Anekant Education Society's

Tuljaram Chaturchand College, Baramati

(Autonomous)

Two Year M.Voc Degree Program in
Food Technology & Research

(Faculty of Food Technology& Research)

CBCS Syllabus

FY M.Voc (Food Technology) Semester -III

For Department Food Technology & Research

Tuljaram Chaturchand College, Baramati

Choice Based Credit System Syllabus(2023 Pattern)

(AsPerNEP2020)

TobeimplementedfromAcademicYear2024-2025

Title of the Programme : FY M.Voc (Food Technology & Research)

Preamble

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

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

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

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

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

Programme Specific Outcomes (PSOs)

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

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

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

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

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

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

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

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

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

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

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

AnekantEducationSociety's

TuljaramChaturchandCollege,Baramati

(Autonomous)

BoardofStudies(BOS) M.Voc. Food Technology & Research

From2022-23to2024-25

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

Information

1. **One semester** = 15 weeks (12 weeks actual teaching and 3 weeks for internal evaluation, tutorials, problem solutions, student's difficulty solution, etc.)
2. As per NCrF :
   - Theory course: A minimum of 15 hours of teaching per credit is required.
   - Laboratory course: A minimum of 30 hours in laboratory activities per credit is required.
3. **1-credit theory** = 15 hours i.e. for 1 credit, 1 hour per week teaching is to be performed.

   15 hours of 1-credit are splinted as 12 hours actual teaching + 3 hours Tutorial (practice problem solving sessions, repeated discussion on difficult topics, and discussion on student's difficulties, questions discussion and internal evaluation)

4. **1-credit practical** = 30 hours. Thus, 1 credit practical = 2 contact hours in laboratory per week

   30 hours splinted as 24 hours' actual table work and 6 hours for journal competition, oral on each practical and other internal evaluation.

5. **Each theory courses of any type** (Major, Minor, VSC, VEC, OE/GE, VEC, SEC, CC, etc.) **is of 2 credits**.
   a. **Theory per semester:** Contact hours = 24 teaching + 6 tutorials (problem solving sessions, repeated discussion on difficult topics, difficult solution, questions discussion and internal evaluation)
   b. Each course will be of two modules, One module = 15 hours
   c. Each module may consist of one or more than one chapter.
6. **Each practical course of any course is of 2 credits = 60 hours per semester**
   a. Minimum 12 laboratory sessions must be conducted in one semester.
   b. Each laboratory sessions should be 4 hours.
   c. If practical is short, then two short practicals should be included in one laboratory sessions.
   d. In 12 laboratory sessions maximum 2 demonstration sessions or table work sessions may be included and must be designed carefully for 4 hours' sessions.
   e. 4 hours' laboratory sessions include - performing table work (practical), calculation, writing results and conclusion, and submission of practical in written form to practical in charge.
   f. Pre-laboratory reading and post laboratory work / questions should be assigned on each practical and this will be the part of internal evaluation.
7. **Design syllabus of each theory and practical course as per above guidelines.**
   a. **Theory syllabus** should be given module wise and chapter wise.
   b. **Theory syllabus** should include name of topic, number of teaching hours allotted, detailed point wise syllabus, page numbers, references book no.

c. It is recommended that**, design syllabus of one theory course from maximum two references books** and they will be called as main reference books/text books. Below that, you can add names of more reference books and they will be supplementary reference books.

d. Syllabus of practical must be given practical wise. Name of experiment and aim of the experiment should be clearly mentioned. Mention reference book number or bibliography for each practical. At least 16 practicals' must be included in syllabus from which 12 practicals will be actually conducted. If practical is short, then two short practicals' will be considered as one practical.

e. At the end of syllabus of theory and practical course, a list of references book should be given number wise.

f. At the end of each theory and practical course 6 CO should be given.

A. Names of UG and PG courses related to Specialization

Important Note: For specialized subjects wherever designing of practical course is not adequate then included, theory course of 2 credits in place of practical course.

Semester	Major Courses	Major Elective Curses	Minor Curses	VSC	IKS
I	2 theory + 1 Practical			1 Theory	1 Theory
II	2 theory + 1 Practical		1 Theory + 1 Practical	1 Practical	0
III	3 theory + 1 Practical		1 Theory + 1 Practical	1 Theory	0
IV	3 theory + 1 Practical		1 Theory + 1 Practical	1 Practical	0
V	3 theory + 2 Practical	1 Theory + 1 Practical	1 Theory + 1 Practical	1 Theory	0
VI	3 theory + 2 Practical	1 Theory + 1 Practical		1 Practical	0
	VII and VIII Sem honours degree with major				
VII	5 theory + 2 Practical	1 Theory + 1 Practical	0	0	0
VIII	5 theory + 2 Practical	1 Theory + 1 Practical	0	0	0
	VII and VIII Sem honours degree with research				
VII	4 theory + 1 Practical	1 Theory + 1 Practical	0	0	0
VIII	4 theory + 1 Practical	1 Theory + 1 Practical	0	0	0

* In elective course 2T+2P are related to each other. In this case students have to choose more than 1 option i.e. in elective part, at least 2 courses each consisting of 1 theory 1 practical courses in combination.

Course Structure for F. Y. M. Voc. (Food Technology) 2023-204

Level	Semester	Major		Research Methodology	OJT/FP	RP	Cum. Cr.
		Mandatory	Elective				
6.0	III	FTR-601-MJMDairy Processing Technology (T) (4 C) FTR-602-MJM - Post-Harvest technology (T) (4C)	FTR-611-MJE - Supply Chain Management (T) (2 C) **OR** FTR-611-MJE- Food Service Management (T) (2 C)		FTR-621-RP - Research Project (P)(4C)		**22 Cr.**
		FTR-603-MJM - Food Engineering (T) (2 C) FTR-604-MJM -MJM Dairy Processing Technology (P) (2 C) FTR-605-MJM - Post-Harvest technology (P) (2 C)	FTR-612-MJE - Supply Chain Management (P) (2 C) **OR** FTR-612-MJE- Food Service Management (P) (2 C)				
	IV	FTR-651-MJM -MJM-Meat Processing Technology (T) (4 C) FTR-652-MJM - Processing of Fruits & Vegetables (T) (4 C)	FTR-661-MJE - Entrepreneurship Development (T) (2 C) **OR** FTR-661-MJE- Plant Design & Layout (T) (2 C)		FTR-681-RP - Research Project (P) (4 C)		**22 Cr.**
		FTR-653-MJM- Food Safety, Quality Management (T) (2C) FTR-654-MJM - Meat Processing Technology (P) (2 C) FTR-655-MJM Processing of Fruits & Vegetables (P) (2 C)	FTR-662-MJE - Entrepreneurship Development (T) (2 C) **OR** FTR-662-MJE- Plant Design & Layout (T) (2 C)				
Cum. Cr.		**28**	**8**	**4**	**4**	**-**	**44**

