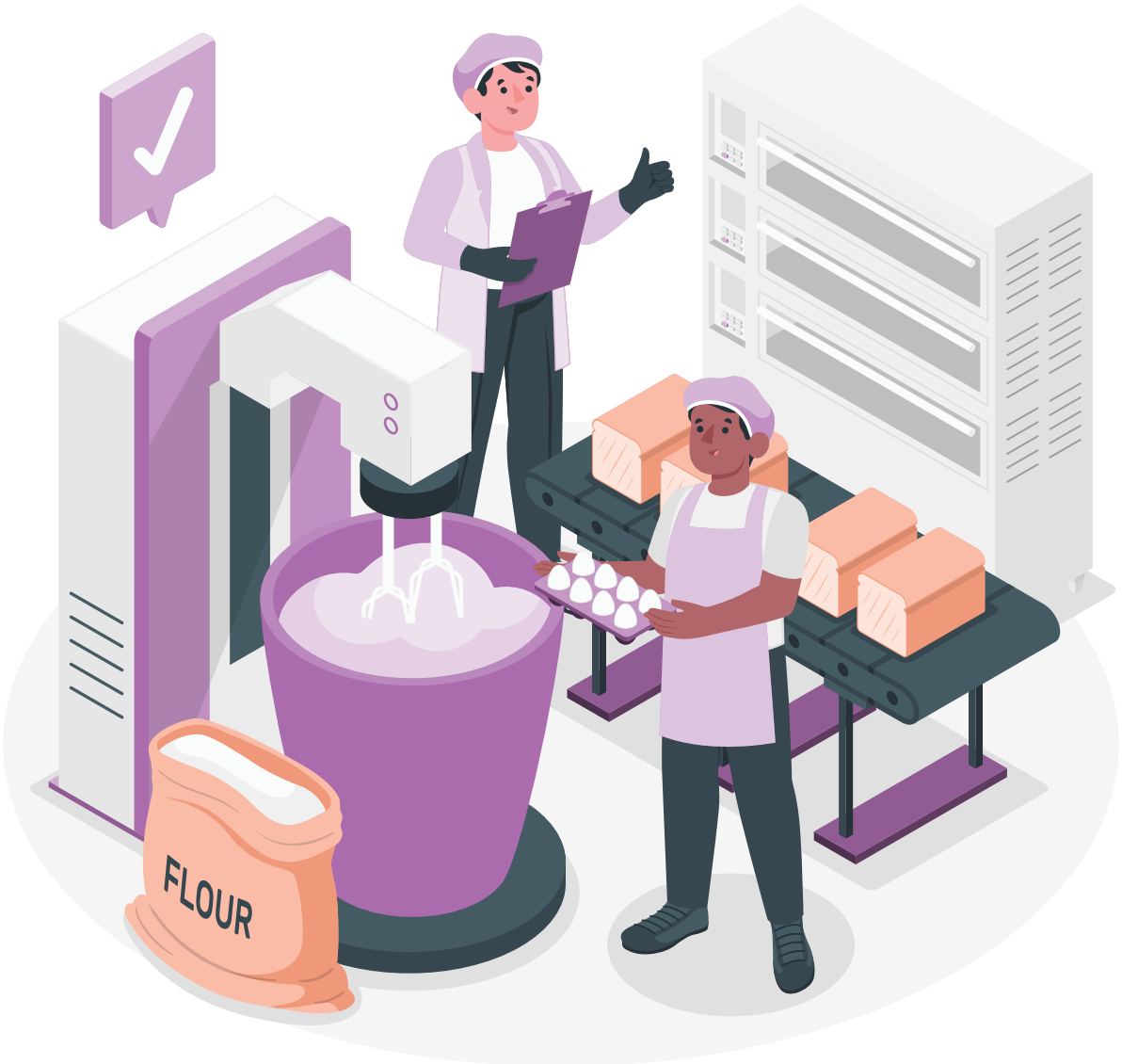
National Curriculum of Pakistan
2022-23

TECHNICAL EDUCATION

FOOD PROCESSING & PRESERVATION

Grades 9-10



NATIONAL CURRICULUM COUNCIL SECRETARIAT
MINISTRY OF FEDERAL EDUCATION AND
PROFESSIONAL TRAINING, ISLAMABAD
GOVERNMENT OF PAKISTAN

بسم الله الرحمن الرحيم

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It is with great pride that we, at the National Curriculum Council Secretariat, present the first core curriculum in Pakistan's 75-year history. Consistent with the right to education guaranteed by Article 25-A of our Constitution, the National Curriculum of Pakistan (2022-23) aspires to equip every child with the necessary tools required to thrive in and adapt to an ever-evolving globalized world.

The National Curriculum is in line with international benchmarks, yet sensitive to the economic, religious, and social needs of young scholars across Pakistan. As such, the National Curriculum aims to shift classroom instruction from rote learning to concept-based learning.

