamp in Atomic Absorption (AA) unit for the analyte

PC40. regulate by nebulizing liquid sample and spray into an atomizer, or atom source

PC41. observe that the heat source dries the sample and atomizes it, breaking it down into individual elements. The light at a certain wavelength is passed through the atomized sample, where it is absorbed by elements of interest, and that energy absorption is measured

PC42. review in flame AA, the atomizer or atom source is in the form of an air/acetylene or nitrous oxide/acetylene flame

PC43. coordinate to introduce the sample as an aerosol into the flame, which is aligned so that the light beam passes through the flame, where the light is absorbed, measured, and reported by the instrument

PC44. facilitate Graphite Furnace Atomic Absorption (GFAA) by introducing the sample directly into a graphite tube, which is heated to remove liquid solvent and to atomize the remaining sample

PC45. observe that sample introduced to the tube is atomized, and the atoms are retained within the tube for an extended period

PC46. check light is passed through this tube and absorbance is measured and as a result of this improved analyte control sensitivity and detection limits are significantly improved

PC47. administer in Induction Coupled Plasma Mass Spectrometry (ICP-MS), the sample is atomized and ionized by the plasma source

PC48. observe charged ions are passed into a mass spectrometer, where ions are split according to their mass before reaching the detector, which in turn identifies and quantifies the elements present in a sample based on their mass

PC49. facilitate significant improvement in sensitivity by following the ICP-MS approach

Carry out reporting and documentation

To be competent, the user/individual on the job must be able to:

PC50. review and update the test methods and procedures as per the schedule

PC51. ensure the updation of logbooks, worksheets, calibration records, parameters of columns, reagents, volumetric solution, and working standards

PC52. account for defects/problems/incidents/quality issues/test results as applicable as per SOP

PC53. prepare analytical and quality control reports for detailed findings and recommendations as per SOPs

PC54. prepare reports of validations, deviations, and incidents to the production and quality assurance team in compliance with GLP and GMP

PC55. facilitate to document testing results and analysis accurately

PC56. maintain all original and controlled document files and quality records in a timely and accurate manner and made them available for inspection and auditory purposes

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. selection of an appropriate sample or samples, from a larger amount of material

KU2. procedures followed to select the test portion from the sample (or subsample) and include in-laboratory processing, mixing, reducing, coning & quartering, rifling, and milling & grinding

KU3. test portion which is actual material weighed or measured for the analysis

KU4. properties of an analyte such as volatility, sensitivity to light, thermal lability, and chemical reactivity are considered in designing sampling strategy and choosing equipment, packaging, and storage conditions

KU5. how to prepare a clear record of procedures for the sampling process

KU6. sampling procedures followed through inspection by attributes have risk associated with acceptance/rejection of non-conformities is predetermined by the acceptable quality level (AQL) or the limiting quality (LQ)

KU7. powerful integration software is used to quantify the peak size

KU8. GCs are designed with various detectors based on the analytical requirements, gas composition and required detection limits to help determine the detector used

KU9. process GCs typically utilize FID, PID, or TCD, due to their simple reliable designs

KU10. columns are tools used to separate the sample into its constituent components

KU11. equipment used for sampling, subsampling, sample handling, sample preparation, and sample extraction

KU12. significance of gravimetric or volumetric errors during sampling should be considered and any critical equipment calibrated

KU13. poorly considered sampling, especially if destructive, may render the whole consignment valueless or inoperative

KU14. selection of the partitioning medium is determined by the nature of the sample matrix and the properties of the analytes

KU15. liquid extraction enables highly selective matching of solvent to analyte solubility. Extraction times are short, typically, minutes. It uses relatively small quantities of organic solvents, thereby reducing costs and facilitating disposal

KU16. ultrasonic stimulation is often applied in conjunction with the extraction solvent to drive the liquid medium into the interior of the matrix, ensuring intimate and energetic contact between solvent and analyte molecules

KU17. steam distillation can be utilized to selectively extract volatile compounds. Extraction times are long, however, and the method has a narrow range of use and is applied offline

KU18. light source is a hollow cathode lamp (HCL) or an electrodeless discharge lamp (EDL), with different lamps being used for different analytes (elements of interest)

KU19. Atomic Absorption Consumables are flame uses Lamps, Gases & O-rings, furnaces in addition need Graphite tubes Caps & Holders

KU20. ICP-MS Consumables are argon gas, glassware - torches, spray chambers, nebulizers and cones - skimmers and sampling

KU21. detection limits of atomic absorption and ICP-MS

KU22. procedures for reporting any unresolved issues and hazards

KU23. procedures for management of Standard Operating Procedures (SOPs), Standard Testing Procedures (STPs), protocols, Equipment documents, method validation protocols & reports

KU24. procedures for reporting non-conformance, deviations, validation results

KU25. procedure for reporting incidents where standard operating procedures are not followed

KU26. statistical concepts and application of statistical tools

KU27. guidelines for electronic records and signatures, audit trails, date, and time stamps

KU28. operating procedure of analytical instruments and equipment

KU29. concepts of organic and analytical chemistry

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read and interpret information such as product labels, safety data sheets, instructions, procedures, and specifications to determine activities in the calibration of instruments/equipment

