Proposed subjects / papers for the General Education & Skill component
Food Processing Technology (M. Voc. Programme)

First year: Semester I

Sr. No.	Subject Name	No. of Credits	Marks
Theory (General Education Component)			
FPT-101	Food Microbiology	4	100
FPT-102	Food Chemistry and Analysis	4	100
FPT-103	Nutrition Science	4	100
Practicals (Skill Component)			
FPT- 1.1	Food Microbiology	6	150
FPT- 1.2	Food Chemistry and Analysis	6	150
FPT- 1.3	Bakery and Confectionery Technology	6	150

Semester II

Sr. No.	Subject Name	No. of Credits	Marks
Theory (General Education Component)			
FPT- 201	Beverage and Snack Food Technology	4	100
FPT- 202	Food Additives, Contaminants and Toxicology	4	100
FPT- 203	Advances in Food Processing & Packaging	4	100
Practicals (Skill Component)			
FPT- 2.1	Beverage and Snack Food Technology	6	150
FPT- 2.2	Processing of Fruits and Vegetables	6	150
FPT- 2.3	Advances in Food Processing & Packaging	6	150

Second year: Semester III

Sr. No.	Subject Name	No. of Credits	Marks
Theory (General Education Component)			
FPT- 301	Elective-1: Dairy Processing Technology Elective-2: Meat Processing Technology	4	100
FPT- 302	Post-Harvest Technology	4	100
FPT-303	Food Safety and Quality Management	4	100
Practicals (Skill Component)			
FPT- 3.1	Dairy Processing Technology	6	150
FPT- 3.2	Post-Harvest Technology	6	150
FPT- 3.3	Statistics and Research Methodology	4	100
FPT- 3.4	Industrial training/Dissertation part-I	2	50

Semester IV

Sr. No.	Subject Name	No. of Credits	Marks
Practicals (Skill Component)			
FPT-4.1	Seminar based on case study	6	150
FPT-4.2	Industrial Visit	6	150
FPT-4.2	Industrial training/Dissertation Part-2	18	450

Note:

- One compulsory visit to field/industry/institute for practical papers in all semesters
- Report Submission and PPT presentation of visit report is mandatory
- Seminar Report preparation and PPT presentation mandatory for each theory papers.
- Group discussion/case study based on local/regional/national social economic aspects.

Second Year Semester III

Elective-1: Dairy Processing Technology

Theory **Paper No. – FPT-301**
Maximum Marks: 100 **Credits: 4**
Teaching Period: 4/week **Teaching Load: 60 Theory Period/ Semester**

Learning Objectives:

- To gain knowledge of biochemical foundation to understand the composition of milk with the chemistry structure and function of its individual components.
- To optimize the learning process including various dairy products from the perspective of changes in milk and its constituents, upon processing.
- To develop the skills for processing of milk products by different methods.

Learning Outcome:

- Students will understand the concept of processing of milk and milk products.
- The students will able to explain the basics behind milk process technology that would comparatively help to get the knowledge of technical views regarding industrial aspect.

Unit I: Chemistry of milk **12 P**

Definition of milk, present scenario of milk and milk products in India and Global. Structure and composition of milk, Enzymes in milk. Structural elements in milk: Surface phenomenon, colloidal interactions, casein micelles, fat globules.

Unit II: Cheese Technology **12 P**

Definition, Standards, Classification, Nutritive value and basic principles of milk for cheese making. Role of starter culture in cheese making, Rennet importance, preparation and its properties, varieties and types of cheese with packaging, Storage and distribution of cheese.

Unit III: Condensed and Dried milk Products **12 P**

Introduction, Status, Legal standards of condensed and dried milk, Manufacturing of condensed and evaporated milk. Drying Mechanics: Drum roller drying, freeze drying, Vacuum, Foam drying and Spray drying, Pilot sterilization and heat stabilization for evaporated milk,

Unit IV: Fat Rich Dairy Products **12P**

Status of lipids in milk, Types of fat rich dairy products, Production and processing of cream, butter and ghee, Packaging storage and distribution of cream, butter and ghee.

Unit V: Supply Chain Management of Dairy Products **12 P**

Need for the cooperative model, Distortions in supply chain, Challenges faced by the Indian Dairy Supply Chain.

