



**Anekant Education Society's**

**Tuljaram Chaturchand College,  
Baramati**

*(Autonomous)*

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

**(Faculty of Food Technology & Research)**

**TY B.Voc (Food Technology) Semester –VI**

**For Department Food Technology & Research**

**Tuljaram Chaturchand College,  
Baramati**

**To be implemented from Academic Year 2022-23**

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

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

**Autonomous**

**First Year: Semester-I**

Subj. Code	Subject Name	No. of Credits	Marks
<b>Theory (General Component)</b>			
FP-1	Principles of Food Preservation	4	100
FP-2	Food Microbiology - I	4	100
FP-3	Food Science - I	4	100
<b>Practical (Skill Component)</b>			
FP-1.1	Principles of Food Preservation	6	150
FP-1.2	Computer Application	6	150
FP-1.3	Food Science-I	6	150

**First Year: Semester-II**

Subj. Code	Subject Name	No. of Credits	Marks
<b>Theory (General Component)</b>			
FP-4	Nutrition Science	4	100
FP-5	Food Microbiology-II	4	100
FP-6	Food Science - II	4	100
<b>Practical (Skill Component)</b>			
FP-2.1	Nutrition Science	6	150
FP-2.2	Food Microbiology-II	6	150
FP-2.3	Soft Skill Development	6	150

**Second Year: Semester-III**

Subj. Code	Subject Name	No. of Credits	Marks
<b>Theory (General Component)</b>			
FP-7	Processing of Fruits, Vegetables & Plantation Crops	4	100
FP-8	Food Analytical Techniques	4	100
FP-9	Food Chemistry-I	4	100
<b>Practical (Skill Component)</b>			
FP-3.1	Processing of Fruits, Vegetables & Plantation crops	6	150
FP-3.2	Food Analytical Techniques	6	150
FP-3.3	Fundamentals in Bio-Statistics	6	150

**Second Year: Semester-IV**

Subj. Code	Subject Name	No. of Credits	Marks
<b>Theory (General Component)</b>			
FP-10	Processing of Cereal, Pulses and Oilseeds	4	100
FP-11	Bakery and Confectionery Technology	4	100

FP-12	Food Chemistry-II	4	100
<b>Practical (Skill Component)</b>			
FP-4.1	Processing of Cereal, Pulses and Oilseeds	6	150
FP-4.2	Bakery and Confectionary Technology	6	150
FP-4.3	Food Chemistry -II	6	150

### Third Year: Semester-V

Subj. Code	Subject Name	No. of Credits	Marks
<b>Theory (General Component)</b>			
FP-13	Dairy Technology	4	100
FP-14	Food Quality and Safety Management	4	100
FP-15	Principle of Post-Harvest Technology	4	100
<b>Practical (Skill Component)</b>			
FP-5.1	Dairy Technology	6	150
FP-5.2	Entrepreneurship Development	6	150
FP-5.3	Project	6	150

### Third Year: Semester-VI

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

**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.

## Programme Specific Outcomes (PSOs)

<b>PO-1</b>	<b>Disciplinary Knowledge</b>	Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and food technology & engineering and its other fields related to the program.
<b>PO-2</b>	<b>Communication Skills</b>	Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.
<b>PO-3</b>	<b>Critical Thinking</b>	Propose novel ideas in explaining the scientific data, facts and figures related to science and technology.
<b>PO-4</b>	<b>Analytical Reasoning and Problem Solving</b>	To enable the students with good scientific and engineering knowledge so as to comprehend, design, and create food products and devices for the food industry and provide solutions for the challenges in the food industry as well as in agriculture.
<b>PO-5</b>	<b>Sense of Inquiry</b>	Curiously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.
<b>PO-6</b>	<b>Use of Modern Tools</b>	Operate modern tools, equipment, instruments and laboratory techniques to perform the experiments and write the programs in different languages.
<b>PO-7</b>	<b>Research Skills</b>	Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.
<b>PO-8</b>	<b>Application of Knowledge</b>	Develop scientific outlook and apply the knowledge with respect to food technology.
<b>PO-9</b>	<b>Ethical Awareness</b>	To train students in professional and ethical attitude, effective communication skills, teamwork skills and multidisciplinary approaches related to food technology and engineering.
<b>PO-10</b>	<b>Teamwork</b>	Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and food technology & engineering and its other fields related to the program.
<b>PO-11</b>	<b>Environment and Sustainability</b>	Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.
<b>PO-12</b>	<b>Lifelong Learning</b>	Propose novel ideas in explaining the scientific data, facts and figures related to science and technology.

