॥ सा विद्या या विमुक्तये ॥

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

'ज्ञानतीर्थ', विष्णुपुरी, नांदेड – ४३१ ६०६ (महाराष्ट्र राज्य) भारत

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

'Dnyanteerth', Vishnupuri, Nanded - 431 606 (Maharashtra State) INDIA

Established on 17th September, 1994, Recognized By the UGC U/s 2(f) and 12(B), NAAC Re-accredited with'B++' grade

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विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत राष्ट्रीय शैक्षणिक धोरण–२०२० नुसार पदवी तृतीय वर्षाचे अभ्यासक्रम (Syllabus) शैक्षणिक वर्ष २०२६–२७ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, दिनांक २२ एप्रिल २०२६ रोजी संपन्न झालेल्या मा.विद्यापरिषद बैठकीतील विषय क्र.०८/६४–२०२६ च्या ठरावानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील राष्ट्रीय शैक्षणिक धोरण–२०२० नुसार पदवी तृतीय वर्षाचे अभ्यासक्रम (Syllabus) शैक्षणिक वर्ष २०२६–२७ पासून लागू करण्यास मा.विद्यापरिषदेने मान्यता प्रदान केली आहे. त्यानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील बी.एस्सी. तृतीय वर्षाचे खालील विषयाचे अभ्यासक्रम (Syllabus) शैक्षणिक वर्ष २०२६–२७ पासून लागू करण्यात येत आहे.

01	B.Sc. III Year Botany	10	B.Sc. III Year Biochemistry
02	B.Sc. III Year Chemistry	11	B.Sc. III Year Agriculture Microbiology
03	B.Sc. III Year Mathematics	12	B.Sc. III Year Electronics
04	B.Sc. III Year Zoology	13	B.Sc. III Year Seed Technology
05	B.Sc. III Year Microbiology	14	B.Sc. III Year Horticulture
06	B.Sc. III Year Geology	15	B.Sc. III Year Analytical Chemistry
07	B.Sc. III Year Enviornment & Earth Science	16	B.Sc. III Year Agrochemical & Fertilizers
08	B.Sc. III Year Statistics	17	B.Sc. III Year Industrial Chemistry
09	B.Sc. III Year Dairy Science	18	B.Sc. III Year Industrial Microbiology

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या www.srtmun.ac.in या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी, ही विनंती.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.:शै–१/परिपत्रक/पदवी/बीएस्सी/२०२६–२७/60
दिनांक : १९.०६.२०२६

सहा.कुलसचिव
शैक्षणिक (१–अभ्यासमंडळे) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :–
१) मा. कुलगुरू महोदयांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. प्र.कुलगुरू महोदयांचे कार्यालय, प्रस्तुत विद्यापीठ
३) मा. अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
४) मा. संचालक, परिक्षा व मुल्यमापन मंडळ, प्रस्तुत विद्यापीठ.
५) मा. प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED - 431 606 (MS)

UNDERGRADUATE PROGRAMME OF

SCIENCE & TECHNOLOGY

B.Sc. Third Year

DAIRY SCIENCE

(For Affiliated Colleges)

Effective from the Academic year 2026 – 2027

(As per NEP-2020)

Framed by

BOARD OF STUDIES IN DAIRY SCIENCE

S.R.T.M. University, Nanded - 431 606

From the Desk of the Dean, Faculty of Science and Technology

Swami Ramanand Teerth Marathwada University, Nanded, in line with its vision statement "***Enlightened Student: A Source of Immense Power***", is trying hard consistently to enrich the quality of science education in its jurisdiction by implementing several quality initiatives. Revision and updating the curriculum to meet the standards of the courses at the national and international level, implementing innovative methods of teaching-learning, and improvisation in the examination and evaluation processes are some of the important measures that enabled the University to achieve ***the 3Es, the equity, the efficiency,*** and ***the excellence*** in higher education of this region. To overcome the difficulty of comparing the performances of the graduating students and also to provide mobility to them to join other institutions, the University has adopted the cumulative grade point average (CGPA) system in the year 2014-2015. Further, following the suggestions by the UGC and looking at better employability, entrepreneurship possibilities and to enhance the latent skills of the stakeholders, the University has adopted the Choice Based Credit System (CBCS) in the year 2018-2019 at graduate and post-graduate level. This provided flexibility to the students to choose courses of their own interests. To encourage the students to opt for the world-class courses offered on online platforms like NPTEL, SWAYAM, and other MOOCS platforms, the University has implemented the credit transfer policy approved by its Academic Council and also has made a provision of reimbursing registration fees of the successful students completing such courses.

SRTM University has been producing a good number of high-calibre graduates; however, it is necessary to ensure that our aspiring students are able to pursue the right education. Like the engineering students, the youngsters pursuing science education need to be equipped and trained as per the requirements of the R&D institutes and industries. This would become possible only when the students undergo studies with an updated and evolving curriculum to match the global scenario.

Higher education is a dynamic process, and in the present era the stakeholders need to be educated and trained in view of the self-employment and self-sustaining skills like start-ups. Revision of the curriculum alone is not the measure for bringing reforms in higher education, but invites several other initiatives. Establishing industry-institute linkages and initiating internship, on-the-job training for the graduates in reputed industries are some of the important steps that the University would like to take in the coming time. As a result, revision of the curriculum was the need of the hour, and such an opportunity was provided by the New Education Policy 2020. National Education Policy 2020 (NEP 2020) aims at equipping students with knowledge, skills, values, leadership qualities, and initiates them for lifelong learning. As a result, the students will acquire expertise in specialized areas of interest, kindle their intellectual curiosity and scientific temper, and create imaginative individuals.

The curriculum given in this document has been developed following the guidelines of NEP-2020 and is crucial as well as challenging due to the reason that it is a transition from a general science-based to a discipline-specific curriculum. All the recommendations of the ***Sukanu Samiti*** given in the **NEP Curriculum Framework-2023** have been followed, keeping the disciplinary approach with rigor and depth, appropriate to the comprehension level of learners. All the Board of Studies (BoS) under the Faculty of Science and Technology of this university have put in their tremendous efforts in making this curriculum of international standard. They have taken care of maintaining logical sequencing of the subject matter with proper placement of concepts with their linkages for better understanding of the students. We take this opportunity to congratulate the Chairman (s) and all the members of various Boards of Studies for their immense contributions in preparing the revised curriculum for the benefit of the stakeholders in line with the guidelines of the **Government of Maharashtra regarding NEP-2020**. We also acknowledge the suggestions and contributions of the academic and industry experts of various disciplines.

We are sure that the adoption of the revised curriculum will be advantageous for the students to enhance their skills and employability. Introduction of the mandatory ***On Job Training, Internship program*** for science background students is praiseworthy and certainly helps the students to imbibe first-hand work experience team work management. These initiatives will also help the students to inculcate the workmanship spirit and explore the possibilities of setting up their own enterprises.

Dr. M. K. Patil
Dean
Faculty of Science and Technology
Swami Ramanand Teerth Marathwada University, Nanded

From the Desk of Chairman, Board of Studies of the Subject Dairy Science

PREAMBLE

The B.Sc. Dairy Science programme, offered under the semester pattern in colleges affiliated to Swami Ramanand Teerth Marathwada University, Nanded, has been thoughtfully designed to address the evolving academic, professional, and societal needs of the dairy sector and its allied fields. The programme envisions the holistic development of students, equipping them with the knowledge, skills, and competencies required to excel in higher education, research, entrepreneurship, and the dairy industry.

The curriculum has been framed in consonance with the National Education Policy (NEP) 2020, and encompasses Major Core (C), Minor (M), Generic Elective (GE), and Vocational and Skill Enhancement (V/SEC) courses, ensuring a multidisciplinary, skill-oriented, and outcome-based educational experience. The content of each theory course is methodically structured into modules and units with well-defined titles and sub-titles, specifying teaching hours, credit allocation, and evaluation weightage for clarity and academic rigour. To reinforce practical competence, laboratory practicals aligned with theory courses, field exposure visits, industrial training, and experiential learning components have been meaningfully integrated into the programme.

The curriculum clearly articulates course objectives, learning outcomes, programme outcomes, and programme-specific outcomes, enabling students to make informed choices regarding elective courses in alignment with their academic interests and career aspirations, while simultaneously deepening their knowledge and skills in Dairy Science. Beyond foundational learning, the programme also prepares students for higher studies, research, teaching, and diverse employment opportunities across dairy and allied sectors.

This curriculum framework has been developed upon a student-centric, outcome-oriented, and curiosity-driven pedagogical foundation, with strong emphasis on conceptual understanding, innovation, critical thinking, and practical application over rote learning. Particular attention has been accorded to experiential learning, industry relevance, entrepreneurship development, and sustainable dairy production systems, ensuring that students are prepared not only as knowledgeable graduates but also as responsible and innovative professionals. The inclusion of Generic Elective and Vocational and Skill Enhancement Courses further strengthens students' employability, broadens their technical competence, and enriches their hands-on exposure to real-world dairy practices.

The Board of Studies sincerely hopes that this curriculum will serve as a meaningful stepping stone in nurturing competent dairy professionals, researchers, and entrepreneurs who are well-equipped to address the evolving needs of society and contribute purposefully to the advancement of the dairy sector and its allied fields.

OBJECTIVES OF THE B.Sc. DAIRY SCIENCE PROGRAMME:

The objectives of this programme are:

1. Provide fundamental and advanced knowledge in dairy science, including milk production, processing, quality control, and dairy technology.
2. Develop scientific temper, analytical ability, and practical skills in dairy production, processing, and management.
3. Equip students with technical competency in dairy chemistry, microbiology, engineering, and product technology.
4. Promote experiential learning through laboratory practicals, field exposure, industrial training, and problem-solving approaches.
5. Develop employability, entrepreneurship, and self-reliance in dairy and allied sectors.
6. Prepare graduates for higher education, research, teaching, and professional careers in dairy industries and related fields.
7. Inculcate professional ethics, environmental awareness, and social responsibility.

PROGRAM-SPECIFIC OUTCOMES (PSO) OF B.Sc. DAIRY SCIENCE:

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

PO1: Demonstrate sound knowledge of the principles and practices of Dairy Science and allied disciplines.

PO2: Apply scientific and technical skills in milk production, processing, preservation, and quality assurance.

PO3: Analyze and solve practical problems related to dairy production, processing, and management using scientific approaches.

PO4: Perform laboratory, field, and industrial operations competently while adhering to safety and quality standards.

PO5: Use modern tools, emerging technologies, and digital applications in Dairy Science and the dairy industry.

PO6: Demonstrate critical thinking, innovation, and research aptitude to address challenges in the dairy sector.

PO7: Develop entrepreneurial skills and pursue employment or self-employment opportunities in dairy and allied enterprises.

PO8: Communicate effectively and function as responsible professionals with ethical, social, and environmental awareness.

The programme is designed to impart comprehensive subject knowledge, analytical ability, and professional competence among students to enable them to successfully appear for NET, MPSC, UPSC, and other national and state-level competitive examinations.

PROGRAM-SPECIFIC OUTCOMES (PSOs) OF B.Sc. DAIRY SCIENCE

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

PSO1: Apply principles of dairy production, milk processing, and dairy product technology in practical and industrial settings.

PSO2: Perform quality evaluation, safety assurance, and laboratory analyses related to milk and dairy products.

PSO3: Demonstrate technical competency in dairy engineering, dairy microbiology, dairy chemistry, and processing operations.

PSO4: Utilize scientific knowledge and modern technologies for efficient dairy farm and dairy plant management.

PSO5: Develop solutions for sustainable dairy production, value addition, and quality improvement.

PSO6: Explore opportunities in dairy entrepreneurship, research, extension services, and professional employment in dairy and allied sectors.

