LEARNING OUTCOMES BASED CURRICULUM

JOB ROLE: Dairy Product Processor

(Ref.ID: FIC/Q2001)

Sector: Dairy Processing

Grades 11 and 12

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION

(a constituent unit of NCERT, under Ministry of Education, Government of India)

Shyamla Hills, Bhopal- 462002, Madhya Pradesh, India

http://www.psscive.ac.in

Gandhiji's Talisman

I will give you a talisman. Whenever you are in doubt or when the self becomes too much with you, apply the following test:

Recall the face of the poorest and the weakest man whom you may have seen and ask yourself if the step you contemplate is going to be of any use to him. Will he gain anything by it? Will it restore him to a control over his own life and destiny? In other words, will it lead to Swaraj for the hungry and spiritually starving millions?

Then you will find your doubts and your self melting away.

M K Gandhi

Learning-Outcomes Based Curriculum

JOB ROLE: DAIRY PRODUCT PROCESSOR

NQR Code: FIC/Q2001

(QUALIFICATION PACK: Ref. Id. FIC/Q2001)

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PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION
Shyamla Hills, Bhopal- 462002, Madhya Pradesh, India

LEARNING OUTCOMES BASED VOCATIONAL CURRICULUM,

Dairy Processing, Dairy Product Processor, November, 2025

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Published by:
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FOREWORD

The Pandit Sunderlal Sharma Central Institute of Vocational Education (PSSCIVE), a constituent unit of National Council of Educational Research and Training (NCERT) is spearheading the efforts of developing learning outcome based vocational curriculum and courseware aimed at integrating both vocational and general qualifications to open pathways of career progression for students. It is a part of Vocationalisation of Education under *SamagraShiksha*. The PSS Central Institute of Vocational Education (PSSCIVE) is developing curricula under the project approved by the Project Approval Board (PAB) of *SamagraShiksha* of Ministry of Human Resource Development (MHRD), Govt. of India.

The main purpose of the learning outcome-based curricula is to bring about the improvement in teaching-learning process and working competences through learning outcomes embedded in the vocational subject. It is a matter of great pleasure to introduce this learning outcome-based curriculum as part of the vocational training packages for the job role of "Dairy Product Processor". The curriculum has been developed for the secondary students of vocational education and is aligned to the National Occupation Standards (NOSs) of a job role identified and approved under the National Skill Qualification Framework (NSQF).The curriculum aims to provide children with employability and vocational skills to support occupational mobility and lifelong learning. It will help them to acquire specific occupational skills that meet employers' immediate needs. The teaching process is to be performed through the interactive sessions in classrooms, practical activities in laboratories and workshops, projects, field visits, and professional experiences. The curriculum has been developed and reviewed by a group of experts and their contributions are greatly acknowledged. The utility of the curriculum will be adjudged by the qualitative improvement that it brings about in teaching-learning. The feedback and suggestions on the content by the teachers and other stakeholders will be of immense value to us in bringing about further improvement in this document.

Dinesh Prasad Saklani
Director,
National Council of Education Research and Training,

PREFACE

India today stands poised at a very exciting juncture in its saga. The potential for achieving inclusive growth are immense and the possibilities are equally exciting. The world is looking at us to deliver sustainable growth and progress. To meet the growing expectations, India will largely depend upon its young workforce. The much-discussed demographic dividend will bring sustaining benefits only if this young workforce is skilled and its potential is channelized in the right direction.

In order to fulfill the growing aspirations of our youth and the demand of skilled human resource, the Ministry of Human Resource Development (MHRD), Government of India introduced the revised Centrally Sponsored Scheme of Vocationalisation of Secondary and Higher Secondary Education that aims to provide for the diversification of educational opportunities so as to enhance individual employability, reduce the mismatch between demand and supply of skilled manpower and provide an alternative for those pursuing higher education. For spearheading the scheme, the PSS Central Institute of Vocational Education (PSSCIVE) was entrusted the responsibility to develop competency-based curricula, student workbooks, teacher handbooks and e-learning materials for the job roles in various sectors, with growth potential for employment.