**Third Year**

**Semester VI**

**Animal Product Technology**

**Theory**

**Paper No. FP-16**

**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 learn about the slaughter house by product utilization and waste management.
- To study about the pre and post slaughter operations.

**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 the pre and post slaughter operations.

CO7: Learn about the slaughter house by product utilization and waste management.

**TOPIC-**

**Unit-1 Introduction**

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:**

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:**

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:**

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**

**References:**

1. Manay S.N. and Shadaksharaswamy M. (2001); Food facts and principles, 2<sup>nd</sup>edn, 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	PO11	PO12
CO1	1	-	-	-	2	-	-	2	-	1	-	-
CO2	3	2	1	-	-	-	-	4		3	2	1
CO3	1	-	-	2	3	-	-	-	-	1	-	-
CO4	-	-	-	-	-	5	3	-	-	-	-	-
CO5	2	1	1	3	-	2	-	-	-	2	1	1
CO6	2	2	1	4	-	-	1	-	-	2	2	1
CO7	3	-	-	-	-	-	-	-	-	3	-	-

Justification for the mapping

**PO1:- Disciplinary Knowledge** - Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.

**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 the pre and post slaughter operations.

**CO7:** Learn about the slaughter house by product utilization and waste management.

**PO2:- Communication Skills:-** Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.

**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 the pre and post slaughter operations.

**PO3- Critical Thinking :-** Propose novel ideas in explaining the scientific data, facts and figures related to

Science and technology.

**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 the pre and post slaughter operations.

**PO4- Analytical Reasoning and Problem Solving-** To enable the students with good scientific and engineering knowledge so as to comprehend, design, and create food products and devices for the food industry and provide solutions for the challenges in the food industry as well as in agriculture.

**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 the pre and post slaughter operations.

**PO5- Sense of Inquiry:-** Curiously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.

**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- Use of Modern Tools:-**

Operate modern tools, equipment, instruments and laboratory techniques to perform the experiments and write the programs in different languages.

**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 Skills:-** Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.

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

**CO6:** Study about the pre and post slaughter operations.

**PO8- Application of Knowledge:-** Develop a scientific outlook and apply the knowledge with respect to food technology.

**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;

**PO9- Ethical Awareness-** To train students in professional and ethical attitude, effective communication skills, team work skills and multidisciplinary approaches related to food technology and engineering.

**PO10:- Team Work -** Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.

**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 the pre and post slaughter operations.

**CO7:** Learn about the slaughter house by product utilization and waste management.

**PO11:- Environment and Sustainability:-** Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.

**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 the pre and post slaughter operations.

**Po12:- Lifelong Learning:-** Propose novel ideas in explaining the scientific data, facts and figures related to Science and technology.

**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 the pre and post slaughter operations.

**Third Year**

**Semester VI**

**PRACTICAL**

**Animal Product Technology  
Paper No. FP-6.1**

**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 learn about the process of determination of moisture content of meat
- To study about the pre and post slaughter operations.

**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 Estimation of protein content of meat by Micro-kjedahl Method  
CO4: Study about processing and preservation of animal foods.  
CO5: Identify and explain the product composition, quality and production process of commercially available selected animal food products.  
CO6: Study about the pre and post slaughter operations.  
CO7: Learn about the shelf-life of the animal products.

**TOPIC-**

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.