Prof.Dr. Rajkumar Sopanrao Sonwane
Chairman,
Board of Studies in Dairy Science
Swami Ramanand Teerth Marathwada University, Nanded

Details of the Board of Studies Members in the subject Dairy Science under the faculty of Science & Technology of S.R.T.M. University, Nanded

Sr No	Name of the Member	Designation	Address	Contact No.
1.	Dr. Rajkumar S.Sonwane	Chairman	Yeshwant Mahavidyalaya, Nanded	8888592956
2	Dr. Pandurang T.Gangasagre	Member	Adarsh College, Hingoli, Tq. & Dist. Hingoli.	9822575427
3	Dr. Suresh N. Landge	Member	Maharashtra Udyagiri Mahavidyalya, Tq. Udgir, Dist. Latur.	9673761858
4	Dr. Gajenra K Londhe	Member	VNMAU, Parbhani	7588571600
5	Dr. Vasant V.Niras	Member	Vivakanand College, Chhatrapati Sambhajinagar	9422712087
6	Dr. Sunil M Gaikwad	Invitee Member	Sanjeevanee Mahavidyalaya, Chapoli, Dist. Latur	9673722333
7	Dr. Arvind P. Naik	Invitee Member	Toshniwal Arts, Commerce and Science College, Tq.Sengaon. Dist. Hingoli.	9421462060
8	Dr. Ranjan B. Yedatkar	Invitee Member	Chhatrapati Shivajiraje Mahavidyalaya, Tq. Udgir, Dist. Latur.	9422120646
9	Dr. Sanjeevani B. Wadekar	Invitee Member	Sharadchandra College of Arts, Commerce and Science, Tq. Naigaon (Bz.), Dist. Nanded	9422638437

Swami Ramanand Teerth Marathwada University, Nanded

Faculty of Science and Technology

Credit Framework for B.Sc.III Year

Multidisciplinary Degree Program with Multiple Entry and Exit

Subject: DAIRY SCIENCE (Major)

Year & Level	Semester	Major *(From the same Faculty)*		Minor 1 *(From the same Faculty)*	Minor 2 *(From the same Faculty)*	Generic Elective (GE) (select from Basket 3 of *Faculties other than Science and Technology*)	Vocational & Skill Enhancement Course	Ability Enhancement Course (AEC) (Basket 4) Value Education Courses (VEC) / Indian Knowledge System (IKS) (Basket 5)	Field Project/ Case Study/ OJT/	Credits	Total Credits
1	2	3		4	5	6	7	8	9	10	11
3 (5.5)	V	SDRSCT1301 (3cr) SDRSCT 1302 (3cr) SDRSIKS 1303 (2cr) SDRSCP 1301 (2cr) SDRSCP 1302 (2cr) 12 Credits	Major Elective SDRSET 1301 (2cr) SDRSEP 1301 (2cr) 04 Credits	--	--	--	SDRSVC1301 02 Credits	--	FP/CS SDRSFP1301 Or SDRSCP1301 04 Credits	22	132
	VI	SDRSCT1351 (3cr) SDRSCT1352 (3cr) SDRSCT 1353 (2cr) SDRSCP1351 (2cr) SDRSCP1352 (2cr) 12 Credits	Major Elective SDRSET 1351 (2cr) SDRSEP 1351 (2cr) 04 Credits	--	--	--	SDRSVC1351 02 Credits	--	OJT SDRSOJ1351 04 Credits	22	
	Cum. Cr.	56		16	08	08	08+4=12	22	08+2=10	44	
Exit option: UG Diploma in Major Dairy Science and Minor Dairy Science on completion of 88 credits and additional 4 credits NSQF / internship in Dairy Science											

B. Sc. Third Year Semester V*(Level 5.5)*

Teaching Scheme

	Course Code	Course Name	Credits Assigned			Teaching Scheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Major	SDRSCT 1301	Goat, Sheep, Poultry and Pig Farming	03	--	12	03	--
	SDRSCT 1302	Dairy Microbiology	03	--		03	--
	SDRSIKS 1303	Introduction to Dairy Science (IKS)	02	--		02	--
	SDRSCP 1301	Practical Based on SDRSCT 1301	-	02		--	04
	SDRSCP 1302	Practical Based on SDRSCT 1302		02		--	04
Elective	SDRSET 1301	Traditional Indian Dairy Products OR	02	--	02	02	--
	SDRSET 1302	Livestock Feed Resources					
	SDRSEP 1301	Practical Based on SDRSET 1301 OR	-	02	02	--	04
	SDRSEP 1302	Practical Based on SDRSET 1302					
Vocational Course	SDRSVC1301	Technology of Fermented Milk Products	--	02	02	--	04
Field Project/ Case Study/ OJT	SDRSFP1301 Or SDRSCS1301	Field Project/Case Study	--	04	04	--	08
Total Credits: 22			10	12	22	10	24

B. Sc. Third Year Semester V *(Level 5.5)*

Examination Scheme

[40% Continuous Assessment (***CA***) and 60% End Semester Assessment (***ESA***)]

(For illustration, we have considered a paper of 02 credits, 50 marks; needs to be modified depending on credits assigned to individual paper)

Subject (1)	Course Code (2)	Course Name (3)	Theory				Practical		Total Col (6+7) / Col (8+9) (10)
			Continuous Assessment (CA)			ESA			
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)	CA (8)	ESA (9)	
Major	SDRSCT 1301	Goat, Sheep, Poultry and Pig Farming	15	15	30	45	--	--	75
	SDRSCT 1302	Dairy Microbiology	15	15	30	45	--	--	75
	SDRSIKS 1303	Introduction to Dairy Science (IKS)	10	10	20	30	--	--	50
	SDRSCP 1301	Practical, Based on SDRSCT 1301	--	--	--	--	20	30	50
	SDRSCP 1302	Practical, Based on SDRSCT 1302	--	--	--	--	20	30	50
Elective	SDRSET 1301	Traditional Indian Dairy Products OR	10	10	20	30	--	--	50
	SDRSET 1302	Livestock Feed Resources							
	SDRSEP 1301	Practical Based on SDRSET 1301 OR	--	--	--	--	20	30	50
	SDRSEP 1302	Practical Based on SDRSET 1302							
Vocational Course	SDRSVC 1301	Technology of Fermented Milk Products	--	--	--	--	20	30	50
Field Project/ Case Study/OJT	SDRSFP1301 Or SDRSCS1301	Field Project/Case Study	--	--	--	--	40	60	100

B. Sc. Third Year Semester VI *(Level 5.5)*

Teaching Scheme

	Course Code	Course Name	Credits Assigned			Teaching Scheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Major	SDRSCT 1351	Milk and Physiology of Lactation.	03	--	12	03	--
	SDRSCT 1352	Processing Technology of Milk	03	--		03	--
	SDRSCT 1353	Introduction to AI in Dairying	02	--		02	--
	SDRSCP 1351	Practical, Based on SDRSCT 1351	--	02		--	04
	SDRSCP 1352	Practical, Based on SDRSCT 1352		02		--	04
Elective	SDRSET 1351	Special Milks OR	02	--	02	02	--
	SDRSET 1352	Dairy Economics OR					
	SDRSEP 1351	Practical Based on SDRSET 1351 OR	--	02	02	--	04
	SDRSEP 1352	Practical Based on SDRSET 1352 OR					
Vocational Course	SDRSVC1351	Technology of Innovative and Value-Added Dairy Products	--	02	02	--	04
Field Project/ Case Study/ OJT	SDRSOJ1351	OJT	--	04	04	--	08
Total Credits 22			10	12	22	10	24

B. Sc. Third Year Semester VI *(Level 5.5)*

Examination Scheme

[40% Continuous Assessment (***CA***) and 60% End Semester Assessment (***ESA***)]

(For illustration, we have considered a paper of 02 credits, 50 marks; needs to be modified depending on credits assigned to individual paper)

Subject (1)	Course Code (2)	CourseName (3)	Theory				Practical		Total Col (6+7) / Col (8+9) (10)
			Continuous Assessment (CA)			ESA			
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)	CA (8)	ESA (9)	
Major	SDRSCT 1351	Milk and Physiology of Lactation.	15	15	30	45	--	--	75
	SDRSCT 1352	Processing Technology of Milk	15	15	30	45	--	--	75
	SDRSCT 1353	Introduction to AI in Dairying	10	10	20	30	--	--	50
	SDRSCP 1351	Practical Based on SDRSCT 1351	--	--	--	--	20	30	50
	SDRSCP 1352	Practical Based on SDRSCT 1352	--	--	--	--	20	30	50
Elective	SDRSET 1351	Special Milks OR	10	10	20	30	--	--	50
	SDRSET 1352	Dairy Economics							
	SDRSEP 1351	Practical Based on SDRSET 1351 OR	--	--	--	--	20	30	50
	SDRSEP 1352	Practical Based on SDRSET 1352							
Vocational Course	SDRSVC1351	Technology of Innovative and Value-Added Dairy Products	--	--	--	--	20	30	50
Field Project/ Case Study/ OJT	SDRSOJ1351	OJT	--	--	--	--	40	60	100

National Education Policy 2020

B.Sc. Dairy Science, III Year (Semester - V)

Major Core Theory Course

Course Code – SDRSCT1301

Title of the Course: Goat, Sheep, Poultry and Pig Farming

[No. of Credits: 3 Credits] **[Total:45 Hours]**

Course prerequisite:

Students enrolling in this course should possess a foundational understanding of livestock production. Specific prerequisites include:

1. Prior completion of coursework covering the biological and production aspects of goats, sheep, poultry, and pigs.
2. Basic familiarity with common breeds, housing requirements, and general management practices for small ruminants and monogastric livestock.
3. A baseline understanding of the technical and managerial requirements necessary for scientific and commercial animal husbandry.

Course Objectives:

The course is designed to enable students to:

1. **Identify** important indigenous and exotic breeds of sheep, goats, pigs, and poultry and understand their economic importance.
2. **Develop** practical skills in scientific management of small ruminants, pigs, and poultry for profitable production.
3. **Understand** management practices related to kidding, lambing, care of does, bucks, ewes, chicks, growers, layers, broilers, and young stock rearing.
4. **Apply** scientific principles of breeding, feeding, housing, and health management for improved livestock productivity.
5. **Perform** essential technical operations such as handling, shearing, debeaking, and artificial insemination.
6. **Develop** entrepreneurial skills through preparation of business plans and understanding market opportunities for meat, wool, and eggs.

Course Outcomes:

1. Upon successful completion of the course, students will be able to:
2. Identify and classify important breeds of sheep, goats, pigs, and poultry and evaluate their production potential.
3. Apply scientific management practices for efficient rearing and profitable operation of small livestock and poultry units.
4. Perform routine technical operations related to breeding, feeding, handling, and health care of livestock and poultry.
5. Optimize productivity through improved breeding, feeding, and management practices while minimizing mortality losses.
6. Demonstrate practical competence to independently manage commercial sheep, goat, pig, or poultry enterprises.
7. Prepare entrepreneurial plans and utilize technical knowledge for self-employment and livestock-based enterprise development.

Curriculum Details: SDRSCT1301-Goat, Sheep, Poultry and Pig Farming

Module No	Unit No	Topic	Hrs
1.		**Goat Farming**	13
	1.1	Introduction and History of Domestication in Goat Farming	
	1.2	Role of Goats in National Economy with its Population and Production.	
	1.3	Zoological Classification of Goat & Common terms used in Goat Farming Housing System of Goat Farming.	
	1.4	Care and Management of Kids, Pregnant does, lactating does and Breeding Buck.	
2		**Sheep Farming**	13
	2.1	Introduction to Sheep Farming Role of Sheep in National Economy	
	2.2	Zoological Classification of Sheep & Common terms used in Sheep Farming.	
	2.3	Different components of Sheep Housing.	
	2.4	Care and Management of lambs, Pregnant Ewes, lactating ewes, and breeding rams.	
3		**Poultry Farming**	13
	3.1	Introduction to Poultry Farming and Poultry Industry in India.	
	3.2	Zoological Classification of Poultry & Common terms used in Poultry Farming.	
	3.3	Poultry Housing Systems	
	3.4	Hatchery Management, Brooding Management, Grower Management, Layer Management and Broiler Management	
4		**Pig Farming**	06
	4.1	Introduction to Pig Farming.	
	4.2	Role of Pig in National Economy.	
	4.3	Pig Housing System.	
Total Periods			**45**

References.

1. Reproduction in Farm Animals - C.N. Sane & Others.
2. A textbook of Animal Husbandry - G.C. Banerjee.
3. Livestock production and management. - NSR Sastri & Thomas.
4. Principles and practices of dairy farm management - Jagdish Prasad.
5. A textbook of Animal Husbandry & Dairy Science - Jagdish Prasad.
6. Poultry Production and Management -Jagdish Prasad.
7. Goat, Sheep and Pig production and Management -Jagdish Prasad.
8. Poultry Farming and Management. - Jagdish Prasad.

National Education Policy 2020
B.Sc. Dairy Science, III Year (Semester -V)
Major Core Practical Course
Course Code – SDRSCP 1301
Title of the Course: Practical Based on SDRSCT1301
[No. of Credits: 2 Credits] [Total:60 Hours]

Course prerequisite:

This course is designed for students who have completed the first and second years of the Undergraduate Programme in the Faculty of Science and Technology.
Candidates must have completed foundational training and core courses in **Dairy Science** during their previous years of study to qualify for this major subject specialization.
A prerequisite understanding of **Animal Science**, including livestock physiology and basic management, is required.

Course objectives:

1. Identify and describe the body parts and important characteristics of poultry and farm animals.
2. Classify and differentiate Indian and exotic breeds of goat, sheep, poultry, and pig based on their productive traits.
3. Explain principles of scientific feeding, housing, culling, and health management practices in livestock and poultry.
4. Demonstrate skills in identification marking, wool shearing, wool grading, and vaccination practices.
5. Apply appropriate feeding and management practices for poultry birds at different stages of growth.
6. Examine various poultry house equipment and interpret their role in efficient farm management.
7. Analyze breed characteristics and management practices for improving livestock and poultry productivity.
8. Perform basic practical operations related to small ruminant, pig and poultry production systems.
9. Evaluate field-level livestock and poultry management practices through farm visits and practical exposure.
10. Develop technical competence and problem-solving skills for sustainable livestock and poultry production.

