GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

COMPETENCY BASED CURRICULUM

FOOD PROCESSING EQUIPMENT TECHNICIAN

(Duration: One Year)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 3.5

SECTOR – FOOD INDUSTRY

Directorate General of Training

FOOD PROCESSING EQUIPMENT TECHNICIAN

(Engineering Trade)

(Designed in 2024)

Version: 1.0

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL – 3.5

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

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1. COURSE INFORMATION

During the one-year duration of Food Processing Equipment Technician trade a candidate is trained on professional skill, professional knowledge &Employability skill related to job role. In addition to this a candidate is entrusted to undertake project work and extra-curricular activities to build up confidence. The broad components covered under Professional Skill subject are as below:

- Configure, disassemble, repair, reassemble and check functionality of mechanical components that are utilized for power transmission. These components may include pulleys, gears, keys, jibs, and shafts, among others
- Make various gauges, such as snap gauges and gap gauges, utilizing standard tools and equipment, and verify their accuracy. Additionally, contribute to the development of industrial automation processes through the implementation of programmable logic controllers (PLCs), human-machine interfaces (HMIs), and various other components and equipment.
- Possess a fundamental understanding of food safety, including knowledge of various types of food hazards and allergens, as well as their corresponding control measures. To be well-versed in food safety standards and can provide a comprehensive overview of basic raw materials and packaging materials commonly utilized in the food processing industry. Additionally, should be able to explain the different types of food processing methods employed in the industry.
- Design and develop various Industrial Automation Systems, including Fixed Automation System, Programmable Automation System, Flexible Automation System, and Integrated Automation System, utilizing PLC and HMI. This role can be applied in various industries, such as automobile process control, automation, baking, confectionery, agriculture, production, manufacturing, fruit and vegetable processing, network technician, plastic processing, and more.
- Conduct routine diagnostic checks on all equipment in the automation industry, as well as repairing and maintaining instruments, electrical wiring, and control systems. Possess a comprehensive understanding of electronics, mechanics, and programmable logic controllers (PLC).
- Capable of performing operations and programming of PLC, implementing systems, and supervising high-level processor management control and data.

2. TRAINING SYSTEM

2.1 GENERAL

The Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers a range of vocational training courses catering to the need of different sectors of the economy/ labour market. The vocational training programs are delivered under the aegis of Directorate General of Training (DGT). Craftsman Training Scheme (CTS) with variants and Apprenticeship Training Scheme (ATS) are two pioneer programs of DGT for strengthening vocational training.

'Food Processing Equipment Technician' trade under CTS is one of the newly designed courses to be delivered nationwide through a network of ITIs. The course is of one-year duration. It mainly consists of Domain area and Core area. In the Domain area (Trade Theory and Practical) impart professional skills and knowledge, while the core area (Employability Skill) imparts requisite core skills, knowledge, and life skills. After passing out the training program, the trainee is awarded National Trade Certificate (NTC) by DGT which is recognized worldwide.

Candidates broadly need to demonstrate that they are able to:

- Read and interpret technical parameters / documents, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations.
- Apply professional knowledge & employability skills while performing the job and modification & maintenance work.
- Check the system specification and application software as per requirement of the job.
- Document the technical parameters related to the task undertaken.

2.2 PROGRESSION PATHWAYS

- Can join industry as Food Processing Equipment Technician and will progress further as Senior Technician, Supervisor and can rise up to the level of Manager.
- Can become Entrepreneur in the related field.
- Can join Apprenticeship programs in different types of industries leading to a National Apprenticeship Certificate (NAC).

2.3 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of one-year: -

S No.	Course Element	Notional Training Hours
1	Professional Skill (Trade Practical)	840
2	Professional Knowledge (Trade Theory)	240
3	Employability Skills	120
	Total	**1200**

Every year 150 hours of mandatory OJT (On the Job Training) at nearby industry, wherever not available then group project is mandatory

On the Job Training (OJT)/ Group Project	150
Optional Courses (10th/ 12th class certificate along with ITI certification or add on short term courses)	240

Trainees of one-year or two-year trade can also opt for optional courses of up to 240 hours in each year for 10th/ 12th class certificate along with ITI certification or add-on short term courses.

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of course through formative assessment and at the end of the training programme through summative assessment as notified by the DGT from time to time.

a) The Continuous Assessment (Internal) during the period of training will be done by **Formative Assessment Method** by testing for assessment criteria listed against learning outcomes. The training institute has to maintain an individual trainee portfolio as detailed in assessment guidelines. The marks of internal assessment will be as per the formative assessment template provided on www.bharatskills.gov.in.

b) The final assessment will be in the form of summative assessment. The All India Trade Test for awarding NTC will be conducted by Controller of examinations, DGT as per the guidelines. The pattern and marking structure is being notified by DGT from time to time. **The learning outcome and assessment criteria will be the basis for setting question papers for final**

assessment. The examiner during final examination will also check the individual trainee's profile as detailed in assessment guidelines before giving marks for practical examination.

2.4.1 PASS REGULATION

For the purposes of determining the overall result, weightage of 100% is applied for six months and one year duration courses and 50% weightage is applied to each examination for two years courses. The minimum pass percentage for Trade Practical and Formative assessment is 60% & for all other subjects is 33%.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking the assessment. Due consideration should be given while assessing for teamwork, avoidance / reduction of scrap / wastage and disposal of scrap / waste as per procedure, behavioral attitude, sensitivity to the environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work
- Computer based multiple choice question examination
- Practical Examination

Evidences and records of internal (Formative) assessments are to be preserved until forthcoming examination for audit and verification by examining body. The following marking pattern to be adopted for formative assessment:

Performance Level	Evidence
(a) Marks in the range of 60%-75% to be allotted during assessment	
For performance in this grade, the candidate should produce work which demonstrates	• Demonstration of good skills and accuracy in the field of work/ assignments.

attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and practices	• A fairly good level of neatness and consistency to accomplish job activities. • Occasional support in completing the task/ job.
(b) Marks in the range of 75%-90% to be allotted during assessment	
For this grade, a candidate should produce work which demonstrates attainment of a reasonable standard of craftsmanship, with little guidance, and regard for safety procedures and practices	• Good skill levels and accuracy in the field of work/ assignments. • A good level of neatness and consistency to accomplish job activities. • Little support in completing the task/job.
(c) Marks in the range of more than 90% to be allotted during assessment	
For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	• High skill levels and accuracy in the field of work/assignments. • A high level of neatness and consistency to accomplish job activities. • Minimal or no support in completing the task/ job.

3. JOB ROLE

The Food Processing Equipment Technician is responsible for setting up and developing industrial processes for a duration of one year. They use tools such as dial indicators, micrometres, vernier callipers, height gauges, screw gauges, plug gauges, sine bars, slip gauges, and other measuring instruments to ensure that finished products meet prescribed accuracies. They may also manufacture parts separately and assemble them using screws, rivets, pins, and other specified methods to create a complete unit according to the provided drawing. Additionally, the Food Processing Equipment Technician performs maintenance work, including preventive maintenance on simple machines. They are able to dismantle and replace different components to construct circuits for pneumatics and hydraulics.

The Food Processing Equipment Technician possesses knowledge of the fundamentals of food safety, including the various types of food hazards and allergens, as well as their controls. They are familiar with food safety standards and have a basic understanding of the raw materials and packing materials used in the food processing industry. Additionally, they are able to explain the different types of food processing methods. It is important the Food Processing Equipment Technician does not pose any risk to himself/ herself or to fellow colleagues and infrastructure while performing his/ her duties. Hence, the Food Processing Equipment Technician should possess knowledge of fundamentals of personal safety, machinery safety, common safety-hazards in the workplace and its control measures. The Food Processing Equipment Technician must demonstrate a safe working attitude at all times.

The article/assembly is tested to ensure proper performance, and any defective wiring, burnt out fuses, or faulty parts are repaired or replaced, while fittings and fixtures are maintained in working order. Motors are installed using necessary lifting and hoisting equipment as per drawings, and air conditioning plants are installed and repaired by replacing or fixing defective parts, re-seating valves, refitting coils, and ensuring proper electrical connections.

