Anekant Education Society's

Tuljaram Chaturchand College, Baramati.

(Empowered Autonomous)

Three Year B. Voc. Degree Programme in Dairy Technology

(Faculty of Vocational Courses)

CBCS Syllabus

S. Y. B. Voc. Dairy Technology Semester -IV

For Department of

Dairy Technology

Tuljaram Chaturchand College, Baramati

Choice Based Credit System Syllabus (2023 Pattern)

(As Per NEP 2020)

To be implemented from Academic Year 2024-2025

Title of the Programme: S. Y. B. Voc.(Dairy Technology)

Preamble

AES's Tuljaram Chaturchand College has made the decision to change the syllabus 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 multi disciplinary 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 Dairy sector and related subjects, the Board of Studies in Dairy Technology at Tuljaram Chaturchand College, Baramati - Pune, has developed the curriculum for the first semester of F. Y. B. Voc. Dairy 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 21stcentury. 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 EducationPolicy(NEP)2020,LOCF(UGC),NCrF,NHEQF,Prof.R.D.Kulkarni'sReport,Government of Maharashtra's General Resolution dated 20thApril and 16th May 2023, and the Circular issued by SPPU, Pune on 31st May2023.

The department of Dairy technology aims at imparting quality education in the realm of procurement, processing and packaging of milk and milk products with an objective to enhance and expand the knowledge and skill set of target students so that they can contribute in the betterment of society at large. The department of Dairy Technology was established with the objective of producing highly proficient technocrats who can meet the standards of the corporate. The department purports to have dexterous mentors adept at molding the student talent pool. A team of well qualified faculty

navigates issuing priceless guidance and tapping the potential of students.

It is estimated that a huge number of Dairy Technology professionals will be required in India five years down the line in keeping with the global trend. Indian professionals are respected across the world for their technology – related skills. Our focus in this department is not only on completing the curriculum to pass the examinations but we also try to keep up with the developments in the technology and expose the students to the latest to ensure that they are able to cope up with the fast changing industrial scenario.

The department is in purpose – built accommodation and is equipped with teaching and office space as well as well equipped laboratories for practical - based teaching. All faculties of the department are members of various professional societies and technical bodies like AFST (I), etc. the department has signed MoU's with various organizations for student exchange and projects.

Overall, revising the Dairy Technology syllabus 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)

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

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

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

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

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

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

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

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

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

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

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

Board of Studies(BOS)in Dairy Technology

From 2022 - 2023 to 2024 - 2025

Sr.No.	Name	Designation
1.	**Dr. W. A. Khan**	Chairman
2.	**Mrs. Ganbote S. S.**	Member
3.	**Ms. Patil P. R.**	Member
4.	**Ms. Pranoti Anagal**	Expert from University
5.	**Dr. Khojare Ajit S.**	Expert from other University
6.	**Dr. Sahoo A. K.**	Expert from other University
7.	**Mr. Vhorkate Karan Dayaram**	Meritorious Alumni

Credit Distribution Structure for S. Y. B. Voc. – 2024 – 2025 (Dairy Technology)

Level	Semester	Major		Minor	OE	VSC,SEC ,(VSEC)	AEC,VEC,IKS	OJT, FP,CEP, CC,RP	Cum .Cr/Sem	Degree/ Cum.Cr.
		Mandatory	Electives							
4.5	III	DRT-201-MJM: Dairy Processing Equipment (2credits)	--	DRT-211-MN Dairy Chemistry (2credits)	DRT – 216 - OE: Entrepreneurship Development (2credits)	DRT – 221 - VSC: Entrepreneurship Development (2credits)	MAR-231-AEC भाषिक उपयोजन व लेखण कौशल्ये HIN – 231 - AEC हिंदी भाषा कौशल्ये SAN-231-AEC प्राथमिक संभाषण कौशल्यम् (2credit)	DRT-235-FP (2credit)	24	UG Certificate 44credits
		DRT -202-MJM Fermented Milk Products (2credits)					GEN-245-IKS Indian Knowledge System (Generic) (2credit)			
		DRT -203-MJM: Manufacture of Fermented Milk		DRT-212-MN Chemical Analysis of Milk				NSS-239-CC NCC-239-CC PES-239-CC YOG-239-		

	Products (2credits)		(2credits)				CC CUL-239-CC (2credit)	
	DRT-204-MJM: Nutrition Science (2credits)							
IV	DRT-251-MJM: Dairy Engineering (2 credits)	--	DRT-261-MN: Dairy Microbiology (2credits)	DRT -266-OE: Food Safety, Hygiene and Sanitation (2credits)	DRT-276-SEC Research Methodology (2credits)	MAR-281-AEC लेखण निर्मिती व परिक्षण कौशल्ये HIN – 281 - AEC हिंदी भाषा: संप्रेषण कौशल्ये SAN-281-AEC प्रगत संभाषण कौशल्यम् (2credit)	NSS-289-CC NCC-289-CC PES-289-CC YOG-289-CC CUL-289-CC (2credit)	22
	DRT-252-MJM: Traditional Indian Dairy Products (2 credits)							
	DRT-253-MJM: Manufacture of Traditional Indian Dairy Products (2 credits)		DRT-262-MN: Analysis of Milk (2credits)				DRT-285-CEP (2credit)	

		DRT-254-MJM: Food Preservation Technology (2 credits)								
	Cum Cr.	**16**	--	8	4	4	6	8	46	

Course Structure for S. Y. B. Voc. Dairy Technology (2023 Pattern)