Course outcomes:

After **successful completion of this course, students will be able to:**

1. Identify and describe body parts and important external features of poultry, goats, sheep, and pigs.
2. Recognize and differentiate important Indian and exotic breeds of goat, sheep, poultry, and pig based on breed characteristics.
3. Demonstrate practical knowledge of identification methods, culling practices, and management techniques in sheep and goat farming.
4. Understand and perform feeding management of chicks, growers, layers, and broilers along with the use of poultry housing equipment.
5. Develop skills in wool shearing, wool grading, vaccination schedules, and health care management of small ruminants.
6. Gain experiential learning through farm visits and relate practical livestock and poultry management practices with field conditions.
7. Apply scientific principles of breeding, feeding, health care and farm management for efficient livestock and poultry production.

Curriculum details: SDRSCP 1301: Practical Based on SDRSCT1301
Goat, Sheep, Poultry and Pig Farming

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1.	Study of body parts of poultry.	4
2.	Study of Goat Breeds Indian Breeds: - Osmanabadi, Sangamneri, Jamunapari, Black Bengal, Exotic Breeds: Sannen, Angora, Boer.	4
3.	Study of Sheep Breeds. Indian Breeds: -Deccani, Gaddi, Chokla. Exotic Breeds: -Merino, Rambouillet.	4
4.	Study of Poultry Breeds. Indian Breeds: - Aseel, Kadaknath. Exotic Breeds: White Leghorn, Rhode Island Red. Commercial varieties: - Giriraja, Grampriya, Swarnadhara.	4
5.	Study of Pig Breeds Indian Breeds: - White Yorkshire	4
6.	Identification Marks of Sheep and Goat	4
7.	Feeding of poultry chicks, growers	4
8.	Poultry House Equipment's	4
9.	Shearing and Grading of Wool	4
10.	Vaccination and Health cover in Sheep and Goat	4
11.	Visit to sheep and goat farms.	10
12.	Visit to poultry and pig farms.	10
	Total	**60**

Textbooks and Reference Books:

1. Reproduction in Farm Animals - C.N. Sane & Others.
2. A textbook of animal husbandry - G.C. Banerjee.
3. Livestock production and management. - NSR Sastri & Thomas.
4. Principles and practices of dairy farm management - Jagdish Prasad.
5. A textbook of animal husbandry & dairy science - Jagdish Prasad.
6. Poultry Production and Management - Jagdish Prasad.
7. Goat, Sheep, and Pig Production and Management - Jagdish Prasad.
8. Poultry Farming and Management. - Jagdish Prasad

National Education Policy 2020

B.Sc. Dairy Science, III Year (Semester - V)

Major Core Theory Course

Course Code – SDRSCT1302

Title of the Course: Dairy Microbiology

[No. of Credits: 3 Credits] **[Total:45 Hours]**

Course prerequisite:

This course is open to students enrolled in the B.Sc. Third Year (Faculty of Science and Technology) who have completed the foundational and core Dairy Science modules at the first and second-year levels.

Before commencing the study of Dairy Microbiology, students must possess a baseline understanding of General Microbiology and Basic Chemistry, alongside technical proficiency in fundamental laboratory practices such as microscopy, media preparation, sterilization, and the aseptic handling of equipment.

Course Objectives:

The course is designed to enable students to: SYLLABUS

1. **Understand** the occurrence, classification, and significance of microorganisms present in milk and dairy products.
2. **Identify** sources of microbial contamination in milk and study factors affecting microbial growth, metabolism, and reproduction.
3. **Explain** microbial spoilage of milk and dairy products and understand preservation methods such as pasteurization, refrigeration, sterilization, and drying.
4. **Develop** knowledge of beneficial microorganisms and starter cultures used in the manufacture of fermented dairy products.
5. **Apply** microbiological principles and laboratory techniques for quality evaluation and safety assessment of milk and dairy products.
6. **Analyze** the importance of sanitation, hygiene, and microbial quality control practices in dairy farms and processing plants.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Identify and classify microorganisms associated with milk and dairy products and explain their significance in dairy science.
2. Analyze microbial growth, metabolism, contamination sources, and factors influencing microbial activity in milk.
3. Explain spoilage mechanisms in milk and dairy products and apply suitable preservation methods for quality maintenance.
4. Describe the role of starter cultures and beneficial microorganisms in the production of fermented dairy products.
5. Perform basic microbiological techniques and tests for evaluation of microbial quality and safety of milk and dairy products.
6. Apply sanitation, hygiene, and quality control practices for safe milk production and dairy processing**.**

Curriculum Details: SDRSCT1302-Dairy Microbiology

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.		**Introduction to Dairy Microbiology**	12
	1.1	Definition, scope and significance of Dairy Microbiology	
	1.2	Microbiology of milk and its functional importance	
	1.3	Classification of microorganisms associated with milk	
	1.4	Sources of microorganisms in milk and routes of contamination	
2.		**Microbiology of milk and milk products**	10
	2.1	Fermentation of milk and types of fermentation; role of beneficial microorganisms	
	2.2	Microbiology of fermented dairy products	
	2.3	Spoilage mechanism and defects in dairy products	
	2.4	Pathogenic microorganisms in milk (*Clostridium, Salmonella, Staphylococcus, Listeria, etc.*) and their public health significance	
3.		**Microbial quality control**	**12**
	3.1	Concepts of microbial quality control in dairy industry. Microbial testing and analytical techniques	
	3.2	Total bacterial count and Standard Plate Count (SPC)	
	3.3	Direct Microscopic Count (DMC), Coliform count	
	3.4	Dye reduction tests (MBRT/Resazurin test)	
4.0		**Preservation, hygiene and safety**	**11**
	4.1	Principles and methods of preservation of milk and dairy products	
	4.2	Quality milk and clean milk production concepts	
	4.3	Microbiology of frozen dairy products.	
	4.4	Safety practices for control of microbial contamination in dairy plants	
Total			**45**

Textbooks and Reference Books:

1. Dairy Microbiology — R.K. Robinson
2. Milk and Milk Products — W.C. Frazier
3. Fundamentals of Dairy Microbiology — Prajapati
4. Modern Dairy Technology — Robinson (2 volumes)
5. Introduction to Dairy Microbiology – R. Singh
6. Handbook of Milk Microbiology – Manish Srivastava
7. Handbook of Dairy Microbiology – Getachew Osei

National Education Policy 2020

B.Sc. Dairy Science, III Year (Semester - V)

Major Core Practical Course

Course Code – SDRSCP 1302

Title of the Course: Practical Based on SDRSCT 1302

(Lab Course in Dairy Microbiology)

[No. of Credits: 2 Credits] **[Total:60 Hours]**

Course prerequisite:

This course is open to students in the B.Sc. Third Year who have completed the basic Dairy Science modules during their first and second years of study.

Students should have a basic understanding of milk microorganisms and be familiar with standard laboratory practices, such as using a microscope, preparing culture media, and following sterilization procedures.

Course objectives:

The course is designed to enable students to:

1. **Understand** laboratory equipment, microscopy, sterilization methods, and preparation of culture media used in dairy microbiology.
2. **Develop** practical skills in isolation, staining, identification, and enumeration of microorganisms associated with milk and dairy products.
3. **Apply** microbiological quality assessment tests for evaluation of milk and dairy products.
4. **Perform** methods for assessing pasteurization efficiency, sanitation, and microbial safety in dairy plants.
5. **Enhance** hands-on competency in aseptic techniques, microbial analysis, and interpretation of laboratory results.
6. **Develop** scientific observation, reporting skills, and practical competence relevant to dairy microbiology laboratories.

Course outcomes:

After successful completion of this course, students will be able to:

1. Demonstrate proficiency in handling microbiology laboratory equipment, microscopy, sterilization procedures, and preparation of culture media.
2. Apply microbiological techniques for isolation, staining, identification, and enumeration of microorganisms in milk and dairy products.
3. Perform and interpret microbial quality tests such as Standard Plate Count, Direct Microscopic Count, Coliform Count, and dye reduction tests.
4. Evaluate the efficiency of milk pasteurization and assess microbial safety through the phosphatase test and related quality control practices.
5. Analyze sanitation and hygiene practices in dairy plants for prevention and control of microbial contamination.
6. Develop practical exposure to dairy microbiology laboratories and processing plants through educational visits and field-based learning.

Curriculum details: SDRSCP 1302: Practical Based on SDRSCT 1302
Dairy Microbiology

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1.	Study of handling laboratory equipment	4
2.	Study of microscope	4
3.	Study of Sterilization techniques used in microbiology laboratory	4
4.	Preparation and sterilization of culture media	4
5.	Isolation and cultivation of bacteria from milk	4
6.	To study Gram staining and identification of bacterial morphology	4
7.	To study Standard Plate Count (SPC) in milk	4
8.	To study Direct Microscopic Count (DMC) of milk	4
9.	To study Coliform count in milk	4
10.	To study Dye reduction tests of milk (Methylene Blue Reduction Test and Resazurin Test)	4
11.	Visit to dairy plant microbiology/quality control laboratory	10
12.	Visit to milk processing plant	10
Total		**60**

Textbooks:

1. Standard Methods for the Examination of Dairy Products – American Public Health Association.
2. Dairy Microbiology – R.K. Robinson.
3. Fundamentals of Dairy Microbiology – J.B. Prajapati.
4. Outlines of Dairy Technology – Sukumar De.
5. Textbook of Dairy Microbiology.

Standards / Manuals / Other Sources

1. Indian Council of Agricultural Research Practical Manuals.
2. Bureau of Indian Standards for milk and dairy products.
3. Food Safety and Standards Authority of India manuals and regulations.
4. National Dairy Research Institute publications and training manuals.
5. American Public Health Association laboratory methods manuals.

National Education Policy 2020

B.Sc. Dairy Science, III Year (Semester - V)

Major Core Theory Course

Course Code – SDRSIKS 1303

Title of the Course: Introduction to Dairy Science (IKS)

[No. of Credits: 2 Credits] [Total:30Hours]

Course prerequisite:

This course is open to students enrolled in the B.Sc. Third Year (Faculty of Science and Technology) who have completed the core Dairy Science modules during their first and second years.

Course Objectives:

The course is designed to enable students to:

1. **Understand** the historical evolution of dairying from ancient civilizations, including the Indus Valley and domestication of cattle.
2. **Explain** the socio-cultural, economic, and traditional significance of livestock and milk in Indian knowledge systems.
3. **Develop** knowledge of contributions of pioneers in dairy development, milk processing, and dairy industry growth.
4. **Understand** indigenous and scientific concepts related to milk processing, quality control, fermentation, and dairy engineering.
5. **Analyze** the application of traditional knowledge and modern dairy science in the manufacture of quality dairy products.
6. **Enhance** awareness of entrepreneurship, farm management, and employment opportunities in dairy and livestock sectors.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Explain the historical development of dairying and livestock domestication and their relevance in Indian knowledge systems.
2. Describe contributions of major pioneers and traditional practices in dairy development, milk processing, and quality improvement.
3. Analyze basic principles of milk processing, fermentation, standardization, and quality control from traditional and scientific perspectives.
4. Apply knowledge of livestock management and dairy practices for farm supervision and dairy enterprise development.
5. Demonstrate awareness of marketing, entrepreneurship, and employment opportunities in dairy and livestock sectors.
6. Integrate indigenous knowledge with modern dairy science for sustainable dairy production and value addition.

Curriculum Details: SDRSIKS 1303-Indian Knowledge Systems

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.		**Ancient Milk Production**	8
	1.1	Neolithic-Mesolithic times and domestication of sheep and goats	
	1.2	Indus Valley and Domestication of Zebu Cattle	
	1.3	Harappan and Mohenjo-Daro Civilizations and milk production	
	1.4	Cultural significance of milk and milk products in Indus Valley	
2.		**Dairy Development in India**	7
	2.1	Dr. Verghese Kurien and the White Revolution	
	2.2	Anand Pattern and Dairy Development in Gujarat	
	2.3	Dr. Niklaus Gerber and Market milk	
	2.4	Dr. Niklaus Gerber and its application in the dairy industry	
3.		**Microorganisms and milk**	**8**
	3.1	Louis Pasteur and Microorganisms	
	3.2	Pasteurization of milk and milk products	
	3.3	Louis Pasteur and Quality control in milk and milk products	
	3.4	Starter culture and Fermented dairy Industry	
4.		**Engineering and Dairy Industry**	**7**
	4.1	Auguste Gaulin: A Father of the homogenization of milk	
	4.2	Homogenization and quality in milk and milk products	
	4.3	Pearson's square and standardization of milk	
	4.4	Standardization and Quality control in milk and milk products	
Total			**30**

Textbooks and Reference Books

1. Animal Husbandry and Allied Technologies in Ancient India. By P. P. Joglekar &P. Goyal
2. History of Animal Keeping in Ancient India, By: Swarnendu Chakraborty
3. The Myth of the Holy Cow, by D. N. Jha
4. Origin and Spread of Domestication and Farming, By: Premendra Priyadarshi
5. Technology of Milk Processing, By: Anant Krishnan
2. Outlines of Dairy Technology, by: Sukumar De
3. Dairy Processing: Improving Quality, By: G. Sumit
4. A Textbook of Dairy Engineering, By: Tufail Ahemed
5. Milk and Dairy Products Technology, By: Edgar Spreer

SYLLABUS

Assessment Scheme:

The assessment scheme and passing criteria will be the same as per the structure of UG programs under NEP2020.

