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

T. Y. B. Voc. Dairy Technology Semester -VI

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 2025-2026

Title of the Programme: T. 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 ofT. 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)

PSO1: Technical Competence
Students will acquire specialized technical knowledge and practical skills in dairy processing, milk product manufacturing, quality assurance, and plant operations, enabling them to work efficiently in dairy and allied industries.

PO2 Problem Solving Skills:
Students will develop analytical and critical thinking skills to identify, assess, and resolve challenges in dairy operations using a blend of theoretical understanding and hands-on experience.

PO3 Employability Skills:
Students will demonstrate essential workplace competencies including effective communication, teamwork, leadership, adaptability, time management, and professional ethics for improved employability in the dairy sector.

PO4 Industry Relevance and entrepreneurial abilities:
Students will be equipped with industry-relevant skills and entrepreneurial capabilities, empowering them to start and manage dairy-based businesses, cooperative ventures, or self-employment projects.

PO5 Ethical and Social Responsibility:
Students will recognize and apply ethical principles and social responsibilities in dairy practices, ensuring consumer safety, fair trade, and compliance with industry regulations.

PO6 Environmental Awareness: Students will understand and apply eco-friendly and sustainable practices in dairy production, focusing on climate change mitigation, pollution control, and effective waste and water management.

PO7 Research and Innovations:
Students will gain exposure to research methodologies and innovative practices, enabling them to contribute to process improvements, product development, and scientific advancements in dairy technology.

PO8 Global Perspective:
Students will understand international trends, standards, and market demands in the dairy industry, enabling them to adapt to global practices and opportunities.

PO9 Multidisciplinary studies: Students will integrate knowledge from microbiology, food science, engineering, management, and ICT to build a comprehensive skill set relevant to diverse roles in the dairy and food sector.

PO10 Community Engagement: Students will engage in socially responsible activities and extension services to promote rural development, nutrition, public health, and sustainable livelihoods through dairy-based initiatives.

Anekant Education Society's

Tuljaram Chaturchand College

Of Arts, Science and Commerce Baramati, Dist-Pune

(Empowered Autonomous)

Board of Studies in Dairy Technology

(Academic Year 2025-26 to 2027-28)

Sr.No.	Name of Member	Designation
1.	**Mr. Khan Wajid A.** Assistant Professor Department of Dairy Technology, T. C. College, Baramati.	**Chairperson**
2.	**Mrs. Ganbote Shruti S.** Assistant Professor, Department of Dairy Technology, T. C. College, Baramati	Member
3.	**Ms. Patil Pallavi R.** Assistant Professor, Department of Dairy Technology, T. C. College, Baramati	Member
4.	**Ms. Pawar Aishwarya R.** Assistant Professor, Department of Dairy Technology, T. C. College, Baramati	Member
5.	**Mrs. Sujata Patil**	Vice-Chancellor Nominee Subject Expert from SPPU, Pune
6.	**Mr. Khojare Ajit S.**	Subject Expert from Outside the Parent University
7.	**Mr. Pathan Fayaz L.**	Subject Expert from Outside the Parent University
8.	**Mr. Bhapkar Sandeep**	Representative from industry/corporate sector/allied areas
9.	**Mr. Chavan Shubham**	Member of the College Alumni
10.	**Mr. Shrey Chavan**	UG Student

Credit Distribution Structure for T.Y. B. Voc. – 2025 – 2026 (Dairy Technology)

Level	Semester	Major		Minor	VSC,SEC,(VSEC)	OJT, FP,CEP, CC,RP	Cum.Cr/Sem	Degree/Cum.Cr.
		Mandatory	Electives (Any Two)					
4.5	V	DRT-301-MJM: Fat Rich Milk Products (2credits)	DRT-306-MJE (A): Quality Assurance & Waste Management (2credits)	DRT-341-MN Food Additives (2credits)	DRT – 321 - VSC: Analysis of Milk (2credits)	DRT-335-FP Field Project (2credit)	22	UG Certificate 44credits
		DRT -302-MJM Dairy By-Product Technology (2credits)	DRT-307-MJE (B): Dairy Plant Management (2credits)					

		DRT -303-MJM: Nutrition Science (2credits)	DRT-308-MJE (C): Cheese Technology (2credits)	DRT-342-MN Food Preservation (2credits)				
		DRT-304-MJM: Sensory Evaluation of Dairy Products (2credits)						
		DRT-305-MJM: Fat Rich Milk Products (2credits)						
	VI	DRT-351-MJM: Dairy Product Development (2 credits)	DRT-356-MJE (A): Supply chain Management (2credits)	DRT -361-MN: Traditional Indian Dairy Products (2credits)	DRT-276-SEC Research Methodology (2credits)	DRT-385-OJT On Job Training (2credit)	22	
		DRT-352-MJM: Packaging Technology (2 credits)						

		DRT-353-MJM: Food Additives & Preservatives (2 credits)	DRT-356-MJE (B): Entrepreneurship Development (2credits)	DRT-362-MN: Traditional Indian Dairy Products (2credits)				
		DRT-354-MJM: Dairy Product Development (2 credits)						
		DRT-355-MJM: Packaging Technology (2 credits)	DRT-356-MJE (C): Dairy Biotechnology (2credits)					
	CumCr.	**20**	**08**	**8**	**4**	**4**	**44**	

8

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. B. Voc. Dairy Technology (2023 Pattern)

