Sugar Processing Operator

QP Code: FIC/Q7102

Version: 1.0

NSQF Level: 4

Food Industry Capacity & Skill Initiative || Shriram Bharatiya Kala kendra, 3rd floor, 1, Copernicus Marg, Mandi House, New Delhi
Delhi 110001

Table of Contents

FIC/Q7102: Sugar Processing Operator

Brief Job Description

Sugar processing Operator is in charge of ensuring that machinery and equipment needed to produce sugar from raw materials like sugar cane or sugar beets are operated efficiently and safely. They control and direct the whole procedure, from the extraction of sugarcane juice to the production of refined sugar products. Sugar processing operator make sure that the product is produced in accordance with industry standards for quality, safety, and the environment.

Personal Attributes

They must have unrelenting attention to detail, to uphold the highest levels of quality control. Prioritizing and fostering a culture of safety among their team, they place a high priority on safety consciousness. They can deal with the constantly shifting requirements of sugar processing because of their high problem-solving abilities and adaptability. For seamless cooperation, effective communication and teamwork are required, and stress management enables serenity under pressure. The critical personality qualities necessary for success in this profession also include dependability, moral behaviour, and a dedication to creating premium sugar goods.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. FIC/N7103: Carry out Sugar Processing
2. FIC/N7104: Carry out Maintenance and Troubleshooting
3. FIC/N9901: Implement health and safety practices at the workplace

Elective NOS:

Elective 1:

FIC/N7105: Perform clarification of sugarcane juice in a sugar mill

Elective 2:

FIC/N7106: Perform evaporation of sugarcane juice in a sugar mill

Elective 3:

FIC/N7107: Perform crystallization of sugar syrup in a sugar mill

Elective 4:

FIC/N7108: Perform refining of crystal sugar

Elective 5:

FIC/N7109: Perform drying of crystal sugar

Qualification Pack (QP) Parameters

Sector	Food Processing
Sub-Sector	Confectionery
Occupation	Processing
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	
Minimum Educational Qualification & Experience	1. 12th grade pass OR 2. Completed 2nd year of 3-year diploma (after 10th) OR 3. 10th-grade pass plus 1-year NTC plus 1 year NAC OR 4. 8th pass plus 2-year NTC plus 1-Year NAC plus CITS OR 5. 10th Grade Pass with 2 years relevant experience in Food Processing Industry OR 6. Previous relevant Qualification of NSQF Level 3.0 with 3 years relevant experience in the Food Processing Industry.
Minimum Level of Education for Training in School	Not Applicable
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	NA
NSQC Approval Date	
Version	1.0

FIC/N7103: Carry out Sugar Processing

Description

This NOS unit is about sugar processing using various methods and machineries as per the specifications and standards of the organization.

Scope

The scope covers the following:

- Pre-processing of Resources
- Processing of Sugar
- Conduct Quality Tests and Inspections
- Carry out Packaging and Dispatch

Elements and Performance Criteria

Pre-processing of resources

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

PC2. check safety norms of defined area and inform the safety in charge if not suitable

PC3. interpret the process chart/product flow chart/formulation chart for products to be produced

PC4. inspect the quantity and quality of the received raw material against specification to ensure it meets the quality standards

Raw material: Sugar cane etc.
Quality standards: Purity and cleanliness, Chemical Composition, Pesticide and chemical residue levels, etc.

PC5. maintain inventory while effectively storing raw material in designated areas

PC6. prepare and set up the machines for sugar processing process

Machines: Extraction machinery, crushers, etc.

PC7. conduct equipment inspection and maintenance to ensure good operator order

PC8. prepare quality control tools and devices for monitoring essential factors

Factors: temperature, pressure, pH, etc.

PC9. calibrate and validate the quality control equipment for accurate test results

PC10. ensure there are ample supplies of packaging materials for packing the finished sugar product

Packaging materials: cartons, containers, etc.

PC11. check the cleanliness of packaging material to ensure it fulfils hygiene and quality requirements

PC12. perform safety inspections and ensure that all safety equipment is accessible and in good working order

Equipment: personal equipment, emergency response equipment, etc.

Processing of Sugar

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

PC13. manage sugar extraction equipment, such as crushers, mills, etc. to obtain juice from sugarcane

PC14. oversee and update the extraction parameters to maximize juice yield

Parameters: crushing or milling speed, Pressure, Feed rate, cutting size, extraction time, temperature, moisture

content, sucrose content, etc.

PC15. clean sugarcane juice from contaminants and solids by following the clarification process

PC16. remove suspended particles by using filtering machinery to ensure juice clarity

PC17. control the evaporation process to lower the water content and raise sugar concentration

PC18. monitor and adjust parameters of the evaporation equipment

Parameters: temperature, pressure, flow rates, etc.

PC19. manage crystallization process for creating sugar crystals

PC20. alter variables to get desired size and quality of crystals

Variables: seeding, temperatures, etc.

PC21. separate sugar crystals from molasses-containing liquid through centrifuges

PC22. administer drying process to completely dry sugar crystals

PC23. sustain ideal conditions and temperatures to ensure product quality

Conduct quality tests and inspections

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

PC24. monitor the efficiency of crushers or mills by observing essential factors while extracting sugar cane juice

Factors: juice flow rates, pulp discharge, etc.

PC25. examine extracted juice to assess its initial parameters

Parameters: sugar concentration, colour, clarity, etc.

PC26. administer the clarifying and filtering operations to confirm the removal of contaminants and suspended particles

PC27. conduct routine turbidity and suspended solids testing to evaluate the working of filtration and clarifying process

PC28. oversee the evaporation and concentration processes to decrease water content and raise sugar concentration

PC29. regulate brix (sugar concentration) testing to ensure it complies with specified requirements

PC30. analyze the crystal samples periodically to verify that size and purity are within standards

PC31. analyze sugar recovery rate and separation efficiency

PC32. check product's temperature and moisture content on a regular basis

PC33. oversee extensive quality checks on purity, color, sucrose content and particle size

Carry out packaging and dispatch

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

PC34. keep packaged materials dry and spotless to avoid contamination or damage

PC35. operate filling machines to precisely weigh and fill packing containers with required amount of sugar

PC36. examine filling procedure to avoid overfilling or underfilling

PC37. apply appropriate details of the product by employing labelling and coding machines

Details: product labels, barcodes, lot numbers, expiration dates, etc.