National Education Policy 2020
B.Sc. Dairy Science, III Year (Semester -V)
Major Elective Theory Course
Course Code – SDRSET1301
Title of the Course: Traditional Indian Dairy Products
[No. of Credits: 2 Credits] **[Total:30 Hours]**

Course pre-requisite:

The course is open to third-year undergraduate students in Science and Technology who have completed basic first-year Dairy Science training for entry-level core Dairy Science courses.

Students enrolling for this course should know of:

1. Basic principles of dairy science and milk composition.
2. Fundamental understanding of traditional and indigenous Indian dairy products.
3. Basics of dairy processing operations, preservation, and product handling.
4. Working knowledge of dairy equipment and instruments used in product manufacture.
5. Introductory knowledge of farm business economics and dairy entrepreneurship.
6. Basic laboratory skills related to quality evaluation of dairy products.

Course objectives:

1. **Understand** the principles, scope, and importance of traditional Indian dairy products.
2. **Explain** the methods of manufacture, composition, and quality characteristics of indigenous dairy products.
3. **Analyse** the processing technology involved in the production of major traditional dairy products such as khoa, chhana, paneer, ghee, and fermented products.
4. **Develop** knowledge regarding equipment, packaging, storage, and quality control aspects of traditional dairy products.
5. **Evaluate** microbiological, physicochemical, and safety aspects associated with traditional dairy products.
6. **Apply** principles of value addition, economics, and entrepreneurship in traditional dairy product manufacture.
7. Appreciate the cultural heritage and commercial potential of Indian traditional dairy products.

Course outcomes:

After successful completion of the course, students will be able to:

1. Describe the significance, classification, and traditional methods of manufacture of Indian dairy products.
2. Explain composition, processing technology, and quality characteristics of major traditional dairy products.
3. Apply principles of dairy processing, equipment handling, and quality control in the manufacture of indigenous dairy products.
4. Analyze physicochemical, microbiological, and storage aspects affecting quality and safety of traditional dairy products.
5. Evaluate packaging, shelf life, economics, and commercial feasibility of traditional dairy products. Develop entrepreneurial and value-added approaches for production and marketing of traditional dairy products.

Curriculum Details: SDRSET 1301 Traditional Indian Dairy Products

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.		**Overview & Heat-Desiccated Milk Products**	8
	1.1	History and classification of traditional Indian dairy products	
	1.2	Nutritional and socio-economic importance	
	1.3	Khoa: Types, composition, manufacture, yield and defects, *Peda, Burfi*	
	1.4	Shelf-life aspects of heat-desiccated products-*Khoa, Peda, Burfi*	
2.		**Coagulated & Chhana-Based Products**	7
	2.1	Chhana: Preparation, properties, defects	
	2.2	Paneer: Manufacture, quality standards, packaging	
	2.3	Rasgulla and Sandesh: Production Technology	
	2.4	Chhana-based sweets and quality evaluation	
3.		**Fat-Rich & Concentrated Milk Products**	**7**
	3.1	Makkhan (Desi butter), Ghee residue (berry)	
	3.2	Ghee: Methods of manufacture (Desi, Creamery, Direct Cream Method and Pre-stratification Method)	
	3.3	Physico-chemical properties and quality standards of ghee	
	3.4	Traditional dairy-based confections	
4.		**Frozen, Packaging & Quality Control Aspects**	8
	4.1	Kulfi: Traditional freezing techniques.	
	4.2	Malai-ka-baraf	
	4.3	Indigenous dairy sweets and beverages (non-fermented)	
	4.4	Packaging materials for traditional dairy products	
		Total	**30**

Books and Reference Books:

1. Aneja, R.P., Mathur, B.N., Chandan, R.C. & Banerjee, A.K. (2002). Technology of Indian Milk Products. Dairy India Publications.
2. De, S. (1980). Outlines of Dairy Technology. Oxford University Press.
3. Sukumar De (Latest Edition). Indian Dairy Products, Oxford University Press.
4. Chandan, R.C. (Ed.). (2011). Dairy India Yearbook. Dairy India Yearbook.
5. Gupta, S.K. (2015). Dairy Technology (Traditional and Modern Methods of Milk Processing). Satish Serial Publishing House.
6. Agarwal, S.P. & Shrivastava, A.K. (2006). Modern Dairy Technology (Vol. I & II). Kalyani Publishers.
7. Indian Council of Agricultural Research (ICAR). Handbook of Animal Husbandry. ICAR, New Delhi.
8. FSSAI (Latest Edition). Food Safety and Standards (Food Products Standards and Food Additives) Regulations.

National Education Policy 2020

B.Sc. Dairy Science, III Year (Semester -V)

Major Elective Practical Course

Course Code – SDRSEP 1301

Title of the Course: Practical Based on SDRET 1301

[No. of Credits: 2 Credits] **[Total:30Hours]**

Course prerequisite:

This course is open to students enrolled in the B.Sc. Third Year (Faculty of Science and Technology) who have completed the foundational and core Dairy Science modules at the first and second-year levels. Candidates must possess a baseline understanding of dairy processing, chemistry, and microbiology. Proficiency in quality control principles and their practical applications within the dairy industry is essential for advanced study.

Course Objectives:

After completion of this course, students will be able to:

1. **Understand** principles and practical techniques involved in dairy processing and product preparation.
2. **Develop** skills in handling equipment, instruments, and laboratory procedures used in dairy science.
3. **Apply** scientific methods for analysis, testing, and quality evaluation of milk and milk products.
4. **Demonstrate** competency in preparation and assessment of traditional and value-added dairy products.
5. **Analyze** practical problems related to dairy processing and adopt suitable corrective measures.
6. **Enhance** technical, entrepreneurial, and professional skills relevant to the dairy industry.

Course Outcomes:

1. After successful completion of the course, students will be able to:
2. Perform practical operations related to dairy processing and product manufacture.
3. Use laboratory equipment and analytical techniques for testing the quality of milk and milk products.
4. Prepare and evaluate traditional dairy products using standard procedures.
5. Analyze processing parameters and quality defects in dairy products.
6. Apply hygiene, sanitation, and quality control practices in dairy laboratory and processing operations.
7. Demonstrate technical proficiency and problem-solving skills for dairy industry applications.

Curriculum details: SDRSEP 1301: Practical Based on SDRSET 1301
Traditional Indian Dairy Products

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1.	Preparation of Khoa, Peda	4
2	Preparation of Burfi	4
3	Preparation of Channa	4
4	Preparation of Sandesh	4
5.	Preparation of Rasogulla	4
6.	Preparation of Makkhan	4
7.	Preparation of Kulfi	4
8.	Preparation of Cream or Malai Separation	4
9.	Preparation of Ghee	4
10.	Preparation of Paneer	4
11.	Visit to Dairy plant	10
12.	Visit to the dairy production unit/Visit to sweet mart	10
	Total	**60**

Textbooks and Reference Books:

1. Aneja, R.P., Mathur, B.N., Chandan, R.C. & Banerjee, A.K. (2002).
2. Technology of Indian Milk Products. Dairy India Publications.
3. De, S. (1980). Outlines of Dairy Technology. Oxford University Press.
4. Food Safety and Standards (Food Products Standards and Food Additives) Regulations

National Education Policy 2020

B.Sc. Dairy Science, III Year (Semester -V)

Major Elective Theory Course

Course Code – SDRSET-1302

Title of the Course: Livestock Feed Resources

[No. of Credits: 2 Credits] **[Total: 30 Hours]**

Course pre-requisite:

The course is offered to third-year undergraduate students who have basic knowledge of animal nutrition, feed resources, and livestock management acquired in earlier semesters.

Course Objectives:

The course is designed to enable students to:

1. **Understand** different types of livestock feed resources and their nutritional importance.
2. **Identify** conventional and unconventional feeds used in livestock feeding.
3. **Explain** the role of concentrate feeds, protein supplements, and feed additives.
4. **Develop** knowledge of feed supplements and their use in a balanced ration.
5. **Analyze** feeding strategies for efficient livestock production.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Classify livestock feed resources and explain their nutritional significance.
2. Identify and evaluate unconventional and green feed resources for livestock.
3. Explain the importance of concentrate feeds and protein supplements.
4. Describe the role of feed additives and supplements in livestock nutrition.
5. Apply knowledge of feed resources for efficient and economical feeding practices.

National Education Policy 2020

B.Sc. Dairy Science, III Year (Semester -V)

Major Elective Theory Course

Course Code – SDRSET-1302

Title of the Course: Livestock Feed Resources

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.		**Green & Unconventional Resources**	8
	1.1	Hydroponic fodder production (Maize, Barley, Wheat)	
	1.2	Azolla as livestock feed	
	1.3	Tree leaves as fodder	
	1.4	Root crops and tubers in animal feeding	
2.		**Concentrate Feed Resources**	8
	2.1	Oil cakes (groundnut, soybean, mustard, etc.)	
	2.2	Pulses chunni (by-products of pulses)	
	2.3	Brans (wheat bran, rice bran)	
	2.4	Brewers' grains and yeast	
3.		**Animal Protein Supplements**	**7**
	3.1	Meat meal	
	3.2	Fish meal	
	3.3	Blood meal	
	3.4	Bone meal	
1.		**Additives & Ration Formulation**	7
	4 1	Mineral mixture	
	4.2	Vitamin mixture	
	4.3	Urea as non-protein nitrogen source	
	4.4	Molasses in animal feeding	
		Total	**30**

National Education Policy 2020

B.Sc. Dairy Science, III Year (Semester -V)

Major Elective Theory Course

Course Code – SDRSEP1302

Title of the Course: Practical based on SDRSET1302

[No. of Credits: 2 Credits] Livestock Feed Resources [Total:60 Hours]

Course pre-requisite:

The course is offered to third-year undergraduate students who have basic knowledge of animal nutrition, feed resources, and livestock management acquired in earlier semesters.

Course Objectives:

The course is designed to enable students to:

1. **Understand** different types of livestock feed resources and their nutritional importance.
2. **Identify** conventional and unconventional feeds used in livestock feeding.
3. **Explain** the role of concentrate feeds, protein supplements, and feed additives.
4. **Develop** knowledge of feed supplements and their use in a balanced ration.
5. **Analyse** feeding strategies for efficient livestock production.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Classify livestock feed resources and explain their nutritional significance.
2. Identify and evaluate unconventional and green feed resources for livestock.
3. Explain the importance of concentrate feeds and protein supplements.
4. Describe the role of feed additives and supplements in livestock nutrition.
5. Apply knowledge of feed resources for efficient and economical feeding practices.

Sr. No.	Practical exercise	Hrs. Required to cover the contents
1	Identification of hydroponic fodder (maize, barley, wheat)	04
2	Study of Azolla production and its use as livestock feed	04
3	Identification of tree leaves used as fodder	04
4	Study of root crops and tubers in animal feeding	04
5	Identification of concentrate feeds (oil cakes, pulses, chunni, brans)	04
6	Identification of animal protein supplements (fish meal, bone meal, etc.)	04
7	Determination of moisture content in feed samples	04
8	Detection of adulterants in feed (sand, urea, husk, etc.)	04
9	Preparation of Urea-Molasses Mineral Block (UMMB)	04
10	Preparation of mineral mixture	04
11	Visit to dairy farm	10
12	Visit to feed mill/ feed processing factory	10
	Total	60

Textbooks: 1. Reddy, D. V. *Animal Nutrition*. New Delhi: Oxford & IBH Publishing Co. Pvt. Ltd.

2. Bhatia, H. S. *Livestock Feeds and Feeding*. New Delhi: Kalyani Publishers. , 3. Banerjee, G. C. *A Textbook of Animal Husbandry*. New Delhi: Oxford & IBH Publishing Co. Pvt. Ltd.