Anekant Education Society's
Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati
(Autonomous)

Course & Credit Structure for (M.Voc. Food Technology & Research) Part-II (2023 Pattern as per NEP-2020

CBCSSyllabusasperNEP2020for F.Y M.Voc. Food Technology & Research (2023 Pattern)

Name of the Programme:M.Voc. Food Technology & Research

ProgrammeCode **:**FTR

Class **:**F.Y M.Voc.

Semester *III*

CourseType **:**MajorMandatory

Course Code **:**FTR-601-MJM

CourseTitle **:**Dairy Processing Technology

No.ofCredits *:04*

No.ofTeachingHours 60

LearningObjectives:

- To study about the history of milk
- 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.
- To learn about the Supply Chain Management of Dairy Products
- To understand about the present scenario of milk and milk products in India and Global.

CourseOutcomes:

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

CO1: Study about the history of milk

CO2: Understand about the present scenario of milk and milk products in India and Global.
CO3: Understand about the marketing survey of milk product.
CO4: Understand the operations used in food processing industry.
CO5: Explain knowledge of the processing operations used in the dairy industry.
CO6: Study about the processing of different milk product in dairy industry.
CO7: Learn about the Supply Chain Management of Dairy Products

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

Justification for mapping

PO1- Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.
CO1: Study about the history of milk
CO2: Understand about the present scenario of milk and milk products in India and Global.
CO5: Explain knowledge of the processing operations used in the dairy industry.
CO6: Study about the processing of different milk product in dairy industry.
CO7: Learn about the Supply Chain Management of Dairy Products

PO2- Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.
CO2: Understand about the present scenario of milk and milk products in India and Global.
CO6: Study about the processing of different milk product in dairy industry.
CO7: Learn about the Supply Chain Management of Dairy Products

PO3- Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.
CO2: Understand about the present scenario of milk and milk products in India and Global.

CO6: Study about the processing of different milk product in dairy industry.

CO7: Learn about the Supply Chain Management of Dairy Products

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

CO1: Study about the history of milk

CO5: Explain knowledge of the processing operations used in the dairy industry.

CO6: Study about the processing of different milk product in dairy industry.

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

CO1: Study about the history of milk

CO4: Understand the operations used in food processing industry.

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

CO1: Study about the history of milk

CO4: Understand the operations used in food processing industry.

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

CO1: Study about the history of milk

CO2: Understand about the present scenario of milk and milk products in India and Global.

CO6: Study about the processing of different milk product in dairy industry.

CO7: Learn about the Supply Chain Management of Dairy Products

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

CO1: Study about the history of milk

CO3: Understand about the marketing survey of milk product.

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

CO1: Study about the history of milk

CO6: Study about the processing of different milk product in dairy industry.

CO7: Learn about the Supply Chain Management of Dairy Products

TopicsandLearningPoints

Unit I: Introduction of milk **5P**

Definition of milk, present scenario of milk and milk products in India and Global, History, Types of milk

Unit II:Chemistry of milk **10P**

Structure and composition of milk, Enzymes in milk. Structural elements in milk: Surface phenomenon, colloidal interactions, casein micelles, fat globules.

Unit II: Cheese Technology **12P**

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 **10P**

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 **10P**

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 **8 P**

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

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 TufailAshmed
5. Principles of Dairy Technology by Woarner
6. Dairy Engineering by Forvall
7. Milk & Milk Products by CBSE
8. Chemistry & Testing of Dairy Products by Atherton Newlander

CBCSSyllabusasperNEP2020for F.Y M.Voc. Food Technology & Research (2023 Pattern)

NameoftheProgramme:M.Voc. Food Technology & Research

ProgrammeCode **:**FTR

Class **:**F.Y M.Voc.

Semester *III*

CourseType **:**MajorMandatory

Course Code **:**FTR-602-MJM

CourseTitle **:Post-Harvest technology**

No.ofCredits *:04*

No.ofTeachingHours 60

LearningObjectives:

- To learn about the importance of post-harvest technology in fruits vegetables and horticultural produce
- 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.
- To understand about the export standards for major fruits, vegetables and plantation crops.
- To study about theproducts and by products of plantation crops

CourseOutcomes:

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

CO1: Learn about the importance of post-harvest technology in fruits vegetables and horticultural produce

CO2: Aware the techniques related to post harvest practices.

CO3: Learn the thorough knowledge of fruits, vegetables and plantation crops right from harvesting to the end product.

CO4: Understand the skills for processing post harvested produce.

CO5: Understand about the export standards for major fruits, vegetables and plantation crops.

CO6: Study about theproducts and by products of plantation crops

CO7: Learn about the importance of scientific storage systems

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

Justification for mapping

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

CO1: Learn about the importance of post-harvest technology in fruits vegetables and horticultural produce
CO2: Aware the techniques related to post harvest practices.
CO5: Understand about the export standards for major fruits, vegetables and plantation crops.
CO6: Study about the products and by products of plantation crops
CO7: Learn about the importance of scientific storage systems

PO2- Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.
CO1: Learn about the importance of post-harvest technology in fruits vegetables and horticultural produce

CO2: Aware the techniques related to post harvest practices.

CO6:Study about theproducts and by products of plantation crops

CO7:Learn about the importance of scientific storage systems

PO3- Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.
CO1: Learn about the importance of post-harvest technology in fruits vegetables and horticultural produce

CO2: Aware the techniques related to post harvest practices.