Concept-based learning permeates all aspects of the National Curriculum, aligning textbooks, teaching, classroom practice, and assessments to ensure compliance with contemplated student learning outcomes. Drawing on a rich tapestry of critical thinking exercises, students will acquire the confidence to embark on a journey of lifelong learning. They will further be able to acknowledge their weaknesses and develop an eagerness to build upon their strengths.

The National Curriculum was developed through a nationwide consultative process involving a wide range of stakeholders, including curriculum experts from the public, private, and non-governmental sectors. Representatives from provincial education departments, textbook boards, assessment departments, teacher training departments, *deeni madaris*, public and private publishers, private schools, and private school associations all contributed their expertise to ensure that the National Curriculum could meet the needs of all Pakistani students.

The experiences and collective wisdom of these diverse stakeholders enrich the National Curriculum, fostering the core, nation-building values of inclusion, harmony, and peace, making the National Curriculum truly representative of our nation's educational aspirations and diversity.

I take this opportunity to thank all stakeholders, including students, teachers, and parents who contributed to developing the National Curriculum of Pakistan (2022-23)

Dr. Mariam Chughtai
Director
National Curriculum Council Secretariat
Ministry of Federal Education and Professional Training

Food Processing & Preservation

Grades 9-10

Domain A: Basics of Food processing & preservation

Food processing is a process that converts raw ingredients into food or other intermediate products for further use. However, food preservation is the handling of food to control its spoilage by preventing the attack & growth of microbes, avoiding oxidation of fats (rancidity), and preserving the nutritional value, texture, and flavor of the food.

Standards: Students will be able to explain the principles of food preservation, historical perspective of food preservation and novel techniques in food processing and preservation

Grade 9	**Grade 10**
Benchmark I: Students will be able to describe the basic concepts of food processing and preservation and discuss different components of food and explain the prior/preliminary operations of food processing.	
Student Learning Outcomes	
[SLO: FPP-09-A-01]: Students will be able to define and describe: Food, Food technology, Food processing and preservation, Food production and Food spoilage [SLO: FPP-09-A-02]: Student will be able to describe types of food spoilage (Chemical, physical, biological and biochemical spoilage)	[SLO: FPP-10-A-01]: Student will be able to describe food components (carbohydrates, protein and fats, minerals, vitamins and water) and categorize the foods on the basis of their components, shelf life (perishable, semi-perishable and non-perishable food), pH (high acid, acid, low acid, alkaline and neutral foods) and sources (animal, plant or related foods). [SLO: FPP-10-A-02]:

[SLO: FPP-09-A-03]: Student will be able to discuss food production & spoilage [SLO: FPP-09-A-04]: Students will be able to assess the national & international situation of food security	Student will be able to explain the preliminary operations for food processing such as; • Handling & transportation of raw ingredients • Cleaning (Dry and wet cleaning) • Sorting and grading of food • Removal of peel, skin or shell • Elimination of inedible components • Food size reduction • Mixing of food • Filtration method • Reduction in enzymatic browning
Grade 9	**Grade 10**
Benchmark II: To discuss the principles forming the basics of food processing and preservation.	
Student Learning Outcomes	
[SLO: FPP-09-A-05]: Students will be able to explain the principles of food preservation for: • Prevention of microorganisms entry in food	

• Hindering the growth and activity of microorganisms • Killing microorganisms • Prevention or delay of self-destruction (autolysis) • Destruction or inactivation of enzymes • Prevention or delay of chemical reactions • Effect of physical defects such as surface drying, crystallization on food	
Grade 9	**Grade 10**
Benchmark III: To describe the innovations in food techniques and packaging and the use of cost-effective, profit driven and eco friendly food processing techniques.	
Student Learning Outcomes	
	[SLO: FPP-10-A-03]: Student will be able to describe the innovations in food processing & preservation like contemporary ways such as • microwave heating, • high-pressure processing (HPP), • packaging innovations like Smart Packaging and Active packaging techniques

	• use of preservatives in food such as natural anti -microbial preservatives and antioxidants. [SLO: FPP-10-A-04]: Students will be able to assess the needs for food processing & preservation in future like • processes to prevent food wastage, • utilization of freeze drying in comparison to drying/dehydrating cost effective & eco-friendly methods to preserve food

Domain B: Techniques of food processing & preservation

The food has been processed since ages, several techniques have been used to process and preserve the food for better quality and longer shelf life.

Standards: Students will be able to enlist and explain the conventional and novel techniques of food processing and preservation

Grade 9	**Grade 10**
Benchmark I: To enlist and explain the conventional techniques (drying, curing, blanching, smoking, fermentation etc.) and novel thermal (ohmic, microwave and irradiative heating) and non-thermal techniques (HPP, ultrasonication, pulse electric field etc.)	
Student Learning Outcomes	

[SLO: FPP-09-B-01]: Students will be able to describe the historical perspective of food processing & preservation. [SLO: FPP-09-B-02]: Students will be able to enlist and explain the conventional techniques of food processing and preservation like; ● Drying ● Curing ● Blanching ● Baking ● Smoking ● Pasteurization ● Freezing ● Fermentation ● Canning ● Pickling	[SLO: FPP-10-B-01]: Students will be able to enlist and describe the novel techniques of food processing & preservation such as; ➢ Thermal techniques: ● Ohmic heating ● Microwave heating ● Radio frequency heating ● Infrared heating [SLO: FPP-10-B-02]: ➢ Non-thermal techniques ● High pressure processing (HPP) ● Pulsed electric fields ● Ionizing radiation ● Ultrasonication

Domain C: Value added food products

The conversion of raw food ingredients into food products is called value addition and such products are known value added products that are more nutritious, palatable and easy to consume by end consumers.