Sem	Course Type	Course Code	Course Name	Theory /Practical	Credits
I	Major Mandatory	DRT-101-MJM	Dairy Farm Management	Theory	02
	Major Mandatory	DRT-102-MJM	Dairy Chemistry	Theory	02
	Major Mandatory	DRT-103-MJM	Chemical analysis of milk	Practical	02
	Open Elective(OE)	DRT-116-OE	Diet Management	Theory	02
	Open Elective(OE)	DRT-117-OE	Diet Planning	Practical	02
	Vocational Skill Course(VSC)	DRT-121-VSC	Waste management and Effluent treatment - I	Theory	02
	Skill Enhancement Course(SEC)	DRT-126-SEC	Soft skill development	Theory	02
	Ability Enhancement Course(AEC)	ENG-131-AEC	Functional English-I	Theory	02
	Value Education Course(VEC)	ENV-135-VEC	Environment Science	Theory	02
	Indian Knowledge System(IKS)	DRT-137-IKS	Milk and Ancient Indian therapy	Theory	02
	Co-curricular Course(CC)	--	To be selected from the Basket	Theory	02
				Total Credits Semester- I	**22**
II	Major Mandatory	DRT-151-MJM	Market milk	Theory	02
	Major Mandatory	DRT-152-MJM	Dairy Microbiology	Theory	02
	Major Mandatory	DRT-153-MJM	Microbial analysis of milk	Practical	02
	Minor	DRT-161-MN	Food Preservation Technology	Theory	02
	Open Elective(OE)	DRT-166-OE	Food adulteration	Theory	02
	Open Elective(OE)	DRT-167-OE	Detection of food adulteration	Practical	02
	Vocational Skill Course(VSC)	DRT-171-VSC	Waste management and Effluent treatment - II	Theory	02
	Skill Enhancement Course(SEC)	DRT-176-SEC	Computer skills	Practical	02
	Ability Enhancement Course(AEC)	ENG-181-AEC	Functional English-II	Theory	02
	Value Education Course(VEC)	COS-185-VEC	Digital & technological solutions	Theory	02
	Co-curricular Course(CC)	--	To be selected from the Basket	Theory	02
				Total Credits Semester II	22
				Cumulative Credits Semester I and II	**44**

Department of Dairy Technology S. Y. B. Voc. Semester – III & IV

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**
	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

I V	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	Practical	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	Community Engagement Programme	Practical	02
				Total Credits Semester IV	22
				Cumulative Credits Semester III and IV	**46**

CourseStructure for T. Y. B. Voc.Dairy Technology (2023 Pattern)

Sem	Course Type	Course Code	Course Title	Theory/ Practical	Credits
V	Major Mandatory	DRT-301-MJM	Fat Rich Milk Products	Theory	02
	Major Mandatory	DRT-302-MJM	Dairy By-Product Technology	Theory	02
	Major Mandatory	DRT-303-MJM	Human Nutrition	Theory	02
	Major Mandatory	DRT-304-MJM	Sensory Evaluation of Dairy Products	Practical	02
	Major Mandatory	DRT-305-MJM	Fat Rich Milk Products	Practical	02
	Major Elective (MJE)	DRT -306-MJE(A)	Quality Assurance & Waste Management	Theory (Any two)	04
	Major Elective (MJE)	DRT -306-MJE(B)	Dairy Plant Management		
	Major Elective (MJE)	DRT -306-MJE(C)	Cheese Technology		
	Minor	DRT -341-MN	Food Additives and Preservatives	Theory	02
	Minor	DRT -342-MN	Food Preservation Technology	Practical	02
	Vocational Skill Course (VSC)	DRT -321-VSC	Analysis of Milk	Practical	02
	Field Project(FP)	DRT -335-FP	Field Project	Practical	02
	Semester-V			**Total Credits**	**22**
VI	Major Mandatory	DRT -351-MJM	Dairy Product Development	Theory	02
	Major Mandatory	DRT -352-MJM	Packaging Technology	Theory	02
	Major Mandatory	DRT -353-MJM	Food Additives & Preservatives	Theory	02
	Major Mandatory	DRT -354-MJM	Dairy Product Development	Practical	02
	Major Mandatory	DRT -355-MJM	Packaging Technology	Practical	02
	Major Elective(MJE)	DRT -356-MJE(A)	Supply chain Management	Theory (Any two)	04
	Major Elective(MJE)	DRT -356-MJE(B)	Entrepreneurship Development		
	Major Elective(MJE)	DRT -356-MJE(C)	Dairy Biotechnology		
	Minor	DRT -361-MN	Traditional Indian Dairy Products	Theory	02
	Minor	DRT -362-MN	Traditional Indian Dairy Products	Practical	02
	On Job Training(OJT)	DRT -385-OJT	On Job Training	Practical	04
				Total Credits Semester-VI	**22**
	V+ VI			**Total Credits Semester-**	**44**

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

Name of the Programme : B. Voc. Dairy Technology

Programme Code : DRT

Class : T. Y. B. Voc.

Semester : VI

Course Type : Major Mandatory

Course Code : DRT-351-MJM

Course Title : Dairy Product Development (Th)

No. of Credits : 02

No. of Teaching Hours : 30

Course Objectives:

- To understand the different types of milk and their making procedures, compositions and use.
- To learn about frozen dairy products, their making procedure and technology used in making.
- To study difference between ice-cream and frozen dairy dessert.
- To study process of production of dried milk.
- To study and understand the working of spray and roller drier.
- To acquire knowledge about by-products in dairy industry.
- To study about different types of milk.

Course Outcomes:

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

CO1. Students will understand the dried milk products in the economy.

CO2. They will understand the process of production of dried milk.

CO3. They will understand the difference between ice-cream and frozen dairy dessert.

CO4. They will understand the working of spray and roller drier.

CO5. They will get information about by product in dairy industry.

CO6. They will learn about the principle and working behind spray drying.