National Education Policy 2020
B.Sc. Dairy Science, III Year (Semester -V)
VSC Course
Course Code – SDRSVC 1301
Title of the Course: Technology of Fermented Milk Products

[No. of Credits: 2 Credits] **[Total: 60 Hours]**

Course prerequisite:

The course is offered to students registered in the third-year undergraduate program in the Faculty of Science and Technology who have completed primary training in dairy science through entry-level core courses. Students should have basic knowledge of milk chemistry, dairy microbiology, and dairy processing technology.

Course Objectives:

The course is designed to enable students to:

1. **Develop** hands-on skills in the manufacture of fermented dairy products using standard processing techniques.
2. **Understand** starter culture handling, fermentation principles, and quality evaluation of fermented milk products.
3. **Apply** physico-chemical, microbiological, and sensory methods for quality assessment of fermented dairy products.
4. **Analyze** defects, shelf life, packaging, storage, and industrial practices related to fermented dairy products.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Explain principles of fermentation and the role of microorganisms, starter cultures, and biochemical changes involved in fermented milk products.
2. Identify and classify different fermented milk products and differentiate their characteristics.
3. Apply processing techniques for the manufacture of fermented milk products including standardization, pasteurization, inoculation, and incubation.
4. Evaluate physicochemical, microbiological, and sensory quality parameters of fermented dairy products.
5. Identify product defects, suggest corrective measures, and assess packaging, storage, and shelf-life aspects.
6. Demonstrate knowledge of starter culture technology and apply technical skills for industrial production and value addition of fermented dairy products.

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Curriculum details: SDRSVC 1301: Technology of Fermented Milk Products

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1.	To study Laboratory Safety, GMP & Sanitation	4
2.	Preparation & Propagation of Starter Cultures	4
3.	Preparation of Dahi (Traditional & Industrial Method)	4
4.	Preparation of Yogurt	4
5.	Preparation of Lassi (Sweet & Salted)	4
6.	Preparation of Shrikhand	4
7.	Preparation of Paneer	4
8.	Analysis of dahi for titratable acidity	4
9.	Analysis of dahi for fat estimation	4
10.	Analysis of dahi for total solids	4
11.	Visit to dairy plant	10
12.	Visit to fermented milk product plant	10
Total		**60**

Textbooks and Reference Books:

1. Outlines of Dairy Technology by
   Sukumar De. Oxford University Press, New Delhi.
2. Technology of Indian Milk Products by
   R.P. Aneja, B.M. Mathur, R.C. Chandan, and A.K. Banerjee. Dairy India Publications, New Delhi.
3. Starter Cultures and Fermented Milk Products
   J.B. Prajapati, I. Sankara Reddy, and V. Sreeja. Anand Agricultural University, Anand, Gujarat.
4. Milk and Milk Products
   C.P. Ananthakrishnan and A. Srinivasan. New India Publishing Agency, New Delhi.
5. Fundamentals of Dairy Microbiology
   J.B. Prajapati. Akta Prakashan, Nadiad, Gujarat.

National Education Policy 2020

B.Sc. Dairy Science, III Year (Semester -V)

Field Project/ Case Study/ OJT

Course Code – SDRSFP1301

Title of the Course: Field Project/Case Study

[No. of Credits: 4 Credits] **[Total: 120 Hours]**

Course Objectives

1. To provide practical exposure to students in dairy farming, dairy processing, dairy product technology, quality control, and dairy management.
2. To develop scientific attitude, technical competency, communication skills, and problem-solving ability through field-based learning.
3. To enable students to conduct surveys, case studies, field investigations, and project-based activities related to dairy science.
4. To familiarize students with dairy industries, cooperative societies, milk collection centers, and dairy entrepreneurship.
5. To develop skills in data collection, analysis, interpretation, report writing, and presentation.
6. To promote awareness regarding hygienic milk production, value addition, sustainability, and rural dairy development.

Course Outcomes

After successful completion of this course, students will be able to:

1. **Understand** the functioning of dairy farms, milk collection systems, and dairy processing units.
2. **Apply** theoretical knowledge for solving practical problems related to dairy production, processing, quality control, and marketing.
3. **Conduct** field surveys, case studies, and technical investigations in dairy science.
4. **Prepare** and evaluate dairy products using scientific and hygienic practices.
5. **Analyze** field data, prepare project reports, and present findings effectively.
6. **Develop** entrepreneurial and managerial skills related to dairy enterprises and value-added dairy products.

Suggested Field Project Areas/Case Study: List of Experiments /Activities:

1. Dairy Farm Management
2. Clean Milk Production and Milk Hygiene
3. Traditional Dairy Products
4. Innovative and Value-Added Dairy Products
5. Milk Quality Analysis
6. Dairy Processing and Quality Control
7. Dairy Marketing and Consumer Preference Studies
8. Dairy Economics and Entrepreneurship
9. Dairy Cooperative Management
10. Dairy Waste Utilization and Sustainability Practices

As per the NEP 2020 Guidelines of Swami Ramanand Teerth Marathwada University and the OJT/Internship Policy Document of Swami Ramanand Teerth Marathwada University, the evaluation structure is available on the website www.srtmu.org.ac.in

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED.
NEP 2020 (Pattern)
DAIRY SCIENCE
B.Sc. Third Year (Semester V)
Goat, Sheep, Poultry and Pig Farming
SDRSCP-1301
Practical Question Paper Proforma

Time- 3.00 Hrs. **Marks-30**

Q. 1) Spotting (Five Spots of **Goat, Sheep, Poultry and Pig**) 10

1) _____ 2) _____ 3) _____

4) _____ 5) _____

Q. 2) Identification Marks of Sheep and Goat/ Feeding of poultry chicks, growers/ Poultry House Equipment's/ Shearing and Grading of Wool/ Vaccination and schedule in Sheep and Goat 15

Q.3. Internal / CA: Record book, Viva Voce and excursion / Visit report 05

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED.
NEP 2020 (Pattern)
DAIRY SCIENCE
B.Sc. Third Year (Semester V)
Dairy Microbiology
SDRSCP-1302
Practical Question Paper Proforma

Time- 3.00 Hrs. (Semester pattern) **Marks-30**

Q. 1) Describe the use of microscope/sterilization technique/sanitation practices in dairy plants to control microbial contamination. 15

Q. 2) Preparation of culture media/isolation of bacteria from milk / Gram staining /standard plate count of milk / direct microscopic count/coliform count of milk / MBRT 10

Q.3) Internal / CA: Record book, Viva Voce and excursion / Visit report 05

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED.
NEP 2020 (Pattern)
DAIRY SCIENCE
B.Sc. Third Year (Semester V)
SDRSEP 1301 (Major)
Traditional Indian Dairy Products
Practical Question Paper Proforma

Time – 4.00 Hrs. **(Semester pattern)** **Paper- Marks – 30**

Q.1. Prepare any one of the following traditional dairy products as allotted. 15
a) Khoa / Peda / Burfi
b) Channa / Paneer
c) Rasogulla

Q.2. Prepare any one of the following traditional dairy products as allotted. 10
a) Makkhan (Desi) / Ghee,
b) Kulfi,
c) Cream / Malai Separation

Q.3. Internal/C.A.: Record book, viva-voce and Excursion/Field visit report. 05

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED.
NEP 2020 (Pattern)
DAIRY SCIENCE
B.Sc. Third Year (Semester V)
SDRSEP 1302 (Major)
Livestock Feed Resources
Practical Question Paper Proforma

Time – 4.00 Hrs. **(Semester pattern)** **Paper- Marks – 30**

Q.1 Major Experiment ***10***

UMMB preparation / Ration formulation.

Q.2 Minor Experiment ***05***

Moisture estimation / Adulteration detection.

Q.3 Spotting / Identification (5 Spots) ***10***

Feed analysis equipment's/ Feed samples, supplements, fodders.

Q.4 Viva-Voce ***05***

Based on practical syllabus and record book/student activity.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED.
NEP 2020 (Pattern)
DAIRY SCIENCE
B.Sc. Third Year (Semester V)
SDRSVC 1301
Technology of Fermented Milk Products
Practical Question Paper Proforma

Time – 4.00 Hrs. **(Semester pattern)** **Paper- Marks – 30**

Q. 1 Spotting (Five Spots) Related to Fermented milk products 10

1) _____ 2) _____ 3) _____

4) _____ 5) _____

Q. 2 Preparation of Yoghurt 10

OR

Estimate fat/acidity present in the given Dahi sample

Q. 3 Prepare lassi using the given Dahi sample 05

OR

Prepare Shrikhnad using the given Dahi sample

Q.4 Internal/C.A.: Record book, viva-voce and Excursion/Field visit report. 05

National Education Policy 2020
B.Sc. Dairy Science, III Year (Semester -V)
Field Project/ Case Study/ OJT
Course Code – SDRSFP1301
Title of the Course: Field Project/Case Study
[No. of Credits: 4 Credits] **[Total: 120 Hours]**

Formative Assessment – 40 Marks

CA: Continuous internal evaluation during the semester based on attendance, practical work, field activities, record book, project work, seminar, and viva-voce.

Summative Assessment – 60 Marks

ESA: Written Project + Presentation and Viva-Voce

As per the OJT/Internship Policy Document of Swami Ramanand Teerth Marathwada University and The NEP 2020 Guidelines of Swami Ramanand Teerth Marathwada University, the evaluation structure is available on the website www.srtmu.org.ac.in

Semester – VI
B.Sc. III Year
Dairy Science
As Per National Education Policy- 2020

National Education Policy 2020

B.Sc. Dairy Science, III Year (Semester - VI)

Major Core Theory Course

Course Code – SDRSCT1351

Title of the Course: Milk and Physiology of Lactation

[No. of Credits: 3 Credits] **[Total:45Hours]**

Course pre-requisite:

The course is offered to students registered in the third-year undergraduate program in the Faculty of Science and Technology who have completed primary training in dairy science at the first-year undergraduate level through entry-level core courses. Students should possess basic knowledge of dairy science, livestock production, and allied sciences.

Students enrolling in this course should have a basic understanding of:

1. Structure and anatomy of the mammary gland and udder.
2. Mammary growth and development.
3. Fundamental concepts of physiology of lactation.
4. Basic knowledge of milk secretion and composition.
5. Introductory understanding of dairy science and milk production.

Course Objectives:

The course is designed to enable students to:

1. **Understand** the composition, physicochemical properties and nutritive value of milk.
2. **Explain** the anatomy and physiology of the mammary gland and process of lactation.
3. **Analyze** factors affecting milk secretion, composition and yield.
4. **Develop** knowledge of milk synthesis, secretion mechanisms and hormonal regulation.
5. **Apply** scientific principles related to milk production for dairy industry prospects.

Course Outcomes:

Upon successful completion of the course, students will be able to:

1. Describe the composition, properties and nutritional significance of milk.
2. Explain physiological processes involved in mammary development and lactation.
3. Analyze factors influencing milk production, secretion, and composition.
4. Identify common milk adulterants and evaluate preservation methods.
5. Apply knowledge of milk physiology in dairy production and quality management.
6. Assess the importance of milk production in relation to future career opportunities in dairy science.

Curriculum Details: SDRSCT 1351 Milk and Physiology of Lactation

Module No	Unit No	Topic	Hrs. Required to cover the contents
1.		**Milk**	13
	1.1	Introduction to the Subject	
	1.2	Production and Utilization trends of milk in India.	
	1.3	Factors affecting Quality and Quantity of Milk	
	1.4	Study of Milk Constituents, Chemical and Physical Properties of Milk	
2.		**Morphology and Anatomy of Udder**	08
	2.1	Structure of Udder	
	2.2	External Structure of Udder.	
	2.3	Internal Structure of Udder.	
	2.4	Theories of Milk Secretion	
3.		**Physiology of Lactation**	12
	3.1	Lactation and Lactation Period	
	3.2	Endocrinology of Udder Physiology of Milk Secretion. Initiation of Lactation. Maintenance of Lactation (Galactopoiesis). Milk Ejection (Let Down of Milk)	
	3.3	Nervous System of Udder.	
	3.4	Circulatory System of Udder.	
4.		**Growth of Udder, Synthesis of Milk, Contamination of Milk**	12
	4.1	Growth of udder at various stages: Embryonic and Fetal Development.From Birth to Puberty.During the Estrus Cycle.; During Pregnancy, During Lactation	
	4.2	Biosynthesis of Milk	
	4.3	Fat Synthesis of Milk	
	4.4	Sources of Contamination in Milk	
Total			**45**

Books and Reference Books:

1. De, S.K. Outlines of Dairy Technology. Oxford University Press, New Delhi.
2. Banerjee, G.C. A Textbook of Animal Husbandry. CBS Publishers and Distributors, New Delhi.
3. Sastry, N.S.R. and Thomas, C.K. Dairy Bovine Production. Kalyani Publishers, Ludhiana.
4. Mahanta, K.C. Handbook of Dairy Science. Kalyani Publishers, Ludhiana.
5. Prasad, Jagdish. Animal Husbandry and Dairy Science. Kalyani Publishers, New Delhi.

