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Item No- 5.7



**RayatShikshanSanstha's  
KARMAVEER BHAURAO PATIL COLLEGE, VASHI.  
NAVI MUMBAI  
(AUTONOMOUS COLLEGE)  
Sector-15- A, Vashi, Navi Mumbai - 400 703**

**Syllabus for F.Y.B.Voc.  
Program: B. Voc.Food Technology**

**Course: F.YB.Voc. Food Technology**

**(Choice Based Credit, Grading and Semester System  
with effect from the academic year 2021-2022)**

RayatShikshanSanstha's  
**Karmaveer Bhaurao Patil College Vashi, Navi Mumbai**  
**Autonomous College**  
[University of Mumbai]  
Syllabus for Approval

<b>Sr. No.</b>	<b>Heading</b>	<b>Particulars</b>
<b>1</b>	<b>Title of Course</b>	<b>F.YB.Voc Food Technology</b>
<b>2</b>	<b>Eligibility for Admission</b>	<b>10+2 (of recognized board)</b>
<b>3</b>	<b>Passing Marks</b>	<b>40%</b>
<b>4</b>	<b>Ordinances/Regulations (if any)</b>	<b>-</b>
<b>5</b>	<b>No. of Years/Semesters</b>	<b>Three years/ Six semester</b>
<b>6</b>	<b>Level</b>	<b>U.G.</b>
<b>7</b>	<b>Pattern</b>	<b>Semester</b>
<b>8</b>	<b>Status</b>	<b>Revised</b>
<b>9</b>	<b>To be implemented from Academic year</b>	<b>2021-2022</b>

## **Preamble of the Syllabus:**

Food Technology is a B.Voc. Course and an under graduation programme at Karmaveer Bhaurao Patil College Vashi, Navi Mumbai [Autonomous College]

With liberalization of Indian economy, all-round industrial growth has been witnessed in all sectors with improvement in social and economic conditions of our people. This has created demand for more and better-quality foods. With advancement in production technology, high yield levels will lead to large amount of marketable surplus of food grains and crop residues, demanding appropriate handling, processing, preservation, storage, marketing and utilization. The development of processing industries to preserve the perishable agricultural produce will not only improve economic and nutritional status of our population but it may help in employment generation in rural as well as urban areas of the country. This can be achieved by linking production, and post-harvest technology in synergistic way.

At present the export from agro-sector represents about 16% of total Indian exports. The primary export commodities are cereals, fruits, vegetables and their processed products, and marine products but fast-growing specialty products have also penetrated in foreign markets. Considering the contribution of these products in Indian export, it is necessary to have appropriate technology for handling and processing of agricultural produce. The importance of Food processing and Quality Control lies in the fact that it has capability to provide food to our population through scientific conservations, eliminating avoidable losses and making available more balanced and nutritious food. High value products from low grade material can be produced by innovative and appropriate processing and packaging technologies and also from by-products and residue waste using integrated approach. Thus, modernization of post-harvest operations and agro-processing industries through innovative and appropriate technology has a vital role to play in national economy in general and rural economy in particular.

Considering the above aspects, the role of food technologist does not stop at farm level but it continues till the harvested crops and animal products are processed, preserved and further modified into useful and nutritious products, until it utilized by the consumer. So, the post-harvest handling and processing need to be attended on priority basis at national and international level. Moreover, with development of processing industries, it is quite likely that the demand for food scientists and technologists will increase in the next few decades. Hence, specializations offered at graduate level need to be strengthened considering occupational needs as well as demands of the food industries. The field of food quality assurance has evolved substantially over the past decade, and certain key developments have become widely accepted.

These include Quality Systems (e.g., ISO) and HACCP. Consequently, it has become essential for undergraduate Food processes and Quality Control students preparing for careers in the food industry to have some basic training in these systems as part of the curriculum in their university or college programs. The B.Sc. programme integrates the latest principles, practices, and terminology of food safety systems with those of quality management systems to provide an understanding of a single food quality management system.

## **Syllabus for F.YB.Voc. Food Technology**

This practical and informative course provides participants with foundational knowledge related to all aspects of food science presented by world renowned experts. This course is designed for any one working in food industry or in the field of food processing in order to increase their knowledge in food chemistry, sensory science, food safety, food packaging and functional foods and Nutraceuticals. This course is designed to give a overview of the most relevant aspects of food science typically covered over our three year under graduate programme. Food processing can be defined as the application of basic sciences and engineering to study the basic and fundamental physical, chemical and biochemical nature of foods and the principles of food processing. Food processing and quality management is the science of processing, packaging of food items and quality assurance. Fruits, vegetables, sea foods, meats, cooked foods, snacks, confectionaries, beverages, juices, canned juices and fruits all come under the preview of food processing and quality management.

### **Objectives of the Course:**

- To enrich students' knowledge and train them in the food processing technology
- To introduce the concepts of quality assurance, safety management
- To inculcate sense of scientific responsibilities and social and environment awareness
- To help student build-up a progressive and successful career

### **Course Outcome:**

**By the end of the course, a student should develop the ability:**

- To understand, coherently and effectively about various aspects of food processing.
- To develop the understanding and interest in the field of food processing
- To develop basic skills in quality control and its industrial applications.

### **Program Specific Outcome**

1. Students will understand the knowledge of food, food analysis, food spoilage and principles of food preservation, food QA and QC
2. Students will get the practical knowledge of bakery and confectionary technology to become a Entrepreneur to develop a skill in Entrepreneurship Development and Project Management.
3. Students will demonstrate knowledge of professional and ethical responsibilities
4. Students will understand the importance of preservation and economical value food
5. Students will get knowledge about industrial Good Manufacturing practices

## **F. YB. Voc. Food Technology**

For the subject of Food processing and quality management there shall be seven papers for 12 lectures each comprising of four units of 3 L each.