The PSSCIVE firmly believes that the vocationalisation of education in the nation needs to be established on a strong footing of philosophical, cultural and sociological traditions and it should aptly address the needs and aspirations of the students besides meeting the skill demands of the industry. The curriculum, therefore, aims at developing the desired professional, managerial and communication skills to fulfill the needs of the society and the world of work. In order to honour its commitment to the nation, the PSSSCIVE has initiated the work on developing learning outcome based curricula with the involvement of faculty members and leading experts in respective fields. It is being done through the concerted efforts of leading academicians, professionals, policy makers, partner institutions, Vocational Education and Training experts, industry representatives, and teachers. The expert group through a series of consultations, working group meetings and use of reference materials develops a National Curriculum. Currently, the Institute is working on developing curricula and courseware for over 50 job roles in various sectors, besides the curricula developed for 100 job roles

We extend our gratitude to all the contributors for selflessly sharing their precious knowledge, acclaimed expertise, and valuable time and positively responding to our request for development of curriculum. We are grateful to MHRD and NCERT

for the financial support and cooperation in realising the objective of providing competency based modular curricula and courseware to the States and other stakeholders under the PAB (Project Approval Board) approved project of Samagra Shiskha of Ministry of Human Resource Development (MHRD), Government of India.

Finally, for transforming the proposed curriculum design into a vibrant reality, all the institutions involved in the delivery system shall have to come together with a firm commitment and they should secure optimal community support. The success of this curriculum depends upon its effective implementation and it is expected that the managers of vocational education and training system, including subject teachers will make efforts to create better facilities, develop linkages with the world of work and foster a conducive environment as per amendments made in the curriculum document.

The PSSCIVE, Bhopal remains committed in bringing about reforms in the vocational education system through the learner-centric curricula and courseware. We hope that this document will prove useful in turning out more competent Indian workforce for the 21stcentury.

Deepak Paliwal Joint Director
PSS Central Institute of Vocational Education
Bhopal

ACKNOWLEDGEMENTS

On behalf of the team at the PSS Central Institute of Vocational Education (PSSCIVE) we are grateful to the members of the Project Approval Board (PAB) of *SamagraShiksha* and the officials of the Ministry of Education (MoE), Government of India for the financial support to the project for development of curricula.

We are grateful to the Director, National Council for Education, Research and Training (NCERT) for his support and guidance. We also acknowledge the contributions of our colleagues at the Technical Support Group of *SamagraShiksha*, MoE, National Skill Development Agency (NSDA) and National Skill Development Corporation (NSDC) and Food Industry Capacity Initiatives of India (FICSI) for their academic support and cooperation in the development of curricula.

We are also grateful to Dr. Rakesh Kumar Raman, Course Coordinator, Ms. Shalu Giri (JPF), Department of Humanities, Sciences, Education and Research, PSSCIVE, Bhopal, and the experts Dr. Samlesh Kumari, Scientist, ICAR-CIAE, Bhopal, Dr. Sunny Kalyan, Project Scientist (SRF-ICMR), ICAR-NDRI, Karnal, Haryana for their contributions in the development of this learning outcome based curricula for the Job Role: Dairy Product Processor for Grades 11 and 12.The contributions made by Dr. Vinay Swarup Mehrotra and his team, at PSSCIVE in the development of the curriculum for the Employability Skills (Part-A) are also duly acknowledged.

PSSCIVE Team

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1. COURSE OVERVIEW

COURSE TITLE: DAIRY PRODUCT PROCESSOR

A Dairy Product Processor is responsible for performing processing operations to produce a variety of dairy products such as curd, paneer, butter, ghee, and flavored milk etc. S/he is expected to operate different types of dairy processing equipment as well as in processing, while and utilize workplace resources efficiently.

A Dairy Product Processor must have the ability to plan, organize, prioritize, and handle work-related stress maintaining product consistency and quality. The individual must coordinate effectively with various departments. S/he should possess reading, writing, basic calculation, and communication skills. Additionally, the individual should have the physical stamina to work long hours, maintain both personal and workplace hygiene, and possess a sound understanding of food safety regulations and standards.