CO7. They will learn about different types of milk

Topics and Learning Points

Unit 1- Condensed Milks-Definition, concept, manufacturing process, judging, grading and defects of condensed milk **07 P**

Unit 2 Dried Milk Products-Definition, Composition, Classification, Standards and principles of drying, changes during drying, advantages and disadvantages of drying, , infant baby food, SMP, WMP, WPC, Ice cream mix powder **08 P**

Unit 3 Ice Cream: Definition, Composition, Classification and Standards (Legal and Others) Principle and Method of Manufacture. Technology used in ice cream making **08 P**

Unit 4- Frozen Dairy Deserts: Definition, Composition, Classification and Standards (Legal and Others) Principle and Method of Manufacture **07 P**

References:

1. Ice Cream 4th Edition – Arbuckle W.S. (1986)
2. Ice Cream: Manufacture and Technology- Bhandari Vivek (2001)
3. By Products from milks – Webb B.H. (1970)
4. Outlines of Dairy Technology, (1980) Sukumar De

Syllabus (2023 Pattern)
(As Per NEP 2020)
Mapping of Program Outcomes with Course Outcomes

Class: T. Y. B.Voc (Sem-VI) Subject: Dairy Technology

Course: Dairy Product Development Course Code: DRT-351-MJM

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	PO10
CO1	3	1	2	3	3	2	2	1	1	3
CO2	3	3	2	1	1	1	1	2	3	3
CO3	3	1	3	1	2	1	2	2	1	3
CO4	1	3	1	3	2	2	1	1	1	1
CO5	3	3	3	3	1	2	3	3	2	3
CO6	3	3	3	1	1	3	1	1	2	3
CO7	3	1	3	1	2	1	1	2	1	3

Justification for the mapping

PO1: Disciplinary Knowledge:

CO1: Demonstrate a comprehensive understanding of the economic significance of dried milk products..
CO2: Apply critical thinking skills to analyze the production process of dried milk.
CO3: Differentiate between ice-cream and frozen dairy dessert, showcasing critical reasoning abilities.
CO5: Articulate information on by-products in the dairy industry with clarity..
CO6: Investigate and present principles and workings behind spray drying in the production of dried milk.
CO7: Explore and present information on different types of milk through research.

PO2: Critical Thinking and Problem Solving:

CO2: Apply critical thinking skills to analyze the production process of dried milk.
CO4: They will understand the working of spray and roller drier.
CO5: Articulate information on by-products in the dairy industry with clarity
CO6: Investigate and present principles and workings behind spray drying in the production of dried milk.

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

CO1: This can be Demonstrate especially through presentations a comprehensive understanding of the economic significance of dried milk products..
CO2: Apply critical thinking skills especially through presentations to analyze the production process of dried milk.
CO3: Through reports, Differentiate between ice-cream and frozen dairy dessert, showcasing critical reasoning abilities.
CO5: This can be through Articulate information on by-products in the dairy industry with clarity..
CO6: Investigate and present principles and workings behind spray drying in the production of dried milk.
CO7: Explore and present information on different types of milk through research.

PO4: Research-Related Skills:

CO1: This can be Demonstrate especially through presentations a comprehensive understanding of the economic significance of dried milk products..
CO4: They will understand the working of spray and roller drier.
CO5: This can be through articulate information on by-products in the dairy industry with clarity.

PO5: Personal and Professional Competence:

CO1: Develop personal competence by understanding the economic and industrial aspects of dried milk products.
CO7: Enhance professional competence by gaining knowledge about the diverse applications of milk in various forms.

PO6: Effective Citizenship and Ethics:

CO1: Assess the ethical considerations in the dairy industry, particularly concerning the production of dried milk.

PO7: Environment and Sustainability:
CO4: Communicate effectively about the functioning of spray and roller driers in the dairy industry.
CO7: Explore and present information on different types of milk through research..

PO8: Self-directed and Life-long Learning:
CO5: Cultivate self-directed learning habits by continuously updating knowledge about the dairy industry and its products.

PO9: Trans-disciplinary Research Competence:
CO2: Apply knowledge to analyze the production process of dried milk..

PO10: Community Engagement
CO1: They will study all the Dairy products of milk in dairy industries.
CO3: They will acquire thorough knowledge of manufacture of milk products.

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

Name of the Programme : B. Voc. Dairy Technology

Programme Code : DRT

Class :T .Y. B. Voc.

Semester : V

CourseType : Major Mandatory

Course Code : DRT-352-MJM

Course Title : Packaging Technology (Th)

No. of Credits : 02

No. of Teaching Hours : 30

Course Objectives:

- To study about packaging material used in dairy industry.
- To study about packaging machines & it's working.
- To study and understand the different packaging systems used in dairy industry.
- To study role and function of packaging materials towards food.
- To study different packaging systems based on different products.
- To study identification of packaging material.
- To study about testing of different packaging materials.

Course Outcomes:

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

CO1. Students will get an exposure towards packaging material used for dairy products

CO2. They will know the identification and testing of packaging material

CO3. They will acquire information about packaging machines & it's working

CO4. They will understand the different packaging systems used in food industry.

CO5. They will learn about the role and function in food and dairy industry.

CO6. They will study about different types of packaging material used in food and dairy industry.

CO7. They will learn about different packaging system used to packed different products.

Topics and Learning Points

Unit-1: Introduction to packaging technology:
Introduction to packaging technology, Packaging evaluation, Need of packaging, Functions of packaging, Types of packaging – Primary, Secondary, Tertiary. **7 Periods**

Unit-2: Types of packaging materials:
Paper and its types , Manufacturing process of paper, Paperboard, Glass & its manufacturing process, plastic and types of plastic, metals, Ceramics . **8 Periods**

Unit-3: Food labeling:
Food labeling, General requirements of food labeling, Food packaging symbols, General requirements of food packaging, Bar coding. **7 Periods**

Unit-4: Packaging Techniques:
Vacuum packaging, Aseptic packaging, Modified atmosphere packaging (MAP),Controlled atmosphere packaging(CAP), Antimicrobial packaging, Intelligent packaging, Bioactive packaging, Shrink packaging, Edible coatings. **8 Periods**

References:

- Caric, M. 1994. Concentrated and Dried Dairy Products. VCH Publishers, Inc., New York.
- Fox, P.F. (Ed.) .1992. Advanced Dairy Chemistry. Vol.1: Proteins, 3rd ed. Elsevier Applied Science, London.
- Fox, P.F. and McSweeney, P.L.H. 2003. Advanced Dairy Chemistry. 3rd ed. Vol.1, part B. Kluwer Academic/Plenum Publishers, New York.
- Gupta, V.K. and Mathur, B.N. 1989. Current trends in whey utilization. Indian Dairyman, 41: 165-169.
- Gupta, V.K. 1997. Compendium of short course on “Technological advances in dairy by-products”, NDRI, Karnal.