### **Semester-I**

<b>SR. NO</b>	<b>PAPER NO.</b>	<b>PAPER NAME</b>
1	UGFT 101	Communication Skills in English and computer skills
2	UGFT 102	Introduction to Food
3	UGFT 103	Introduction to Food spoilage
4	UGFT 104	Principles of Food Preservation-I
5	UGFT 105	Bakery Technology-I
6	UGFT 106	Confectionary Technology-I
7	UGFT 107	Food analysis

### **Semester-II**

<b>SR. NO</b>	<b>PAPER NO.</b>	<b>PAPER NAME</b>
1	UGFT 201	Entrepreneurship Development and Project Management
2	UGFT 202	Dairy Technology
3	UGFT 203	Packaging Technology
4	UGFT 204	Sanitation and Hygiene
5	UGFT 205	Principles of Food Preservation-II
6	UGFT 206	Food Chemistry
7	UGFT 207	Food QA and QC

**F. Y. B. Voc. Food Technology**  
**Semester I**

Sr.No	Paper No.	Title	Theory/ Practical / Project	Total Marks	Distribution of Total Marks (100)	
					End Semester Theory	Internal Assessment
1	UGFT 101	Communication Skills in English and computer skills	Theory	100	60	40
2	UGFT 102	Introduction to Food	Theory	100	60	40
3	UGFT 103	Introduction to Food spoilage	Theory	100	60	40
4	UGFT 104	Principles of Food Preservation-I	Theory	100	60	40
5	UGFT 105	Bakery Technology-I	Theory	100	60	40
6	UGFT 106	Confectionary Technology-I	Theory	100	60	40
7	UGFT 107	Food analysis	Theory	100	60	40
8	UGFT P 101	Communication Skills in English and computer skills	Practical	50	-	-
9	UGFT P 102	Introduction to Food	Practical	50	-	-
10	UGFT P 103	Introduction to Food spoilage	Practical	50	-	-
11	UGFT P 104	Principles of Food Preservation-I	Practical	50	-	-
12	UGFT P 105	Bakery Technology-I	Practical	50	-	-
13	UGFT P 106	Confectionary Technology-I	Practical	50	-	-
14	UGFT P 107	Food analysis	Practical	50	-	-

## Semester II

Sr.No	Paper No.	Title	Theory/ Practical/ Project	Total Marks	Distribution of Total Marks (100)	
					End Semester Theory	Internal Assessment
1	UGFT 201	Entrepreneurship Development and Project Management	Theory	100	60	40
2	UGFT 202	Dairy Technology	Theory	100	60	40
3	UGFT 203	Packaging Technology	Theory	100	60	40
4	UGFT 204	Sanitation and Hygiene	Theory	100	60	40
5	UGFT 205	Principles of Food Preservation-II	Theory	100	60	40
6	UGFT 206	Food Chemistry	Theory	100	60	40
7	UGFT 207	Food QA and QC	Theory	100	60	40
8	UGFTP 201	Entrepreneurship Development and Project Management	Practical	50	-	-
9	UGFTP 202	Dairy Technology	Practical	50	-	-
10	UGFTP 203	Packaging Technology	Practical	50	-	-
11	UGFTP 204	Sanitation and Hygiene	Practical	50	-	-
12	UGFTP 205	Principles of Food Preservation-II	Practical	50	-	-
13	UGFTP 206	Food Chemistry	Practical	50	-	-
14	UGFTP 207	Food QA and QC	Practical	50	-	-

**Examination Scheme for Each Semester:**

**Semester End Examination: 50 Marks** will be as follows –

Tutorials -10 marks

Theory exam -40 marks

<b>Theory:</b> The Semester End Examination for theory course work will be conducted as per the following scheme.		
Each theory paper shall be of two- and half-hour duration.		
All questions are compulsory and will have internal options.		
Q – I		From Unit – I (having internal options.) 10 M
Q – II		From Unit – II (having internal options.) 10 M
Q – III		From Unit – III (having internal options.) 10 M
Q – IV		From Unit – IV (having internal options.) 10 M
<b>II.</b>	<b>Practical</b>	The Semester End Examination for practical course work will be conducted as per the following scheme.
<b>Sr. No.</b>	<b>Particulars of Semester End Practical Examination</b>	<b>Marks%</b>
1	Laboratory Work	30
2	Journal	10
3	Viva	10
<b>TOTAL</b>		<b>50</b>



**Choice Based Credit, Grading and Semester System with effect  
from the academic year 2018-2019**

**F. Y. B. Voc. Food Technology**

**SEMESTER I**

<b>Course Code</b>	<b>Unit</b>	<b>Topics</b>	<b>Credits</b>	<b>Lecture / Sem</b>
UGFT 101	<b>Communication Skills in English and computer skills</b>			
	I	Grammar and Listening	0.8	3
	II	Speaking & Reading Writing		3
	III	Information Concepts and Processing		3
	IV	Computers and Communication		3
UGFT 102	<b>Introduction to Food</b>			
	I	Concept of Food and their functions	0.7	3
	II	Classification of Food		3
	III	Methods of cooking		3
	IV	Food Preparation and storage		3
UGFT 103	<b>Introduction to Food spoilage</b>			
	I	Food as Substrate for Microorganisms	0.8	3
	II	General principles Underlying Spoilage		3
	III	Microorganisms important in causing food spoilage		3
	IV	Spoilage in different food groups		3
UGFT 104	<b>Principles of Food Preservation-I</b>			
	I	General principles of Food preservation	0.8	3
	II	Preservation by use of High temperature		3
	III	Preservation by use of Low temperature		3
	IV	Preservation by Removal of Moisture		3

UGFT 105	<b>Bakery Technology-I</b>			
	I	Unit Operations in Bakery	0.8	3
	II	Sugar and Wheat used in Bakery products		3
	III	Bakery Products		3
	IV	Bread manufacturing		3
UGFT 106	<b>Confectionary Technology-I</b>			
	I	Introduction to confectionery industry and primary processing equipment used in Confectionery	0.8	3
	II	Classification of confectionery		3
	III	Cocoa and chocolate Processing		3
	IV	Confectionary Products		3
UGFT 107	<b>Food analysis</b>			
	I	<b>Introduction to samples</b>	0.8	3
	II	<b>Analysis of chemical constituents</b>		3
	III	<b>Analysis of Food</b>		3
	IV	<b>Microscopic analysis of foods</b>		3
UGFTP 101	-	Communication Skills in English and computer skills	0.8	3
UGFTP 102	-	Introduction to Food	0.7	3
UGFTP 103	-	Introduction to Food spoilage	0.8	3
UGFTP 104	-	Principles of Food Preservation-I	0.8	3
UGFTP 105	-	Bakery Technology-I	0.8	3
UGFTP 106	-	Confectionary Technology-I	0.8	3
UGFTP 107	-	Food analysis	0.8	3

