Supportive Course Manual

FOOD SAFETY MANAGEMENT SYSTEM

DEVELOPED BY

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DEPARTMENT OF FOOD SCIENCE AND NUTRITION
PERIYAR UNIVERSITY
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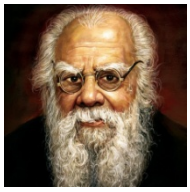
PERIYAR UNIVERSITY

Periyar Palkalai Nagar, Salem-636011

(Reaccredited with 'A' Grade by the NAAC)

School of Professional Studies



DEPARTMENT OF FOOD SCIENCE AND NUTRITION

PG DEGREE

Supportive Course Manual

[Even Semester]

Food Safety Management Practical

(Sub. Code: 18FSTNS01; Max. Marks: 100 (40+60)

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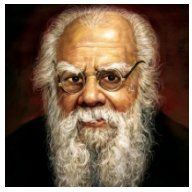


DEPARTMENT OF FOOD SCIENCE AND NUTRITION

Food Safety Management Practical

(Sub. Code: 18FSTNS01; Max. Marks: 100 (40+60)

CERTIFICATION

This is to certify that the bonafide record of work done by _____ during the laboratory class of **Food Safety Management Practical** conducted under the course (Even Semester) offered for other disciplinary students of the University Departments by Department of Food Science and Nutrition, Periyar University, Salem.

Faculty in-charge **Head of the Department**

Department Seal

Record work is submitted for the University Practical Examination held on _____ at Department of Food Science and Nutrition, **PERIYAR UNIVERSITY**, Salem-636011

EXTERNAL EXAMINER **INTERNAL EXAMINER**

Food Safety Management Practical

(Sub. Code: 18FSTNS01; Max. Marks: 100 (40+60)

Contents

Module No.	Sub Module No.	Title: Key Learning Outcomes	Date of Execution	Page No.
Module 1: Hygienic handling of food and 7 C's control				
1	1.2.1	Hazard identification and control measures in the given food sample		
	1.2.2	Effect of temperature and time on microbial growth		
	1.2.3	Determination of fitness of food for consumption		
Module 2: Good hygiene and sanitary practices				
2	2.2.1	Assessing the hygiene and sanitary practices of street food vendor/institutional cafeteria		
	2.2.2	Recording Success-O-Meter in habit forming tools and self-evaluation trackers on good hygiene and healthy practices		
Module 3: Food Label				
3	3.2.1	Identification of different parts of food label and defining its significance in terms of food safety		
Module 4: Food Additives				
4	4.2.1	Identification of food additives added into food items using ingredients part of food label		
Module 4: Food Packaging				
5	5.2.1	Identify the type of packaging material and defining its nature using symbols		
Module 5: Food Adulteration				
6	6.2.1	Identification of common adulterants in food		
Module 6: Food Fortification				
7	7.2.1	Identification of fortificants in food label		

No. of Sub Modules Completed by the Student	
No. of Sub Modules not completed by the Student	
No. of Sub Modules, the Student is Absent	
Record Mark	

Signature of the Faculty

FOOD SAFETY MANAGEMENT PRACTICAL

SUB. CODE: 18FSTNS01 **HOURS**: L + T+P=C
MARKS : 40+60=100 0 + 1+2= 3

Course Objectives and Outcomes

Objectives	Learning Outcomes
To gain practical experience on safe handling of food, identification of fortified food in market, testing the adulterant present in food, components of a food label and safety management norms of FSSAI for a consumer	Able to define the food hazards; practice safe handling of food in the kitchen, personal hygiene, pest control measures, temperature control in storing of food at home; identify adulterants, additives and fortificants in food, parts of food label; educate the public on food safety rules and regulations

Syllabus

Exercise No.	Unit/Module	Intended Learning Chapters	
		Tutorial (18 hours) (K1, K2)	Practical (36 hours) (K3, K4)
1	Hygienic handling of food and 7 C's control	Type of hazard in food, signs of spoilage in food, food contaminants, food poisoning and infection, food allergens, common fault in handling of food, 7 C's in control of contamination and control measures; 5 F's for food infection and infestation – Food, Feces, Fingers, Fomites and Flies, factors controlling food poisoning and keeping the food out of danger zone	1. Hazard identification and control measures in the given food sample 2. Effect of temperature and time on microbial growth 3. Determination of fitness of food for consumption
2	Good hygiene and sanitary practices	Do's and Dont's in Location, layout and facilities; material handling; food preparation; holding, packaging, distribution, serving and transportation; personal hygiene; support services	1. Assessing the hygiene and sanitary practices of street food vendor/institutional cafeteria 2. Recording Success-O-Meter in habit forming tools and self-evaluation trackers on good hygiene and healthy practices
3	Food label	Components of food label and FSSAI regulations	1. Identification of different parts of food label and defining its significance in terms of food safety
4	Food Additives	Common permitted additives added to food and its numbering system	1. Identification of food additives added into food items using ingredients part of food label
5	Food Packaging	Packaging material identification symbols and FSSAI regulations	2. Identify the type of packaging material and defining its nature using symbols
6	Food Adulteration	Common adulterants in food and its identification	1. Identification of common adulterants in food
7	Food Fortification	Fortification in food and government programmes on food fortification	1. Identification of fortificants in food label

References

Text Books

1. FSSAI Training Manual on "Hygienic Handling of Food, Hygiene of our Surroundings, Personal Hygiene, Need for Food Safety-Invisible World of Microorganisms, Detect Adulteration with

Rapid Test, Safe Food Handling and Hygiene Booklet for Food Handlers, Safe and Nutritious Food at School, Safe and Nutritious Food at Workplace and Safe and Nutritious Food at Home, www.snfportal.in, 2017.
2. FSSAI and Food Fortification Resource Centre Team (2017), Large Scale Food Fortification in India.

Reference Books

1. FSSAI Manuals for Quality testing (www.fssai.gov.in)
2. Food and Agricultural Organization (1980): Manuals of Food Quality Control. 2 Additives Contaminants Techniques, Rome.
3. Furia, T.E. Ed. 1980. Regulatory Status of Direct Food Additives. CRC Press, Florida.
4. Krammer, A. and Twigg, B.A. (1970). Quality Control for the Food Industry. 3rd Edn. AVI, Westport.
5. Rekha S. Singhal ,Pushpa R. Kulkarni, Dananesh V. Rege, (1997). Hand Book of Indices of food Quality and Authenticity, wood head Publishing Ltd.

Journals

SCI Journals in the discipline of Food Science and Technology

MODULE 1: HYGIENIC HANDLING OF FOOD AND 7 C'S CONTROL

1.1 Technical Knowledge (K1 and K2)

1.1.1 Definitions

- ***"Food"*** means any substance, whether processed, partially processed or unprocessed, which is intended for human consumption
- ***"Hazard"*** means a biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect
- ***"Food Spoilage"***is defined as decomposition & damage caused to food by various agents, making it unsuitable for consumption
- ***"Food Hygiene"*** is defined as "All condition and measures necessary to ensure the safety and suitability of foods at all stages of food chain." which involves preventing objectionable matter getting into the food
- ***"Contaminant"*** is anything naturally introduced into the product or intentionally added to the product during the different stages of the food chain from the farm to the table which may cause harm to the consumer
- ***"Cross Contaminant"*** is the transfer of pathogens from contaminated food (usually raw) to ready- to- eat foods by direct contact, drip or indirect contact using a vehicle such as hands or a cloth or cutting boards and knives
- ***"Food safety"*** means assurance that food is acceptable for human consumption according to its intended use

1.1.2 Knowledge and Understanding

1.1.2.1 FOOD SPOILAGE

Food spoilage occurs when the original nutritional value, texture and/or flavour of the food are affected or degraded, and the food become harmful to people and unsuitable to eat.

On the basis of shelf-life, foods are classified as:

- Non-perishable or stable foods: These foods do not spoil unless handled carelessly and can be stored in a cool, dry place for up to one year. For example, sugar, oil, whole grains, preserves and canned food.
- Semi-perishable foods: Foods in this group remain in a good condition for a few weeks to a few months, if stored properly in correct containers in well ventilated, cool rooms. This group includes foods like semolina, gram flour, onions, apples, frozen foods, etc.
- Perishable foods: This is the largest group and includes most food items we consume everyday like milk, eggs, meat, fish, poultry and most fruits and vegetables specially green leafy vegetables. These foods contain high amounts of proteins, moisture and other nutrients and are an ideal medium for bacterial growth. They spoil easily by natural enzymatic changes and have a very short shelf-life of a few hours to a few days after which they will spoil rapidly. This group is responsible for the outbreak of food borne diseases. This group also includes all prepared food, opened canned food and frozen food which has thawed. Foods in this group must be stored at low temperatures to retard growth of microbes and action of enzymes.

Causes of Spoilage in Food

Foods spoil mainly because of anyone or more of the following reasons:

- Microbiological action – souring of milk, moldy bread
- Action of insects – damaging grains and food like weevils, insect fragments
- Presence of contaminants – stones, grit, irradiation
- Natural enzymatic changes – over-ripening of fruits
- Physical damage – bruising, freezer burn
- Chemical reactions – rancidity in fats, hydrogen swell

The following conditions that could lead to spoilage of food are listed below:

- Buying more than required
- Buying poor quality food
- Not checking commodities, packaging and labels
- Not refrigerating/freezing purchased food promptly

- Refrigerators/freezers not working properly
- Using refrigerator space incorrectly
- CONTAMINATION AND CROSS CONTAMINATION
    - **BIOLOGICAL CONTAMINANTS –**Visible contaminants like rat droppings, beetles and weevils, insect body parts, flies and worms which can be seen in food as well as invisible contaminants, like bacteria, viruses, molds, algae, and parasites which cause food borne diseases
    - **CHEMICAL CONTAMINANTS -**like non-permissible food additives, adulterants, cleaning chemicals, packaging adhesives and inks and refrigerants, heavy metals (lead, mercury, cadmium) pesticide residues, veterinary drugs, naturally occurring toxins in food.
    - **PHYSICAL CONTAMINANTS -** glass, metal, bone, shell, hair, sticking plasters, stones, grit, feathers, cigarette stubs etc.
    - **CROSS CONTAMINATION** is the transfer of pathogens from contaminated food (usually raw) to ready- to- eat foods by direct contact, drip or indirect contact using a vehicle such as hands or a cloth or cutting boards and knives. Cross contamination can happen at any stages of processing, transportation, storage, distribution or even at the stage of consumption.

Food Poisoning and Food Infection

Consumption of contaminated food can result in food borne illnesses. A food borne illness/disease is a general term applied to all types of illnesses caused by microbes, substances or any kind of material present in the food we have eaten. It includes

- Food Poisoning
- Food Infections and
- Food Allergies
- Food Safety Hazard

FOOD POISONING	FOOD INFECTION
Generally transmitted through food	Transmitted through other vehicles as well as food
Caused by a toxin. Bacteria multiply in food and release toxin	Caused by living microbes. Bacteria multiply in the body reaching large numbers
Incubation period: 1 – 6 hours. Relatively short onset period	Incubation period: 12 – 24 hours Usually a longer onset period
Symptoms: nausea and vomiting, diarrhoea, usually no fever	Symptoms: diarrhoea, abdominal pain, vomiting, fever
Duration: one day, sometimes longer	Duration: one to seven days, sometimes longer
Examples: Staph food poisoning, Botulism, Bacillus cereus food poisoning, Perfringens food poisoning	Examples: Salmonellosis, Gastro- enteritis, Shigellosis, Cholera, Hepatitis A, Amoebiasis, Giardiasis

The 5 F' s which are responsible for spread of disease

Food	Contaminated food and water infected by food handler or from the farm, diseased animals and their products
Fingers	Unwashed hands and dirty fingernails
Faeces	Sewage, contaminated food, water, and unwashed hands after using the toilet
Fomites	Unclean utensils, equipment, door knobs, taps and towels
Flies and Pests	Houseflies, cockroaches, rats and pets

Food Allergies

An allergy is defined as a special reaction of an individual to some ingredient in food. Some people show abnormal sensitivity to certain foods which are otherwise harmless to people. Substances which cause allergies are called 'Allergens'.