COURSE OBJECTIVES: On completion of the course, students should be able to:

- Apply effective oral and written communication skills to interact with people and customers;
- Identify the principal components of a computer system;
- Demonstrate the basic skills of using computer;
- Demonstrate self-management skills;
- Demonstrate the ability to provide a self-analysis in context of entrepreneurial skills and abilities;
- Demonstrate the knowledge of the importance of green skills in meeting the challenges of sustainable development and environment protection;
- Perform various tasks related to the processing, testing and handling of milk while maintaining its quality;
- Describe different types of ingredients and additives used in dairy product formulations;
- Describe the standard procedures to produce different types of dairy products;
- Perform various tasks to prepare for production of dairy products;
- Apply necessary health and safety practices to ensure food safety and personal hygiene

COURSE REQUIREMENTS: The learner should have a basic knowledge of science.

COURSE LEVEL: On completion of this course, a student can take up a higher level course for a job role in dairy product processor, and can work in the dairy industry.

COURSE DURATION: 600 hrs.

Class11: 300 hrs.
Class12: 300 hrs.

Total: 600 hrs.

SCHEME OF UNITS AND ASSESSMENT

This course is a planned sequence of instructions consisting of Units meant for developing employability and vocational competencies of students of Grades 11 and 12, opting for vocational subject along with general education subjects. The unit-wise distribution of hours and marks for Grade 11 is as follows:

GRADE 11			
	Units	**No. of Hours for Theory and Practical 300**	**Max. Marks for Theory and Practical 100**
Part A	**Employability Skills**		
	Unit 1: Communication Skills – III	25	**10**
	Unit 2: Self- management Skills – III	25	
	Unit 3: Information and Communication Technology Skills – III	20	
	Unit4: Entrepreneurial Skills – III	25	
	Unit5: Green Skills – III	15	
	Total	**110**	**10**
Part B	**Vocational Skills**		
	Unit 1: Operational Planning, Work Area Maintenance, and Production Organization	45	40
	Unit 2: Market Milk – Production, Processing, Quality Assessment, and Hygiene	35	
	Unit3: Production of Indigenous and Fat-Rich Dairy Products	45	
	Unit4: Management of Dairy Plant Operations and Production Systems	40	
	Total	**165**	**40**
Part C	**Practical Work**		
	Practical Examination	06	15
	Written Test	01	10
	Viva Voce	03	10
	Total	**10**	**35**
Part D	**Project Work/Field Visit**		
	Practical File/Student Portfolio	10	10
	Viva Voce	05	05
	Total	**15**	**15**
	Grand Total	**300**	**100**

The unit-wise distribution of hours and marks for Grade 12 is as follows:

GRADE 12			
	Units	**No. of Hours for Theory and Practical 300**	**Max. Marks for Theory and Practical 100**
Part A	**Employability Skills**		
	Unit 1: Communication Skills – IV	25	**10**
	Unit 2: Self-management Skills–IV	25	
	Unit 3: Information and Communication Technology Skills – IV	20	
	Unit 4: Entrepreneurial Skills – IV	25	
	Unit 5: Green Skills – IV	15	
	Total	**110**	**10**
Part B	**Vocational Skills**		
	Unit1: Production and Technology of Cultured and Frozen Dairy Products	45	
	Unit2: Concentrated and Dried Dairy Products: Principles and Practices	40	**40**
	Unit3: Dairy Industry: By-products	40	
	Unit4: Food Safety and Team Management FSMS: HACCP, GMP	40	
	Total	**165**	
Part C	**Practical Work**		
	Practical Examination	06	15
	Written Test	01	10
	Viva Voce	03	10
	Total	**10**	**35**
Part D	**Project Work/Field Visit**		
	Practical File/Student Portfolio	10	10
	Viva Voce	05	05
	Total	**15**	**15**
	Grand Total	**300**	**100**

2. TEACHING/TRAINING ACTIVITIES

The teaching and training activities have to be conducted in classroom, laboratory/ workshops and field visits. Students should be taken to field visits for interaction with experts and to expose them to the various tools, equipment, materials, procedures and operations in the workplace. Special emphasis should be laid on the occupational safety, health and hygiene during the training and field visits.

CLASSROOM ACTIVITIES

Classroom activities are an integral part of this course and interactive lecture sessions, followed by discussions should be conducted by trained vocational teachers. Vocational teachers should make effective use of a variety of instructional aids, such as audio-video materials, colour slides, charts, diagrams, models, exhibits, hand-outs, online teaching materials, etc. to transmit knowledge and impart training to the students.