CO5: Understand about the export standards for major fruits, vegetables and plantation crops.

CO6:Study about theproducts and by products of plantation crops

CO7:Learn about the importance of scientific storage systems

PO4- Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.
CO6:Study about theproducts and by products of plantation crops

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

CO4: Understand the skills for processing post harvested produce.

PO6- Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.
CO1: Learn about the importance of post-harvest technology in fruits vegetables and horticultural produce
CO4: Understand the skills for processing post harvested produce.

PO7- Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.
CO2: Aware the techniques related to post harvest practices.
CO6: Study about theproducts and by products of plantation crops
CO7: Learn about the importance of scientific storage systems

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.
CO1: Learn about the importance of post-harvest technology in fruits vegetables and horticultural produce
CO3: Learn the thorough knowledge of fruits, vegetables and plantation crops right from harvesting to the end product.

PO9- Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.
CO1: Learn about the importance of post-harvest technology in fruits vegetables and horticultural produce
CO6: Study about theproducts and by products of plantation crops
CO7: Learn about the importance of scientific storage systems

TopicsandLearningPoints

Unit-I INTRODUCTION **10P**

Post-harvest engineering of crops – objectives - post harvest systems and losses in agricultural commodities structure, engineering properties of agricultural materials, optimum stage of harvest, importance of loss, reduction; Post-Harvest Handling operations. Pre-drying operation- Moisture content, RH measurement, air-grain measurement. Equation of mass and energy balance

Unit II: Post-harvest technology of fruits, vegetables & plantation crops 10P

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.

Unit II: Processing and packaging operations 15P

Cleaning, Threshing And Grading-Threshing and shelling operation - principles and operation - various decorticators/dehullers/shellers. Cleaning and grading: Aspiration, scalping, size separators, screens, sieve analysis, capacity and effectiveness of screens, various types of separators (specific gravity, magnetic, disc, spiral, pneumatic, inclined belt draper, velvet roll separator, colour sorters, cyclone separator), shape graders.

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. Products and by products of plantation crops: cashew, areca nut, coconut

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

Material Handling - Conveying equipment- Belt conveyor, Chain conveyor, Screw conveyor, Bucket elevator, Pneumatic conveying system, Gravity conveyor: Principle of operation, advantages, disadvantages, capacity and speed. Size reduction

Modes of transportation, postharvest disorders, Primary and secondary insect pests, rodents and microorganisms of stored food grains and their control, integrated pest management, Fumigation and controlled atmosphere storage of food grains, Rodent Control. pest and diseases and their management in major horticultural crops,

Unit V: Principles And Practice Of Storage 10P

Importance of scientific storage systems, post-harvest physiology of semi-perishables and perishables. Damages: Direct damages, indirect damages, causes of spoilage during storage, sources of infestation and control.

Storage structures: Traditional & Modern; Farm silos: Horizontal silos, tower silos, pit silos, trench silos, size and capacity of silos.

Storage of perishables: Cold storage, controlled and modified atmospheric storage, hypobaric storage, evaporative cooling storage, conditions for storage of perishable products, control of temperature and relative humidity inside storage

Unit VI: Export of post -harvest produces 5P

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

References:

1. Haid, N.F. and S.K. Salakahe.1997. Post -harvest physiology and hardening of fruits andvegetables. Greada Publication, London.
2. Chadha, K .L. and O. P. Pareek, 1996. Advances in horticulture. MalhotraPublishers,New Delhi. 1997.
3. Pandey, P. H. Post- harvest technology of fruits and vegetables 1997. Technicalpublishers 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.

Pandey, P. H. 1998. Principles and practices of post -harvest technology.KalyaniPublishers, New Delhi

CBCSSyllabusasperNEP2020for F.Y M.Voc. Food Technology & Research (2023 Pattern)

NameoftheProgramme:M.Voc. Food Technology & Research

ProgrammeCode **:**FTR

Class **:**F.Y M.Voc.

Semester *III*

CourseType **:**MajorMandatory

Course Code **:**FTR-603-MJM

CourseTitle **:Food Engineering**

No.ofCredits *:02*

No.ofTeachingHours 30

LearningObjectives:

- To learn about the engineering properties of foods
- To understand the Aerodynamic and hydrodynamic characteristics drag coefficient.
- To study about the theory of ultra-filtration and reverse osmosis
- To learn about the freezing and drying of foods.
- To understand the thermodynamic properties of moist air, kinetics of water absorption
- To study about the effect of radiation.

CourseOutcomes:

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

CO1: Learn about the engineering properties of foods
CO2: Study about the effect of radiation.
CO3: Understand the thermodynamic properties of moist air, kinetics of water absorption
CO4: Understand the Aerodynamic and hydrodynamic characteristics drag coefficient.
CO5: Learn about the freezing and drying of foods.
CO6: Study about the theory of ultra-filtration and reverse osmosis

CO7: Learn about the mass transfer, molecular diffusion and diffusivity

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

Justification for mapping

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.
CO1: Learn about the engineering properties of foods
CO2: Study about the effect of radiation.
CO5: Learn about the freezing and drying of foods.
CO6: Study about the theory of ultra-filtration and reverse osmosis
CO7: Learn about the mass transfer, molecular diffusion and diffusivity

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.
CO1: Learn about the engineering properties of foods
CO2: Study about the effect of radiation.

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.
CO1: Learn about the engineering properties of foods
CO2: Study about the effect of radiation.
CO5: Learn about the freezing and drying of foods.

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.
CO2: Study about the effect of radiation.
CO5: Learn about the freezing and drying of foods.
CO6: Study about the theory of ultra-filtration and reverse osmosis

PO5- Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.
CO1: Learn about the engineering properties of foods
CO4: Understand the Aerodynamic and hydrodynamic characteristics drag coefficient.

PO6- Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.
CO1: Learn about the engineering properties of foods
CO4: Understand the Aerodynamic and hydrodynamic characteristics drag coefficient.

