CHAPTER-IV

Food Processing And Technology

2 marks Questions:

1. **What is the primary purpose of drying grains after harvest?**
    - **Answer:** To increase their shelf life.
2. **Name a few preserved products made from vegetables/fruits/grains in India.**
    - **Answer:** Pickles, murabbas, and papads.
3. **What are the changing demands in the food industry due to improved transportation and communication?**
    - **Answer:** Increasing demand for 'fresh,' 'organic,' 'safer and healthier' foods, and foods with adequate shelf life.
4. **What is the significance of food processing in India in terms of GDP?**
    - **Answer:** It contributes nearly 6% of GDP.
5. **Why is food fortification done?**
    - Answer: To add nutrients lacking in certain foods and ensure minimum dietary requirements are met.

4 marks Questions:

1. **Explain the importance of food processing and technology in India's progress.**
    - **Answer:** India has transitioned from an agro-deficit to an agro-surplus country, leading to the need for storage and processing of agricultural produce. The food industry contributes nearly 6% to GDP and has become a major producer of processed foods.
2. **Describe the basic concepts of food science.**
    - **Answer:** Food science involves the application of basic sciences like chemistry and physics, along with culinary arts, agronomics, and microbiology. It encompasses the technical aspects of food from harvesting to consumption.
3. **What are the key factors influencing microbial growth in foods?**
    - **Answer**: Nutrient availability, moisture, pH, oxygen levels, and the presence or absence of inhibiting substances.
4. **Classify foods based on perishability and provide examples.**
    - **Answer**: Perishable foods (milk, curds, fish), Semi-perishable foods (fruits, vegetables), Non-perishable foods (grains like rice, wheat, pulses).

5. **What are minimally processed foods?**

- **Answer:** Foods processed as little as possible to retain the quality of fresh foods, involving cleaning, trimming, and storage at low temperatures.

7 marks questions

1. Explain the following terms:(A) Food Science (B) Food Processing (C) Food Technology (D) Food Manufacturing and (E) Food Spoilage

Explanation of Terms:

- **Food Science:** Food science is a multidisciplinary field that involves the application of basic sciences such as chemistry, physics, culinary arts, agronomics, and microbiology to study the composition, changes, and properties of food. It encompasses the entire process from harvesting or slaughtering to cooking and consumption.
- **Food Processing**: Food processing refers to the set of methods and techniques used to transform raw ingredients into finished and semi-finished products. It involves converting raw materials, either from plant or animal sources, into marketable and often long-shelf-life food products.
- **Food Technology**: Food technology is the application of scientific and socio-economic knowledge, along with legal rules, for the production of food. It utilizes knowledge from food science and food engineering to produce a variety of foods. This field involves the selection, storage, preservation, processing, packaging, and distribution of safe, nutritious, and affordable foods.

- **Food Manufacturing:** Food manufacturing is the mass production of food products using principles of food technology to meet the diverse needs of the growing population. It is one of the largest manufacturing industries in contemporary times.
- **Food Spoilage**: Food spoilage is the deterioration of food associated with factors such as spoilage, off-flavors, changes in texture, discoloration, and loss of nutritional value. It occurs due to various reasons, including microbial activity, inappropriate processing or storage temperatures, exposure to light, oxygen, moisture, and contamination by microorganisms or chemicals.

2. Explain briefly the significance of Food Technology. How has it affected the life of modern housewives, specially working women?

Significance of Food Technology: Food technology has significantly impacted modern lifestyles, especially for working women. The demand for 'fresh,' 'organic,' 'safer and healthier' foods has increased. Food technology caters to these demands by developing methods to produce high-quality, shelf-stable, and convenient foods. This has not only diversified food choices but also contributed to the growth of the food industry, making it a major player in the economy.

3. List some of the old methods of food preservation followed at home giving examples and their viability in present times.

Old Methods of Food Preservation: Some old methods of food preservation include sun drying, controlled fermentation, salting/pickling, candying, roasting, smoking, baking, and using spices as preservatives. While these traditional methods are still viable, the advent of the industrial revolution has introduced new techniques, enhancing the shelf life and safety of food products.

4. Give a brief account of development of food preservation to its present status.

Development of Food Preservation: The development of food preservation has a rich history. The canning process by Nicolas Appert in 1810 and Louis Pasteur's research on spoilage and pasteurization in 1864 were pivotal events. World wars, space exploration, and changing consumer preferences in the 20th century led to the growth of food technology. In the 21st century, food technologists face challenges in producing foods that cater to health and changing consumer needs.

5. As a prospective food technologist what knowledge and skills does the industry require you to have?

Knowledge and Skills for Food Technologists: Professionals in food processing and technology need a range of knowledge and skills, including understanding the seasonal availability of food, the nature and properties of food, nutritional content analysis, cost analysis, food hygiene, safety, and quality assurance. Additionally, skills in product development, sensory evaluation, industrial practices, and information technology are crucial.

6. Keeping the concept of health and wellness in mind, explain with examples how food scientists are trying to enhance the food values in processed and packaged foods.

Enhancing Food Values in Processed Foods: Food scientists aim to enhance food values in processed and packaged foods by altering nutrient content. Examples include fortification of staple foods like salt, wheat flour, milk, and oats. Additionally, reducing calorie content through the use of artificial sweeteners and replacing fat in ice creams with specially treated proteins are strategies to align processed foods with health and wellness goals.

