

Model Curriculum

Milk Powder Manufacturing Technician

SECTOR: FOOD PROCESSING
SUB-SECTOR: DAIRY PRODUCTS
OCCUPATION: PROCESSING
REF ID: FIC/Q2006, V1.0
NSQF LEVEL: 4



Certificate

**CURRICULUM COMPLIANCE TO
QUALIFICATION PACK – NATIONAL OCCUPATIONAL
STANDARDS**

is hereby issued by the

FOOD INDUSTRY CAPACITY AND SKILL INITIATIVE (FICSI)

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: **'Milk Powder Manufacturing Technician'** QP No. **'FIC/Q2006, NSQF Level 4'**

Date of Issuance: 30 June, 2018
Valid up to: 30 June, 2019

S. S. Arora
Authorized Signatory
(Food Industry Capacity and Skill Initiative)

* Valid up to the next review date of the Qualification Pack

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Milk Powder Manufacturing Technician

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Milk Powder Manufacturing Technician”, in the “Food Processing” Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	Milk Powder Manufacturing Technician		
Qualification Pack Name & Reference ID. ID	FIC/Q2006, v1.0		
Version No.	1.0	Version Update Date	04/09/2018
Pre-requisites to Training	Preferably Class 10 and 0-1 year experience in a dairy processing unit		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Prepare and maintain work area and process machineries to produce milk powder. • Process milk to produce milk powder. • Carry out documentation and record keeping related to manufacturing of milk powder. • Observe food safety and hygiene standards at work. 		

This course encompasses 4 out of 4 National Occupational Standards (NOS) of “Milk Powder Manufacturing Technician” Qualification Pack issued by “Food Industry Capacity and Skill Initiative”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p>Introduction to Training Program and Overview of Food Processing Industry</p> <p>Theory Duration (hh:mm) 02:00</p> <p>Practical Duration (hh:mm) 00:00</p> <p>Corresponding NOS Code Bridge Module</p>	<ul style="list-style-type: none"> Define food processing List the various sub sectors of food processing industry Define dairy processing State the composition and nutritive value of milk State the need for processing of milk List the various units within a dairy processing plant State the methods of testing milk for accepted quality standards 	
2	<p>Organizational Standards and Norms</p> <p>Theory Duration (hh:mm) 08:00</p> <p>Practical Duration (hh:mm) 10:00</p> <p>Corresponding NOS Code FIC/N2021</p>	<ul style="list-style-type: none"> State the roles and responsibilities of a milk powder manufacturing technician State how to conduct yourself at the workplace State the personal hygiene and sanitation guidelines State the food safety hygiene standards to follow in a work environment 	Protective Gloves, Head Caps, Aprons, Safety Goggles, Safety Boots, Mouth Masks, Sanitizer, Food Safety Manual
3	<p>Prepare and maintain work area and process machineries for production of milk powder</p> <p>Theory Duration (hh:mm) 15:00</p> <p>Practical Duration (hh:mm) 30:00</p>	<ul style="list-style-type: none"> State the materials and equipment used in the cleaning and maintenance of the work area State the common detergents and sanitizers used in cleaning work area and machineries State the methods of cleaning and sanitization Perform the process of preparing the work area for scheduled production Describe the functions to be carried out before starting production State the different types of maintenance procedures Conduct minor repairs and faults in process machineries 	pH Meter, Weighing Balance, Beaker, Bunsen Burner, Filter, Homogenizer, Spray Dryer, Pasteurizer, Separator, Clarifier, Packaging Machines, Protective Gloves, Head Caps, Aprons, Safety Goggles, Safety Boots, Mouth Masks, Sanitizer, Food Safety Manual