Foods which commonly contain Allergens

- Nuts – Peanuts (groundnuts), all types of tree nuts such as walnut, pistachio, Brazil nut, cashew nut, hazel nuts.
- Milk and milk products
- Eggs
- Fish and Shellfish
- Soya and its products like tofu, bean curd, soya milk
- Cereals containing gluten like wheat
- Sesame seed, mustard, celery

Common Food Allergies	
Infants and Young children	Older children and Adults
Cow's Milk	Fish
Egg White	Shellfish
Wheat	Peanut
Soy protein	Tree-nuts (Almond, Cashew etc)
Peanut	Celery, Tomato, Onion, garlic
Fish	Fruits : Apple, Strawberry

Symptoms of allergy vary and include

- General flushing of the skin
- Swelling of throat and mouth
- Severe asthma
- Sudden feeling of weakness
- Fall in blood pressure
- Urticaria or rashes on the body
- Difficulty in swallowing and speaking
- Abdominal pain, nausea and vomiting,
- In some cases, the person may collapse and lose consciousness

Food allergies need to be controlled. They can be easily controlled by observing the following points

- Clearly label all ingredients used in RTE foods.
- Mention whether the same processing plant is used for processing foods containing likely allergens.
- During production of foods, take extreme care to prevent carryover of allergens from the utensils/equipment.
- Menu description must be clear and Service staff in restaurants should know basic ingredients used in recipes.
- Clearly write all ingredients on the label to facilitate informed choice by consumers.
- In case of severe symptoms immediate medical attention shall be sought.
- Effective communication to all food handlers regarding allergens and its control.

Food Safety Hazard means biological, chemical or physical agent in food, or condition of food, with the potential to cause an adverse health effect. There are majorly four types of hazards -

1. Physical Hazards

Any foreign object (inanimate) found in the food or a naturally occurring object (metal, hard plastic), that can cause a food borne illness is called a 'Physical Hazard'.

Common Physical Hazards include:

- Glass
- Chipped pieces from equipment
- Metal shavings from cans and foils
- Stapler pins
- Blades
- Plastic or chipped pieces of disposables
- Lint and threads
- Band- aids
- Hair
- Finger nails

- Jewellery pieces
- Insects and other pests

2. Chemical Hazards

Naturally occurring and process- induced chemical substances that can cause a food borne illness are called a 'Chemical Hazard'.

Natural Chemical Contaminants include:

- Mycotoxins

Process Induced Chemical Contaminants include:

- Toxic metals in the processing set up or supply chain
- Pesticides, Colorants
- Cleansing products and sanitizers
- Equipment lubricants
- Chemical Food Additives, Preservatives
- Packaging materials-migration of residues from packaging material to oil.
- Adulteration with other oils or mineral oil

3. Biological Hazards

Biological hazards are organisms, or substances produced by organisms, that pose a threat to human health. They are a major concern in food processing because they cause most food borne illness outbreaks.

Major biological hazards include –

- **Bacteria** ex: Salmonella spp., Enterohaemorrhagic *Escherichia coli*, Listeria monocytogenes, Staphylococcus aureus, Clostridium botulinum,
- **Yeast &Mold** ex: Candida, Aspergillus sp, Helicosporium

4. Physical-Biological Hazard

These are the hazards coming from biological creatures like flies, worms, cockroaches' weevils, caterpillars and so on, whether in live or dead form.

1.1.2.2 7C's TO PREVENT CONTAMINATION OF FOOD AND FOOD BORNE ILLNESSES

1. CHECK
2. CLEAN
3. COVER
4. CROSS CONTAMINATION AVOID
5. COOK
6. COOL/CHILL
7. CONSUME

CHECK

- Check all commodities for quality before purchasing and purchase from reliable outlets.
- Select wholesome food at right stage of maturity.
- No signs of visible contamination.
- If frozen, at right temperature.
- If packaged, check 'Best before date', packaging intact

CLEAN

- Wipe all packages, tins, bottles etc. before storing them in appropriate storage area.
- Pick and clean green leafy vegetables to remove spoilt leaves, inedible stalks and roots. Wash whole fruit, vegetables and eggs and drain/dry before storing in refrigerator

COVER

- Keep all food covered in storage area or during preparation and service to keep away pests and dust.
- Store stable foods in clean, dry, covered containers in dry food store.
- If lids are unavailable, use cling film or aluminium foil.
- Even food kept in refrigerator should be covered to prevent contamination drying out and

absorbing off odours.

CROSS CONTAMINATION AVOID

- Wash hands well before handling food.
- Keep raw and cooked food apart. Store raw food below cooked food.
- Use separate chopping boards and knives for raw and cooked food.
- Wash hand often to prevent cross contamination

COOK

- Cooking destroys pathogenic organisms.
- Improves digestibility.
- Increases taste, flavour and aroma.
- Improves appearance and prevents enzymatic browning.
- Increases shelf-life.
- Thaw frozen foods before cooking them.
- Cook food thoroughly.
- Check internal temperature of food is at least 700C with probe thermometer.
- Reheat leftovers thoroughly.
- Stir food in Microwave oven for even cooking/heating.

COOL / CHILL

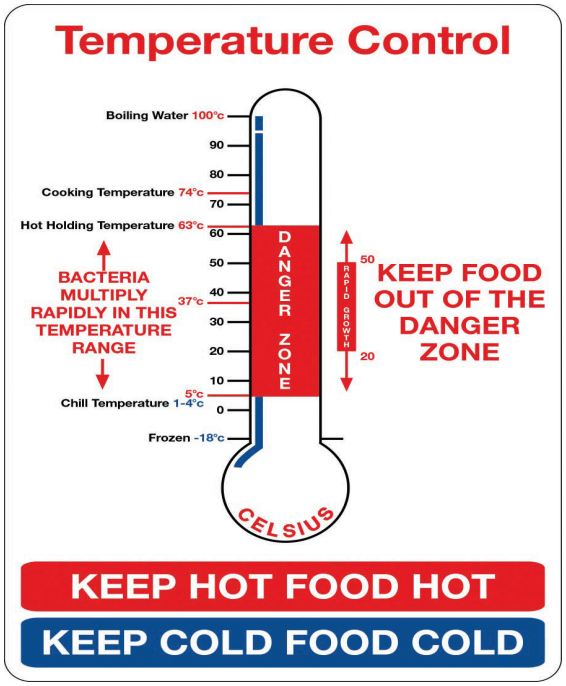
- Cool food within 1 1⁄2 to 2 hours if food is perishable/ potentially hazardous, and is to be served later.
- Cool food in shallow containers or in a water/ice bath.
- Cool in small portion sizes to cool faster.
- Refrigerate/freeze food within 1 1⁄2 to 2 hours.

CONSUME

- Serve food in a clean environment.
- Use clean crockery and cutlery.
- Eat freshly prepared food as far as possible.
- Hot hold above 630C and keep perishables out of ‘Danger zone’.
- If single service items are used for service, do not reuse them.
- Do not waste food, serve only what you can eat.
- Segregate plate waste and plastic waste in bins and recycle.
- Rinse/wash dishes/tiffin boxes well after the meal is over.

1.1.2.3 Effect of Time and Temperature on Microbial Growth

Microbial growth in food can be controlled by controlling time and temperature. Bacteria die at high temperatures. They stop growing and remain dormant at low temperatures. However, spores may survive boiling temperatures unless boiled for some time. Microbial growth can be controlled by controlling time and temperature.



82°c Minimum Temperature of Water for Sanitising Equipment
- Will disinfect cleaning equipment.
- Legal temperature to reheat food in Scotland only

75°c Recommended Cooking Temperature
- Food should be cooked to this temperature for at least 30 seconds unless they are served rare.

63°c Recommended Cooking Temperature
- Food must be heated to above 75ºC if it is going to be held hot.
- Food must be held hot above 63ºC by law with a target of 65ºC.

Heat as fast as possible

Danger Zone (Higher than 8ºC and less than 63ºC)
- Prime temp for bacterial growth - Keep food in this zone for a minimum time period.

Cool as fast as possible

8°c Minimum Legal Storage Temperature for High Risk Foods
- Some bacteria continue to grow; certain bacteria e.g. Listeria, prefer cold conditions.

5°c Chilled Food Temperature
- Bacteria continue to grow slowly; this is the company storage temp for chilled food.

0°c Freezing Point
- Stops the growth of bacteria; but bacteria will survive and some will continue to grow.

DURHAM REGION HEALTH DEPARTMENT

New!

HAZARDOUS FOOD TEMPERATURE CHART

(Effective September 1, 2004)

MINIMUM REQUIRED INTERNAL FOOD TEMPERATURES

COLD HOLDING	
Refrigerated Foods	4 °C / 40 °F or colder
Frozen Foods	- 18 °C / 0 °F or colder
COOKING All temperatures to be maintained for a minimum of 15 seconds	
Whole Poultry chicken, turkey, duck, etc.	82 °C / 180 °F
Ground / Cut Poultry wings, breasts, legs, etc.	74 °C / 165 °F
Food Mixtures (e.g. soups, stews, casseroles, gravies)	74 °C / 165 °F
Pork / Pork Products	71 °C / 160 °F
Ground Meat other than poultry (e.g. beef, lamb)	71 °C / 160 °F
Fish	70 °C / 158 °F
Other Hazardous Foods large cuts of e.g. beef, lamb or goat; rice, beans, etc.	70 °C / 158 °F
HOT HOLDING	
After cooking, all hazardous foods must be held at a minimum 60 °C / 140 °F until service.	
REHEATING All temperatures to be maintained for a minimum of 15 seconds	
All hazardous foods must be reheated, within a 2 hour period, to at least their specified minimum required internal cooking temperature. All poultry must be reheated to at least 74 °C / 165 °F.	

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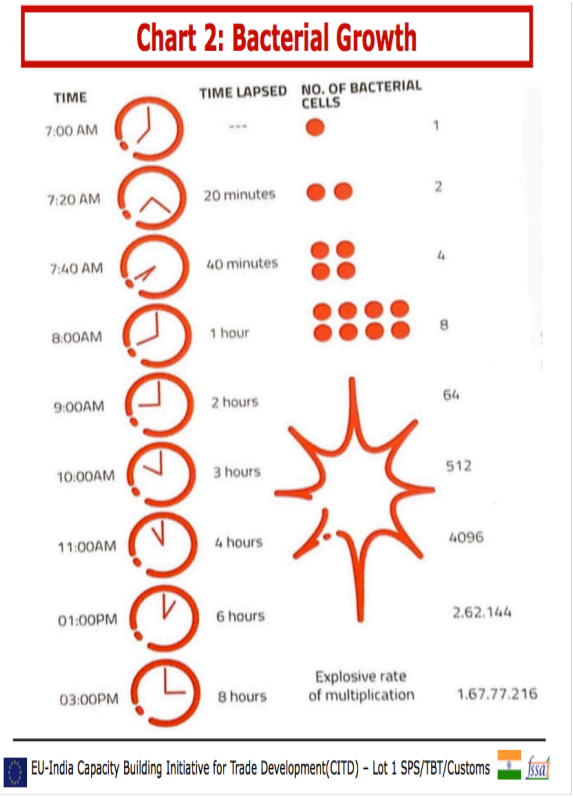
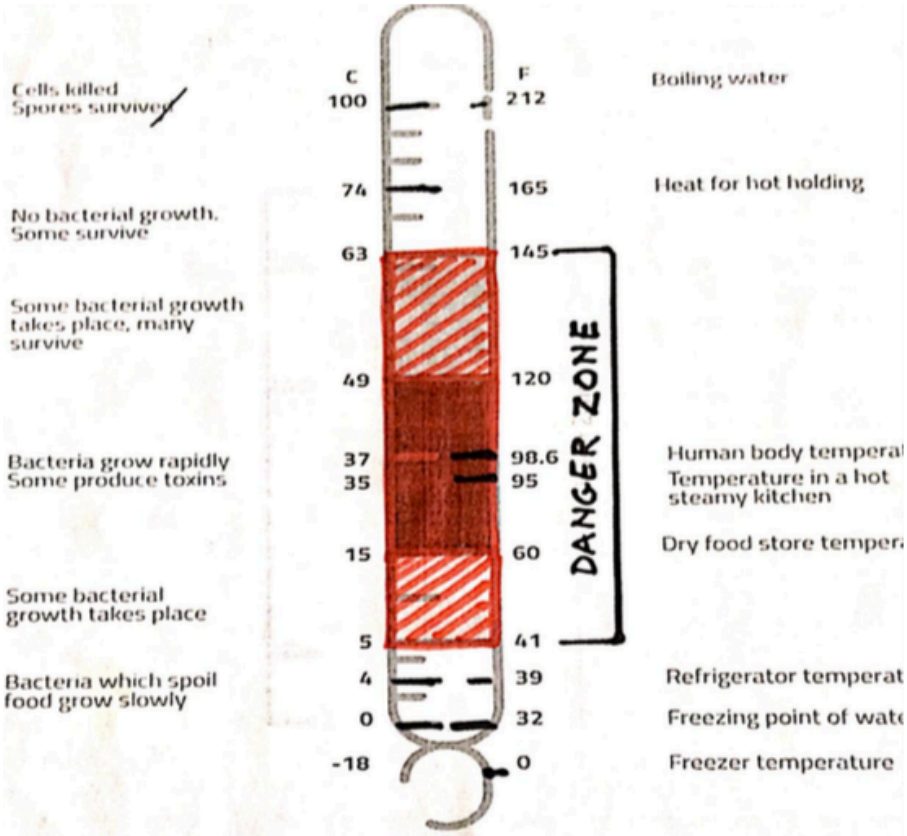


1.1.2.3 Fitness of Food for Consumption

Hygienic Storage of Food



There are three main storage areas for food on the basis of temperature:

- The dry food store or store room – room temperature
- The refrigerator – 1°C to 4°C – chilled storage
- The deep freezer – Temperature - 18°C – Frozen storage

Dry Food Store

- Used to store stable or non-perishable food for long periods.
- Airy, well-lit, clean, protected from pests and dampness.
- Keep food cool, clean and covered.
- Rotate food supplies using the first-in, first –out (FIFO) principle.
- Place food or bins on racks or shelves at least 15 cm off the floor.
- Bins or containers should have well fitted lids with a scoop to remove contents.
- Inspect commodities once a week for signs of spoilage like weevils, clumping of grains etc.