Pipe Fitter; lays, repairs and maintains, pipes for supply of water, gas, oil or steam in buildings, gardens, workshops, stores, ships etc., according to drawings or instructions. Examines drawings and other specifications or receives relevant instructions. Cuts passage holes for laying pipes in walls and floors. Cuts reams, threads and bends pipes according to specifications. Lays pipes in cut passage and assembles pipe sections with couplings, sockets, Tee's elbows etc. Levels position of pipes using sprit level for gravitational flow. Caulks joints, tests them for leakage with pneumatic or hydraulic pressure and secures pipe line to structure with clamps, brackets, and hangers. Fits water meters, taps etc. to pipe where necessary. Repairs and replaces leaky pipe lines, taps and joints and provides connections to overhead

water tanks. Helps Plumber, General in fittings sanitary fittings to buildings. May join pipe sections and fittings.

Grinder, General; grinds and smoothens metal surfaces to specified accuracy using one or more type of grinding machine. Examines drawings and other specifications of part to be ground. Selects grinding wheel of appropriate size, shape and abrasive quality and fastens it on spindle of machine. Mounts metal part accurately in position on machine using chucks, jigs, fixtures or between centres of head and tail stock of machine as required and sets it accurately either parallel or at angle in relation to grinding wheel as specified using appropriate devices and instruments necessary. Adjusts machine table, guides, stops and other controls to determine direction and limit of metal and grinding wheel movements. Selects grinding wheel speed and starts machine for grinding. Manipulates hand wheel or sets and starts automatic controls to bring grinding wheel in contact with work. Checks progress of grinding with measuring instruments and gauges for accuracy. May balance dress or change grinding wheel, stone or abrasive. May oil and clean machine.

Mechanical Engineering Technicians, Other; include all other Mechanical Engineering Technicians engaged in manufacture, research, testing and other fields of mechanical engineering, not elsewhere classified.

Food Processing Equipment Technician will be able to plan and organize assigned work and detect & resolve issues during execution. Demonstrate possible solutions and agree tasks within the team. Communicate with required clarity and understand technical English. Sensitive to environment, self-learning and productivity.

Reference NCO-2015: -

a) 7126.0301 - Pipe Fitter;
b) 7224.0100 - Grinder, General
c) 3115.9900 - Mechanical Engineering Technicians, Other

Reference NOS:

a) FIC/N9468
b) FIC/N9469
c) FIC/N9470
d) FIC/N9471
e) FIC/N9472
f) FIC/N9473
g) FIC/N9474
h) FIC/N9475
i) FIC/N9476
j) FIC/N9477
k) FIC/N9478
l) FIC/N9479
m) FIC/N9480
n) FIC/N9481
o) FIC/N9483
p) FIC/N9484
q) FIC/N9485
r) PSS/N9401
s) PSS/N9402

4. GENERAL INFORMATION

Name of the Trade	**FOOD PROCESSING EQUIPMENT TECHNICIAN**
NCO – 2015	7126.0301, 3115.9900, 7224.0100
NOS Covered	FIC/N9468, FIC/N9469, FIC/N9470, FIC/N9471, FIC/N9472, FIC/N9473, FIC/N9474, FIC/N9475, FIC/N9476, FIC/N9477, FIC/N9478, FIC/N9479, FIC/N9480, FIC/N9481, FIC/N9483, FIC/N9484, FIC/N9485, PSS/N9401, PSS/N9402
NSQF Level	Level-3.5
Duration of Craftsmen Training	One Year (1200 Hours+150 hours OJT/Group Project)
Entry Qualification	Passed 10th class examination
Minimum Age	14 years as on first day of academic session.
Eligibility for PwD	LD, CP, LC, DW, AA, LV
Unit Strength (No. of Student)	24 (There is no separate provision of supernumerary seats)
Space Norms	200 sq. m
Power Norms	10 KW
Instructors Qualification for:	
1. Food Processing Equipment Technician Trade	B.Voc/Degree in Mechanical/Electrical /Industrial/ Food/ Mechatronics Engineering from AITCE/UGC Recognized University with one year experience in the relevant field. OR 03 years Diploma in Mechanical/Electrical/Industrial/Food Processing Engineering from AICTE/recognized Board/ Institute or relevant Advanced Diploma (Vocational) from DGT with two-year experience in the relevant field. OR NTC/NAC in "Food Processing Equipment Technician" CTS trade with three-year experience in the relevant field. **Essential Qualification:** Relevant Regular / RPL variants of National Craft Instructor Certificate (NCIC) under DGT. **NOTE: - Out of two Instructors required for the unit of 2 (1+1), one must have Degree/ Diploma and other must have NTC/ NAC qualifications. *However, both of them must possess NCIC in any of its variants.***
2. Workshop	B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering

Calculation & Science	College/ university with one-year experience in the relevant field. **OR** 03 years Diploma in Engineering from AICTE / recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. **OR** NTC/ NAC in any one of the engineering trades with three years' experience. **Essential Qualification:** Regular / RPL variants of National Craft Instructor Certificate (NCIC) in relevant trade **OR** Regular / RPL variants NCIC in RoDA or any of its variants under DGT
3. Engineering Drawing	B.Voc/Degree in Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field. **OR** 03 years Diploma in Engineering from AICTE / recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. **OR** NTC/ NAC in any one of the engineering/ Draughtsman group of trades with three years' experience. **Essential Qualification:** Regular / RPL variants of National Craft Instructor Certificate (NCIC) in relevant trade OR Regular/RPL variants NCIC in RoDA or any of its variants under DGT
2. Employability Skill	MBA/ BBA / Any Graduate/ Diploma in any discipline with Two years' experience with short term ToT Course in Employability. (Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above) **OR** Existing Social Studies Instructors in ITIs with short term ToT Course in Employability.
3. Minimum Age for Instructor	21 Years
List of Tools and Equipment	As per Annexure – I

5. LEARNING OUTCOME

Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.

5.1 LEARNING OUTCOMES

1. Implement personal safety, machine safety and developing safe work attitude. (NOS: FIC/N9468)
2. Use various hand tools in the trade. (NOS: FIC/N9469)
3. Apply concepts of food safety, food hazards, Allergens and its control. (NOS: FIC/N9470)
4. Operate various food processing equipment for mixing, baking, frying and milling blending, homogenization & packing. (NOS: FIC/N9471)
5. Plan & perform Preventive and corrective maintenance of power transmission system of food processing and packaging machineries. (NOS: FIC/N9472)
6. Identify, dismantle, replace and assemble different pneumatics and hydraulics components. (NOS: FIC/N9473)
7. Check various components of pneumatics and hydraulic system and construct pneumatic & hydraulic circuit to check functionality. (NOS: FIC/N9473)
8. Carryout preventive maintenance of lubrication & cooling system of different machines as per manufactures guidelines. (NOS: FIC/N9474)
9. Perform joining of tubes/ pipes, dismantling and assembling of valves & fittings with pipes and carryout test for leakages. (NOS: FIC/N9475)
10. Plan and perform simple repair, overhauling of different machines and check for functionality. (NOS: FIC/N9476)
11. Plan & perform day to day preventive maintenance as per schedule, repair and checking functionality of Grinding and Milling machines, Conveyors etc. (NOS: FIC/N9477)
12. Plan and perform maintenance of feeding devices used in food processing industry. (NOS: FIC/N9478)
13. Apply basic concepts of electricity in food processing equipment. (NOS: FIC/N9479)
14. Troubleshoot and restore different Electrical, Electronic systems/ devices. (NOS: FIC/N9480)
15. Apply concepts of refrigeration, air conditioning and Compressors, Boilers and water treatment. (NOS: FIC/N9481)
16. Demonstrate function of different sensors. (NOS: FIC/N9483)
17. Demonstrate Programmable logic control and its application, Selection criteria and types. (NOS: FIC/N9484)

18. Operate the variable frequency drive VFD. (NOS: FIC/N9485)
19. Read and apply engineering drawing for different application in the field of work. (NOS: PSS/N9401)
20. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS: PSS/N9402)

