



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

**COMPETENCY BASED CURRICULUM**

**CERTIFICATE COURSE ON**

# **TECHNICIAN (FOOD SAFETY, HYGIENE AND SANITATION)**



**NSQF LEVEL- 5**

**SECTOR : FOOD INDUSTRY**

# TECHNICIAN (FOOD SAFETY, HYGIENE AND SANITATION)

**Duration: 500 Hours**

**NSQF LEVEL - 5**

**(Version: 1.0)**

**Designed in 2021**

**Developed By**

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

**Sectoral Trade Course Committee of Food Industry Sector**

**&**

**CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE**

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## 1. COURSE INFORMATION

### 1.1 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 of short term duration are intended for up skilling of NTC/ NAC pass out candidates. After passing out of the course, the trainee is awarded a competency based certificate approved by DGT.

The main objective of this Short term course for 500 hours is to enable man power in Food Safety, Hygiene and Sanitation. This course has been framed to study the Food Safety, Hygiene and Sanitation using basic microbiological Lab techniques, identification of Contamination of foods from various sources, collection and testing of water samples, detection of index microorganisms in milk and canned foods, analysis of detergents and sanitizers solution, available iodine in sanitizer solution. The learner has to conduct survey of on-farm practices (and post production practices) for safe and quality food and non-food agricultural products, Techniques for Chemical and physical product contamination control, Methods for Prevention of cross contamination, Survey of hygienic and sanitary condition in food shops/food vendors, Visit to different industry to get known about the procedure adopted to identification of Critical Control Point This short term course will be very much useful in Food Industry as well for Self Employment.

### 1.2 PROGRESSION PATHWAYS

- Can join industries as food inspector and will be progress further as Senior food inspector and can rise to the higher level.
- Can become Entrepreneur in the related field.

### 1.3 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during 13 Weeks: -

S No.	Course Element	Notional Training Hours
1.	Professional Skill (Trade Practical)	350
2.	Professional Knowledge (Trade Theory)	150
	<b>Total</b>	<b>500</b>

### 1.3 ASSESSMENT & CERTIFICATION

The trainees will be assessed for his/her Instructional skills, knowledge and attitude towards learning throughout the course span.

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 guideline.

b) 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.

c) Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop/Field
- Answer sheet of assessment
- Viva-voce
- Participation and punctuality

Evidences of internal assessments are to be preserved until forthcoming Block examination for audit and verification by examining body.

d) The minimum pass percentage for skill test is 60%.

## 2. JOB ROLE

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**Chemist, Food;** conducts analysis concerning chemistry of foods to develop and improve food and beverages. Experiments with natural and synthetic materials or by-products to develop new foods, additives, preservatives, antiadulteration agents, and related products. Studies effects of various methods of processing, preservation, and packaging on composition and properties of food, such as colour, texture, aroma, taste, shelf life, and nutritive content. Tests food and beverage samples, such as starch, sugar, cereals, beer, canned and dehydrated food products, meats, vegetables, dairy foods, and other products to ensure compliance with food laws, and standards of quality and purity. May perform, or supervise workers performing, quality control tests in food processing, canning, freezing, brewing or distilling.

**Technologist, Food;** devises new or improved technique for processing, conservation, preservation, utilization and evaluation of content of new food stuffs generated from plant and animal life and suitable for human consumption and animal breed. Conducts research processes to create new foods, improves existing techniques to economize processing and also to impart better values and taste to food, such as cold storage of perishable, meat, fish, etc., canning, pickling, dehydration of fruits and vegetable etc. evolves measures, such as infestation control, fungicidal treatment and insecticidal storage to protect foods from spoilage and damage. Examines food stuff contamination, adulteration, food value, etc. by biochemical and nutrition tests and quality control measures. Develops through research, new methods and processes for recovering useful and utilizable by-products from industrial and domestic wastes of food stuffs. May control and guide transformation process, such as blending, anti-oxidization and microbiological and sanitary measures.

### Reference NCO-2015:

- i. 2131.1400 - Chemist, Food
- ii. 2145.0800 - Technologist, Food

### 3. GENERAL INFORMATION

<b>Name of the Trade</b>	<b>Technician (Food Safety, Hygiene and Sanitation)</b>	
<b>Trade Code</b>	DGT/8018	
<b>Reference NCO - 2015</b>	2131.1400 , 2145.0800	
<b>NSQF Level</b>	Level 5	
<b>Duration of Craftsmen Training</b>	500 Hours	
<b>Entry Qualification</b>	12th or NTC/NAC in any trade of food processing sector/ hospitality sector	
<b>Unit Strength (No. of Student)</b>	20	
<b>Space Norms</b>	65 Sq. m	
<b>Power Norms</b>	5 KW	
<b>Instructors Qualification</b>	Degree in Food Technology/Microbiology with one year experience in relevant field. OR Diploma in Food Technology/Microbiology with two years experience in relevant field. OR NTC/NAC in Fruit and vegetable processing/ Preservation of fruits and vegetable with 5 years Experience in relevant field.	
<b>List of Tools and Equipment</b>	As per Annexure – I	
<b>Distribution of training on hourly basis: (Indicative only)</b>		
<b>Total hours/ Week</b>	<b>Trade practical</b>	<b>Trade theory</b>
40	30	10