GS2. write and document using appropriate terminology and in the specified format

GS3. communicate with others effectively

GS4. takes responsibility for planning, sequencing, and prioritizing tasks

GS5. analyse and report variances promptly

GS6. check the sample integrity

GS7. maintain a laboratory notebook and follow the related rules

GS8. should be able to guide and lead sample handlers or other subordinates related to work

GS9. takes responsibility for planning, sequencing, and prioritising tasks

GS10. analyse and report variances promptly
GS11. check the sample integrity
GS12. maintain a laboratory notebook and follow the related rules
GS13. should be able to guide and lead sample handlers or other subordinates related to work

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Carry out Sampling and Sample Preparation	**6.5**	**4.5**	**-**	**4.5**
PC1. apply specific methods as per national or sectoral standards for sampling as appropriate	0.5	0.5	-	0.5
PC2. enforce sampling through experience or adapt methods from similar applications or be treated as heterogeneous	0.5	0.5	-	0.5
PC3. carry out sampling stages with an understanding of overall context of analysis	1	0.5	-	0.5
PC4. administer that large laboratory sample is reduced test portion is homogeneous, thus reducing the particle size by grinding or milling. If the laboratory sample is large, it may be necessary to subdivide it prior to grinding or milling	1	0.5	-	0.5
PC5. • subdivide sample by following different mechanisms • Mechanisms - coning and quartering, riffling, or by means of a rotating sample divider or a centrifugal divider	1	0.5	-	0.5
PC6. • take care of samples by avoiding cross-contamination, by ensuring equipment does not contaminate the sample and the composition of the sample is not altered during grinding • Equipment – metals, etc.	0.5	0.5	-	0.5
PC7. • analyze problem necessitating sample extraction and design the sampling strategy considering the nature of problem • Nature of problem - average analyte concentration in the material is required; analyte profile across the material is required; material is suspected of contamination by a particular analyte; contaminant is heterogeneously distributed (occurs in hot spots) in the material; there may be other, non-analytical factors to consider, including the nature of the area under examination	0.5	0.5	-	0.5
PC8. administer the use and value of the rest of the original material once a sample has been removed for analysis.	1	0.5	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC9. maintain record of procedures followed in order that sampling process may be repeated exactly irrespective of strategy used for sampling	0.5	0.5	-	0.5
Perform analysis through classical analytical techniques	**10.5**	**5.5**	**-**	**5.5**
PC10. identify whether the analyte is either organic or inorganic prior to qualitative analysis of any given compound	1	0.5	-	0.5
PC11. perform classical qualitative analysis by adding one or a series of chemical reagents to the analyte	1	0.5	-	0.5
PC12. draw inferences about the identity of analyte by observing the chemical reactions and their products	1	0.5	-	0.5
PC13. administer the result of the assay between added chemical reagents and functional groups of organic molecules	1	0.5	-	0.5
PC14. • identify molecules by following measurements in addition to chemical reactions between chemical reagents and functional groups • Measurements - including those of boiling points, melting points, and densities, etc.	1	0.5	-	0.5
PC15. examine during gravimetric analysis an excess of added reagent reacts with the analyte to form a precipitate	1	0.5	-	0.5
PC16. handle precipitate by filtering, drying, and weighing as its mass is used to calculate the concentration or amount of assayed substance in the analyte	1	0.5	-	0.5
PC17. examine during titrimetric (Volumetric) analysis, the reagent (the titrant) is added gradually or stepwise to the analyte from a buret	1	0.5	-	0.5
PC18. • administer equivalence point of the titration, typically observed as a colour change • Point of titration - the point at which the quantities of the two reacting species are equivalent	1	0.5	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC19. supervise if no spontaneous colour change occurs during the titration, a small amount of a chemical indicator is added to the analyte prior to the titration	0.5	0.5	-	0.5
PC20. calculate the amount or concentration of the analyte by accessing the end point with the concentration of the titrant	1	0.5	-	0.5
Carry out quantitative and qualitative analysis	**23.5**	**14.5**	**-**	**14.5**
PC21. • instill the sample manually into carrier gas with a syringe, via a sample loop and analytical valve which are in-line with the carrier stream • Carrier Gas – nitrogen, helium, argon, and hydrogen or air	1	0.5	-	0.5
PC22. ensure in automated instruments, the carrier gas is switched in line with the sample loop for a precise, pre-determined period of time, injecting the sample onto the column administer the cycle is repeated continuously in the process Gas Chromatography (GC)/ Mass spectrometry (MS) analysis	1	0.5	-	0.5
PC23. mount columns in an oven with precise temperature and carrier gas flow control	1	0.5	-	0.5
PC24. monitor that under tightly controlled conditions, analysis is repeated; the same gas component will exit the column (elute) with the same timing as the previous analysis	1	0.5	-	0.5
PC25. regulate separated gasses leave (or elute from) the column(s), and pass through a detector which, in turn, responds with an output signal	1	0.5	-	0.5
PC26. observe that signal generates the characteristic GC peaks in a chromatogram and peaks are proportional in area to the concentration of gases of interest	1	0.5	-	0.5