6. ASSESSMENT CRITERIA

LEARNING OUTCOMES	ASSESSMENT CRITERIA
1. Implement personal safety, machine safety and developing safe work attitude. (NOS: FIC/N9468)	Demonstrate safe work attitude development among the trainees.
	Perform First Aid Methods.
	Demonstrate the importance of trade and job-specific trainings.
	Demonstrate and play a video on common hazards in the workplace and Its avoidance.
	Demonstrate chemical safety, safe handling and disposal of chemicals and waste materials.
	Following electrical safety, Fire Safety.
2. Use various hand tools in the trade. (NOS: FIC/N9469)	Use of all marking aids.
	Mark layout of a work piece- for line, circle, arcs.
	Remove wheel lug nuts.
	Demonstrate workshop tools with specification.
3. Apply concepts of food safety, food hazards, Allergens and its control. (NOS: FIC/N9470)	Demonstrate HACCP and GMP requirements.
	Handling of Food Processing industry wastages.
	Demonstrate Allergen handling and control in food industry.
4. Operate various food processing equipment for mixing, baking, frying and milling blending, homogenization & packing. (NOS: FIC/N9471)	Identify various parts of different food processing & packing machineries.
	Demonstrate handling of various types of Food Processing machineries.
	Handling of various types of Food Processing machineries for mixing, baking, frying, milling, blending and homogenization.
	Demonstrate handling of various types of Food Processing machineries for packaging of finish goods.
	Handling of various types of Food Processing machineries.
5. Plan & perform Preventive and corrective	Perform dismantling and mounting of pulleys.
	Making & replacing damaged keys.

maintenance of power transmission system of food processing and packaging machineries. (NOS: FIC/N9472)	Repair & replacement of belts and check for workability.
	Make template/gauge to check involutes profile.
6. Identify, dismantle, replace and assemble different pneumatics and hydraulics components. (NOS: FIC/N9473)	Demonstrate knowledge of safety procedures in hydraulic systems
	Identify hydraulic components e.g., Pumps, Reservoir, Fluids, Pressure relief valve (PRV), Filters, different types of valves, actuators, and hoses
7. Check various components of pneumatics and hydraulic system and construct pneumatic & hydraulic circuit to check functionality. (NOS: FIC/N9473)	Inspect fluid levels, service reservoirs, clean/replace filters.
	Demonstrate Hydraulic and Pneumatic Simulation software.
8. Carryout preventive maintenance of lubrication & cooling system of different machines as per manufactures guidelines. (NOS: FIC/N9474)	Identify various types of lubricants/ Lubrication system and their components & lubricating points and components of coolant system.
	Cleaning of lubrication lines and oil filters.
	Perform fittings of different types of seals and oil rings.
	Prepare and fit gasket for different joint Surface.
	Carryout preventive maintenance of lubrication system of machines, cooling system and breakdown maintenance of cooling system.
	Prepare lubrication schedule- daily, weekly, monthly concept.
9. Perform joining of tubes/ pipes, dismantling and assembling of valves & fittings with pipes and carryout test for leakages.	Perform flaring of tubes and tube joints, cutting & threading of pipe.
	Fitting of pipes as per layout
	Perform bending of pipes- cold and hot.
	Dismantle & assemble – globe valves, ball valve, sluice valves,

(NOS: FIC/N9475)	stop cocks, seat valves and non-return valve.
	Fit & assemble pipes, valves and test for leakage & functionality of valves.
	Measure, check and record in control chart.
10. Plan and perform simple repair, overhauling of different machines and check for functionality. (NOS: FIC/N9476)	Perform simple and routine maintenance work with check list
	Demonstrate alignment, leveling of Machine tools
	Carry out testing of machine tools such as geometrical parameters.
11. Plan & perform day to day preventive maintenance as per schedule, repair and checking functionality of Grinding and Milling machines, Conveyors etc. (NOS: FIC/N9477)	Perform repair of machinery
	Identify washers, gasket, clutch, keys, jibs, cotter, Circlip, etc.
	Dismantle, assemble different types of bearing
	Perform routine check of machine
12. Plan and perform maintenance of feeding devices used in food processing industry. (NOS: FIC/N9478)	Demonstrate feeding devices for various purposes in food industry.
	Demonstrate cleaning of machineries used with recommended sanitizers
13. Apply basic concepts of electricity in food processing equipment. (NOS: FIC/N9479)	Demonstrate electrical safety precautions and first aid
	Measure current, voltage, resistance, power, power, power factor, energy using analog and digital meter
	Demonstrate to make star and delta connection
	Identify electrical tools
14. Troubleshoot and restore different Electrical, Electronic systems/ devices. (NOS: FIC/N9480)	Check loose contacts in the control panel wirings
	Determine faults in power circuit such as fuse blown, MCB Tripped, control fuse blown etc.
	Troubleshoot circuit breaker, DC Machine, AC/DC drives
	Replace fuses, Locating OLR
15. Apply concepts of refrigeration, air	Identify various refrigeration equipment and components of vapour compression system like compressor, condenser,

conditioning and Compressors, Boilers and water treatment. (NOS: FIC/N9481)	expansion device
	Test compressor
	Demonstrate to start the compressor with and without relay
	Check and find fault of electrical accessories like thermostat, timer, defrost heaters, bi-metal, air louvers etc
	Dismantle/assemble reciprocating/rotary compressor
	Demonstrate boilers, psychometric chart
16. Demonstrate function of different sensors. (NOS: FIC/N9483)	Identify Behavior of Reflex Photoelectric Sensors.
	Identify Behavior of ultrasonic sensor.
	Determine working principles of sensors
	Identify Behavior of reed switch and limit switch.
	Determine logical operation of sensors
	Identify Behavior of Temperature Sensors.
	Identify Behavior of Level Control.
17. Demonstrate Programmable logic control and its application, Selection criteria and types. (NOS: FIC/N9484)	Demonstrate programmable logic device and different terminal
	Demonstrate communication port in PLC and their application
	Connect PLC to HMI
	Demonstrate HMI programming software
18. Operate the variable frequency drive VFD. (NOS: FIC/N9485)	Connect variable frequency Drive with PLC and motor
	Demonstrate variable frequency Drive
	Carry out operate variable frequency drive
	Demonstrate small PLC program for VFD operation
19. Read and apply engineering drawing for different application in the field of work. (NOS: PSS/N9401)	Read & interpret the information on drawings and apply in executing practical work.
	Read &analyze the specification to ascertain the material requirement, tools and assembly/maintenance parameters.
	Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
20. Demonstrate basic	Solve different mathematical problems.

mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS: PSS/N9402)	Explain concept of basic science related to the field of study.

7. TRADE SYLLABUS

SYLLABUS FOR FOOD PROCESSING EQUIPMENT TECHNICIAN TRADE			
DURATION: ONE YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 35 Hrs.; Professional Knowledge 10 Hrs.	LO-1: Implement personal safety, machine safety and developing safe work attitude.	1. Demonstrate safe work attitude development among the trainees by educating them on fundamentals of Safety, e.g., hazards, near misses, risk assessment and control measures. Basic Safety terminologies and critical statutory requirements. 2. Practice on First Aid Methods. 3. Demonstrate the importance of trade and job-specific trainings. 4. Demonstrate and play a video on common hazards in the workplace and Its avoidance, e.g. moving machine parts, slip-trip, height work, confined space, etc. 5. Demonstrate chemical safety, safe handling and disposal of chemicals and waste materials like metal chips/burrs hazards materials etc. 6. Display safety signs for Danger, Warning, caution &	Overview of Food Processing industry and its various aspects. All necessary guidance to be provided to the new comers to become familiar with the working of Industrial Training Institute system including stores procedures. Soft Skills, its importance and Job opportunity after completion of training. Importance of safety and general precautions observed in the industry/shop floor Hazard Identification and risk assessment. Introduction of First aid, electrical safety. Introduction of PPEs. Response to emergencies e.g.; power failure, fire, and system failure. Importance of housekeeping & good shop floor practices and work to permit. Introduction to 5S concept & Its application. Occupational Safety & Health: Safety and Environment guidelines, legislations & regulations as