PC38. check packaged goods on a regular basis for any flaws

Flaws: contaminated or broken packing

PC39. remove and separate goods that are defective or broken

PC40. organize stacking and palletization of packed goods for effective storage and transportation

PC41. keep thorough records of the packing procedure and revisions made to the package

Records: including the number of items packed, the packaging materials employed, any errors or deviations, etc.

PC42. plan and manage loading of packaged sugar goods effectively and safely onto vehicles or shipping containers

PC43. verify specifics of packaged sugar goods and shipment or delivery correspond to customer's demands

Specifics of packaging: amount, kind of product, packaging requirement, etc.

Specifics of shipment and delivery: final destination, time of delivery, etc.

PC44. communicate periodically with teams to organize delivery schedules

Teams: Logistic team, dispatchers, transport staff, etc.

PC45. resolve any packing or dispatch-related problems and notify to supervisor

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. fundamental principles behind the process of sugar extraction, crystallization, and purification
KU2. physical and chemical characteristics of sugar and its behaviour when processed
KU3. how to operate and maintain sugar processing apparatus, including mills, centrifuges, evaporators, and packaging equipment
KU4. characteristics and features of each processing line machine
KU5. sugar product quality requirements including sucrose concentration, colour, purity, and particle size
KU6. how to do quality checks and evaluate test findings
KU7. safety procedures and guidelines in a manufacturing setting, including hazardous materials and mechanical safety
KU8. environmental legislation relating to sustainable practices and trash disposal
KU9. effects of process control variables on product quality, such as, temperature, pressure, flow rates, and sugar concentration
KU10. processing parameters to optimize efficiency and yield
KU11. good hygiene practices and food safety regulations
KU12. how to identify and address technical problems, quality-standard violations and equipment problems
KU13. inventory management and material handling
KU14. handling techniques for raw materials, packaging materials and finished products
KU15. how to maintain accurate records of processing activities, quality tests, equipment maintenance and production logs
KU16. industry-specific regulations, standards, and certifications related to sugar processing
KU17. compliance requirements for safety, quality, and environmental practices

Generic Skills (GS)

The user/individual on the job needs to know how to:

GS1. knowledge of documentation and record-keeping
GS2. analyze information and take appropriate actions
GS3. prioritize safety and adhering to safety protocols
GS4. note down the information communicated by the senior/supervisor, observations (if any) related to the process, as per applicability in the organization
GS5. read and interpret the work order from the supervisor, certificate of analysis, analysis report from internal lab, process required for producing various types of products, equipment manuals and process documents to understand the equipment operation and process requirement
GS6. communicate effectively with subordinates as well as supervisors
GS7. perform calculations related to quantities, parameters and measurements
GS8. collaborate and contribute to a positive and productive work environment
GS9. discuss task lists, schedules, and activities for carrying out production with the senior/supervisor

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks

National Occupational Standards (NOS) Parameters

NOS Code	FIC/N7103
NOS Name	Carry out Sugar Processing
Sector	Food Processing
Sub-Sector	Confectionery
Occupation	Processing
NSQF Level	4
Credits	4
Version	1.0
Next Review Date	29/05/2027

FIC/N7104: Carry out maintenance and troubleshooting

Description

This NOS unit is about carrying out preventive maintenance and troubleshooting of equipment issues along with periodic documentation.

Scope

The scope covers the following:

- Carry out preventive planned maintenance
- Perform troubleshooting of equipment issues
- Carry out documentation to ensure compliance

Elements and Performance Criteria

Carry out preventive planned maintenance

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

PC1. check for wear, damage, or malfunction on a regular basis on all processing machinery
Machinery: mills, centrifuge, evaporators, drying units, etc.

PC1. perform operational and visual inspections to identify any anomalies or possible problems

PC2. lubricate appropriately moving components to decrease friction and prevent wear

PC3. prevent performance issues by keeping equipment away from contaminants
Contaminants: debris, sugar residue, other impurities, etc.

PC4. maintain alignment and ensure proper assembly of parts
Parts: loose bolts, nuts, fasteners, etc.

PC5. replace filters and screens per maintenance plan recommendations in order to avoid clogging

PC6. examine or replace drive systems, chains, and conveyor belts to avoid belt or chain failures

PC7. inspect appropriate parts for loose connections or corrosion
Parts: wiring, control panels, electrical connections, etc.

PC8. verify sensors, switches and control systems are operating properly

PC9. monitor cooling and heating systems for technical issues
Cooling and Heating system: heat exchangers, condensers, etc.
Technical issues: leaks, obstructions, temperature changes, etc.

PC10. examine or replace damaged seals, gaskets and lubricate pumps if required

PC11. make sure safety precautions are working as intended
Safety precautions: emergency stops, safety guards, etc.

PC12. adhere to preventive maintenance schedule created by maintenance department

Perform troubleshooting of equipment issues

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

PC13. safely shutdown or isolate damaged equipment to avoid further harm

PC14. identify equipment problems that can assist in comprehending source of issue
Problem identification: through strange sensations, noises, visual indications, etc.

PC15. conduct methodical testing and isolation of components or subsystems to identify precise location and cause of problem

PC16. check wiring, connections and device parts for signs of wear, damage and loose connections

PC17. inquire about equipment operating circumstances

Circumstances: current maintenance history, operating parameters, modifications to process conditions, etc.

PC18. evaluate performance of equipment and collect information by using diagnostic tools and equipment

Tools and equipment: meters, gauges, sensors, etc.

PC19. interpret instrument readings and use it for troubleshooting along with coworkers

Coworkers: managers, engineers, maintenance staff, etc.

PC20. categorize any possible contributing elements or circumstances that may result in recurrent issues and suggest preventive steps to avert such issues

Carry out documentation to ensure compliance

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

PC21. gather information and keep records of each manufacturing batch's information

Information: raw material consumption, production rates, processing characteristics, equipment used, people involved, start and end time, etc.