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	2	-	-	2	-	1	-	-
CO2	3	2	1	-	-	-	-	4		3	2	1
CO3	1	-	-	2	3	-	-	-	-	1	-	-
CO4	-	-	-	-	-	5	3	-	-	-	-	-
CO5	2	1	1	3	-	2	-	-	-	2	1	1
CO6	2	2	1	4	-	-	1	-	-	2	2	1
CO7	3	-	-	-	-	-	-	-	-	3	-	-

Justification for the mapping

**PO1:- Disciplinary Knowledge** - Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.

**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 the pre and post slaughter operations.

**CO7:** Learn about the slaughter house by product utilization and waste management.

**PO2:- Communication Skills:-** Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.

**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 the pre and post slaughter operations.

**PO3- Critical Thinking :-** Propose novel ideas in explaining the scientific data, facts and figures related to

Science and technology.

**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 the pre and post slaughter operations.

**PO4- Analytical Reasoning and Problem Solving-** To enable the students with good scientific and engineering knowledge so as to comprehend, design, and create food products and devices

for the food industry and provide solutions for the challenges in the food industry as well as in agriculture.

**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 the pre and post slaughter operations.

**PO5- Sense of Inquiry:-** Curiously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.

**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- Use of Modern Tools:-**

Operate modern tools, equipment, instruments and laboratory techniques to perform the experiments and write the programs in different languages.

**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 Skills:-** Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.

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

**CO6:** Study about the pre and post slaughter operations.

**PO8- Application of Knowledge:-** Develop a scientific outlook and apply the knowledge with respect to food technology.

**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;

**PO9- Ethical Awareness-** To train students in professional and ethical attitude, effective communication skills, team work skills and multidisciplinary approaches related to food technology and engineering.

**PO10:- Team Work -** Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.

**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 the pre and post slaughter operations.

**CO7:** Learn about the slaughter house by product utilization and waste management.

**PO11:- Environment and Sustainability:-** Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.

**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 the pre and post slaughter operations.

**Po12:- Lifelong Learning:-** Propose novel ideas in explaining the scientific data, facts and figures related to Science and technology.

**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 the pre and post slaughter operations.

**Third Year**

**Semester VI**

**Food Safety, Hygiene and Sanitation**

**Theory**

**Paper No. FP-17**

**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.
- Study about the Industrial by-products and waste utilization
- Learn about the importance of Importance of Safe Foods.
- Understand about the Control methods using physical and chemical agents

**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 the Industrial by-products and waste utilization

**TOPIC-**

**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	PO11	PO12
CO1	-	-	-	-	2	-	-	2	-	-	-	-
CO2	-	2	1	-	-	-	-	4	-	-	2	1
CO3	1	-	-	2	3	-	-	-	-	1	-	-
CO4	-	-	-	-	-	-	3	-	-	-	-	-
CO5	1	1	1	-	-	2	-	-	-	1	1	1
CO6	-	2	1	4	-	-	1	-	-	-	2	-
CO7	-	-	-	-	-	-	-	-	-	-	-	-

Justification for the mapping

**PO1:- Disciplinary Knowledge** - Understand the basic concepts, fundamental principles and experimental findings and the scientific the theories related to food technology, food science and Food technology & engineering and its other fields related to the program.

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

**CO5:** Apply a range of food quality systems so student will Understand the basic concepts

**CO7:** Study about the Industrial by-products and waste utilization

**PO2:- Communication Skills:-** Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.

**CO2:** Identify & prevent potential sources of food contamination and express their ideas for prevention.

**CO5:** Apply a range of food quality systems so student will Understand the basic concepts

**CO6:** Prepare a food safety plan so their thinking power can be grow more.

**PO3- Critical Thinking :-** Propose novel ideas in explaining the scientific data, facts and figures related to Science and technology.

**CO2:** Identify & prevent potential sources of food contamination and express their ideas for prevention.

**CO5:** Apply a range of food quality systems so student will Understand the basic concepts



**CO6:** Prepare a food safety plan so their thinking power can be grow more.

**PO4- Analytical Reasoning and Problem Solving-** To enable the students with good scientific and engineering knowledge so as to comprehend, design, and create food products and devices for the food industry and provide solutions for the challenges in the food industry as well as in agriculture.

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

**CO6:** Prepare a food safety plan so their thinking power can be grow more.

**PO5- Sense of Inquiry:-** Curiously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.

**CO1:** Identify food safety hazards and their control

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

**PO6- Use of Modern Tools:-**

Operate modern tools, equipment, instruments and laboratory techniques to perform the experiments and write the programs in different languages.