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Corresponding NOS Code FIC/N2020	<ul style="list-style-type: none"> Prepare the machines and tools required for production 	
4.	Production of milk powder Theory Duration (hh:mm) 25:00 Practical Duration (hh:mm) 50:00 Corresponding NOS Code FIC/N2021	<ul style="list-style-type: none"> Perform a check if all the machineries are clean and in good working conditions List the different control parameters of the various machineries State the fat content and SNF of toned and double toned milk Demonstrate the receiving of milk and checking its quality Use the filter to remove sediments from milk Use separator for separation of cream from milk Demonstrate use of homogenizer for getting desire fat content Demonstrate use of pasteurizer Carry out chilling of milk in the chilling tank Use the spray dryer in order to produce milk powder Demonstrate the packaging and analyze the quality of the finished product Demonstrate cleaning the machineries used with recommended sanitizers following CIP (clean-in-place) procedure Perform cleaning of equipment and tools using recommended cleaning agents and sanitizers 	pH Meter, Weighing Balance, Beaker, Bunsen Burner, Filter, Homogenizer, Spray Dryer, Pasteurizer, Separator, Clarifier, Packaging Machines, Protective Gloves, Head Caps, Aprons, Safety Goggles, Safety Boots, Mouth Masks, Sanitizer, Food Safety Manual
5.	Complete documentation and record keeping related to production of milk powder Theory Duration (hh:mm) 10:00 Practical Duration	<ul style="list-style-type: none"> State the need for documenting and maintaining records of raw materials, processes and finished products State the method of documenting and recording the details of raw material to final finished product Demonstrate the process of documenting records of production plan, process parameters, and finished products 	Food Safety Manual, Log Books.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	(hh:mm) 04:00 Corresponding NOS Code FIC/N2022		
6.	Food Safety, Hygiene and Sanitation for Processing Food Products Theory Duration (hh:mm) 15:00 Practical Duration (hh:mm) 35:00 Corresponding NOS Code FIC/N9001	<ul style="list-style-type: none"> State the importance of safety, hygiene and sanitation in the baking industry Apply the industry standards to maintain a safe and hygiene workplace Apply HACCP principles to eliminate food safety hazards in the process and products Apply safety practices in the work area 	Protective Gloves, Head Caps, Aprons, Safety Goggles, Safety Boots, Mouth Covers, Sanitizer, Food Safety Manual ,Log Books etc.
7.	Professional and Core Skills Theory Duration (hh:mm) 06:00 Practical Duration (hh:mm) 10:00 Corresponding NOS Code Bridge Module	<ul style="list-style-type: none"> Undertake a self-assessment test to identify personal strengths and weaknesses Plan and schedule the work order and manage time effectively to complete the tasks assigned State the importance of decision making Identify potential problems and make sound and timely decision State the importance of listening 	
8.	IT Orientation Theory Duration (hh:mm) 07:00 Practical Duration (hh:mm) 13:00 Corresponding NOS Code	<ul style="list-style-type: none"> Identify parts of the computer Use the computer keyboard effectively to type Use ERP effectively to record day-to-day activities Use the word processor effectively Use the spreadsheet application effectively Use the computer to document day-to-day activities 	Computer/Laptop

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	FIC/N2022		
	Total Duration 240:00 Theory Duration 88:00 Practical Duration 152:00	Unique Equipment Required: pH Meter, Weighing Balance, Beaker, Bunsen Burner, Filter, Homogenizer, Spray Dryer, Pasteurizer, Separator, Clarifier, Packaging Machines, Protective Gloves, Head Caps, Aprons, Safety Goggles, Safety Boots, Mouth Masks, Sanitizer, Food Safety Manual, Log Books, Computer/Laptop	

Grand Total Course Duration: **240Hours, 0 Minutes**

*(This syllabus/ curriculum has been approved by **SSC: Food Industry Capacity and Skill Initiative**)*

Trainer Prerequisites for Job role: “Milk Powder Manufacturing Technician” mapped to Qualification Pack: “FIC/Q2006, v1.0”

Sr. No.	Area	Details
1	Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack “FIC/Q2006”, Version 1.0
2	Personal Attributes	An aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training, and pre/post work to ensure competent, employable candidates at the end of the training. Strong communication skills, ability to work as part of a team; a passion for quality and for developing others; well-organized and focused, eager to learn and keep oneself updated with the latest in the mentioned fields.
3	Minimum Educational Qualifications	<ul style="list-style-type: none"> • M.Sc/M.Tech/ME in Dairy Technology or Food Engineering with 1-2 years of hands on experience in a dairy industry, or • B.Sc (home Sc) /B.Tech/BE in Dairy Technology or Food Engineering with 2-3 years of hands on experience in dairy industry, or • Diploma in Dairy Technology or Food Engineering (dairy) with 4 years of hand on experience in a dairy industry.
4a	Domain Certification	Certified for Job Role: “Milk Powder Manufacturing Technician” mapped to QP: “FIC/Q2006, v1.0”. Minimum accepted score is 80%
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “MEP/Q0102”. Minimum accepted score is 80 % as per FICSI guidelines.
5	Experience	<ul style="list-style-type: none"> • M.Sc/M.Tech/ME in Dairy Technology or Food Engineering with 1-2 years of hands on experience in a dairy industry, or • B.Sc (home Sc) /B.Tech/BE in Dairy Technology or Food Engineering with 2-3 years of hands on experience in dairy industry, or • Diploma in Dairy Technology or Food Engineering (dairy) with 4 years of hand on experience in a dairy industry.