## SEMESTER II

Course Code	Unit	Topics	Credits	Lecture / Sem
<b>Entrepreneurship Development and Project Management</b>				
UGFT 201	I	Introduction to Entrepreneurship	0.8	3
	II	Entrepreneurial Development Programme and Role of institutions/schemes		3
	III	Project		3
	IV	Setting up of micro small and medium enterprises		3
<b>Dairy Technology</b>				
UGFT 202	I	Introduction to Dairy chemistry	0.8	3
	II	Processing of market milk		3
	III	Indigenous and Fermented milk products		3
	IV	In-Plant cleaning system		3
<b>Packaging Technology</b>				
UGFT 203	I	Introduction to packaging	0.7	3
	II	Deteriorative Reactions and shelf life of foods		3
	III	Packaging Materials and their properties		3
	IV	Labelling and safety concerns in food pack		3
<b>Sanitation and Hygiene</b>				
UGFT 204	I	Sanitation and Health	0.8	3
	II	Hygiene and food handling		3
	III	Environmental Sanitation		3
	IV	Hygiene Practices and Sanitation regulations and Standards		3
<b>Principles of Food Preservation-II</b>				
UGFT 205	I	Preservation by using Preservatives		3

	II	Preservation by radiation	0.8	3
	III	Preservation by fermentation		3
	IV	Preservation of Different Foods		3
	<b>Food Chemistry</b>			
UGFT 206	I	Water	0.8	3
	II	Carbohydrates		3
	III	Lipids		3
	IV	Proteins		3
	<b>Food QA and QC</b>			
UGFT 207	I	Concept of quality	0.8	3
	II	Concepts of quality management		3
	III	HACCP system		3
	IV	Food Quality Management Agencies		3
UGFTP 201	-	Entrepreneurship Development and Project Management	0.8	3
UGFTP 202	-	Dairy Technology	0.8	3
UGFTP 203	-	Packaging Technology	0.7	3
UGFTP 204	-	Sanitation and Hygiene	0.8	3
UGFTP 205	-	Principles of Food Preservation-II	0.8	3
UGFTP 206	-	Food Chemistry	0.8	3
UGFTP 207	-	Food Quality Management Agencies	0.8	3

**Note** – Blue Highlighted Topics/ Course has focused on employability/ entrepreneurship / skill development

**F. Y. B. Voc. Food Technology**  
**Semester I**  
**Modules at a Glance**

<b>Unit title</b>	<b>Learning Outcomes</b>
Communication Skills in English and Computer Skills	<p>The learner will be able to:</p> <ul style="list-style-type: none"> <li>• The course aims at training students in the usage of English Language in various contexts and enabling them to communicate effectively in English.</li> <li>• The course also aims at training students to use the computer.</li> <li>• To re-introduce students to the basics of English grammar so that they may comprehend, speak and write grammatical correct English.</li> <li>• To enable the students to speak English confidently and effectively in a wide variety of situations.</li> <li>• To facilitate the students to make functional use of IT skills in teaching – learning process.</li> </ul>
Introduction to Foods	<p>The learner will be able:</p> <ul style="list-style-type: none"> <li>• To study about the major and minor components of food and their properties</li> <li>• To know about the different methods of cooking foods</li> <li>• To study the classification, structure and chemistry of the various food components.</li> <li>• To understand the changes that occurs in the different constituents during storage and ways and means to prevent it.</li> </ul>
Introduction to Food Spoilage	<p>The learner will be able:</p> <ul style="list-style-type: none"> <li>• To understand the basic causes of food spoilage</li> <li>• To study the different ways in which food spoilage occurs and the techniques to prevent it.</li> <li>• To know the different spoilage agents and the ways in which they act on food.</li> </ul>

Principles of Food Preservation-I	<p>The learner will be able:</p> <ul style="list-style-type: none"> <li>• To understand the principles behind the various methods of food preservation.</li> <li>• To know how to use these principles to preserve different types of foods.</li> <li>• To study the method of action of different preservatives.</li> </ul>
Bakery Technology-I	<p>The learner will be able:</p> <ul style="list-style-type: none"> <li>• To highlight the processing methods used in baking industries.</li> <li>• To know about the various types of food products made using baking technology.</li> <li>• To have a basic idea about baking manufacture and quality control.</li> <li>• To know about the importance of each ingredient in the bakery and how it effects the overall product and its sensory and quality parameters.</li> <li>• To be able to start a small-scale bakery unit</li> </ul>
Confectionary Technology-I	<p>The learner will be able:</p> <ul style="list-style-type: none"> <li>• To highlight the processing methods used in confectionery industries.</li> <li>• To know about the various types of food products made using confectionary technology.</li> <li>• To have a basic idea about confectionery manufacture and quality control.</li> <li>• To know about the importance of each ingredient in the confectionary and how it effects the overall product and its sensory and quality parameters.</li> <li>• To be able to start a small-scale confectionery unit</li> </ul>
Food Analysis	<p>The learner will be able:</p> <ul style="list-style-type: none"> <li>• To become knowledgeable of food components and characteristics and techniques available for their analysis.</li> <li>• To be able to choose appropriate methods for the analyte and/or food system of interest and interpret analytical data including use of common calculations, and resources relevant to food analysis.</li> <li>• To Demonstrate oral and written communication skills to effectively communicate scientific ideas related with food analysis</li> </ul>

## Semester I

Unit No.	Modules / Units
<b>Paper title: Communication Skills in English and Computer Skills</b> <b>Paper Code: UGFT 101</b>	
<b>Unit 1.1:</b>	<b>Grammar and Listening (3L)</b> Articles, The Verb, Active and Passive Voice, Tenses, Concord, Modal Auxiliaries, The Adverb, The Preposition, Conjunction, Idioms, Phrasal Verbs, Direct and Indirect Speech, Active listening, Barriers to listening, Listening and note taking, listening to announcements, Listening to news on the radio and television
<b>Unit 1.2:</b>	<b>Speaking, Reading &amp; Writing (3L)</b> Brief introduction to the Phonetic script, Falling and rising tones, participating in conversations, Small Talk, Making a short formal speech, telephone skills. Reading: theory and Practice, Scanning, Surveying a textbook using an index, Reading for information, Understanding text structure, Locating main points, Making inferences, Reading graphics, Reading for research, Describing people, place, events and things, Short Stories, Vocabulary and Comprehension, Guide to letter writing, Writing a Letter of Application and CV/ Resume, Interview Technique.
<b>Unit 1.3:</b>	<b>Information Concepts and Processing (3L)</b> Evolution of information processing, Data, Information language and communication. Elements of a computer processing system: Hardware-CPU, storage devices and media.  VDU, Input-output devices, data communication equipment. Software-System software, Application software
<b>Unit 1.4:</b>	<b>Computers and Communication (3L)</b> Concept as resource manager and coordinator of processor, devices and memory. Command interpreter, typical commands of DOS/ UNIX/ Netware, GUI-Windows, Single user, multi-user, workstation, and client server systems. Computer networks, Network protocols. LAN, WAN, Services offered by Internet.
<b>References-</b>	1. Sethi, Anjanee&Bhavana Adhikari. <i>Business Communication</i> . New Delhi: Tata McGraw Hill Tickoo, Champa& Jaya Sasikumar. <i>Writing with a Purpose</i> . New York: OUP, 1979. 2. Sonie, Subhash C. <i>Mastering the Art of Effective Business Communication</i> . New Delhi: Student Aid Publication, 2008. 3. Herekar, Praksh. <i>Business Communication</i> . Pune: Mehta Publications,