PC22. create daily or shift production logs to track sugar processing status

PC23. record correctly and legibly the findings of quality testing in quality control documents

PC24. record sampling process followed in production line

sampling record: includes sample sizes, sampling locations, sample collecting techniques, etc.

PC25. maintain records of normal maintenance procedures

Procedures: repairs, calibrations, inspections, etc.

PC26. ascertain all records are maintained per industry-specific regulations

Regulations: laws governing food safety, environment, product quality, etc.

PC27. discuss documentation findings with appropriate parties to address concerns or issues

Parties: management, quality control teams, supervisors, etc.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. functions, components and operation of the processing equipment such as crushers, centrifuges, evaporators, packaging machinery, etc.

KU2. preventive maintenance procedures such as maintenance intervals, lubrication requirements, inspection points, etc.

KU3. how to use tools and equipment such as wrenches, lubrication devices, diagnostic instruments, etc.

KU4. safety protocols and best practices for maintenance tasks

KU5. importance of maintenance schedules and adherence

KU6. working of critical components and processes

KU7. data instruments and sensors

KU8. how to determine root cause of the issues and which solution to implement

KU9. specific industry regulations, quality standards, and compliance requirements including food safety and environmental regulations

KU10. how to maintain accurate production, quality equipment maintenance records

Generic Skills (GS)

The user/individual on the job needs to know how to:

GS1. focus on details while inspecting equipment and follow maintenance checklists

GS2. knowledge of documentation and record-keeping

GS3. analyze information and take appropriate actions

GS4. prioritize safety and adhering to safety protocols

GS5. note down the information communicated by the senior/supervisor, observations (if any) related to the process, as per applicability in the organization

GS6. read and interpret the work order from the supervisor, certificate of analysis, analysis report from internal lab, process required for producing various types of products, equipment manuals and process documents to understand the equipment operation and process requirement

GS7. communicate effectively with subordinates as well as supervisors

GS8. perform calculations related to quantities, parameters and measurements

GS9. collaborate and contribute to a positive and productive work environment

GS10. discuss task lists, schedules, and activities for carrying out production with the senior/supervisor

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks

National Occupational Standards (NOS) Parameters

NOS Code	FIC/N7104
NOS Name	Carry out maintenance and troubleshooting
Sector	Food Processing
Sub-Sector	Confectionery
Occupation	Processing
NSQF Level	4
Credits	3
Version	1.0
Next Review Date	29/05/2024

FIC/N7105: Perform clarification of sugarcane juice in a sugar mill

Description

This OS unit is about removing the impurities from the sugarcane juice obtained from the milling process as per the industry standard and the available machinery.

Scope

The scope covers the following:

- Prepare tools for clarification process at a sugar mill
- Carryout clarification of sugarcane juice
- Perform post-production cleaning and regular maintenance of equipment

Elements and Performance Criteria

Prepare tools for clarification process at a sugar mill

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

PC1. check the availability and working of the tools in the clarification area

PC2. inspect the workers in the station are wearing PPE kits

PC3. ensure all safety procedures are followed while working with high-temperature drying equipment

Carryout clarification of sugarcane juice

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

PC4. pass the sugarcane juice to the vibrating screens/sieve baskets to remove solid particles, leaves and large debris

PC5. add prescribed amount of Sulphur dioxide or its derivates Sulphur metabisulphite to maintain the color and prolong the shelf life

PC6. heat the raw sugarcane juice at 70-75° C temperature in primary heaters to kill the bacteria (Leuconostoc)

PC7. transfer the raw juice to the lime station to add lime (calcium hydroxide) to the solution to aid precipitation and coagulation of particles, neutralize the pH level

PC8. pump the neutralized cane juice into continuous clarifier and add flocculants (to improve sedimentation or filterability of smaller particles

PC9. allow the treated juice to settle in settling tanks, which gives sludge at the bottom and clear juice on the top

PC10. clear juice is skimmed or decanted from the top and the sludge/mud is disposed of for use as fertilizers

PC11. transfer the clear juice to vacuum evaporators for further processing

PC12. document the activities of the clarification process for quality audit and process improvement

Perform post-production cleaning and regular maintenance of equipment

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

PC13. clean the clarification process equipment with the approved cleaning agents and methods of cleaning

PC14. follow the GMP health and safety standards while cleaning equipment

PC15. sanitize the work with the approved sanitizers and as per GMP standards

PC16. handle the maintenance needs/repairs of equipment that are identified during cleaning activity

PC17. document the equipment maintenance and cleaning activities

PC18. dispose of waste materials gathered during the cleaning process

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. benefits of heating the raw sugar cane juice
KU2. importance of clarification process in sugar cane processing
KU3. role of Sulphur-di-oxide in sugar processing
KU4. reasons for using high-quality milk of lime
KU5. importance of the pH level
KU6. flocculation process and flocculants used
KU7. advantages of flocculation process
KU8. skimming or decanting of clarified sugar cane juice
KU9. working of the various tools used in the clarification process
KU10. chemical composition of raw sugar cane juice and clarified juice
KU11. attributes to check as part of Quality control
KU12. waste disposal as per the industry standards and GMP guidelines
KU13. Industry best practices for manufacturing goods (GMP)
KU14. FSSAI schedule 4 standards with regard to manufacturing food products
KU15. personal health and safety standards while at work

Generic Skills (GS)

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

GS1. read and interpret policies and process manuals
GS2. communicate with others effectively
GS3. collaborate with team members to increase process efficiency
GS4. plan and prioritize tasks to maximize productivity
GS5. be punctual and courteous
GS6. adhere to the production schedule and meet deadline
GS7. follow safety standards for self and others
GS8. read operation manuals and process documents to understand the equipment operation and process requirement

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks

National Occupational Standards (NOS) Parameters

NOS Code	FIC/N7105
NOS Name	Perform clarification of sugarcane juice in a sugar mill
Sector	Food Processing
Sub-Sector	Confectionery
Occupation	Processing
NSQF Level	4
Credits	2
Version	1.0
Next Review Date	29/05/2027

FIC/N7106: Perform evaporation of sugarcane juice in a sugar mill

Description

This OS unit is about overseeing the evaporation stage of sugar production in order to get a concentrated sugarcane juice for extracting sugar crystals as per the industry standard and the available machinery.