		personal safety message. 7. Practice on electrical safety like earthing, common electrical hazards and its preventive measures. 8. Practice on Fire Safety. Common Fire hazards and control measures (detection, protection, emergency procedures, etc.) 9. Practical demonstration of fire extinguishers, detectors, main PPEs used in factories	applicable. Basic understanding on General work, Hot work, Height work confined space work and material handling equipment., LOTO kits, etc. Types of Fire extinguishers and uses. Machine safety as per OEM recommendation (guarding, interlocking etc.)
Professional Skill 50 Hrs.; Professional Knowledge 10 Hrs.	LO-2: Use various hand tools in the trade.	10. Practice using all marking aids, like steel rule with spring calipers, dividers, scriber, punches, Chisel etc. 11. Mark layout of a work piece- for line, circle, arcs. 12. Practice to remove wheel lug nuts. 13. Practice on General Workshop tools with specification viz., Allen keys, pliers, multi-grip, long nose, flat-nose, spanner, screw driver and other electrical tools.	• Bench vice & C-clamps, Spanners- ring spanner, open end spanner & the combination spanner, universal adjustable open end spanner. Sockets & accessories, Pliers - • Combination pliers, multi grip, long nose, flat-nose, • Nippers or pincer pliers, Side cutters, Tin snips, Circlip pliers, external circlips pliers.
Professional Skill 50 Hrs.; Professional Knowledge 10 Hrs.	LO-3: Apply concepts of food safety, food hazards, Allergens and its control.	14. Demonstrate HACCP and GMP requirements in Food Processing industry. 15. Practice handling of Food Processing industry wastages. 16. Demonstrate Allergen handling and control in food industry.	• Food safety and regulations FSSAI: FDA, Codex Alimentarius, BIS, Agmark, Overview of Food Safety and Standards Act, 2006, HACCP, Food Safety Management System, GMP and GHP. • Importance of personal Hygiene, Cleaning & Sanitary

			standards of Food processing industry. • Tools and equipment hygiene • Food Safety and Standards (Schedule 4) Safety standards and Hygiene practice in food industry, 12Golden rules of safe food. • Allergen handling and control in food industry
Professional Skill 35 Hrs.; Professional Knowledge 10 Hrs.	LO-4: Operate various food processing equipment for mixing, baking, frying and milling blending, homogenization & packing.	17. Identify various parts of different food processing & packing machineries. 18. Demonstrate & practice handling of various types of Food Processing machineries for mixing, baking, frying, milling, blending and homogenization. 19. Demonstrate & practice handling of various types of Food Processing machineries for packaging of finish goods.	• Various types of Food Processing such as mixing, baking, frying, milling blending and homogenization. • Different types of foreign particles, their detection and mitigation. • Raw material and packing material machineries. • Introduction to various parts of different machineries in food processing & packing. • Stacking Norms: First in First Out (FIFO) First Expiry First Out (FEFO) Form Fill seal (FFS)
Professional Skill 78 Hrs.; Professional Knowledge 12 Hrs.	LO-5: Plan & perform Preventive and corrective maintenance of power transmission system of food processing and packaging machineries.	20. Perform dismantling and mounting of pulleys. 21. Practice making & replacing damaged keys. 22. Practice repair & replacement of belts and check for workability. 23. Make template/gauge to check involutes profile. 24. Dismantle and assemble Pneumatics and its components including the	Preventive and corrective maintenance. Spare parts planning. Power transmission elements. The object of belts including V belts, their sizes and specifications, materials of which the belts are made, selection of belts, methods of joining food grade belts. Power transmissions- coupling types-flange

		safety risks associated with it and key precautionary measures.	coupling, -Hooks coupling- universal coupling and its uses. Types of pulleys- solid, split and 'V' belt, Types of drives-open and cross belt drives. The Demonstration LOTO procedure on pneumatics/ hydraulics.
Professional Skill 76 Hrs.; Professional Knowledge 14 Hrs.	LO-6: Identify, dismantle, replace and assemble different pneumatics and hydraulics components. LO-7: Check various components of pneumatics and hydraulic system and construct pneumatic & hydraulic circuit to check functionality.	25. Demonstrate knowledge of safety procedures in hydraulic systems (Demo by video) 26. Identify hydraulic components – Pumps, Reservoir, Fluids, Pressure relief valve (PRV), Filters, different types of valves, actuators, and hoses 27. Inspect fluid levels, service reservoirs, clean/replace filters 28. Practice on Hydraulic and Pneumatic Simulation software.	Symbols of hydraulic components, hydraulic oils –function, properties, and types, Contamination in oils and its control - Hydraulic Filters – types, constructional features, and their typical installation locations, cavitation, Hazards & safety precautions in hydraulic systems - Hydraulic reservoir & accessories, Pumps, Classification – Gear/vane/ piston types, Pressure relief valves – Direct acting and pilot-operated types - Pipes, tubing, Hoses and fittings – constructional details, minimum bend radius, routing tips for hoses. Types of pneumatic fitting and their selections. Construction of pneumatic circuits using simulation software. Pneumatic cylinders- types, construction, working, materials, specifications, mounting and cushioning. Pneumatic motors- types, construction, working, specifications and applications Description and function of air Reciprocating Compressor. Function of Air service unit (FRL- Filter, Regulator, Lubricator & air

			lock system CLIT (Cleaning Lubricating Inspecting and Tightening).
Professional Skill 78 Hrs.; Professional Knowledge 12 Hrs.	LO-8: Carryout preventive maintenance of lubrication & cooling system of different machines as per manufactures guidelines.	29. Identify various types of lubricants/ Lubrication system and their components & lubricating points. 30. Practice cleaning of lubrication lines and oil filters. 31. Perform fittings of different types of seals and oil rings. 32. Prepare and fit gasket for different joint Surface. 33. Carryout preventive maintenance of lubrication system of machines. 34. Prepare lubrication schedule- daily, weekly, monthly concept. 35. Identify components of coolant system. 36. Carryout preventive maintenance of cooling system. 37. Carryout breakdown maintenance of cooling system.	Lubrication and its importance, lubricating systems & various grading of lubrication with special emphasis to food processing equipment. Difference between coolant and lubricants. Warning & protective devices used in centralized lubrication system (Pressure switch, temperature gauge, level indicator and relief valve.) Lubrication fittings. Storage and handling, Lubricant contamination detection and control, Leakage prevention- Shaft seals, sealing devices and “O” rings. Essential parts of a basic coolant system Various types of coolants, its properties and uses coolant system type-soluble oils-soaps, soda water etc.
Professional Skill 35 Hrs.; Professional Knowledge 10 Hrs.	LO-9: Perform joining of tubes/ pipes, dismantling and assembling of valves & fittings with pipes and carryout test for leakages.	38. Perform flaring of tubes and tube joints. 39. Perform cutting & Threading of pipe. 40. Practice fitting of pipes as per layout 41. Perform bending of pipes- cold and hot. 42. Dismantle & assemble –	**Pipes and tubes -** Types and specifications. Pipes and pipe fitting- commonly used pipes. Pipe schedule and standard sizes. Pipe bending methods. Use of bending fixture, pipe threads- Std. Pipe threads Die and Tap, pipe vices. Use of tools such as pipe

		globe valves, ball valve, sluice valves, stop cocks, seat valves and non-return valve. 43. Fit & assemble pipes, valves and test for leakage & functionality of valves. 44. Measure, check and record in control chart.	cutters, pipe wrenches, pipe dies, and tap, pipe bending machine etc. Standard pipefitting-Methods of fitting or replacing the above fitting, repairs and erection on rainwater drainage pipes and household taps and pipe work. Inspection & Quality control - Basic SPC -Visual Inspection.
Professional Skill 35 Hrs.; Professional Knowledge 10 Hrs.	LO-10: Plan and perform simple repair, overhauling of different machines and check for functionality.	45. Perform simple repair work. 46. Perform the routine maintenance with check list. 47. Carryout inspection of Machine tools such as alignment, leveling etc. 48. Perform accuracy testing of machine tools such as geometrical parameters.	Look Listen Feel (LLF) Maintenance: Definition, types and its necessity. System of symbol and colour coding. Possible causes for failure and remedies.
Professional Skill 85 Hrs.; Professional Knowledge 20 Hrs.	LO-11: Plan & perform day to day preventive maintenance as per schedule, repair and checking functionality of Grinding and Milling machines, Conveyors etc.	49. Perform repair of machinery: - Making of packing gaskets. 50. Check washers, gasket, clutch, keys, jibs, cotter, Circlip, etc. and replace/ repair if needed. 51. Use hollow punches, extractor, drifts, various types of hammers and spanners, etc. for repair work. 52. Dismantle, assemble different types of bearing and check for functionality. 53. Perform routine check of machine and do replenish	Importance of Technical English terms used in industry – (in simple definition only) Technical forms, process charts, activity logs, in required formats of industry, estimation, cycle time, productivity reports, job cards. Washers-Types and calculation of washer sizes. The making of joints and fitting packing. Types of material handling equipment. Types of conveyors, forklift, cranes, Pneumatic blowers,