PRACTICAL WORK IN LABORATORY/WORKSHOP

Practical work may include but not limited to hands-on-training, simulated training, role play, case based studies, exercises, etc. Equipment and supplies should be provided to enhance hands-on learning experience of students. Only trained personnel should teach specialized techniques. A training plan that reflects tools, equipment, materials, skills and activities to be performed by the students should be submitted by the vocational teacher to the Head of the Institution.

FIELDVISITS/EDUCATIONALTOUR

In field visits, students will go outside the classroom to obtain specific information from experts or to make observations of the activities. A checklist of observations to be made by the students during the field visits should be developed by the Vocational Teachers for systematic collection of information by the students on the various aspects. Principals and Teachers should identify the different opportunities for field visits within a short distance from the school and make necessary arrangements for the visits. At least three field visits should be conducted in a year.

3. ASSESMENTAND CERTIFICATION

Upon successful completion of the course by the candidate, the Central/ State Examination Board for Secondary Education and the respective Sector Skill Council will certify the competencies.

The National Skills Qualifications Framework (NSQF) is based on outcomes referenced to the National Occupation Standards (NOS's), rather than inputs.

The NSQF level descriptors, which are the learning outcomes for each level, include the process, professional knowledge, professional skills, core skills and responsibility. The assessment is to be undertaken to verify that individuals have the knowledge and skills needed to perform a particular job and that the learning programme undertaken has delivered education at a given standard. It should be closely linked to certification so that the individual and the employer could come to know the competencies acquired through the vocational subject or course. The assessment should be reliable, valid, flexible, convenient, cost effective and above all it should be fair and transparent. Standardized assessment tools should be used for assessment of knowledge of students. Necessary arrangements should be made for using technology in assessment of students.

KNOWLEDGE ASSESSMENT (THEORY)

Knowledge Assessment should include two components: one comprising of internal assessment and second an external examination, including theory examination to be conducted by the Board. The assessment tools shall contain components for testing the knowledge and application of knowledge. The knowledge test can be objective paper-based test or short structured questions based on the content of the curriculum.

WRITTENTEST

It allows candidates to demonstrate that they have the knowledge and understanding of a given topic. Theory question paper for the vocational subject should be prepared by the subject experts comprising group of experts of academicians, experts from existing vocational subject experts/teachers, subject experts from university/colleges or industry. The respective Sector Skill Council should be consulted by the Central/State Board for preparing the panel of experts for question paper setting and conducting the examinations.

The blue print for the question paper may be as follows:

Duration: 3 hrs

S. No.	Typology of Question	No. of Questions			
		Very Short Answer (1 mark)	Short Answer (2 Marks)	Long Answer (3 Marks)	Marks
1.	Remembering–(Knowledge based simple recall questions, to know specific facts, terms, concepts, principles, or theories; identify, define or recite, information)	2	1	2	10

2.	Understanding– (Comprehension– to be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase, or interpret information)	1	2	2	11
3.	Application – (Use abstract information in concrete situation, to apply knowledge to new situations: Use given content to interpret a situation, private an example, or solve a problem)	0	1	1	05
4.	High Order Thinking Skills – (Analysis &Synthesis – Classify, compare, contrast, or differentiate between different pieces of information; Organize and/ or integrate unique pieces of information from a variety of sources)	0	1	0	02
5.	Evaluation – (Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values)	0	1	0	02
	Total	**3x1=3**	**6x2=12**	**5x3=15**	**30 (14 Question)**

SKILL ASSESSMENT (PRACTICAL)

Assessment of skills by the students should be done by the assessors/examiners on the basis of practical demonstration of skills by the candidate, using a competency checklist The competency checklist should be developed as per the National Occupation Standards (NOS's) given in the Qualification Pack for the Job Role to bring about necessary consistency in the quality of assessment across different sectors and Institutions. The student has to demonstrate competency against the performance criteria defined in the National Occupation Standards and the assessment will indicate that they are 'competent', or are 'not yet competent'. The assessors assessing the skills of the students should possess a current experience in the industry and should have undergone an effective training in assessment principles and practices. The Sector Skill Councils should ensure that the assessors are provided with the training on the assessment of competencies. Practical examination allows candidates to demonstrate that they have the knowledge and understanding of performing a task. This will include hands-on practical exam and viva voce. For practical, there should be a team of two evaluators – the subject teacher and the expert from the relevant industry certified by the Board or concerned Sector Skill Council. The same team of examiners will conduct the viva voce.