Scope

The scope covers the following

- Prepare the tools for evaporation process
- Carryout evaporation of sugarcane juice at the sugar mill
- Perform post-production cleaning and regular maintenance of equipment

Elements and Performance Criteria

Prepare the tools for evaporation process

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

PC1. verify the evaporators for the process are working efficiently and safety

PC2. check the chemicals and raw materials used for the process are available in adequate quantity

PC3. ensure all safety procedures are followed while working with high-temperature drying equipment

PC4. check the availability of health and safety kits in the work area

Carryout evaporation of sugarcane juice at the sugar mill

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

PC5. adjust various parameters of the evaporators to get the desired concentration of sugar cane juice

Parameters: temperature, pressure, flow rates

PC6. preheat the clarified sugarcane solution to improve the energy efficiency of the evaporation process

PC7. add appropriate defoaming agents to prevent foam formation

defoaming agents' type: silicone-based, polyglycol-based, mineral oil-based, fatty acid-based, non-ionic surfactants, food grade antifoam agents

PC8. transfer this solution to the series of multiple-effect evaporators in a controlled temperature

PC9. pass steam through the first evaporator which vaporizes the water in the sugarcane juice

PC10. vapour from the first evaporator moves to the second evaporator in the series and works as a heating medium

PC11. ensure the sugarcane juice flows through multiple effect evaporators to get a thicker syrup at each step

PC12. check the concentration level of the syrup at the end of the process, is as per the industry standards (from 10-15 Brix dissolved solids to 50-70 Brix thick syrup)

PC13. transfer the concentrated syrup to cooling chambers to reduce their temperature

PC14. send sample to the appropriate department for quality check

quality check: sugar content, purity

PC15. store them in tanks or vessels until ready for the next process namely crystallization

PC16. document the activities of the evaporation process for quality audits and process improvement

perform post-production cleaning and regular maintenance of equipment

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

PC17. clean the equipment with the approved cleaning agents and methods of cleaning

PC18. follow the GMP health and safety standards while cleaning equipment
PC19. sanitize the work area with the approved sanitizers and as per GMP standards
PC20. check the working of the equipment before the next batch is ready for evaporation process
PC21. document the cleaning and maintenance activities
PC22. dispose of waste materials gathered during the cleaning process

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. importance of preheating the sugarcane juice/extract
KU2. significance of the evaporation process
KU3. tools used in the evaporation process
KU4. working of the multi-effect evaporators
KU5. about defoaming agents
KU6. criteria for selection of defoaming agents and prescribed dosage
KU7. effects of foaming of sugarcane juice in the evaporation process
KU8. process of condensation
KU9. importance of the brix level of the concentrated syrup
KU10. importance of cooling the sugar syrup to reduce its temperature
KU11. check the sugar content and purity as part of Quality control
KU12. Industry Best Practices for manufacturing goods (GMP)
KU13. FSSAI schedule 4 standards with regard to manufacturing food products
KU14. personal health and safety standards while at work

Generic Skills (GS)

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

GS1. read and interpret policies and process manuals
GS2. communicate with others effectively
GS3. collaborate with team members to increase process efficiency
GS4. plan and prioritize tasks to maximize productivity
GS5. be punctual and courteous
GS6. adhere to the production schedule and meet deadline
GS7. follow safety standards for self and others
GS8. read operation manuals and process documents to understand the equipment operation and process requirement

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks

National Occupational Standards (NOS) Parameters

NOS Code	FIC/N7106
NOS Name	Perform evaporation of sugarcane juice in a sugar mill
Sector	Food Processing
Sub-Sector	Confectionery
Occupation	Processing
NSQF Level	4
Credits	2
Version	1.0
Next Review Date	29/05/2027

FIC/N7107: Perform crystallization of sugar syrup in a sugar mill

Description

This OS unit is about overseeing the crystallization process in which the concentrated sugar syrup is converted into sugar crystals as per the industry standard and the available machineries.

Scope

The scope covers the following

- Prepare the tools for crystallization process
- Carryout crystallization of concentrated sugar syrup at the sugar mill
- Perform post production cleaning and regular maintenance of equipment

Elements and Performance Criteria

Prepare the tools for crystallization process

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

PC1. verify the crystallizers (large vessel with agitators or mixers) used for the crystallization process are working efficiently and safety

PC2. check the chemicals and raw materials used for the process are available in adequate quantity

PC3. verify the work area is clean and is ready for the crystallization process

PC4. check the availability of health and safety kits at the work area

PC5. ensure all safety procedures are followed while working with high temperature drying equipment

Carryout crystallization of concentrated sugar syrup at the sugar mill

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

PC6. adjust various parameters of the vacuum pan to get the desired sugar crystals

Parameters: temperature, pressure, vacuum levels

PC7. feed the sugar syrup into the vacuum pan crystallizers to begin the crystallization process

PC8. add small quantity of sugar crystals or seed crystals to initiate the crystallization process

PC9. monitor the seeding process for uniform crystal formation

PC10. check the seed crystals are distributed evenly using agitators/stirrers

PC11. control supersaturation with these measures

Measures: seed crystals, agitator speed, antisolvents or crystal growth modifiers, pH control,

PC12. monitor and test the progress of crystallization

Parameters: sugar content, crystal size, quality of the growing sugar crystals

PC13. control the cooling rate to promote uniform growth of sugar crystals

PC14. leave the mass of sugar crystals in the crystallizers after draining the syrup namely the molasses

PC15. transfer the sugar crystals to centrifuges to separate sugar crystals from the remaining syrup (centrifuge rotates at 1000-2800 revolutions per minute)