National Education Policy 2020

B.Sc. Dairy Science, III Year (Semester - VI)

Major Core Practical Course

Course Code – SDRSCP 1351

Title of the Course: Practical Based on SDRSCT 1351

Lab Course in Milk and Physiology of Lactation

[No. of Credits: 2 Credits] [Total:60 Hours]

Course pre-requisite:

The course is offered to students registered for the third-year Undergraduate Programme in the Faculty of Science and Technology who have acquired basic training in Dairy Science through entry-level core courses. Students should have prior knowledge of:

1. Basic concepts of dairy science and milk production
2. Fundamentals of mammary anatomy and physiology
3. Principles of hygienic milk production
4. Basic knowledge of milk composition and quality evaluation
5. Introductory laboratory skills related to dairy science

Course Objectives

The course is designed to enable students to:

1. **Understand** the anatomy of the udder and physiology associated with milk secretion.
2. **Develop** practical skills in hygienic milk production and milking methods.
3. **Perform** quality evaluation tests for milk and detect adulterants and preservatives.
4. **Apply** laboratory techniques for estimation of milk constituents and quality parameters.
5. **Examine** udder health through mastitis detection and related pathological tests.
6. **Acquire** field exposure through visits to dairy farms and dairy plants.

Course Outcomes

Upon successful completion of this practical course, students will be able to:

1. Describe the structure of the udder and explain its role in milk secretion and lactation.
2. Demonstrate proper preparation of animals, hygienic milk production practices and scientific milking methods.
3. Perform routine platform tests and analyze milk quality through organoleptic evaluation, fat, acidity and pH determination.
4. Identify mastitis, milk adulterants and preservatives using standard laboratory procedures.
5. Apply practical skills related to milk quality control, hygiene and dairy farm management.
6. Evaluate dairy farm and dairy plant operations through field visits and experiential learning.

Curriculum details: SDRSCP 1351: Practical Based on SDRSCT 1351

Sr. No	Practical exercise	Hrs. Required to cover the contents
1.	Study of external Structure of udder (Modal)	4
2.	Preparation of Animals for Milking.	4
3.	Study of various dairy structures.	4
4.	Clean and Hygienic milk production.	4
5.	Milking Methods.	4
6.	Pathological test Mastitis	4
7.	Determination of Platform test.	4
8.	Determination of fat.	4
9.	Determination of Acidity and pH	4
10.	Detection of Adulteration in Milk	4
11.	Detection of Preservatives in Milk	4
12.	Visit to Dairy Farm.	8
13	Visit to Dairy Plant.	8
	Total	**60**

Textbooks, Books/Record Books / Laboratory References:

1. De, S.K. *Outlines of Dairy Technology.* Oxford University Press, New Delhi, 2001.
2. Banerjee, G.C. *A Textbook of Animal Husbandry.* CBS Publishers and Distributors, New Delhi.
3. Sastry, N.S.R. and Thomas, C.K. *Dairy Bovine Production.* Kalyani Publishers, New Delhi/Ludhiana, 1991.
4. Mahanta, K.C. *Handbook of Dairy Science.* Kalyani Publishers, Ludhiana.
5. Prasad, Jagdish. *Animal Husbandry and Dairy Science.* Kalyani Publishers, New Delhi.
6. Roy, N.K., and Sen, D.C. *Textbook of Practical Dairy Chemistry.*

National Education Policy 2020
B.Sc. Dairy Science, III Year (Semester - VI)
Major Core Theory Course
Course Code – SDRSCT1352
Title of the Course: Processing Technology of Milk
[No. of Credits: 3 Credits] **[Total:45 Hours]**

Course prerequisite:

This course is for third-year Science and Technology undergraduates who have completed introductory Dairy Science as a first-year core course.

The student should possess basic knowledge of Dairy Science.

Course Objectives:

1. **Understand** the structure and functioning of the dairy industry and milk procurement systems
2. **Explain** principles and operations involved in reception, filtration, clarification, grading, and cooling of milk.
3. **Apply** knowledge of standardization, homogenization, pasteurization, sterilization, and UHT processing in milk processing operations.
4. **Analyze** methods of storage, refrigeration, distribution, and cold chain management for preservation of milk quality.
5. **Demonstrate** understanding of steam generation, utility management, and their applications in dairy plants.
6. **Evaluate** packaging systems, legal quality standards, HACCP, GMP, and sanitation practices in dairy processing.
7. **Develop** awareness about dairy plant hygiene, CIP systems, and environmental management practices in dairy industries.
8. **Build** technical competency for safe, quality-oriented, and sustainable milk processing operations.

Course Outcomes:

After successful completion of this course, students will be able to:

1. Perform and interpret major primary processing operations including standardization, homogenization, and heat treatments of milk.
2. Explain storage, refrigeration, distribution, and cold chain practices for maintaining milk quality and safety.
3. Develop technical and practical skills required for dairy processing and dairy plant operations.

Curriculum Details: SDRSCT 1352-Processing Technology of Milk

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.		**Introduction and Milk Collection**	12
	1.1	Introduction to Dairy Industry and Milk Processing	
	1.2	Milk Procurement and Collection Systems	
	1.3	Reception of Milk	
	1.4	Filtration and Clarification	
2.		**Primary Processing of Milk**	12
	2.1	Cooling of Milk and Importance in Tropical Climates	
	2.2	Standardization of Milk	
	2.3	Homogenization of Milk	
	2.4	Pasteurization of Milk: LTLT and HTST method	
3.		**Heat Treatment and Storage**	11
	3.1	Sterilization and UHT Processing	
	3.2	Storage of Raw and Processed Milk, Refrigeration Systems and Cold Storage	
	3.3	Distribution of Market Milk	
	3.4	Cold Chain Management	
4.		**Packaging, Quality Control and Sanitation**	10
	4.1	Methods and Packaging Systems of Milk	
	4.2	Legal Standards: FSSAI, BIS of Market Milk	
	4.3	Dairy Plant Hygiene and GMP	
	4.4	CIP and Sanitation	
Total			**45**

Text Books and Reference Books:

1. Outlines of Dairy Technology – Sukumar De. Oxford University Press.
2. Fundamentals of Dairy Chemistry – B.H. Webb, A.H. Johnson, and J.A. Alford. CBS Publishers.
3. Milk and Milk Processing – J.S. Yadav. Anmol Publications.
4. Dairy Technology Vol I – C.H. Eckles, W.B. Combs, and H. Macy. Tata McGraw-Hill.
5. Principles of Dairy Processing – P. Walstra, J.T.M. Wouters, and T.J. Geurts. CRC Press.
6. Dairy Plant Engineering and Management – Tufail Ahmed. Kitab Mahal.
7. Handbook of Milk and Milk Processing – R.K. Robinson (Ed.).
8. Wiley. Modern Dairy Technology – R.K. Robinson. Springer.
9. Technology of Dairy Products – H.G. Kessler. Food Science Publications.
10. Food Safety and Standards Authority of India Manuals and Regulations for Milk and Milk Products.
11. Bureau of Indian Standards: Standards for Market Milk and Dairy Products.

National Education Policy 2020

B.Sc. Dairy Science, III Year (Semester - VI)

Major Core Practical Course

Course Code – SDRSCP 1352

Title of the Course: Practical Based on SDRSCT 1352

[No. of Credits: 2 Credits] [Total:60 Hours]

Course prerequisite:

This course is offered to students registered in the third-year undergraduate programme in the Faculty of Science and Technology who have received primary training in the field of Dairy Science at the first-year undergraduate level for entry-level core courses in Dairy Science as a major subject

Course Objectives:

1. **Understand** principles and operations involved in milk processing and dairy plant practices.
2. **Develop** skills in handling, testing, processing, and quality evaluation of milk and milk products.
3. **Apply** practical knowledge of dairy equipment, processing techniques, sanitation, and process control.
4. **Analyze** quality parameters and perform standard tests used in milk processing operations.
5. **Demonstrate** competency in operation, maintenance, and troubleshooting of dairy processing equipment.
6. **Evaluate** processing methods for producing safe, quality dairy products in accordance with industry standards.
7. **Build** professional skills related to dairy plant management, hygiene, safety, and good manufacturing practices.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Perform practical operations related to reception, filtration, clarification, cooling, standardization, pasteurization, and other milk processing techniques.
2. Operate and handle dairy processing equipment and instruments used in milk processing plants.
3. Conduct quality control tests for raw and processed milk and interpret results.
4. Apply principles of sanitation, cleaning, and safety practices in dairy processing units.
5. Prepare and evaluate processed dairy products using standard practical procedures.
6. Analyze processing parameters and solve basic practical problems encountered in dairy plants.
7. Demonstrate employability skills and practical competence required for dairy industry and higher studies.

Curriculum details: SDRSCP 1352: Practical Based on SDRSCT 1352

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1.	Study of chilling of milk	4
2.	Study of storage of milk.	4
3.	Standardization of milk by Pearson square method.	4
4.	Study of batch pasteurizer (LTLT) and HTST pasteurizer.	4
5.	Determination of efficiency of pasteurization (Phosphatase test)	4
6.	Study of homogenizer, homogenization of milk and determination of homogenization efficiency.	4
7.	Study of efficiency of milk sterilization.	4
8.	Study of packaging methods and packaging systems for market milk.	4
9.	Cleaning and sanitation of dairy equipment.	4
10.	Study of design and layout of a dairy plant.	4
11.	Visit to a milk processing/chilling plant.	10
12.	Visit to a commercial dairy plant/UHT or packaging unit.	10
Total		**60**

Textbooks and Reference Books:

1. Outlines of Dairy Technology – Sukumar De. Oxford University Press.
2. Milk and Milk Processing – J.S. Yadav. Anmol Publications.
3. Principles of Dairy Processing – P. Walstra, J.T.M. Wouters, and T.J. Geurts. CRC Press.
4. Handbook of Milk and Milk Processing – R.K. Robinson (Ed.). Wiley.
5. Technology of Dairy Products – H.G. Kessler. Food Science Publications.

Standards and Manuals / References:

1. Indian Council of Agricultural Research Dairy Science Textbooks and Practical Manuals.
2. National Dairy Research Institute technical bulletins and dairy processing manuals.

National Education Policy 2020

B.Sc. Dairy Science, III Year (Semester - VI)

Major Core Theory Course

Course Code – SDRSCT1353

Title of the Course: Introduction to AI in Dairying

[No. of Credits: 2 Credits] **[Total: 30 Hours]**

Course prerequisite:

The course is offered to a student registered in the undergraduate third-year Programme in the Faculty of Science and Technology who has received primary training in Dairy Science at the first-year level for entry-level core courses in dairy science as a major subject. The students should have basic knowledge of dairy production, milk processing, computer applications, and introductory data handling.

Course Objectives:

1. To provide practical exposure to artificial intelligence tools and smart technologies used in dairying.
2. To develop skills in handling dairy data for predictive analysis and decision support.
3. To familiarize students with sensors, automation, and precision dairy farming tools.
4. To demonstrate applications of AI in dairy processing, quality control, and food safety.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Demonstrate basic use of AI tools and digital technologies relevant to dairying.
2. Apply sensor-based and precision dairy farming technologies for herd monitoring.
3. Analyse dairy data for disease prediction, productivity and process optimization.
4. Evaluate AI applications in quality control, food safety and dairy automation.

Curriculum Details: - Introduction to AI in Dairying SDRSCT-1353

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.		**Fundamentals of Artificial Intelligence**	07
	1.1	Introduction to AI and its evolution	
	1.2	Neural Networks and Deep Learning basics	
	1.3	Data types in dairy industry(sensor, image, process data)	
2.		**AI in Dairy Farm Management**	08
	2.1	Concept of Precision Dairy Farming	
	2.2	Sensor technologies for monitoring milk yield, activity, rumination	
	2,3	AI for heat detection and estrus prediction	
	2.4	Disease prediction models (mastitis detection), Image-based animal identification	
3.		**AI in Milk Processing & Product Manufacturing**	08
	3.1	AI for process optimization (pasteurization, homogenization)	
	3.2	Predictive maintenance of dairy equipment	
	3.3	Computer vision for quality inspection	
	3.4	AI-based adulteration detection	
4.		**AI in Quality Control & Safety**	07
	4.1	AI-based microbial growth prediction	
	4.2	Shelf-life prediction modelling	
	4.3	Spectroscopy and machine vision in quality testing	
	4.4	HACCP integration with AI	
		Total	**30**

Text Books

1. Artificial Intelligence: A Modern Approach
   Russell, S. J. and Norvig, P. (2020). 4th ed., Pearson Education, New York, USA.
2. Machine Learning
   Mitchell, T. M. (1997). McGraw-Hill Education, New York, USA.
3. Dairy Processing and Quality Assurance
   Chandan, R. C., Kilara, A. and Shah, N. P. (2015). 2nd ed., Wiley-Blackwell, Ames, Iowa, USA.
4. Precision Dairy Farming
   Berckmans, D. (Ed.) (2006). Wageningen Academic Publishers, Wageningen, Netherlands.
5. Artificial Intelligence for Precision Agriculture
   Raj, P., Gayathri, N. and Kathrine, G.J.W. (2025). CRC Press, Boca Raton, Florida, USA.