Sem	Course Type	Course Code	Course Name	Theory /Practical	Credits
III	Major Mandatory	DRT-201-MJM	Dairy Processing Equipment	Theory	02
	Major Mandatory	DRT-202-MJM	Fermented Milk Products	Theory	02
	Major Mandatory	DRT-203-MJM	Fermented Milk Products	Practical	02
	Major Mandatory	DRT-204-MJM	Nutrition Science	Practical	02
	Minor	DRT-211-MN	Dairy Chemistry	Theory	02
	Minor	DRT-212-MN	Chemical Analysis of Milk	Practical	02
	Open Elective(OE)	DRT- 216-OE	Dairy Plant Management	Theory	02
	Vocational Skill Course(VSC)	DRT-221-VSC	Entrepreneurship Development	Practical	02
	Ability Enhancement Course(AEC)	MAR-231-AEC	MAR- भाषिक उपयोजन व लेखण कौशल्ये	Theory	02
		HIN-231-AEC	HIN- हिंदी भाषा कौशल्ये		
		SAN-231-AEC	SAN- प्राथमिक संभाषण कौशल्यम्		
	Co-curricular Course(CC)	YOG/PES/CUL /NCC-239-CC	NSS-239-CC	Practical	02
			NCC-239-CC		
			PES-239-CC		
			YOG-239-CC		
			CUL-239-CC		
	Field Project (FP)	DRT-235- FP	Field Project	Practical	02
	Indian Knowledge System(IKS)	GEN-245-IKS	Indian Knowledge System (Generic)	Theory	02
				Total Credits Semester-III	**24**
IV	Major Mandatory	DRT-251-MJM	Dairy Engineering	Theory	02
	Major Mandatory	DRT-252-MJM	Traditional Indian Dairy Products	Theory	02
	Major Mandatory	DRT-253-MJM	Manufacture of Traditional Indian Dairy Products	Practical	02
	Major Mandatory	DRT-254-MJM	Food Preservation Technology	Practical	02
	Minor	DRT-261-MN	Dairy Microbiology	Theory	02
	Minor	DRT-262-MN	Analysis of Milk	Practical	02
	Open Elective(OE)	DRT- 266-OE	Food Safety, Hygiene and Sanitation	Theory	02

	Skill Enhancement Course(SEC)	DRT-276-SEC	Processing of Milk	Theory	02
	Ability Enhancement Course(AEC)	MAR-281-AEC	MAR- लेखण निर्मिती व परिक्षण कौशल्ये	Theory	02
		HIN-281-AEC	HIN- हिंदी भाषा: संप्रेषण कौशल्ये		
		SAN-281-AEC	SAN- प्रगत संभाषण कौशल्यम्		
	Co-curricular Course(CC)	YOG/PES/CUL /NCC-289-CC	NSS-289-CC	Practical	02
			NCC-289-CC		
			PES-238-CC		
			YOG-289-CC		
			CUL-289-CC		
	Community Engagement Project (CEP)	DRT-285- CEP		Practical	02
				Total Credits Semester IV	22
				Cumulative Credits Semester III and IV	**46**

CBCS Syllabus as per NEP 2020 for S. Y. B. Voc.
Dairy Technology (2023 Pattern)

Name of the Programme : B. Voc. Dairy Technology

Programme Code : DRT

Class : S. Y. B. Voc.

Semester : IV

Course Type : Major Mandatory

Course Code : DRT-251-MJM

Course Title : Dairy Engineering (Th)

No. of Credits : 02

No. of Teaching Hours : 30

Course Objectives:

1. To study the different utilities used in dairy plant
2. To study refrigeration unit, its working, and principle
3. To study about Refrigerant.
4. To study about milk storage units
5. To study about water supply system
6. To study about water softening plant
7. To study in depth knowledge of energy flow in an industry

Course Outcomes:

By the end of the course, students will be able to:

CO1. Students will be able to explore engineering section of the processing.
CO2. They will be able to differentiate between alternate and direct current.
CO3. They will get acquainted with the knowledge of refrigeration cycle.
CO4. They will receive vast information on characteristics of refrigerant.
CO5. They will get in depth knowledge of energy flow in an industry
CO6. They will study identification of milk storage units.
CO7. They will study about water supply system and water softening plant.

Weightage: 1=weak or low relation, 2=moderate or partial relation, 3=strong or direct relation

	Programme Outcomes(POs)								
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	1		2	2	1		2	2
CO2	2	2	1		2			2	1
CO3	1	2	2	1	2			2	1

CO4	3	3	1	1	2			2	1
CO5	3	2	2		1	1	2	1	3
CO6	3				2			3	3
CO7	3				2		3	3	3

Justification for the mapping

PO1: Disciplinary Knowledge:
All of the COs also contributes to the development of students' disciplinary knowledge in dairy technology. For example, CO4, CO5, require students to master advanced information on characteristics of refrigerants and get depth knowledge of energy flow in an industry. CO1 and CO2 require students to explore engineering section of the processing and able to differentiate between alternative and direct current. CO3 require students to develop a deep understanding of refrigeration cycle. CO6 Study about different utility used in dairy plant. CO7 study of water supply and dairy effluent system

PO2:Critical Thinking and Problem solving
All of the COs also contributes to the development of students' critical thinking and problem-solving skills. For example, CO4 require students to think critically about different characteristics of refrigerant. CO2, CO3 and CO5 require students to use their knowledge on differentiate the currents, knowledge about refrigeration cycle, and solving problem related energy flow in an industry. CO1 require students to think critically about engineering problems in processing section and solving it.

PO3: Social Competence Exhibit thought sand ideas effectively in writing and orally:
CO3, CO5 contribute to the development of students' research-related current and energy flow in industry. For example, CO2 requires students to explore engineering section.CO4 requires students to develop their ability to think critically about characteristics of refrigerants.

PO4: Research-Related Skills:
CO1, CO3, CO4, contribute to the development of students' trans-disciplinary knowledge. For example, CO1 requires students to learn how to apply to explore engineering skills, refrigeration cycle and characteristics of refrigerants.

PO5: Personal and professional competence
CO1, CO2, CO3, CO4, CO5, CO6, CO7 all contribute to the development of students' personal and professional competence. For example, all of the Cos require students to develop the ability to working dependently and as part of a team. They also require students to develop their communication skills and their ability to apply their knowledge to solve real-world problems.

PO6: Effective Citizenship and Ethics:
CO1, CO5 contribute effective citizenship knowledge about engineering processing and energy flow.

PO7: Environment and sustainability:
CO5 contribute knowledge about energy flow maintenance in an industry and CO7 study of water supply and dairy effluent system

PO8: Self – directed and lifelong learning:
CO1, CO2, CO3,CO4 and CO5, CO6, CO7, contribute lifelong knowledge about the energy flows and primary engineering processes. Study about different utility used in dairy plant and study of

water supply and dairy effluent system.

