



Anekant Education Society's
Tuljaram Chaturchand College, Baramati
(Autonomous)

Three Year B.Voc Degree Program in
Food Technology & Research

(Faculty of Food Technology & Research)

CBCS Syllabus

TY B.Voc (Food Technology) Semester –VI
For Department Food Technology & Research

Tuljaram Chaturchand College, Baramati
Choice Based Credit System Syllabus (2024 Pattern)
To be implemented from Academic Year 2024-2025

Title of the Programme: TY B.Voc (Food Technology & Research)**Preamble**

AES's, Tuljaram Chaturchand College of Arts, Science and Commerce (Autonomous) has made the decision to change the syllabi of across various faculties from June, 2023 by incorporating the guidelines and provisions outlined in the National Education Policy (NEP), 2020. The NEP envisions making education more holistic and effective and to lay emphasis on the integration of general (academic) education, vocational education and experiential learning. The NEP introduces holistic and multidisciplinary education that would help to develop intellectual, scientific, social, physical, emotional, ethical and moral capacities of the students. The NEP 2020 envisages flexible curricular structures and learning based outcome approach for the development of the students. By establishing a nationally accepted and internationally comparable credit structure and courses framework, the NEP 2020 aims to promote educational excellence, facilitate seamless academic mobility, and enhance the global competitiveness of Indian students. It fosters a system, where educational achievements can be recognized and valued not only within the country but also in the international arena, expanding opportunities and opening doors for students to pursue their aspirations on a global scale.

In response to the rapid advancements in science and technology and the evolving approaches in various domains of Food Technology and related subjects, the Board of Studies in Dept. of Food Technology and Research at Tuljaram Chaturchand College of Arts, Science and Commerce (Autonomous), Baramati - Pune, has developed the curriculum for the first semester of F.Y. M.Voc. Food Technology, which goes beyond traditional academic boundaries. The syllabus is aligned with the NEP 2020 guidelines to ensure that students receive an education that prepares them for the challenges and opportunities of the 21st century. This syllabus has been designed under the framework of the Choice Based Credit System (CBCS), taking into consideration the guidelines set forth by the National Education Policy (NEP) 2020, LOCF (UGC), NCrf, NHEQF, Prof. R.D. Kulkarni's Report, Government of Maharashtra's General Resolution dated 20th April and 16th May 2023, and the Circular issued by SPPU, Pune on 31st May 2023.

A Food Technology Graduates degree equips students with the knowledge and skills necessary for a diverse range of fulfilling career paths. Food Technology graduate students find opportunities in various fields, including procurement, Testing and quality control, Processing and Production, Research and Development, Storage and Supply Chain Management, Food Regulatory Agencies, Auditing, Academics, Competitive exams, Biostatistics, Database analysis, Entrepreneurship Development, and many other food and food related organizations.

Throughout their Three-year degree program, students explore the significance of Farm to Fork processing by utilization of post -harvest technology. They learn tools, techniques, and processes which is required to set up agencies including pickles, jam and jelly, fruit processing, vegetable processing, organic product, dairy products, Animal Product processing Bakery and Confectionery products producing industries.

Overall, revising the Food Technology syllabi in accordance with the NEP 2020 ensures that students receive an education that is relevant, comprehensive, and prepares them to navigate the dynamic and interconnected world of today. It equips them with the knowledge, skills, and competencies needed to contribute meaningfully to society and pursue their academic and professional goals in a rapidly changing global landscape.

Programme Specific Outcomes (PSOs)

Programme Outcomes for Vocational (M.Voc.) Degree Programme in accordance with National Education Policy-2020 with effect from Academic Year 2023-24. Bachelor of Vocation (M.Voc.) Courses are designed to provide students with specific vocational skills and knowledge that are directly applicable to the industry or field they are studying. The programme outcomes of these courses typically focus on preparing students for employment or entrepreneurship in their chosen vocational area.

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

PO5-Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

PO6-Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.

PO7-Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.

PO9-Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.

PO10-Community Engagement: The students will be able to demonstrate the capability to participate in community-engaged services/activities for promoting the wellbeing of society

Anekant Education Society's

Tuljaram Chaturchand College, Baramati*(Autonomous)***Board of Studies (BOS) M.Voc. Food Technology & Research**