Annexure: Assessment Criteria

CRITERIA FOR ASSESSMENT OF TRAINEES	
Job Role	Milk Powder Manufacturing Technician
Qualification Pack	FIC/Q2006
Sector Skill Council	Food Processing

Guidelines for Assessment:

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, as well as the selected elective NOS/set of NOS.
OR
4. Assessment will be conducted for all compulsory NOS, as well as the selected optional NOS/set of NOS.
5. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below)
6. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criteria
7. To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
8. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack

Assessable Outcome	Assessment Criteria	Total Mark (600)	Out Of	Marks Allocation	
				Theory	Skills Practical
1. FIC/N2020: Prepare and maintain work area and process machineries for production of milk powder	PC.1 Prepare clean and maintain the cleanliness of the work area using approved sanitizers and keep it free from dust, waste, flies and pests	100	15	5	10
	PC2. Ensure that the work area is safe and hygienic for food processing		20	8	12
	PC3. Dispose waste materials as per defined SOPs and industry requirements		15	6	9
	PC4. Check the working and performance of all machineries and tools used for the process such as filter, homogenizer, pasteurizer, separator, clarifier, packaging machines, etc.		20	8	12
	PC5. Clean the machineries and tools used with approved sanitizers following SOP		10	4	6
	PC6. Place the necessary tools required for process		5	1	4
	PC7. Attend the minor repairs/ faults of all machines, if required		15	3	12
Total			100	35	65
2. FIC/N2021: Production of milk powder	PC1. assemble fittings, valves, impeller shaft and other parts to equipment to prepare for operation	100	2	0.5	1.5
	PC2. connect pipes between holding tanks and process equipment		2	0.5	1.5
	PC3. start each of the process machineries and ensure its working and performance		2	0.5	1.5
	PC4. turn valves or pump sterilizing solution and rinse by passing water through pipes to sterilize process equipment		2	0.5	1.5
	PC5. check and ensure all process machineries are clean and in good mechanical condition		2	0.5	1.5
	PC6. Refer process chart/ product flow chart/formulation chart for product(s) produced.		2	1	1
	PC7. receive milk from the raw material storage area/warehouse/holding tanks		2	0.5	1.5
	PC8. check and conform the quality through physical parameters (like impurities, colour, appearance, temperature etc) and by verifying the quality report		4	1.5	2.5
	PC9. set and control metering devices to allow measured volume of milk for processing		4	1.5	2.5

	PC10. open valves to pass measured quantity of milk through filter to remove impurities		4	1.5	2.5
	PC11. set control parameters and open valves to allow milk into homogenizer to homogenize milk to achieve required fat content		5	2	3
	PC12. set steam pressure and temperature of the pasteurizer, turn valves to allow steam, observe pressure and temperature, and open valves to allow milk into pasteurizer for pasteurization of milk to kill microbes		5	2	3
	PC13. set controls parameters of evaporator like temperature, pressure etc, and open valves to allow milk to pass through evaporator to boil milk under vacuum to increase the total solid content		5	2	3
	PC14. operate spray dryer by controlling the size of the droplets, the air temperature, and the airflow, to produce milk powder		5	2	3
	PC15. start spray drier, high pressure pump and turn valves to feed milk through nozzles or atomizer to the heated vacuum chamber where milk droplets are dried into powder		5	2	3
	PC16. set temperature and vacuum in spray dryer, observe gauges and adjust controls to maintain specified process parameters		5	2	3
	PC17. adjust and control air flow and feed temperature to control viscosity of milk for spray drying process and to increase the capacity of spray drying chamber		5	2	3
	PC18. adjust temperature of dryer and control flow rate into dryer to obtain specified moisture content		5	2	3
	PC19. set controls to increase nozzle pressure of spray drier to achieve best mixing of milk and hot air, and for achieving milk powder of required fineness		5	2	3
	PC20. control speed of centrifugal atomizer, air inlet temperature to the spray dryer to achieve required fineness and to improve production rate (in case of centrifugal atomizer)		5	2	3
	PC21. control flow rate of air through fluidized bed drier for secondary heating and cooling of milk powder		5	2	3