PO9:Trans – disciplinary research competence:
CO1, CO2, CO3, CO4, CO5, CO6, CO7 all contribute to the development of students' ability to engage in self-directed and life-long learning. For example, all of the COs require students to develop their ability to learn new concepts and apply them to new problems. They also require students to develop their ability to think critically about their own learning and to identify areas where they need to improve.

Topics and Learning Points

Unit-1Refrigeration, Heat and heat transfer: Principles of Vapor compression refrigeration cycle, refrigeration components, common refrigerants, properties of good refrigerants, Ice bank Tank (IBT), Bulk milk cooler. Heat transfer Principle and Laws, Types of heat exchangers, their installation & working, Microwave heating of milk and milk products. Evaporators and dryers, Humidifiers **8P**

Unit-2Basic electrical engineering: Alternating current fundamentals, Polyphase alternating current circuits, star & delta connections. AC Motors, starters & DG set, Fundamentals of Transformer **7P**

Unit-3Water Supply and Dairy Effluent System: Tube well, water storage and supply, Water quality water treatments and purification, Waste water treatment, reuse and disposal, Water conservation and rain water harvesting **8P**

Unit-4 Equipments and Milk storage: Butter churners – Types, Installation, working & Maintenance, Ice-Cream freezers-Types & working,Ghee Vat, Cheese Vat, Paneer Equipments, Milk storage tanks and milk silos, Packaging equipments of milk/ dairy products and processing units of UHT plant **7P**

References:

1. Refrigeration and Air conditioning(1993) Arrora S.C. Domkundwar S.
2. Engineering Thermodynamics (1977) Gupta C.P. , Prakash Rajendra
3. Food Engineering systems (1979) Farrall Arthur W.

CBCS Syllabus as per NEP 2020 for S. Y. B. Voc.
Dairy Technology (2023 Pattern)

Name of the Programme : B. Voc. Dairy Technology

Programme Code : DRT

Class : S .Y. B. Voc.

Semester : IV

Course Type : Major Mandatory

Course Code : DRT-252-MJM

Course Title : Traditional Indian Dairy Products (Th)

No. of Credits : 02

No. of Teaching Hours : 30

Course Objectives:

- To know importance of indigenous milk product and its market demand
- To learn the making process of different indigenous milk products
- To study defects of the products and prevention
- To know about manufacturing process of different traditional Indian dairy products
- To learn the nutritional value and importance of traditional Indian dairy products
- To know the market demand for different indigenous products
- To study judging and grading of indigenous milk products

Course Outcomes:

By the end of the course, students will be able to:

CO1. Students will get an exposure towards traditional Indian dairy products.
CO2. They will know the importance of traditional Indian dairy products.
CO3. They will acquire information on process of product manufacturing and its nutritional value.
CO4. They will be able to understand processing of heat desiccated, heat and acid coagulated, fat rich products along with judging and grading of indigenous milk products.
CO5. They will know importance of indigenous milk product and its market demand.
CO6. They will learn different making process of indigenous milk product.
CO7. They will study judging and grading of indigenous milk products.

Weightage:1=weakorlowrelation,2=moderateorpartialrelation,3=strongordirectrelation

	Programme Outcomes(POs)								
CourseOutcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3			2			2	3	

CO2	1		2	1			2	1	
CO3	1		2	2			2	3	
CO4	2	2	2	3			1	2	
CO5	3							3	
CO6	3			3			2	3	3
CO7	3	3						3	3

Justification for the mapping

PO1: Disciplinary Knowledge:
All of the course outcomes (COs) contribute to the development of students disciplinary knowledge in dairy technology. For example, CO2, CO3, and CO4 require students to understand knowledge about traditional dairy products, its manufacturing process and nutritional value and understand process of heat desiccated, heat and acid coagulated, fat rich products with judging and grading indigenous milk products. CO5 understand the knowledge of indigenous milk products and its market demand. CO6 Understand different making process of indigenous milk product.CO7 Get knowledge about judging and grading of indigenous milk products

PO2: Critical Thinking and Problem solving
All of the COs also contributes to the development of students' critical thinking and problem-solving skills. For example, CO4 require students to think critically about judging and grading of indigenous milk products. CO7 Get knowledge about judging and grading of indigenous milk products

PO3: Social Competence Exhibit thoughts and ideas effectively in writing and orally:
CO2, CO3, and CO4 contribute to the development of students' research-related skills and scientific temper. For example, CO2 requires students to learn importance of traditional Indian dairy products.CO3requiresstudentstodeveloptheirabilitytothink process of product manufacturing and its nutritional value and CO4 requires students to apply their knowledge of judging and grading of indigenous milk products. CO6Understand different making process of indigenous milk product

PO4: Research-Related Skills:
CO1, CO2, CO3, and CO4 contribute to the development of students' trans-disciplinary knowledge. For example, CO1 requires students to exposure towards the traditional Indian dairy products. CO2 requires students to know importance of traditional Indian dairy products. CO3 and CO4 require students to apply their knowledge of traditional Indian dairy products in manufacturing and its nutritional value and also helps to judging and grading of milk products. CO6Understand different making process of indigenous milk product

PO7: Environment and sustainability:
CO1, CO2, CO3, and CO4 all contribute to the development of students knowledge about traditional Indian dairy products. For example, CO1 require to develop exposure of students towards Indian dairy products. CO2 requires students know the importance of traditional Indian dairy products. CO3 and CO4 required to students to acquire information about product manufacturing and its nutritional value and able to understand process, judging and grading of indigenous milk products. CO6Understand different making process of indigenous milk product

PO8: Self – directed and lifelong learning:
CO1, CO2, CO3, and CO4 contribute to the development of students' self directed and lifelong learning. For example, CO1 requires students to exposure towards the traditional Indian dairy products. CO2 requires students to know importance of traditional Indian dairy products. CO3 and CO4 require students to apply their knowledge of traditional Indian dairy products in

manufacturing and its nutritional value and also help to judging and grading of milk products. CO5 understand the knowledge of indigenous milk products and its market demand. CO6 Understand different making process of indigenous milk product and CO7 Get knowledge about judging and grading of indigenous milk products

PO9: Trans – disciplinary research competence:
CO6Understand different making process of indigenous milk product and CO7 Get knowledge about judging and grading of indigenous milk products

Topics and Learning Points

Unit 1- Heat desiccated products **7P**

- Definition, Composition, And standards of Khoa and Basundi
- Methods of manufacture and factors affecting quality of products
- Khoa based sweets

Unit 2- Paneer and Channa **8P**

Definition, Composition, Standards and Factors affecting quality of Paneer and Channa, Methods of manufacturing Paneer and Channa, Channa based sweets

Unit 3- Concentrated Milks **7P**

Definition, standards and nutritive value and principle of evaporation, methods of manufacture and use of sweetened condensed and evaporated milks

Unit 4 Fat Rich Products **8P**

Ghee, Butter and Makkhan Definition, Composition and standards, Methods of manufacturing

References:

1. Milk Products of India – ICAR Anantkrishanan C.P. and Srinivasan M.R.
2. Technology of Indian Milk Products- Aneja R.P., Mathur B.N.
3. Indian Dairy Products (1974) Rangappa K.S., Acharya K.T.