Second Year **Semester III**

Elective-2: Meat Processing Technology

Theory **Paper No. – FPT-301**

Maximum Marks: 100 **Credits: 4**

Teaching Period: 4/week **Teaching Load: 60 Theory Period/ Semester**

Learning outcomes

- Learn the structure, composition and nutritive value of meat
- Will be able to identify different types and cuts used for slaughtering
- Able to identify the changes that occurs during processing
- Will learn about factors determining meat quality

Unit I: Introduction to Meat technology **15 P**

Sources of meat and meat products in India, scope of meat chicken and seafood processing, terminologies related to meat, chemical composition and microscopic structure of meat, slaughtering of animals, inspection and grading of meat

Factors affecting post mortem changes, properties and shelf life of meat, meat quality, meat refrigeration, evaluation, mechanical deboning, tenderization, aging, pickling and smoking of meat, meat plant sanitation, meat based value added products

Unit II: Poultry **10 P**

Poultry classification, composition, preservation and processing - slaughtering, stunning methods, ante-mortem handling, cuts

Unit III: Egg **10 P**

Structure, composition, nutritive value and functional properties of egg, preservative by different methods, processing of egg products, factors affecting quality of egg

Unit IV: Fisheries **10 P**

Introduction to fisheries, Composition and Nutritive value of fish, types of fish, composition, structure, post-mortem changes, handling, canning, smoking, salting, dehydration and icing and preparation

Unit-V: **15P**

- **Introduction of Animal By product:** Need & Importance of by product processing, handling & utilization of skin, intestine, glands and fallen animals
- **By-product processing plants:** By-product processing plant layout, rendering & poultry by products and utilization of bone, blood, hoof, horn, wool and hair.
- **Waste disposal:** Utilization & disposal of organic waste from slaughterhouse and effluent treatment

Second Year **Semester III**

Dairy Processing Technology

Practical **Paper No. – FPT-3.1**

Maximum Marks: 150 **Credits: 6**

Teaching Period: 6/week **Teaching Load: 30 Practicals Period/ Semester (4 Period each)**

1. Study of manufacturing of cheese 3P
2. Preparation of acid casein 2P
3. Preparation of sweet condensed milk 2P
4. Skim milk Powder making by spray drying 2P
5. Preparation of protein enriched ice cream 1P
6. Preparation of table cream 2P
7. Preparation of butter 2P
8. Preparation of ghee 2P
9. Preparation of fermented milk product 4P
    a) Preparation of chakka
    b) Preparation of flavoured yoghurt
    c) Preparation of whey-based beverages
    d) Preparation of sour milk (kefir)
10. Preparation of traditional milk product 2P
11. Study of plant layout design of milk industries 3P
12. Visit to Industry 3P
13. Preparation of Report on Industrial Visit 2P

References

1. K. S. Sharma-Dairy chemistry.
2. Milk and Milk Products by Eckles and Eckles .
3. Outlines of Dairy Technology by Sukmar De
4. Dairy Plant System and Layout by Tufail Ashmed
5. Principles of Dairy Technology by Woarner 5. Dairy Engineering by Forvall
6. Milk & Milk Products by CBSE 7. Chemistry & Testing of Dairy Products by Atherton Newlander

Second Year Semester III

Post Harvest Technology

Theory **Paper No. – FPT-302**
Maximum Marks: 100 **Credits: 4**
Teaching Period: 4/week **Teaching Load: 60 Theory Period/ Semester**

Learning Objectives:

- To aware the techniques related to post harvest practices.
- To learn the thorough knowledge of fruits, vegetables and plantation crops right from harvesting to the end product.
- To develop the skills for processing post harvested produce.

Learning Outcome:

- Students will acknowledge the steps and techniques involved in post -harvest practices.
- The students will able to explain processing and packaging operations.

Unit-I Unit Operations in Post Harvest Technology 15P

Unit operations of food processing viz. grading, sorting, peeling and size reduction machineries for various unit operations, energy balance in food processing. Size reduction process: Principles, theories and laws, energy considerations, equipments. Mixing and forming, theory and applications, mixing indices, equipments for solid and liquid.

Mass, Energy balance and Heat transfer: Steam injection, steam infusion, plate heat exchangers, tubular heat exchangers and scraped surface heat exchangers, Thermal processing: Death kinetics, thermal death curve, decimal reduction time. Z-factor, heat penetration curve, process time calculations, mathematical curve, mathematical and graphical solutions

Unit II: Post-harvest technology of fruits, vegetables & plantation crops 15 P

Importance of post-harvest technology in fruits vegetables and horticultural produce. Maturity indices, harvesting, handling, grading of fruits, vegetables, plantation crops. Pre-harvest factors affecting quality, factors responsible for deterioration of fruits and vegetables, physiological and bio-chemical changes, hardening and delaying ripening process. Post-harvest treatments of plantation crops. Quality parameters and specification

Unit II: Processing and packaging operations 10 P

Cooling treatments for fruits, vegetables and plantation crops including cold chain operations.