	<p>2007.</p> <p>4. Herekar, Praksh. <i>Principals of Business Communication</i>. Pune: Mehta Publications, 2003. Rai, Urmila &amp; S. M. Rai. <i>Business Communication</i>. Himalaya Publishing House, 2007.</p> <p>5. Pradhan, N. S. <i>Business Communication</i>. Mumbai: Himalaya Publishing House, 2005.</p> <p>6. Pardeshi, P. C. <i>Managerial Communication</i>. Pune: Nirali Prakashan, 2008.</p>
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**Paper title: Introduction to Foods**

**Paper Code: UGFT 102**

<b>Unit 2.1:</b>	<p><b>Concept of Food and their functions (3L)</b>          Concept of food, food science, Objectives of food science, Food Chemistry and Basic nutritional classification (Water; Carbohydrates; Proteins; Fats and oils), Pigments, colours and flavours in food, structure of water molecule, moisture in foods, free water, bound water, water activity, estimation of moisture in foods, determination of moisture and water activity.</p>
<b>Unit 2.2:</b>	<p><b>Classification of Food (3L)</b>          Classification of different types of food on the basis of sources</p>
<b>Unit 2.3:</b>	<p><b>Methods of cooking (3L)</b>          Traditional cooking methods, Modern cooking methods, Objectives and importance of cooking</p>
<b>Unit 2.4:</b>	<p><b>Food Preparation and storage (3L)</b>          Basic terms used in food preparation, Pre-Processing for cooking, Storage of raw and cooked food</p>
<b>References-</b>	<p>1. B. Shreelakshmi: "Food Science" (second edition), New Age International, New Delhi.</p> <p>2. Swaminathan: "Text book Of Food Science", Vol-1, BAPPCO, Bangalore.</p> <p>3. Devendrakumar Bhatt &amp; Priyanka Tomar: An Introduction to Food Science, Technology &amp; Quality Management, Kalyani Publishers.</p> <p>4. Sumati R. Mudambi: Fundamentals of Food &amp; Nutrition Wiley Eastern Ltd, New Delhi.</p>



**Paper title-Introduction to Food Spoilage**

**Paper Code: UGFPQM103**

<b>Unit 3.1:</b>	<b>Food as Substrate for Microorganisms (3L)</b> pH, Moisture requirement: the concept of water activity, Oxidation-Reduction potential, Nutrient content, Inhibitory substances and biological structure, combined effects of factors affecting growth
<b>Unit 3.2:</b>	<b>General principles Underlying Spoilage (3L)</b> Definition, types of spoilage - physical, enzymatic, chemical and biological spoilage, Mechanism of spoilage and its end products, shelf life determination
<b>Unit 3.3:</b>	<b>Microorganisms important in causing food spoilage (3L)</b> Bacterial and fungal food spoilage, food poisoning, food borne infection, food borne intoxication. Toxins produced by <i>Staphylococcus</i> , <i>Clostridium</i> , <i>Aspergillus</i> ; Bacterial Pathogens- <i>Salmonella</i> , <i>Bacillus</i> , <i>Listeria</i> , <i>E. coli</i> , <i>Shigella</i> , <i>Campylobacter</i> .
<b>Unit 3.4:</b>	<b>Spoilage in different food groups (3L)</b> Food spoilage – Introduction, spoilage in cereals, vegetables and fruits, meat, eggs, poultry, fish, milk and milk products, canned foods, nuts and oil seeds, fats and oil seeds. Definition - food infection and food intoxication.
<b>References-</b>	1. Prakash Triveni: Food Preservation, Aadi Publication, Delhi. 2. M. Shafiur Rahman: Hand Book of Food Preservation, Marcel Dekker Inc, New York 3. McWillims and Paine: Modern Food Preservation, Surjeet Publication.

**Paper title- Principles of Food Preservation-I**

**Paper Code: UGFT 104**

<b>Unit 4.1:</b>	<b>General principles of Food preservation (3L)</b> Methods of food preservation, Principles of food preservation, Asepsis, Removal of microorganisms, Maintenance of Anaerobic conditions
	<b>Preservation by use of High temperature (3L)</b> Pasteurization: Definition, types, Sterilization, Canning - history and steps

<b>Unit 4.2:</b>	involved, spoilage encountered in canned foods, types of containers used for canning foods. Food irradiation – Principles, merits and demerits, effects of irradiation and photochemical methods.
<b>Unit 4.3:</b>	<b>Preservation by use of Low temperature (3L)</b> Refrigeration - advantages and disadvantages, freezing: Types of freezing, common spoilages occurring during freezing, difference between refrigeration and freezing.
<b>Unit 4.4:</b>	<b>Preservation by Removal of Moisture (3L)</b> Drying and dehydration - merits and demerits, factors affecting, different types of drying, Concentration: principles and types of concentrated foods.
<b>References-</b>	1. Yoginder K Alagh: Scope for Agro processing in India, Ajanta Publications. 2. Agro Based and Processed Food Products, New Delhi. 3. Niir Board: Modern Technology of Agro Processing and Agricultural Waste, National Institute of India Re 2000.

**Paper Title- Bakery Technology-I**  
**Paper Code: UGFPQM105**

<b>Unit 5.1:</b>	<b>Unit Operations in Bakery (3L)</b> Importance of bakery, Important cereals used in bakery, Flour Mill, mixer, moulding machine, balance, packing machines, measuring glass, moulds, knives, extruder, oven, and Layout of Bakery plant.
<b>Unit 5.2:</b>	<b>Sugar and Wheat used in Bakery products (3L)</b> Sugarcane, jaggery, raw sugar, refined sugar, white sugar, manufacture of sugar from sugar cane. Wheat and properties- quality of wheat and gluten strength, protein content.
<b>Unit 5.3:</b>	<b>Bakery Products (3L)</b> Manufacturing of cakes, biscuits, cookies, doughnuts, muffins, fermented biscuits
<b>Unit 5.4:</b>	<b>Bread manufacturing (3L)</b> Ingredients used for bread manufacture, methods of mixing the ingredients, dough development methods - straight dough, sponge dough, moulding, proofing, baking, packing, spoilage, bread staling, methods to reduce bread

	staling and spoilage. Additives, emulsifiers, preservatives leavening agents used in bread manufacturing
<b>References-</b>	1. W. P. Edwards: Science of Bakery Products. 2. Emmanuel Obene: Chocolate science and Technology