From 2022-23 to 2024-25

Sr.No	Name of the BOS members	Designation
1.	Dr. Wajid A. Khan Head & Associate Professor, Department of Food Technology & Research. C. College, Baramati	Chairman
2.	Ms. Vaibhavi A. Bhosale Assistant Professor, Dept. of Food Tech. & Research T. C. College, Baramati	Internal Member
3.	Ms. Asawari D. Katekar Assistant Professor, Dept. of Food Tech. & Research T. C. College, Baramati	Internal Member
4.	Ms. Tilotama R. Pawar Assistant Professor, Dept. of Food Tech. & Research T. C. College, Baramati	Internal Member
5.	Ms. Shreeja R. Deokar Assistant Professor, Dept. of Food Tech. & Research T. C. College, Baramati	Internal Member
6.	Ms. Gayatri T. Deshmukh Assistant Professor, Dept of Food Tech. & Research T. C. College, Baramati	Internal Member
7.	Dr. A.K. Sahoo Professor, Dept. of Food Technology, Shivaji University, Kolhapur	External Member Expert from other University
8.	Dr. Rinku Agarwal Assistant Professor, Dept. of Food Technology, MIT-ADT University	External Member Expert from other University
9.	Ms. Meenaz Wadgaonkar, General Manager- Operation, Gits Food Products Pvt. Ltd., Hadapsar	External Member Industry Expert
10.	Mr. Sagar Salunkhe Plant Manager, Bauli India Bakes & Sweets, MIDC, Baramati	Meritorious Alumni

Title of the Course: B. Voc. (Food Processing & Post Harvest Technology)
(To be implemented from Academic Year - 2022-2023)

Course structure:

- B. Voc. is three year degree programme with three theory and three practical courses in each semester.
- Each theory course will be of four credits and each credit is of 15 periods
- Each practical course will be of six credits and each credit is of 15 periods
- Each period is of one clock hour.
- In each practical course, there will be one visit to the relevant industry/ institute.
- In addition to the regular practicals based on the theory course, special emphasis will be on communications and soft skills development of the students.

Eligibility:

- 1) **First Year B.Voc. (Diploma):** A student who has passed the Higher Secondary School Certificate (10+2) in any stream or its equivalent examination
- 2) **Second Year B.Voc. (Advanced diploma):** Keeping terms of First Year of B. Voc. and if they fulfill the eligibility conditions.
- 3) **Third Year B.Voc. (Degree):** Student shall pass all First Year B. Voc. courses and satisfactorily keeping terms of Second Year of B. Voc.

Note: Admissions will be given as per the selection procedure / policies adopted by the college, in accordance with conditions laid down by the Savitribai Phule Pune University, Pune.

Examination Pattern:**Examination:**➤ **Pattern of Examination.**

- i) Internal exam, Term end exam, Oral, Project, Presentation, GD, Viva voce
- ii) Pattern of the question paper:

- i) 25% Objective Question
- ii) 50% Short and Long Answer type question
- iii) 25% Problem based Case Study/long answer type

➤ **Theory Examination: -**

- i) Continuous Internal Assessment: 50 Marks (Unit Test I & II, Assignment-2No., Attendance) for each course of programme.
- ii) Semester End Examination: 50 Marks on the basis of Answer Sheet Evaluation for each course

➤ **Practical Examination: -**

- i) Continuous Internal Assessment: 75 Marks (Written exams, Visit Report, Journal, Viva Voce, Seminar/Presentation, Group Discussion and Attendance) for each course.
- ii) Semester End Examination: 75 Marks on the basis of Answer Sheet Evaluation with performance in practical examination which will be evaluated by external examiner for each course.

**Anekant Education Society's
TULJARAM CHATURCHAND COLLEGE, BARAMATI
DIST-Pune-413102**

Third Year: Semester-VI

Subj. Code	Subject Name	No. of Credits	Marks
Theory (General Component)			
FP-16	Animal Product Technology	4	100
FP-17	Food Safety, Hygiene & Sanitation	4	100
FP-18	Packaging Technology	4	100
Practical (Skill Component)			
FP-6.1	Animal Product Technology	6	150
FP-6.2	Packaging Technology	6	150
FP-6.3	Internship	6	150

Third Year

Semester VI

Animal Product Technology

Theory

Paper No. UBFP-361

Maximum Marks: 100

Credits: 4

Teaching Period: 4 Theory

Teaching Load: 60 Theory Period/Semester

Learning Objectives:

- To understand need and importance of livestock, egg, Fish and poultry industry
- To study structure, composition and nutritional quality of animal products.
- To study processing and preservation of animal foods.
- To understand technology behind preparation of various animal food products and by-product utilization.
- To study about waste management of slaughter house.
- To learn about antimortem inspection

Course Outcomes:

On completion of the course, students will be able to:

CO1: Explain the composition, structure and function of meat, eggs, milk and fish;

CO2: Identify and describe the physical and biochemical changes occurring during the conversion of muscle to meat;

CO3: Describe and evaluate the implication of storage and processing operations on the quality of selected foods of animal origin;

CO4: Collect and interpret the data of experiments on the effect of processing conditions on quality parameters of animal food products;

CO5: Identify and explain the product composition, quality and production process of commercially available selected animal food products.

CO6: Study about waste management of slaughter house.