## 4. LEARNING OUTCOME

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

### 4.1 LEARNING OUTCOMES

1. Handle the different lab equipment and apply basic microbiological techniques for safety and hygiene of food.
2. Analyse the microbiological and hazardous causes of food spoilage.
3. Perform the methods of detection and examination of micro-organisms that causes food poisoning.
4. Conduct survey on hygienic and sanitary condition of the quality of food and apply the guidelines for food safety and quality systems.
5. Apply the techniques to detect the limit of adulterants in different food samples and check for compliance related to FSSAI guidelines.



**SYLLABUS – FOOD SAFETY, HYGIENE AND SANITATION**

**Duration: 500 Hours**

<b>Duration</b>	<b>Reference Learning outcome</b>	<b>Professional Skills (Trade Practical)</b>	<b>Professional Knowledge (Trade Theory)</b>
Professional skills – 70 Hrs  Professional Knowledge – 30 Hrs	Handle the different lab equipment and apply basic microbiological techniques for safety and hygiene of food.	<p><b>Basic microbiological Lab Techniques in food safety and hygiene</b></p> <p>Glassware’s handling and usage, washing, identification and care of equipments, lab facilities, Selection and storage of chemicals, media ingredients, Cleaning of work surface, hands, needles, loops; Disposal methods for used articles, hazard prevention; Protocols: preparation of solutions required for media, cotton plug making for tubes, flasks, pipettes. Preparation of slides, preparation of media. Identification of different parts of compound microscopes. Practice on working of microscope</p>	<p>Meaning and Principle of food safety, hygiene and sanitation. Food hygiene: Contamination of foods from various sources. Green plants and fruits, animals, sewage, soil, air and water and their health hazards. Role of microbiological techniques in Food safety, Hygiene and sanitation.</p>
Professional skills – 70 Hrs  Professional Knowledge – 30 Hrs	Analyse the microbiological and hazardous causes of food spoilage.	<p><b>Microbiological and Hazard analysis of foods</b></p> <p>Collection of water samples. Testing of water for: (i) Physical quality (ii) Bacteriological quality. Detection of index microorganisms in milk and canned foods. Identification of harmful microorganisms (<i>Salmonella</i>, <i>Escherechia coli</i>, <i>Listeria</i>, <i>Yersinia</i>). Analysis of detergents and sanitizers (Sodium Hydroxide in Lye, available chlorine in sanitizer (Sodium Hypochlorite and Calcium Hypochlorite) solution,</p>	<p><b>Food spoilage &amp; Hazards</b></p> <p>Spoilage caused by microorganisms (bacteria, fungi, and virus). Food spoilage. Perishable, semi perishable and non perishable foods. Physical, chemical and biological hazards. Water Requirement and use, sources of water supply, water pollution, purification of water, portable water and its quality-Criteria and standards, hardness of water and its treatment, defluoridation of water.</p>

		available iodine in sanitizer solution.	<del>Food Infection and Intoxication</del>
Professional skills – 70 Hrs  Professional Knowledge – 30 Hrs	Perform the methods of detection and examination of microorganisms that causes food poisoning.	<p><b>Detection and identification methods of Food Poisoning microorganisms</b></p> <p>Detection methodologies of toxin microorganisms (immunology-based method, the count method of culturing and colony). Rapid detection of poisoning microorganisms by using kits.</p> <p>Visual examination of growth, description of colony morphology, turbidity measure by colorimetry.</p> <p><b>Staining techniques</b></p> <p>Preparation of smears, use of monochrome staining, gram stain.</p> <p><b>Microscopic examination</b></p> <p>Determination of size and shape of microorganisms.</p>	<p>Food poisoning caused by bacteria: Salmonella, Staphylococcal poisoning, Botulinum, Clostridium perfringens and B.cerus. Sources, incubation period, mechanism of action. Investigation of Food Poisoning, prevention and control. Food Poisoning caused by agents other than microorganism. Poisonous plants, animals, chemicals, metals and pesticides etc.</p>
Professional skills – 70 Hrs  Professional Knowledge – 30 Hrs	Conduct survey on hygienic and sanitary condition of the quality of food and apply the guidelines for food safety and quality systems.	<p><b>Food quality analysis</b></p> <p>Survey of on-farm practices (and post production practices) for safe and quality food and non-food agricultural products, Traceability techniques, Techniques for Chemical and physical product contamination control, Methods for Prevention of cross contamination, Survey of hygienic and sanitary condition in food shops/food vendors, Visit to different industry to get known about the procedure adopted to identification of Critical Control Point.</p>	<p><b>Food safety and quality systems</b></p> <p>Good Agricultural Practices (GAP), Good Hygienic Practices (GHP), Hazard Analysis and Critical Control Points (HACCP), and Food Safety Management Systems such as ISO 22000.</p> <p><b>Importance of personal hygiene in food industry, food hygiene in procurement of raw material, Maintenance of equipment hygiene, storage of processed food.</b> Sanitary procedures for preparation, handling and storage of foods.</p>
Professional skills – 70 Hrs	Apply the techniques to detect the limit of adulterants in different	Analysis of food samples to detect the limit of various colours, sweeteners and	<b>Food additives and contaminants:</b> various kinds of additives - food colour,