Syllabus (2023 Pattern)
(As Per NEP 2020)
Mapping of Program Outcomes with Course Outcomes

Class: T. Y. B.Voc (Sem-VI) Subject: Dairy Technology
Course: Packaging Technology Course Code: DRT-352-MJM

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	PO10
CO1	3	1	1	2	1	1	2	3	1	1
CO2	1	1	2	1	3	1	2	1	1	2
CO3	1	1	2	2	1	2	2	3	2	1
CO4	2	2	2	3	1	2	1	2	2	3
CO5	3	1	1	1	2	1	1	3	1	1
CO6	3	1	1	3	2	3	2	3	3	2
CO7	3	3	1	1	1	1	1	3	3	1

Justification for the mapping

PO1: Disciplinary Knowledge:
CO1: Gain expertise in the various packaging materials utilized in the dairy industry.
CO2: They will know the identification and testing of packaging material.
CO4: Conduct research to comprehend the diverse packaging systems employed in the food industry.
CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.
CO7: Explore sustainable practices in packaging systems, aligning with environmental concerns.

PO2: Critical Thinking and Problem Solving:
CO2: Demonstrate analytical skills in the identification and testing of packaging materials.
CO4: They will understand the different packaging systems used in the food industry.
CO5: Understand the role and functions of packaging in the context of the food and dairy industry, fostering personal and professional competence.
CO7: Explore sustainable practices in packaging systems, aligning with environmental concerns.

PO3: Social Competence Exhibit thoughts and ideas effectively in writing and orally:
CO1: Gain expertise in the various packaging materials utilized in the dairy industry.
CO2: They will know the identification and testing of packaging material.
CO5: Understand the role and functions of packaging in the context of the food and dairy industry, fostering personal and professional competence.

PO4: Research-Related Skills:
CO2: Demonstrate analytical skills in the identification and testing of packaging materials.
CO4: Conduct research to comprehend the diverse packaging systems employed in the food

industry.
CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.
CO4: Gain trans-disciplinary insights into the packaging systems used for different food products.

PO5: Personal and Professional Competence:
CO5: Understand the role and functions of packaging in the context of the food and dairy industry, fostering personal and professional competence.
CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.

PO7: Environment and Sustainability:
CO1: Gain expertise in the various packaging materials utilized in the dairy industry.
CO2: Demonstrate analytical skills in the identification and testing of packaging materials.
CO4: Conduct research to comprehend the diverse packaging systems employed in the food industry.
CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.
CO7: Explore sustainable practices in packaging systems, aligning with environmental concerns.

PO8: Self-directed and Life-long Learning:
CO1: Gain expertise in the various packaging materials utilized in the dairy industry. CO2: They will know the identification and testing of packaging material.
CO2: Demonstrate analytical skills in the identification and testing of packaging materials.
CO4: Conduct research to comprehend the diverse packaging systems employed in the food industry.
CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.

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

Name of the Programme : B. Voc. Dairy Technology

Programme Code : DRT

Class : T .Y. B. Voc.

Semester : V

Course Type : Major Mandatory

Course Code : DRT-353-MJM

Course Title : Food Additives and Preservatives (Th)

No. of Credits : 02

No.of Teaching Hours : 30

Course Objectives:

- To learn about food additives used in food
- To understand the function of different food additives in improving shelf life
- To know the advantages and importance of food additives
- To learn the difference between food additives and food adulterants
- To understand the different classes of food additives and their role in improving texture , appearance and other sensory characteristics of food
- To learn about health problems related to over consumption of food additives.
- To learn basic understanding of the food toxicology.

Course Outcomes:

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

CO1. Better understanding of the functions of different food additives.

CO2. Exposure about food additives related to bakery and confectionary

CO3. Exposure about types of pigments, flavoring components.

CO4. Provide students with basic understanding of the principle of food toxicology

CO5. Identification of appropriate technique for detection of food adulterant

CO6. Recognize the common technique of detection of food adulterant

CO7. Exposure about types of food additives.

Topics and Learning Points

Unit-1- Introduction to food additives

Definition of food additives, History, Types of additives, functions of additives, Importance of food additives. **07 P**

Unit 2- Natural Food additives

Definition, Different Natural food additives (vitamin, minerals, pigments, amino acids, Fatty Acids) and their applications

08P

Unit 3- Chemical Food additives

Chelating agents, emulsifying agents, stabilizers, and thickening agents, antioxidants, antifoaming & ant caking agents**,** fat substitute and replacers, sweeteners

07 P

Unit 4- Food Preservatives

Definition, Principles of food preservation, Functions of food preservatives, Characteristics of food preservatives classification of food preservatives (Class I &Class II) **08 P**

References:

1. Natural food preservatives – By Sourish Bhattacharya

Syllabus (2023 Pattern)
(As Per NEP 2020)
Mapping of Program Outcomes with Course Outcomes

Class: T. Y. B.Voc (Sem-VI) Subject: Dairy Technology
Course: Food Additives and Preservatives Course Code: DRT-353-MJM

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	PO10
CO1	1	1	3	2	2	1	3	2	2	1
CO2	2	2	1	3	3	2	3	1	1	1
CO3	1	1	2	1	3	3	3	3	2	2
CO4	1	1	1	1	2	2	1	2	1	3
CO5	1	2	2	2	1	1	2	1	2	2
CO6	3	1	1	1	1	3	1	3	3	1
CO7	3	1	1	1	2	3	3	1	3	3

Justification for the mapping

PO1: Disciplinary Knowledge:
CO2: They will comprehend various methods and processes employed in food preservation.
CO3: They will be able to demonstrate pre-preparation actions, considering social and cultural contexts.
CO6: They will continue to learn and adapt to new types of additives throughout their professional life.