CO7: Learn about antimortem inspection

Unit-1 Introduction

12 Lectures

Sources of Meat and Meat Products in India, it's important in National Economy

Meat: Definition of Meat, Classification, Structural and Composition of meat, Nutritive value of meat, Slaughtering of animals: Pre-slaughter transport and care and anti-mortem inspection, post-mortem inspection and grading of meat, Pre and post slaughter operations,

Processing and preservation of meat: Aging or chilling, freezing, pickling, curing, cooking and smoking of meat, Meat tenderization, gelation preparation, Preservation with antibiotics, radiations, Recent concepts in animal product processing

Unit-2 Egg:

12 Lectures

Structure, Composition and quality of egg: Structure, composition of egg, Nutritive value of egg, Evaluation of quality and grading of eggs

Processing and Preservation of eggs: Egg processing – freezing, drying and canning, Preservation of shell eggs, Effect of heat on egg protein, Egg foams and factors influencing. Preparation of protein concentrate

Unit-3 Poultry:**12 Lectures**

Slaughtering of poultry, structure & composition and Nutritive value of poultry meat: Pre-slaughter transport and care and antimortem inspection, post-mortem inspection and grading of poultry meat. Processing and preservation of poultry meat: Manufacture of poultry products, Preservation of poultry meat, Sources and developments of meat and poultry industries and importance in national economy, By-products utilization of abattoir

Unit-4 Fish:**12 Lectures**

Structure and composition of fish: Types and Classification of Fish, Structure of fish, Composition and Nutritive value of fish, Post mortem changes
Processing and preservation of fish: Fish spoilage, Processing of fish meal, fish flour, fish – oil, Canning and freezing of fish, Fish cookery, Commercial fish handling preservation transport, Preparation of various fish products

Unit-5 Slaughter House by product utilization and Waste Management**12 Lectures****References:**

1. Manay S.N. and Shadaksharaswamy M. (2001); Food facts and principles, 2ndedn, New Age International (P) limited publishers.
2. Potter N. N. and Hotchkiss J.H. (1966); Food Science, 5th edn., CBS Publishers and distributors.
3. Y.H. Huiet at (2001) Meat Science & Applications, Marcel Dekker Inc.
4. NIIR Board; Preservation of Meat and Poultry Products, 1st, Asia Pacific Business Press Inc.
5. Stadelman W.J. and Cotterill O.J. (1973); Egg Science & Technology, 1st, The AVI Publishing Company, Inc.

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	-	-	-	2	-	-	2	-	1
CO2	3	2	1	-	-	-	-	4		3
CO3	1	-	-	2	3	-	-	-	-	1
CO4	-	-	-	-	-	5	3	-	-	-
CO5	2	1	1	3	-	2	-	-	-	2
CO6	2	2	1	4	-	-	1	-	-	2
CO7	3	-	-	-	-	-	-	-	-	3

Justification for the mapping

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

CO1: Explain the composition, structure and function of meat, eggs, milk and fish;

CO2: Identify and describe the physical and biochemical changes occurring during the conversion of muscle to meat;

CO3: Describe and evaluate the implication of storage and processing operations on the quality of selected foods of animal origin;

CO5: Identify and explain the product composition, quality and production process of commercially available selected animal food products.

CO6: Study about waste management of slaughter house.

CO7: Learn about antimortem inspection

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

CO2: Identify and describe the physical and biochemical changes occurring during the conversion of muscle to meat;

CO5: Identify and explain the product composition, quality and production process of commercially available selected animal food products.

CO6: Study about waste management of slaughter house.

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

CO2: Identify and describe the physical and biochemical changes occurring during the conversion of muscle to meat;

CO5: Identify and explain the product composition, quality and production process of commercially available selected animal food products.

CO6: Study about waste management of slaughter house.

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

CO3: Describe and evaluate the implication of storage and processing operations on the quality of selected foods of animal origin;

CO5: Identify and explain the product composition, quality and production process of commercially available selected animal food products.

CO6: Study about waste management of slaughter house.

PO5-Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

CO1: Explain the composition, structure and function of meat, eggs, milk and fish;

CO3: Describe and evaluate the implication of storage and processing operations on the quality of selected foods of animal origin;

PO6-Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.

CO4: Collect and interpret the data of experiments on the effect of processing conditions on quality parameters of animal food products;

CO5: Identify and explain the product composition, quality and production process of commercially available selected animal food products.

PO7-Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.

CO4: Collect and interpret the data of experiments on the effect of processing conditions on quality parameters of animal food products;

CO6: Study about waste management of slaughter house.

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.