CBCS Syllabus as per NEP 2020 for S. Y. B. Voc.
Dairy Technology (2023 Pattern)

Name of the Programme : B. Voc. Dairy Technology

Programme Code : DRT

Class : S .Y. B. Voc.

Semester : IV

Course Type : Major Mandatory

Course Code : DRT-253-MJM

Course Title : Manufacture of Traditional Indian Dairy Products (pr)

No. of Credits : 02

No. of Teaching Hours : 60

Course Objectives:

- To know importance of indigenous milk product and its market demand
- To learn the making process of different indigenous milk products like khoa, paneer, pedha, channa, kalakand, etc
- To study defects of the products and prevention
- To know about manufacturing process of different traditional Indian dairy products
- To learn the nutritional value and importance of traditional Indian dairy products
- To know the market demand for different indigenous products
- To study judging and grading of indigenous milk products

Course Outcomes:

By the end of the course, students will be able to:

CO1. Students will get an exposure towards traditional Indian dairy products.
CO2. They will know the importance of Indian dairy products & its nutrition value
CO3. They will acquire information on manufacturing process and products on small as well as industrial scale.
CO4. They will be able to understand processing of khoa and khoa based products, paneer and channa based products.
CO5. They will learn the importance of different indigenous milk products.
CO6. They will learn the making process of different indigenous milk products.
CO7. They will understand history of indigenous milk products

Weightage:1=weakorlowrelation,2=moderateorpartialrelation,3=strongordirectrelation

	Programme Outcomes(POs)

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3			2			2	3	
CO2	1		2	1			2	1	
CO3	1		2	2			2	3	
CO4	2	2	2	3			1	2	
CO5	3							3	
CO6	3			3			2	3	3
CO7	3	3						3	3

Justification for the mapping

PO1: Disciplinary Knowledge
All of the course outcomes (COs) contribute to the development of students disciplinary knowledge in dairy technology. For example, CO2, CO3, and CO4 require students to understand knowledge about traditional dairy products, its manufacturing process and nutritional value and understand process of heat desiccated, heat and acid coagulated, fat rich products with judging and grading indigenous milk products. CO5 understand the knowledge of indigenous milk products and its market demand. CO6Understand different making process of indigenous milk product.CO7 Get knowledge about judging and grading of indigenous milk products

PO2:Critical Thinking and Problem solving
The entire COs also contributes to the development of students' critical thinking and problem-solving skills. For example, CO4 require students to think critically about judging and grading of indigenous milk products. CO7 Get knowledge about judging and grading of indigenous milk products

PO3:Social Competence Exhibit thoughts and ideas effectively in writing and orally:
CO2, CO3, and CO4 contribute to the development of students' research-related skills and scientific temper. For example, CO2 requires students to learn importance of traditional Indian dairy products.CO3requiresstudentstodeveloptheirabilitytothink process of product manufacturing and its nutritional value and CO4 requires students to apply their knowledge of judging and grading of indigenous milk products. CO6Understand different making process of indigenous milk product

PO4:Research-RelatedSkills:
CO1, CO2, CO3, and CO4 contribute to the development of students' trans-disciplinary knowledge. Forexample, CO1 requires students to exposure towards the traditional Indian dairy products. CO2 requires students to know importance of traditional Indian dairy products. CO3 and CO4 require students to apply their knowledge of traditional Indian dairy products in manufacturing and its nutritional value and also helps to judging and grading of milk products. CO6Understand different making process of indigenous milk product

PO7:Environment and sustainability:
CO1, CO2, CO3, and CO4 all contribute to the development of students knowledge about traditional Indian dairy products. For example, CO1 require to develop exposure of students towards Indian dairy products. CO2 requires students know the importance of traditional Indian dairy products. CO3 and CO4 required to students to acquire information about product manufacturing and its nutritional value and able to understand process, judging and grading of indigenous milk products. CO6Understand different making process of indigenous milk product

PO8:Self – directed and lifelong learning:
CO1, CO2, CO3, and CO4 contribute to the development of students' self directed and lifelong learning. For example, CO1 requires students to exposure towards the traditional Indian dairy products. CO2 requires students to know importance of traditional Indian dairy products. CO3 and CO4 require students to apply their knowledge of traditional Indian dairy products in manufacturing and its nutritional value and also help to judging and grading of milk products. CO5 undertsnad the knowledge of indigenous milk products and its market demand. CO6 Understand different making process of indigenous milk product and CO7 Get knowledge about judging and

grading of indigenous milk products

PO9:Trans – disciplinary research competence:

CO6 Understand different making process of indigenous milk product and CO7 Get knowledge about judging and grading of indigenous milk products

Topics and Learning Points	
To learn the making process of different indigenous milk products	
1. Preparation of Khoa	2P
2. Preparation of Gulabjamun	2P
3. Preparation of Rasgulla	2P
4. Preparation of Pedha	2P
5. Preparation of Barfi	2P
6. Preparation of Kalakand	2P
7. Preparation of Channa	2P
8. Preparation of Basundi	2P
9. Preparation of Rasmalai	2P
10. Preparation of Paneer	2P
11. Preparation of Rabdi	2P
12. Preparation of kheer	2P
13. Preparation of Sandesh sweet	2P
14. Preparation of Colostrums milk cake	2P
15. Visit report	2P

References:

1. Milk Products of India – ICAR Anantkrishanan C.P. and Srinivasan M.R.
2. Technology of Indian Milk Products- Aneja R.P., Mathur B.N.
3. Indian Dairy Products (1974) Rangappa K.S., Acharya K.T.