National Education Policy 2020

B.Sc. Dairy Science, III Year (Semester -VI)

Major Elective Theory Course

Course Code – SDRSET 1351

Title of the Course: Special Milks

[No. of Credits: 2 Credits] **[Total:60 Hours]**

Course prerequisite:

This course is offered to students enrolled in the third-year undergraduate programme under the Faculty of Science and Technology who have completed foundational training in Dairy Science at the First-Year undergraduate level, enabling entry into core Dairy Science courses as a major subject. Students should possess basic knowledge of Dairy Science and related subjects:

1. Basic knowledge of dairy science and milk composition.
2. Fundamental understanding of dairy chemistry, microbiology, and dairy processing principles.
3. Familiarity with introductory concepts of milk handling, processing, and dairy products.

Course Objectives

After completion of this course, students will be able to:

1. **Understand** the different types of special milks and their nutritional significance in the human diet.
2. **Explain** principles involved in processing and manufacturing of standard, processed, fermented, and value-added milks.
3. **Develop** knowledge of composition, legal standards, manufacture, and uses of different fluid milk products.
4. **Apply** scientific and technological concepts related to processing of special milks and dairy products.
5. **Analyze** industrial applications and employment opportunities in dairy processing and manufacturing sectors.
6. **Develop** entrepreneurial skills for self-employment through dairying and dairy-associated enterprises.

Course Outcomes

After successful completion of the course, students will be able to:

1. Describe classification, composition, legal standards and uses of special milks.
2. Explain manufacturing processes of toned, double-toned, recombined, reconstituted, standardized, and homogenized milks.
3. Demonstrate understanding of processing principles involved in fermented milks such as acidophilus milk, cultured buttermilk, Bulgarian milk, and yogurt.
4. Analyze nutritional, technological, and commercial importance of value-added milks including fortified, flavored, and specialty milks.
5. Apply knowledge for quality production and small-scale manufacturing of special dairy products.
6. Develop skills for employment opportunities in dairy processing plants and milk manufacturing industries.
7. Explore entrepreneurship opportunities in dairy processing and value-added dairy products.

Curriculum Details: SDRSET 1351 -Special Milks

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.	**Standard Milk**		8
	1.1	Introduction to the Subject of Milks Definition, Composition, Manufacturing, Legal Standards and Uses:	
	1.2	Toned and Double Toned Milk	
	1.3	Recombined Milk	
	1.4	Reconstituted Milk	
2.	**Processed Milk**		7
	2.1	Definition, Composition, Manufacturing, Legal Standards and Uses:	
	2.2	Standardized Milk, Homogenized Milk	
	2.3	Synthetic Milk: Definition, Preparation Flow Chart, and Uses	
	2.4	Filled Milk: Definition, Preparation, and Uses.	
3.	**Fermented Milk**		8
	3.1	Definition, Composition, Manufacturing, Legal Standards and Uses	
	3.2	Acidophilic Milk	
	3.3	Cultured Buttermilk	
	3.4	Bulgarian Milk, Yoghurt	
4.	**Value-Added Milk**		7
	4.1	Definition, Composition, Manufacturing, and Uses:	
	4.2	Flavoured and Chocolate Milk	
	4.3	Fortified Milk	
	4.4	Vitaminized and Iodized Milk	
	4.5	Donkey Milk: Definition, Composition, Manufacturing, and Medicinal Values in Infant Nutrition.	
Total			**30**

Textbooks and Reference Books

1. Technology of Milk Processing: Ananthakrishnan, C. P. *Technology of Milk Processing*. Daya Publishing House / ICAR-oriented editions, New Delhi.
2. Outlines of Dairy Technology, De, Sukumar. *Outlines of Dairy Technology*. Oxford University Press, New Delhi, First Edition, 2001.
3. Dairy Processing: Improving Quality. Smit, G. (Ed.). *Dairy Processing: Improving Quality*. Woodhead Publishing / Elsevier, Cambridge, 2003.
4. Dairy Science and Technology: Walstra, P., Wouters, J.T.M., and Geurts, T.J. *Dairy Science and Technology*. CRC Press / Taylor & Francis, Boca Raton, 2006.
5. Technology of Dairy Products. Early, Ralph. *Technology of Dairy Products*. Springer, New York, 2nd Edition, 1998.
6. Milk and Dairy Product Technology. Spreer, Edgar. *Milk and Dairy Product Technology*. Marcel Dekker/CRC Press, New York, 1998 (reprint editions available).

National Education Policy 2020

B.Sc. Dairy Science, III Year (Semester -VI)

Major Elective Practical Course

Course Code – SDRSEP 1351

Title of the Course: Practical Based on SDRSET 1351

[No. of Credits: 2 Credits] [Total:60 Hours]

Course pre-requisite

This course is offered to students enrolled in the third-year undergraduate programme under the Faculty of Science and Technology who have acquired foundational training in Dairy Science at the first and second-year undergraduate level.

Students should possess:

1. Basic knowledge of milk composition and dairy chemistry.
2. Fundamental understanding of dairy processing and special milk products.
3. Familiarity with elementary laboratory practices and dairy product preparation.
4. Basic knowledge of sanitation, quality control, and dairy plant operations.

Course Objectives

After completion of this practical course, students will be able to:

1. **Understand** practical methods involved in the manufacture of special and fermented milks.
2. **Develop** skills in preparation and quality evaluation of recombined, cultured, acidophilic, flavoured, and standardized milk.
3. **Apply** principles of dairy processing in practical production of special milk products.
4. **Demonstrate** competency in handling equipment and processing techniques used in milk product manufacture.
5. **Develop** exposure to dairy plant operations through industrial visits and practical training.
6. **Promote** entrepreneurial and employability skills in dairy processing and manufacturing.

Course Outcomes

After successful completion of the course, students will be able to:

1. Prepare special milk products using standard practical procedures.
2. Demonstrate practical skills in preparation of acidophilic, cultured, recombined and flavoured milk.
3. Apply principles of standardization and processing in milk product manufacture.
4. Evaluate product quality and follow sanitation and safety practices during preparation.
5. Understand industrial operations through exposure to milk processing and manufacturing plants.
6. Develop practical competence for employment and self-employment in dairy processing enterprises.

Curriculum details: SDRSEP 1351: Practical Based on SDRSET 1351

Sr. No	Practical exercise	Hrs. Required to cover the contents
1.	Preparation of Synthetic Milk	4
2.	Preparation of Acidophilic Milk	4
3.	Preparation of Cultured Milk	4
4.	Preparation of Recombined Milk	4
5.	Preparation of Flavoured Milk	4
6.	Preparation of Standardized Milk	4
7.	Preparation of Toned Milk	4
8	Preparation of Double Toned Milk	4
9	Preparation of Skim Milk	4
10	Preparation of Fortified Milk	4
11	Visit to Milk Processing Plant and Study of Market Milk Processing Operations	10
12	Visit to Dairy Plant for Manufacturing of Milk Products and Packaging Systems	10
	Total	**60**

Textbooks and Reference Books

1. Outlines of Dairy Technology. Oxford University Press, New Delhi.
2. Technology of Milk Processing. Daya Publishing House / ICAR Publications, New Delhi.
3. Dairy Processing: Improving Quality. Woodhead Publishing, Cambridge.
4. Dairy Science and Technology. CRC Press.
5. Technology of Dairy Products. Springer.
6. Indian Council of Agricultural Research Practical Manuals and Dairy Science Course Material.
7. Milk and Milk Products" – C. P. Ananthakrishnan & A. Abdullah
8. "Technology of Indian Milk Products" – Aneja, Mathur, Chandan & Banerjee

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B.Sc. Dairy Science, III Year (Semester -VI)

Major Elective Practical Course

Course Code – SDRSEPT1352

Title of the Course: Dairy Economics

[No. of Credits: 2 Credits] [Total:30 Hours]

Course Pre-requisites

1. This course is offered to students enrolled in the third-year undergraduate programme under the Faculty of Science and Technology who have acquired foundational training in Dairy Science at the first and second-year undergraduate level.
2. Familiarity with the fundamentals of agricultural economics and farm management is expected.
3. Ability to perform basic mathematical calculations (percentages, averages, cost analysis).
4. Prior exposure to field visits or practicals in dairy production and processing will be helpful.

Course Objectives

1. To **understand** the economic principles governing dairy production, processing, and marketing.
2. To **analyse** cost structures, profitability, and efficiency in dairy enterprises.
3. To **develop** skills in economic decision-making for dairy industry operations.
4. To **expose** students to real-world dairy economics through practical exercises and case studies.

Course Outcomes

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

1. **Conceptual Understanding**
- Explain the role of dairy economics in national and rural development.
- Describe cost concepts, production functions, and marketing systems in the dairy sector.
2. **Analytical Skills**
- Calculate cost of milk production and perform break-even analysis for dairy enterprises.
- Evaluate profitability and efficiency of different dairy farm models (traditional vs modern).
3. **Applied Competence**
- Prepare farm budgets and feasibility reports for dairy units.
- Analyze marketing channels and price spreads for milk and milk products.
4. **Decision-Making Ability**
- Recommend economic strategies for risk management and insurance in dairy farming.
- Assess consumer preferences and market trends to guide product development.
5. **Professional Exposure**
- Conduct surveys, case studies, and field visits to cooperatives/private dairies.
- Present economic analyses and reports with clarity and practical relevance.

Curriculum details: Dairy Economics (SDRSET 1352)

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.		**Introduction to Dairy Economics and Indian Dairy Industry**	8
	1.1	Scope and Importance of Dairy Economics	
	1.2	Role of dairy sector in Indian economy	
	1.3	Development of Indian dairy industry	
	1.4	Demand and supply of milk and milk products	
2.		**Economics of Dairy Farming in India**	7
	2.1	Basics of dairy farm economics	
	2.2	Cost of milk production	
	2.3	Estimation of production cost	
	2.4	Profitability of dairy farming	
3.		**Marketing and Price Analysis of Dairy Products**	8
	3.1	Introduction to dairy marketing	
	3.2	Milk procurement systems	
	3.3	Cooperative system and AMUL model	
	3.4	Marketing channels of milk products	
4.0		**Farm Management and Risk Management**	7
	4.1	Principles of dairy farm management	
	4.2	Farm budgeting	
	4.3	Profitability analysis	
	4.4	Risk and uncertainties in dairy farming	
Total			**30**

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B.Sc. Dairy Science, III Year (Semester -VI)

Major Elective Practical Course

Course Code – SDRSEP 1352

Title of the Course: Dairy Economics

[No. of Credits: 2 Credits] [Total:60 Hours]

Course pre-requisite:

This course is offered to third-year undergraduate students under the Faculty of Science and Technology who have acquired basic knowledge of Dairy Science, Dairy Husbandry, and Dairy Chemistry during the First and Second Year of the programme.

Course Objectives:

The practical course in Dairy Economics is designed to

1. **Develop** understanding of economic principles related to dairy farming and dairy product marketing.
2. **Provide** practical knowledge on cost estimation, budgeting, and break-even analysis in dairy enterprises.
3. **Train** students in economic evaluation of milk production and dairy product manufacturing.
4. **Enhance** skills in market survey, consumer preference analysis, and demand estimation of dairy products.
5. **Familiarize** students with marketing channels, price spread, and value chain analysis in the dairy sector.
6. **Provide** exposure to organized dairy farms and dairy processing plants through field visits.
7. **Improve** analytical, managerial, and decision-making abilities for sustainable dairy business management.
8. **Develop** field-oriented skills for planning profitable dairy enterprises and understanding market trends.

Course Outcomes:

1. After successful completion of this practical course, students will be able to:
2. Calculate the cost of milk production in cows and buffaloes using standard economic methods.
3. Estimate the cost of production of dairy products such as paneer and curd.
4. Analyze break-even point (BEP) and profitability of dairy farming enterprises.
5. Evaluate price spread and identify marketing margins in the dairy supply chain.
6. Study and map different marketing channels for milk and dairy products.
7. Prepare budgets for small-scale dairy units and assess their economic feasibility.
8. Conduct consumer preference surveys for organic, fortified, and value-added dairy products.
9. Analyze production and consumption trends of milk products in local markets.
10. Estimate demand for milk and milk products using survey and market data.
11. Assess consumer demand for value-added products such as flavored milk and curd.
12. Gain practical exposure to dairy farm management through visits to organized government dairy farms.