Pack house operations: Cleaning, sorting, grading, disinfection & packaging. Ripening methods and study of ripening agents (Ethylene). Technology involved in pack house operations. Physical, physiological and biochemical changes during ripening of fruits and vegetables. Products and by products of plantation crops: cashew, areca nut, coconut

Unit IV: Transport, postharvest disorders, and post-harvest loss 10P

Modes of transportation, postharvest disorders, pest and diseases and their management in major horticultural crops, Factors affecting the quality of fruits and vegetables.

Unit V: Export of post -harvest produces 10 P

WTO guidelines for export of horticultural produces – CODEX standards and export standards for major fruits, vegetables and plantation crops.

Second Year **Semester III**

Post Harvest Technology

Practical **Paper No. – FPT-3.2**
Maximum Marks: 150 **Credits: 6**
Teaching Period: 6/week **Teaching Load: 30 Practicals Period/ Semester (4 Period each)**

1. Study of maturity indices of 3P
    a) Fruits
    b) Vegetables
    c) Plantation crops
2. Study of post-harvest methods in fruits and vegetables with its harvest indices 3P
3. Evaluation of physical, and biochemical changes during ripening of fruits. 3P
4. Assessment of storage technologies involved during post- harvest practices 2P
5. Study of post-harvest diseases 2P
6. Demonstration of different packaging material used in fruits, vegetables and plantation crops packing 2P
7. Evaluation of physiological loss in weight and quality of horticultural produce.2P
8. Practices in pack house treatment of fruits, vegetables and plantation crops 2P
9. Study of cold storage of grapes and bananas 2P
10. Assessment of grading of plantation crops and fruits 2P
11. Preparation of value-added product from plantation crop 2P
12. Visit to cold storage units/ Packaging house units 3P
13. Preparation of Report on Industrial Visit 2P

References:

1. Haid, N.F. and S.K. Salakahe.1997. Post -harvest physiology and hardening of fruits and vegetables. Greada Publication, London.
2. Chadha, K .L. and O. P. Pareek, 1996. Advances in horticulture. Malhotra Publishers, New Delhi. 1997.
3. Pandey, P. H. Post- harvest technology of fruits and vegetables 1997. Technical publishers of India, Allahabad.
4. Jacob John, P., 2008. A Handbook on postharvest management of fruits and
5. Joseph, J. Jen. 1989. Quality factors of fruits and vegetables. Chemistry and technology 1989. American Chemical Society, Washington.
6. Pandey, P. H. 1998. Principles and practices of post -harvest technology. Kalyani Publishers, New Delhi.

Second Year Semester III

Food safety and Quality Management

Theory **Paper No. – FPT-303**

Maximum Marks: 100 **Credits: 4**

Teaching Period: 4/week **Teaching Load: 60 Theory Period/ Semester**

Learning Objectives:

- Study of analysis of the quality parameters of food products.
- To gain knowledge of different food processing operations with certain quality parameters.

Learning Outcome:

- Students will understand the concept of quality management in food processing.
- The students will able to explain the degree of standard of any processed product.

Unit I: Food safety: Overview **12 P**

Importance of food safety, Food quality attributes, Factors affecting food safety

Unit II: Food quality management **12 P**

Food quality management systems, HACCP: Principles, examples, Application of HACCP in field level

Unit III: Good manufacturing practices (GMP) **12P**

personal cleanliness, buildings and facilities, sanitary operations, sanitary facilities and controls. Equipment and utensils, production and process control, warehousing and distribution, traceability and recall

Unit IV: Food Safety Management Systems (FSMS) **12P**

ISO, Codex Alimentarius Commission (CAC) guidelines for food quality management

Unit V: Food safety and Food Quality **12 P**

Approach of food industries to the food safety and food quality interpretation

References:

1. CAC (Codex Alimentarius Commission). 2007. Codex Alimentarius Commission – Procedural manual. Joint FAO/WHO Food Standards Programme. FAO, Rome, Italy.
2. James SJ, and James C (2010) Advances in the cold chain to improve food safety, food quality and the food supply chain. In: Mena C, Stevens G (Eds) Delivering performance in food supply chains.

Second Year Semester III

Statistics and Research Methodology

Practical **Paper No. – FPT-3.3**
Maximum Marks: 100 **Credits: 4**
Teaching Period: 4/week **Teaching Load: 30 Practicals Period/ Semester (4 Period each)**

Learning Objectives:

- Study of research methodologies.
- To gain knowledge of different technical aspect of research and statistical steps involved in research process.