Refrigerator

- Used for short term storage of perishable food including surplus cooked food.
- Food preserved by circulation of cold air, hence do not overcrowd or open door often.
- Do not store hot food or cool it in the refrigerator.
- Cover all milk and milk products as they absorb smells.
- Store raw food, specially flesh foods below cooked food to prevent drip or contamination from raw to cooked food.

Deep Freezer

- Used for long term storage of perishable food and frozen food items. (Ideal temperature is -18°C).
- Unlike the refrigerator, it should be well stacked to maintain low temperatures.
- Wrap food well to prevent freezer burn, cross contamination and absorption of odour and flavour.
- The food package should have the date and contents labelled neatly on the package.
- Frozen foods should be thawed before use. Once thawed, use immediately, do not refreeze.

Signs of Spoilage in Food

While purchasing food we should select clean wholesome food which is at the right stage of maturity. Food should be purchased from reliable licensed suppliers only. Some of the common signs of spoilage in foods which we consume frequently are listed below:-

1. Fruits and vegetables
    - Discolouration and mushy texture, presence of mold
    - Leaves are wilted and limp
    - Presence of insects/worms
    - Skin or peel is damaged or bruised
    - Potatoes are green and sprouted
    - Overripe fruit and over-mature vegetable
2. Canned food
    - Cans are leaky or rusty
    - Bulging ends and puffy appearance
    - Contents smell putrid
    - Contents discoloured
    - Brine or syrup looks cloudy, bubbly or slimy
    - Contents spurt out when can is opened
3. Frozen foods
    - Do not buy food with lot of ice-crystals in packet
    - Discard if there is any discolouration, off taste or smell
    - Do not refreeze food once it has thawed
    - Thaw only what you need
4. Milk
    - Spoiled milk curdles or turns sour
    - Milk may turn slimy or ropy
    - Discolouration
    - Change in smell
5. Cereals and Pulses
    - Presence of weevils, beetles, moths and worms
    - Clumping of whole grains
    - Dirt, mud and stones
    - Musty odour and off flavour
6. Eggs
    - Dirty discoloured shells
    - Cracked shells
    - Egg floats in water
    - Broken egg has blood spot/meat spot/foul odour
7. Fish
    - Dull sunken eyes
    - Gills grey or green
    - Off odour
    - Flesh flabby, separates from bone
    - Few scales left on flesh
    - Depression remains when outer skin is pressed
8. Meat
    - Discolouration
    - Putrid smell
    - Slimy appearance and feel
9. Dry fruit and chocolates
    - Spoiled by yeast
10. Cooked food
    - High risk of getting spoilt
    - Spoilage may or may not be visible

- Off flavours and off odour

Common Faults in Food Preparation and Services

- Preparing food much before serving time
- Storing perishable food at room temperature beyond four hours
- Slow cooling of surplus food at room temperature before refrigerating it.
- Inadequate storage facilities and improper reheating of leftover food
- Cooking frozen meat/fish/poultry without thawing it.
- Cross contamination from raw to cooked food (improper storage and not using separate cutting board as per Food Hygienic Practices) and using cooked food contaminated with bacteria.
- Undercooking meat and poultry
- Holding hot food below 63°C during service
- Infected food handlers
- Preparing surplus food and not checking quality before consumption

1.2 Practical Skill (K3, K4 and K5)

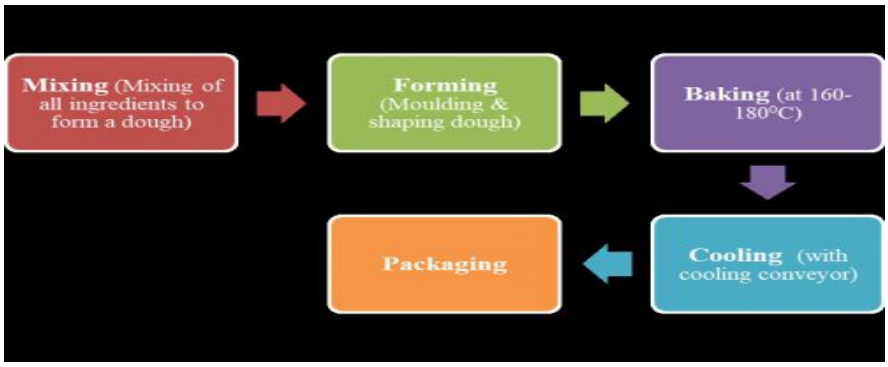
1.2.1 Hazard identification and control measures in the given food sample

Example
Biscuit

i. Ingredients List (Marie Biscuit)

Formulation	(1)	(2)
Flour	100.00	100.00
Cornflour	4.41	4.10
Maize flour	14.70	-
Granulated sugar	25.59	21.67
Invert syrup 80%	7.94	6.67
Butter	-	4.87
Whey powder	-	1.67
Margarine	-	10.00
Shortening	11.03	-
Lecithin	0.57	0.50
Salt	0.88	0.70
Soda	0.67	0.58
ACP	0.08	0.16
Protease	0.02	0.02
SMS 10% solution	0.02	0.02
Whole liquid egg	-	3.33
Ammonium bicarbonate	0.73	0.33
Water	26.47	17.95

ii. Schematise the Process Flow



iii. Identify the Hazard and Control Measures

S.No.	Process Operation	Hazard (Y/N)				Source of Hazard	Hazard to be addressed (Y/N)	Control Measures in terms of 7 C's
		Physical	Chemical	Biological	Physico-Biological			
1	Mixing	Y	Y	Y	Y	Ingredients; Equipments; Personnel	Y	1. Check the raw materials for hazard 2. Clean the ingredients 3. Avoid addition of cross contaminated ingredients 4. Check for personnel hygiene and handling practices
2	Forming	Y	-	Y	Y	Equipments for forming; Personnel	Y	1. Clean the equipments (mould and shapes) thoroughly using food grade cleaning agents 2. Check for personnel hygiene and handling practices
3	Baking	Y	-	Y	-	Baking Trays	Y	1. Clean the Baking trays and Equipments

						and Equipments; Improper baking		2. Check for temperature setting in baking oven 3. Cook/Bake as per norms
4	Cooling	-	-	Y	Y	Aeration; Personnel	Y	1. Cool in a covered place with proper aeration 2. Check the quality of air used for aeration 3. Check for personnel hygiene and handling practices
5	Packing	Y	-	Y	Y	Packaging equipments, Personnel	Y	1. Check the packaging equipments 2. Check for personnel hygiene and handling practices 3. Clean the packaging equipments 4. Avoid cross contamination through packaging material 5. Consume quality assured and quality controlled biscuit

Exercise:

Name of the Item:

i. List the Ingredients

ii. Schematise the Process Flow

iii. Identify the Hazard and Control Measures

S.No.	Process Operation	Hazard				Source of Hazard	Hazard to be addressed (Y/N)	Control Measures in terms of 7 C's
		Physical	Chemical	Biological	Physico-Biological			
1								
2								
3								
4								
5								
6								
7								

1.2.2 Effect of temperature and time on bacterial growth

Activity 1

i. If bacteria get multiplied in a food by dividing into two in every 20 minutes, calculate the time taken for one bacterial cell to become more than 500.

512 bacteria in exactly three hours

ii. Demonstration on setting of curd

Ingredients

- Boiled milk – 150 ml
- Curd – one teaspoon
- Three bowls
- Refrigerator

Method

- Bring the 100 ml of boiled milk to warm temperature – 40 to 45°C and add curd (1/2 teaspoon)
- Bring the 50 ml of boiled milk to room temperature (cold) – 25 to 28°C and add curd (1/4 teaspoon)
- Pour warm milk into two bowls, each 50 ml
- Keep one bowl of warm milk and cold milk at room temperature and other bowl in refrigeration temperature
- Observe three bowls after 8 hours

Questions to be answered

- Why did the milk in all bowls not set immediately?

  Microorganisms need time to grow

- Why did the warm milk set at room temperature?

  Temperature is within the danger zone.

- Why did the cold milk not set properly at room temperature?

  Microorganisms need warmth to grow.

- Why did the warm milk not set at refrigeration temperature?

  Refrigerator temperature is 1 to 4°C. Microorganisms need warmth to grow.

- Why did the curd get sour taste?

  Lactose in the milk gets converted in to lactic acid

iii. Write the perishability and safe holding temperature for the following food

Food Item	Perishability	Safe holding temperature (°C)
Cereals, Pulses and Millets		
Milk (Raw)		
Butter, Paneer and Ghee		
Meat, Fish, Chicken		
Apple, Pomegranate, Amla		
Mango, Papaya, Guava, Banana		
Green leafy vegetables		
Potato, Onion, Garlic		
Tomato, Guard vegetables		
Spices and Condiments		
Ready to serve hot food		

items		
Ready to serve cold food items		
Bottled beverages and soft drinks		
Snacks and savouries		

1.2.3 Determination of fitness of food for consumption

Define the fitness of the following items for consumption

Food Item	Fitness (Y/N)	Type of microorganisms grown	Signs of spoilage	Prevention measure of spoilage
Bread kept at room temperature for 15 days				
Boiled Milk kept at room temperature for 3 days				
Butter, Paneer and Ghee kept at refrigerator for 20 days				
Meat, Fish, Chicken kept at deep freezer for 5 days				
Apple, Pomegranate, Amla kept at room temperature for 10 days				
Mango, Papaya, Guava, Banana kept at refrigeration for 6 days				
Green leafy vegetables kept at 20°C for 2 days				
Potato kept at room temperature for three months				
Tomato, Guard vegetables kept at room temperature for 10 days				
Spices and Condiments kept at room temperature for 6 months				
Ready to serve hot food items – sambar kept at room temperature for three hours				
Ready to serve cold food items – ice cream kept at room temperature for one hour				
Bottled beverages and soft drinks – kept at 7°C for three months				
Snacks and savouries – Puffs kept at room temperature for 6 hours				

MODULE 2: GOOD HYGIENE AND SANITARY PRACTICES

2.1 Technical Knowledge (K1 and K2)

2.1.1 Street Food

According to FAO (2000), street foods are defined as ready to eat foods and/or beverages sold by vendors and hawkers especially in the streets and/or other similar places. Street vended foods are foods prepared on the street or prepared at home and consumed on the street without further preparation. The street food trade is large and complex, providing both an important means of income and an affordable source of nutrition for millions of people.

Street foods are also appreciated for their unique flavors, variety available, convenience, and ethnic and nutritional significance. However, there exist numerous health hazards that accompany consumption of these street vended foods. The main health hazard is microbial contamination of these foods along with the use of low quality raw materials, pesticide residues, use of chemical additives such as preservatives, colors, flavours, etc. Also, street food handlers are mostly uneducated and unaware of the importance of food safety and the need for good food handling practices. They are, very often carriers of pathogens such as *E.coli*, Salmonella and Staphylococcus aureus, who eventually transfer these food borne hazards to consumers. Therefore, the consumption of street vended food potentially increases the risk of food borne diseases caused by a variety of pathogens. These meals form a significant part of the daily diet and have a major influence on health and well-being. The nutritive value and hygiene of these foods is usually neglected or compromised

1.1.2 Food and Drink Establishments

Food and drink establishments are places where an individual gets food in the form of breakfast, lunch, dinner or snacks, accompanied by some form of drink. Unhygienic practices in food and drink establishments affect the health of the clients. There are several types of food and drink establishment in rural areas. Some may provide only food; others provide food and drinks such as soft drinks, beer and other alcoholic drinks; some provide only snacks and hot drinks.