		as per requirement. 54. Demonstrate different types of conveyors, Pneumatic conveyor, Wire conveyor, Slat Conveyor, Bucket Elevator, Gravity Roller Conveyor, Powered Roller Conveyor, Wheel Conveyor, V-type Bucket Conveyor.	Elevators Oven. ISI colour coding for various pipe lines. Risks associated with the conveyors and key safety requirements.
Professional Skill 65 Hrs.; Professional Knowledge 10 Hrs.	LO-12: Plan and perform maintenance of feeding devices used in food processing industry.	55. Demonstrate use of feeding devices for various purposes in food industry. 56. Demonstrate cleaning of machineries used with recommended sanitizers following CIP (clean-in-place) procedure. 57. Carryout maintenance of feeding devices used in food processing industry.	Types of Feeding devices, use and their maintenance, special attribute of the feeding devices.
Professional Skill 35 Hrs.; Professional Knowledge 10 Hrs.	LO-13: Apply basic concepts of electricity in food processing equipment.	58. Demonstrate electrical safety precautions and first aid. 59. Identify, use and maintain electrical tools. 60. Measure current, voltage, resistance, power, energy using analog and digital meter. 61. Test continuity, insulation and earthing using megger. 62. Make star and delta connection and show line voltage, line current, phase voltage and phase current. 63. Measure power and power factor.	Safety precautions to be observed while working on electricity. Common electrical hazards in workplace and its mitigation measures. Electrical terms such as AC and DC supply, Voltage, Current, Resistance, Power, Energy, Frequency etc. Conductors and Insulators, Materials used as conductors. Series and parallel circuit, open circuit, short circuit, etc. Understanding a single-line diagram. Measuring Instruments such as voltmeter, ammeter, ohm meter, watt meter, energy

			meter and frequency meter. Earthing and its importance. Earth resistance. Insulation and continuity test star and delta connection.
Professional Skill 38 Hrs.; Professional Knowledge 07 Hrs.	LO-14: Troubleshoot and restore different Electrical, Electronic systems/ devices.	64. Practice replacement of fuses, Locating OLR and its resetting practice. 65. Practice locating faults in power circuit such as fuse blown, MCB Tripped, control fuse blown etc. 66. Perform checking of loose contacts in the control panel wirings. 67. Troubleshoot and Service a circuit breaker. 68. Service and troubleshoot the DC motor starter. 69. Maintain, Service, and troubleshoot DC Machine. 70. Troubleshoot AC/DC drives. Check the feedback sensors.	Demonstration of Electrical Work Permit system. Guidelines for trouble shooting of electrical, electronic systems.
Professional Skill 35 Hrs.; Professional Knowledge 10 Hrs.	LO-15: Apply concepts of refrigeration, air conditioning and Compressors, Boilers and water treatment.	71. Identify various refrigeration equipment and components of vapour compression system like compressor, condenser, expansion device. 72. Perform testing of compressor. 73. Start the compressor with and without relay. 74. Perform fault finding and testing of electrical accessories like thermostat, timer, defrost heaters, bi-metal, air louvers etc. and	Basic principle of refrigeration, working, use, specifications of refrigeration tools, instruments and equipment. Fundamentals of Refrigeration and its units. Thermodynamics law. Types of Refrigeration systems, including vapour absorption refrigeration cycle. (VARC), water – combination Study the construction and working of vapour compression cycle, low side & high side of vapour compression system. Applications of vapour

		other system components. 75. Dismantle /assemble reciprocating/ rotary compressor. 76. Demonstrate psychometric chart. 77. Demonstrate boilers and its types	compression cycle. Coefficient of Performance (COP), Ton of Refrigeration. Construction and working of V.C Cycle, fundamental operations, sub cooling and super heating. Basic function of compressed air and introduction to Nitrogen Gas and its properties. Fresh water treatment and water treatment process Boilers and its types Steam transmission system, steam traps, heat exchanger.
Professional Skill 37 Hrs. Professional Knowledge 08 Hrs.	LO-16: Demonstrate function of different sensors.	78. Demonstrate behaviour of Proximity Sensors, inductive sensor, capacitive sensor, magnetic sensor. Examples of sensors used for Safety applications and working principles 79. Identify behaviour of Reflex Photoelectric Sensors. 80. Identify behaviour of ultrasonic sensor. 81. Identify behaviour of reed switch and limit switch. 82. Identify behaviour of Temperature Sensors. 83. Identify behaviour of Level Control. 84. Perform logical operation of sensors. 85. Interface Sensors with Actuators.	Introduction to Sensors & and Interlock Applications. Types of Sensors & Operation Proximity Sensor -Classifications & Operation Sensors for Temperature Measurements Sensors for Distance and Displacement Sensor characteristics and Interface technique. Types of Safety Interlocks/ sensors
Professional Skill 38 Hrs.; Professional	LO-17: Demonstrate Programmable logic control and	86. Demonstrate programmable logic device and different terminal, their uses and input power	Programmable logic device Basics of Ladder diagram. Block diagram of PLC. Working principle of PLC and

Knowledge 07 Hrs.	its application, Selection criteria and types.	supply requirements. 87. Demonstrate communication port in PLC and their application. 88. Practice connecting PLC to HMI. 89. Use a programmable memory to store the instructions and specific functions that include On/Off control, timing counting, sequencing, arithmetic and data handling. 90. Demonstrate HMI programming software.	HMI. Communication protocol for HMI and PLC communication.
Professional Skill 35 Hrs.; Professional Knowledge 10 Hrs.	LO-18: Operate the variable frequency drive VFD.	91. Demonstrate Variable Frequency Drive. 92. Perform connection of Variable Frequency Drive with PLC and motor. 93. Operate Variable Frequency Drive, Set and control speed of motor by VFD. 94. Demonstrate Small PLC program for VFD operation.	Variable frequency drive. VFD and Servo drive. Working of VFDs.
ENGINEERING DRAWING			
Professional Knowledge ED - 30 hrs.	Read and apply engineering drawing for different application in the field of work.	Introduction to Engineering Drawing and Drawing Instruments – • Conventions • Sizes and layout of drawing sheets • Title Block, its position and content • Drawing Instrument Lines- Types and applications in drawing Free hand drawing of – • Geometrical figures and blocks with dimension • Transferring measurement from the given object to the free hand sketches. • Free hand drawing of hand tools and measuring tools. Drawing of Geometrical figures: • Angle, Triangle, Circle, Rectangle, Square, Parallelogram. • Lettering & Numbering – Single Stroke.	