<b>Paper Title- Confectionary Technology-I</b> <b>Paper Code: UGFT106</b>	
<b>Unit 6.1:</b>	<b>Introduction to confectionery industry and primary processing equipment used in Confectionery (3L)</b> Characteristics of confectionary products, Types of confectionary products, Ingredients used in confectionary products Classification of confectionery products, Types of sweeteners and their properties
<b>Unit 6.2:</b>	<b>Classification of confectionery (3L)</b> Sugar boiled confectionery- crystalline and amorphous confectionery, rock candy, hard candy, lemon drop, china balls, soft candy, lollypop, marshmallows, fudge, cream, caramel, toffee, lozenges, gumdrops, honeycomb candy
<b>Unit 6.3:</b>	<b>Cocoa and chocolate processing (3L)</b> Ingredients, Cocoa fruit, pulverisation, fermentation, cocoa powder, Manufacturing of chocolates, conching of chocolate, fat bloom chocolates, Examples of chocolate industry
<b>Unit 6.4:</b>	<b>Confectionary Products (3L)</b> Boiled Sweets, Gelatine Sweets, Crystallized confectionery, chewing gum processing
<b>References-</b>	1. Textbook of Bakery and Confectionery” by Ashokkumar Y 2. Modern Technology of Food Processing and Agro Based industries” by NIIR Board 3. “The Fundamental Techniques of Classic Bread Baking” by Matthew Septimus and French Culinary Institute

<b>Paper Title- Food Analysis</b>	
<b>Paper Code: UGFT 107</b>	
<b>Unit 7.1:</b>	<b>Introduction to samples (3L)</b> Types of samples analysed, steps in analysis, choice of methods; sampling procedures, considerations and sample preparation; Evaluation of analytical data – accuracy and precision, sources of errors, specificity, sensitivity and detection limits, regression analysis, reporting results
<b>Unit 7.2:</b>	<b>Analysis of chemical constituents (3L)</b> Their characterization and significance- moisture, ash, minerals, lipids, fat, proteins, fibre, titratable acidity, starch, reducing sugars
<b>Unit 7.3:</b>	<b>Analysis of Food (3L)</b> Spectroscopic analysis of foods – basic principles, UV, visible, fluorescence. Chromatographic analysis of foods – basic principles
<b>Unit 7.4:</b>	<b>Microscopic analysis of foods (3L)</b> Analysis of vitamins, pigments, flavors, extraneous matter, pesticides and mycotoxins. Microscopic analysis of foods Other methods- potentiometry, enzymatic, immunoassays, thermal analysis. Analysis of genetically modified foods.
<b>References-</b>	1. A Laboratory Manual of Food Analysis” by Shalini Sehgal 2. Food Processing Operations Analysis” by H Das 3. Food Analysis: Theory and Practice” by Pomeranz / Meloan

**UG FTP-101 Communication Skills in English and Computer Skills**  
**UG FTP-102 Introduction to Foods and UG FTP-103 -Introduction to Food Microbiology (72L)**

- 1) Introduction to Laboratory Practices
- 2) Introduction to Food Lab
- 3) Laboratory equipment and their usage
- 4) Protocol for the preparation of Reagents
- 5) Good Manufacturing Practices for foods
- 6) GHP for foods
- 7) Sources of foods

- 8) Different types of dry heat cooking methods
- 9) Different types of moist heat cooking methods
- 10) Combination of cooking methods
- 11) Basic Microbial techniques
  - Pouring a plate
  - Sterilisation of equipment and materials
  - Flaming procedure
  - Using a pipette
  - Flaming the neck of bottles and test tubes
  - Use of the autoclave/pressure cooker
  - Preparing serial dilutions
- 12) Working with bacteria and yeast
  - Streak plate
  - Inoculation using a Pasteur pipette
  - Inoculating the Petri dish
  - Using a spreader
  - Spread plate
- 13) Sample preparation
- 14) Microbiological analysis (APC, E. coli, Coliforms, S. aureus, Listeria, yeast and mould)
- 15) Identification of microorganisms
- 16) Enumeration of microorganisms and reporting results
- 17) Testing sensitivity to antimicrobial substances
- 18) Microscopy
  - Using the microscope
  - Stained preparations
  - Making a smear
  - A simple stain A differential stain: Gram's staining method
- 19) Good microbiological laboratory practice (GMLP)

## **UGFTP-104 Principles of Food Preservation-I and UGFTP-105- Bakery Technology-I (72L)**

- 1) Introduction to drying equipment's
- 2) Applications of driers.
- 3) Classification of food based on pH value and moisture content.
- 4) Drying rate
- 5) Drying curve
- 6) Physiological change in food after drying
- 7) Preparation of food product by drying
  - Onion flakes
  - Raw mango powder / Leafy vegetable powder
  - Raisins
  - Papad and chips
- 8) Blanching of vegetables
- 9) Storage by using different preservatives
- 10) Preparation of following:
  - Bread rolls
  - Bread sticks
  - softs rolls
  - Buns
  - Hot Cross Buns
  - Danish Pastry
  - Croissants
  - Brioche
  - Fermented doughnuts
  - Chelsea buns
  - Russian stolen
  - Basic bun dough
  - Pizza base

## References-

1.W. P. Edwards: Science of Bakery Products

2.John Kingslee: A professional text to bakery and confectionary, New Age International Publication

## UGFTP 106 Confectionary Technology-I and UGFTP 107 -Food Analysis (72L)

1. Cakes by different methods (e.g. sponge cake, Mediera cake, Genoise; fatless sponge; rock cake; fruit cake)
2. Icing - Fondant; American frosting; Butter cream icing; Royal icing; gum paste; marzipan; marshmallow; lemon meringue; fudge; almond paste; glace icing.
3. Toffees – Milk toffee; chocolate; stick jaws; liquor chocolate.
4. Cakes &Geuteaux:- Queen cakes, fruit cake; birthday cake; easter eggs; chocolate dippings; wedding cakes; cheese cakes; black forest,; gateaus; gateau religious; apple strudel; Baking powder Dough nuts; fruit gateaus; baba-au-rhum, savarin chantilly; savarin; meringue; chantily, Swiss rolls and Madeline cak
5. INDIAN SWEETS
  - Chenna - Rasgulla, Chamcham, Pakiza, Chennatoasi, Rassmalai
  - Khoya - GulabJamun, Berfi
  - Sugar - Mysore Pak, Ghewar
  - Flour/ Besan - Patisa, Shakarpare, Halwa, Ladoo, peda
  - Milk - Kheer, Rabri
  - Nuts - Barfi, Chikki
6. Assessment of lab accuracy and precision. includes safety review and chemistry essentials
7. Proximate analysis of foods
  - Moisture
  - Ash
  - Crude Fat
  - Crude Protein
  - Crude Fibre
  - Carbohydrates