- *Restaurants* are food establishments that provide lunch and dinner
- *Cafés* provide hot drinks and snacks. Hot drinks include tea, coffee, milk, or a blend of milk and coffee (*macchiato*). The café must have water boiling equipment for coffee and tea preparation. Cakes and doughnuts (such as *bombolino*, *chornake* and *sambusa*) are served as snacks.
- *Tea houses* provide tea and snacks. Snacks are usually plain bread, *sambusa* and *bombolino*. Tea is served after mixing with boiled water in a kettle.
- *Tej bet* is a drink establishment that offers a local light alcoholic beverage made of fermented honey in water, called *tej*, which is served in large measures.
- *Tela bet* is an establishment that provides a local light alcoholic drink called *tela*. They are common in rural areas of Ethiopia.
- *Areki bet* is a drink establishment that provides a local drink containing more alcohol than *tela* or *tej*. It is consumed in smaller quantities.
- A *grocery* is an establishment that provides packed food and drink items. Groceries may also provide hot dishes.
- A *butcher's shop* is a food establishment that offers meat for sale
- A *bakery* is a food establishment that offers plain bread for sale.
- A *hotel* is a food establishment that offers food, drinks of all types, and bedroom services. The capacity of service and the quality of foods and bedrooms in a rural hotel are less than those of urban hotels.

1.1.3 Personal Hygiene

Personal hygiene can be defined as an act of maintaining **cleanliness** and grooming of the external body. Maintaining good **personal hygiene** consists of bathing, washing your hands, brushing teeth and sporting clean clothing. Additionally, it is also about making safe and **hygienic** decisions when you are around others.

The following personal hygienic practices should be followed everyday.

HOW I STAY CLEAN
I wash my hands properly after going to the toilet.
I have a bath every day.
I wear clean clothes and clean shoes.
I wash, comb and tie my hair neatly.
I wash my ears and eyes while bathing.
I brush my teeth twice a day.
I clean and clip my nails regularly.
I keep my cuts and wounds covered with a bandage.

When to Wash Your Hands
GUIDELINES
After Using the Toilet, Urinal or anytime you visit the restroom for any reason
Before and After Handling or Preparing any Food Item
Before and After handling raw meats, raw poultry of other raw foods
After Sneezing, Coughing or Scratching Any Part of Your Body
Before Serving Food, Beverages, Setting or Waiting Tables
After Handling a Tissue or Handkerchief
After Cleaning, Washing Dishes or Bussing Tables
After Touching Your Face, Hair, Clothes or Any Part of Your Body
Employees are required to wash your hands BEFORE beginning work, BEFORE working with foods and AFTER any activity that could contaminate the food and equipment you are working with.
Before Putting Gloves on, or Anytime You Take Gloves Off
After Eating, Drinking and After Breaks
After Smoking, Chewing Gum or Chewing

13 steps to effective hand washing
1
WET HANDS WITH WARM RUNNING WATER
2
APPLY ENOUGH SOAP TO COVER ALL HAND SURFACES
3
RUB HANDS PALM TO PALM
4
RUB BACK OF EACH HAND WITH THE PALM OF OTHER HAND WITH FINGERS INTERLACED
5
RUB PALM TO PALM WITH FINGERS INTERLACED
6
RUB WITH BACKS OF FINGERS TO OPPOSING PALMS WITH FINGERS INTERLOCKED
7
RUB EACH THUMB CLASPED IN OPPOSITE HAND USING ROTATIONAL MOVEMENT
8
RUB TIPS OF FINGERS IN OPPOSITE PALM IN A CIRCLUAR MOTION
9
RUB EACH WRIST WITH OPPOSITE HAND
10
RINSE HANDS WITH WATER UNTIL ALL SOAP HAS ALL GONE
11
DRY THOROUGHLY WITH A PAPER TOWEL, CLEAN TOWEL OR HAND DRYER
12
USE THE PAPER TOWEL TO TURN OFF THE TAP
13
YOUR HANDS ARE NOW CLEAN

2.2 Practical Skill (K3, K4 and K5)

2.2.1 Assessing Hygiene and Sanitary Practices of a Street Food Vendor/Institutional Cafeteria

a. Street food vending vehicle with its surroundings

b. Questionnaire to assess the safe and hygienic food handling practices in street food vending machine

S.No.	Practices	Yes/No
1	The premises shall be located in a sanitary place free from filthy surroundings. Environmentally unpolluted area shall be selected for the sale of the street vended foods.	
2	The place used to manufacture foods shall have adequate space for manufacturing and storage to maintain hygienic environment.	
3	The premises shall have adequate space to move and shall be well lit with proper ventilation to expel fumes and smell.	
4	Depending on the business, volume and nature of the food manufactured and sold, there shall be facility to wash equipments used and other utilities separately and keep them stored for use.	
5	The washed item shall never come in contact with the used ones and shall be ensured that washed utensils shall never be kept over and above in a heap unless they are dried or wiped moisture free.	
6	No vessel which may cause metallic leaching into the food while preparation or storage shall be used by the food business operators. For example, Aluminium vessel for acidic foods or Copper or Brass vessel without food grade lining.	
7	All equipments shall be well cleaned and disinfected, dried and stored on a rack or on a pallet to ensure freedom from growth of mould, fungi and other infestation.	
8	There shall be a designated container with lid and lined with garbage bag for the collection of solid waste and refuse.	
9	The waste shall not be disposed in open areas and cause problem to the public.	
10	The food business operator shall remember that they are responsible for keeping the area clean and safe and avoid any sort of potential contamination.	
11	Equal parts of vinegar and water is mixed well. This solution can be used for cleaning of counter tops, tables, gas stoves and floors. It is an also an excellent insect repellent.	
12	Baking powder can be used for removing clogs in the drainage with hot water, cans, kitchen counter, floor, etc.	
13	Sprinkle baking powder on cut lemon surface and use for cleaning utilities to clean and disinfect the surfaces and repel insects.	
14	1 cup of water (150ml) + 1 tablespoon bleaching powder. Add 3 drops of the above solution to 1 litre of water. Wait for 10 to 15 minutes. The water will be clean and disinfected.	
15	1⁄2 tablespoon bleaching powder + 1 litre of water, mix well.	

	Soak fruits and vegetables after washing in this solution for 10 to 15 minutes, when raw vegetables are used for consumption (raw salads). Cleaning utilities (clothes, scrubbers, brushes, clothes, etc.) at the end of cleaning and washing. Dip in the above solution for 15 minutes for disinfection.	
16	All personnel engaged in the manufacturing, transportation or sale of food shall wear clean dress as well as apron, gloves while serving or handling, and head gears to protect the food from contamination.	
17	They shall keep nails trimmed without nail polish, clean and wash hands with soap and sanitize before commencing the work and every time they feel hands become dirty and invariably after using toilets.	
18	Scratching of any body part or touching hair shall be avoided while handling food.	
19	All food handlers shall avoid wearing loose jewellery which may fall in the food and refrain from carrying loose metal parts or coins in their pockets which can accidentally fall into the product and cause a physical hazard to the consumers.	
20	Eating, chewing, smoking, spitting and nose blowing shall be prohibited.	
21	All articles of food stored or intended to be sold shall be in covered containers well protected from any contamination and shall be fit for consumption.	
22	The vehicles used for transportation of food shall be clean and well maintained.	
23	Quantity to be cooked shall be for the day's requirement only so that leftovers can be minimized.	
24	Hot food shall be transported in hot condition in a thermocol container or warmer and sold in hot condition.	
25	If excess is prepared, the same shall be in chilled condition and before serving, the chilled food can be re heated and served to ensure safety.	
26	Under no condition, food once re heated shall not be again stored in chiller and reheated again and served.	
27	It is ideal to use disposable gloves and sanitize them every 2 hours while handling cooked foods or replace with a new one.	
28	All left overs shall be disposed after the designated time and never be used for sale or consumption.	
29	Rubbish, waste water, open toilet facilities and stray animals shall not be near the area.	
30	In case a platform or cart is used, the surface shall be corrosion free and easily cleanable.	
31	Separate waste bins shall be provided by the vendor for the consumers to dispose the remains and the waste after eating.	
32	Water for drinking shall be potable and shall be covered and protected. They shall not be kept in filthy area.	
33	The used plates shall be wiped off waste using clothes or wipers into the bins provided and cleaned and sanitized.	
34	In case refrigerator is used in street vending facility, the same shall be cleaned and sanitized at least once in a week.	
35	The location of the vending unit shall be in a place approved by the authority and not blocking traffic or pedestrians or near unhygienic locations.	
36	The knives and cutting board shall be color coded.	

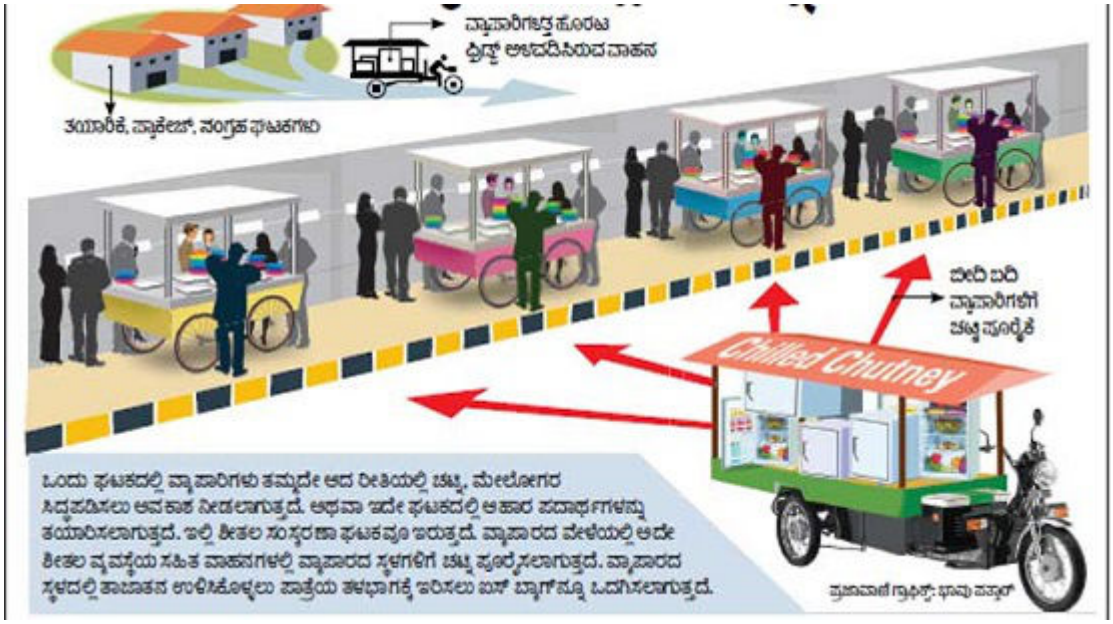
Yes – 1, No – 0

Suggestion by the Assessor:

The assessed street food vendor has followed

a. Very good hygiene and sanitary practices (If scored between 29 -36)
b. Good hygiene and sanitary practices (If scored between 21 -28)
c. Fair hygiene and sanitary practices (If scored between 13 -20)
d. Poor hygiene and sanitary practices (If scored between 07 -13)
e. Very poor hygiene and sanitary practices (If scored between 01 -06)

Suggested layout and design of a street food vending vehicle



c. Questionnaire to assess the safe and hygienic food handling practices in institutional kitchen

Interviewer's name: _____ Date of interview: _____

Name of establishment: _____

1 Type of establishment	
1) Hotel	4) *Tej bet*
2) Restaurant/Canteen	5) Other:
3) Tea house	_____
2 Licence	Yes / No
3 Water supply	
3.1 Source	1) Piped for potable water
	2) Piped for bore-well water
	3) Piped for public stand post
3.2 Handwashing facilities	1) Washbasin