CBCS Syllabus as per NEP 2020 for S. Y. B. Voc.
Dairy Technology (2023 Pattern)

Name of the Programme : B. Voc. Dairy Technology

Programme Code : DRT

Class : S .Y. B. Voc.

Semester : IV

Course Type : Major Mandatory

Course Code : DRT-254-MJM

Course Title : Food Preservation Technology (Pr)

No. of Credits : 02

No. of Teaching Hours : 60

Course Objectives:

- To study methods of preservation of foods
- To study the natural and chemical preservatives i. e. class I and class II preservatives
- To study effect of different physical parameters on food
- To learn how to improve quality of food
- To learn how to enhance the shelf life of the products
- To study about variety of preservatives which are used commercially
- To study different methods of food processing

Course Outcomes:

By the end of the course, students will be able to:

CO1. Students will be able to apply different preservation techniques to the food.
CO2. They will understand the processing of food through various processes.
CO3.hey will learn about effect of different physical parameters on food.
CO4. They will learn about the variety of preservatives that are used commercially.
CO5. They will be able to improve quality of food.
CO6. They will be able to study class- I and class- II preservatives.
CO7. They will be able to enhance the shelf life of the product.

Weightage:1=weakorlowrelation,2=moderateorpartialrelation,3=strongordirectrelation

	Programme Outcomes(POs)								
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3							3	
CO2	3						3		

CO3			2						
CO4		2							3
CO5					3				
CO6				3				3	
CO7						2			

Justification for the mapping

PO1: Disciplinary Knowledge:

CO1: Students will acquire knowledge on the science and principles of food preservation.

CO2: They will comprehend various methods and processes employed in food preservation.

PO2: Critical Thinking and Problem Solving:

CO4: Students will analyze and choose the most suitable preservation technique based on critical evaluation.

PO3: Social Competence:

CO3: They will be able to demonstrate pre-preparation actions, considering social and cultural contexts.

PO4: Research-Related Skills:

CO6: Students will research and learn about different types of preservatives.

PO5: Personal and Professional Competence:

CO5: They will enhance the shelf life of food, showcasing personal and professional competence.

PO6: Effective Citizenship and Ethics:

CO7: They will understand and adhere to ethical considerations in different methods of food preservation.

PO7: Environment and Sustainability:

CO2: They will comprehend the environmental impact of different food preservation processes.

PO8: Self-directed and Life-long Learning:

CO1: Students will independently gather information on the preservation of food.

CO6: They will continue to learn and adapt to new types of preservatives throughout their professional life.

PO9: Trans-disciplinary Research Competence:

CO4: Students will explore trans-disciplinary aspects related to food preservation techniques

Topics and Learning Points

1. Study of class I and class II preservatives **2P**
2. Preservation by Salt (Pickle and fish) **2P**
3. Preservation by Sugar (Jam, Jelly) **2P**
4. Preservation by Oil (Vegetable pickle) **2P**
5. Preservation by Chemical preservative (Squash, Kechup) **2P**
6. Preservation by Low temperature (Chilling and freezing peas **2P**
7. Preservation by High temperature (Blanching, Pasteurization) **2P**
   Vegetables, Fruits, Milk
8. Preservation by Drying (Sun and mechanical) Spinach, Grapes **2P**
9. Preservation by Use of acidulants: Preparation of tomato products **2P**
10. Preservation by Osmotic dehydration **2P**
11. Activity – Which are preservatives used in food and prepare the list and write the uses

References:

- Hand book of Food preservation (1999) M. Shafiur Rahman CRC Press
- Food Preservation techniques (2003) Peter Zeuthen
- The Technology of food preservation 4th Edition (2006) Norman W. Desroier

CBCS Syllabus as per NEP 2020 for S. Y. B. Voc.
Dairy Technology (2023 Pattern)

Name of the Programme : B. Voc. Dairy Technology

Programme Code : DRT

Class : S .Y. B. Voc.

Semester : IV

Course Type : Minor

Course Code : DRT-261-MN

Course Title : Dairy Microbiology (Th)

No. of Credits : 02

No. of Teaching Hours : 30

Course Objectives:

1. To learn basics of Fermentations, Starter cultures, and Fermentor
2. To understand the function of a starter culture
3. To know the advantages and importance of fermentation
4. To learn making process of various western fermented milk products
5. To learn making process of various Indian fermented milk products
6. To learn about nutritional values of fermented products.
7. To learn Principles of cheese making.

Course Outcomes:

By the end of the course, students will be able to:

CO1. Students will get an exposure towards fermented class of milk products.

CO2. They will know the importance of fermented milk products.

CO3. They will acquire information on fermentation process and products.

CO4. They will be able to understand processing of cheese along with some other fermented products.

CO5. They will be able to understand the function of microorganisms in Dairy products.

CO6. They will learn principle of cheese making.

CO7. They will able to understand basics of fermentation, starter culture and fermentors.

Weightage:1=weakorlowrelation,2=moderateorpartialrelation,3=strongordirectrelation

	Programme Outcomes(POs)								
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3							3	3
CO2	3							3	3

CO3	2			3					
CO4	2						2		
CO5	3	3						3	
CO6	3				3			3	
CO7	2	2			2				

Justification for the mapping

PO1: Disciplinary Knowledge:
CO1: Students will acquire knowledge about the microbial composition of milk.
CO2: They will demonstrate an understanding of microorganisms with commercial importance.
CO3: They will gain familiarity with various methods employed for microbial analysis.
CO4: They will comprehend the overall impact of microbial activity on milk.
CO5: They will distinguish between beneficial and harmful microorganisms in milk.
CO6: They will learn and apply different staining methods used in microbiology.
CO7: They will proficiently execute techniques for the isolation of pure cultures.
PO2: Critical Thinking and Problem Solving:
CO5: They will distinguish between beneficial and harmful microorganisms in milk.
CO7: They will proficiently execute techniques for the isolation of pure cultures.
PO4: Research-Related Skills:
CO3: They will develop skills in utilizing various methods for microbial analysis.
PO5: Personal and Professional Competence:
CO6: They will demonstrate proficiency in different staining methods used in microbiology.
CO7: They will showcase competence in executing techniques for the isolation of pure cultures.
PO7: Environment and Sustainability:
CO4: They will understand the environmental implications of microbial activity on milk.
PO8: Self-directed and Life-long Learning:
CO1: Students will acquire knowledge about the microbial composition of milk.
CO2: They will demonstrate an understanding of microorganisms with commercial importance.
CO5: They will distinguish between beneficial and harmful microorganisms in milk.
CO6: They will learn and apply different staining methods used in microbiology.
PO9: Trans-disciplinary Research Competence:
CO1: Students will gain knowledge about the microbial composition of milk with potential trans-disciplinary applications.
CO2: They will recognize the trans-disciplinary relevance of microorganisms with commercial importance.

