Model Curriculum

QP Name: Fundamentals of Food Quality and Testing

QP Code: FIC/N7633

Version: 1.0

NSQF Level: 4.0

Model Curriculum Version: 1.0

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Training Parameters

Sector	Food Processing
Sub-Sector	Multi-sectorial
Occupation	Quality Analysis/Assurance
Country	India
NSQF Level	4.0
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2113.0500
Minimum Educational Qualification and Experience	12th Grade pass or equivalent OR 10th Grade pass with 3 years of experience in food processing industry OR Previous relevant Qualification of NSQF Level 3.0 with 3 years of experience in food processing industry OR Previous relevant qualification of NSQF Level 3.5 with 1.5 years of experience in food processing industry
Pre-Requisite License or Training	NA
Minimum Job Entry Age	NA
Last Reviewed On	08-05-2025
Next Review Date	07-05-2028
NSQC Approval Date	08-05-2025
QP Version	1.0
Model Curriculum Creation Date	08-05-2025
Model Curriculum Valid Up to Date	07-05-2028
Model Curriculum Version	1.0
Minimum Duration of the Course	60 Hours
Maximum Duration of the Course	60 Hours

Program Overview

This section summarises the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills to:

- Explain the fundamentals of food quality and testing in a food processing facility.

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration (Hours)	Practical Duration (Hours)	On-the-Job Training Duration (Mandatory) (Hours)	On-the-Job Training Duration (Recommended) (Hours)	Total Duration (Hours)
FIC/N7633: Fundamentals of Food Quality and Testing **NOS Version No.: 1.0** **NSQF Level: 4.0**	**20:00**	**40:00**	**00:00**	**00:00**	**60:00**
Module 1: Introduction to the Food Processing Sector and Fundamentals of Food Quality & Testing	02:00	00:00	00:00	00:00	02:00
Module 2: Testing of Food and Packaging Material	07:00	20:00	00:00	00:00	27:00
Module 3: Quality Monitoring & Analysis	05:00	09:00	00:00	00:00	14:00
Module 4: Compliance with Regulations and Standards	02:00	03:00	00:00	00:00	05:00
Module 5: Compliance with Good Food Laboratory Practices (GFLPs)	04:00	08:00	00:00	00:00	12:00
Total Duration	**20:00**	**40:00**	**00:00**	**00:00**	**60:00**

Module Details

Module 1: Introduction to the Food Processing Sector and Fundamentals of Food Quality & Testing
Mapped to FIC/N7633, v1.0

Terminal Outcomes:

- Explain the importance of Food Processing Industry.
- Discuss the Fundamentals of Food Quality and Testing.

Duration (in hours): 02:00	Duration (in hours): 00:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Define food processing. - Describe the various sub-sectors of food processing industry. - Discuss the scope of employment in the food processing industry. - Explain the concept of food quality and its critical role in food processing. - Describe the key principles and guidelines outlined in the Food Safety and Standards Act, 2006.	
Classroom Aids	
Training Kit - Facilitator's Guide, Participant's Handbook, Presentations and Software, Whiteboard, Marker, Projector, Laptop, Video Films	
Tools, Equipment and Other Requirements	
Nil	

Module 2: Testing of Food and Packaging Material
Mapped FIC/N7633, v1.0

Terminal Outcomes:

- Explain the principles of physical, chemical, and microbiological testing of food.
- Discuss the methods and tools used for food testing and analysis.
- Elucidate the process of conducting physical tests on packaging materials and how the results influence material selection and design.

Duration (in hours): 07:00	Duration (in hours): 20:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Explain the principles of sensory evaluation, including taste, texture, aroma, and appearance, and their significance in assessing food quality. - Describe the process of conducting sensory tests, including how to interpret results to evaluate food products. - Discuss the basic physical properties of food such as texture, colour, and viscosity, and their impact on food quality. - Elucidate the methods for sampling food for physical, chemical, and microbiological testing, and their importance in ensuring accurate results. - Explain the significance of physical test results and their role in maintaining food quality and consistency. - Describe the use of texture analyzers, colorimeters, viscometers, and moisture analyzers in the physical testing of food. - Discuss the chemical properties of food like pH, acidity, sugar content, and fat content, and how these are tested. - Elucidate the use of pH meters, titrators, refractometers, and spectrophotometers for chemical testing and their role in food analysis. - Explain the standard chemical tests, including pH measurement, moisture content, and fat content analysis. - Describe the principles of microbiology relevant to food safety, including types of	- Demonstrate how to prepare food samples for physical tests, ensuring they are representative. - Show how to observe and accurately record physical attributes such as colour, size, shape, and texture. - Demonstrate how to operate basic physical testing instruments like texture analyzers and colorimeters. - Show how to handle, store, and dispose of chemicals used in testing properly to ensure safety and compliance. - Demonstrate how to perform standard chemical tests such as pH measurement and moisture content analysis using appropriate equipment. - Show how to prepare samples for microbiological testing, including dilution and plating, while following aseptic techniques. - Demonstrate how to use microbiological testing tools and equipment, such as incubators and microscopes. - Show how to count colony-forming units (CFUs) and identify basic microbial types and indicator microorganisms. - Demonstrate how to interpret microbiological test results and document findings accurately. - Demonstrate the evaluation of food quality regularly to ensure compliance with applicable standards and customer expectations.

microorganisms like bacteria, yeasts, and moulds.