PC27. instill a medium into which the target analytes can be preferentially partitioned followed by the separation of the analyte-containing phase from the remainder of the sample	1	0.5	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC28. administer sample is heated, have its pH adjusted, or be otherwise treated to make analytes more accessible to the partitioning medium	1	0.5	-	0.5
PC29. • place solid analytes in solution for chromatographic separation irrespective of the extraction process • Solution - additional pretreatments, such as liquid/liquid extraction (LLE) or solid-phase extraction (SPE), to remove substances that might interfere with the chromatographic separation and the detection of the target analytes • Extraction Process – Liquid extraction, Ultrasonic simulation, Steam distillation	1	0.5	-	0.5
PC30. employ Liquid-liquid extraction, on- and offline solid-phase extraction, and gel permeation chromatography (GPC) in the partitioning of target analytes in liquid samples or liquid extracts of solid samples	1	0.5	-	0.5
PC31. filter turbid or otherwise opaque liquids to remove particulates prior to extraction	1	0.5	-	0.5
PC32. install guard columns at the head of the analytical column to prevent contamination of the stationary phase by the sample matrix	1	0.5	-	0.5
PC33. ensure the guard column is connected to the precolumn by means of a transfer valve	0.5	0.5	-	0.5
PC34. administer automated sampling system instead of manual injectors to get highly reproducible injection volume, low carryover, and increased sample throughput	0.5	0.5	-	0.5
PC35. assemble HPLC pumps to deliver pulse-free flow with high precision over a wide flow rate range with low dead volume	0.5	0.5	-	0.5
PC36. maintain a limit of detection (LOD) and limit of quantification (LOQ) as two to three and 10 to 20 times the noise level. LOD for food additives can be as low as 100 parts per trillion	1	0.5	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC37. • administer other important detection parameters are appropriate, as per defined standards • Parameters - dynamic range, calibration linearity, chromatographic selectivity, and qualitative information	1	0.5	-	0.5
PC38. automate derivatization and integrate online within the analysis to improve sensitivity and/or selectivity of an optical detector (UV, visible, or fluorescence) when analytes lack chromophores or an adequate optical response	1	0.5	-	0.5
PC39. administer to install of a lamp in Atomic Absorption (AA) unit for the analyte	1	0.5	-	0.5
PC40. regulate by nebulizing liquid sample and spray into an atomizer, or atom source	0.5	0.5	-	0.5
PC41. observe that the heat source dries the sample and atomizes it, breaking it down into individual elements. The light at a certain wavelength is passed through the atomized sample, where it is absorbed by elements of interest, and that energy absorption is measured	1	0.5	-	0.5
PC42. review in flame AA, the atomizer or atom source is in the form of an air/acetylene or nitrous oxide/acetylene flame	0.5	0.5	-	0.5
PC43. coordinate to introduce the sample as an aerosol into the flame, which is aligned so that the light beam passes through the flame, where the light is absorbed, measured, and reported by the instrument	0.5	0.5	-	0.5
PC44. facilitate Graphite Furnace Atomic Absorption (GFAA) by introducing the sample directly into a graphite tube, which is heated to remove liquid solvent and to atomize the remaining sample	1	0.5	-	0.5
PC45. observe that sample introduced to the tube is atomized, and the atoms are retained within the tube for an extended period	0.5	0.5	-	0.5
PC46. check light is passed through this tube and absorbance is measured and as a result of this improved analyte control sensitivity and detection limits are significantly improved	0.5	0.5	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC47. administer in Induction Coupled Plasma Mass Spectrometry (ICP-MS), the sample is atomized and ionized by the plasma source	0.5	0.5	-	0.5
PC48. observe charged ions are passed into a mass spectrometer, where ions are split according to their mass before reaching the detector, which in turn identifies and quantifies the elements present in a sample based on their mass	0.5	0.5	-	0.5
PC49. facilitate significant improvement in sensitivity by following the ICP-MS approach	0.5	0.5	-	0.5
Carry out reporting and documentation	**3.5**	**3.5**	**-**	**3.5**
PC50. review and update the test methods and procedures as per the schedule	0.5	0.5	-	0.5
PC51. ensure the updation of logbooks, worksheets, calibration records, parameters of columns, reagents, volumetric solution, and working standards	0.5	0.5	-	0.5
PC52. account for defects/problems/incidents/quality issues/test results as applicable as per SOP	0.5	0.5	-	0.5
PC53. prepare analytical and quality control reports for detailed findings and recommendations as per SOPs	0.5	0.5	-	0.5
PC54. prepare reports of validations, deviations, and incidents to the production and quality assurance team in compliance with GLP and GMP	0.5	0.5	-	0.5
PC55. facilitate to document testing results and analysis accurately	0.5	0.5	-	0.5
PC56. maintain all original and controlled document files and quality records in a timely and accurate manner and made them available for inspection and auditory purposes	0.5	0.5	-	0.5
NOS Total	**44**	**28**	**-**	**28**

National Occupational Standards (NOS) Parameters

NOS Code	FIC/N7630
NOS Name	Carry out Physical, Chemical, and Instrumental Analysis
Sector	Food Processing
Sub-Sector	Fruits and Vegetables, Food Grain Milling (Including oil seeds), Dairy Products, Meat and Poultry, Fish and Seafood, Bread and Bakery, Alcoholic Beverages, Aerated Water/Soft Drinks
Occupation	Quality Analysis/ Assurance
NSQF Level	5
Credits	6
Version	1.0
Last Reviewed Date	23/06/2023
Next Review Date	23/06/2026
NSQC Clearance Date	23/06/2023

FIC/N7631: Carry out maintenance and decommissioning of equipment

Description

This OS unit is about carrying out the activities for preventive maintenance, repairing equipment and decommissioning of equipment along with documentation and reporting as per standards.