7. Explain the following briefly:

• Why do we need to process and preserve food?

• What causes food spoilage and renders it unfit for human consumption?

• Food spoilage is generally caused by bacteria. What are the four conditions that bacteria need to grow and multiply?

• What is done in food processing to extend shelf life?

• After the completion of 10+2 examination what is the professional scope in the field of Food Processing and Technology?

Explanation of Concepts:

- **Need to Process and Preserve Food:** Processing and preserving food are essential to prevent physical, chemical, and biological deterioration, ensuring food remains safe and edible. Various methods are employed to extend shelf life and maintain quality.
- **Causes of Food Spoilage:** Food can spoil due to factors such as pests, inappropriate temperatures, light, radiation, oxygen, moisture, microorganisms, and naturally present enzymes. These factors lead to changes in color, texture, flavor, and nutritional value.
- **Conditions for Bacterial Growth:** Bacteria require nutrient-rich foods, appropriate moisture levels, specific pH conditions, oxygen availability, and the absence of inhibiting

substances to grow and multiply. The danger zone for bacterial growth is between 5–60°C.

- **Methods in Food Processing:** Food processing involves applying heat, removing water moisture, lowering temperature during storage, reducing pH, and controlling the availability of oxygen to prevent food spoilage.
- **Scope after 10+2:** After completing 10+2, individuals can pursue short-term courses, certificates, diplomas, or opt for bachelor's and master's degrees in food technology. The food industry offers diverse career opportunities, including production management, project implementation, marketing, research, teaching, entrepreneurship, and consultancy.

Multiple-Choice Questions (MCQs):

1. **What is the primary purpose of food processing mentioned in the passage?**
    - A. To increase shelf life
    - B. To enhance flavor
    - C. To improve digestibility
    - D. All of the above
    - **Answer: D**
2. **What is the current rank of the Indian food industry in terms of size according to the passage?**
    - A. 1st
    - B. 3rd
    - C. 5th
    - D. 7th
    - **Answer: C**
3. **Which process, developed in 1810, had a major impact on food preservation?**
    - A. Freezing
    - B. Pasteurization
    - C. Canning
    - D. Fermentation
    - **Answer: C**

4. **What does HACCP stand for in the context of food processing?**
    - A. Hazard Analysis and Control of Critical Points
    - B. Hygiene and Control in Food Production
    - C. Handling and Analysis of Critical Control Points
    - D. Health Assessment and Critical Control Points
    - **Answer: A**
5. **Which of the following is an example of a non-perishable food?**
    - A. Milk
    - B. Fruits
    - C. Rice
    - D. Fish
    - **Answer: C**

Fill in the Blanks:

1. **Food Technology uses and exploits knowledge of Food Science and Food Engineering to produce varied _____.**
    - **Answer:** foods
2. **Louis Pasteur developed the process of _____ to treat milk and destroy disease-producing organisms.**
    - **Answer:** pasteurization
3. **Processed foods can be classified based on the extent and type of processing, such as minimally processed foods, preserved foods, manufactured foods, and _____ foods.**
    - **Answer:** formulated
4. **Food scientists deal with physico-chemical aspects of food, helping us understand the nature and properties of _____.**
    - **Answer:** food
5. **Food processing requires good-quality raw materials from either plant and/or animal sources to be converted into attractive, marketable, and often long _____ food products.**
    - **Answer:** shelf-life

Summary of "Food Processing and Technology":

The field of Food Processing and Technology has gained significance due to changing consumer demands and the need for improved food quality. The chapter highlights the evolution of the food industry in India, which has transitioned from an agro-deficit to an agro-surplus country. Currently, it ranks fifth in size, contributing nearly 6% to the GDP.

Consumers now seek fresh, organic, safer, and healthier foods with extended shelf life, prompting scientists to develop innovative methods and techniques for food processing. The importance of food fortification to address nutrient deficiencies and the impact of lifestyle diseases have further driven advancements in food technology.

The chapter introduces key concepts such as Food Science, Food Processing, and Food Technology. Food Science involves applying basic sciences like chemistry and physics to study the technical aspects of food from harvesting to consumption. Food Processing refers to methods and techniques transforming raw ingredients into finished products, while Food Technology utilizes scientific knowledge and socio-economic principles for production.

The historical development of Food Technology, starting from Nicolas Appert's canning process in 1810 to Louis Pasteur's contributions, is discussed. The chapter emphasizes the role of food technology in addressing changing consumer preferences, health concerns, and providing a variety of safe and convenient foods.

Food preservation is essential to combat physical, chemical, and biological deterioration. Methods such as heat application,

moisture removal, temperature control, pH reduction, and oxygen regulation are employed to extend the shelf life of food. Processed foods are classified based on the extent and type of processing, ranging from minimally processed to food derivatives.

The educational and career aspects of Food Processing and Technology are also outlined. Professionals in this field require knowledge in food science, chemistry, microbiology, and nutrition, along with skills in quality control, sensory evaluation, and food preparation. Various career avenues, including production management, marketing, research and development, and entrepreneurship, are highlighted.

The chapter concludes by emphasizing the growing demand for well-trained individuals in the food industry and the potential for entrepreneurship in food processing. Self-employment opportunities, supported by government incentives, contribute to the industry's expansion in India.