Curriculum details: Dairy Economics SDRSEP 1352

Sr. No.	Practical exercise	Hrs. Required to cover the contents
1	Determination of Cost of Milk Production in Cows and Buffaloes	04
2	Estimate cost of production of paneer and curd	04
3	Estimation of Break-Even Point (BEP) in Dairy Farming	04
4	Price Spread Analysis of Milk from Producer to Consumer	04
5	Study and Mapping of Marketing Channels of Dairy Products	04
6	Preparation of Budget for Small-Scale Dairy Units (5–10 Animals)	04
7	Consumer Preference Survey for Organic and Fortified Milk Products	04
8	Survey of Production and Consumption Trends of Milk Products in Local Markets	04
9	Estimation of Demand for Milk and Milk Products	04
10	Estimate consumer demand for flavoured milk or curd.	04
11	Field Visit to an organized Government dairy farm	10
12	Field Visit to processing plants	10
	Total	60

Textbooks:

1. Outlines of Dairy Technology — Sukumar De
2. Indian Dairy Products — K.S. Rangappa and K.T. Achaya
3. Economics of Dairy Farming — S.S. Acharya and N.L. Agarwal
4. Agricultural Marketing in India — S.S. Acharya and N.L. Agarwal
5. Dairy Technology — Sukh Dev Kumar and O.P. Arora

Reference books;

1. Milk and Milk Products — A. Aneja, B.N. Mathur, R.C. Chandan and H.S. Banerjee
2. Technology of Indian Milk Products — A. Aneja, B.N. Mathur, R.C. Chandan and H.S. Banerjee
3. Principles of Dairy Management — Jagdish Prasad
4. Dairy Economics" by *N.K. Verma & R.K. Khatkar*
5. "Economics of Livestock Production and Management" by *K.K. Kalra*
6. "Agricultural Economics" by *S. Subba Reddy*
7. Dairy India" (Latest Edition)- Dairy India Publication
8. DAHD (Department of Animal Husbandry & Dairying)
9. NDDB Annual Reports

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B.Sc. Dairy Science, III Year (Semester -VI)

VSC Course

Course Code – SDRSVC 1351

Title of the Course: Technology of Innovative and Value-Added Dairy Products

[No. of Credits: 2 Credits] **[Total:60 Hours]**

Course pre-requisite:

This course is offered to students enrolled in the Third Year Undergraduate Programme under the Faculty of Science and Technology who have received basic training in Dairy Science during the First Year of undergraduate study for entry-level core courses in Dairy Science as a major subject. Students should possess fundamental knowledge of Dairy Science.

Course Objectives

1. To impart hands-on training in preparation of value-added dairy products.
2. To develop skills in standardization, processing, packaging and quality evaluation of dairy products.
3. To provide practical knowledge of fermentation, preservation and shelf-life enhancement techniques.
4. To familiarize students with economic feasibility, cost analysis and small-scale entrepreneurship opportunities in dairy value addition.

Course Outcomes

1. After successful completion of the course, students will be able to:
2. Evaluate milk quality and suitability for preparation of value-added dairy products.
3. Prepare major value-added dairy products using appropriate processing techniques.
4. Apply fermentation, preservation and storage methods for product quality and shelf-life improvement.
5. Analyze packaging materials and shelf-life requirements for dairy products.
6. Develop basic entrepreneurial skills through cost analysis and small-scale dairy product planning.

Curriculum details: SDRSVC 1351: Technology of Innovative and Value-Added Dairy Products

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1.	Development of Designer / Functional Milk	4
2.	Preparation of Low-fat & Herbal Paneer	4
3.	Development of Probiotic Dahi/Yogurt	4
4.	Preparation of Flavoured & Fortified Milk	4
5.	Manufacture of Khoa-based Innovative Sweets	4
6.	Preparation of fortified Lassi	4
7.	Preparation of Probiotic Whey Drink with Herbal Extract	4
8.	Preparation of Low-Calorie, Reduced-Fat and Diabetic Ice Cream	4
9.	Preparation of Protein Enriched Dairy Health Drink (butter milk	4
10.	Development of Functional Shrikhnad Fortified with omega-3 fatty acids	4
11.	Visit to Butter/Ghee Processing Plant	10
12.	Visit to Chocolate/Dairy Product Plant	10
	Total	60

Textbooks and References:

1. De, S. *Outlines of Dairy Technology.* Oxford University Press, New Delhi.
2. Aneja, R.P., Mathur, B.N., Chandan, R.C., and Banerjee, A.K. *Technology of Indian Milk Products.* Dairy India Publications.
3. Rangappa, K.S. and Achaya, K.T. *Indian Dairy Products.* Asia Publishing House.
4. Fox & McSweeney – Dairy Chemistry and Biochemistry
5. Early R. – Technology of Dairy Products
6. Smith G. – Dairy Processing: Improving Quality
7. Wong N.P. – Fundamentals of Dairy Chemistry
8. Onwulata & Huth – Whey Processing and Functionality
9. Kele, V.D. (Ed.) – Handbook of Dairy Science

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B.Sc. Dairy Science, III Year (Semester -VI)

OJT

Course Code – SDRSOJ1351

Title of the Course: On-the-Job-Training / Internship Training

[No. of Credits: 4 Credits] **[Total: 120 Hours]**

- As per **"On-the-Job-Training / Internship Training Policy Document"** (OJT/Internship Policy Document of S.R.T.M. University, Nanded)
- As per Swami Ramanand Teerth Marathwada University, Nanded, NEP 2020 regulations available on www.srtmun.ac.in

Swami Ramanand Teerth Marathwada University, Nanded.
NEP-2020 (Pattern)
B.Sc. Third Year (Semester-VI)
Name of Paper: Milk and Physiology of Lactation
SDRSCP- 1351
Practical Question Paper Performa

Time: 4 hr **Marks 30**

Spotting - (Ten Spots) Dairy equipment / Specimens / Models 10

1) _____ 2) _____ 3) _____

4) _____ 5) _____ 6) _____

7) _____ 8) _____ 9) _____

10) _____

Q.2. Udder/Preparation of animals for milking/Milking Methods/Mastitis Tests/Adulteration of Milk 08

Q.3. Write the various dairy structures/clean and hygienic milk production/determination of Platform tests. Fat/Acidity/pH 07

Q.4.

A) Viva-voce 03

B. Record Book

Swami Ramanand Teerth Marathwada University, Nanded.
NEP-2020 (Pattern)
B.Sc. Third Year (Semester-VI)
Practical Question Paper Proforma
Name of Paper Title: Processing Technology of Milk (SDRSECP- 1352) :

Time: 4 Hours | **Marks: 30**

Q.1 Spotting – (Ten Spots) 10

1) _____ 2) _____ 3) _____

4) _____ 5) _____ 6) _____

7) _____ 8) _____ 9) _____

10) _____

Q.2 Chilling of milk/ Standardization of Milk by Pearson Square Method / Determine Efficiency of Pasteurization (Phosphatase Test)/Homogenization efficiency / Efficiency of milk sterilization 08

Q.3 Storage of milk /Batch Pasteurizer (LTLT) / HTST Pasteurizer/cleaning and sanitation of dairy equipment/ Sterilization of milk/design & Layout of a Dairy Plant. 07

Q.4. A) Viva-voce 03

B) Record Book 02

Swami Ramanand Teerth Marathwada University, Nanded.
NEP-2020 (Pattern)
B.Sc. Third Year (Semester-VI)
Practical Question Paper Proforma
Major Elective Practical Course
Course Code – SDRSEP 1351
Title of the Course: Practical Based on SDRSET 1351
Special Milks

Time: 4 Hours | **Marks: 30**

Q.1. Preparation of acidophilic milk/ Flavoured milk/ Synthetic milk 15
Q.2. Preparation of recombined milk/chocolate milk/standardized milk. 10

Q.3. Practical Record / Excursion Report /visit report and viva voce 05

Swami Ramanand Teerth Marathwada University, Nanded.
NEP-2020 (Pattern)
B.Sc. Third Year (Semester-VI)
Practical Question Paper Proforma
Major Elective Practical Course
Course Code – SDRSEP 1352
Title of the Course: Practical Based on SDRSET 1352

Time: 4 Hours | **Dairy Economics** **Marks: 30**

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Q.1 Major Exercise (Attempt Any ONE) 10

a) Determine the cost of milk production per litre for a dairy farm maintaining cows and buffaloes using the given data. camera-ready syllabus Camera-ready syllabus

OR

b) Prepare a budget for a small-scale dairy unit consisting of 5–10 animals and estimate expected profit.

Q.2 Minor Exercise (Attempt Any ONE) 08

a) Estimate the cost of production of paneer or curd using the given market prices of raw materials.

OR

b) Perform price spread analysis of milk from producer to consumer.

OR

Q. 3 a) Estimate consumer demand for flavored milk or curd based on survey data. 07

OR

b) Calculate the Break-Even Point (BEP) for a dairy farming enterprise using the given expenditure and income data.

Q.4 Practical Record / Survey Report /field visit 05

Swami Ramanand Teerth Marathwada University, Nanded.
NEP-2020 (Pattern)
B.Sc. Third Year (Semester-VI)
Practical Question Paper Proforma
Title: Technology of Innovative & Value-Added Dairy Products

Time: 4 Hours | **SDRSVC – 1351** **Marks: 30**

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SYLLABUS

Q.1. Spotting - (Five Spots) Dairy Equipment / Ingredients / Specialized Products 10

1) ---------- 2) ---------- 3) ----------

4) ---------- 5) ----------

Q.2. Preparation of Probiotic Dahi/Yogurt or Functional Shrikhnad fortified with Omega-3: Organoleptic evaluation and record the setting time/consistency./Calculate the cost of production for 1 kg of Innovative Khoa-based Sweets or Flavoured & Fortified Milk. 07

Q.3. Prepare a batch of Herbal Paneer or Probiotic Whey Drink with Herbal Extract. Demonstrate the correct method of incorporating the herbal extract without affecting the coagulation/stability of the product. 08

Q.4. Internal assessment:

a) Record Book. 03

b) Excursion/visit report and viva voce. 02

Swami Ramanand Teerth Marathwada University, Nanded.
NEP-2020 (Pattern)
B.Sc. Third Year (Semester-VI)
Assessment Scheme: OJT
Course Code – SDRSOJ1351
Title of the Course: On-the-Job-Training / Internship Training

[No. of Credits: 4 Credits] **[Total: 120 Hours]**

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As per the **OJT/Internship Policy Document** of Swami Ramanand Teerth Marathwada University and the NEP 2020 Guidelines of Swami Ramanand Teerth Marathwada University, the evaluation structure for the 4-credit **On-the-Job Training (OJT) programme** is based on a total of **100 marks**, divided into Continuous Assessment (**CA) of 40** marks and Semester-End Assessment (**SEA) of 60** marks.

As per Swami Ramanand Teerth Marathwada University, Nanded, NEP 2020 regulations available on website: www.srtmun.ac.in

LIST OF EQUIPMENT:

A. General Dairy Laboratory Equipment

1. Weighing balance (digital)
2. Lactometer
3. Thermometer (0–110°C)
4. pH meter
5. Measuring cylinders & beakers
6. Stainless steel utensils
7. Stirring rods/ladles
8. Gas stove / hot plate
9. Refrigerator
10. Deep freezer

B. Equipment for Heat-Desiccated Products (Khoa, Peda, Burfi)

1. Karahi (thick bottom pan)
2. Scraper / Khurpa
3. Stainless steel trays
4. Moulds for peda/burfi
5. Weighing scale
6. Moisture oven (for quality testing)

C. Equipment for Coagulated & Chhana-Based Products (Chhana, Paneer, Rasgulla)

1. Milk boiling vat
2. Muslin cloth
3. Paneer press
4. Chhana hanging stand
5. Thermometer
6. Stainless steel perforated trays
7. Sugar syrup boiling vessel

D. Equipment for Fat-Rich Products (Makkhan, Ghee, Cream Separation)

1. Cream separator (manual/electric)
2. Butter churner (hand churner/mixer type)
3. Ghee boiler
4. Clarification vessel
5. Fine filter cloth
6. Lactometer (for cream testing)

E. Equipment for Frozen Products (Kulfi)

1. Kulfi moulds
2. Ice box / insulated container
3. Deep freezer
4. Hand blender/mixer
5. Thermometer

F. For Visit & Quality Control Observation

1. Milk reception tank
2. Pasteurizer
3. Homogenizer
4. Packaging machine
5. Cream separator
6. Quality control lab equipment

(Gerber centrifuge, moisture oven, pH meter)

G. Quality Control & FSSAI Related Testing Equipment

1. Gerber centrifuge (for fat test)
2. Hot air oven
3. Muffle furnace
4. pH meter
5. Titration setup (burette, pipette)
6. Sensory evaluation score cards

Minimum Essential Equipment (For Small College Lab)

1. Gas stove, Karahi, Paneer press, Cream separator, Butter churner, Deep freezer,
2. Weighing balance, Thermometer, Refrigerator

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