Topics and Learning Points

Unit-1- Introduction to fermentation and starter culture
Definition, Types of fermentation, Design and working of Fermentor, Characteristics of fermented milk products, Nutritional importance, need, and benefits of fermented milk products. Definition and classification of Starter culture, Types and importance, Role and function of starter culture, properties of good starter. Defects in starter culture **08 Periods**

Unit 2- Indian Fermented Milk Products
Varieties of Indian fermented milk products: Dahi, Mishti Dahi, Buttermilk, Lassi, Chakka, Shrikhand, Shrikhand wadi **07 Periods**

Unit 3- Western Fermented Milk Products

Varieties of western fermented milk products: Yoghurt, Kefir, Kumis, Bulgarian butter milk, Acidophilus milk, Yakult and leben. **07 Periods**

Unit 4-Cheese

History Definition and classification of cheeses, Microbiology of cheese making, Chemistry of cheese making. Principle and method of manufacture of cheddar cheese, Mozzarella cheese, Gauda cheese and processed cheese**.** **08 Periods**

References:

1. Outlines of Dairy Technology, (1980) Sukumar De
2. Cultured milk products in CRC handbook (1982) Chandan R.C, Shahani K.K.
3. Yogurt Science and Technology (2004) Tamime A.Y. and Robinson R.K.

CBCS Syllabus as per NEP 2020 for S. Y. B. Voc.
Dairy Technology (2023 Pattern)

Name of the Programme : B. Voc. Dairy Technology

Programme Code : DRT

Class : S .Y. B. Voc.

Semester : IV

Course Type : Minor

Course Code : DRT-262-MN

Course Title : Analysis of Milk (Pr)

No. of Credits : 02

No. of Teaching Hours : 60

Course Objectives:

- To study analysis of milk and milk products
- To study preparation of different samples for testing
- To understand sensory analysis of milk and milk products
- To study about estimation of moisture, Ash and Total solids in milk
- To study about test for determining urea, cellulose and sucrose in milk and milk products
- To study laboratory equipments and instruments
- To study about milk and milk products

Course Outcomes:

By the end of the course, students will be able to:

CO1. Students will get exposure to laboratory instruments and equipments

CO2. They will learn basic analysis of milk

CO3. They will be able to test water for its pH and hardness

CO4. They will be able to perform sensory analysis for milk and milk products

CO5. They will be able to prepare product sample for testing

CO6. They will to handle the laboratory equipments

CO7. They will acquire knowledge about performing different tests for testing milk and milk products

Weightage:1=weakorlowrelation,2=moderateorpartialrelation,3=strongordirectrelation

	Programme Outcomes(POs)								
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3			3					
CO2		2		3					
CO3		3			2				
CO4	3				3				
CO5								3	
CO6		3						3	
CO7	3								

Justification for the mapping

PO1: Disciplinary Knowledge:

CO1: Students will acquire comprehensive knowledge of chemicals used in milk analysis. CO4: Students will gain exposure to the instruments employed in milk analysis.

CO7: Students will be able to prepare chemicals of different normality used for milk analysis.

PO2: CriticalThinkingandProblemSolving:

CO2: Students will critically analyze standard values of quality parameters in milk. CO3: Students will develop the ability to examine and evaluate the quality of milk.

CO6: Students will demonstrate critical thinking skills by performing different platform tests for milk.

PO4: Research-Related Skills:

CO1: Students will engage in research by acquiring knowledge of chemicals used in milk analysis.

CO2: Students will conduct research by understanding standard values of quality parameters in milk.

PO5: Personal and Professional Competence:

CO3: Students will develop competence in examining the quality of milk.

CO4: Exposure to instruments will contribute to personal and professional competence.

PO8: Self-directed and Life-long Learning:

CO5: Students will understand the functions of all the chemicals used for milk analysis.

CO6: Performing different platform tests for milk will encourage self-directed learning

Topics and Learning Points

1.	Introduction to basic laboratory instruments and equipments	**2P**
2.	Basic analysis of milk	**2P**
3.	Testing of water for pH and Hardness	**2P**
4.	Sensory analysis of milk	**2P**
5.	Sensory analysis of milk products	**2P**
6.	Preparation of product sample for testing	**2P**
7.	Determining Moisture content of milk and milk product	**2P**
8.	Determining Urea in milk/milk product	**2P**
9.	Determining Cellulose in milk/milk product	**2P**
10.	Determining Sodium chloride in milk/milk product	**2P**
11.	Determining Ash in milk products	**2P**
12.	Determining Total solids in milk	**2P**
13.	Determining Sucrose in milk	**2P**
14.	Industrial Visit and Report submission	**2P**

References:

CBCS Syllabus as per NEP 2020 for S. Y. B. Voc.
Dairy Technology (2023 Pattern)

Name of the Programme : F. Y. B Voc. Dairy Technology

Programme Code : DRT

Class : S. Y. B Voc.

Semester : IV

Course Type : Open Elective (OE)

Course Code : DRT-266-OE

Course Title : Food Safety, Hygiene and Sanitation (Th)

No. of Credits : 02

No. of Teaching Hours : 30

Course Objectives:

- To study Food safety, hygiene and sanitation
- To study Industrial waste utilization
- To Design and implementation of food safety management systems such as ISO series
- To study about common food borne illness and their treatments
- To study about industrial hazards
- To study about packaging methods which can prevent food contamination
- To study about HACCP and its prerequisites such as GMP, GHP etc.