PO2: Critical Thinking and Problem Solving:
CO1: Students will acquire knowledge on the science and principles of food additives.
CO4: Students will analyze and choose the most suitable preservation technique based on critical evaluation.

PO3: Social Competence:
CO2: They will comprehend various methods and processes employed in food preservation.
CO3: They will be able to demonstrate pre-preparation actions, considering social and cultural contexts.
CO4: Students will analyze and choose the most suitable preservation technique based on critical evaluation.

PO4: Research-Related Skills:
CO1: Students will acquire knowledge on the science and principles of food additives.
CO6: Students will research and learn about different types of preservatives.

PO5: Personal and Professional Competence:
CO1: Students will acquire knowledge on the science and principles of food additives.
CO5: They will enhance the shelf life of food, showcasing personal and professional competence.

PO6: Effective Citizenship and Ethics:
CO1: Students will acquire knowledge on the science and principles of food additives.
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 additives.

PO8: Self-directed and Life-long Learning:
CO1: Students will independently gather information on the natural and chemical food additives.
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 preservatives.

P10: Community Engagement:
CO1: Students will acquire knowledge on the science and principles of food preservation.

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

Name of the Programme	**:** B. Voc. Dairy Technology
Programme Code	**:** DRT
Class	**:** T .Y. B. Voc.
Semester	**:** VI
Course Type	**:** Major Mandatory
Course Code	**:** DRT-354-MJM
Course Title	**:** Dairy Product Development (Pr)
No. of Credits	**:** 02
No. of Teaching Hours	**:** 60

Course Objectives:

- To prepare and study different types of milks and it's processing.
- To understand the different types of milk and their making procedures, compositions and use.
- To learn about frozen dairy products, their making procedure and technology used in making.
- To study difference between ice-cream and frozen dairy dessert.
- To study process of production of dried milk.
- To study and understand the working of spray and roller drier and prepare SMP/WMP.
- To acquire knowledge about by-products in dairy industry and study preparation of whey beverages

Course Outcomes:

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

CO1. Students will understand the importance of dried milk products.
CO2. They will understand the process of production of dried milk.
CO3. They will understand the principle and manufacturing of ice- cream.
CO4. They will learn working and principle of spray and roller drier.
CO5. They will learn about by products in dairy industry.
CO6. They will study to prepare different types of milks and its processing.
CO7. They will learn about preparation whey powder and whey beverages.

Topics and Learning Points

1. Preparation of flavored milk
2. Preparation of condensed milk
3. Preparation of Evaporated milk
4. Preparation of Ice cream
5. Preparation of Kulfi
6. Preparation of SMP/WMP by spray drying
7. Preparation of rehydrated milk
8. Preparation of recombinant Milk
9. Preparation of Ice-cream mix powder
10. Visit report

References:

- Sensory Evaluation Practices- Stone H, and Sidel J. (1993)
- Outlines of Dairy Technology - Su Kumar De

Syllabus (2023 Pattern)
(As Per NEP 2020)
Mapping of Program Outcomes with Course Outcomes

Class: T. Y. B.Voc (Sem-VI) Subject: Dairy Technology
Course: Dairy Product Development Course Code: DRT-354-MJM

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

	Programme Outcomes(POs)									
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	2	3	3	2	1	1	1	3
CO2	3	3	2		1	1	2	1	3	3
CO3	2	1	3	1	1	2	2	1	1	3
CO4	1	3	1	3	3	1	1	1	2	1
CO5	3	3	3	3	1	1	1	3	1	3
CO6	3	3	3	1	1	1	2	2	2	3
CO7	3	1	3	1	2	2	1	1	1	3

Justification for the mapping

PO1: Disciplinary Knowledge:
CO1: Demonstrate a comprehensive understanding of the economic significance of dried milk products..
CO2: Apply critical thinking skills to analyze the production process of dried milk.
CO3: Differentiate between ice-cream and frozen dairy dessert, showcasing critical reasoning abilities.

CO5: Articulate information on by-products in the dairy industry with clarity..
CO6: Investigate and present principles and workings behind spray drying in the production of dried milk.
CO7: Explore and present information on different types of milk through research.

PO2: Critical Thinking and Problem Solving:
CO2: Apply critical thinking skills to analyze the production process of dried milk.
CO4: They will understand the working of spray and roller drier.
CO5: Articulate information on by-products in the dairy industry with clarity
CO6: Investigate and present principles and workings behind spray drying in the production of dried milk.

PO3: Social Competence Exhibit thoughts and ideas effectively in writing and orally:
CO1: This can be Demonstrate especially through presentations a comprehensive understanding of the economic significance of dried milk products..
CO2: Apply critical thinking skills especially through presentations to analyze the production process of dried milk.
CO3: Through reports, Differentiate between ice-cream and frozen dairy dessert, showcasing critical reasoning abilities.
CO5: This can be through Articulate information on by-products in the dairy industry with clarity..
CO6: Investigate and present principles and workings behind spray drying in the production of dried milk.
CO7: Explore and present information on different types of milk through research.

PO4: Research-Related Skills:
CO1: This can be Demonstrate especially through presentations a comprehensive understanding of the economic significance of dried milk products..
CO4: They will understand the working of spray and roller drier.
CO5: This can be through articulate information on by-products in the dairy industry with clarity.

PO5: Personal and Professional Competence:
CO1: Develop personal competence by understanding the economic and industrial aspects of dried milk products.
CO7: Enhance professional competence by gaining knowledge about the diverse applications of milk in various forms.

PO6: Effective Citizenship and Ethics:
CO1: Assess the ethical considerations in the dairy industry, particularly concerning the production of dried milk.

PO7: Environment and Sustainability:
CO4: Communicate effectively about the functioning of spray and roller driers in the dairy industry.
CO7: Explore and present information on different types of milk through research..

PO8: Self-directed and Life-long Learning:
CO5: Cultivate self-directed learning habits by continuously updating knowledge about the dairy industry and its products.

