



Revised Proposed Syllabus  
For  
**M. Voc.**  
**(Food Processing Technology)**  
**(Autonomous)**

Sponsored by  
**University Grant Commission**

Under  
**National Skill Qualification Framework (NSQF)**

To be implemented from  
2023-24

**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
<b>Theory (General Education Component)</b>			
PMFP111	Food Microbiology	4	100
PMFP112	Food Chemistry and Analysis	4	100
PMFP113	Nutrition Science	4	100
<b>Practicals (Skill Component)</b>			
PMFP114	Food Microbiology	6	150
PMFP115	Food Chemistry and Analysis	6	150
PMFP116	Bakery and Confectionery Technology	6	150

**Semester II**

Sr. No.	Subject Name	No. of Credits	Marks
<b>Theory (General Education Component)</b>			
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
<b>Practicals (Skill Component)</b>			
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
<b>Theory (General Education Component)</b>			
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
<b>Practicals (Skill Component)</b>			
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
<b>Practicals (Skill Component)</b>			
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.

**Title of the Course: M. Voc. (Food Processing Technology)**  
**(To be implemented from Academic Year - 2022-2023)**

**Course Structure:**

- M. Voc. is two year post graduate programme with three general education courses and three skill components courses in each semester
- Each general education course will be of four credits and each credit is of 15 periods.
- Each skill component course will be of six credits and each credit is of 15 periods.
- Each period is of one clock hour.
- In each skill component course there will be one visit to the relevant industry/ institute.
- In addition to the regular practical are based on the theory course, special emphasis will be on communications and soft skills development of the students.

**Eligibility:**

- 1) First Year M.Voc. (Post Graduate Diploma): A student who has passed the graduation degree (10+2+3) in any stream or its equivalent examination.
- 2) Second Year M.Voc. (Post Graduate Degree): Satisfactorily keeping terms of First Year of M. Voc. and if they fulfill the eligibility conditions.

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

**Examination Pattern:**

**Pattern of Examination: Semester:**

- General education courses (Theory paper) - I, II, and III Semester.
- Skill Component (Practical Course): Practical examination will be conducted.
- Weight-age of marks in each course: Internal continues assessment (50%) and end semester examination (50%)

**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.

## 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 be 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****Maximum Marks: 150****Teaching Period: 6/week****Paper No. – FPT-3.2****Credits: 6****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:**

- Haid, N.F. and S.K. Salakahe.1997. Post-harvest physiology and hardening of fruits and vegetables. Greeda Publication, London.
- Chadha, K.L. and O. P. Pareek, 1996. Advances in horticulture. Malhotra Publishers, New Delhi. 1997.
- 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 be 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. 1<sup>st</sup> 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**

**Maximum Marks: 150**

**Teaching Period: 6/week**

**Paper No. – FPT-4.1**

**Credits: 6**

**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**

**Maximum Marks: 150**

**Teaching Period: 6/week**

**Paper No. – FPT-4.2**

**Credits: 6**

**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**

**Maximum Marks: 600**

**Teaching Period: 24/week**

**Paper No. – FPT-4.3**

**Credits: 18**

**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