**CO5:** Apply a range of food quality systems so student will Understand the basic concepts

**PO7- Research Skills:-** Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.

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

**PO8- Application of Knowledge:-** Develop a scientific outlook and apply the knowledge with respect to food technology.

**CO1:** Identify food safety hazards and their control

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

**PO9- Ethical Awareness-** To train students in professional and ethical attitude, effective communication skills, team work skills and multidisciplinary approaches related to food technology and engineering.

**PO10:- Team Work -** Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.

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

**CO5:** Apply a range of food quality systems so student will Understand the basic concepts

**CO7:** Study about the Industrial by-products and waste utilization

**PO11:- Environment and Sustainability:-** Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.

**CO2:** Identify & prevent potential sources of food contamination and express their ideas for prevention.

**CO5:** Apply a range of food quality systems so student will Understand the basic concepts

**CO6:** Prepare a food safety plan so their thinking power can be grow more.

**Po12:- Lifelong Learning:-** Propose novel ideas in explaining the scientific data, facts and figures related to Science and technology.

**CO2:** Identify & prevent potential sources of food contamination and express their ideas for prevention.

**CO5:** Apply a range of food quality systems so student will Understand the basic concepts

**CO6:** Prepare a food safety plan so their thinking power can be grow more.

**Third Year**

**Semester VI**

**Theory**

**Packaging Technology  
Paper No. FP-18**

**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 about the working of various packaging instruments.
- To learn about the different forms of packaging used for packaging of food products.

**Course Outcomes:**

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

CO1: Understand the purpose and principles of food packaging.

CO2: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO3: Design solutions to packaging problems.

CO4: Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.

CO5: Explain knowledge of the legal, environmental, quality aspects associated with packaging materials and operations used in the food industry.

CO6: Understand the operations involved in packaging material manufacture.

CO7: Learn about the different forms of packaging used for packaging of food products.

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	1	-	3	5	4	2	-	1	-	1
CO2	3	2	1	-	2	-	-	4	-	-	2	1
CO3	1	-	3	2	3	-	-	-	-	3	2	-
CO4	-	-	-	-	-	5	3	-	5	-	4	-
CO5	2	-	-	3	5	-	5	4	6	2	-	-
CO6	2	-	1	5	-	6	-	4	5	2	2	1
CO7	3	-	1	-	5	6	-	-	-	-	2	1

**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	PO11	PO12
CO1	1	-	1	-	3	5	4	2	-	1	-	1
CO2	-	2	1	-	2	-	-	4	-	-	2	1
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	2	1
CO7	-	2	1	-	5	6	-	-	-	-	2	1

Justification for the mapping

**PO1:- Disciplinary Knowledge** - Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.

**CO1:** Students will be able to understand major food preservation techniques.

**CO3:** Students may know about the safety & wholesomeness and their use.

**CO5:** Students will be able to understand operations involved in packaging material manufacturing

**CO6:** Students will be able to understand major packaging material and methods used in food packaging.

**PO2:- Communication Skills:-** Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.

**CO2:** Students will learn about the packaging techniques, and underlying principles.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging.

**CO7:** Students will learn about effect of advance processing techniques on food product.

**PO3- Critical Thinking :-** Propose novel ideas in explaining the scientific data, facts and figures related to Science and technology.

**CO1:** Students will be able to understand major food preservation techniques.

**CO2:** Students will learn about the packaging techniques, and underlying principles.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging.

**CO7:** Students will learn about effect of advance processing techniques on food product.

**PO4- Analytical Reasoning and Problem Solving-** To enable the students with good scientific and engineering knowledge so as to comprehend, design, and create food products and devices for the food industry and provide solutions for the challenges in the food industry as well as in agriculture.

**CO3:** Students may know about the safety & wholesomeness and their use.

**CO5:** Students will be able to understand operations involved in packaging material manufacturing and their advantages.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging and how to use them.

**PO5- Sense of Inquiry:-** Curiously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.

**CO1:** Students will be able to understand major food preservation techniques.

**CO2:** Students will learn about the packaging techniques, and underlying principles.

**CO3:** Students may know about the safety & wholesomeness and their use.

**CO5:** Students will be able to understand operations involved in packaging material manufacturing and their advantages.