PO7- Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.
CO1: Learn about the engineering properties of foods
CO2: Study about the effect of radiation.
CO6: Study about the theory of ultra-filtration and reverse osmosis
CO7: Learn about the mass transfer, molecular diffusion and diffusivity

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.
CO3: Understand the thermodynamic properties of moist air, kinetics of water absorption

PO9- Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.
CO1: Learn about the engineering properties of foods
CO6: Study about the theory of ultra-filtration and reverse osmosis
CO7: Learn about the mass transfer, molecular diffusion and diffusivity

TopicsandLearningPoints

UNIT I: **6P**

Engineering properties of foods, their significance in equipment design, processing and handling of food and food products, steady state and unsteady state heat transfer, Numerical, graphical and analog methods in the analysis of heat transfer. Solution of unsteady state equations, solar radiation.

UNIT II: **8P**

Mass transfer, molecular diffusion and diffusivity, equilibrium stage process, convective mass transfer co-efficient, mass transfer with laminar and turbulent flow. Design equations for convective mass transfer, simultaneous momentum, Separation by equilibrium stages, immiscible phases, distillation of binary mixtures and multi-component separations.

UNIT III: **6P**

Aerodynamic and hydrodynamic characteristics drag coefficient, terminal velocity and Reynolds number, application of aerodynamic properties to the separation, pneumatic handling and conveying of food products, material and energy balance.

UNIT IV: **10P**

Thermodynamic properties of moist air, kinetics of water absorption, Evaporation and dehydration of foods, design of single and multi-effect evaporators, mechanics of movement of air through stationary bed, thin layer and thick layer bed drying, simulation models for drying systems, use of weather data for drying operations, design of dryers, New direction in freeze bed drying, cyclic pressure freeze drying. Microwave drying and vacuum drying, efficient drying systems, infrared heating, freezing of foods, freeze concentration and drying, freezing point curves, phase diagrams, methods of freeze concentration, design problems.

Theory of ultra-filtration and reverse osmosis, selection and types of membranes and properties, concentration polarization, mathematical description of flow through membrane, application and use in food industry.

References:

1. Fellows, P.J. (2015). Food processing technology. Elsevier India.
2. Singh, Paul R. (2009). Introduction to food engineering. Academic Press.
3. Berk, Zeri. (2009). Food process engineering and technology. Elsevier India.
4. Smith, P.G. “Introduction to Food Process Engineering” Springer, 2005.
5. Gopala Rao, Chandra, “Essential of Food Process Engineering”, BS Publications, 2006.
6. Toledo, Romeo T. 92007). Fundamentals of food process engineering. Springer.

CBCSSyllabusasperNEP2020for F.Y M.Voc. Food Technology & Research (2023 Pattern)

NameoftheProgramme:M.Voc. Food Technology & Research

ProgrammeCode **:**FTR

Class **:**F.Y M.Voc.

Semester *III*

CourseType **:**Major Mandatory

Course Code **:**FTR-604-MJM

CourseTitle **:Dairy Processing Technology**

No.ofCredits *:02*

No.ofTeachingHours 30

LearningObjectives:

- To study about the manufacturing of cheese
- 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.
- To learn about the plant layout design of milk industries
- To understand about the present scenario of milk and milk products in India and Global.

CourseOutcomes:

CO1: Study about the history of milk

CO2: Understand about the present scenario of milk and milk products in India and Global.

CO3: Understand about the marketing survey of milk product.

CO4: Understand the operations used in food processing industry.

CO5: Explain knowledge of the processing operations used in the dairy industry.

CO6: Study about the processing of different milk product in dairy industry.

CO7: Learn about the plant layout design of milk industries

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	-	-	3	3	_	**2**	**1**	_	-
CO2	_	1	_	-	-	1	4	1	-	-
CO3	3	-	2	-	-	1	-	**2**	-	-
CO4	6	7	6	-	**1**	**3**	-	-	-	-
CO5	2	4	3	_	-	-	-	-	-	-
CO6	6	6	5	**3**	-	-	**3**	-	**2**	-
CO7	_	**2**	**2**	-	-	-	**3**	-	**2**	-

Justification for mapping

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

CO1: Study about the history of milk

CO3: Understand about the marketing survey of milk product.

CO4: Understand the operations used in food processing industry.

CO5: Explain knowledge of the processing operations used in the dairy industry.

CO6: Study about the processing of different milk product in dairy industry.

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

CO2: Understand about the present scenario of milk and milk products in India and Global.

CO4: Understand the operations used in food processing industry.

CO5: Explain knowledge of the processing operations used in the dairy industry.

CO6: Study about the processing of different milk product in dairy industry.

CO7: Learn about the plant layout design of milk industries

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

CO3: Understand about the marketing survey of milk product.

CO4: Understand the operations used in food processing industry.

CO5: Explain knowledge of the processing operations used in the dairy industry.

CO6: Study about the processing of different milk product in dairy industry.

CO7: Learn about the plant layout design of milk industries

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

CO1: Study about the history of milk

CO6: Study about the processing of different milk product in dairy industry.

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

CO1: Study about the history of milk

CO4: Understand the operations used in food processing industry.

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

CO2: Understand about the present scenario of milk and milk products in India and Global.

CO3: Understand about the marketing survey of milk product.

CO4: Understand the operations used in food processing industry.

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

CO1: Study about the history of milk

CO2: Understand about the present scenario of milk and milk products in India and Global.

CO6: Study about the processing of different milk product in dairy industry.

CO7: Learn about the plant layout design of milk industries

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

CO1: Study about the history of milk

CO2: Understand about the present scenario of milk and milk products in India and Global.

CO3: Understand about the marketing survey of milk product.

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

CO6: Study about the processing of different milk product in dairy industry.

CO7: Learn about the plant layout design of milk industries

TopicsandLearningPoints

Sr. No.	Practical Name	Periods
1.	Study of manufacturing of cheese	**2P**
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	**2P**
6.	Preparation of table cream	**2P**
7.	Preparation of butter	**2P**
8.	Preparation of ghee	**2P**
9.	Preparation of fermented milk product	**2P**
10.	Preparation of chakka	**2P**
11.	Preparation of flavoured yoghurt	**2P**
12.	Preparation of whey-based beverages	**2P**
13.	Preparation of sour milk (kefir)	**2P**
14.	Preparation of traditional milk product	**2P**
15.	Study of plant layout design of milk industries	**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 TufailAshmed
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

CBCSSyllabusasperNEP2020for F.Y M.Voc. Food Technology & Research (2023 Pattern)

NameoftheProgramme:M.Voc. Food Technology & Research

ProgrammeCode **:**FTR

Class **:**F.Y M.Voc.