- Discuss the process of dilution and plating for microbial analysis and its importance in food safety.

- Elucidate the significance of microbial load in food safety and quality, and how it is monitored.

- Describe the Standard Operating Procedures (SOPs) for physical, chemical, and microbiological testing.

- Explain the safety protocols for handling samples, chemicals, and microorganisms during food testing.

- Explain the importance of monitoring environmental conditions in the manufacturing area.

- Discuss the documentation and record maintenance requirements for food testing and their importance in ensuring compliance and accuracy.

- Describe the types of tests performed on packaging materials to evaluate their effectiveness in protecting food.

- Explain how the tests performed on packaging materials determine the material's suitability for food protection.

- Demonstrate the process of conducting sensory tests and interpreting results.

- Show how to identify areas of improvement in food quality through regular inspections, audits, and assessments.

- Demonstrate the implementation of corrective actions based on evaluation findings, ensuring continuous compliance with applicable food quality standards.

Classroom Aids

Training Kit - Facilitator's Guide, Participant's Handbook, Presentations and Software, Whiteboard, Marker, Projector, Laptop, Video Films

Tools, Equipment and Other Requirements

Weighing Balance, Moisture Analyzer, Texture Analyzer, Refractometer, Viscometer, Colorimeter/Spectrophotometer, pH Meter, Titration Apparatus, Pipettes, Volumetric Flasks, Solvent Extraction Equipment, Autoclave, Incubator, Laminar Flow Hood, Petri Dishes, Microscope, Colony Counter

Module 3: Quality Monitoring & Analysis
Mapped FIC/N7633, v1.0

Terminal Outcomes:

- Explain the role of quality control systems in ensuring food safety and consistency.
- Demonstrate the development and implementation of effective quality control protocols.
- Discuss the importance of regular quality monitoring and analysis in food production.

Duration (in hours): 05:00	Duration (in hours): 09:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Explain the economic impact of maintaining high food quality standards. - Describe the effect of consistent food quality on customer satisfaction and brand loyalty. - Identify the process of designing quality control systems across various stages of food production. - Explain how to develop, implement and monitor quality control protocols. - Describe continuous evaluation and application of statistical methods in quality management. - Explain the relevant statistical methods. - Discuss the concepts of normality and morality. - Explain how to perform stock solution calculations with precision. - Explain the principles of sensory evaluation of food products, including taste, texture, aroma, and appearance. - Identify the significance of microbial load in food safety and quality. - Explain the Standard Operating Procedures (SOPs) specific to physical, chemical, and microbiological testing. - Describe the use of statistical tools, such as Statistical Process Control (SPC) to monitor food quality, identify trends, and implement improvements.	- Demonstrate the development of quality control systems across various stages of food production. - Show how to design, evaluate and refine quality control protocols throughout the production process. - Demonstrate using industry standards and methods to create strong quality control frameworks. - Demonstrate the application of different sampling techniques. - Demonstrate how to perform accurate weight metrology measurements and calibrate instruments to ensure precision in testing. - Demonstrate the evaluation of food quality regularly to ensure compliance with applicable standards and customer expectations. - Demonstrate the process of conducting sensory tests and interpreting results. - Show how to identify areas of improvement in food quality through regular inspections, audits, and assessments. - Demonstrate the implementation of corrective actions based on evaluation findings, ensuring continuous compliance with applicable food quality standards.
Classroom Aids	
Training Kit - Facilitator's Guide, Participant's Handbook, Presentations and Software, Whiteboard, Marker, Projector, Laptop, Video Films	

Tools, Equipment and Other Requirements

Weighing Balance, Moisture Analyzer, Texture Analyzer, Refractometer, Viscometer, Colorimeter/Spectrophotometer, Calipers, Micrometers, Sieve Shaker, pH Meter, Statistical Software

Module 4: Compliance with Regulations and Standards
Mapped FIC/N7633, v1.0

Terminal Outcomes:

- Discuss the importance of maintaining compliance with food safety regulations standards.