CO1: Explain the composition, structure and function of meat, eggs, milk and fish;

CO2: Identify and describe the physical and biochemical changes occurring during the conversion of muscle to meat;

PO10-Community Engagement: The students will be able to demonstrate the capability to participate in community-engaged services/activities for promoting the wellbeing of society

CO1: Explain the composition, structure and function of meat, eggs, milk and fish;

CO2: Identify and describe the physical and biochemical changes occurring during the conversion of muscle to meat;

CO3: Describe and evaluate the implication of storage and processing operations on the quality of selected foods of animal origin;

CO5: Identify and explain the product composition, quality and production process of commercially available selected animal food products.

CO6: Study about waste management of slaughter house.

CO7: Learn about antimortem inspection

Third Year

Semester VI

PRACTICAL

Animal Product Technology
Paper No. UBFP-361-1

Maximum Marks: 150

Credits: 6

Teaching Period: 2/week

Teaching Load: 30 Practical/Semester (4 Period each)

Learning Objectives:

- To understand need and importance of livestock, egg, Fish and poultry industry
- To study structure, composition and nutritional quality of animal products.
- To study processing and preservation of animal foods.
- To understand technology behind preparation of various animal food products and by-product utilization.
- To study about waste management of slaughter house.
- To learn about antimortem inspection

Course Outcomes:

On completion of the course, students will be able to:

CO1: Explain the composition, structure and function of meat, eggs, milk and fish;

CO2: Identify and describe the physical and biochemical changes occurring during the conversion of muscle to meat;

CO3: Describe and evaluate the implication of storage and processing operations on the quality of selected foods of animal origin;

CO4: Collect and interpret the data of experiments on the effect of processing conditions on quality parameters of animal food products;

CO5: Identify and explain the product composition, quality and production process of commercially available selected animal food products.

CO6: Study about waste management of slaughter house.

CO7: Learn about antimortem inspection

1. Estimation of moisture content of meat
2. Estimation of protein content of meat by Micro-kjedahl Method
3. To study shelf-life of the eggs.
4. Candling and grading of eggs
5. To study the canning of meat.
6. Egg pickle production.
7. To the study the slaughtering of Animals
8. Determination of physico-chemical quality of meat and meat products.
9. Introduction to the product formulation.
10. Quality evaluation of fish and prawns.

References:

1. Manay S.N. and Shadaksharaswamy M. (2001); Food facts and principles, 2ndedn, New Age International (P) limited publishers.
2. Potter N. N. and Hotchkiss J.H. (1966); Food Science, 5th edn., CBS Publishers and distributors.
3. Y.H. Huiet at (2001) Meat Science & Applications, Marcel Dekker Inc.
4. NIIR Board; Preservation of Meat and Poultry Products, 1st, Asia Pacific Business Press Inc.
5. Stadelman W.J. and Cotterill O.J. (1973); Egg Science & Technology, 1st, The AVI Publishing Company, Inc.

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	-	-	-	2	-	-	2	-	1
CO2	3	2	1	-	-	-	-	4		3
CO3	1	-	-	2	3	-	-	-	-	1
CO4	-	-	-	-	-	5	3	-	-	-
CO5	2	1	1	3	-	2	-	-	-	2
CO6	2	2	1	4	-	-	1	-	-	2
CO7	3	-	-	-	-	-	-	-	-	3

Justification for the mapping

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

CO1: Explain the composition, structure and function of meat, eggs, milk and fish;

CO2: Identify and describe the physical and biochemical changes occurring during the conversion of muscle to meat;

CO3: Describe and evaluate the implication of storage and processing operations on the quality of selected foods of animal origin;

CO5: Identify and explain the product composition, quality and production process of commercially available selected animal food products.

CO6: Study about waste management of slaughter house.

CO7: Learn about antimortem inspection

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

CO2: Identify and describe the physical and biochemical changes occurring during the conversion of muscle to meat;

CO5: Identify and explain the product composition, quality and production process of commercially available selected animal food products.

CO6: Study about waste management of slaughter house.

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

CO2: Identify and describe the physical and biochemical changes occurring during the conversion of muscle to meat;

CO5: Identify and explain the product composition, quality and production process of commercially available selected animal food products.

CO6: Study about waste management of slaughter house.

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

CO3: Describe and evaluate the implication of storage and processing operations on the quality of selected foods of animal origin;

CO5: Identify and explain the product composition, quality and production process of commercially available selected animal food products.

CO6: Study about waste management of slaughter house.

PO5-Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

CO1: Explain the composition, structure and function of meat, eggs, milk and fish;

CO3: Describe and evaluate the implication of storage and processing operations on the quality of selected foods of animal origin;

PO6-Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.

CO4: Collect and interpret the data of experiments on the effect of processing conditions on quality parameters of animal food products;

CO5: Identify and explain the product composition, quality and production process of commercially available selected animal food products.

PO7-Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.

CO4: Collect and interpret the data of experiments on the effect of processing conditions on quality parameters of animal food products;

CO6: Study about waste management of slaughter house.

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.