Semester *III*

CourseType **:**MajorMandatory

Course Code **:**FTR-604-MJM

CourseTitle **:Post-Harvest technology**

No.ofTeachingHours 30

LearningObjectives:

- To learn about the importance of post-harvest technology in fruits vegetables and horticultural produce
- To aware the techniques related to post harvest practices.
- To learn about the maturity of various fruits and vegetables
- To develop the skills for processing post harvested produce.
- To understand about the export standards for major fruits, vegetables and plantation crops.
- To study about theproducts and by products of plantation crops

CourseOutcomes:

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

CO1: Learn about the importance of post-harvest technology in fruits vegetables and horticultural produce
CO2: Aware the techniques related to post harvest practices.
CO3: Learn the thorough knowledge of fruits, vegetables and plantation crops right from harvesting to the end product.
CO4: Understand theprolonging storage life
CO5: Understand about the export standards for major fruits, vegetables and plantation crops.
CO6: Study about theproducts and by products of plantation crops
CO7: Learn about the Packing methods and types of packaging

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

CO6	**4**	**3**	**3**	**3**	**-**	**-**	**3**	**-**	**2**	**-**
CO7	**5**	**6**	**5**	**-**	**2**	**-**	**3**	**-**	**2**	**-**

Justification for mapping

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.
CO1: Learn about the importance of post-harvest technology in fruits vegetables and horticultural produce
CO2: Aware the techniques related to post harvest practices.
CO5: Understand about the export standards for major fruits, vegetables and plantation crops.
CO6: Study about theproducts and by products of plantation crops
CO7: Learn about the Packing methods and types of packaging

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.
CO2: Aware the techniques related to post harvest practices.
CO4: Understand theprolonging storage life
CO6: Study about theproducts and by products of plantation crops
CO7: Learn about the Packing methods and types of packaging

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.
CO2: Aware the techniques related to post harvest practices.
CO4: Understand theprolonging storage life
CO6: Study about theproducts and by products of plantation crops
CO7: Learn about the Packing methods and types of packaging

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.
CO1: Learn about the importance of post-harvest technology in fruits vegetables and horticultural produce
CO5: Understand about the export standards for major fruits, vegetables and plantation crops.
CO6: Study about theproducts and by products of plantation crops

PO5- Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.
CO1: Learn about the importance of post-harvest technology in fruits vegetables and horticultural produce
CO4: Understand theprolonging storage life
CO7: Learn about the Packing methods and types of packaging

PO6- Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.
CO1: Learn about the importance of post-harvest technology in fruits vegetables and horticultural produce
CO2: Aware the techniques related to post harvest practices.
CO4: Understand theprolonging storage life

PO7- Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.
CO1: Learn about the importance of post-harvest technology in fruits vegetables and horticultural produce
CO2: Aware the techniques related to post harvest practices.
CO6: Study about theproducts and by products of plantation crops
CO7: Learn about the Packing methods and types of packaging

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.
CO1: Learn about the importance of post-harvest technology in fruits vegetables and horticultural produce
CO3: Learn the thorough knowledge of fruits, vegetables and plantation crops right from harvesting to the end product.

PO9- Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.
CO1: Learn about the importance of post-harvest technology in fruits vegetables and horticultural produce
CO2: Aware the techniques related to post harvest practices.
CO6: Study about theproducts and by products of plantation crops
CO7: Learn about the Packing methods and types of packaging

TopicsandLearningPoints

Sr. No.	Practical Name	Periods
1	Practice in judging the maturity of various fruits and vegetables	2P
2	Determination of Total Soluble solid	2P
3	Determination of acidity in milk	2P
4	Packing methods and types of packaging	2P
5	Pre-cooling packing methods for export or international trade	2P
6	Principles for prolonging storage life	2P
7	Effect of ethylene in ripening process	2P
8	To study the cold storage banana	2P
9	To study quality analysis of food	2P
10	To study the layout of pack house	2P
11	To study layout of unit operation	2P
12	To study the preservation by drying & dehydration	4P
13	To study the preparation of lemon marmalade	2P
14	To study the preparation of mix vegetable pickle	2P

References:

1. Haid, N.F. and S.K. Salakahe.1997. Post -harvest physiology and hardening of fruits andvegetables. Greada Publication, London.
2. Chadha, K .L. and O. P. Pareek, 1996. Advances in horticulture. MalhotraPublishers,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.

CBCSSyllabusasperNEP2020for F.Y M.Voc. Food Technology & Research (2023 Pattern)

NameoftheProgramme:M.Voc. Food Technology & Research

ProgrammeCode **:**FTR

Class **:**F.Y M.Voc.

Semester *III*

CourseType **:**MajorElective

Course Code **:**FTR-611-MJE

CourseTitle **:Supply Chain Management**

No.ofCredits :02

No.ofTeachingHours **:** 30

LearningObjectives:

- To know about importance of efficient supply chain management in the food industry
- To study about the Inventory Management Techniques
- To study about theimportance of quality control in the food industry
- To understand thetransportation modes and logistics networks
- To understand the key stakeholder and their roles
- To learn about warehousing and distribution center management

CO1: Learn about importance of efficient supply chain management in the food industry
CO2: Study about the Inventory Management Techniques
CO3: Study about theimportance of quality control in the food industry
CO4: Understand theHazard Analysis and Critical Control Points (HACCP)
CO5: Understand thetransportation modes and logistics networks
CO6: Understand the key stakeholder and their roles
CO7: Learn about warehousing and distribution center management

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

Justification for mapping

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.
CO1: Learn about importance of efficient supply chain management in the food industry
CO2: Study about the Inventory Management Techniques
CO5: Understand thetransportation modes and logistics networks
CO6: Understand the key stakeholder and their roles
CO7: Learn about warehousing and distribution center management

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.
CO2: Study about the Inventory Management Techniques
CO6: Understand the key stakeholder and their roles
CO7: Learn about warehousing and distribution center management