Learning Outcome:

- Students will understand the statistical error in the research and to overcome the research problems.
- The students will acknowledge the methods of research as well as Stastical background of any research.

Module-1: Introduction of Research Design **4 P**

Steps in the Process of Research

Identifying a hypothesis and/or research problem, specifying a purpose, creating research questions, Reviewing literature, Ethics of research and informed consent.

Module II: Introduction to Qualitative Research **4 P**

Essence of Qualitative data, Data Sampling and Collection Techniques

Module III: Introduction to Quantitative Research **4 P**

Essence of Quantitative Data and Collection and Analysis Techniques

Module IV: Interpreting Qualitative Data **4 P**

Qualitative Data Analysis Procedures, Coding and Thematic development

Module V: Preparation of Research article **4 P**

Use of techniques and writing about findings, Intellectual property rights (IPRs): Concept of IP and IPR; Patents; Copyright; Industrial designs; Trade secrets; Ethics in publication; Plagiarism and open access publishing

References:

John Creswell Research Design: Qualitative, Quantitative, and Mixed Methods Approaches

Second Year Semester III

Dissertation part-1

Practical **Paper No. – FPT-3.4**
Maximum Marks: 50 **Credits: 2**
Teaching Period: 2/week **Teaching Load: 10 Practicals Period/ Semester (4 Period each)**

The dissertation shall consist of a report on any research work or a comprehensive and critical review of recent development in the subject or detailed report of the project work consisting of a design and / or development work being carried out by the candidate. The report must include comprehensive literature work and detailed work plan on the topic selected for dissertation.

Term work:

The dissertation part-I will be in the form of seminar report on the project work being carried out by the candidate and will be assessed by review committee with minimum three examiners (guide/co-guide, examiners and senior faculty member from the department).

Viva-Voce:

It shall consist of a PPT presentation by the examinee on his work in the presence of examination committee.

Note: Dissertation/research work/in-plant training will be distributed according to merit basis. E.g. 1st 50% students on the basis of merit can choose in-plant training/dissertation work while next 50% student dissertation/research work mandatory. Monthly report submission is compulsory in case of industrial training.

Second Year Semester IV

Seminar based on case study

Practical **Paper No. – FPT-4.1**
Maximum Marks: 150 **Credits: 6**
Teaching Period: 6/week **Teaching Load: 10 Practicals Period/ Semester (4 Period each)**

The seminar, on any topic pertaining to food technology, would involve:

a) Exhaustive literature review, comprising of at least 100 references, based on various reputed journals (peer reviewed), conference proceedings, latest books, etc.
b) Preparation, submission and presentation of a review paper (1 Hard copy of paper and a soft copy of paper and presentation)
c) Secondary data analysis and its interpretation to bring out the finding.
d) Preparation, submission and presentation of the seminar report (3 Hard copies of seminar report and a soft copy of seminar report and presentation)

Viva-Voce:

It shall consist of a PPT presentation by the examinee on his work in the presence of examiners.

Second Year Semester IV

Industrial Visit

Practical **Paper No. – FPT-4.2**
Maximum Marks: 150 **Credits: 6**
Teaching Period: 6/week **Teaching Load: 10 Practicals Period/ Semester (4 Period each)**

- Educational tour of one to two weeks to various industries within and outside the state of the university and submission of report on industrial tour carrying a weightage of 6 credit hours.
- Preparation, submission and presentation of the industrial visit report (3 Hard copies of report and a soft copy of report and presentation).

Viva-Voce:

It shall consist of a PPT presentation by the examinee on his work in the presence of examiners.

Second Year Semester IV

Dissertation Part-II

Practical **Paper No. – FPT-4.3**
Maximum Marks: 600 **Credits: 18**
Teaching Period: 24/week **Teaching Load: 120 Practicals Period/ Semester (4 Period each)**

The dissertation part-II will be in continuation of dissertation part-I and shall consist of a report on the research work done by the candidate or a detailed report of the project work consisting of a design and /or development work that the candidate has executed. The examinee shall submit the dissertation in five copies to the head of the department duly certified by the guide, head of department and the Principal that the work has been satisfactorily completed. If candidates performed work in other institute, they have to submit separate copies of dissertation as per the requirement to the institute.

If the company will provide in plant training to the candidates then they have to submit monthly progress report along with attendance report to the department duly signed by the Factory manager/HR manager.

Term work:

The dissertation will be assessed by examination panel with two with minimum two examiners (External Examiners and senior faculty member from the department).

Viva-Voce:

It shall consist of a PPT presentation by the examinee on his work in the presence of examination panels.