Project Work (individual or group project) is a great way to assess the practical skills on ascertain time period or timeline. Project work should be given on the basis of the capability of the individual to perform the tasks or activities involved in the project. Projects should be discussed in the class and the teacher should periodically monitor the progress of the project and provide feedback for improvement and innovation. Field visits should be organized as part of the project work. Field visits can be followed by a small-group work/project work. When the class returns from the field visit, each group might be asked to use the information that they have gathered to prepare presentations or reports of their observations. Project work should be assessed on the basis of practical file or student portfolio.

Student Portfolio is a compilation of documents that supports the candidate's claim of competence.

Documents may include reports, articles, photos of products prepared by students in relation to the unit of competency.

Viva voce allows candidates to demonstrate communication skills and content knowledge. Audio or video recording can be done at the time of viva voce. The number of external examiners would be decided as per the existing norms of the Board and these norms should be suitably adopted/adapted as per the specific requirements of the vocational subject. Viva voce should also be conducted to obtain feedback on the student's experiences and learning during the project work/field visits.

4. UNIT CONTENTS

GRADE-11

PART A: EMPLOYABILITY SKILLS

S. No.	Units	Duration (hrs)
1.	Communication Skills- III	25
2.	Self- management Skills– III	25
3.	Information and Communication Technology Skills- III	20
4.	Entrepreneurial Skills– III	25
5.	Green Skills– III	15
	Total	**110**

UNIT 1: COMMUNICATION SKILLS– III			
Learning Outcome	**Theory (10hrs)**	**Practical (15hrs)**	**Duration (25hrs)**
1. Demonstrate knowledge of communication	1. Introduction to communication 2. Importance of communication 3. Elements of communication 4. Perspectives in communication 5. Effective communication	1. Role-play on the communication process 2. Group exercise on factors affecting perspectives in communication 3. Classroom discussion on the 7Cs of effective communication 4. Chart making on elements of communication	03
2. Demonstrate verbal communication	1. Verbal communication 2. Public Speaking	1. Role-play of a phone conversation. 2. Group exercise on Public speaking	02
3. Demonstrate non- verbal communicati on	1. Importance of non-verbal communication 2. Types of non-verbal communication 3. Visual communication	1. Role-play on non- verbal communication 2. Group exercise on body language 3. Group activity on methods of communication	02

4. Speak using correct pronunciation	1. Pronunciation basics 2. Speaking properly 3. Phonetics 4. Types of sounds	1. Group activities on practicing pronunciation	01
5. Apply an assertive communication style	1. Important communication styles 2. Assertive communication 3. Advantages of assertive communication 4. Practicing assertive communication	1. Group discussion on communication styles 2. Observing and sharing communication styles	03
6. Demonstrate the knowledge of saying no	1. Steps for saying 'No' 2. Connecting words	1. Group discussion on how to respond 2. Group activity on saying 'No'	02
7. Identify and use parts of speech in writing	1. Capitalisation 2. Punctuation 3. Basic parts of speech 4. Supporting parts of speech	1. Group activity on identifying parts of speech 2. Writing a paragraph with punctuation marks 3. Group activity on constructing sentences 4. Group activity on identifying parts of speech	03
8. Write correct sentences and paragraphs	1. Parts of a sentence 2. Types of object 3. Types of sentences 4. Paragraph	1. Activity on writing sentences 2. Activity on active and passive voice 3. Assignment on types of sentences	02
9. Introduce yourself to others and write about oneself	1. Greetings 2. Introducing self and others	1. Role-play on formal and informal greetings 2. Role-play on introducing someone 3. Practice greetings	02
10. Introduce yourself to others and write about oneself	1. Talking about self 2. Filling a form	1. Practice self-introduction and filling up forms 2. Practice self-introduction to others	01