CO1: Explain the composition, structure and function of meat, eggs, milk and fish;

CO2: Identify and describe the physical and biochemical changes occurring during the conversion of muscle to meat;

PO10-Community Engagement: The students will be able to demonstrate the capability to participate in community-engaged services/activities for promoting the wellbeing of society

CO1: Explain the composition, structure and function of meat, eggs, milk and fish;

CO2: Identify and describe the physical and biochemical changes occurring during the conversion of muscle to meat;

CO3: Describe and evaluate the implication of storage and processing operations on the quality of selected foods of animal origin;

CO5: Identify and explain the product composition, quality and production process of commercially available selected animal food products.

CO6: Study about waste management of slaughter house.

CO7: Learn about antimortem inspection

Third Year

Semester VI

Theory

Food Safety, Hygiene and Sanitation

Paper No UBFP-362

Maximum Marks: 100

Credits: 4

Teaching Period: 4 Theory

Teaching Load: 60 Theory Period/Semester

Learning Objectives

To understand the following:

- Food safety, hygiene and sanitation
- Industrial waste utilization
- Design and implementation of food safety management systems such as ISO series, HACCP and its prerequisites such as GMP, GHP etc.
- By- product & waste utilization from the food Industries
- Genetically modified foods\Transgenic, Organic foods
- Nutritional labelling

Course Outcomes:

On completion of the course, students will be able to:

CO1: Identify food safety hazards and their control

CO2: Identify & prevent potential sources of food contamination

CO3: Apply the principles of Hazard Analysis Critical Control Points (HACCP)

CO4: Recognize the principal legal responsibilities of food handlers regarding personal hygiene

CO5: Apply a range of food quality systems

CO6: Prepare a food safety plan

CO7: Study about Nutritional labelling

Unit-1: Introduction to Food Safety: Definition, Types of hazards, biological, chemical, physical hazards, Factors affecting Food Safety, Importance of Safe Foods. **12 Lectures**

Unit-2: Food Safety Management Tools: Basic concept, Prerequisites- GHPs ,GMPs, SOPs etc, HACCP, ISO series, TQM - concept and need for quality, components of TQM, Kaizen. Risk Analysis, Accreditation and auditing **12 Lectures**

Unit-3: Industrial byproducts and waste utilization: Potential & prospects of byproduct & waste utilization from the food Industries in India Byproduct & waste with special reference to Agricultural & agro based industries, cereal & cereal product, fruits and vegetable, meat, Poultry and fish, milk & milk products. **12 Lectures**

Unit-4: Hygiene and Sanitation in Food Service Establishments: Introduction, Sources of contamination, Control methods using physical and chemical agents, Waste Disposal, Pest and Rodent Control, Personnel Hygiene, Food Safety Measures. **12 Lectures**

Unit-5: Recent concerns: New and Emerging Pathogens, Packaging, Product labelling and Nutritional labeling, genetically modified foods\Transgenic, Organic foods, Newer approaches to food safety, Recent Outbreaks.

12 Lectures

References:

1. Lawley, R., Curtis L. and Davis,J. The Food Safety Hazard Guidebook , RSC publishing, 2004
2. De Vries. Food Safety and Toxicity, CRC, New York, 1997
3. Marriott, Norman G. Principles of Food Sanitation, AVI, New York, 1985
4. Forsythe, S J. Microbiology of Safe Food, Blackwell Science, Oxford, 2000 & Sons; USA, 1987
5. Quality Control for Food Industry – Krammer & Twig

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	-	-	-	2	-	-	2	-	-
CO2	-	2	1	-	-	-	-	4	-	-
CO3	1	-	-	2	3	-	-	-	-	1
CO4	-	-	-	-	-	-	3	-	-	-
CO5	1	1	1	-	-	2	-	-	-	1
CO6	-	2	1	4	-	-	1	-	-	-
CO7	-	-	-	-	-	-	-	-	-	-

Justification for the mapping

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

CO3: Apply the principles of Hazard Analysis Critical Control Points (HACCP)

CO5: Apply a range of food quality systems

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

CO2: Identify & prevent potential sources of food contamination

CO5: Apply a range of food quality systems

CO6: Prepare a food safety plan

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

CO2: Identify & prevent potential sources of food contamination

CO5: Apply a range of food quality systems

CO6: Prepare a food safety plan

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

CO3: Apply the principles of Hazard Analysis Critical Control Points (HACCP)

CO6: Prepare a food safety plan

PO5-Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

CO1: Identify food safety hazards and their control

CO3: Apply the principles of Hazard Analysis Critical Control Points (HACCP)

PO6-Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.

CO5: Apply a range of food quality systems

PO7-Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.

CO4: Recognize the principal legal responsibilities of food handlers regarding personal hygiene

CO6: Prepare a food safety plan

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.