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.
CO2: Study about the Inventory Management Techniques
CO5: Understand thetransportation modes and logistics networks
CO6: Understand the key stakeholder and their roles
CO7: Learn about warehousing and distribution center management

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.
CO1: Learn about importance of efficient supply chain management in the food industry
CO5: Understand thetransportation modes and logistics networks
CO6: Understand the key stakeholder and their roles

PO5- Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.
CO1: Learn about importance of efficient supply chain management in the food industry
CO4: Understand theHazard Analysis and Critical Control Points (HACCP)

PO6- Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect

of environmental degradation, climate change, pollution control, effective waste management etc.
CO1: Learn about importance of efficient supply chain management in the food industry
CO4: Understand theHazard Analysis and Critical Control Points (HACCP)

PO7- Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.
CO1: Learn about importance of efficient supply chain management in the food industry
CO2: Study about the Inventory Management Techniques
CO6: Understand the key stakeholder and their roles
CO7: Learn about warehousing and distribution center management

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.
CO1: Learn about importance of efficient supply chain management in the food industry
CO3: Study about theimportance of quality control in the food industry

PO9- Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.
CO1: Learn about importance of efficient supply chain management in the food industry
CO2: Study about the Inventory Management Techniques
CO7: Learn about warehousing and distribution center management

TopicsandLearningPoints

Unit-1: Introduction to Food Supply Chain Management **10P**

- Overview of the food supply chain
- Importance of efficient supply chain management in the food industry
- Key stakeholder and their roles
- Sourcing strategies for raw materials
- Supplier selection and evaluation
- Contract negotiation and management

Unit-2: Production, Planning and Inventory Management **8P**

- Production planning and scheduling
- Inventory Management Techniques
- Justi-in-time (JIT) and Lean principles in food production

Unit-3: Distribution and Logistics **6P**

1 Transportation modes and logistics networks
2 Warehousing and distribution center management
3 Last-mile delivery challenges

Unit-4: Quality Control and Food Safety **7P**

- Importance of quality control in the food industry
- Hazard Analysis and Critical Control Points (HACCP)
- Regulatory requirements and compliance

References:

- Chopra, S., & Meindl, P. (2019). Supply Chain Management: Strategy, Planning, and Operation. Pearson.
- Simchi-Levi, D., Kaminsky, P., &Simchi-Levi, E. (2008). Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies. McGraw-Hill.

Christopher, M. (2016). Logistics & Supply Chain Management. Pearson Education Limited.

CBCSSyllabusasperNEP2020for F.Y M.Voc. Food Technology & Research (2023 Pattern)

NameoftheProgramme:M.Voc. Food Technology & Research

ProgrammeCode **:**FTR

Class **:**F.Y M.Voc.

Semester *III*

CourseType: MajorElective

Course Code **:**FTR-611-MJE

CourseTitle **:Food Service Management**

No.ofCredits *:02*

No.ofTeachingHours 30

LearningObjectives:

- To know about food service establishments.
- To learn about the planning and setting a food service unit
- To learn about the managerial problems of food service unit

- To learn about the layout for different food service establishments
- To learn about the directing and administrative leadership
- To understand about the presentation of project report

CourseOutcomes:

CO1: Learn about food service establishments.
CO2: Learn about the planning and setting a food service unit
CO3: Learn about the managerial problems of food service unit
CO4: Learn about the layout for different food service establishments
CO5: learn about the directing and administrative leadership
CO6: Understand the evaluation of plans
CO7: Understand about the presentation of project report

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

Justification for mapping

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

CO1: Learn about food service establishments.
CO2: Learn about the planning and setting a food service unit
CO3: Learn about the managerial problems of food service unit
CO4: Learn about the layout for different food service establishments
CO5: learn about the directing and administrative leadership
CO6: Understand the evaluation of plans

CO7: Understand about the presentation of project report

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

CO2: Learn about the planning and setting a food service unit
CO3: Learn about the managerial problems of food service unit
CO4: Learn about the layout for different food service establishments
CO6: Understand the evaluation of plans

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

CO2: Learn about the planning and setting a food service unit
CO3: Learn about the managerial problems of food service unit
CO4: Learn about the layout for different food service establishments
CO5: learn about the directing and administrative leadership
CO6: Understand the evaluation of plans

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

CO1: Learn about food service establishments.
CO5: learn about the directing and administrative leadership
CO6: Understand the evaluation of plans

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

CO1: Learn about food service establishments.
CO2: Learn about the planning and setting a food service unit
CO4: Learn about the layout for different food service establishments

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

CO1: Learn about food service establishments.
CO2: Learn about the planning and setting a food service unit
CO4: Learn about the layout for different food service establishments

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

CO2: Learn about the planning and setting a food service unit
CO7: Understand about the presentation of project report

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

CO1: Learn about food service establishments.
CO3: Learn about the managerial problems of food service unit

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

CO6: Understand the evaluation of plans
CO7: Understand about the presentation of project report

TopicsandLearningPoints

Unit 1: History and Development of Food Service System **5P**

History, Food service establishments, Types-commercial and non-commercial, their characteristics

Unit 2: Planning and Setting a Food Service Unit **8P**

Planning, Investment, funds, Project report, registration, Layout, Design (definition), Layout for different food service establishments, planning a layout. Evaluation of plans

Unit 3:

A. Directing and Administrative Leadership **10P**

Direction, leadership, delegation, decentration, centralization, supervision, human relations in industry, authority and responsibility, motivation, communication.

B. Staff Planning and Management

Manpower planning, selection, recruitment and training, wages, salaries, incentives, promotion, demotion, transfer, dismissal

Unit 4: **7P**

A. Evaluation:

Objectives, techniques and problems.

B. Managerial Problems:

Managerial problems of food service unit. Methods to tackle problems.

References:

- Khan, M. A.(1987): Food Service Operations, AVI Publishing INC,Connecticut.)
- Malhan, S and Sethi, M. (1987):Catering management,An Integrated Approach,Wiley Eastern Ltd.New Delhi.
- Malhotra, R. K.(2002):Food Service and catering Managemebnt,Anmol Publication Pvt Ltd.
- Minor L J and Cichy R. F.(1984): Food Service System Management,AVI Publishing INC,Connecticut.
- Sulliavan, C.F. (1990): Management of Medical Food Service, Van Nostrand Reinhold, Newyork.
- Taylor, E., and Taylor, J. (1990): Mastering Catering Theroy, Macmilan press Ltd.London.