	PC22. set and control operating parameters such as fluidizing velocity, spray rate and temperature to adjust agglomerate characteristics		3	1	2
	PC23. check the quality of milk powder conveyed out of drier		2	1	1
	PC24. sample product and transfer to quality lab for analysis		2	1	1
	PC25. place container on scale under outlet of spray dryer equipment to fill container with specified amount of powder		2	0.5	1.5
	PC26. place packed and labelled products in cartons and transfer to storage area and store maintaining storage conditions following SOP		2	1	1
	PC27. report discrepancies/concerns to department supervisor for immediate action and implement the suggested corrective actions		2	0.5	1.5
	PC28. clean the work area, equipment and tools using recommended cleaning agents and sanitizers		2	0.5	1.5
	PC29. attend minor repairs/faults (if any) of all components and machines		2	0.5	1.5
	PC30. ensure periodic (daily/weekly/monthly/quarterly/half yearly/annual) maintenance of all machines and equipment following the SOP or following suppliers instructions/manuals		2	1	1
			100	35	65
3. FIC/Q2022: Complete documentation and record keeping related to production of milk powder	PC1. Document and maintain records of details of raw materials and packaging materials as per organizational standards	100	10	6	4
	PC2. Document and maintain record on observations (if any) related to raw materials and packaging materials		5	3	2
	PC3. Load the raw material details in ERP for future reference		5	3	2
	PC4. Verify the documents and track from finished products to raw materials, in case of quality concerns and during quality management system audits		5	3	2
	PC5. Document and maintain records of production plan with details		10	6	4
	PC6. Document and maintain records of process details for entire production in process chart or production log for all products produced		15	9	6

	PC7. Document and maintain records of batch size, production yield, wastage of raw materials, energy utilization and final product produced		10	6	4
	PC8. Document and maintain record of observations or deviations		5	3	2
	PC9. Load the production plan and process details in ERP for future reference		5	3	2
	PC10. Verify documents and track from finished product to ingredients, in case of quality concerns and for quality management system audit		5	3	2
	PC11. Document and maintain records of finished products		3	2	1
	PC12. Document and maintain records of the finished product details as per organizational standards		7	4	3
	PC13. Document and maintain record on observations or deviations (if any) related to finished products		5	3	2
	PC14. Load the finished product details in ERP for future reference		5	3	2
	PC15. Verify the documents and track from finished product to ingredients, in case of quality concerns and for quality management system audits		5	3	2
	Total		100	60	40
4. FIC/N9001: Food Safety, hygiene and sanitation for processing food products	PC1. Comply with food safety and hygiene procedures followed in the organization	100	5	2	3
	PC2. Ensure personal hygiene by use of gloves, masks, hair net, ear plugs, boots etc.		6	1	5
	PC3. Ensure hygienic production of food by inspecting raw materials, ingredients, finished products etc for compliance to physical, chemical and microbiological procedures		5	2	3
	PC4. Pack products in appropriate packaging material, label and store them in designated area free from pests, flies etc.		10	4	6
	PC5. Clean, maintain and monitor food processing equipment periodically, using it only for the specified purpose		5	2	3
	PC6. Use safety equipment such as fire extinguisher, eye wash unit, first aid kit when required		10	4	6
	PC7. Follow housekeeping practices by having designated area for machines/tools		5	2	3

PC8. Follow industry standards like GMP, HACCP and product recall	10	4	6
PC9. Attend training on hazard management to understand type of physical, chemical and microbiological hazards	5	1	4
PC10. Identify, document and report problems such as rodents and pests to management	5	1	4
PC11. Conduct workplace checklist audit before and after work to ensure safety and hygiene	5	1	4
PC12. Document and maintain raw material, process, packaging material to maintain the effectiveness of quality system	4	1	3
PC13. Determine the quality of food using criteria such as odor, color, taste and best before date and take immediate measures to prevent spoilage	5	2	3
PC14. Store raw materials, finished products and allergens separately to prevent cross contamination	5	2	3
PC15. Label raw materials and finished products and store them in different storage areas according to safe food practices	5	2	3
PC 16. Follow stock rotation based on FEFO/FIFO	10	4	6
	100	35	65