Duration (in hours): 02:00	Duration (in hours): 03:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the application of Indian and international food quality and safety regulations, including FSSAI guidelines and ISO 22000. • Describe the documentation and record maintenance requirements concerning food testing. • Identify the safety protocols related to the handling of samples, chemicals, and microorganisms. • Discuss the National Accreditation Board for Testing and Calibration Laboratories (NABL) standards. • Explain the quality standards for raw material and ingredient procurement to ensure food safety and quality consistency. • Elaborate on the vendor and supplier evaluation methods based on food safety and quality standards.	• Demonstrate how to interpret and apply the applicable regulations to meet legal and safety requirements. • Show how to follow changes in food safety regulations and standards. • Demonstrate the coordination with regulatory bodies and ensuring that the organization adheres to the latest food safety laws and guidelines
Classroom Aids	
Training Kit - Facilitator's Guide, Participant's Handbook, Presentations and Software, Whiteboard, Marker, Projector, Laptop, Video Films	
Tools, Equipment and Other Requirements	
pH Meter, Autoclave, Incubator, Laminar Flow Hood, Safety goggles, Handwashing Station, Fire extinguisher, First aid kit	

Module 5: Compliance with Good Food Laboratory Practices (GFLPs)
Mapped FIC/N7633, v1.0

Terminal Outcomes:

- Explain the applicable Good Food Laboratory Practices (GFLPs).
- Describe the lab equipment calibration and maintenance procedures.
- Demonstrate the application of new and emerging technologies in food quality and testing.

Duration (in hours): 04:00	Duration (in hours): 08:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Discuss the importance of food-testing laboratory hygiene and sanitation. - Explain the record maintenance requirements concerning laboratory equipment calibration and validation. - Explain the importance of following appropriate methods for the detection of or adulterants, pesticide residues, and heavy metals in food products. - Discuss the emerging technologies concerning food quality testing, such as Matrix-Assisted Laser Desorption/ Ionization (MALDI), Electrospray Ionization (ESI), Imaging Mass Spectrometry, Biosensors, Lab-on-a-chip, etc. - Explain the importance of following emerging trends, new research, and technological advancements in food safety and testing. - Describe the process of integrating new insights and innovations into a food processing organization's quality testing processes.	- Show the appropriate laboratory sanitation practices to prevent cross-contamination and maintain testing accuracy. - Demonstrate the equipment calibration and maintenance procedures. - Show the Good Food Laboratory Practice (GFLP) protocols for proper handling, storage, and disposal of reagents, samples, and hazardous waste. - Demonstrate the procedures for the maintenance of lab equipment. - Demonstrate the FSSAI-recommended detection methods for heavy metals in food, such as Atomic Absorption Spectroscopy (AAS) and Inductively Coupled Plasma Mass Spectrometry (ICP-MS) - Demonstrate the FSSAI-approved techniques for detecting pesticide residues in food products, including Gas Chromatography-Mass Spectrometry (GC-MS) and Liquid Chromatography-Mass Spectrometry (LC-MS).
Classroom Aids	
Training Kit - Facilitator's Guide, Participant's Handbook, Presentations and Software, Whiteboard, Marker, Projector, Laptop, Video Films	
Tools, Equipment and Other Requirements	
Calibrated Balances and Scales, pH Meters and Conductivity Meters, Refrigerators and Incubators, Autoclaves and Sterilizers, Calibration Standards and Certified Reference Materials	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialisation**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	*Specialization*	*Years*	*Specialization*	
B.Sc./B.Tech	Food Safety and Quality Management/ Food Science/ Food Technology/ Biotechnology/ Microbiology	3	Food Processing/ Quality Analysis	1	Training of Fundamentals of Food Quality and Testing	
M.Sc./ M.Tech	Food Safety and Quality Management/ Food Science/ Food Technology/ Biotechnology/ Microbiology	2	Food Processing/ Quality Analysis	1	Training of Fundamentals of Food Quality and Testing	
MBA	Food Safety and Quality Management	2	Food Processing/ Quality Analysis	1	Training of Fundamentals of Food Quality and Testing	

Trainer Certification	
Domain Certification	**Platform Certification**
Certified for Job Role: "Fundamentals of Food Quality and Testing" mapped to NOS: "FIC/N7633, v1.0". Minimum accepted score is 80%.	Recommended that the Trainer is certified for the Job Role: "Trainer (VET and Skills)", mapped to the Qualification Pack: "MEP/Q2601, v2.0". The minimum accepted score as per MEPSC guidelines is 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training/Assessment Experience**		**Remarks**
		Years	*Specialization*	*Years*	*Specialization*	
B.Sc./B.Tech	Food Safety and Quality Management/ Food Science/ Food Technology/ Biotechnology/ Microbiology	4	Food Processing/ Quality Analysis	1	Assessment of Fundamentals of Food Quality and Testing	
M.Sc./ M.Tech	Food Safety and Quality Management/ Food Science/ Food Technology/ Biotechnology/ Microbiology	3	Food Processing/ Quality Analysis	1	Assessment of Fundamentals of Food Quality and Testing	
MBA	Food Safety and Quality Management	3	Food Processing/ Quality Analysis	1	Training of Fundamentals of Food Quality and Testing	

Assessor Certification	
Domain Certification	**Platform Certification**
Certified for Job Role: "Fundamentals of Food Quality and Testing" mapped to NOS: "FIC/N7633, v1.0". Minimum accepted score is 80%.	Certified for the Job Role: "Assessor (VET and Skills)", mapped to the Qualification Pack: "MEP/Q2701, v2.0", with a minimum score of 80%.