		Dimensioning • Types of arrow head • Leader line with text • Position of dimensioning (Unidirectional, Aligned) Symbolic representation – • Different symbols used in the related trades. Concept and reading of Drawing in • Concept of axes plane and quadrant Concept of Orthographic and Isometric projections • Method of first angle and third angle projections (definition and difference) Reading of Job drawing related to trades
WORKSHOP CALCULATION & SCIENCE		
Professional Knowledge WC- 30 Hrs	Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study.	Unit, Fractions • Classification of unit system • Fundamental and Derived units F.P.S, C.G.S, M.K.S and SI units • Measurement units and conversion • Factors, HCF, LCM and problems • Fractions - Addition, substraction, multiplication & division • Decimal fractions - Addition, subtraction, multiplication & division • Solving problems by using calculator Square root, Ratio and Proportions, Percentage • Square and square root • Simple problems using calculator • Applications of Pythagoras theorem and related problems • Ratio and proportion • Ratio and proportion - Direct and indirect proportions • Percentage • Percentage - Changing percentage to decimal and fraction Material Science • Types metals, types of ferrous and non-ferrous metals • Introduction of iron and cast iron Mass, Weight, Volume and Density • Specific gravity Speed and Velocity, Work, Power and Energy • Speed and velocity - Rest, motion, speed, velocity, difference between speed and velocity, acceleration and retardation • Speed and velocity - Related problems on speed & velocity • Work, power, energy, HP, IHP, BHP and efficiency Heat & Temperature and Pressure • Concept of heat and temperature, effects of heat, difference between heat and temperature, boiling point & melting point of different metals and non-metals • Scales of temperature, Celsius, Fahrenheit, Kelvin and

		conversion between scales of temperature. Basic Electricity • Introduction and uses of electricity, electric current AC, DC their comparison, voltage, resistance and their units. • Conductor, insulator, types of connections - series and parallel. • Ohm's law, relation between V.I.R & related problems. • Electrical power, energy and their units, calculation with assignments. • Magnetic induction, self and mutual inductance and EMF generation • Electrical power, HP, energy and units of electrical energy Trigonometry • Analytical geometry • Measurement of angles • Trigonometrically ratios
Examination		

SYLLABUS FOR CORE SKILLS
1. Employability Skills (Common for all CTS trades) (120 Hrs)

Learning outcomes, assessment criteria, syllabus and Tool List of Core Skills subjects which is common for a group of trades, provided separately in www.bharatskills.gov.in/ www.dgt.gov.in

ANNEXURE-I

LIST OF TOOLS & EQUIPMENT			
FOOD PROCESSING EQUIPMENT TECHNICIAN (For 24 Candidates)			
S No.	**Name of the Tools and Equipment**	**Specification**	**Quantity**
A. TRAINEES TOOL KIT			
1.	"V" block	V-Block pair 7 cm with clamps	12 Nos.
2.	"V" block	V-Block 15 cm with clamps	12 Nos.
3.	Metal L	Metal - L - 15cm	12 Nos.
4.	Metal L	Metal - L - 30cm	12 Nos.
5.	Angle Plate	10 x 20 cm.	12 Nos.
6.	Spirit Level	15 cm metal	12 Nos.
7.	File warding	15 cm smooth	12 Nos.
8.	File knife edge	15 cm smooth	12 Nos.
9.	File cut saw	15 cm smooth	12 Nos.
10.	File feather edge	15 cm smooth	12 Nos.
11.	File triangular	15 cm smooth	12 Nos.
12.	File round	20 cm second cut	12 Nos.
13.	File square	15 cm second cut	12 Nos.
14.	File square	25 cm second cut	12 Nos.
15.	File triangular	20 cm second cut	12 Nos.
16.	File flat	30 cm second cut	12 Nos.
17.	File flat	20 cm bastard	12 Nos.
18.	File flat	30 cm bastard	12 Nos.
19.	File Swiss type	Needle set of 12.	12 Nos.
20.	File half round	25 cm second cut.	12 Nos.
21.	File half round	25 cm bastard	12 Nos.
22.	File round	30 cm bastard	12 Nos.
23.	File hand	15 cm second cut	12 Nos.
24.	Card file.	----	12 Nos.
25.	Oil Stone	15 cm x 5 cm x 2.5 cm	12 Nos.
26.	Pliers' combination	15 cm	12 Nos.
27.	Blow Lamp	0.50 liters.	12 Nos.
28.	Spanner	D.E. 6 -26 mm set of 10 pcs.	12 Nos.
29.	Spanner adjustable	15 cm	12 Nos.

30.	Box spanner	Set 6-25 mm set of 8 with Tommy bar	12 Nos.
31.	Glass magnifying	7 cm	12 Nos.
32.	Clamp toolmaker	5 cm and 7.5 cm set of 2.	12 Nos.
33.	Clamp “C”	5 cm	12 Nos.
34.	Clamp “C”	10 cm	12 Nos.
35.	Scraper flat	15 cm.	12 Nos.
36.	Scraper triangular	15 cm	12 Nos.
37.	Scraper half round	15cm	12 Nos.
38.	Chisel	cold 9 mm cross cut 9 mm diamond.	12 Nos.
39.	Chisel	Cold 19 mm flat	12 Nos.
40.	Chisel	cold 9 mm round nose.	12 Nos.
41.	Motorized + Tennon Saw	----------	12 Nos.
42.	Hand hammer	1 kg. with handle Ball Peen	12 Nos.
43.	Hacksaw	frame fixed 30 cm.	12 Nos.
44.	Mallets Wooden	----------	12 Nos.
45.	V-Block, Files, mallets, screwdrivers, chisels, etc.	----------	12 Nos.
46.	Hand Drilling Machine	Rated input power: 600W, Power output: 301W, Rated torque: 1.8 Nm	12 Nos.
47.	Metal Saw	No-Load Speed: 3,800 rpm, Saw blade diameter 355 mm, saw blade bore 25.4 mm	12 Nos.
48.	Straight Grinder HEAVY DUTY with attachments	No-Load Speed: 10000 – 30000 rpm, Rated power output: 380W	12 Nos.
49.	Professional Air Blower	Power consumption: 820 W, No-load speed: 16000rpm, Flow rate: 0-4.5 m3/s	12 Nos.
50.	Jig Saw Portable	Input Power: 900W, No-load speed: 11,000 rpm, Disc Diameter: 100	12 Nos.
51.	Hammer Drill Wired	Drill type: hammer, optimum power transfer	12 Nos.
52.	Hand Held Sander / Polisher	No Load Speed: 11000 rpm	12 Nos.
53.	Digital Dial Torque Wrench	Range: 20 to 280 Nm	12 Nos.
54.	Lifting Tackle/Sling	1 Ton×2mtr	12 Nos.
55.	Impact Wrench	1/2-inch drive	12 Nos.

56.	Laser Light Pen	----------	12 Nos.
57.	Surface Plate	Cast iron	12 Nos.
58.	Digital Screw Pitch Gauge	Working voltage: 3.0 V / DC, Measure precision: 0.1 degree	12 Nos.
59.	Laser Distance Measurement Instrument	Levelling Accuracy (Vial): +/- 0.2degree, Measuring Accuracy Typical: +/- 1/16 inch (1.5 mm)	12 Nos.
60.	Palm Scale	Capacity-500gms, Least Count-0.1g	12 Nos.
61.	Allen Screwdriver Wrench	Tool 6Pcs T Handle Ball Ended Hex Key	12 Nos.
62.	Universal Quick Adjustable Multi-function Wrench Spanner	Range: 6-32mm	12 Nos.
63.	Double Ended Wrench Hex Socket Spanner	8 In 1, Range: 6-32mm	12 Nos.
64.	Combination Plier Insulated	200 mm	(24 +1) Nos.
65.	Screwdriver Insulated	4mm X 150 mm, Diamond Head	(24 +1) Nos.
66.	Screwdriver Insulated	6mm X 150 mm	(24 +1) Nos.
67.	Knife Double Bladed Electrician	100 mm	(24 +1) Nos.
68.	Neon Tester	500 V	(24 +1) Nos.
B. MEASURING INSTRUMENT			
69.	Steel Rule	60 cm.	12 Nos.
70.	Vernier Caliper	0- 15 cm	12 Nos.
71.	Micrometer outside	0 – 50 mm	12 Nos.
72.	Micrometer Inside	0 to 20 mm	12 Nos.
73.	Digital Multi Meter	DC 200mv -1000v,0 – 10A & AC 200mv- 750v, 0-10A, resistance 0-20 MΩ and 3 1/2 digit	12 Nos.
74.	Digital Wattmeter	230 V, 1 KW, 50 Hz	2 Nos.
75.	Power Factor Meter Digital	440 V, 20 A, Three Phase portable box type	2 Nos.
76.	Megger	Analog - 500 V	2 Nos.
77.	a. Tong Tester / Clamp b. AC Ammeter MI, Analog, portable box type c. Ammeter MC, Analog, portable box type	Meter 0 - 100 A (Digital Type) 0-1A, 0-5 A ,0-25 A 0-500 mA, 0-5 A, 0-25 A	2 Nos. each

	d. AC Energy meter e. AC Energy meter	Single phase, 10 A, 240 V Induction Type Three phase, 15 A, 440 V Induction Type	
C. LIST OF TOOLS & ACCESSORIES			
78.	Compressor	unit suitable for Pressure: 8 bar, Delivery: 50 lpm (or more), Reservoir capacity: 24 Litres (Or more), 230V, 50 Hz, with pressure regulator and water separator	1 No.
79.	Pneumatic Trainer Kit, each consisting of the following matching components and accessories		01 set
	I. Single acting cylinder	Max. stroke length 50 mm, Bore dia. 20 mm	1 No.
	II. Double acting cylinder	Max. stroke length 100 mm, Bore dia 20 mm, magnetic type	1 No.
	III. 3/2-way valve	manually-actuated, Normally Closed	2 Nos.
	IV. 3/2-way valve	pneumatically-actuated, spring return	1 No
	V. One-way flow control valve	with manually-operated switch	2 Nos
	VI. 5/2-way valve	with manually-operated switch	
	VII. Shuttle valve (OR)		1 No.
	VIII. Two-pressure valve (AND)		1 No.
	IX. Pressure gauge	0-16 bar	1 Nos.
	X. Manifold with self-closing	NRV, 6-way	1 No.
	XI. Pushbutton station for electrical signal input	with 3 illuminated momentary-contact switches (1 NO + 1 NC) and 1 illuminated maintained-	1 No.