	2) Water trough
	3) Manual
	4) Other, describe:
	_____
4 Excreta disposal (for public use only)	
4.1 Is there a latrine?	Yes / No
4.2 Type	1) Water carriage/flush toilet
	2) Dry latrine
4.4 Does the dry pit latrine have a vent pipe?	Yes / No
4.5 Is there a septic tank?	Yes / No
4.6 Maintenance condition of latrine at the time of visit	1) Needs minor repair
	2) Needs major repair
	3) No need of repair
4.7 Cleanliness of latrine at the time of visit	1) Clean and next person can use it
	2) Unclean and next person cannot use it
5 Liquid waste management	
5.1 Where is the wastewater from the hand and dishwashing facilities disposed of?	1) Septic tank
	2) Seepage
	3) Storm pipe
	4) Open ditch
	5) Latrine
5.2 Are there any insects breeding around the liquid waste facilities?	Yes / No
5.3 Is there any overflowing liquid waste at the time of inspection?	Yes / No
6 Solid waste management	
6.1 Is there a refuse container for public use?	Yes / No
6.2 Is there a garbage container for kitchen use?	Yes / No
6.3 Is garbage containers are color coded?	Yes / No
6.3 How is the refuse and garbage finally disposed of?	1) Burning
	2) Refuse pit burial
	3) Open field dumping
	4) Municipal service
	5) Other, specify:
	_____

7 Equipment washing facilities	
7.1 Is hot water used for Dishwashing?	Yes / No
7.2 Is Food Grade Detergent used for Dishwashing?	Yes / No
7.3 Does All washed utensils disinfected?	Yes / No
7.4 Does All disinfected utensils wiped and dried?	Yes / No
8 Food handlers' personal hygiene	
Check the following in at least one food handler working in kitchen and dining area:	
8.1 Does Fingernails cut short?	Yes / No
8.2 Does Hair covered during work?	Yes / No
8.3 Does Finger ornaments worn during work?	Yes / No
8.4 Is any infection present at a time of visit	1) Skin (open wound)
	2) Respiratory infection
	3) Diarrhoeal infection
	4) Discharge from the eye
	5) Discharge from the nose
	6) Discharge from the ear
	7) Other, specify:
	_____
8.5 Is any outer garment (apron/gown) worn?	Yes / No
8.6 What is the colour of outer garment?	1) White
	2) Blue
	3) Red
	4) Grey
	5) Other, specify:
	_____
8.7 Is the outer garment visibly dirty?	Yes / No
9 Food servicing hygiene practice	
9.1 When is the food served?	1) Any time of day
	2) At specified times (e.g. for breakfast, lunch and dinner)
9.2 How are perishable food items stored?	1) Kept in fridges
	2) Hot foods served immediately
	3) Food leftovers reheated and served
	4) Other, specify:
	_____

9.3 Are the water and ice from approved source?	Yes / No
9.4 Depending on the nature of the food operations undertaken, shall adequate facilities be available for heating, cooling, cooking, refrigerating and freezing food, for storing refrigerated or frozen foods, monitoring food temperatures and when necessary, controlling ambient temperatures to ensure the safety and suitability of food?	Yes / No
10 Building conditions	
10.1 Is food flow in one direction as far as possible (i.e. receiving – storage – preparation - packaging / serving – transportation - retailing)?	Yes / No
10.2 Are adequate spaces provided for food preparation, food storage, scullery, storage of equipment / utensils and installation of sanitary fitments, parking of vehicles?	Yes / No
10.3 Are incompatible areas (such as cloakrooms or toilets) completely segregated from food rooms?	Yes / No
10.4 Does the internal design and layout of food establishment ensure good food hygiene practices, including protection against cross-contamination between and during operations.	Yes / No
10.5 Shall the structures within food establishments be soundly built of durable materials and be easy to maintain, clean and where appropriate, able to be disinfected.	Yes / No
10.6 Shall adequate means of natural or mechanical ventilation be in place	Yes / No
10.7 Does the cleaning and disinfection procedures followed according to the schedule planned?	Yes / No
10.8 Shall regular inspection be conducted at least once in a fortnight for early detection of pest and to apprehend pest situations at the premises?	Yes / No
10.9. Kitchen	
10.9.1 Is there any visible smoke (check the wall and ceiling/roof for smoke particles)	Yes / No
10.9.2 Is there overcrowding?	Yes / No
10.9.3 Presence of vectors	Yes / No
10.9.4 Shall cooking range inside kitchens and food rooms be equipped with an exhaust system that can efficiently and effectively remove all fumes, smoke, steam or any vapour arising?	Yes / No

10.9.5 Shall only sound, suitable raw materials or ingredients be used?	Yes / No
10.10 Dining room	
10.10.1 Walls in good condition	Yes / No
10.10.2 Ceiling in good condition	Yes / No
10.10.3 Adequate lighting	Yes / No
10.10.4 Adequate ventilation	Yes / No
10.10.5 Tables and chairs in good condition	Yes / No
11 Traceability	
11.1 Does the records of purchase, inspection, storage, processing/preparation, and delivery which ensure an effective mechanism for traceability of the incoming materials to the supplier until the delivery of finished food product to the consumer maintained?	Yes / No
11.2 Is there any product withdrawal and product recall procedures?	Yes / No
12. PRODUCT INFORMATION AND CONSUMER AWARENESS	
12.1 Is there any board displaying the items available?	Yes / No
12.2 Does complaints, suggestions and product inspection books available?	Yes / No
12.3 Does the Phone No. /Address of food establishment Manager/ Nearest Food Inspector/ Auditor displayed at prominent places?	Yes / No
12.4 Are all licences and certificates displayed?	Yes / No
12.5 Does menu card indicate allergens present (if any) with the products?	Yes / No

Suggestions for good hygienic and sanitary practices in institutional cafeteria

2.2.2 Recording Success-O-Meter in habit forming tools and self-evaluation trackers on good hygiene and healthy practices

1. Behavioral Changes

   Has the learners shown any behavioral change? Yes /No

   If Yes, list the behavioral change noticed in you

2. Conceptual Development

   Has knowledge about the relevant topic increased? Yes/No

   If Yes, state the knowledge gained

3. Performance Change

   Has the learning contributed to any improved performance in daily routine? Yes/No

   If Yes, list the daily routine practiced

MODULE 3 : FOOD LABEL

3.1Technical Knowledge (K1 and K2)

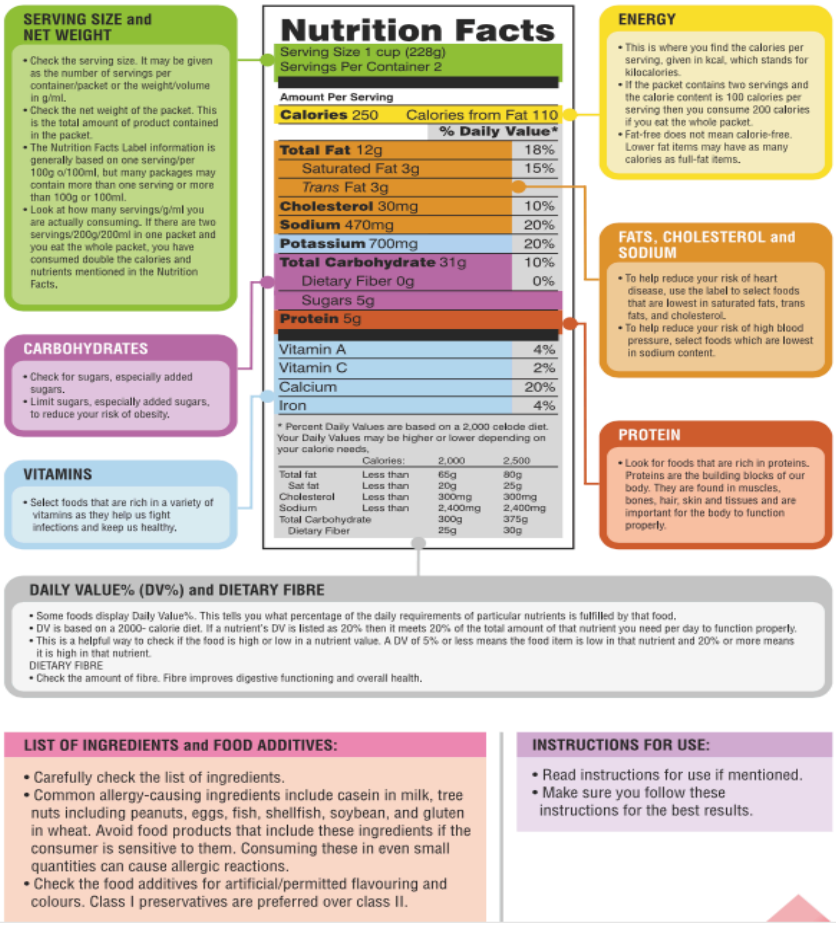
3.1.1 Parts of Food Label

All pre-packaged foods must be labelled before they are sold. Labelling tells the consumer what they are purchasing in terms of nutritive value. It helps them make a conscious selection. It helps them compare food products by value for money. It is mandatory to mention additives and likely allergens which may have accidentally entered food, on the label.

The following information should be displayed on the food label.

- Name of the food product
- List of ingredients in descending order of weight
- Symbol for vegetarian/non-vegetarian food
- Nutritional facts
- Food additives and their class/numerical identification number of colours
- Name and address of manufacturer and manufacturing unit
- Net weight of contents and drained weight
- Lot/Code/Batch identification no.
- Date of manufacture dd/mm/year
- Best before date
- If irradiated mention particulars
- Country of origin for imported food
- Instructions for use & disposal of packaging
- Licensing authority and license number
- The label may have pictures and graphics on it

Nutritional facts on the food label



Logos on the food label

fssai

FOR ALL PACKAGED FOODS AND BEVERAGES

FOR PACKAGED DRINKING WATER AND CERTAIN PROCESSED FOODS

भारत सरकार GOVERNMENT OF INDIA

FOR ALL AGRICULTURAL PRODUCTS

GREEN dot for vegetarian food

MAROON dot for non-vegetarian food, including egg

3.2 Practical Skill (K3, K4 and K5)

3.2.1 Identification of different parts of food label and defining its significance in terms of food safety

S.No.	Parts of label	Yes / No	Significance of the part as per FSSAI regulations
1	Name of the product		The name of the food shall include trade name or description of food contained in the package
2	List of ingredients		Except for single ingredient foods, a list of ingredients shall be declared on the label as the name of Ingredients used in the product shall be listed in descending order of their composition by weight or volume, as the case may be, at the time of its manufacture
3	Nutritional facts		Nutritional Information or nutritional facts per 100 gm or 100ml or per serving of the product shall be given on the label
4	Declaration regarding veg or non-veg		The symbol shall be prominently displayed on principal display panel; just close in proximity to the name or brand name of the product
5	Declaration regarding food additives		International Numerical Identification number of additives used shall also be indicated either under the list of ingredients or along with the declaration.
6	Name and complete address of the manufacturer		The name and complete address of the manufacturer and the manufacturing unit if these are located at different places and in case the manufacturer is not the packer or bottler, the name and complete address of the packing or bottling unit as the case may be shall be declared on every package of food; Where an article of food is imported into India, the package of food shall also carry the name and complete address of the importer in India
7	Net quantity		Net quantity by weight or volume or number, as the case may be, shall be declared on every package of food
8	Lot/Code/Batch Identification		A batch number or code number or lot number which is a mark of identification by which the food can be traced in the manufacture and identified in the distribution, shall be given on the label.

9	Date of manufacture or packing		The date, month and year in which the commodity is manufactured, packed or pre-packed, shall be given on the label
10	Best before and Use by date		Best before date shall not be applicable for aspartame, infant milk substitute, wines, liquors and alcoholic beverages; use by date is specified instead of best before date
11	Country of origin for imported food		The country of origin of the food shall be declared on the label of food imported into India
12	Instruction for use		Instructions for use, including reconstitution, where applicable, shall be included on the label, if necessary, to ensure correct utilization of the food
13	Logo and symbols		FSSAI number logo, recyclable status of the package, type of package etc. shall be declared on the label
14	Claim		Functional, nutritional and health claims shall be declared to specify the claim of the product

MODULE 4: FOOD ADDITIVES

4.1 Technical Knowledge (K1 and K2)

Food additives are substances added to food to preserve flavor or enhance its taste, appearance, or other qualities. Some additives have been used for centuries; for example, preserving food by pickling (with vinegar), salting, as with bacon, preserving sweets or using sulfur dioxide as with wines. With the advent of processed foods in the second half of the twentieth century, many more additives have been introduced, of both natural and artificial origin. Food additives also include substances that may be introduced to food indirectly (called "indirect additives") in the manufacturing process, through packaging, or during storage or transport.