Professional Knowledge – 30 Hrs	food samples and check for compliance related to FSSAI guidelines.	preservatives. Techniques to detect the adulterants in different food samples collected from the market.	preservatives, artificial sweeteners, adulterants and pesticide residues, FSSAI guidelines related to adulteration of different food. <b>Sanitation</b> in food processing plant, Sanitizers- detergents, disinfectants.
<b>Examination</b>			

## 7. ASSESSMENT CRITERIA

LEARNING OUTCOMES	ASSESSMENT CRITERIA
1. Handle the different lab equipment and apply basic microbiological techniques for safety and hygiene of food.	Handle and use glassware's carefully.
	Identify the lab equipment and facilities.
	Select and store chemicals, media ingredient.
	Carry out sanitation and hygiene practices for rooms, articles and personnel.
	Clean work surface, hands, needles and loops.
	Dispose used articles for hazard prevention.
	Maintain Protocols: preparation of solutions required for media, cotton plug making for tubes, flasks and pipettes.
	Prepare various types of media and apply the methods of sterilization of media.
	Prepare slides and media.
Set up compound microscopes and use it for detecting micro-organisms.	
2. Analyse the microbiological and hazardous causes of food spoilage.	Examine water samples and check for physical quality and Bacteriological quality.
	Determine the index of microorganisms in milk and canned foods.
	Detect E. Coli, Listeria, Yersinia & Salmonella from food samples.
	Analyse detergents for detecting the quantity of Sodium Hydroxide.
	Analyse sanitizers solution for detecting the quantity of Sodium Hypochlorite ,Calcium Hypochlorite and iodine.
3. Perform the methods of detection and examination of micro-organisms that causes food poisoning.	Use toxin methodology for detecting microorganisms.
	Use kits for rapid detection of poisonous microorganisms.
	Visual examination of growth, description of colony morphology, turbidity measure by colorimetry.
	Prepare smears and use of monochrome staining and gram stain.
	Determine the size and shape of microorganisms using microscope.
4. Conduct survey on hygienic and sanitary condition of the quality of food and apply the guidelines for food safety and quality systems.	Explain methods of survey on-farm food products and check for compliance with guidelines.
	Knowledge of Food safety and quality systems guidelines like <i>Good Agricultural Practices (GAP)</i> , <i>Good Hygienic Practices (GHP)</i> , <i>Hazard Analysis and Critical Control Points (HACCP)</i> , and <i>Food Safety Management Systems such as ISO 22000</i> .
	Apply Traceability techniques for analyzing food quality.
	Apply Techniques for Chemical and physical product contamination control for analyzing food quality.
	Perform the Methods for Prevention of cross contamination.
	Explain survey of hygienic and sanitary condition in food shops/food

	vendors.
	Check the Critical Control Point and visit to different food industry to know about the procedure adopted.
5. Apply the techniques to detect the limit of adulterants in different food samples and check for compliance related to FSSAI guidelines.	Knowledge of food safety & quality control.
	Identify various kinds of additives- food colour, preservatives, artificial sweeteners, toxins, adulterants and pesticide residues.
	Knowledge of sanitizers detergents and disinfectant.