PC16. use spring water to wash the crystals off the centrifuge

PC17. send sample to the appropriate department for quality check

Quality check: flavor, color, purity, size

PC18. send the sugar crystals for drying station for drying process

perform post-production cleaning and regular maintenance of equipment

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

PC19. clean the equipment with the approved cleaning agents and methods of cleaning
PC20. disassembling and cleaning separator components to prevent residual sugar accumulation and contamination
PC21. maintain the dust collection systems and filters to prevent air borne dust that can contaminate the sugar
PC22. follow the GMP health and safety standards while cleaning equipment
PC23. sanitize the work area with the approved sanitizers and as per GMP standards
PC24. handle the maintenance needs/repairs of equipment that are identified during cleaning activity
PC25. document the equipment maintenance and cleaning activities
PC26. dispose of waste materials gathered during the cleaning process

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU16. crystallization process in sugar production
KU17. working of the vacuum pan crystallizers and other tools used in this process
KU18. significance of adding seed crystals
KU19. need for monitoring growth of sugar crystals
KU20. factors that influence the crystallization of sugar
KU21. massecuite and mother liquor
KU22. centrifugation process to separate the crystals from the mother liquor
KU23. supersaturation process
KU24. significance of monitoring the cooling process
KU25. byproduct molasses
KU26. check the sugar flavor, color, purity and size as part of Quality control
KU27. documentation of crystallization process, cleaning and maintenance activities
KU28. industry best practices for manufacturing goods (GMP)
KU29. FSSAI schedule 4 standards with regard to manufacturing food products
KU30. personal health and safety standards while at work

Generic Skills (GS)

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

GS9. read and interpret policies and process manuals
GS10. communicate with others effectively
GS11. collaborate with team members to increase process efficiency
GS12. plan and prioritize tasks to maximize productivity
GS13. be punctual and courteous
GS14. adhere to the production schedule and meet deadline
GS15. follow safety standards for self and others
GS16. read operation manuals and process documents to understand the equipment operation and process requirement

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks

National Occupational Standards (NOS) Parameters

NOS Code	FIC/N7107
NOS Name	Perform crystallization of sugar syrup in a sugar mill
Sector	Food Processing
Sub-Sector	Confectionery
Occupation	Processing
NSQF Level	4
Credits	2
Version	1.0
Next Review Date	29/05/2027

FIC/N7108: Perform refining of crystal sugar

Description

This OS unit is about managing refining process of the sugar crystals as per the industry standard and the available machinery.

Scope

The scope covers the following

- Organize the raw materials for refining process
- Carryout refining of sugar from sugar crystals
- Perform post-production cleaning and regular maintenance of equipment

Elements and Performance Criteria

Organize the raw materials for refining process

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

PC1. procure the sugar crystals for refining

PC2. clean the sugar crystals through clarification, evaporation, crystallization and drying

PC3. check the refining machinery are in working condition

PC4. verify the work area is clean and ready for the refining process

PC5. check the availability of health and safety kits in the work area

Carryout refining of sugar from sugar crystals

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

PC6. pass the dried sugar crystals into different vibrating screens / Sievers with different mesh sizes for grading

PC7. collect the graded sugar in a container

PC8. transfer the remaining to the vibrating screens / Sievers again with a different mesh size to get different grades of sugar

PC9. send the sugar of different grades for quality check

PC10. conduct the quality of sugar to check if it meets the specifications

perform post-production cleaning and regular maintenance of equipment

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

PC11. clean and sanitize the screens, sieves and other equipment for correct sizing and grading with the approved cleaning agents and methods of cleaning

PC12. follow the GMP health and safety standards while cleaning equipment

PC13. sanitize the work area with the approved sanitizers and as per GMP standards

PC14. address the repair/replacement needs of equipment that were identified during cleaning

PC15. inspect the equipment and infrastructure for wear and tears

PC16. dispose of waste materials in line with industry and environmental regulations

PC17. document the cleaning and maintenance activities for internal audit

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. refining process in sugar production

KU2. Instrumentation and control systems
KU3. different methods of sorting and grading sugar crystals
KU4. tools used in sorting and grading
KU5. operating techniques of the tools
KU6. check the sugar color, purity and size as part of Quality control
KU7. Industry Best Practices for manufacturing goods (GMP)
KU8. FSSAI schedule 4 standards with regard to manufacturing food products
KU9. personal health and safety standards while at work

Generic Skills (GS)

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

GS1. read and interpret policies and process manuals
GS2. communicate with others effectively
GS3. collaborate with team members to increase process efficiency
GS4. plan and prioritize tasks to maximize productivity
GS5. be punctual and courteous
GS6. adhere to the production schedule and meet deadline
GS7. follow safety standards for self and others
GS8. read operation manuals and process documents to understand the equipment operation and process requirement

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks

National Occupational Standards (NOS) Parameters

NOS Code	FIC/N7108
NOS Name	Perform refining of crystal sugar
Sector	Food Processing
Sub-Sector	Confectionery
Occupation	Processing
NSQF Level	4
Credits	2
Version	1.0
Next Review Date	29/05/2027

FIC/N7109: Perform drying of crystal sugar

Description

This OS unit is about removing the moisture from the sugar crystals in the drying section and ensure the final product meets the quality standards. They are also responsible for the maintenance and troubleshooting of the equipment used in the process.

Scope

The scope covers the following

- Prepare the tools for drying the raw sugar
- Carryout drying process in a sugar mill
- Perform post-production cleaning and regular maintenance of equipment

Elements and Performance Criteria

Prepare the tools for refining the raw sugar crystals

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

PC1. check the availability and the working of the drying equipment for the drying process

PC2. verify the work area is clean and ready for the drying process

PC3. check the availability of health and safety kits in the work area

PC4. ensure all safety procedures are followed while working with high-temperature drying equipment

Carryout drying of raw sugar crystals at the sugar mill

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

PC5. operate and monitor the drying equipment for efficient and safe working

PC6. adjust the temperature and airflow of the drying equipment

PC7. operate the conveyor for carrying the sugar to the dryer

PC8. supervise the loading of sugar crystals into the dryer for moisture removal

PC9. set the drying time for the sugar crystals based on the moisture content while loading and the desired moisture level at the end (recommended level 0.02% 0.06% by weight)