Scope

The scope covers the following :

- This unit/task covers the following:
- Carry out preventive planned maintenance, Overhaul instrumentation equipment, Decommissioning of equipment, Carry out documentation as per regulatory compliance standards

Elements and Performance Criteria

Carry out preventive planned maintenance

To be competent, the user/individual on the job must be able to:

PC1. work safely at all times, complying with health and safety, environmental and other relevant food and drink regulations, directives and guidelines

PC2. obtain and use the correct issue of company and/or manufacturers' drawings and maintenance documentation

PC3. plan and communicate the maintenance activities so as to minimise any disruption to normal working

PC4. follow the relevant maintenance schedules to carry out the required work

PC5. insert or override any relevant system trip defeats (including fire extinguishant, emergency shutdown) in accordance with organisational procedures

PC6. isolate instruments (including process, electrical, hydraulic, pneumatic, mechanical) in accordance with organisational procedures

PC7. provide and maintain safe access and working arrangements for the maintenance area

PC8. carry out the maintenance activities in accordance with organisational procedures within the limits of your personal authority

PC9. carry out functional tests and adjust equipment to specification

PC10. re-connect and return the system to service on completion of the maintenance activities

PC11. report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule

PC12. complete maintenance records and documentation in accordance with organisational requirements

PC13. dispose of waste materials in accordance with safe working practices and approved procedures

Overhaul instrumentation equipment

To be competent, the user/individual on the job must be able to:

PC14. obtain and use the correct equipment repair/overhauling documentation (including manuals, drawings, maintenance records)

PC15. follow the relevant repair/overhauling schedules to carry out the required work

PC16. provide and maintain safe access and working arrangements for the repair/overhauling area

PC17. follow decontamination procedures for instruments that have been used with hazardous (including toxic, corrosive, inflammable, explosive, radioactive) substances

PC18. apply electrostatic discharge (ESD) protection procedures as per procedures

PC19. establish and mark/label components to aid in re-assembly

PC20. check that equipment is maintained free from damage and foreign objects

PC21. carry out repair/overhaul to the agreed level, using correct tools and techniques as per standards

PC22. identify and store all removed components in accordance with organisational procedures

PC23. report any instances where repair/overhauling activities cannot be fully met, or where there are identified defects outside planned repair/overhauling schedule

PC24. dispose of unwanted components, waste materials and substances, in accordance with safe working practices approved procedures

Decommissioning of equipment

To be competent, the user/individual on the job must be able to:

PC25. conduct equipment survey or inspection before planning for decommissioning

PC26. identify and select equipment/facility to be decommissioned for recycling, reuse or resale

PC27. record manufacturer, serial number, equipment specs, part number, suite and rack location/area and photos, etc. before initiating the process

PC28. coordinate with facility managers to finalize equipment inventory for review and approval

PC29. administer decommissioning of approved equipment ensuring site security

PC30. direct wiped, decommissioned and disconnected equipment towards the circular repository

PC31. prepare transfer notes and reports for audit compliance

Carry out documentation as per regulatory compliance standards

To be competent, the user/individual on the job must be able to:

PC32. identify procedures, records and workplace documentation needed for audit

PC33. document evidence collection methods and sources along with checklists developed as per specifications

PC34. identify and categorized non - conformities observed from prior audit trails and plan actionable steps

PC35. maintain records of effectiveness of corrective actions

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. health and safety and environmental requirements of the area in which the repair/overhaul activity is to take place, and the responsibility these requirements place on you not to compromise food safety

KU2. isolation and lock-off procedure or permit-to-work procedure that applies to the equipment, including the critical control points

KU3. specific health and safety food and drink precautions to be applied during the repair/overhaul activity, and their effects on other

KU4. responsibilities in relationship to Hazard Analysis and Critical Control Points (HACCP), Threat Assessment and Critical Control Points (TACCP), Vulnerability Assessment and Critical Control Points (VACCP) during the repair/overhaul activities

KU5. what constitutes a hazardous voltage and how to recognize victims of electric shock

KU6. how to reduce the risks of a phase to earth shock (including insulated tools, rubber mating and isolating transformers)

KU7. protective equipment that you need to use for both personal protection (PPE) and protection of the instrumentation and control equipment being repaired

KU8. hazards associated with repairing/overhauling instrumentation and control equipment, and with the tools and equipment used, and how to minimise them and reduce any risks

KU9. how to extract and use information from equipment manuals, history/maintenance reports, charts, circuit and physical layouts, specifications, symbols used in instrumentation and control circuits, and other documents needed in the repair/overhaul process

KU10. erminology used with instrumentation and control equipment, and the use of system diagrams and associated symbols

KU11. basic principles of operation of the instrumentation and control equipment being repaired/overhauled, and the performance