**F. Y. B. Voc. Food Technology  
Semester II**

**Modules at a Glance**

<b>Unit title</b>	<b>Learning Outcomes</b>
Entrepreneurship Development and Project Management	<p>The learner will be able to</p> <ul style="list-style-type: none"> <li>• To know about the various procedures for starting a small-scale unit of production.</li> <li>• To have a basic idea about how to prepare a project to start a small-scale industry.</li> <li>• To know about various agencies that can provide assistance for starting a new project.</li> </ul>
Dairy Technology	<p>The learner will be able to</p> <ul style="list-style-type: none"> <li>• To understand about the products that can be made from milk.</li> <li>• To understand the processing and storage of dairy products.</li> <li>• To know about the quality control measures applied in dairy industries.</li> <li>• To have a basic idea about their processing and products which can be made at a small scale</li> </ul>
Packaging Technology	<p>The learner will be able to</p> <ul style="list-style-type: none"> <li>• To familiarize with the different materials and methods used for packaging.</li> <li>• To understand the technology behind packaging and packaging materials</li> <li>• To have a basic idea about the materials used for food packaging and their testing.</li> <li>• To know about the different forms in which a food can be packed.</li> </ul>
Sanitation and Hygiene	<p>The learner will be able to</p> <ul style="list-style-type: none"> <li>• To know the principles and applications of sanitation in food industry.</li> <li>• To know about the various types of Sanitation techniques applicable in the food industry</li> <li>• To gain an understanding of food hygiene, sanitation and safety during food processing unit operations.</li> </ul>
Food preservation	<p>The learner will be able to</p>



II	<ul style="list-style-type: none"> <li>• To study the different ways in which food spoilage occurs and the techniques to prevent it.</li> <li>• To know the different spoilage agents and the ways in which they act on food.</li> <li>• To understand the principles behind the various methods of food preservation.</li> <li>• To know how to use these principles to preserve different types of foods.</li> <li>• To study the method of action of different preservatives.</li> </ul>
Food Chemistry	<p>The learner will be able to</p> <ul style="list-style-type: none"> <li>• To study the different nutritive parameters</li> <li>• To know the mechanism of food constituents.</li> <li>• To study the classification of carbohydrates, proteins and lipids</li> </ul>
Food QA and QC	<p>The learner will be able to</p> <ul style="list-style-type: none"> <li>• To understand the principles and framework of food safety.</li> <li>• To understand food laws and regulations governing the quality of foods.</li> <li>• To apply preventive measures and control methods to minimize microbiological hazards and maintain quality of foods.</li> <li>• To identify the wide variety of parameters affecting food quality.</li> <li>• To understand about Intellectual property rights.</li> </ul>

## Semester II

**Paper Title: Entrepreneurship Development and Project Management**

**Paper Code: UGFT 201**

<b>Unit 1.1:</b>	<b>Introduction to Entrepreneurship (3L)</b> Meaning, definition and concepts, characteristics, functions, entrepreneurial traits and motivation, role of entrepreneur in economic development, factors affecting entrepreneurial growth. Types of entrepreneurs - Intrapreneurship, Women entrepreneurship, significance, problems, solutions to the problems
<b>Unit 1.2:</b>	<b>Entrepreneurial Development Programme and Role of institutions/schemes (3L)</b> Objectives, Steps, Need for training- target group- Contents of the training programme-Special Agencies for Entrepreneurial Development and Training-DIC, SIDCO, SIDBI, NIESBUD, EDII, SISI, NREG Scheme- SWARNA JAYANTHI, Rozgar Yojana Schemes.
<b>Unit 1.3:</b>	<b>Project (3L)</b> Meaning, Features, Classification, Project identification, Stages in project identification, Project Life Cycle, Project formulation- Elements, Feasibility Analysis-Network Analysis-Project Planning.
<b>Unit 1.4:</b>	<b>Setting up of micro small and medium enterprises(3 L)</b> Setting up of micro small and medium enterprises, location significance, Green channel, Bridge capital, Seed capital assistance, Margin money scheme, Sickness, Causes-Remedies.
<b>References-</b>	<ol style="list-style-type: none"><li>1. Herekar, Praksh. <i>Business Communication</i>. Pune: Mehta Publications, 2007.</li><li>2. Herekar, Praksh. <i>Principals of Business Communication</i>. Pune: Mehta Publications, 2003.</li><li>3. John, David. <i>Group Discussions</i>. New Delhi: Arihant Publications. Kumar, Varinder. <i>Business Communications</i>. New Delhi: Kalyani Publishers, 2000.</li><li>4. Rai, Urmila &amp; S. M. Rai. <i>Business Communication</i>. Himalaya Publishing House, 2007.</li><li>5. Pradhan, N. S. <i>Business Communication</i>. Mumbai: Himalaya Publishing House, 2005.</li></ol>

	<p>6. Pardeshi, P. C. <i>Managerial Communication</i>. Pune: Nirali Prakashan, 2008.</p> <p>7. Sethi, Anjane&amp;Bhavana Adhikari. <i>Business Communication</i>. New Delhi: Tata McGraw Hill Tickoo, Champa&amp; Jaya Sasikumar. <i>Writing with a Purpose</i>. New York: OUP, 1979.</p> <p>8. Sonie, Subhash C. <i>Mastering the Art of Effective Business Communication</i>. New Delhi: Student Aid Publication, 2008.</p> <p>9. Whitehead, Jeffrey &amp; David. H Whitehead. <i>Business Correspondence</i>. Allahabad: Wheeler Publishing 1996.</p>
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**Paper Title- Dairy Technology**