CBCSSyllabusasperNEP2020for F.Y M.Voc. Food Technology & Research (2023 Pattern)

NameoftheProgramme:M.Voc. Food Technology & Research

ProgrammeCode **:**FTR

Class **:**F.Y M.Voc.

Semester *III*

CourseType: MajorElective

Course Code **:**FTR-612-MJE

CourseTitle **:Supply Chain Management**

No.ofCredits *:02*

No.ofTeachingHours 30

LearningObjectives:

- To know about importance of efficient supply chain management in the food industry
- To study about the Inventory Management Techniques
- To study about theimportance of quality control in the food industry
- To understand thetransportation modes and logistics networks
- To understand the analysis of real-world case studies in food supply management.
- To learn about warehousing and distribution center management

CourseOutcomes:

CO1: Students will have a thorough understanding on the working principle and instrumentation of various instruments used in food analysis
CO2: The students will know the importance of various methods to identify any malfunction aspect of food.
CO3: The students will know qualitative and quantitative methods of food analysis
CO4: The students will know different techniques used in analysis of food
CO5: The students will know the subjective and objective evaluation of food
CO6: The students will know the working principle of instruments used for analysis
CO7: The students will know the quantification technique of various components, allergens present in food products.

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

Justification for the mapping

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.
CO2: The students will know the importance of various methods to identify any malfunction aspect of food.
CO4: The students will know different techniques used in analysis of food
CO5: The students will know the subjective and objective evaluation of food
CO6: The students will know the working principle of instruments used for analysis
CO7: The students will know the quantification technique of various components, allergens present in food products.

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.
CO1: Students will have a thorough understanding on the working principle and instrumentation of various instruments used in food analysis
CO2: The students will know the importance of various methods to identify any malfunction aspect of food.
CO4: The students will know different techniques used in analysis of food
CO6: The students will know the working principle of instruments used for analysis
CO7: The students will know the quantification technique of various components, allergens present in food products.

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.
CO1: Students will have a thorough understanding on the working principle and instrumentation of various instruments used in food analysis
CO5: The students will know the subjective and objective evaluation of food
CO6: The students will know the working principle of instruments used for analysis

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.
CO1: Students will have a thorough understanding on the working principle and instrumentation of various instruments used in food analysis
CO5: The students will know the subjective and objective evaluation of food
CO6: The students will know the working principle of instruments used for analysis

PO5- Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.
CO1: Students will have a thorough understanding on the working principle and instrumentation of various instruments used in food analysis
CO4: The students will know different techniques used in analysis of food

PO6- Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.
CO1: Students will have a thorough understanding on the working principle and instrumentation of various instruments used in food analysis

CO4: The students will know different techniques used in analysis of food
CO6: The students will know the working principle of instruments used for analysis

PO7- Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.
CO1: Students will have a thorough understanding on the working principle and instrumentation of various instruments used in food analysis
CO2: The students will know the importance of various methods to identify any malfunction aspect of food.
CO6: The students will know the working principle of instruments used for analysis

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.
CO1: Students will have a thorough understanding on the working principle and instrumentation of various instruments used in food analysis
CO3: The students will know qualitative and quantitative methods of food analysis
CO6: The students will know the working principle of instruments used for analysis

PO9- Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.
CO1: Students will have a thorough understanding on the working principle and instrumentation of various instruments used in food analysis
CO7: The students will know the quantification technique of various components, allergens present in food products.

TopicsandLearningPoints

Sr. No.	Practical Name	Periods
1.	Block chain Technology	**2P**
2.	Internet of things (loT)	**2P**
3.	Predictive Analytics	**2P**
4.	Cold Chin Optimization	**2P**
5.	Vertical Farming and Urban Agrcilutre	**2P**
6.	Collaborative supply chain platforms	**2P**
7.	Sustainable packaging solutions	**2P**
8.	Precision agriculture	**2P**
9.	Alternative Distribution channels	**3P**

10.	Food waste reduction Initiatives	**3P**
11.	Analysis of real-world case studies in food supply management.	**4P**
12.	Preparation of report	**4P**

References:

- Chopra, S., & Meindl, P. (2019). Supply Chain Management: Strategy, Planning, and Operation. Pearson.
- Simchi-Levi, D., Kaminsky, P., &Simchi-Levi, E. (2008). Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies. McGraw-Hill.

Christopher, M. (2016). Logistics & Supply Chain Management. Pearson Education Limited.

CBCSSyllabusasperNEP2020for F.Y M.Voc. Food Technology & Research (2023 Pattern)

Name of the Programme: M.Voc. Food Technology & Research

Programme Code **:** FTR

Class **:** F.Y M.Voc.

Semester *III*

Course Type : MajorElective

Course Code **:** FTR-612-MJE

Course Title **:** Food Service Management

No.ofCredits *:02*

No.ofTeachingHours 30

LearningObjectives:

- To know about food service establishments.
- To learn about the planning and setting a food service unit
- To learn about the managerial problems of food service unit
- To learn about the layout for different food service establishments
- To learn about the directing and administrative leadership
- To understand about the presentation of project report

CourseOutcomes:

CO1: Learn about food service establishments.
CO2: Learn about the planning and setting a food service unit
CO3: Learn about the managerial problems of food service unit
CO4: Learn about the layout for different food service establishments
CO5: learn about the directing and administrative leadership
CO6: Understand the case study regarding food service management
CO7: Understand about the presentation of project report

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

Justification for the mapping

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

CO1: Learn about food service establishments.
CO2: Learn about the planning and setting a food service unit
CO3: Learn about the managerial problems of food service unit
CO4: Learn about the layout for different food service establishments
CO5: learn about the directing and administrative leadership
CO6: Understand the evaluation of plans
CO7: Understand about the presentation of project report

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

CO2: Learn about the planning and setting a food service unit
CO3: Learn about the managerial problems of food service unit
CO4: Learn about the layout for different food service establishments