PO9: Trans-disciplinary Research Competence:
CO2: Apply knowledge to analyze the production process of dried milk.

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

Name of the Programme : B. Voc. Dairy Technology

Programme Code : DRT

Class : T .Y. B. Voc.

Semester : VI

Course Type : Major Mandatory

Course Code : DRT-355-MJM

Course Title : Packaging Technology (Pr)

No. of Credits : 02

No. of Teaching Hours : 60

Course Objectives:

- To study about packaging material used in dairy industry.
- To study about packaging machines & it's working.
- To study and understand the different packaging systems used in dairy industry.
- To study role and function of packaging materials towards food.
- To study different packaging systems based on different products.
- To study identification of packaging material.
- To study about testing of different packaging materials.

Course Outcomes:

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

CO1. Students will get an exposure towards packaging material used for dairy products

CO2. They will know the identification and testing of packaging material

CO3. They will acquire information about packaging machines & its working

CO4. They will understand the different packaging systems used in food industry.

CO5. They will study about different packaging material.

CO6. They will study about different packaging machines.

CO7. They will learn to prepare album of different types of packaging material.

Topics and Learning Points

1. Study of standards for packaging materials
2. Measure the internal tearing resistance of a paper.

3. Study of GSM.
4. Study of cut out examination of canned food products.
5. Determination of water vapor permeability.
6. Study of the resistance of paper board & corrugates board to puncture.
7. Study of the internal tearing resistance of a paper
8. Study of tensile strength of packaging material.
9. Study of bursting strength of paper.
10. Prepare packaging album.

References:

- Handbook 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

Syllabus (2023 Pattern)
(As Per NEP 2020)
Mapping of Program Outcomes with Course Outcomes

Class: T. Y. B.Voc (Sem-VI) Subject: Dairy Technology
Course: Packaging Technology Course Code: DRT-355-MJM

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

	Programme Outcomes(POs)									
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	1	2	1	2	2	3	2	1
CO2	3	1	1	1	1	3	3	2	1	1
CO3	1	3	2	1	2	1	3	1	1	2
CO4	1	2	3	2	2	1	1	1	3	3
CO5	2	1	1	2	3	3	1	2	2	2
CO6	1	1	3	3	1	3	3	3	2	1
CO7	1	2	1	1	2	2	3	2	2	3

Justification for the mapping

PO1: Disciplinary Knowledge:

CO1: Gain expertise in the various packaging materials utilized in the dairy industry.
CO2: They will know the identification and testing of packaging material.
CO4: Conduct research to comprehend the diverse packaging systems employed in the food industry.
CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.
CO7: Explore sustainable practices in packaging systems, aligning with environmental concerns.

PO2: Critical Thinking and Problem Solving:
CO2: Demonstrate analytical skills in the identification and testing of packaging materials.
CO4: They will understand the different packaging systems used in the food industry.
CO5: Understand the role and functions of packaging in the context of the food and dairy industry, fostering personal and professional competence.
CO7: Explore sustainable practices in packaging systems, aligning with environmental concerns.

PO3: Social Competence Exhibit thoughts and ideas effectively in writing and orally:
CO1: Gain expertise in the various packaging materials utilized in the dairy industry.
CO2: They will know the identification and testing of packaging material.
CO5: Understand the role and functions of packaging in the context of the food and dairy industry, fostering personal and professional competence.

PO4: Research-Related Skills:
CO2: Demonstrate analytical skills in the identification and testing of packaging materials.
CO4: Conduct research to comprehend the diverse packaging systems employed in the food industry.
CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.
CO4: Gain trans-disciplinary insights into the packaging systems used for different food products.

PO5: Personal and Professional Competence:
CO5: Understand the role and functions of packaging in the context of the food and dairy industry, fostering personal and professional competence.
CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.

PO7: Environment and Sustainability:
CO1: Gain expertise in the various packaging materials utilized in the dairy industry.
CO2: Demonstrate analytical skills in the identification and testing of packaging materials.
CO4: Conduct research to comprehend the diverse packaging systems employed in the food industry.
CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.
CO7: Explore sustainable practices in packaging systems, aligning with environmental concerns.

PO8: Self-directed and Life-long Learning:
CO1: Gain expertise in the various packaging materials utilized in the dairy industry. CO2: They will know the identification and testing of packaging material.
CO2: Demonstrate analytical skills in the identification and testing of packaging materials.
CO4: Conduct research to comprehend the diverse packaging systems employed in the food industry.
CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.

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

Name of the Programme : B. Voc. Dairy Technology
Programme Code : DRT
Class : T. Y. B. Voc.
Semester : VI
Course Type : Major Elective
Course Code : DRT-356-MJE (A)
Course Title : Supply Chain Management (Th)
No. of Credits : 02
No. of Teaching Hours : 30

Course Objectives:

- To know about importance of efficient supply chain management in the food industry
- To study about the Inventory Management Techniques
- To study about the importance of quality control in the food industry
- To understand the transportation modes and logistics networks
- To understand the key stakeholder and their roles
- To learn about warehousing and distribution center management
- To demonstrate various waste water treatments.

Course Outcomes:

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

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

Topics and Learning

Unit-1: Introduction to Food Supply Chain Management **08 P**

- 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 **07 P**

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

Unit-3: Distribution and Logistics **07 P**

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

Unit-4: Quality Control and Food Safety **08 P**

- 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

Syllabus (2023 Pattern)
(As Per NEP 2020)
Mapping of Program Outcomes with Course Outcomes

Class: T. Y. B.Voc (Sem-VI) Subject: Dairy Technology

Course: Supply Chain Management Course Code: DRT-355-MJE (A)

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	PO10
CO1	3	2	3	1	1	1	2	1	2	1
CO2	3	1	1	3	1	2	2	1	1	1
CO3	2	3	3	3	2	2	1	2	3	2
CO4	2	1	1	1	3	1	1	1	1	3
CO5	1	3	1	1	1	3	1	1	3	2
CO6	1	2	2	3	1	1	3	2	1	1
CO7	1	2	2	1	3	3	3	2	1	3

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 importance of efficient supply chain management in the food industry
CO2: Study about the Inventory Management Techniques
CO5: Understand the transportation 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 the transportation 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 the transportation 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 the Hazard Analysis and Critical Control Points (HACCP)

PO6: Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values.
CO1: Learn about importance of efficient supply chain management in the food industry
CO4: Understand the Hazard Analysis and Critical Control Points (HACCP)

PO7: Research and Innovations: Depending on the program, 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, programs 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 the importance 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.