LIST OF TOOLS & EQUIPMENT			
TECHNICIAN (FOOD SAFETY, HYGIENE AND SANITATION)			
S No.	Tools and Equipment	Specification	Quantity (No.)
<b>A. LISTS OF EQUIPMENT, GLASSWARE AND CHEMICALS</b>			
1.	Auto clave Horizontal		1
2.	Laminar flow		1
3.	Incubators		1
4.	Anaerobic jar		1
5.	BOD incubator		1
6.	Refrigerator		1
7.	Water Distillation System		1
8.	Electrical Incinerator		1
9.	Deep freezer		1
10.	Desiccators		1
11.	Micro Pipettes	1ml fixed 1ml variable 10 ml	2 Each
12.	pH /EC /TDS meter		1
13.	Hot Air Oven		1
14.	Vertical Laminar Flow Chamber		Each 1 No
15.	Vortex mixture		2 Nos
16.	Magnetic stirrer with hot plate		1
17.	Sonicator		1
18.	water bath		1
19.	TLC Set		1
20.	Dish washer		1
21.	colony counter		2
22.	Freeze Dryer		1
23.	UV Spectrophotometer		1
24.	Air sampler		1
25.	Compound microscope		1
26.	Haemocytometer		1
27.	Shaking Incubator		1
28.	Fermentor		1
29.	pH meter		1
30.	centrifuge		1

31.	Heating mantle		1
32.	Electronic balances		2
33.	Fire extinguisher		1
34.	Eye washer		1
35.	Bunsen burner		2
36.	Spirit lamp		2
37.	Thermometer		2
38.	Plate spreader		2
39.	Auto Loop sterilizer		1
40.	Inoculating loop		5
41.	Chemicals	Nutrient agar medium, nutrient broth, Potassium dihydrogen phosphate, Peptone, Sodium chloride Potassium dichromate , Conc. Sulphuric acid . Sterile sampling bags, Agar , Plate count agar ,Yeast and mold agar , Potato dextrose agar ,Chlortetracycline hydrochloride, Tartaric acid , Lauryl tryptose broth , Brilliant green bile broth , EC medium , Levines Eosin methylene blue agar , Tryptone ,MRVP test reagent , Koser Citrate medium .p-dimethyl aminobenzaldehyde (for Kovacs reagent), Baird-Parker agar , Trypticase soy broth , Sodium pyruvate , Brain heart infusion broth , Coagulase plasma,Toluidine blue ,SS agar, MSA agar, EMB agar, Macconkey agar, MRS agar, MRS broth, Sodium Hydroxide, Hydrochloric acid, buffer tablets	As required
42.	Glass wares	Autoclavable petridishes, culture tubes, beakers, conical flasks, measuring cylinders, absorbent & Nonabsorbent cotton, Autoclavable Test tubes, Autoclavable screw cap tubes, Burette borosilicate , Burette stands , Measuring cylinders graduated, Universal bottles, McCartney bottles, Funnels glass, Buchner flasks, Beakers, Conical flasks , Volumetric flasks, Milk dilution bottles with screw caps, glass Pipettes, Glass bottles with polypropylene (autoclavable) screw caps, Durham	As required

		tubes and Brushes for bottle washing.	
43.	Plastic wares	Test tube stand, petri plate holders, pH paper, Aluminium foil, autoclavable micro tips, Enamel trays	As required



## ANNEXURE-II

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts and all others who contributed in designing/ revising the curriculum. Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

Industries Involved in development of the qualification:

1. Marico Ltd., Mumbai
2. Pepsico, Gurgaon
3. GSK Consumer New Delhi
4. TATA Consumer Products New Delhi
5. Nestle, Panipat, Haryana
6. FSSAI-FDA, New Delhi
7. Ashoka Hotel, Delhi
8. Taj Hotel, Delhi
9. IRCTC, New Delhi
10. Food Lab, New Delhi

### List of Expert Members contributed/ participated for finalizing the course curriculum of Food Safety, Hygiene and Sanitation.

S No.	Name & Designation Shri/Mr./Ms	Organization	Remarks
1.	Ishwar Singh, Director	DGT HQ	STCC Convener
2.	C.S. Murthy, Director	RDSDE, Kolkata	STCC Coordinator
3.	G.N. Eswarappa, JDT	CSTARI, Kolkata	Member
4.	Suryabhan Singh Patel, HoD	Kulbhaskar Aashram, PG College, Prayagraj, UP	Expert
5.	Sachin Kumar, TO	NSTI (W), Prayagraj, UP	Expert
6.	Saurabh Chaturvedi, Director	Dadi ki Rasoi, Pvt. Ltd, Pratapgarh	Expert
7.	A. K. Kushwaha, Owner	Rajul Gramodyog, Prayagraj, UP	Expert
8.	Arti Kumari, Chef	Hotel Saket, Prayagraj, UP	Expert
9.	Mewalal Kushwaha, Instructor (Food Processing)	Govt. Food science training centre, Prayagraj, UP	Expert

10.	R.N. Manna, TO	CSTARI, Kolkata	Member
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