		contact switch (1 NO + 1 NC), Contact load 2A	
	XII. Relay station	with 3 relays each with 4 contact sets (3NO+1NC or Change-over type), 5 A	1 Nos.
	XIII. 3/2-way single solenoid valve	with LED	1 No.
	XIV.5/2-way single solenoid valve	with manual override and LED	1 No.
	XV. Power supply unit,	Input voltage 85 – 265 V AC, Output voltage: 24 V DC, Output current: max. 4.5 A, Short-circuit-proof.	1 No.
	XVI. Profile plate, Anodised Aluminium	1100x700 mm, with carriers, mounting frames and mounting accessories (To be fitted onto the pneumatic workstation)	1 No.
80.	Pneumatic Workstation with 40 square mm aluminium profile legs, wooden work surface, and one pedestal drawer unit having 5 drawers, each with handles and individual locks, on metallic full panel drawer slide	(1) Worktable – Size (Approx.) L1200mmXW900mmXH900 mm, with four castor wheels including two lockable wheels at the front side (2) Drawer – Size (Approx.) – L460mmxW495mm xH158mm each, and overall size of Drawer unit (Approx.) L470mmxW495mmxH825mm and (3) Drawer slide height (Approx.) 85mm.	1 No.
81.	Carrier for mounting components, such as PB & relay boxes.		1 No.
82.	Cut section model for pneumatic components		1 set
83.	Hydraulic Trainer Kit, each consisting of the following matching components and accessories:		1 set
	I. Hydraulic Power pack	with	

		(1) external gear pump having a delivery rate of 2.5 lpm, (approx.) @ 1400 rpm operating pressure 60 bar, coupled to a single-phase AC motor (230 V AC) having start capacitor and ON/OFF switch and overload protection (2) pressure relief valve adjustable from 0– 60 bars (3) oil reservoir, ≥5 litres capacity having sight glass, drain screw, air filter and P and T ports	
	II. Pressure relief valve	pilot-operated	1 No
	III. Drip tray, steel	size 1160 mm x 760 mm.	1 No.
	IV. Pressure Gauge	Glycerin-damped, Indication range of: 0 – 100 bars	1 No.
	V. Four-Way distributor	with five ports, equipped with a pressure gauge	1 No.
	VI. Double acting hydraulic cylinder	with a control cam, Piston diameter16 mm, Piston rod diameter10 mm, Stroke length 200 mm.	1 No.
	VII. Suitable Weight	for vertical loading of hydraulic cylinder	1 No.
	VIII. Mounting kit for weight	for realizing pulling and pushing load.	1 No.
	IX. 3/2-way directional control valve	with hand lever actuation.	1 No.
	X. 4/2-way directional control valve	with hand lever actuation.	1 No.
	XI. 4/3-way directional control valve	closed-centre position, with hand lever actuation.	1 No.
	XII. Non-return valve.		1 No.
	XIII. Pilot-operated check valve	Pilot to open.	1 No.
	XIV. One-way flow control valve	With integrated check valve.	1 No.
	XV. T-Connector with self-sealing coupling nipples (2 Nos.) and quick coupling socket (1 No.).		2 Nos.

	XVI. Profile plate,	Anodised Aluminium, 1100x700 mm, with carriers, mounting frames and mounting accessories (To be fitted onto the Hydraulic workstation)	1 set
84.	Hydraulic Workstation with 40 squares mm aluminium profile legs, wooden work surface, and one pedestal drawer unit having 5 drawers, each with handles and individual locks, on metallic full panel drawer slide:	(1) Worktable – Size (Approx.) L1200mmXW900mmXH900 mm, with four castor wheels including two lockable wheels at the front side, (2) Drawer – Size (Approx.) – L460mmxW495mm xH158mm each, and overall size of Drawer unit (Approx.) L470mmxW495mmxH825m m and (3) Drawer slide height (Approx.) 85mm.	1 set
85.	Cut-section models for hydraulic Components		1 set
86.	Fuses	• HRC • Glass • Rewire Type	4 Each
87.	Miniature circuit Breaker	16 amp	2 Nos.
88.	AC Starters: - a. Resistance type starter b. Direct online Starter c. Star Delta Starter- Manual d. Star Delta Starter – Semi automatic e. Star Delta Starter – Fully automatic f. Star Delta Starter - Soft starter g. Auto Transformer type	For A.C Motors of 2 to 5 H.P.	1 No. each
89.	AC Squirrel Cage Motor with star delta starter and triple pole iron	5 HP, 3-Phase, 415 V, 50 Hz	1 No.

	clad switch fuse with Mechanical Load.		
90.	Pneumatically operated hand tools	Air impact wrench-1/4' 3/8' 1/2' 3/4' 1' Ratchet wrench - 1/4' 1/2' stall pistol type air screw driver5-38Nm Air riveting nut tool- M3 to M8	1 No.
91.	PLC trainer Kit with HMI	Analog and digital PLC (Size of the board 3 ft x 3 ft)	1 No.
92.	Sensor kit including proximity switches	Level, temperature, pressure, humidity etc.	2 Each
93.	Freezer	mini freezer: 50L capacity single phase/Automatic defrost	1 No.
94.	Deep freezer	temperature range : -20 degree celcius 100-150 lt capacity single phase -electrified	1 No.
95.	Temperature control oven	Deck oven/4tray -(400-600mm) single phase, 150 watts power range	1 No.
96.	Grinding equipment	Grain/Sugar	1 No.
97.	Conveyor	belt conveyor: rubber material belt thickness :2-5mm/width: 100-500mm speed: 2-3m/s, lenth:1-10 ft capacity: 1-50kg/ft	1 No.
98.	Dryer	25-30 lt capacity Tray dryer- 3 tray Single phase electrified	1 No.
99.	Mini Boiler	steam range: 100 -150 kg/hr pressure: 2-5 bar Electrified/LPG	1 No.
100.	homogenizer	Capacity: 100 ltr 0-100 bar - Pressure range	1 No.
101.	Pulverizer	3-5 kg/hr, Power- 750 watts, 0.5-1 HP single phase Hopper capacity - 1-2Kg	1 No.
102.	Oil expeller	3-5 kg/hr, Power- 750 watts, 0.5-1 HP single phase, Hopper capacity - 1-2Kg	1 No.