Standards: Students will be able to explain the significance of value added products in preventing food spoilage as well as the industrial and economical point of view.

Grade 9	Grade 10
Benchmark I: To explain the principles and techniques involved in production of value added food products, their significance in preventing food spoilage as well as the industrial and economical point of view.	
Student Learning Outcomes	
[SLO: FPP-09-C-01]: Students will be able to define the concept of value addition & value added food products [SLO: FPP-09-C-02]: Students will be able to discuss the concept of value addition of food commodities and enlist value added food products such as juice, squash, jam, breads, muffin, biscuits, ketchup, sauces…	[SLO: FPP-10-C-01]: Students will be able to define the concept of value addition and describe the significance of food processing and preservation in preparation of value added products. [SLO: FPP-10-C-02]: Students will be able to identify and apply conventional techniques of food processing & preservation in making of value added products. [SLO: FPP-10-C-03]: Students will be able to explain the process of production of value added food products (juices, squash, jam, jellies, marmalades, breads, tortillas, cakes, muffins, biscuits, ketchups, sauces, dips etc. [SLO: FPP-10-C-04]: Students will be able to describe the commercialized significance of value added products from an industrial and economical point of view.

Domain D: Dimensions of Food processing & preservation

There are different dimensions playing a significant role in the field of food processing & preservation.

Standards: Students will be able to explain the role of temperature, moisture removal techniques (food drying), significance of food additives and utilization of fermentation and its associated health benefits.

Grade 9	**Grade 10**
Benchmark I: To discuss the importance of temperature and moisture in food preservation and explain the basic processes involved in food drying.	
Student Learning Outcomes	

[SLO: FPP-09-D-01]: Students will be able to describe the role of temperature like high temperature, low temperature, above freezing and below freezing temperature in food processing & preservation. [SLO: FPP-09-D-02]: Students will be able to define moisture and describe the significance of moisture in food. Moreover, effect of moisture on food shelf-life and ways to eliminate water from food [SLO: FPP-09-D-03]: Students will be able to enlist and define the methods of food drying like sun drying, dehydrating, oven drying & dehydrofreezing	[SLO: FPP-10-D-01]: Students will be able to describe and differentiate between chemical additives as preservative and non-preservative [SLO: FPP-10-D-02]: Students will be able to explain and distinguish the role of preservatives, nutritive additives, sweeteners, flavors and colors [SLO: FPP-10-D-03]: Students will be able to describe the food laws and regulations for use of chemical additives in foods [SLO: FPP-10-D-04]: Students will be able to define fermentation [SLO: FPP-10-D-05]: Students will be able to list fermented foods [SLO: FPP-10-D-06]: Students will be able to discuss the use of different organisms for food fermentation (Probiotics, bacteria, fungi) [SLO: FPP-10-D-07]: Students will be able to describe the advantages of fermentation/ outcomes achieved through fermentation like

	improved health of the digestive system, stronger and better immunity, and enhanced availability of beneficial nutrients.
Grade 9	**Grade 10**
Benchmark II: To define and differentiate between food additives, adulterants, contaminants and preservatives.	
Student Learning Outcomes	
[SLO: FPP-09-D-04]: Students will be able to define chemical additives and differentiate among contaminants, food adulterants and food preservatives [SLO: FPP-09-D-05]: Students will be able to describe the role of chemical additives	

Domain E: Food packaging & food industry

The packaging of food is an end step of processing & preservation. It is basically the enclosing of food in order to prevent the food from microbial attack, chemical, biological and physical contamination. Food packaging is utilized to preserve the food quality for longer time period

Standards: Students will be able to explain food packaging as enclosing food to protect it from contamination from physical, chemical, and biological sources.

Grade 9	**Grade 10**
Benchmark: To describe the importance of food packaging material & labeling in the food industry.	
Student Learning Outcomes	
	[SLO: FPP-10-E-01]: Students will be able to define food packaging and food labeling. [SLO: FPP-10-E-02]: Students will be able to describe the importance of food packaging & labeling in food industry as well as to inform the end consumer regarding food products [SLO: FPP-10-E-03]: Students will be able to explain properties of food material for food packaging such as cost effective, easy to use, non-hazardous, eco-friendly

	[SLO: FPP-10-E-04]: Students will be able to identify and differentiate the food packaging materials utilized in the industry (Paper, board, rigid plastic, soft plastic, glass, cans, tetra pack etc.)

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