



**Gyanmanjari**  
Innovative University

Syllabus  
Gyanmanjari Science College  
Semester-7 (B.Sc.)

**Subject:** - Technology of Food Preservation and Packaging- BSCFT17403

**Type of course:** Major

**Prerequisite:** Students should understand principles of food science and microbiology, including food composition, spoilage mechanisms, and microorganisms. Knowledge of physicochemical changes, shelf-life factors, and basic hygiene and sanitation is essential for understanding food preservation methods and packaging systems.

**Rationale:** The Technology of Food Preservation and Packaging course provides essential knowledge to enhance shelf life, safety, and quality of food products. It covers key preservation methods and modern packaging technologies that prevent spoilage and contamination. The course supports food security, reduces post-harvest losses, and emphasizes sustainability and regulatory standards. It equips students with practical and technical skills for careers in food processing, quality assurance, research, and innovation in the food industry.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits C	Examination Marks					Total Marks
CI	T	P		SEE		CCE			
				Theory	Practical	MSE	LWA/V	ALA	
3	0	2	4	75	25	30	20	50	200

*Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.*

3 Credits \* 25 Marks = 75 Marks (each credit carries 25 Marks) Theory  
 1 Credits \* 25 Marks = 25 Marks (each credit carries 25 Marks) Practical  
 SEE 100 Marks will be converted in to 50 Marks  
 CCE 100 Marks will be converted in to 50 Marks  
 It is compulsory to pass in each individual component.



**Course Content:**

Unit No.	Course content	Hrs	% Weightage
1	<p><b>Introduction to Food preservation</b></p> <ul style="list-style-type: none"> <li>• Food preservation: introduction and history.</li> <li>• Thermal Processing: Heat penetration, types of heat treatments and effects on foods, heat resistance of microorganisms, thermal death curve.</li> <li>• Principles of food preservation (asepsis, removal of microorganisms, inhibition, destruction).</li> <li>• Methods of preservation: physical, chemical, and biological Preservatives: Uses and effects of class I and class II preservatives in foods.</li> </ul>	10	25
2	<p><b>Food preservation methods</b></p> <ul style="list-style-type: none"> <li>• Refrigeration, chilling and freezing: Theory, principles, methods, systems, application and changes in foods during low temperature storage.</li> <li>• Intermediate Moisture (IM) Foods: principles, characteristics, advantages and problems.</li> <li>• Canning of foods.</li> <li>• Drying, dehydration, and concentration of foods: principles, methods, equipment, applications.</li> <li>• Ionizing radiation: sources, equipment, mechanism, dose determination, effects on food. Microwave preservation: principles, equipment, applications.</li> <li>• Novel (Emerging) Food Preservation Methods: High Pressure Processing (HPP), Pulsed Electric Field (PEF), Cold Plasma Technology, Ozone Treatment, Modified Atmosphere Packaging (MAP), Active Packaging, Edible Coatings and Films, Ultrasonication.</li> </ul>	10	25



3	<p><b>Fundamentals, Materials, and Packaging Systems</b></p> <ul style="list-style-type: none"> <li>● Factors affecting shelf life of food material during storage.</li> <li>● Importance and functions of food packaging.</li> <li>● Factors affecting packaging (moisture, oxygen, light, temperature, microorganisms).</li> <li>● Properties of packaging materials: mechanical, barrier, thermal, chemical.</li> <li>● Packaging materials: glass, metals, paper, plastics, laminates and composites</li> <li>● Types of packaging: primary, secondary, tertiary.</li> <li>● Packaging techniques: vacuum packaging, modified atmosphere packaging (MAP), aseptic packaging, retort packaging.</li> <li>● Active and intelligent packaging systems.</li> </ul>	10	25
4	<p><b>Packaging Operations, Applications, and Regulations</b></p> <ul style="list-style-type: none"> <li>● Packaging machinery: filling, sealing, form-fill-seal systems, automation.</li> <li>● Quality control and testing of packaging materials.</li> <li>● Packaging of different food products (dairy, fruits, vegetables, meat, bakery, beverages).</li> <li>● Food safety issues in packaging (migration, contamination)</li> <li>● Packaging standards and regulations (FSSAI, Codex, ISO)</li> <li>● Food labelling requirements.</li> <li>● Sustainable packaging: biodegradable materials, recycling, waste management, emerging technologies.</li> </ul>	15	25

**Continuous Assessment:**

Sr. No	Active Learning Activities	Marks
1	<p><b>Presentation:</b> Students will prepare a presentation on different food preservation methods (thermal processing, refrigeration, drying, and radiation) and their impact on food quality, and upload it on the GMIU web portal.</p>	10
2	<p><b>Field-Based Learning:</b> Students will visit a food processing unit or packaging industry to observe preservation techniques and packaging systems in practice, prepare a report, and upload it on the GMIU web portal.</p>	10



3	<b>Research-Oriented Activities:</b> Students will prepare a literature review on innovative food packaging technologies (active, intelligent, and sustainable packaging) and upload it on the GMIU web portal.	10
4	<b>Project Work:</b> Students will prepare a report on the role of modern preservation and packaging methods in extending shelf life and ensuring food safety, and upload it on the GMIU web portal.	10
5	<b>Attendance</b>	10
<b>Total</b>		<b>50</b>

**Suggested Specification table with Marks (Theory):75**

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	40%	30%	10%	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Course Outcome:**

After learning the course, the students should be able to:	
CO1	Understand the principles of food preservation, including causes of spoilage, thermal processing, preservation methods (physical, chemical, biological), and the role of preservatives in maintaining food quality and safety.
CO2	Explain various food preservation techniques such as refrigeration, freezing, drying, canning, ionizing radiation, and microwave processing, and analyze their effects on food quality and shelf life.
CO3	Analyze the fundamentals of food packaging, including materials, properties, packaging systems, and modern techniques such as vacuum, MAP, aseptic, and intelligent packaging.
CO4	Describe packaging operations, machinery, quality control, applications for different foods, regulatory standards, labelling requirements, and sustainable packaging practices in the food industry.



**List of Practical:**

Sr. No.	Descriptions	Unit No.	Hrs.
1.	Study of food spoilage and isolation of common spoilage microorganisms from spoiled food.	1	4
2.	Determination of thermal processing parameters and plotting of thermal death curve.	1	2
3.	Preservation of food by refrigeration/freezing and evaluation of quality changes.	2	4
4.	Preparation of food product label.	3	2
5.	Thickness measurement of packaging material.	3	4
6.	Drying/dehydration of food samples and analysis of moisture loss.	3	2
7.	Demonstration of microwave preservation and its effect on food quality.	3	4
8.	Study and comparison of different packaging materials (glass, metal, paper, plastics).	3	2
9.	To perform sterility testing of packaging products.	4	2
10.	Analysis of food labeling as per regulatory standards.	4	4
Total		30	

**Instructional Method:**

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.



**Reference Books:**

1. Robertson, G.L. – *Food Packaging: Principles and Practice* (3rd Edition)
2. Jaiswal, A.K. & Shankar, S. (Eds.) – *Food Packaging and Preservation: Antimicrobial Materials and Technologies*
3. NIIR Board – *Modern Technology on Food Preservation*
4. Rahman, M.S. – *Handbook of Food Preservation*
5. Jana, A. – *Food Packaging Technology*