KU12. how to make sensory checks (by sight, sound, smell, touch) where to obtain, and how to interpret drawings, schematic and physical diagrams, specifications, flow charts, manufacturers' manuals, maintenance schedules and other documents required for the maintenance activities the various planned maintenance schedules that are generally used (including condition-based maintenance, scheduled maintenance and total preventative maintenance (TPM)

KU13. schedules and methods to be followed, in compliance with company procedures for planned maintenance on instrumentation and control equipment

KU14. basic principles of how the system functions, its operating sequence, the working purpose of individual units/components and how they interact

KU15. principles of the equipment's design feature for safe operation in a food or drink environment including minimising the chance of contaminates or foreign bodies in the final product

KU16. equipment operating and control procedures, and how to apply them along with the planned maintenance procedures

KU17. reasons for making sure that control systems are isolated or put into manual control, and appropriate trip locks, keys or program overrides are inserted, before removing any sensors or instruments from the system 18. the identification of instrument sensors (including how to identify their markings, calibration information, operating parameters and working range)

KU18. methods of checking and calibrating instruments, and the type and range of equipment that can be used

KU19. testing methods and procedures to be used to check that system conforms within acceptable limits

KU20. procedure for obtaining consumables and `lifed' or consumable items that will require replacing during the planned maintenance activity

KU21. company policy on the repair/replacement of components during the maintenance

KU22. problems that can occur whilst carrying out planned maintenance activities, and how they can be avoided

KU23. organisational procedure to be adopted for the safe disposal of waste of all types of materials including any spoilt food or drink products

KU24. extent of your own authority and to whom you should report if you have problems that you cannot resolve

KU25. legislation, regulations, orders, codes and standards applicable to the areas being audited

KU26. communication methods relevant to different groups and audience

KU27. legislation that impacts on acceptable communication methods and conduct including anti-discrimination, anti-harassment and privacy legislation

KU28. methods used to identify Critical Control Points and establish critical limits, suited to the nature of the hazard, the requirements of the audit and the industry sector

KU29. the underlying principles of risk-based approaches to controlling food safety hazards including HACCP as described in the Codex Alimentarius Guidelines

KU30. vocabulary and terms relating to food safety, including terms and jargon to describe technical processes, industry standards and common biological and chemical terms

KU31. activities involved in decommissioning such as, wiping data and migrating services, checking processes for backup and recovery are fully functional, identifying any SLAs, licenses and warranties that may need to be cancelled, disconnecting utilities, considering the fire safety of the vacated facility or area, ensuring the site remains secure during and post-decommissioning to prevent trespassing

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read and interpret information such as product labels, safety data sheets, instructions, procedures, and specifications to determine activities in honey extraction processes

GS2. write and document using appropriate terminology and in specified format

GS3. communicate with others effectively

GS4. takes responsibility for planning, sequencing, and prioritising tasks

GS5. analyse and report variances promptly

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Carry out preventive planned maintenance	**19**	**13**	**-**	**6.5**
PC1. work safely at all times, complying with health and safety, environmental and other relevant food and drink regulations, directives and guidelines	1	1	-	0.5
PC2. obtain and use the correct issue of company and/or manufacturers' drawings and maintenance documentation	1	1	-	0.5
PC3. plan and communicate the maintenance activities so as to minimise any disruption to normal working	2	1	-	0.5
PC4. follow the relevant maintenance schedules to carry out the required work	1	1	-	0.5
PC5. insert or override any relevant system trip defeats (including fire extinguishant, emergency shutdown) in accordance with organisational procedures	2	1	-	0.5
PC6. isolate instruments (including process, electrical, hydraulic, pneumatic, mechanical) in accordance with organisational procedures	1	1	-	0.5
PC7. provide and maintain safe access and working arrangements for the maintenance area	2	1	-	0.5
PC8. carry out the maintenance activities in accordance with organisational procedures within the limits of your personal authority	1	1	-	0.5
PC9. carry out functional tests and adjust equipment to specification	2	1	-	0.5
PC10. re-connect and return the system to service on completion of the maintenance activities	1	1	-	0.5
PC11. report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule	2	1	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. complete maintenance records and documentation in accordance with organisational requirements	1	1	-	0.5
PC13. dispose of waste materials in accordance with safe working practices and approved procedures	2	1	-	0.5
Overhaul instrumentation equipment	**17**	**11**	**-**	**5.5**
PC14. obtain and use the correct equipment repair/overhauling documentation (including manuals, drawings, maintenance records)	1	1	-	0.5
PC15. follow the relevant repair/overhauling schedules to carry out the required work	1	1	-	0.5
PC16. provide and maintain safe access and working arrangements for the repair/overhauling area	1	1	-	0.5
PC17. follow decontamination procedures for instruments that have been used with hazardous (including toxic, corrosive, inflammable, explosive, radioactive) substances	2	1	-	0.5
PC18. apply electrostatic discharge (ESD) protection procedures as per procedures	1	1	-	0.5
PC19. establish and mark/label components to aid in re-assembly	2	1	-	0.5
PC20. check that equipment is maintained free from damage and foreign objects	2	1	-	0.5
PC21. carry out repair/overhaul to the agreed level, using correct tools and techniques as per standards	2	1	-	0.5
PC22. identify and store all removed components in accordance with organisational procedures	1	1	-	0.5
PC23. report any instances where repair/overhauling activities cannot be fully met, or where there are identified defects outside planned repair/overhauling schedule	2	1	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC24. dispose of unwanted components, waste materials and substances, in accordance with safe working practices approved procedures	2	1	-	0.5
Decommissioning of equipment	**7**	**7**	**-**	**4**
PC25. conduct equipment survey or inspection before planning for decommissioning	1	1	-	0.5
PC26. identify and select equipment/facility to be decommissioned for recycling, reuse or resale	1	1	-	0.5
PC27. record manufacturer, serial number, equipment specs, part number, suite and rack location/area and photos, etc. before initiating the process	1	1	-	0.5
PC28. coordinate with facility managers to finalize equipment inventory for review and approval	1	1	-	0.5
PC29. administer decommissioning of approved equipment ensuring site security	0.5	1	-	1
PC30. direct wiped, decommissioned and disconnected equipment towards the circular repository	1.5	1	-	0.5
PC31. prepare transfer notes and reports for audit compliance	1	1	-	0.5
Carry out documentation as per regulatory compliance standards	**4**	**4**	**-**	**2**
PC32. identify procedures, records and workplace documentation needed for audit	1	1	-	0.5
PC33. document evidence collection methods and sources along with checklists developed as per specifications	1	1	-	0.5
PC34. identify and categorized non - conformities observed from prior audit trails and plan actionable steps	1	1	-	0.5
PC35. maintain records of effectiveness of corrective actions	1	1	-	0.5
NOS Total	**47**	**35**	**-**	**18**