Assessment Strategy

This section includes the processes involved in identifying, gathering and interpreting information to evaluate the learner on the required competencies of the program.

Assessment will be based on the concept of Independent Assessors empanelled with Assessment Agencies, identified, selected, trained and certified on Assessment techniques. These Assessors would be aligned to assess as per the laid down criteria.

Assessment Agency would conduct assessment only at the training centres of Training Partner or designated testing centers authorized by FICSI.

Ideally, the assessment will be a continuous process comprising of three distinct steps:

A. Mid-term assessment
B. Term/Final Assessment

Each National Occupational Standard (NOS) in the respective QPs will be assigned weightage. There in each Performance Criteria in the NOS will be assigned marks for theory and/or practical based on relative importance and criticality of function.

This will facilitate preparation of question bank / paper sets for each of the QPs. Each of these papers sets/question banks created by the Assessment Agency will be validated by the industry subject matter experts through FICSI, especially with regard to the practical test and the defined tolerances, finish, accuracy etc.

The following tools are proposed to be used for final assessment:

i. Written Test: This will comprise of (i) True/False Statements, (ii) Multiple Choice Questions, (iii) Matching Type Questions. Online system for this will be preferred.
ii. Practical Test: This will comprise a test job to be prepared as per project briefing following appropriate working steps, using necessary tools, equipment and instruments. Through observation it will be possible to ascertain candidate's aptitude, attention to details, quality consciousness etc. The end product will be measured against the pre-decided MCQ filled by the Assessor to gauge the level of his skill achievements.
iii. Structured Interview: This tool will be used to assess the conceptual understanding and the behavioural aspects as regards the job role and the specific task at hand.

On the Job:

1. Each module (which covers the job profile of Fundamentals of Food Quality and Testing) will be assessed separately.

2. The candidate must score 70% in each module to successfully complete the OJT.

3. Tools of Assessment that will be used for assessing whether the candidate is having desired skills and etiquette of dealing with customers, understanding needs & requirements, assessing the customer and perform Soft Skills effectively:

- Videos of Trainees during OJT
- Answer Sheets of Question Banks
- Assessing the Logbook entries of Trainees at Employer location
- Employer Performance Feedback.

4. Assessment of each Module will ensure that the candidate is able to:

- Testing the Quality of Food and Packaging Materials
- Monitoring and Analyzing Food Quality
- Ensuring Compliance with Relevant Regulations and Standards
- Adhering to Good Food Laboratory Practices

References

Glossary

Term	Description
Declarative Knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning Outcome	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
OJT (R)	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work, or produce a tangible work output by applying cognitive, affective, or psychomotor skills.
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do it upon the completion of the training.
Terminal Outcome	Terminal outcome is a statement of what a learner will know, understand and be able to do upon the completion of a module. A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

Term	Description
NCVET	National Council for Vocational Education and Training
FICSI	Food Industry Capacity & Skill Initiative
QP	Qualification Pack
MC	Model Curriculum
NSQF	National Skills Qualification Framework
NSQC	National Skills Qualification Committee
NOS	National Occupational Standards
NCO	National Classification of Occupations
ES	Employability Skills
FSSAI	Food Safety and Standards Authority of India
SOPs	Standard Operating Procedures
PPE	Personal Protective Equipment
HACCP	Hazard Analysis and Critical Control Point
ISO	International Organization for Standardization
LIMS	Laboratory Information Management Systems
GLP	Good Laboratory Practices
CFUs	colony-forming units
SPC	Statistical Process Control
GC	Gas Chromatography
LC	Liquid Chromatography
HPLC	High-Performance Liquid Chromatography
UHPLC	Ultra-High-Performance Liquid Chromatography
GC-MS	Gas Chromatography-Mass Spectrometry
LC-MS	Liquid Chromatography-Mass Spectrometry
NIR	Near-Infrared Spectroscopy
FTIR	Fourier Transform Infrared Spectroscopy
NMR	Nuclear Magnetic Resonance
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
AAS	Atomic Absorption Spectroscopy
PCR	Polymerase Chain Reaction
MALDI	Matrix-Assisted Laser Desorption/Ionization
ESI	Electrospray Ionization
OJT	On-the-Job Training