**CO7:** Students will learn about effect of advance processing techniques on food product and their effect on the food.

**PO6- Use of Modern Tools:-**

Operate modern tools, equipment, instruments and laboratory techniques to perform the experiments and write the programs in different languages.

**CO1:** Students will be able to understand major food preservation techniques.

**CO4:** Students will be able to understand Novel food processing methods like thermal processing, cold preservation etc.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging and how to use them.

**CO7:** Students will learn about effect of advance processing techniques on food product and their effect on the food.

**PO7- Research Skills:-** Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.

**CO1:** Students will be able to understand major food preservation techniques.

**CO4:** Students will be able to understand Novel food processing methods like thermal processing, cold preservation etc.

**CO5:** Students will be able to understand operations involved in packaging material manufacturing and their advantages.

**PO8- Application of Knowledge:-** Develop a scientific outlook and apply the knowledge with respect to food technology.

**CO1:** Students will be able to understand major food preservation techniques.

**CO2:** Students will learn about the packaging techniques, and underlying principles.

**CO5:** Students will be able to understand operations involved in packaging material manufacturing and their advantages.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging and how to use them.

**PO9- Ethical Awareness-** To train students in professional and ethical attitude, effective communication skills, team work skills and multidisciplinary approaches related to food technology and engineering.

**CO4:** Students will be able to understand Novel food processing methods like thermal processing, cold preservation etc.

**CO5:** Students will be able to understand operations involved in packaging material manufacturing and their advantages.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging and how to use them

**PO10:- Team Work** - Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.

**CO1:** Students will be able to understand major food preservation techniques.

**CO3:** Students may know about the safety & wholesomeness and their use.

**CO5:** Students will be able to understand operations involved in packaging material manufacturing

**CO6:** Students will be able to understand major packaging material and methods used in food packaging.

**PO11:- Environment and Sustainability:-** Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.

**CO2:** Students will learn about the packaging techniques, and underlying principles.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging.

**CO7:** Students will learn about effect of advance processing techniques on food product.

**PO12:- Lifelong Learning:-** Propose novel ideas in explaining the scientific data, facts and figures related to Science and technology.

**CO1:** Students will be able to understand major food preservation techniques.

**CO2:** Students will learn about the packaging techniques, and underlying principles.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging.

**CO7:** Students will learn about effect of advance processing techniques on food product.

**Third Year**

**Semester VI**

**PRACTICAL**

**Packaging Technology  
Paper No. FP-6.2**

**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 about the working of various packaging instruments.
- To learn about the different forms of packaging used for packaging of food products.

**Course Outcomes:**

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

CO1: Understand the purpose and principles of food packaging.

CO2: Describe the role and function of packaging materials used for a range of consumer food needs and wants.

CO3: Design solutions to packaging problems.

CO4: Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.

CO5: Explain knowledge of the legal, environmental, quality aspects associated with packaging materials and operations used in the food industry.

CO6: Understand the operations involved in packaging material manufacture.

CO7: Learn about the different forms of packaging used for packaging of food products.

**TOPIC**

- 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 & Gowramma RV. 1996. *Food Packaging Materials*. Tata McGraw Hill.
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17. Sacharow S & Griffin RC. 1980. *Principles of Food Packaging*. AVI Publ.
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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	PO11	PO12
CO1	1	-	1	-	3	5	4	2	-	1	-	1
CO2	-	2	1	-	2	-	-	4		-	2	1
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	2	1
CO7	-	2	1	-	5	6	-	-	-	-	2	1

Justification for the mapping

**PO1:- Disciplinary Knowledge** - Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.

**CO1:** Students will be able to understand major food preservation techniques.

**CO3:** Students may know about the safety & wholesomeness and their use.

**CO5:** Students will be able to understand operations involved in packaging material manufacturing

**CO6:** Students will be able to understand major packaging material and methods used in food packaging.

**PO2:- Communication Skills:-** Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.

**CO2:** Students will learn about the packaging techniques, and underlying principles.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging.