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

Name of the Programme : B. Voc. Dairy Technology

Programme Code : DRT

Class : T. Y. B. Voc.

Semester : VI

Course Type : Major Elective

Course Code : DRT-356-MJE (B)

Course Title : Entrepreneurship Development (Th)

No. of Credits : 02

No. of Teaching Hours : 30

Course Objectives:

1. To understand the concept of entrepreneurship.
2. To learn key skills for being a successful entrepreneur.
3. To study qualities of an Entrepreneur.
4. To study concept of entrepreneurship.
5. To understand the laws and regulations for the industries.
6. To gain basic knowledge and guidance for start-up.
7. To gain information of all the institutes working for entrepreneurial support.

Course Outcomes:

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

CO1. Students will get some basic guidance for their start-up.

CO2. They will be aware of all the institutes working for entrepreneurial support.

CO3. They will be able to structure their project reports.

CO4. They will understand the C and traits needed for entrepreneurship.

CO5. They will be educated towards laws and regulations for the industries.

CO6. They will understand concept of entrepreneurship.

CO7. They will learn skills for being a successful entrepreneur.

Topics and Learning Points

Unit-1: Introduction to Entrepreneurship: Introduction, Concept of Entrepreneurs, Entrepreneurship and Enterprise, Quality of an entrepreneurs, Rewards and penalties for an

entrepreneur, Need of Entrepreneurship development, Phases of Entrepreneurship development. **07 P**

Unit-2: Opportunity Identification and Entrepreneurial Support System: Business Planning, Procedure for starting small scale industry, Identification of Business Opportunity- Market research, SWOT analysis, Process of final product selection. Entrepreneurial Support System - Sources of Information, Application forms, District Industry Centre (DICs), Role of commercial bank for financial assistance, SISI, NSIC, SIDBI and NABARD. **10 P**

Unit-3: Project Report Preparation: Introduction, Preliminary project report, Techno-economic Feasibility Report, Detailed Project Report (DPR), Project Viability and Project Appraisal. **05 P**

Unit-4: Legal Aspect of business: Introduction, Business environment, Taxation, Factory Act, 1948, Concept of Ecology and Environment, Environment Protection Act, 1986, Safety at work place and Personal Protection Equipment, Export and import policies. . **08 P**

References:

- Dairy Plant Management- D.B. Puranik
- Management of dairy plants- Martin Mortensen (2012)
- In milk plant layout FAO- H.S. Hall, B. Helge (1963)

Syllabus (2023 Pattern)
(As Per NEP 2020)
Mapping of Program Outcomes with Course Outcomes

Class: T. Y. B.Voc (Sem-VI) Subject: Dairy Technology

Course: Entrepreneurship Development Course Code DRT-356-MJE (B)

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	PO10
CO1	1	1	1	3	1	1	1	1	3	1
CO2	2	1	1	1	2	1	1	3	1	1
CO3	1	1	2	3	1	1	2	1	2	2
CO4	1	3	3	1	3	2	2	2	1	3
CO5	2	1	1	1	1	3	3	1	2	2
CO6	3	1	2	2	1	1	1	3	1	1
CO7	1	3	1	1	3	1	2	1	1	3

Justification for the mapping

PO1: Disciplinary Knowledge:
CO6: Gain a comprehensive understanding of the concept of entrepreneurship as a part of their disciplinary knowledge.

PO2: Critical Thinking and Problem Solving:
CO4: Enhance problem-solving abilities by recognizing the qualities and traits essential for entrepreneurship.
CO7: Learn skills for becoming a successful entrepreneur, contributing to personal and professional competence.

PO3: Social Competence - Exhibit thoughts and ideas effectively in writing and orally:
CO3: Acquire skills in structuring project reports, demonstrating proficiency in research-related competencies.

PO4: Research-Related Skills:
CO3: Acquire skills in structuring project reports, demonstrating proficiency in research-related competencies.
CO1: Enhance trans-disciplinary research competence by gaining insights into various domains related to entrepreneurship.

PO5: Personal and Professional Competence:
CO4: Enhance problem-solving abilities by recognizing the qualities and traits essential for entrepreneurship.
CO7: Learn skills for becoming a successful entrepreneur, contributing to personal and professional competence.

PO6: Effective Citizenship and Ethics:
CO5: Be educated on laws and regulations pertinent to industries, fostering a sense of ethical entrepreneurship and effective citizenship.

PO8: Self-directed and Life-long Learning:
CO2: Develop critical thinking skills by becoming aware of all the institutes providing entrepreneurial support.
CO6: Develop self-directed and life-long learning skills through exposure to various aspects of entrepreneurship and its continuous evolution.

PO9: Trans-disciplinary Research Competence:
CO1: Enhance trans-disciplinary research competence by gaining insights into various domains related to enterpreneurship.