National Occupational Standards (NOS) Parameters

NOS Code	FIC/N7631
NOS Name	Carry out maintenance and decommissioning of equipment
Sector	Food Processing
Sub-Sector	Generic
Occupation	Quality Analysis/ Assurance
NSQF Level	5
Credits	5
Version	1.0
Last Reviewed Date	23/06/2023
Next Review Date	23/06/2026
NSQC Clearance Date	23/06/2023

FIC/N9904: Ensure food safety at the workplace

Description

This unit is about performing various tasks for ensuring food safety at the workplace.

Scope

The scope covers the following :

- Ensure food safety at the workplace

Elements and Performance Criteria

Ensure food safety at the workplace

To be competent, the user/individual on the job must be able to:

PC1. identify the biological, chemical, and physical hazards at various stages of food processing. Stages: procurement of raw material; production, manufacturing, distribution, delivery of finished product, etc.

PC2. implement food safety procedures and regulatory policies at the food processing workplace. Policies: Visitor's Policy, Health declaration policy, Jewellery policy, Quality, and safety policy

PC3. ensure that the materials are adequately isolated to prevent them from contamination. Materials: raw materials, processed materials, finished goods, etc. Contamination: Physical, Chemical, Biological & shop floor environment

PC4. establish and follow Good Manufacturing Practices (GMPs) laid down in applicable Food Safety and Standards Authority of India (FSSAI) guidelines. Good Manufacturing Practices (GMPs): location and layout(ergonomics), cleaning and sanitation, equipment and containers, pest control, facilities (lighting, water supply, drainage and waste disposal, air quality and ventilation), food storage, transportation, and distribution etc.

PC5. establish and follow allergen management system for handling and storage of raw materials

PC6. establish and follow monitoring systems like Hazard Analysis Critical Control Point (HACCP), product information and consumer awareness, product recall and withdrawal, and traceability HACCP: Hazard identification, identification of critical control points, establish critical limits, corrective and preventive action. Product information and consumer awareness: Product labelling and consumer education. Traceability: forward and backward traceability

PC7. take appropriate action in instances such as VACCP (Vulnerability Assessment Critical Control Points) and TACCP (Threat Assessment Critical Control Points)

PC8. plan, conduct, manage, consolidate outcomes, and close corrective actions of workplace audit on food safety as per FSSAI guidelines, address the non-conformance with root cause analysis (RCA), corrective action preventive action(CAPA)

PC9. address issues pertaining to food safety and quality reported by the team members

PC10. record information such as food safety regulations followed, inspections done, faults observed, etc. as per standard procedure

PC11. organize trainings and workshops on food safety aspects such as Good Manufacturing Practices (GMP), HACCP, VACCP, TACCP, etc.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. various processes that take place in a food industry
KU2. biological, chemical, and physical hazards in a food industry
KU3. types of food contaminations, their causes, and ways to prevent it
KU4. organisational policy and procedures for ensuring food safety(such as Visitor's Policy, Health declaration policy, Jewelry policy, Quality, and safety policy)
KU5. applicable regulations for ensuring food safety as listed in 'The Food Safety and Standards Act, 2006'
KU6. role of HACCP in food industry, its constituents and procedure to implement it in an organisation
KU7. VACCP and TACCP and how to implement it effectively
KU8. how to conduct workplace food safety audits
KU9. types of allergen and allergen management at workplace
KU10. key observations and corrective actions to be applied for ensuring food safety
KU11. various issues that can arise during production and other processes as faced by team
KU12. information to be recorded in the work process
KU13. how to do root cause analysis and perform corrective action and preventive actions
KU14. how to conduct training of workforce on various food safety procedures such as GMP, HACCP, information to be shared, ways to report accidents, escalation of issues beyond own scope, etc.