To regulate these additives, and inform consumers, each additive is assigned a unique number, termed as "E numbers", which is used in Europe for all approved additives. This numbering scheme has now been adopted and extended by the *Codex Alimentarius* Commission to internationally identify all additives,[3] regardless of whether they are approved for use. E numbers are all prefixed by "E", but countries outside Europe use only the number, whether the additive is approved in Europe or not. For example, acetic acid is written as E260 on products sold in Europe, but is simply known as additive 260 in some countries. Additive 103, alkannin, is not approved for use in Europe so does not have an E number, although it is approved for use in Australia and New Zealand. Since 1987, Australia has had an approved system of labelling for additives in packaged foods. Each food additive has to be named or numbered. The numbers are the same as in Europe, but without the prefix "E".

The United States Food and Drug Administration (FDA) lists these items as "generally recognized as safe" (GRAS);[4] they are listed under both their Chemical Abstracts Service number and FDA regulation under the United States Code of Federal Regulations.

Colours

E	100	Curcumin
		Riboflavins
E	101	(i) Riboflavin
		(ii) Riboflavin-5'-phosphate
E	102	Tartrazine
E	104	Quinoline Yellow
E	110	Sunset Yellow FCF, Orange Yellow S
E	120	Cochineal, Carminic acid, Carmines
E	122	Azorubin, Carmoisine
E	123	Amaranth
E	124	Ponceau 4R, Cochineal Red A
E	127	Erythrosine
E	128	Red 2G
E	129	Allura red AC
E	131	Patent Blue V
E	132	Indigotine, Indigo Carmine
E	133	Brillant Blue FCF
		Chlorophylls and chlorophyllins
E	140	(i) chlorophylls
		(ii) chlorophyllins
		Copper complexes of chlorophylls and chlorophyllins
E	141	(i) copper complexes of chlorophylls
		(ii) copper complexes of chlorophillins
E	142	Green S
E	150 a	Plain Caramel
E	150 b	Caustic sulphite caramel
E	150 c	Ammonia caramel
E	150 d	Sulphite ammonia caramel
E	151	Brillant Black BN, Black BN
E	153	Vegetable carbon
E	154	Brown FK
E	155	Brown HT
		Carotenes

E	160 a	(i) Mixed carotenes
		(ii) Beta-carotene
E	160 b	Anatto, bixin, norbixin
E	160 c	Paprika extract, capsanthin, capsorubin
E	160 d	Lycopene
E	160 e	Beta-apo-8'-carotenal (C 30)
E	160 f	Ethyl ester of Beta-apo-8'-carotenic acid (C30)
E	161 b	Lutein
E	161 g	Canthaxanthin
E	162	Beetroot Red, betanin
E	163	Anthocyanins
		Calcium carbonates
E	170	(i) Calcium carbonate
		(ii) Calcium hydrogen carbonate
E	171	Titanium dioxide
E	172	Iron oxides and hydroxides
E	173	Aluminum
E	174	Silver
E	175	Gold
E	180	Litholrubine BK

Preservatives

E	200	Sorbic acid
E	202	Potassium sorbate
E	203	Calcium sorbate
E	210	Benzoic acid
E	211	Sodium benzoate
E	212	Potassium benzoate
E	213	Calcium benzoate
E	214	Ethyl p-hydroxybenzoate
E	215	Sodium ethyl p-hydroxybenzoate
E	216	Propyl p-hydroxybenzoate
E	217	Sodium propyl p-hydroxybenzoate
E	218	Methyl p-hydroxybenzoate
E	219	Sodium methyl p-hydroxybenzoate
E	220	Sulphur dioxide
E	221	Sodium sulphite
E	222	Sodium hydrogen sulphite
E	223	Sodium metabisulphite
E	224	Potassium metabisulphite
E	226	Calcium sulphite
E	227	Calcium hydrogen sulphite
E	228	Potassium hydrogen sulphite
E	230	Biphenyl, diphenyl
E	231	Orthophenyl phenol
E	232	Sodium orthophenyl phenol
E	233	Thiabendazole
E	234	Nisin
E	235	Natamycin
E	239	Hexamethylene tetramine
E	242	Dimethyl dicarbonate
E	249	Potassium nitrite
E	250	Sodium nitrite
E	251	Sodium nitrate
E	252	Potassium nitrate
E	281	Sodium propionate
E	282	Calcium propionate
E	283	Potassium propionate
E	284	Boric acid

E	285	Sodium tetraborate (borax)
E	1105	Lysozyme

Antioxidants

E	300	Ascorbic acid
E	301	Sodium ascorbate
E	302	Calcium ascorbate
		Fatty acid esters of ascorbic acid
E	304	(i) Ascorbyl palmitate
		(ii) Ascorbyl stearate
E	306	Tocopherol-rich extract
E	307	Alpha - tocopherol
E	308	Gamma - tocopherol
E	309	Delta - tocopherol
E	310	Propyl gallate
E	311	Octyl gallate
E	312	Dodecyl gallate
E	315	Erythorbic acid
E	316	Sodium erythorbate
E	320	Butylated hydroxyanisole (BHA)
E	321	Butylated hydroxytoluene (BHT)

Sweeteners

		Sorbitol
E	420	(i) Sorbitol
		(ii) Sorbitol syrup
E	421	Mannitol
E	950	Acesulfame-K
E	951	Aspartame
E	952	Cyclamic acid and its Na and Ca salts
E	953	Isomalt
E	954	Saccharin and its Na, K and Ca salts
E	957	Thaumatin
E	959	Neohesperidine DC
		Maltitol
E	965	(i) Maltitol
		(ii) Maltitol syrup
E	966	Lactitol
E	967	Xylitol

Others

Acid, acidity regulators, anti -caking agents, anti-foaming agents, bulking agents, carriers and carrier solvents, emulsifying salts, firming agents, flavour enhancers, flour treatment agents, foaming agents, glazing agents, humectants, modified starches, packaging gases, propellants, raising agents and sequestrants.

		Calcium carbonates
E	170	(i) Calcium carbonate
		(ii) Calcium hydrogen carbonate
E	260	Acetic acid
E	261	Potassium acetate
E	262	Sodium acetate
E	263	Calcium acetate
E	270	Lactic acid
E	290	Carbon dioxide
E	296	Malic acid
E	297	Fumaric acid
E	325	Sodium lactate

E	326	Potassium lactate
E	327	Calcium lactate
E	330	Citric acid
E	331	Sodium citrates
		(i) Monosodium citrate
		(ii) Disodium citrate
		(iii) Trisodium citrate
		Potassium citrates
E	332	(i) Monopotassium citrate
		(ii) Tripotassium citrate
E	333	Calcium citrates
		(i) Monocalcium citrate
		(ii) Dicalcium citrate
		(iii) Tricalcium citrate
E	334	Tartaric acid (L(+)-)
E	335	Sodium tartrates
		(i) Monopotassium tartrate
		(ii) Dipotassium tartrate
E	336	Potassium tartrates
		(i) Monopotassium tartrate
		(ii) Dipotassium tartrate
E	337	Sodium Potassium Tartrate
E	338	Phosphoric acid
		Sodium phosphates
		(i) Mono sodium phosphate
		(ii) Di sodium phosphate
E	339	(iii) Tri sodium phosphate
		Potassium phosphates
		(i) Mono potassium phosphates
E	340	(ii) Dipotassium phosphates
		Calcium phosphates
		(i) Monocalcium phosphate
E	341	
		(ii) Dicalcium phosphate
		(iii) Tricalcium phosphate
		Magnesium phosphates
E	343	(i) Monomagnesium phosphate
		(ii) Dimagnesium phosphate
		Sodium malates
E	350	(i) Sodium malate
		(ii) Sodium hydrogen malate
E	351	Potassium malate
		Calcium malates
E	352	(i) Calcium malate
		(ii) Calcium hydrogen malate
E	353	Metatartaric acid
E	354	Calcium tartrate
E	355	Adipic acid
E	356	Sodium adipate
E	357	Potassium adipate
E	363	Succinic acid
E	380	Triammonium citrate
E	385	Calcium disodium ethylene diamine tetra-acetate (calcium disodium EDTA)
E	422	Glycerol
E	431	Polyoxyethylene (40) stearate
		Diphosphates
		(i) Disodium diphosphate
		(ii) Trisodium diphosphate
E	450	(iii) Tetrasodium diphosphate
		(v) Tetrapotassium diphosphate

		(vi) Dicalcium diphosphate	
		(vii) Calcium dihydrogen diphosphate	
		Triphosphates	
E	451		
		(i) Pentasodium triphosphate	
		(ii) Pentapotassium triphosphate	
		Polyphosphates	
		(i) Sodium polyphosphate	
E	452	(ii) Potassium polyphosphate	
		(iii) Sodium calcium polyphosphate	
		(iv) Calcium polyphosphate	
E	459	Beta-Cyclodextrine	
E	479 b	Thermally oxidized soya bean oil interacted with mono and diglicerides	of fatty acids
		Sodium carbonates	
		(i) Sodium carbonate	
E	500		
		(ii) Sodium hydrogen carbonate	
		(iii) Sodium sesquicarbonate	
		Potassium carbonates	
E	501	(i) Potassium carbonate	
		(ii) Potassium hydrogen carbonate	
		Ammonium carbonates	
E	503	(i) Ammonium carbonate	
		(ii) Ammonium hydrogen carbonate	
		Magnesium carbonates	
E	504	(i) Magnesium carbonate	
		(ii) Magnesium hydroxide carbonate	
E	507	Hydrochloric acid	
E	508	Potassium chloride	
E	509	Calcium chloride	
E	511	Magnesium chloride	
E	512	Stannous chloride	
E	513	Sulphuric acid	
		Sodium sulphates	
E	514	(i) Sodium sulphate	
		(ii) Sodium hydrogen sulphate	
		Potassium sulphates	
E	515	(i) Potassium sulphate	
		(ii) Potassium hydrogen sulphate	
E	516	Calcium sulphate	
E	517	Ammonium sulphate	
E	520	Aluminium sulphate	
E	521	Aluminium sodium sulphate	
E	522	Aluminium potasssium sulphate	
E	523	Aluminium ammonium sulphate	
E	524	Sodium hydroxide	
E	525	Potassium hydroxide	
E	526	Calcium hydroxide	
E	527	Ammonium hydroxide	
E	528	Magnesium hydroxide	
E	529	Calcium oxide	
E	530	Magnesium oxide	
E	535	Sodium ferrocyanide	
E	536	Potassium ferrocyanide	
E	538	Calcium ferrocyanide	
E	541	Sodium aluminium phosphate, acidic	
E	551	Silicon dioxide	
E	552	Calcium silicate	
		Magnesium silicates	
E	553 a	(i) Magnesium silicate	

			(ii) Magnesium trisilicate
E	553	b	Talc
E	554		Sodium aluminium silicate
E	555		Potassium aluminium silicate
E	556		Calcium aluminium silicate
E	558		Bentonite
E	559		Aluminium silicate (Kaolin)
E	570		Fatty acids
E	574		Gluconic acid
E	575		Glucono-delta-lactone
E	576		Sodium gluconate
E	577		Potassium gluconate
E	578		Calcium gluconate
E	579		Ferrous gluconate
E	585		Ferrous lactate
E	620		Glutamic acid
E	621		Monosodium glutamate
E	622		Monopotassium glutamate
E	623		Calcium diglutamate
E	624		Monoammonium glutamate
E	625		Magnesium diglutamate
E	626		Guanylic acid
E	627		Disodium guanylate
E	628		Dipotassium guanylate
E	629		Calcium guanylate
E	630		Inosinic acid
E	631		Disodium inosinate
E	632		Dipotassium inosinate
E	633		Calcium inosinate
E	634		Calcium 5'-ribonucleotides
E	635		Disodium 5'-ribonucleotides
E	640		Glycine and its sodium salt
E	650		Zinc Acetate
E	900		Dimethyl polysiloxane
E	901		Bees wax, white and yellow
E	902		Candelilla wax
E	903		Carnauba wax
E	904		Shellac
E	905		Microcrystalline wax
E	912		Montan acid esters
E	914		Oxidized polyethylene wax
E	920		L-Cysteine *(may be used only as a flour treatment agent)*
E	927	b	Carbamide
E	938		Argon
E	939		Helium
E	941		Nitrogen
E	942		Nitrous oxide
E	943	a	Butane
E	943	b	Iso-Butane
E	944		Propane
E	948		Oxygen
E	949		Hydrogen
E	999		Quillaia extract
E	1200		Polydextrose
E	1201		Polyvinylpyrrolidone
E	1202		Polyvinylpolypyrrolidone
E	1404		Oxidized starch
E	1410		Monostarch phosphate
E	1412		Distarch phosphate
E	1413		Phosphated distarch phosphate
E	1414		Acetylated distarch phosphate