**Paper Code: UGFT 202**

<b>Unit 2.1:</b>	<p><b>Introduction to Dairy chemistry (3L)</b></p> <p>Milk - Definition, sources, and composition of milk, factors effecting composition of milk, physiochemical properties of milk, grading of milk-definition and types of grades, collection and transportation of milk, Skim milk, evaporated milk, condensed milk, standardized milk, toned milk, double toned milk, flavoured milk, reconstituted milk.</p>
<b>Unit 2.2:</b>	<p><b>Processing of market milk (3L)</b></p> <p>Flowchart of milk processing, Reception, Different types of cooling systems. Clarification and filtration process, standardization- Pearson's square method, pasteurization-LTLT, HTST and UHT process- continuous pasteuriser, Sterilisation and Homogenisation, Cream separation- centrifugal cream separator, bactofugation.</p>
<b>Unit 2.3:</b>	<p><b>Indigenous and Fermented milk products (3L)</b></p> <p>Product description, methods for manufacture of butter, cheese, ice cream, khoa, channa, paneer, shrikhand, ghee. Spray drying system: dried milk- whole milk and skim milk powder. Instantization of milk.</p>
<b>Unit 2.4:</b>	<p><b>In-Plant cleaning system (3L)</b></p> <p>Introduction to Cleaning in- place (CIP) system - cleaning procedure, Cleaning efficiency, Methods of cleaning in food industry, cleaning solutions – Detergents, Sanitizers. SIP system of dairy plant, Personal</p>

	hygiene in dairy plant.
<b>References-</b>	<ol style="list-style-type: none"> <li>1. B. Shreelakshmi : “Food Science” (second edition), New Age International, New Delhi.</li> <li>2. Swaminathan: “Text book Of Food Science”, Vol-1, BAPPCO, Bangalore.</li> <li>3. Devendrakumar Bhatt &amp; Priyanka Tomar : An Introduction to Food Science, Technology &amp; Quality Management, Kalyani Publishers.</li> <li>4. Sumati R. Mudambi: Fundamentals of Food &amp; Nutrition wiley Eastern Ltd, New Delhi.</li> <li>5. Philips T E, Modern cooking for teaching and trade, Volit orient longman, Bombay</li> </ol>

<b>Paper Title- Packaging Technology</b>	
<b>Paper Code: UGFT 203</b>	
<b>Unit 3.1:</b>	<b>Introduction to packaging (3L)</b> Definition, Functions of packaging – Containment, Protection, Preservation, Promotion, Convenience, Communication. Requirements of effective package, Types of food packaging- primary, secondary and tertiary packaging.
<b>Unit 3.2:</b>	<b>Deteriorative Reactions and shelf life of foods (3L)</b> Introduction, deteriorative Reactions in food- factors affecting deterioration of foods-physical changes, biological changes, chemical changes. Shelf life of foods – Definition, intrinsic and extrinsic factors controlling the rate of reactions. Shelf life determination tests.
<b>Unit 3.3:</b>	<b>Packaging Materials and their properties (3L)</b> Rigid containers- Glass, Wooden boxes, metal cans- Aluminum and tin plate containers, Semi rigid containers- paperboard cartons, Flexible packaging- paper, plastic pouches- Low density

	polyethylene, High density polyethylene and Polypropylene. Packaging materials for dairy products, bakery and confectionary, granular products, fruits and vegetables, Aseptic packaging, Active packaging, Intelligent packaging, modified atmospheric packaging and controlled atmospheric packaging, shrink packaging, stretch packaging, Biodegradable packaging, Edible packaging, Tetra packs
<b>Unit 3.4:</b>	<b>Labelling and safety concerns in food pack (3L)</b> Printing process, inks, adhesives, labelling, coding- bar codes, Food packaging closures of glass and plastic containers, Legislative and safety aspects of food packaging, Machineries used in Food Packaging, Package testing-Thickness – Paper density - Basis weight – Grammage - Tensile Strength - Gas Transmission Rate (GTR) - Water Vapour Transmission Rate (WVTR).
<b>References-</b>	<ol style="list-style-type: none"> <li>1. Prakash Triveni: Food Preservation, Aadi Publication, Delhi.</li> <li>2. M. Shafiur Rahman: Hand Book of Food Preservation, Marcel Dekker Inc, New York</li> <li>3. McWillims and Paine: Modern Food Preservation, Surjeet Publication.</li> <li>4. Fellows, P. and Ellis H, 1990 Food Processing Technology: Principles and Practicals, New York</li> <li>5. NPCS Board, Modern Technology on Food Preservation</li> <li>6. B. Sivasankar: Food Processing and Preservation</li> </ol>

**Paper Title- Sanitation and Hygiene**

**Paper Code: UGFT 204**

<b>Unit 4.1:</b>	<b>Sanitation and Health (3L)</b> Definition, importance of sanitation, application of sanitation to food industry and food service establishments. Microorganisms and their characteristics, control of microbial growth in food. Food contamination and spoilage, food borne diseases.
<b>Unit 4.2:</b>	<b>Hygiene and food handling (3L)</b> Purchasing and receiving safe food, food storage, sanitary procedures in food preparation, serving and displaying of food, special food

	operations.
<b>Unit 4.3:</b>	<b>Environmental Sanitation (3L)</b> Location and layout of premises, constructional details, sanitary requirements for equipment, guidelines for cleaning equipment, cleaning procedures, pest control, water supply, storage and waste disposal, environmental pollution, Fumigation.
<b>Unit 4.4:</b>	<b>Hygiene Practices and Sanitation regulations and Standards (3L)</b> Introduction, necessity, personnel hygiene, sanitary practices, management and sanitation, safety at work place, regulatory agencies, control of food quality, local health authority. Food sanitation check lists.
<b>References-</b>	<ol style="list-style-type: none"> <li>1. Kader A A: Post Harvest Technology of Horticulture crops. 2<sup>nd</sup> edition, University of California</li> <li>2. Salunkhe D K and Kadam S S: handbook of world food legumes, CRC Press, Florida</li> <li>3. Niir Board: Modern Technology of Agro Processing and Agricultural Waste, National Institute of Indi Re 2000.</li> <li>4. Salunkhe D K, Chavan J K, Adsule R N and Kadam S: World oilseed chemistry, technology and utilization, VNR, New York</li> </ol>