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write an accident/incident report in local language or English
GS2. read and comprehend basic content to read labels, charts, signages and symbols
GS3. read and comprehend basic English to read product manuals for safe operation
GS4. question coworkers appropriately in order to clarify instructions and other issues
GS5. make appropriate decisions pertaining to the concerned area of work regarding the work objective, span of authority, responsibility, laid down procedure and guidelines
GS6. plan and organize the work schedule, work area, tools, equipment, and materials for improved productivity
GS7. identify probable solutions to the problems in hand
GS8. evaluate proposed solution with respect to key priorities and considerations
GS9. seek official and authorised sources of help and guidance to resolve problems that cannot be solved at one's level of authority
GS10. identify cause and effect relations in their area of work to anticipate potential problems and their solution
GS11. analyse the problem, suggest corrective actions and implement workable solutions

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Ensure food safety at the workplace	**30**	**70**	**-**	**-**
PC1. identify the biological, chemical, and physical hazards at various stages of food processing. Stages: procurement of raw material; production, manufacturing, distribution, delivery of finished product, etc.	-	-	-	-
PC2. implement food safety procedures and regulatory policies at the food processing workplace. Policies: Visitor's Policy, Health declaration policy, Jewellery policy, Quality, and safety policy	-	-	-	-
PC3. ensure that the materials are adequately isolated to prevent them from contamination. Materials: raw materials, processed materials, finished goods, etc. Contamination: Physical, Chemical, Biological & shop floor environment	-	-	-	-
PC4. establish and follow Good Manufacturing Practices (GMPs) laid down in applicable Food Safety and Standards Authority of India (FSSAI) guidelines. Good Manufacturing Practices (GMPs): location and layout(ergonomics), cleaning and sanitation, equipment and containers, pest control, facilities (lighting, water supply, drainage and waste disposal, air quality and ventilation), food storage, transportation, and distribution etc.	-	-	-	-
PC5. establish and follow allergen management system for handling and storage of raw materials	-	-	-	-
PC6. establish and follow monitoring systems like Hazard Analysis Critical Control Point (HACCP), product information and consumer awareness, product recall and withdrawal, and traceability HACCP: Hazard identification, identification of critical control points, establish critical limits, corrective and preventive action. Product information and consumer awareness: Product labelling and consumer education. Traceability: forward and backward traceability	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC7. take appropriate action in instances such as VACCP (Vulnerability Assessment Critical Control Points) and TACCP (Threat Assessment Critical Control Points)	-	-	-	-
PC8. plan, conduct, manage, consolidate outcomes, and close corrective actions of workplace audit on food safety as per FSSAI guidelines, address the non-conformance with root cause analysis (RCA), corrective action preventive action(CAPA)	-	-	-	-
PC9. address issues pertaining to food safety and quality reported by the team members	-	-	-	-
PC10. record information such as food safety regulations followed, inspections done, faults observed, etc. as per standard procedure	-	-	-	-
PC11. organize trainings and workshops on food safety aspects such as Good Manufacturing Practices (GMP), HACCP, VACCP, TACCP, etc.	-	-	-	-
NOS Total	**30**	**70**	**-**	**-**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	FIC/N9904
NOS Name	Ensure food safety at the workplace
Sector	Food Processing
Sub-Sector	Generic
Occupation	Generic
NSQF Level	5
Credits	TBD
Version	1.0
Last Reviewed Date	23/06/2023
Next Review Date	23/06/2026
NSQC Clearance Date	23/06/2023

DGT/VSQ/N0101: Employability Skills (30 Hours)

Description

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

Scope

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

Elements and Performance Criteria

Introduction to Employability Skills

To be competent, the user/individual on the job must be able to:

PC1. understand the significance of employability skills in meeting the job requirements

Constitutional values – Citizenship

To be competent, the user/individual on the job must be able to:

PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices

Becoming a Professional in the 21st Century

To be competent, the user/individual on the job must be able to:

PC3. explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.

Basic English Skills

To be competent, the user/individual on the job must be able to:

PC4. speak with others using some basic English phrases or sentences

Communication Skills

To be competent, the user/individual on the job must be able to:

PC5. follow good manners while communicating with others

PC6. work with others in a team

Diversity & Inclusion

To be competent, the user/individual on the job must be able to:

PC7. communicate and behave appropriately with all genders and PwD

PC8. report any issues related to sexual harassment

Financial and Legal Literacy

To be competent, the user/individual on the job must be able to:

PC9. use various financial products and services safely and securely

PC10. calculate income, expenses, savings etc.