CO1: Identify food safety hazards and their control

CO2: Identify & prevent potential sources of food contamination

PO10-Community Engagement: The students will be able to demonstrate the capability to participate in community-engaged services/activities for promoting the wellbeing of society

CO3: Apply the principles of Hazard Analysis Critical Control Points (HACCP)

CO5: Apply a range of food quality systems

Third Year

Semester VI

Theory

Packaging Technology
Paper No. UBFP-363

Maximum Marks: 100

Credits: 4

Teaching Period: 4 Theory

Teaching Load: 60 Theory Period/Semester

Learning Objectives:

- To understand the purpose and principles of food packaging.
- To impart knowledge and skills related to types, functions, testing of various packaging materials used in food processing industries
- To evaluate the suitability of packaging material for a particular type of food.
- To understand the operations involved in packaging material manufacture.
- To study different types of packaging material
- To learn about different machinery used for food packaging.

Course Outcomes:

On completion of the course, students will be able to:

CO1: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO2: Design solutions to packaging problems.

CO3: Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.

CO4: Explain knowledge of the legal, environmental, quality aspects associated with packaging materials and operations used in the food industry.

CO5: Understand the operations involved in packaging material manufacture.

CO6: study different types of packaging material

CO7: To learn about different machinery used for food packaging.

Unit-1: Introduction, Protection of Food products - major role of food packaging - Functions of packaging, Need for protective packaging. Packaging requirements and selection of packaging materials; Types of Container, packaging materials and Forms: Paper and Glass. **12 Lectures**

Unit-2: Metals: Tinsplate containers, tinning process, components of tinsplate, tin free steel (TFS), types of cans, aluminum containers, lacquers; Plastics: types of plastic films, laminated plastic materials, co-extrusion, edible films, biodegradable plastics. **12 Lectures**

Unit-3: Test for Packaging Materials, their methods of testing and evaluation; Barrier properties of packaging materials: Theory of permeability, factors affecting permeability, permeability coefficient, gas transmission rate (GTR) and water vapor transmission (WVTR) rate and its measurement. **12 Lectures**

Unit-4: Food packaging systems: Different forms of packaging such as rigid, semi rigid, flexible forms and different packaging system for (a) dehydrated foods (b) frozen foods (c) dairy products (d) fresh fruits and vegetables (e) meat, poultry and sea foods. **12 Lectures**

Unit-5: Vacuum, CA and MA packaging systems, gas packaging machine; seal and shrink packaging machine; form and fill sealing machine; aseptic packaging systems; bottling machines; carton making machines. **12 Lectures**

References

1. Crosby NT.1981. *Food Packaging: Aspects of Analysis and Migration Contaminants*. App. Sci. Publ.
2. Kadoya T. (Ed). 1990. *Food Packaging*. Academic Press.
3. Mahadeviah M & Gowramma RV. 1996. *Food Packaging Materials*. Tata McGraw Hill.
4. Palling SJ. (Ed). 1980. *Developments in Food Packaging*. App. Sci. Publ.
5. Painy FA. 1992. *A Handbook of Food Packaging*. Blackie Academic.
6. Sacharow S & Griffin RC. 1980. *Principles of Food Packaging*. AVI Publ.
7. Stanley S & Roger CG.1970. *Food Packaging*. AVI Publ.
8. Gordon L. Robertson: *Food Packaging- Principles and Practice* Marcel Dekker Inc,USA (1993)
9. Donald Downing: *Complete Course in Canning* (3 Volumes) CTI Publications inc, USA (1996)
10. Mathlouthi M. (Editor): *Food Packaging and Preservation* Elsevier Applied Science Publications Essex, UK (1986)
11. J. R.D.David, R. H Graves and V.R. Carlson: *Aseptic Processing and Packaging of Foods*: CRC Press, New York

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	-	1	-	3	5	4	2	-	1
CO2	3	2	1	-	2	-	-	4		-
CO3	1	-	3	2	3	-	-	-	-	3
CO4	-	-	-	-	-	5	3	-	5	-
CO5	2	-	-	3	5	-	5	4	6	2
CO6	2	-	1	5	-	6	-	4	5	2
CO7	3	-	1	-	5	6	-	-	-	-

Justification for the mapping

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

CO2: Design solutions to packaging problems.

CO3: Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.

CO5: Understand the operations involved in packaging material manufacture.

CO6: study different types of packaging material

CO7: To learn about different machinery used for food packaging.

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

CO2: Design solutions to packaging problems.

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

CO1: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO2: Design solutions to packaging problems.

CO3: Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.

CO6: study different types of packaging material

CO7: To learn about different machinery used for food packaging.

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

CO3: Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.

CO5: Understand the operations involved in packaging material manufacture.

CO6: study different types of packaging material

PO5-Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

CO1: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO2: Design solutions to packaging problems.

CO3: Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.