103.	Plate mill	5 inch thickness plate capacity: 2-4 Kg/hr 0.5-1 Hp motor / single phase	1 No.
104.	High Pressure Fan	2980rpm	1 No.
105.	Pasteurizer	Capacity: 100lt Temperature range: 70-100 degree celcius, Single phase-electric heater	1 No.
106.	Servo Motor drives Trainer kit		1 No.
107.	Air-conditioning, direct system.	Complete with all controls including humidity control	1 No.
108.	Air conditioning, indirect system. (Water cooled)	Complete with all controls including humidity control	1 No.
109.	Gas leak detector for halogen gas		1 No.
110.	Electronic leak detector		1 No.
111.	Sensor thermometer (digital)	-50 degree Celsius to 150 degrees Celsius	1 No.
112.	Fin straightened/fin comb	With strong steel wire-based combing on wood	1 No.
113.	Filler gauge	0.05 mm - 1 mm	1 No.
114.	Compressors testers for small hermetic compressors	Fixed with electrical input/ output indicating facilities	1 No.
115.	Digital thermometer	Graduated disc analogy type	1 No.
116.	Temperature &Humidity recorder	Capacity to record 24 hrs. record	1 No.
117.	Capacitor start induction motor	1 Hp, 230 V	1 No.
118.	Evacuating and refrigerant charging station, consist of a) Rotary two stage vacuum pump and motor (with gas ballast and anti-such back) b) manifold with gauges and valves and capable of pulling vacuum up to 50 microns of Hg and with provision of connecting to a micron level vacuum gauge c) Graduated charging cylinder with provision for temperature correction and all necessary isolating valves	(CAP. 2 kg. In lieu of (b)above and with accuracy of + / - g for charging hydrocarbons)	1 No.
119.	Hygiene Kit		1 No.

Shop floor furniture and material			
120.	Working Bench	2.5 m x 1.20 m x 0.75 m	4 Nos.
121.	Instructor's table		1 No.
122.	Instructor's chair		2 Nos.
123.	Metal Rack	100cm x 150cm x 45cm	4 Nos.
124.	Lockers with drawers		1 for Each Trainee
125.	Almirah	2.5 m x 1.20 m x 0.5 m	1 No.
126.	Air Conditioner		As required
127.	Black board/white board	(Minimum 4x6 feet)	1 No.
128.	Fire Extinguisher	CO_2 2 KG	2 Nos.
129.	Fire Buckets	Standard size	2 Nos.
130.	Gas Connections		As required
Note: - 1. Internet facility is desired to be provided in the class room.			

ANNEXURE - II

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts, trainers of ITIs, NSTIs, faculties from universities and all others who contributed in revising the curriculum.

Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

List of Expert members participated for finalizing the course curriculum of Food Processing Equipment Technician trade held on			
S No.	**Name & Designation Sh/Mr./Ms.**	**Organization**	**Remarks**
1.	Sunil Kumar Gupta, DDG (ER)	CSTARI, Kolkata	Chairman
2.	T. Ragulan, JD/HoD	CSTARI, Kolkata	Co-ordinator
3.	Brindabas Das, DD	CSTARI, Kolkata	Member
4.	S. Bandyopadhyay, AD	DGT, HQ, New Delhi	Member
5.	Abhijit Samanto, Instructor	ITI College, Malda	Member
6.	Sanjib Sutradhar, Instructor	Govt. ITI Raiganj	Member
7.	Prasanta Biswas, Instructor	Govt. ITI Raiganj	Member
8.	Dr. Lakshmishri Roy, Faculty	Techno Main Salt Lake EM-4/1, Sec-V, Kolkata - 91	Member
9.	Prodip Mukhopadhyay Ex-MD, Sr. Advisor	Webel, Makaut	Member
10.	Sk. Altaf Hossain, Asst. Director	CSTARI, Kolkata	Member
11.	B. Sharanappa, Asst. Director	CSTARI, Kolkata	Member
12.	Akhilesh Pandey, Asst. Director	CSTARI, Kolkata	Member
13.	Bharat K. Nigam, TO	CSTARI, Kolkata	Member
14.	P.K. Bairagi, TO	CSTARI, Kolkata	Member
15.	K.V.S. Narayana, TO	CSTARI, Kolkata	Member
16.	Buddhaditya Biswas, TO	CSTARI, Kolkata	Member
17.	Swapan Sen, TO	CSTARI, Kolkata	Member
18.	Hemant Kujur, Jr. D/man	CSTARI, Kolkata	Member
19.	Pradip Biswas, Jr. D/Man	CSTARI, Kolkata	Member

20.	Aditya Bagari, Manager - Operations	ITC Foods Division ICML Medak, Telangana	Member
21.	A Surya Bhagavan, Manager HR	ITC FBD Medak, Telangana	Member
22.	Udhaya Kumar, Operations Manager	Amway India Enterprises Dindigul, Tamil Nadu	Member
23.	K Balaji, Sr Manager	Del Monte Foods Pvt Ltd Kalukondapally, Hosur	Member
24.	Dharmender Singh, G M Operations	Vishwas Foods Pvt. Ltd. Saboli Nathupur Road, Sonepath	Member
25.	Sai Sibani Kar, Director	M/s Kar and Brothers Salipur, Cuttack, Odisha	Member
26.	Jagan K, Packing Executive	Vell Biscuits, Puducherry	Member
27.	Padmanaban V, Operations Manager	ITC Limited, ICML Pudukkottai, Tamil Nadu	Member
28.	Parvathimuthu, Manufacturing Executive	ITC Limited, ICML, Pudukkottai, Tamil Nadu	Member
29.	C Abirami, Senior HR executive	ITC Limited Pudukkottai Tamil Nadu	Member
30.	Nandini PNR, DGM - Technical Services	Delmonte Foods Pvt Ltd, Hosur Tamil Nadu	Member
31.	Srikanth V S, Manager	ITC Limited, Viralimalai	Member
32.	Ganesan. M, Assistant manager	ITC Pudukkottai, Viralimalai	Member
33.	Mohanraj, Asst. Manager HR	ITC limited, Pudukkottai, Tamil Nadu	Member
34.	Divakar K, Sr. Executive	Del Monte Foods Private Ltd., Hosur	Member
35.	Santhosh Maintenance Manager	ITC, Pudukkottai, Tamil Nadu	Member
36.	K. Sitaramaiah, QA Manager	ITC Limited, Trichy	Member
37.	Krishnamoorthy, Manager HR	ITC limited, Pudukkottai, Tamil Nadu	Member
38.	Padmanabhan T, Sr Manager HR	ITC limited, Pudukkottai, Tamil Nadu	Member
39.	N D Vishwanath, General Manager & ICML Head	ITC Foods Division, Trichy Pudukottai, Tamil Nadu	Member
40.	Dr. K. Thaniyarasu, Principal	Government ITI Viralimalai Madurai	Member
41.	V. Manikandan, Junior Training Officer	Govt ITI, Viralimalai Madurai	Member
42.	S. Puviyarasan,	Vocon Manufacturing Private	Member

	Factory Manager	Limited, Tirupur	
43.	Kuppuraj A., Principal	Government ITI Pullambadi for women, Trichy	Member
44.	Pinaki Bandyopadhyay Manager Engineering - Biscuits & Utility	ITC Limited (FBD - ICMF, Uluberia) Howrah	Member
45.	Kirubhadaran K. Junior Training officer	Govt ITI Thanjavur	Member
46.	Sivakumar, Operation manager	Rangaa Food Industries Pvt Ltd Vellakovil, Kangeyam (T.K), Tiruppur, Taimil Nadu	Member
47.	Kumaresan C., Plant Head	Ameya Foods C/o. Marico Limited Kasigoundenpudur, Sulur, Coimbatore	Member
48.	M. Mohankumar General Manager - process	Naga Limited Foods Dindigul, Tamil Nadu	Member
49.	Jayant Prasad Tarapure Manager - Manufacturing	ITC Limited, Howrah, West Bengal	Member
50.	Venkatakrishnan V Principal	Govt ITI, Sivagangai, Tamil Nadu	Member
51.	G. Ismathbanu Deputy director/ Principal	Govt ITI Thanjavur	Member

ABBREVIATIONS:

CTS	Craftsmen Training Scheme
ATS	Apprenticeship Training Scheme
CITS	Craft Instructor Training Scheme
DGT	Directorate General of Training
MSDE	Ministry of Skill Development and Entrepreneurship
NTC	National Trade Certificate
NAC	National Apprenticeship Certificate
NCIC	National Craft Instructor Certificate
LD	Locomotor Disability
CP	Cerebral Palsy
MD	Multiple Disabilities
LV	Low Vision
HH	Hard of Hearing
ID	Intellectual Disabilities
LC	Leprosy Cured
SLD	Specific Learning Disabilities
DW	Dwarfism
MI	Mental Illness
AA	Acid Attack
PwD	Person with disabilities


कौशलं बलम्