PC10. send the dried sugar for quality checks

checks: moisture content

PC11. maintain records of the process carried out for quality audits and process optimization

PC12. transport the dried sugar for packaging

perform post-production cleaning and regular maintenance of equipment

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

PC13. clean the dryers to remove residual sugar particles with the approved cleaning agents and methods of cleaning

PC14. maintain the dust collection systems and filters to prevent air borne dust that can contaminate the sugar

PC15. follow the GMP health and safety standards while cleaning equipment

PC16. sanitize the work area with the approved sanitizers and as per GMP standards

PC17. handle the maintenance needs/repairs of equipment that are identified during cleaning activity

PC18. document the equipment maintenance and cleaning activities

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. importance of drying process in sugar milling
KU2. working of the different types of driers used for removing moisture content in sugar
KU3. significance of maintaining the approved moisture level and ill effects of high levels of moisture
KU4. troubleshooting and maintenance of various tools used in this process
KU5. documentation of the drying process, cleaning and maintenance of tools
KU6. Industry Best Practices for Manufacturing Goods (GMP)
KU7. FSSAI schedule 4 standards with regard to manufacturing food products
KU8. personal health and safety standards while at work

Generic Skills (GS)

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

GS1. read and interpret policies and process manuals
GS2. communicate with others effectively
GS3. collaborate with team members to increase process efficiency
GS4. plan and prioritize tasks to maximize productivity
GS5. be punctual and courteous
GS6. adhere to the production schedule and meet deadline
GS7. follow safety standards for self and others
GS8. read operation manuals and process documents to understand the equipment operation and process requirement

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks

National Occupational Standards (NOS) Parameters

NOS Code	FIC/N7109
NOS Name	Perform drying of crystal sugar
Sector	Food Processing
Sub-Sector	Confectionery
Occupation	Processing
NSQF Level	4
Credits	2
Version	1.0
Next Review Date	29/05/2027

FIC/N9906: Apply food safety guidelines in Food Processing

Description

This unit covers the essential components of food safety, Good Manufacturing Practices (GMP), and personal hygiene in the food industry. It emphasizes the importance of individuals working in the food industry in protecting the health and well-being of consumers by following food safety protocols and procedures and ensuring the production of safe and high-quality food products.

Scope

The scope covers the following :

- Apply personal hygiene and follow Good Manufacturing practices at the workplace.
- Implement Food Safety and pre-requisite programs (PRP) at the workplace.

Elements and Performance Criteria

Apply personal hygiene and follow Good Manufacturing practices at workplace

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

PC1. follow a site relevant documented procedure for Personal Hygiene and Visitor/ Contractor rules.

PC2. follow work instructions at levels of employees inside a food manufacturing site and ensure that the relevant instructions are well communicated and being followed at the fixed timelines.

PC3. ensure timely participate and carry out the relevant training and awareness sessions on personal hygiene, GMP, and related topics.

PC4.ensure timely medical examination from a prescribed and authorized doctor and comply with the guidelines of Schedule IV as described in Food Safety Standard Authority of India (FSSAI) guidelines.

PC5. fill in data in the daily monitoring checklist related to personal hygiene, food safety, and GMP.

PC6. follow a site-relevant documented procedure and area-wise work instructions for Good Manufacturing Practices (GMP) to be followed on the site.

• procedure: Hand washing requirements, Gowning & De gowning protocols, cleaning, and sanitation of employee lockers, follow the protocols as laid down in the different categories of processing areas like Low Risk, High Risk, High Care areas, etc.

PC7. follow all validated Do's & Don'ts inside a food manufacturing firm.

PC8. follow man and materials movement throughout the production facility, to restrict unwanted hazards to cross-contaminate the products which are being manufactured in the facility.

PC9. refer to the process flow charts, HACCP summary plan, and critical process parameters in each and respective areas of the production line.

PC10. identify the material requirements such as manufacturing equipments, Utensils, and other processing aids, cleaning chemicals, and cleaning work instructions in all the relevant areas of the manufacturing facility. Also, a special focus shall be given to Allergens and their risks. Wherever required, the allergen requirements shall be separately addressed.

PC11. ensure to properly tag and number all the equipment, machinery, tools, and other processing aids to keep proper traceability of the product being manufactured and handled at the site.

PC12. follow and implement all training and awareness guidelines in the manufacturing area and regularly participate in training effectiveness for evaluation.

PC13. participate in audits and address the aspects of Good Manufacturing Procedures, personal hygiene, and food safety.

PC14. ensure the record keeping and documentation such as Daily Monitoring Sheets, Batch Traceability Records, machine records, product parameters, process control parameters, etc.

Implement food safety practices at the workplace

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

PC15. maintain updated facilities, equipment, and tool and design requirements to minimize the risks associated with the products being handled at the site.
PC16. follow the instruction in the raw and packaging materials warehouse and ensure receiving material parameters match all the laid requirements. parameters: Incoming vehicles Visual report, storage, and handling requirements, hazardous and non-hazardous goods, allergens, cross-contamination risks, Quarantine, Accepted & rejected goods, monitoring temperature and humidity, etc.
PC17. follow FSSAI Schedule IV requirements related to Pest Control, Cleaning, and Sanitation, Utilities, Waste Disposal, Prevention of Cross-Contamination, allergen management, corrective action, preventive actions, food operation control etc.
PC18. ensure timely check of the critical control points and product parameters.
PC19. record keeping and documentation such as daily monitoring sheets, cleaning sheets, parameters, etc.
PC20. report any food safety and GMP issue to the supervisor, if any.