PC11. approach the concerned authorities for any exploitation as per legal rights and laws

Essential Digital Skills

To be competent, the user/individual on the job must be able to:

PC12. operate digital devices and use its features and applications securely and safely

PC13. use internet and social media platforms securely and safely

Entrepreneurship

To be competent, the user/individual on the job must be able to:

PC14. identify and assess opportunities for potential business

PC15. identify sources for arranging money and associated financial and legal challenges

Customer Service

To be competent, the user/individual on the job must be able to:

PC16. identify different types of customers

PC17. identify customer needs and address them appropriately

PC18. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

To be competent, the user/individual on the job must be able to:

PC19. create a basic biodata

PC20. search for suitable jobs and apply

PC21. identify and register apprenticeship opportunities as per requirement

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. need for employability skills

KU2. various constitutional and personal values

KU3. different environmentally sustainable practices and their importance

KU4. Twenty first (21st) century skills and their importance

KU5. how to use basic spoken English language

KU6. Do and dont of effective communication

KU7. inclusivity and its importance

KU8. different types of disabilities and appropriate communication and behaviour towards PwD

KU9. different types of financial products and services

KU10. how to compute income and expenses
KU11. importance of maintaining safety and security in financial transactions
KU12. different legal rights and laws
KU13. how to operate digital devices and applications safely and securely
KU14. ways to identify business opportunities
KU15. types of customers and their needs
KU16. how to apply for a job and prepare for an interview
KU17. apprenticeship scheme and the process of registering on apprenticeship portal

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. communicate effectively using appropriate language
GS2. behave politely and appropriately with all
GS3. perform basic calculations
GS4. solve problems effectively
GS5. be careful and attentive at work
GS6. use time effectively
GS7. maintain hygiene and sanitisation to avoid infection

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Introduction to Employability Skills	1	1	-	-
PC1. understand the significance of employability skills in meeting the job requirements	-	-	-	-
Constitutional values – Citizenship	1	1	-	-
PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices	-	-	-	-
Becoming a Professional in the 21st Century	1	3	-	-
PC3. explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.	-	-	-	-
Basic English Skills	2	3	-	-
PC4. speak with others using some basic English phrases or sentences	-	-	-	-
Communication Skills	1	1	-	-
PC5. follow good manners while communicating with others	-	-	-	-
PC6. work with others in a team	-	-	-	-
Diversity & Inclusion	1	1	-	-
PC7. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC8. report any issues related to sexual harassment	-	-	-	-
Financial and Legal Literacy	3	4	-	-
PC9. use various financial products and services safely and securely	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. calculate income, expenses, savings etc.	-	-	-	-
PC11. approach the concerned authorities for any exploitation as per legal rights and laws	-	-	-	-
Essential Digital Skills	**4**	**6**	**-**	**-**
PC12. operate digital devices and use its features and applications securely and safely	-	-	-	-
PC13. use internet and social media platforms securely and safely	-	-	-	-
Entrepreneurship	**3**	**5**	**-**	**-**
PC14. identify and assess opportunities for potential business	-	-	-	-
PC15. identify sources for arranging money and associated financial and legal challenges	-	-	-	-
Customer Service	**2**	**2**	**-**	**-**
PC16. identify different types of customers	-	-	-	-
PC17. identify customer needs and address them appropriately	-	-	-	-
PC18. follow appropriate hygiene and grooming standards	-	-	-	-
Getting ready for apprenticeship & Jobs	**1**	**3**	**-**	**-**
PC19. create a basic biodata	-	-	-	-
PC20. search for suitable jobs and apply	-	-	-	-
PC21. identify and register apprenticeship opportunities as per requirement	-	-	-	-
NOS Total	**20**	**30**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0101
NOS Name	Employability Skills (30 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	2
Credits	1
Version	1.0
Last Reviewed Date	23/06/2023
Next Review Date	23/06/2026
NSQC Clearance Date	23/06/2023

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.

2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.

3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.

4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below).

5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criterion.

6. To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.

7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Minimum Aggregate Passing % at QP Level : 70

(**Please note**: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

Minimum Passing % at NOS Level: 70

(**Please note**: A Trainee must score the minimum percentage for each NOS separately as well as on the QP as a whole.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
FIC/N7629.Planning, Organizing, and Setting up of Food Analysis Laboratory	38	31	-	31	100	25
FIC/N7630.Carry out Physical, Chemical, and Instrumental Analysis	44	28	-	28	100	25
FIC/N7631.Carry out maintenance and decommissioning of equipment	47	35	-	18	100	25
FIC/N9904.Ensure food safety at the workplace	30	70	-	-	100	15
DGT/VSQ/N0101.Employability Skills (30 Hours)	20	30	-	-	50	10
Total	**179**	**194**	**-**	**77**	**450**	**100**

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
AA	Assessment Agency
AB	Awarding Body
ISCO	International Standard Classification of Occupations
NCO	National Classification of Occupations
NCrF	National Credit Framework
NOS	National Occupational Standard(s)
NQR	National Qualification Register
NSQF	National Skills Qualifications Framework
OJT	On-the-Job Training
NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.
National Occupational Standard	NOS defines the measurable performance outcomes required from an individual engaged in a particular task. They list down what an individual performing that task should know and also do.
Qualifications	A formal outcome of an assessment and validation process is obtained when a competent body determines that an individual has achieved learning outcomes to given standards
Qualification File	A Qualification File is a template designed to capture necessary information of a Qualification from the perspective of NSQF compliance. The Qualification File will be normally submitted by the awarding body for the qualification.
Sector	A grouping of professional activities on the basis of their main economic function, product, service, or technology.
Long Term Training	Long-term skilling means any vocational training program undertaken for a year and above.
Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.

Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standard	NOS are occupational standards which apply uniquely in the Indian context.
Qualification Pack(QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.