CO5: Understand the operations involved in packaging material manufacture.

CO7: To learn about different machinery used for food packaging.

PO6-Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.

CO1: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO4: Explain knowledge of the legal, environmental, quality aspects associated with packaging materials and operations used in the food industry.

CO6: study different types of packaging material

CO7: To learn about different machinery used for food packaging.

PO7-Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.

CO1: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO4: Explain knowledge of the legal, environmental, quality aspects associated with packaging materials and operations used in the food industry.

CO5: Understand the operations involved in packaging material manufacture.

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.

CO1: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO2: Design solutions to packaging problems.

CO5: Understand the operations involved in packaging material manufacture.

CO6: study different types of packaging material

PO9-Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.

CO4: Explain knowledge of the legal, environmental, quality aspects associated with packaging materials and operations used in the food industry.

CO5: Understand the operations involved in packaging material manufacture.

CO6: study different types of packaging material

PO10-Community Engagement: The students will be able to demonstrate the capability to participate in community-engaged services/activities for promoting the wellbeing of society

CO1: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO3: Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.

CO5: Understand the operations involved in packaging material manufacture.

CO7: To learn about different machinery used for food packaging.

Third Year

Semester VI

PRACTICAL

Packaging Technology
Paper No. UBFP-361-2

Maximum Marks: 150

Credits: 6

Teaching Period: 2/week

Teaching Load: 30 Practical/Semester (4 Period each)

Learning Objectives:

- To understand the purpose and principles of food packaging.
- To impart knowledge and skills related to types, functions, testing of various packaging materials used in food processing industries
- To evaluate the suitability of packaging material for a particular type of food.
- To understand the operations involved in packaging material manufacture.
- To study different types of packaging material
- To learn about different machinery used for food packaging.

Course Outcomes:

On completion of the course, students will be able to:

CO1: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO2: Design solutions to packaging problems.

CO3: Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.

CO4: Explain knowledge of the legal, environmental, quality aspects associated with packaging materials and operations used in the food industry.

CO5: Understand the operations involved in packaging material manufacture.

CO6: study different types of packaging material

CO7: To learn about different machinery used for food packaging.

- 1) Identification and testing of packaging materials
- 2) Determination of wax from wax paper;
- 3) Testing of lacquered tin plate sheets;
- 4) Measurement of tin
- 5) Determination of equilibrium moisture content;
- 6) Grading of glass bottles for alkalinity;
- 7) Determination of water vapour transmission rate of packaging material;
- 8) To perform vacuum packaging of food sample and carry out its storage study;
- 9) Testing the compression strength of the boxes;
- 10) Packaging the food material in seal and shrink packaging machine and study its shelf life;

- 11) Testing the strength of glass containers by thermal shock test; Testing the strength of filled pouches by drop tester.
- 12) Preparation of album of different types of packaging.
- 13) Visit to industry
- 14) Preparation of visit report & presentation

References

12. Crosby NT.1981. *Food Packaging: Aspects of Analysis and Migration Contaminants*. App. Sci. Publ.
13. Kadoya T. (Ed). 1990. *Food Packaging*. Academic Press.
14. Mahadeviah M & Gowamma RV. 1996. *Food Packaging Materials*. Tata McGraw Hill.
15. Palling SJ. (Ed). 1980. *Developments in Food Packaging*. App. Sci. Publ.
16. Painy FA. 1992. *A Handbook of Food Packaging*. Blackie Academic.
17. Sacharow S & Griffin RC. 1980. *Principles of Food Packaging*. AVI Publ.
18. Stanley S & Roger CG.1970. *Food Packaging*. AVI Publ.
19. Gordon L. Robertson: *Food Packaging- Principles and Practice* Marcel Dekker Inc,USA (1993)
20. Donald Downing: *Complete Course in Canning* (3 Volumes) CTI Publications inc, USA (1996)
21. Mathlouthi M. (Editor): *Food Packaging and Preservation* Elsevier Applied Science Publications Essex, UK (1986)
22. J. R.D.David, R. H Graves and V.R. Carlson: *Aseptic Processing and Packaging of Foods*: CRC Press, New York

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	-	1	-	3	5	4	2	-	1
CO2	-	2	1	-	2	-	-	4		-
CO3	3	-	-	2	3	-	-	-	-	3
CO4	-	-	-	-	-	5	3	-	5	-
CO5	2	-	-	3	5	-	5	4	6	2
CO6	2	2	1	5	-	6	-	4	5	2
CO7	-	2	1	-	5	6	-	-	-	-

Justification for the mapping

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

CO1: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO3: Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.

CO5: Understand the operations involved in packaging material manufacture.

CO6: study different types of packaging material

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

CO2: Design solutions to packaging problems.

CO6: study different types of packaging material

CO7: To learn about different machinery used for food packaging.