**CO7:** Students will learn about effect of advance processing techniques on food product.

**PO3- Critical Thinking :-** Propose novel ideas in explaining the scientific data, facts and figures related to Science and technology.

**CO1:** Students will be able to understand major food preservation techniques.

**CO2:** Students will learn about the packaging techniques, and underlying principles.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging.

**CO7:** Students will learn about effect of advance processing techniques on food product.

**PO4- Analytical Reasoning and Problem Solving-** To enable the students with good scientific and engineering knowledge so as to comprehend, design, and create food products and devices for the food industry and provide solutions for the challenges in the food industry as well as in agriculture.

**CO3:** Students may know about the safety & wholesomeness and their use.

**CO5:** Students will be able to understand operations involved in packaging material manufacturing and their advantages.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging and how to use them.

**PO5- Sense of Inquiry:-** Curiously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.

**CO1:** Students will be able to understand major food preservation techniques.

**CO2:** Students will learn about the packaging techniques, and underlying principles.

**CO3:** Students may know about the safety & wholesomeness and their use.

**CO5:** Students will be able to understand operations involved in packaging material manufacturing and their advantages.

**CO7:** Students will learn about effect of advance processing techniques on food product and their effect on the food.

**PO6- Use of Modern Tools:-**

Operate modern tools, equipment, instruments and laboratory techniques to perform the experiments and write the programs in different languages.

**CO1:** Students will be able to understand major food preservation techniques.

**CO4:** Students will be able to understand Novel food processing methods like thermal processing, cold preservation etc.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging and how to use them.

**CO7:** Students will learn about effect of advance processing techniques on food product and their effect on the food.

**PO7- Research Skills:-** Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.

**CO1:** Students will be able to understand major food preservation techniques.

**CO4:** Students will be able to understand Novel food processing methods like thermal processing, cold preservation etc.

**CO5:** Students will be able to understand operations involved in packaging material manufacturing and their advantages.

**PO8- Application of Knowledge:-** Develop a scientific outlook and apply the knowledge with respect to food technology.

**CO1:** Students will be able to understand major food preservation techniques.

**CO2:** Students will learn about the packaging techniques, and underlying principles.

**CO5:** Students will be able to understand operations involved in packaging material manufacturing and their advantages.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging and how to use them.

**PO9- Ethical Awareness-** To train students in professional and ethical attitude, effective communication skills, team work skills and multidisciplinary approaches related to food technology and engineering.

**CO4:** Students will be able to understand Novel food processing methods like thermal processing, cold preservation etc.

**CO5:** Students will be able to understand operations involved in packaging material manufacturing and their advantages.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging and how to use them

**PO10:- Team Work -** Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.

**CO1:** Students will be able to understand major food preservation techniques.

**CO3:** Students may know about the safety & wholesomeness and their use.

**CO5:** Students will be able to understand operations involved in packaging material manufacturing

**CO6:** Students will be able to understand major packaging material and methods used in food packaging.

**PO11:- Environment and Sustainability:-** Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.

**CO2:** Students will learn about the packaging techniques, and underlying principles.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging.

**CO7:** Students will learn about effect of advance processing techniques on food product.

**PO12:- Lifelong Learning:-** Propose novel ideas in explaining the scientific data, facts and figures related to Science and technology.

**CO1:** Students will be able to understand major food preservation techniques.

**CO2:** Students will learn about the packaging techniques, and underlying principles.

**CO6:** Students will be able to understand major packaging material and methods used in food packaging.

**CO7:** Students will learn about effect of advance processing techniques on food product.

**Third Year**

**Semester VI**

**Internship**

**PRACTICAL**

**Paper No. FP-6.3**

**Maximum Marks: 150**

**Credits: 6**

**Teaching Period: 2/week**

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

**Learning Objectives:**

- To understand the working of food processing industry.
- To impart knowledge and skills related to food processing industries
- To understand about the marketing survey of food product.
- To understand the operations used in food processing industry.
- To study about the different food standards used in food industry.
- To learn about the maintenance of personal hygiene & food safety in food processing industry.