Knowledge and Understanding (KU)
The individual on the job needs to know and understand:
KU1. importance of personal hygiene, GMP, visitors & contractor's rules. Associated risk in case of deviation from the standard policies and how the requirement is linked with the site's FSSAI License.
KU2. importance of training and work instruction delivered by the supervisors.
KU3. importance of filling the records and checklists, formats and how to ensure that the timely and effective completion is achieved.
KU4. knowledge of trainings and skills required to perform in food processing premises.
KU5. understand FSSAI Schedule IV requirements of food handlers and PRPs within the processing area
KU6. importance of timely medical examinations and awareness of communicable diseases
KU7. Understanding of Do's & Don'ts, intellect mindset to understand the visual illustrations
KU8. understanding about Site Zoning plans.
KU9. awareness of layout which would help to demarcate the defined movements of RM, PM, FG, and wastes generated during the processing of goods. This one lays a framework to launch Good Manufacturing Practices (GMP) successfully and effectively on site.
KU10. understand the manufacturing process, product parameters and process control parameters such as CCPs
KU11. understanding about Hazard Analysis and Critical Control Points (HACCP)
KU12. understanding about Allergens and their types and controls to monitor effective handling of allergen raw materials on site.
KU13. basic understanding of traceability and mock recall
KU14. awareness about Internal & external Audits
KU15. understanding for RCA CAPA, cleaning and sanitation
KU16. awareness about record keeping and data monitoring in various sheets as per organizational requirement

Generic Skills (GS)
User/individual on the job needs to know how to:
GS1. read and comprehend basic content to read labels, charts, signages, symbols and product manuals
GS2. communicate with coworkers appropriately to clarify instructions and other issues
GS3. plan and organize the work schedule, work area, tools, equipment, and materials for improved productivity
GS4. plan and prioritize tasks as per work requirements
GS5. always be punctual and courteous
GS6. good observations and intellect mindset

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Ensure food safety and personal hygiene	**7**	**19**	-	-
PC1. follow relevant practices to avoid cross contamination at all stages of food processing operations	1	4	-	-
PC2. follow organisational procedures for handling items that may cause allergic reactions	1	4	-	-
PC3. follow Good Manufacturing Practices (GMP) at the workplace. Good Manufacturing Practices: 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 (Source: Schedule IV, FSSAI Licensing and Registration, 2011)	3	7	-	-
PC4. follow Good Hygiene Practices (GHP) at the workplace appropriately. Good Hygiene Practices: use of gloves, hairnets, masks, ear plugs, goggles, shoes etc; washing hands regularly; treating injuries such as cuts, boils, skin infections and grazes; preventive health check-ups ; getting vaccinated whenever required. (Source: Schedule IV, FSSAI Licensing and Registration, 2011)	2	4	-	-
Follow safety measures to avoid accidents	**11**	**24**	-	-
PC5. use protective clothing/equipment for specific tasks and work conditions	2	4	-	-
PC6. identify job-site hazardous work and possible causes of risk or accident at the workplace	2	4	-	-
PC7. deal with hazards safely and appropriately to ensure safety of self and others as per organisational protocol	2	4	-	-
PC8. use various types of fire extinguishers effectively	2	4	-	-
PC9. respond promptly and appropriately to an accident situation or medical emergency	1	4	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. provide cardio-pulmonary resuscitation (CPR) as per the requirement (e.g. cardiac arrest)	2	4	-	-
Follow emergency procedures	**6**	**12**	-	-
PC11. follow workplace emergency and evacuation procedures	2	4	-	-
PC12. use safe methods to free a person from electrocution	2	4	-	-
PC13. administer appropriate first aid to victims in case of cuts, bleeding, burns, choking, electric shock, poisoning etc.	2	4	-	-
Manage infection control	**6**	**15**	-	-
PC14. use appropriate disinfectants to disinfect the work area and equipment as per organisational protocol	3	7	-	-
PC15. ensure personal hygiene by washing hands regularly using alcohol based sanitisers and wearing personal protective equipment (PPE)	1	4	-	-
PC16. report illness of self and others to the supervisor or concerned authority	2	4	-	-
NOS Total	**30**	**70**	-	-

National Occupational Standards (NOS) Parameters

NOS Code	FIC/N9901
NOS Name	Implement health and safety practices at the workplace
Sector	Food Processing
Sub-Sector	Generic
Occupation	Generic
NSQF Level	3
Credits	TBD
Version	1.0
Last Reviewed Date	24/02/2022
Next Review Date	24/02/2024
NSQC Clearance Date	24/02/2022

FIC/N9902: Work effectively in an organisation

Description

This unit is about working effectively with others.

Scope

The scope covers the following :

- Communicate effectively
- Work in a team effectively
- Respect diversity

Elements and Performance Criteria

Communicate effectively

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

PC1. obtain complete information and instructions from designated personnel **PC2.** reciprocate understanding and seek clarifications whenever required **PC3.** provide information accurately and clearly

PC4. use inclusive language (verbal, non-verbal and written) that is gender, disability and culturally sensitive

Work in a team effectively

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

PC5. plan tasks to be performed as per priority and need

PC6. consult with and assist others to maximize effectiveness and efficiency at work **PC7.** escalate problems and grievances beyond own scope to the concerned authority **PC8.** take appropriate action to resolve conflicts at the workplace

Respect diversity

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

PC9. maintain a gender-neutral behaviour with everyone at the workplace

PC10. empathise with People with Disabilities (PwD) and offer help, if required

PC11. recognise and report incidents of harassment and discrimination to appropriate authority

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. organizational quality procedures and processes associated with work

KU2. standards, policies, and procedures followed in the organization relevant to employment, harassment, discrimination and performance conditions

KU3. reporting structure, inter-dependent functions, lines, and procedures applicable at the workplace

KU4. different types of harassment and discrimination based on gender, disability, caste, religion, and culture

KU5. components of effective communication and its importance **KU6.**
importance of teamwork in organizational and individual success **KU7.**
importance of ethics and discipline for professional success

KU8. how to express and address grievances appropriately and effectively

KU9. importance and ways of managing interpersonal conflict effectively

KU10. different types of disabilities and the challenges faced by persons with disability (PwD)

KU11. laws, acts and provisions defined for PwD

KU12. importance of gender sensitivity and equality

KU13. legislations, grievance redressal mechanisms, and penalties against harassment in the workplace

Generic Skills (GS)

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

GS1. communicate information, doubts and concerns about work related matters in local language or Hindi/English

GS2. read and interpret information given in local language or Hindi/English

GS3. establish priorities and deadlines in consultation with other and record them