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

Name of the Programme : B. Voc. Dairy Technology
Programme Code : DRT
Class : T. Y. B. Voc.
Semester : VI
Course Type : Major Elective
Course Code : DRT-356-MJE (C)
Course Title : Dairy Biotechnology (Th)
No. of Credits : 02
No. of Teaching Hours : 30

Course Objectives:

- To Learn about history of cheese making and evolution of different varieties of cheeses
- To Understand how quality of milk critical role in good cheese making
- To acquire knowledge about the role of rennet and starter cultures in cheese making
  To understand how various additives play critical role in good cheese making
- To develop skills to manufacture good quality cheeses of both fresh and ripened varieties
- To learn about improving yield for improving economics of production of cheese
- To learn about classification of cheese

Course Outcomes:

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

CO1. They will learn about cheese making.
CO2. They will Understand how quality of milk critical role in good cheese making.
CO3. Students will acquire knowledge about the classification of cheese.
CO4. They will learn about improving yield of cheese to improve production.
CO5. Students will recognize the common technique of used in cheese making.
CO6. They will acquire knowledge about the role of rennet and starter cultures in cheese making
CO7. They will understand how various additives play critical role in good cheese making

Topics and Learning Points

Unit 1 – Introduction to dairy Biotechnology

Introduction to biotechnology, Introduction to genetics, Watson and crick model of DNA, RNA, Gene transfer mechanism, mutation and types of mutation,
Recombinant DNA technology –Tools and Techniques **08 P**

Unit 2 – Tissue Culture Techniques

Introduction to tissue culture techniques, Plant- cell, tissue and organ culture**,**
Animal - cell and organ culture, applications of tissue culture**.** **07 P**

Unit 3 – Industrial Biotechnology

Industrial Biotechnology- GMOs, Bioengineered food, Bioremediation
Genetically modified food(GMF) – Concept ,types and application
Regulations concerning Genetically Modified food in India, **07 P**

Unit 4 – Bioinformatics

Bioinformatics- Introduction and tools ,
Application of biotechnology in food and dairy industry,
Genetic manipulation of dairy starters for improved attributes of commercial value.
Ethical issues related to use of genetically modified foods. **08 P**

References:

1. Outlines of dairy technology – By Sukumar De.

Syllabus (2023 Pattern)
(As Per NEP 2020)
Mapping of Program Outcomes with Course Outcomes

Class: T. Y. B.Voc (Sem-VI) Subject: Dairy Technology
Course: Dairy Biotechnology Course Code: DRT-356-MJE (C)

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	PO10
CO1	2	1	1	2	2	1	1	2	2	3
CO2	2	2	1	3	2	3	1	2	1	1
CO3	1	2	2	1	2	1	3	2	1	3
CO4	3	3	1	1	2	3	3	2	1	2
CO5	3	2	2	3	1	1	2	1	3	2
CO6	3	1	2	2	2	1	1	3	3	1
CO7	3	2	1	1	2	2	3	3	3	1

Justification for the mapping
PO1: Disciplinary Knowledge:
CO1: Gain exposure to learn about cheese making.

CO2: learn about how quality of milk critical role in good cheese.
CO4: Acquire in-depth knowledge of improving yield of cheese to improve production.

PO2: Critical Thinking and Problem Solving:
CO2: learn about how quality of milk critical role in good cheese.
CO4: Acquire in-depth knowledge of improving yield of cheese to improve production.
CO5: Develop recognize the common technique of used in cheese making.
CO6: Recognize and understand the importance of quality in food production.

PO3: Social Competence Exhibit thoughts and ideas effectively in writing and orally:
CO5: Develop recognize the common technique of used in cheese making.

PO4: Research-Related Skills:
CO4: Acquire in-depth knowledge of improving yield of cheese to improve production.

PO5: Personal and Professional Competence:
CO5: Develop recognize the common technique of used in cheese making.
CO4: Acquire in-depth knowledge of improving yield of cheese to improve production.
CO6: Recognize and understand the importance of quality in food production.

PO6: Effective Citizenship and Ethics:
CO3Acquire in-depth knowledge about classification of cheese.
CO7: learn about various additives play critical role in good cheese making.

PO7: Environment and Sustainability:
CO4: Acquire in-depth knowledge of improving yield of cheese to improve production.
CO7: learn about various additives play critical role in good cheese making.

PO8: Self-directed and Life-long Learning:
CO6: Recognize and understand the importance of quality in food production.

PO9: Trans-disciplinary Research Competence:
CO4: Acquire in-depth knowledge of improving yield of cheese to improve production.

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

Name of the Programme : B. Voc. Dairy Technology
Programme Code : DRT
Class : T .Y. B. Voc.
Semester : VI
Course Type : Minor
Course Code : DRT-351-MN
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.

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.

Syllabus (2023 Pattern)
(As Per NEP 2020)
Mapping of Program Outcomes with Course Outcomes

Class: T. Y. B.Voc (Sem-VI) Subject: Dairy Technology

Course: Traditional Indian Dairy Products Course Code: DRT-351-MN

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

	Programme Outcomes(POs)									
CourseOutcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	1	2	1	3	2	3	3	1
CO2	1	1	2	1	1	2	2	1	1	1
CO3	1	2	2	2	2	1	2	3	2	2
CO4	2	2	3	3	3	1	1	2	3	3
CO5	3	3	1	1	1	2	1	3	1	2
CO6	3	1	1	3	1	1	2	3	3	1
CO7	3	3	3	1	2	3	1	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

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

Name of the Programme : B. Voc. Dairy Technology
Programme Code : DRT
Class : T.Y. B. Voc.
Semester : VI
Course Type : Minor
Course Code : DRT-352-MN
Course Title : Traditional Indian Dairy Technology (Pr)
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 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

Topics and Learning Points

To learn the making process of different indigenous milk products

1. Preparation of Khoa
2. Preparation of Gulabjamun
3. Preparation of Rasgulla
4. Preparation of Pedha
5. Preparation of Barfi
6. Preparation of Kalakand
7. Preparation of Channa
8. Preparation of Basundi
9. Preparation of Rasmalai
10. Preparation of Paneer
11. Preparation of Rabdi
12. Preparation of kheer
13. Preparation of Sandesh sweet
14. Preparation of Colostrums milk cake
15. Visit report

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.

Syllabus (2023 Pattern)
(As Per NEP 2020)
Mapping of Program Outcomes with Course Outcomes

Class: T. Y. B.Voc (Sem-VI) Subject: Dairy Technology
Course: Traditional Indian Dairy Technology Course Code: DRT-352-MN

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

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