Course Outcomes:

By the end of the course, students will be able to:

CO1. Students will know about the importance of food safety.
CO2. They will get to know about the hazards of consumption of unsafe food.
CO3. They will know about the different pathogens that can enter the body through contaminated food.
CO4. They will achieve information about common food borne illnesses and their treatments.
CO5. They will understand the packaging methods that can prevent food contamination.
CO6. They will understand about food safety hygiene and sanitation.
CO7. They will understand about industrial waste utilization.

Weightage:1=weakorlowrelation,2=moderateorpartialrelation,3=strongordirectrelation

	Programme Outcomes(POs)								
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3		1	3	3	3	3	3	
CO2	3	3	2	3	3	3	3	3	3
CO3	3	3		3			3	3	
CO4	3	3		3			3	3	
CO5	3	3	2	3	3	3	3	3	3
CO6	3	3		3	3		3	3	3
CO7	3	3		3	3			3	3

Justification for the mapping

PO1: Disciplinary Knowledge:

All of the course outcomes (COs) contribute to the development of student's disciplinary knowledge in Dairy Technology. For example, CO1, CO2 require students to master in concept of food safety and its importance along with the hazards of consumption of unsafe food.CO 3 and CO4 require students to apply knowledge of sanitary practices to prevent risks of food borne illnesses. CO5 requires students to apply their knowledge in developing different packaging to ensure food safety. CO6 Get knowledge about packaging methods which can prevent food contamination

CO7Will know about the properties and uses of different detergent, sanitizers and cleaning agents.

PO2: Critical Thinking and Problem solving

Some of the outcomes contribute to the development of student's critical thinking and problem-solving skills. For example, CO2 and CO3 require students to think critically about how to apply different processing and preservation techniques to make sure that the food is free from any hazard and is safe for human consumption. CO4 and CO5 require students to use their knowledge in selecting suitable processing technique according to the possible hazard from the product. CO6 Get knowledge about packaging methods which can prevent food contamination. CO7 will know about the properties and uses of different detergent, sanitizers and cleaning agents.

PO3: Social Competence Exhibit thoughts and ideas effectively in writing and orally:

CO1, CO2 and CO5 contribute to the development of student's Social Competence to exhibit thoughts and ideas effectively in writing and orally. For example, CO1 and CO2 requires students to learn thorough information on food safety and its importance in order to spread ore awareness in the same aspect and eventually contributing to the society.CO5requiresstudentstodeveloptheirabilitytothinkcriticallyabout advanced packaging techniques which can ensure the safety of the food for longer period of time.

PO4: Research-RelatedSkills:

All of the course outcomes (COs) contribute to the development of student's research – related skills. For example, CO1 requires students to learn importance of food safety and the need of collecting more and more useful information on the same. CO2 requires students to develop an understanding of the connections between the presence of different hazards and their consequences on human health. CO3 and CO4 require students to apply their knowledge of different processing techniques and advancements in the field of food preservation to prevent incidents of food poisoning. CO5 requires students to acquire with effects of different packaging materials on different foods. CO6 Get knowledge about packaging methods which can prevent food contamination. CO7 will know about the properties and uses of different detergent,

sanitizers and cleaning agents.

PO5: Personal and professional competence
CO1, CO2 and CO5 contribute to the development of student's personal and professional competence. For example, all of the mentioned Cos require students to develop their ability to work independently and as part of a team in any organized sector to implement different guidelines. They also require students to develop their communication skills and their ability to apply their knowledge to solve real – world problems. CO6 Get knowledge about packaging methods which can prevent food contamination. CO7 will know about the properties and uses of different detergent, sanitizers and cleaning agents.

PO6: Effective Citizenship and Ethics:
CO1, CO2 and CO5 contribute to the development of student's Effective Citizenship and Ethics. For example, manufacture of food free from hazards requires student to consider the management systems, guidelines, rules and regulations laid by different govt. and private organizations.

PO7: Environment and sustainability:
All the course outcomes contribute in development of student's Environment and sustainability approach. For example, CO1 and CO2 requires students to understand the intensity of the impact of an unsafe food on the human health. CO3 and CO4 requires student to develop their ability in contributing to the environment and produce a sustainable manufacturing process of a food that ensures food safety of the consumer. CO6 Get knowledge about packaging methods which can prevent food contamination.

PO8: Self – directed and lifelong learning:
All the course outcomes contribute in development of student's self – directed and lifelong learning. For example, CO1 and CO2 require students to get acquaint with common food hazards and their sources to overcome their hazardous implications. CO3 and CO4 requires student to develop an ability to come up with the solutions to assure food safety and quality. CO5 require student to think critically and formulate a technique of protecting the food from its surrounding environment with the help of intelligent packaging. CO6 Get knowledge about packaging methods which can prevent food contamination. CO7 will know about the properties and uses of different detergent, sanitizers and cleaning agents.

PO9: Trans – disciplinary research competence:
CO2, CO5, contribute to the development of students' ability to engage in self-directed and life-long learning. For example, all of the mentioned COs require students to develop their ability to learn new concepts and apply them to new problems. They also require students to develop their ability to think critically about their own learning and to identify areas where they need to improve. CO6 Get knowledge about packaging methods which can prevent food contamination. CO7 will know about the properties and uses of different detergent, sanitizers and cleaning agents.

Topics and Learning Points

Unit-1: Introduction to Food Safety: Definition, Types of hazards, biological, chemical, physical hazards, Factors affecting Food Safety, Importance of Safe Foods **7P**

Unit-2: Food Safety Management Tools: Basic concept, Prerequisites- GHPs ,GMPs, SOPs

etc, HACCP, ISO series, TQM - concept and need for quality, components of TQM, Kaizen. Risk Analysis, Accreditation and Auditing **8P**

Unit-3: Industrial byproducts and waste utilization: Potential & prospects of byproduct & waste utilization from the food Industries in India Byproduct & waste with special reference to milk & milk products **7P**

Unit-4:Hygiene and Sanitation in Food Service Establishments: Introduction, Sources of contamination, Control methods using physical and chemical agents, Waste Disposal, Pest and Rodent Control, Personnel Hygiene, Food Safety Measures **8P**

References:

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

CBCS Syllabus as per NEP 2020 for S. Y. B. Voc.
Dairy Technology (2023 Pattern)

Name of the Programme : F. Y. B Voc. Dairy Technology

Programme Code : DRT

Class : S. Y. B Voc.