GS4. be punctual

GS5. listen to others concerns and doubts carefully and address them

GS6. be courteous

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Communicate effectively	**8**	**13**	-	-
PC1. obtain complete information and instructions from designated personnel	2	3	-	-
PC2. reciprocate understanding and seek clarifications whenever required	2	3	-	-
PC3. provide information accurately and clearly	2	3	-	-
PC4. use inclusive language (verbal, non- verbal and written) that is gender, disability and culturally sensitive	2	4	-	-
Work in a team effectively	**8**	**14**	-	-
PC5. plan tasks to be performed as per priority and need	2	4	-	-
PC6. consult with and assist others to maximize effectiveness and efficiency at work	2	3	-	-
PC7. escalate problems and grievances beyond own scope to the concerned authority	2	3	-	-
PC8. take appropriate action to resolve conflicts at the workplace	2	4	-	-
Respect diversity	**6**	**12**	-	-
PC9. maintain a gender-neutral behaviour with everyone at the workplace	2	4	-	-
PC10. empathise with People with Disabilities (PwD) and offer help, if required	2	4	-	-
PC11. recognise and report incidents of harassment and discrimination to appropriate authority	2	4	-	-
NOS Total	**22**	**39**	-	-

National Occupational Standards (NOS) Parameters

NOS Code	FIC/N9902
NOS Name	Work effectively in an organisation
Sector	Food Processing
Sub-Sector	Generic
Occupation	Generic
NSQF Level	3
Credits	TBD
Version	1.0
Last Reviewed Date	24/02/2022
Next Review Date	18/06/2026
NSQC Clearance Date	24/02/2022

SGJ/N1702: Optimize resource utilization at workplace

Description

This unit is about adopting sustainable practices and optimizing use of resources, especially material, energy and waste, in day-to-day operations at work

Scope

The scope covers the following : Material

- conservation practices
- Energy/electricity conservation practices Effective
- waste management/recycling practices

Elements and Performance Criteria

Material conservation practices

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

PC1. identify ways to optimize usage of material including water in various tasks/activities/processes

PC2. check for spills/leakages in various tasks/activities/processes

PC3. plug spills/leakages and escalate to appropriate authority if unable to rectify **PC4.** carry out routine cleaning of tools, machines and equipment *Energy/electricity conservation practices*

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

PC5. identify ways to optimize usage of electricity/energy in various tasks/activities/processes

PC6. check if the equipment/machine is functioning normally before commencing work and rectify wherever required

PC7. report malfunctioning (fumes/sparks/emission/vibration/noise) and lapse in maintenance of equipment

PC8. ensure electrical equipment and appliances are properly connected and turned off when not in use

Effective waste management/recycling practices

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

PC9. identify recyclable and non-recyclable, and hazardous waste generated

PC10. segregate waste into different categories

PC11. dispose non-recyclable waste appropriately

PC12. deposit recyclable and reusable material at identified location

PC13. follow processes specified for disposal of hazardous waste

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. potential hazards, risks and threats based on the nature of work **KU2.** layout of the workstation and electrical and thermal equipment used **KU3.** organizations procedures for minimizing waste

KU4. efficient and inefficient utilization of material and water

KU5. ways of efficiently managing material and water in the process **KU6.** basics of electricity and prevalent energy efficient devices **KU7.** ways to recognize common electrical problems

KU8. common practices of conserving electricity

KU9. usage of different colours of dustbins

KU10. categorization of waste into dry, wet, recyclable, non-recyclable and items of single-use plastics

KU11. waste management and methods of waste disposal

KU12. common sources of pollution and ways to minimize it

Generic Skills (GS)

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

GS1. record data on waste disposal at workplace

GS2. complete statutory documents relevant to safety and hygiene

GS3. read Standard Operating Practices (SOP) documents

GS4. communicate with colleagues on the significance of greening of jobs

GS5. make timely decisions for efficient utilization of resources

GS6. complete tasks efficiently and accurately within stipulated time **GS7.** work with supervisors/team members to carry out work related tasks **GS8.** identify cause and effect of greening of jobs

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Material conservation practices	**4**	**8**	-	-
PC1. identify ways to optimize usage of material including water in various tasks/activities/processes	1	2	-	-
PC2. check for spills/leakages in various tasks/activities/processes	1	2	-	-
PC3. plug spills/leakages and escalate to appropriate authority if unable to rectify	1	2	-	-
PC4. carry out routine cleaning of tools, machines and equipment	1	2	-	-
Energy/electricity conservation practices	**4**	**8**	-	-
PC5. identify ways to optimize usage of electricity/energy in various tasks/activities/processes	1	2	-	-
PC6. check if the equipment/machine is functioning normally before commencing work and rectify wherever required	1	2	-	-
PC7. report malfunctioning (fumes/sparks/emission/vibration/noise) and lapse in maintenance of equipment	1	2	-	-
PC8. ensure electrical equipment and appliances are properly connected and turned off when not in use	1	2	-	-
Effective waste management/recycling practices	**5**	**10**	-	-
PC9. identify recyclable and non-recyclable, and hazardous waste generated	1	2	-	-
PC10. segregate waste into different categories	1	2	-	-
PC11. dispose non-recyclable waste appropriately	1	2	-	-
PC12. deposit recyclable and reusable material at identified location	1	2	-	-
PC13. follow processes specified for disposal of hazardous waste	1	2	-	-
NOS Total	**13**	**26**	-	-

National Occupational Standards (NOS) Parameters

NOS Code	SGJ/N1702
NOS Name	Optimize resource utilization at workplace
Sector	Green Jobs
Sub-Sector	Other Green Jobs
Occupation	Resource Optimization
NSQF Level	3
Credits	TBD
Version	1.0
Last Reviewed Date	24/02/2022
Next Review Date	24/02/2026
NSQC Clearance Date	24/02/2022

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.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
FIC/N9026: Prepare for production			-	-		
			-	-		
			-	-		
FIC/N9901.Implement health and safety practices at the workplace			-	-		
FIC/N9902.Work effectively in an organisation			-	-		
SGJ/N1702.Optimize resource utilization at workplace			-	-		
Total			-	-		

Acronyms

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.