E	1420	Acetylated starch
E	1422	Acetylated distarch adipate
E	1440	Hydroxy propyl starch
E	1442	Hydroxy propyl distarch phosphate
E	1450	Starch sodium octenyl succinate
E	1451	Acetylated oxidized starch
E	1505	Triethyl citrate
E	1518	Glyceryl triacetate (triacetin)
E	1520	Propylene glycol

4.2 Practical Skill (K3, K4 and K5)

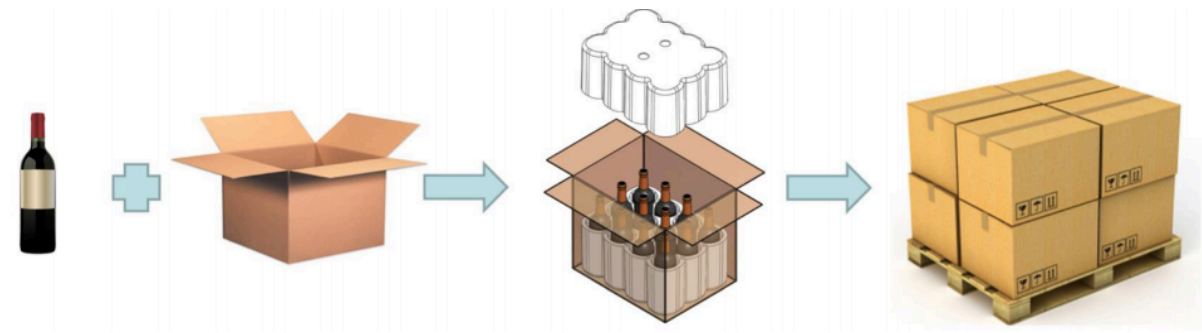
4.2.1 Identification of food additives added into food items using ingredients part of food label

S.No.	E-number	Class of Additive	Name of the Additive
1			
2			
3			
4			
5			
6			
7			
8			

MODULE 5: FOOD PACKAGING

5.1 Technical Knowledge (K1 and K2)

Packaging can be classified into three main groups: primary packaging, secondary packaging and tertiary packaging. Any product generally requires a primary packaging to contain the product and secondary packaging to transport it.



Primary Packaging: The first-level package that directly contacts the product is referred to as the "primary package." For example, a beverage can, a paper envelope for a tea bag, an inner bag in a cereal box and an individual candy wrap in a pouch are primary packages, and their main function is to contain and preserve the product. Beyond this packaging lies the product itself. Primary packages must be compatible with the product.

Secondary Packaging: The secondary package contains two or more primary packages and protects the primary packages from damage during distribution and storage. It's main aim is branding display and logistical purposes as well as protecting and collating individual units during storage. Secondary packaging is often used by the beverage, food and cosmetic sectors for displaying primary packs on shelves therefore it is often referred to as display packaging.

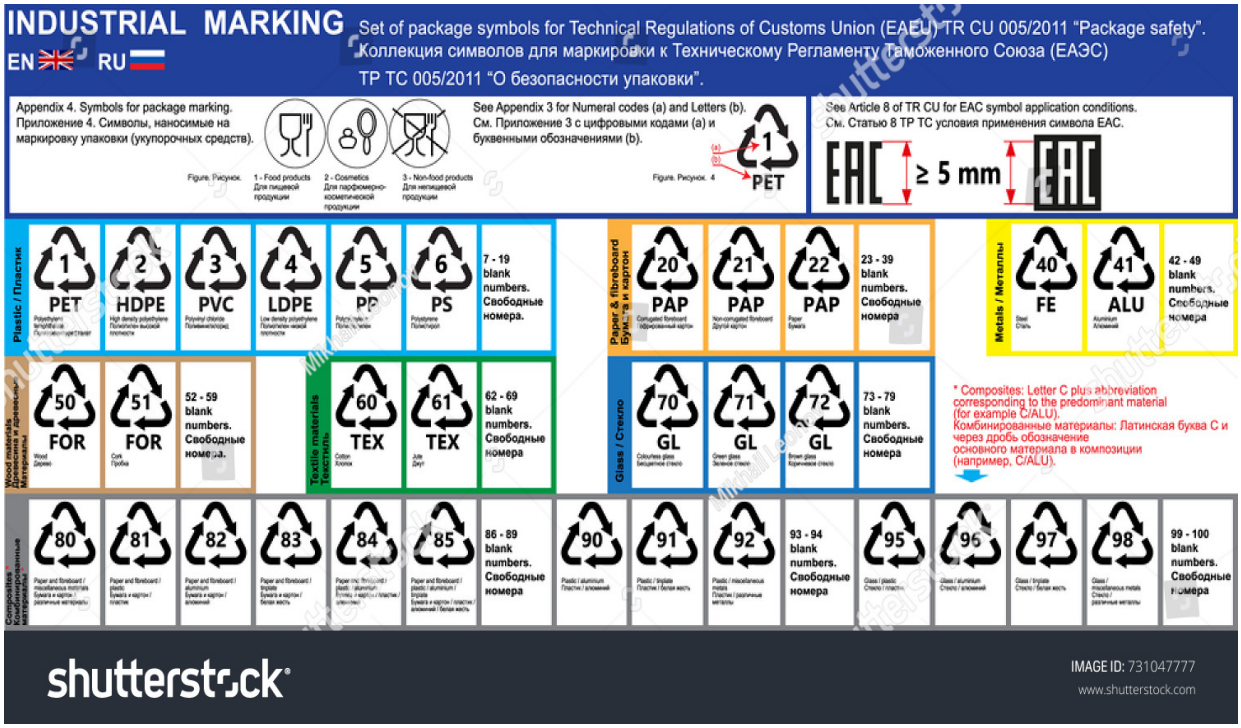
Tertiary Packaging: The tertiary package typically contains a number of the primary or secondary packages. Tertiary packaging is used for bulk handling warehouse storage and transport shipping therefore it is also called as "distribution package". It facilitates the protection, handling and transportation of a series of sales units or secondary packaging in order to group everything into unit loads during transit. This type of packaging is rarely seen by the consumer.

Materials used in packaging

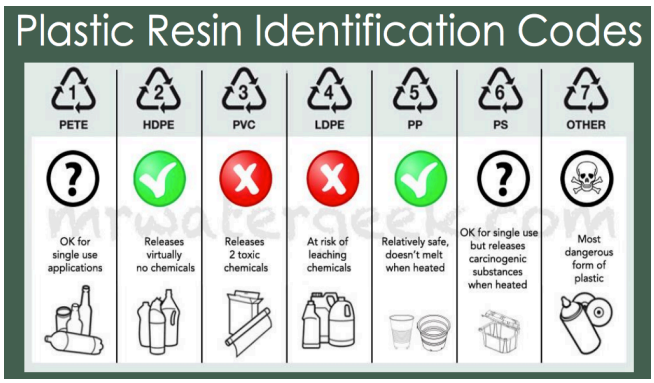
Plastic: The most common packaging material is plastic and at the same time it is one of the most difficult to dispose of. Almost 10% of our rubbish consists of different types of plastic. They are a problem in landfills as they are bulky, they contaminate degrade slowly. The factors common to all plastics are that they are light, strong cheap to manufacture.

Polyethylene (PET) E.g. cling wrap, High-density polyethylene (HDPE) E.g. Cereal bags, Low-density polyethylene (LDPE) E.g. Kraft singles wrappers, Polypropylene (PP) E.g. chip, biscuit, 2 minute noodle wrappers

Metal: Metal is a material most appropriate for packaging foods. Amongst all, aluminium is attractive, light strong at the same time but requires a lot of raw materials energy to make it. The majority of cans of soft drinks, lids, aluminium foil, etc. are made aluminium. It is widely used for products such as sodas, beer, canned goods and animal foods. Because of the high cost of using aluminium to package products, most industries take donations of recycled canned goods to help save money in their business. It can be separated by magnets should be recycled in all cases. • Glass: Glass is the traditional vessel in the home. Glass jars and bottles are highly used for numerous food and beverage products including jam, honey, alcoholic beverages and food items such as pickles and especially liquids. Although glass is extremely fragile it makes for an excellent, well-sealed packaged for any perishable products. It is inalterable, strong easy to recycle. Its weight may involve some difficulties for transport.



CODE	MATERIAL	APPLICATIONS
1 PET OR 1 PETE	Polyethylene terephalate	Clear softdrinks and beverage bottles, food packaging
2 HDPE OR 2 PE-HD	High density polyethylene	Bottles (especially for food products, detergent and cosmetics), Industrial wrapping and film, sheets, plastic bags
3 PVC OR 3 V	Polyvynil Chloride	Bottles, packaging film, credit cards, water containers, water pipes
4 LDPE OR 4 PE-LD	Low density polyethylene	Cling film, plastic bags, flexible containers and food wrap
5 PP	Polypropylene	Packaging such as yoghurt and margarine pots, sweet and snack wrappers, medical packaging, milk and beer crates, shampoo bottles
6 PS	Polystyrene	Disposable hot or cold drink cups and plates, fast food clamshells, dairy product containers
7 OTHER OR 7 O	All other resins and multi-materials not otherwise defined	Other resins, complex composites and laminates



Cardboard: Most products that are packaged in cardboard boxes are first wrapped in another type of packaging such as bubble wrap or foam. However, cardboard is the most appropriate for wrapping. Its use may prove to be unnecessary when used for products which are already packaged sufficiently. In all cases, this packaging material is easy to recycle reuse. It is used in the form of boxes, sheets corrugated cardboard.

Bags used in retail packaging are called as "flexible packaging". These can be either made of paper or plastic, single or multi-layered. A large variety of flexible package styles and formats are available to suit a broad variety of product applications and consumer preferences. Many of these styles incorporate consumer convenience features including zippers, "slider" zippers, spouts, fitments, specialty closures and handles. Flexible Packaging Solutions include Stand-up Pouch, Flat Bottom, Side Gusset Bag, Single Serve Portion Packet, Top or Corner Spout, Retort Pouch formats etc.

5.2 Practical Skill (K3, K4 and K5)

5.2.1 Identify the type of packaging material and defining its nature using symbols

S. No.	Name of the Product in Pack	Class of Packaging	Packaging Material	Codes	Graphic Design	Recyclable or not
1						
2						
3						
4						
5						

MODULE 6: FOOD ADULTERATION

6.1 Technical Knowledge (K1 and K2)

Food Adulteration refers to the process by which the quality or the nature of a given food is reduced through addition of adulterants or removal of vital substance. Food adulterants refer to the foreign and usually inferior chemical substance present in food that cause harm or is unwanted in the food. Basically, during food adulteration, small quantity of non-nutritious substances is added intentionally to improve the appearance, texture or storage properties of the food. Food adulteration is quite common in the developing countries.

TYPES OF FOOD ADULTERATION

1. Intentional adulteration: The adulterants are added as a deliberate act with intention to increase profit. E.G. sand, marble chips, stones, chalk powder, etc.
2. Incidental Adulteration: Adulterants are found in food due to negligence, ignorance or lack of proper facilities. E.G. Packaging hazards like larvae of insects, droppings, pesticide residues, etc.
3. Metallic adulteration: When the metallic substances are added intentionally or accidentally. Eg: arsenic, pesticides, lead from water, mercury from effluents, tins from cans, etc.

METHODS OF FOOD ADULTERATION

1. **Mixing:** Mixing of clay, stones, pebbles, sand, marble chips, etc.
2. **Substitution:** Cheaper and inferior substances being replaced wholly or partially with good ones.
3. **Concealing quality:** Trying to hide the food standard. E.G. adding captions of qualitative food to low quality for selling.
4. **Decomposed food:** Mainly in fruits and vegetables. The decomposed ones are mixed with good ones
5. **Misbranding/ False labels:** Includes duplicate food stuffs, changing of manufacture and expiry dates.
6. **Addition of toxicants:** adding non-edible substances like argemone in mustard oil, low quality preservatives, colouring agents, etc.

6.2 Practical Skill (K3, K4 and K5)

6.2.1 Identification of common adulterants in food

Test 1

Test 2

Detection of detergent in milk

Testing method:

1. Take 5 to 10ml of sample with an equal amount of water.
2. Shake the contents thoroughly.
3. If milk is adulterated with detergent, it forms dense lather.
4. Pure milk will form very thin foam layer due to agitation..