**Paper Title- Food preservation II**

**Paper Code: UGFT 205**

<b>Unit 5.1:</b>	<b>Preservation by using Preservatives (3L)</b> Food preservation: Definition, principles, importance of food preservation, traditional and modern methods of food preservation. Food additives – definition, types, Class I and Class II preservatives
<b>Unit 5.2:</b>	<b>Preservation by radiation (3L)</b> Ultraviolet radiation, Ionizing radiations, gamma rays and cathode rays, Microwave processing, <b>Ultrasonics</b> , High pressure and Membrane Technology.
<b>Unit 5.3:</b>	<b>Preservation by fermentation (3L)</b> Curing and Pickling; Smoking, Controlled and modified atmospheric

	storage. Chemical preservatives, bio preservatives, antimicrobials; hurdle technology.
<b>Unit 5.4:</b>	<b>Preservation of Different Foods (3L)</b> Cereal and products, Sugar products, Vegetables, Fruits, Meat and products, Fish and other products, Eggs, Poultry, Milk and products, Canned Foods.
<b>References-</b>	<ol style="list-style-type: none"> <li>1. John Kingslee: A professional text to bakery and confectionary, New Age International Publication.</li> <li>2. NIIR Board: The complete technology book on bakery products</li> <li>3. W. P. Edwards: Science of Bakery Products.</li> <li>4. Emmanueal Obene : Chocolate science and Technology</li> </ol>

<b>Paper Title- Food Chemistry</b>	
<b>Paper Code: UGFT 206</b>	
<b>Unit 6.1:</b>	<b>Water(3L)</b> Introduction to food chemistry, Role and type of water in foods; Functional properties of water; role of water in food spoilage; Water activity, estimation of moisture in foods, determination of moisture and water activity.
<b>Unit 6.2:</b>	<b>Carbohydrates(3L)</b> Carbohydrates: Nomenclature, composition, sources, structure, functions, classification, Properties of Starch – gelatinisation, gel formation, syneresis, starch degradation, dextrinisation, retrogradation.
<b>Unit 6.3:</b>	<b>Lipids(3L)</b> Nomenclature, composition, sources, structure, functions, classification, Physical and chemical properties-hydrolysis, hydrogenation, rancidity and flavour reversion, emulsion and emulsifiers, saponification value, acid value and iodine value, smoke point
<b>Unit 6.4:</b>	<b>Proteins (3L)</b> Nomenclature, sources, structure, functions, classification, Physical,

	chemical and functional properties - denaturation, hydrolysis. Enzymes - Specificity, mechanism of enzyme action
<b>References-</b>	1. Food Chemistry by H.D Belitz, Grosch, Schieberle

<b>Paper Title- Food QA &amp; QC</b>	
<b>Paper Code: UGFT 207</b>	
<b>Unit 7.1:</b>	<b>HACCP system(3L)</b> Hazard analysis Critical Control Point: Definition, principles Guidelines for the application of HACCP system
<b>Unit 7.2:</b>	<b>Concepts of quality management(3L)</b> Objectives, importance and functions of quality control Quality management systems in India, Sampling procedures and plans Food Safety and Standards Act, 2006, Domestic regulations Labeling issues, Food Safety and Standards Act, 2011, Total Quality Management, GMP/GHP, GLP, GAP, Sanitary and hygienic practices
<b>Unit 7.3:</b>	<b>Concept of quality(3L)</b> Quality attributes- physical, chemical, nutritional, microbial sensory; their measurement and evaluation Sensory vis-à-vis instrumental methods for testing quality
<b>Unit 7.4:</b>	<b>Food Audits (3L)</b> HACCP, Quality manuals, documentation and audits Indian & International quality systems and standards like ISO and Food Codex, Applications in different food industries Food adulteration and food safety
<b>References-</b>	1. Food Chemistry by H.D Belitz, Grosch, Schieberle



## **UGFT 201 Entrepreneurship Development and Project Management**

### **UGFT 202- Dairy Technology and UGFT 203- Packaging Technology (72L)**

1. Preparation of following
  - Dahi
  - Chakka and Shrikhand
  - Butter
  - Lassi
  - Ghee
  - Kulfi
  - Paneer
  - Khoa
  - Basundi
  - Rabri
2. Sampling and testing of Milk and Milk Products
3. Visit to Milk and Milk Products Processing Plant
4. Identification of different types of packaging and packaging materials
5. Determination of tensile strength of given material
6. To perform different destructive tests for glass containers
7. To perform non-destructive tests for glass containers
8. Determination of wax weight
9. Determination of tearing strength of paper
10. Measurement of thickness of packaging materials
11. To perform grease-resistance test in plastic pouches
12. Determination of bursting strength of packaging material
13. Determination of water-vapour transmission rate
14. Demonstration of can-seaming operation
15. Testing of chemical resistance of packaging materials

### **UGFT 204 Sanitation and Hygiene and UGFT 205- Food preservation II (72L)**

1. Use of chemicals as sanitizers
2. Comparison of different disinfectants
3. Calculating MIC value of disinfectants used
4. Use of different fumigants
5. Methods of personal hygiene

6. Storage of fruits by drying
7. Storage of fish by drying
8. Storage of vegetables by pickling
9. Storage of food by canning
10. Storage of food by irradiation
11. Storage of food by fermentation
12. Storage of food by freezing
13. Storage of foods by freeze drying
14. Storage of food by pasteurization
15. Comparison of different methods of food preservation

### **UGFT 206- Food Chemistry**

### **UGFT 207- Food QA and QC (72L)**

1. Principle and working of analytical instrument such as hot air oven, colorimeter, balances, muffle furnace, spectrophotometer, centrifuge
2. Estimation of Moisture from food sample
3. Estimation of ash from food sample
4. Estimation of Fat from food sample
5. Cut-out analysis of canned food
6. Test of sensory evaluation
  - Hedonic scale
  - Duo-trio test
  - Ranking difference
  - Triangle test
7. Detection of basic tastes and their threshold values
8. Consumer acceptability trial
9. Statistical analysis of sensory data
10. Laboratory preparation of food products and their sensory analysis
11. Determination of insecticides residue in given food sample
12. Visits to the quality control laboratories of the food industry, educational institutions and testing centres.

### **References –**

1. W. P. Edwards: Science of Bakery Products.
2. Emmanuel Obene: Chocolate science and Technology

### Evaluation Pattern

The performance of the learners shall be evaluated into two components viz. by Internal Assessment with 40% marks in the first component and by conducting the Semester End Examinations with 60% marks as the second component. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below: -

#### **A) Internal Assessment – 40% 40 Marks**

20 Marks mid-term Online Test (MCQ Based Questions)

20 Marks [Any Two activities of 10 marks each] Presentation/Group Discussion /Project/  
Field visit / Subject related Individual activity

#### **B) Semester End Examinations – 60% 60 Marks**

### Question Paper Pattern

Maximum Marks: 60

Questions to be set: 03

Duration: 2 Hrs.

All Questions are Compulsory Carrying 20 Marks each.

Q:1	Answer the following (Any 4)	20 marks
Q:2	Answer the following (Any 4)	20 marks
Q:3	Answer the following (Any 4)	20 marks

Note: Full length question of 20 marks may be divided into four sub questions of each 5 marks.

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