**Course Outcomes:**

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

- CO1: Understand the working of food processing industry.
- CO2: Impart knowledge and skills related to food processing industries
- CO3: understand about the marketing survey of food product.
- CO4: Understand the operations used in food processing industry.
- CO5: Explain knowledge of the legal, environmental, quality aspects associated with operations used in the food industry.
- CO6: Study about the different food standards used in food industry.
- CO7: Learn about the maintenance of personal hygiene & food safety in food processing industry.

**INFORMATION-**

Students should undergo a 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	PO11	PO12
CO1	2	-	-	-	4	-	-	3	4	2	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	2
CO3	3	-	-	2	-	-	-	1	2	3	-	-
CO4	-	1	1	-	2	2	1	-	-	-	1	1
CO5	-	2	-	-	-	2	-	-	-	-	2	-
CO6	-	-	-	4	-	-	1	-	1	-	-	-
CO7	3	-	1	-	-	-	-	-	-	3	-	1

Justification for the mapping

**PO1:- Disciplinary Knowledge** - Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.

**CO1:** Understand the working of food processing industry and their rules.

**CO3:** Student will understand about the marketing survey of food product and learn about marketing.

**CO7:** Learn about the maintenance of personal hygiene & food safety in food processing industry.

**PO2:- Communication Skills:-** Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.

**CO4:** Understand the operations used in food processing industry.

**CO5:** Explain knowledge of the legal, environmental, quality aspects associated with operations used in the food industry.

**PO3- Critical Thinking :-** Propose novel ideas in explaining the scientific data, facts and figures related to Science and technology.

**CO2:** Impart knowledge and skills related to food processing industries will learn about effect of advance processing techniques on food product.

**CO4:** Understand the operations used in food processing industry.

**CO7:** Learn about the maintenance of personal hygiene & food safety in food processing industry.

**PO4- Analytical Reasoning and Problem Solving-** To enable the students with good scientific and engineering knowledge so as to comprehend, design, and create food products and devices for the food industry and provide solutions for the challenges in the food industry as well as in agriculture.

**CO3:** Student will understand about the marketing survey of food product and learn about marketing.

**CO6:** Study about the different food standards used in food industry and learn their advantages and disadvantages.

**PO5- Sense of Inquiry:-** Curiously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.

**CO1:** Understand the working of food processing industry and their rules.

**CO4:** Understand the operations used in food processing industry.

**PO6- Use of Modern Tools:-**

Operate modern tools, equipment, instruments and laboratory techniques to perform the experiments and write the programs in different languages.

**CO4:** Understand the operations used in food processing industry.

**CO5:** Explain knowledge of the legal, environmental, quality aspects associated with operations used in the food industry.

**PO7- Research Skills:-** Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.

**CO4:** Understand the operations used in food processing industry.

**CO6:** Study about the different food standards used in food industry and learn their advantages and disadvantages.

**PO8- Application of Knowledge:-** Develop a scientific outlook and apply the knowledge with respect to food technology.

**CO1:** Understand the working of food processing industry and their rules.

**CO3:** Student will understand about the marketing survey of food product and learn about marketing.

**PO9- Ethical Awareness-** To train students in professional and ethical attitude, effective communication skills, team work skills and multidisciplinary approaches related to food technology and engineering.

**CO1:** Understand the working of food processing industry and their rules.

**CO3:** Student will understand about the marketing survey of food product and learn about marketing.

**PO10:- Team Work -** Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and Food technology & engineering and its other fields related to the program.

**CO1:** Understand the working of food processing industry and their rules.

**CO3:** Student will understand about the marketing survey of food product and learn about marketing.

**PO11:- Environment and Sustainability:-** Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.

**CO4:** Understand the operations used in food processing industry.

**CO5:** Explain knowledge of the legal, environmental, quality aspects associated with operations used in the food industry.

**PO12:- Lifelong Learning:-** Propose novel ideas in explaining the scientific data, facts and figures related to Science and technology.

**CO2:** Impart knowledge and skills related to food processing industries will learn about effect of advance processing techniques on food product.

**CO4:** Understand the operations used in food processing industry.

**CO7:** Learn about the maintenance of personal hygiene & food safety in food processing industry.