Pure milk

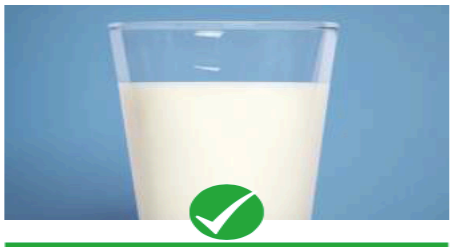
Adulterated milk

Test 3

Detection of starch in milk and milk products (khoya, chenna, paneer)

Testing method:

1. Boil 2-3 ml of sample with 5ml of water.
2. Cool and add 2-3 drops of tincture of iodine.
3. Formation of blue colour indicates the presence of starch.
   (In the case of milk, addition of water and boiling is not required)



Pure milk

Adulterated milk

Test 4

Detection of other oils in coconut oil

Testing method:

1. Take coconut oil in a transparent glass.
2. Place this glass in refrigerator for 30 minutes. (Do not keep in the freezer)
3. After refrigeration, coconut oil solidifies.
4. If coconut oil is adulterated, then other oils remain as a separate layer.

Pure

Adulterated

Test 5

Detection of mashed potatoes, sweet potatoes and other starches in ghee/butter

Testing method:

1. Take ½ teaspoon of ghee/butter in a transparent glass bowl.
2. Add 2-3 drops of tincture of iodine.
3. Formation of blue colour indicates the presence of mashed potatoes, sweet potatoes and other starches.

Pure

Adulterated

Test 6

Detection of sugar solution in honey

Testing method - 1:

1. Take a transparent glass of water.
2. Add a drop of honey to the glass.
3. Pure honey will not disperse in water.
4. If the drop of honey disperses in water, it indicates the presence of added sugar.

Testing method - 2:

1. Take a cotton wick dipped in a pure honey and light with a match stick.
2. Pure honey will burn.
3. If adulterated, the presence of water will not allow the honey to burn if it does; it will produce a cracking sound.

Pure

Adulterated

Test 7

Detection of chalk powder in sugar/pithi sugar/jaggery

Testing method:

1. Take a transparent glass of water.
2. Dissolve 10g of sample in water.
3. If sugar/pithi sugar/jaggery is mixed with chalk, the adulterant will settle down at the bottom.

Pure

Adulterated

Test 8

Detection of extraneous matter (dust, pebble, stone, straw, weed seeds, damaged grain, weeviled grain, insects, rodent hair and excreta) in food grains

Testing method:

1. Take small quantity of sample in a glass plate.
2. Examine the impurities visually.
3. Pure food grains will not have any such impurities.
4. Impurities are observed visually in adulterated food grains.

Pure

Adulterated

Test 9

Detection of excess bran in wheat flour

Testing method:

1. Take a transparent glass of water.
2. Sprinkle a spoon of wheat flour on the surface of water.
3. Pure wheat flour will not show excess bran on water surface.
4. Adulterated wheat flour shows excess bran floating on water surface.

Pure wheat flour

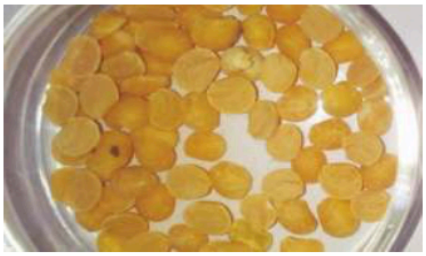
Excess bran in wheat flour

Test 10

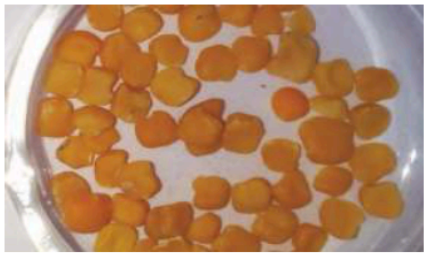
Detection of khesari dal in dal whole and split

Testing method:

1. Take small quantity of dal whole or split in a glass plate.
2. Examine the impurities visually.
3. Khesari dal which has edged type appearance showing a slant on one side and square in appearance can be separated out by close examination.
4. Pure dal will not have any such impurities.



Pure dal



Khesari dal

Test 11

Detection of added colour in food grains

Testing method:

1. Take a transparent glass of water.
2. Add 2 teaspoons of food grains and mix thoroughly.
3. Pure food grains will not leave any colour.
4. Adulterated food grains leaves colour immediately in water.

Pure

Adulterated

Test 12

Detection of turmeric in sella rice

Testing method:

1. Take a tea spoon of rice in a glass plate.
2. Sprinkle a small amount of soaked lime (commonly known as chuna which is used in pan) on the rice grains.
3. Pure grains will not form red colour.
4. Adulterated grains will form red colour.

Pure

Adulterated

Test 13

Detection of rhodamine B in ragi

Testing method:

1. Take cotton ball soaked in water or vegetable oil. (conduct the test separately)
2. Rub the outer surface of the ragi.
3. If cotton absorbs colour, then it indicates the adulteration of rhodamine B for colouring the outer surface of ragi.

Pure

Adulterated

Test 14

Detection of sand, soil, insects, webs, lumps, rodent hair and excreta in Atta, Maida, Suji (Rawa)"

Testing method:

1. These can be identified by visual examination.

Atta, Maida, Suji (Rawa)

Sand, Soil, insects, webs, lumps, rodent hair and excreta

Test 15

Detection of papaya seeds in black pepper

Testing method - 1:

1. Add some amount of black pepper to a glass of water.
2. Pure black pepper settles at the bottom.
3. In the adulterated black pepper, papaya seeds float on the surface of water.

Black pepper

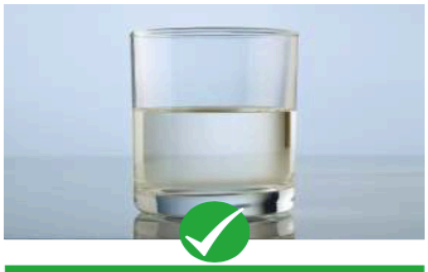
Papaya seeds

Test 16

Detection of soap stone or other earthy matter in asafoetida (hing)

Testing method:

1. Shake little portion of the sample with water and allow to settle.
2. Pure asafoetida will not leave any soap stone or other earthy matter at the bottom.
3. If asafoetida is adulterated, soap stone or other earthy matter will settle down at the bottom.



Pure

Adulterated

Test 17

Detection of chalk in common salt

Testing method:

1. Stir a spoonful of sample of salt in a glass of water.
2. The presence of chalk will make solution white and other insoluble impurities will settle down.

Common salt

Chalk

Test 18

Detection of artificial/water soluble synthetic colours in chilli powder

Testing method:

1. Sprinkle chilli powder on the surface of water taken in a glass tumbler.
2. The artificial colourants will immediately start descending in colour streaks.

Pure

Adulterated

Test 19

Detection of starch in asafoetida

Testing method:

1. Tincture of iodine is added to the sample of asafoetida.
2. Appearance of blue colour shows the presence of starch.

Asafoetida

Starch

Test 20

Detection of exhausted cloves in cloves

Testing method:

1. Take some water in a glass and put cloves.
2. Genuine cloves will settle down at the bottom while exhausted cloves will float on surface.

Cloves

Volatile oil extracted cloves

Test 21

Detection of exhausted cloves in cloves

Testing method:

1. Take some water in a glass and put cloves.
2. Genuine cloves will settle down at the bottom while exhausted cloves will float on surface.

Cloves

Volatile oil extracted cloves

Test 22

Detection of grass seeds coloured with charcoal dust in cumin seeds

Testing method:

1. Rub small amount of cumin seeds on palms.
2. If palms turn black, adulteration is indicated.

Pure

Adulterated

Test 23

Detection of argemone seeds in mustard seeds

Testing method:

1. Take small quantity of mustard seeds in a glass plate.
2. Examine visually for the argemone seeds.
3. Mustard seeds have a smooth surface and when pressed, inside it is yellow in colour.
4. Argemone seeds have grainy, rough surface and are black in colour. When pressed, it is white in colour from inside.

Mustard seeds

Argemone seeds

Test 24

Detection of artificial colour in turmeric powder

Testing method:

1. Add a teaspoon of turmeric powder in a glass of water.
2. Natural turmeric powder leaves light yellow colour while settling down.
3. Adulterated turmeric powder will leave a strong yellow colour in water while settling down.

Pure

Adulterated

Test 25

Differentiation of common salt and iodised salt

Testing method:

1. Cut a piece of potato, add salt and wait for a minute.
2. Add two drops of lemon juice.
3. If it is iodised salt, blue colour will develop.
4. In the case of common salt, there will be no blue colour.

Iodised salt

Common salt

Test 27

Detection of malachite green in green vegetables like bitter gourd, green chilli and others.

Testing method - 1:

1. Take a cotton piece soaked in water or vegetable oil. (conduct the test separately)
2. Rub the outer green surface of a small part of green vegetable/chilli.
3. If the cotton turns green, then it is adulterated with malachite green.

Pure

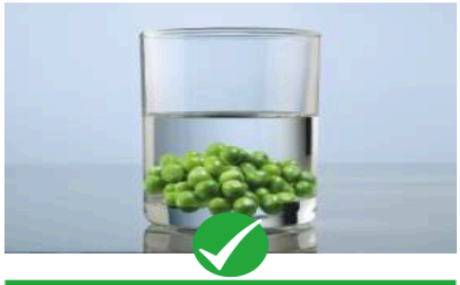
Adulterated

Test 28

Detection of artificial colour on green peas

Testing method:

1. Take little amount of green peas in a transparent glass.
2. Add water to it and mix well.
3. Let it stand for half an hour.
4. Clear separation of colour in water indicates adulteration.



Pure

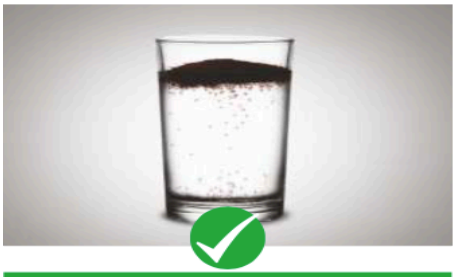
Adulterated

Test 29

Detection of chicory powder in coffee powder

Testing method:

1. Take a transparent glass of water.
2. Add a teaspoon of coffee powder.
3. Coffee powder floats over the water but chicory begins to sink.



Pure

Adulterated

Test 30

Detection of exhausted tea in tea leaves

Testing method - 1:

1. Take a filter paper and spread few tea leaves.
2. Sprinkle with water to wet the filter paper.
3. Wash the filter paper under tap water and observe the stains against light.
4. Pure tea leaves will not stain the filter paper.
5. If coal tar is present, it will immediately stain the filter paper.

Testing method - 2:

1. Take small amount of tea leaves/ dust and place it in the centre of a filter paper.
2. Add water drop by drop at the heap of the tea leaves/ dust.
3. If the tea is adulterated with a coloured tea, water will dissolve the added colour and leave streak of colour in the filter paper.

Report on the identified adulterant

Food item	Adulterated or not	Type of adulterant

MODULE 7: FOOD FORTIFICATION

7.1 Technical Knowledge (K1 and K2)

Food fortification or **enrichment** is the process of adding micronutrients (essential trace elements and vitamins) to food. It can be carried out by food manufacturers, or by governments as a public health policy which aims to reduce the number of people with dietary deficiencies within a population.

Main methods of food fortification:

1. Commercial and industrial fortification (wheat flour, corn meal, cooking oils)
2. Biofortification (breeding crops to increase their nutritional value, which can include both conventional selective breeding, and genetic engineering)
3. Home fortification (example: vitamin D drops)

Examples of foods and beverages that have been fortified and shown to have positive health effects: Iodised salt, carotene fortified oil, carotene fortified rice etc.

Fortification is the addition of key vitamins and minerals such as Iron, Iodine, Zinc, Vitamins A & D to staple foods such as rice, wheat, oil, milk and salt to improve their nutritional content. These nutrients may or may not have been originally present in the food before processing or may have been lost during processing.

The **Food Fortification Resource Centre** is a Resource and Support Centre to promote large-scale fortification of food across India. It is a resource hub which provides information and inputs on standards and food safety, technology and processes, premix and equipment procurement and manufacture, quality assurance and quality control for fortification of foods. FFRC's approach is to motivate, nudge and facilitate the food industry to adopt Food Fortification as a norm.

7.2 Practical Skill (K3, K4 and K5)

7.2.1 Identification of fortificants in food label

Food Item	Type of fortificants	Symbol represented or not