CO6: Understand the evaluation of plans

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

CO2: Learn about the planning and setting a food service unit
CO3: Learn about the managerial problems of food service unit
CO4: Learn about the layout for different food service establishments
CO5: learn about the directing and administrative leadership
CO6: Understand the evaluation of plans

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

CO1: Learn about food service establishments.
CO5: learn about the directing and administrative leadership
CO6: Understand the evaluation of plans

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

CO1: Learn about food service establishments.
CO2: Learn about the planning and setting a food service unit
CO4: Learn about the layout for different food service establishments

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

CO1: Learn about food service establishments.
CO2: Learn about the planning and setting a food service unit
CO4: Learn about the layout for different food service establishments

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

CO2: Learn about the planning and setting a food service unit
CO7: Understand about the presentation of project report

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.
CO1: Learn about food service establishments.
CO3: Learn about the managerial problems of food service unit

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

CO6: Understand the evaluation of plans
CO7: Understand about the presentation of project report

TopicsandLearningPoints

Sr. No.	Practical Name	Periods
1.	**Introduction to Food Service Management**	**2P**
	➢ Overview of the Food Service industry	
	➢ Role of Food Service Managers	
	➢ Trends and Challenges in Food Service Management	
2.	**Food Safety and Sanitation**	**2P**
	➢ Principles of Food Safety	
	➢ Foodborne illnesses and prevention	
	➢ Sanitation practices in food service establishments	
	➢ Regulatory requirements (e.g. FDA, USDA)	
3.	**Menu planning and design:**	**2P**
	• Menu development process	
	• Menu analysis and pricing	
	• Dietary considerations and special diets	
	• Menu engineering and profitability	
4.	**Purchasing and Inventory Management**	**2P**
	➢ Procurement methods	
	➢ Vendor selection and negotiation	
	➢ Inventory control techniques	
	➢ Cost control and waste reduction	
5.	**Food Production and Operations**	**2P**
	➢ Kitchen layout and design	

	➢ Production scheduling	
	➢ Kitchen equipment and technology	
	➢ Quality control and food presentation	
6.	**Staffing and Human resource Management**	**2P**
	➢ Recruitment and Selection	
	➢ Training and development	
	➢ Employee scheduling	
	➢ Performance management and motivation	
7.	**Customer service and Marketing**	**2P**
	➢ Customer Service principles	
	➢ Building customer loyalty	
	➢ Marketing strategies for food service	
	➢ Handling complaint and feed back	
8.	**Financial Management**	**2P**
	➢ Budgeting and financial planning	
	➢ Cost analysis and control	
	➢ Revenue management	
	➢ Financial report and analysis	
9.	**Sustainability and Environmental Considerations:**	**2P**
	1) Sustainable practices in food service	
	2) Waste management	
	3) Energy efficiency	
	4) Ethical sourcing	
10.	**Case studies**	**4P**
	➢ Hands-on experience in food service operations	
	➢ Case studies of real-world food service management scenarios	
	➢ Group projects or simulations	
11.	**Filed Trips or Guest Speakers:**	**4P**
	1. Visits to food service establishments	
	2. Guest speakers from the industry sharing insights and experiences	
12.	**Final Project or Assessment**	**4P**
	➢ Culminating project applying concepts learned throughout the course	
	➢ Assessment of practical skill and knowledge through exams, presentation or projects	

Reference:

- Chopra, S., & Meindl, P. (2019). Supply Chain Management: Strategy, Planning, and Operation. Pearson.
- Simchi-Levi, D., Kaminsky, P., &Simchi-Levi, E. (2008). Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies. McGraw-Hill.
- Christopher, M. (2016). Logistics & Supply Chain Management. Pearson Education Limited.

CBCSSyllabusasperNEP2020for F.Y M.Voc. Food Technology & Research (2023 Pattern)

Name of the Programme: M.Voc. Food Technology & Research

Programme Code **:** FTR

Class **:** F.Y M.Voc.

Semester *III*

Course Type **:** Research Project

Course Code **:** FTR-621-RP

Course Title **:** Research Project

No.of Credits *:04*

No.of Teaching Hours 60

LearningObjectives:

1. To understand the importance of Product Development.
2. To learn about the new product development
3. To study about the perform market survey about new product.
4. To learn about to analysis of new product.
5. To study about the Preparation of project report
6. To learn about the publication of research paper into national &international journal.
7. To understand the process of launching a new product.

CourseOutcomes:

CO1: understand the importance of Product Development.
CO2: learn about the new product development

CO3: Study about the perform market survey about new product.
CO4: Learn about to analysis of new product.
CO5: Study about the Preparation of project report
CO6: learn about the publication of research paper into national &international journal.
CO7: understand the process of launching a new product

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

Justification for the mapping

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

CO1: understand the importance of Product Development.
CO2: learn about the new product development
CO3: Study about the perform market survey about new product.
CO4: Learn about to analysis of new product.
CO5: Study about the Preparation of project report
CO6: learn about the publication of research paper into national &international journal.
CO7: understand the process of launching a new product

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

CO4: Learn about to analysis of new product.
CO5: Study about the Preparation of project report
CO6: learn about the publication of research paper into national &international journal.
CO7: understand the process of launching a new product

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

CO2: learn about the new product development
CO4: Learn about to analysis of new product.

CO5: Study about the Preparation of project report
CO7: understand the process of launching a new product

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

CO3: Study about the perform market survey about new product.
CO6: learn about the publication of research paper into national &international journal.

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

CO1: understand the importance of Product Development.
CO3: Study about the perform market survey about new product.
CO4: Learn about to analysis of new product.

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

CO4: Learn about to analysis of new product.
CO5: Study about the Preparation of project report

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

CO4: Learn about to analysis of new product.
CO5: Study about the Preparation of project report
CO6: learn about the publication of research paper into national &international journal.

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

CO1: understand the importance of Product Development.
CO3: Study about the perform market survey about new product.

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

CO1: understand the importance of Product Development.
CO2: learn about the new product development
CO3: Study about the perform market survey about new product.
CO6: learn about the publication of research paper into national &international journal.

TopicsandLearningPoints

The research project 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. The examinee shall submit the research project 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.

Term work:

The research project 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.