Semester : IV

Course Type : Skill Enhancement Course (SEC)

Course Code : DRT-276-SEC

Course Title : Processing of Milk (Th)

No. of Credits : 02

No. of Teaching Hours : 30

Course Objectives:

- To study the methods of the collection and transportation of milk.
- To study hygiene and sanitation in dairy industry.
- To study about storage of milk.
- To study about processing of milk in dairy industries.
- To study about Bactofugation.
- To study about Ultra-High Temperatures.
- To study about varieties of special milks.

Course Outcomes:

By the end of the course, students will be able to:

CO1. Students will know about the collection and transportation of milk.
CO2. They will get to know about hygiene and sanitation in dairy industry.
CO3. They will know about the different varieties of special milks.
CO4. They will achieve information about storage of milk in dairy industries.
CO5. They will understand processing of milk in dairy industries.
CO6. They will study about Bactofugation.
CO7. They will study about Ultra-High Temperatures.

Weightage:1=weakorlowrelation,2=moderateorpartialrelation,3=strongordirectrelation

	Programme Outcomes(POs)								
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	3		2					

CO2	3	3	2	3	3	3			
CO3	3			3				3	
CO4	3	3	3		3	3			
CO5	2	3	2	2		3	2	3	
CO6	2			2			3		
CO7	3			3			3		

Justification for the mapping

PO1: Disciplinary Knowledge:

All of the course outcomes (COs) contribute to the development of student's disciplinary knowledge in Dairy Technology. For example, CO1, CO2 require students to master in concept of food safety and its importance along with the hazards of consumption of unsafe food.CO 3 and CO4 require students to apply knowledge of sanitary practices to prevent risks of food borne illnesses. CO5 requires students to apply their knowledge in developing different packaging to ensure food safety. CO6 Get knowledge about packaging methods which can prevent food contamination

CO7Will know about the properties and uses of different detergent, sanitizers and cleaning agents.

PO2: Problem Solving Skills: CO1: Students will know about the collection and transportation of milk. Addressing logistical challenges in milk transportation involves problem-solving to ensure efficient operations.CO2: They will get to know about hygiene and sanitation in the dairy industry. Implementing effective sanitation measures requires critical thinking to solve potential contamination issues. CO4: They will achieve information about storage of milk in dairy industries. Solving issues related to milk spoilage and storage conditions requires innovative problem-solving approaches. CO5: They will understand processing of milk in dairy industries. Processing challenges, such as maintaining quality during production, require effective problem-solving skills.

PO3: Employability Skills: CO2: They will get to know about hygiene and sanitation in the dairy industry. Knowledge of hygiene standards is essential for employability in food safety and quality assurance roles. CO4: They will achieve information about storage of milk in dairy industries. Understanding storage requirements is crucial for roles in logistics and supply chain management within the dairy sector. CO5**:** They will understand processing of milk in dairy industries. Proficiency in milk processing techniques enhances employability in various dairy production roles.

PO4: Industry Relevance and Entrepreneurial Abilities: CO1: Students will know about the collection and transportation of milk. | Effective collection and transportation practices are crucial for industry success and innovation in dairy ventures. CO2: They will get to know about hygiene and sanitation in the dairy industry. Understanding sanitation is key to developing products that meet industry safety standards and consumer expectations**.** CO3: They will know about the different varieties of special milks. Knowledge of diverse milk products supports entrepreneurial opportunities in niche markets. CO5: They will understand processing of milk in dairy industries. Processing knowledge is vital for developing competitive products and meeting market demands. CO6: They will study about Bactofugation. Understanding advanced processing techniques like Bactofugation can lead to innovation and competitive advantage in the industry. CO7: They will study about Ultra-High Temperatures (UHT). Knowledge of UHT processing is essential for creating long shelf-life products, enhancing marketability.

PO5: Ethical and Social Responsibility: CO2: They will get to know about hygiene and sanitation in the dairy industry. Commitment to hygiene practices reflects ethical responsibilities towards consumer safety and public health. CO4: They will achieve information about storage of milk in dairy industries. Ethical considerations in waste reduction and sustainability are important in milk storage practices.

PO6: Environmental Awareness: CO2: They will get to know about hygiene and sanitation in the dairy industry. Proper sanitation practices contribute to environmental sustainability by minimizing waste and pollution. CO4: They will achieve information about storage of milk in dairy industries. Effective storage solutions can reduce environmental impact through efficient use of resources. CO5: They will understand processing of milk in dairy industries. Sustainable processing methods help in minimizing environmental degradation while maintaining product quality.

PO7: Research and Innovations: CO5: They will understand processing of milk in dairy industries. | Innovation in processing techniques leads to improved efficiency and product quality in the dairy industry. CO6: They will study about Bactofugation. Bactofugation represents an innovative approach to enhancing dairy safety and quality through research-driven techniques. CO7: They will study about Ultra-High Temperatures (UHT). UHT technology is a result of ongoing research and innovation aimed at improving product shelf life and safety.

PO8: Global Perspective: CO3: They will know about the different varieties of special milks. Awareness of global dairy practices and diverse milk products fosters a broader understanding of international markets. CO5: They will understand processing of milk in dairy industries. Understanding processing techniques from a global perspective can inform best practices and innovations in the industry.

Topics and Learning Points

Unit 1-Milk Reception **07 P**

Milk Collection and Transportation, Milk Reception at the Dairy Dock, Milk Chilling and Storage

Unit 2-Processing of milk **08 P**

Clarification, Separation, Bactofugation and Standardization, Pasteurization and Homogenization

Unit 3-Sterilization and Ultra-High-Temperature Processing **07 P**

Unit 4-Special Milks **08 P**

Sterilized milk, Homogenized milk, Flavoured milk, Toned milk, Double toned milk, standardized milk, rehydrated milk, recombinant milk, UHT milk.

References:

- Outlines of Dairy Technology, (1980) Sukumar De
- The technology of milk processing, (1991) Khan A.Q
- Manual for milk plant operations, (1957) Washington
- Food engineering and Dairy technology (1981) Kessler H.G.