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

CO1: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO2: Design solutions to packaging problems.

CO6: study different types of packaging material

CO7: To learn about different machinery used for food packaging.

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

CO3: Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.

CO5: Understand the operations involved in packaging material manufacture.

CO6: study different types of packaging material

PO5-Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

CO1: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO2: Design solutions to packaging problems.

CO3: Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.

CO5: Understand the operations involved in packaging material manufacture.

CO7: To learn about different machinery used for food packaging.

PO6-Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.

CO1: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO4: Explain knowledge of the legal, environmental, quality aspects associated with packaging materials and operations used in the food industry.

CO6: study different types of packaging material

CO7: To learn about different machinery used for food packaging.

PO7-Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.

CO1: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO4: Explain knowledge of the legal, environmental, quality aspects associated with packaging materials and operations used in the food industry.

CO5: Understand the operations involved in packaging material manufacture.

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.

CO1: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO2: Design solutions to packaging problems.

CO5: Understand the operations involved in packaging material manufacture.

CO6: study different types of packaging material

PO9-Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.

CO3: Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.

CO4: Explain knowledge of the legal, environmental, quality aspects associated with packaging materials and operations used in the food industry.

CO5: Understand the operations involved in packaging material manufacture.

CO6: study different types of packaging material

PO10-Community Engagement: The students will be able to demonstrate the capability to participate in community-engaged services/activities for promoting the wellbeing of society

CO1: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO3: Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.

CO5: Understand the operations involved in packaging material manufacture.

CO6: study different types of packaging material

Third Year

Semester VI

Internship

PRACTICAL

Paper No. UBFP-361-3

Maximum Marks: 150

Credits: 6

Teaching Period: 2/weak

Teaching Load: 30 Practical/Semester (4 Period each)

Learning Objectives:

- To understand need and importance of working of machinery in industry
- To study personal hygiene in food industry
- To study processing of food product
- To understand technology behind preparation of various food products and by-product utilization.
- To study about waste management of food industry
- To learn about marketing of food industry

Course Outcomes:

On completion of the course, students will be able to:

CO1: To understand need and importance of working of machinery in industry

CO2: To study personal hygiene in food industry

CO3 To study processing of food product

CO4: To understand technology behind preparation of various food products and by-product utilization.

CO5: To study about waste management of food industry

CO6: To learn about marketing of food industry

CO7: To get knowledge of export of food industry

Students should undergo an project work for a period of 60 days, during course of three year. The programme is arranged by the Department of Food Processing and Post-Harvest Technology in consultation with the food industries. The purpose of the programme is to get hands-on experience on various aspects of food industries that forms the strong foundation for the young food technologists. The department will allot students to the industry, in consultation with the industry concerned. Student should report for the programme on the stipulated date. He/ she shall complete this period of 60 days In-plant training in either summer or winter vacation. On completion, each student should prepare a project report duly certified by the supervisor in the industry. Consequently, a seminar should be conducted in the department to present the finding

of the project work. The bonafide project report attested by the head of the department will be evaluated by the external examiner and a viva voce will be conducted.

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	-	-	-	4	-	-	3	4	2
CO2	-	-	2	-	-	-	-	-	-	-
CO3	3	-	-	2	-	-	-	1	2	3
CO4	-	1	1	-	2	2	1	-	-	-
CO5	-	2	-	-	-	2	-	-	-	-
CO6	-	-	-	4	-	-	1	-	1	-
CO7	3	-	1	-	-	-	-	-	-	3

Justification for the mapping

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

CO1: To understand need and importance of working of machinery in industry

CO3 To study processing of food product

CO7: To get knowledge of export of food industry

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

CO4: To understand technology behind preparation of various food products and by-product utilization.

CO5: To study about waste management of food industry

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

CO2: To study personal hygiene in food industry

CO4: To understand technology behind preparation of various food products and by-product utilization.

CO7: To get knowledge of export of food industry

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

CO3 To study processing of food product

CO6: To learn about marketing of food industry

PO5-Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

CO1: To understand need and importance of working of machinery in industry

CO4: To understand technology behind preparation of various food products and by-product utilization.

PO6-Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.

CO4: To understand technology behind preparation of various food products and by-product utilization.

CO5: To study about waste management of food industry

PO7-Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.

CO4: To understand technology behind preparation of various food products and by-product utilization.

CO6: To learn about marketing of food industry

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.

CO1: To understand need and importance of working of machinery in industry

CO3 To study processing of food product

PO9-Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.

CO1: To understand need and importance of working of machinery in industry

CO3 To study processing of food product

CO6: To learn about marketing of food industry

PO10-Community Engagement: The students will be able to demonstrate the capability to participate in community-engaged services/activities for promoting the wellbeing of society

CO1: To understand need and importance of working of machinery in industry

CO3 To study processing of food product

CO7: To get knowledge of export of food industry