11. Develop Questioning skill	1. Main types of questions 2. Forming closed and 3. open-ended questions	1. Practice exercise on forming questions 2. Group activity on Framing questions	01
12. Communicate information about family to others	1. Names of relatives 2. Relations	1. Practice talking about family 2. Role-play on relations	01
13. Describe habits and routines	1. Concept of habits and routines	1. Discuss habits and routines 2. Group activity on describing routines	01
14. Ask or give directions to others	1. Asking for directions 2. Using land marks	1. Role-play on asking and giving directions 2. Identifying symbols	**01**
Total			**25**

UNIT 2: SELF-MANAGEMENT–III			
Learning Outcome	**Theory (10 hrs)**	**Practical (15 hrs)**	**Duration (25 hrs)**
1. Identify and analyze own strengths and weaknesses	1. Understanding self 2. Techniques for identifying strengths and weaknesses 3. Difference between Interests and abilities	1. Activity on writing aims in life 2. Prepare a worksheet on interests and abilities	03
2. Demonstrate personal grooming skills	1. Guidelines for dressing and grooming 2. Preparing a personal grooming checklist	1. Activity on dressing and grooming standards 2. Self-reflection on dressing and grooming	04
3. Maintain personal hygiene	1. Importance of personal hygiene 2. Three steps to personal hygiene 3. Essential steps of hand washing	1. Role-play on personal hygiene 2. Assignment on personal hygiene	03

4. Demonstrate the knowledge of working in a team and participating In group activities	1. Describe the benefits of teamwork 2. Working in a team	1. Assignment on working in a team 2. Self-reflection on teamwork	03
5. Develop networking skills	1. Benefits of networking skills 2. Steps to build Networking skills	1. Activity on networking 2. Assignment on Networking skills	03
6. Describe the meaning and importance of self- motivation	1. Meaning of self-motivation 2. Types of motivation 3. Steps to building self- motivation	1. Activity on staying motivated 2. Assignment on reasons hindering motivation	03
7. Set goals	1. Meaning of goals purpose of goal-setting 2. Setting SMART goals	1. Assignment on setting SMART goals 2. Activity on developing long-term and short-term goals	03
8. Apply time management strategies and techniques	1. Meaning and importance of time management 2. Steps for effective Time management	1. Checklist for making preparation for daily activities 2. Preparing To-do-list	03
Total			**25**

UNIT 3: INFORMATION AND COMMUNICATION TECHNOLOGY- III			
Learning Outcome	**Theory (08 hrs)**	**Practical (12 hrs)**	**Duration (20 hrs)**
1. Create a document on the word processor	1. Introduction to ICT 2. Advantages of using a word processor. 3. Work with LibreOffice Writer	1. Demonstration and practice of the following: • Creating a new document • Typing text • Saving the text • Opening and saving file on Microsoft word/LibreOffice Writer.	02

2. Identify icons on the toolbar	1. Status bar 2. Menu bar 3. Icons on the Menu bar 4. Multiple ways to perform a function	1. Work with a basic user interface of LibreOffice writer 2. Working with LibreOffice Writer or Microsoft Word	02
3. Save, close, open and print document	1. Save a word document 2. Close Open an existing document 3. Print	1. Perform the functions for saving, closing and printing documents on LibreOffice Writer 2. Perform the Functions on Microsoft Word	02
4. Format text in a word document	1. Change style and size of text 2. Align text 3. Cut, Copy, Paste 4. Find and replace	1. Perform the Functions of Formatting on LibreOffice Writer 2. Perform the Functions of Formatting on Microsoft Word	02
5. Check spelling and grammar in a word document	1. Use of spell checker 2. Autocorrect	1. Perform the Functions of checking spellings On LibreOffice Writer 2. Perform the Functions of Checking the Spelling on Microsoft Word	02
6. Insert lists, tables, pictures, and shapes in a word document	1. Insert bullet list 2. Number list 3. Tables 4. Pictures 5. Shapes	1. Perform the Functions on LibreOffice Writer	03
7. Insert header, footer and page number in a word document	1. Insert header 2. Insert footer 3. Insert page number 4. Page count	1. Perform the Functions on LibreOffice Writer 2. Perform the Functions on Microsoft Word	03

8. Make changes by using the track Change option in a word document	1. Tracking option 2. Manage option 3. Compare documents	1. Perform the Functions on LibreOffice Writer 2. Perform the functions on Microsoft Word	04
Total			**20**

UNIT 4: ENTREPRENEURIAL SKILLS– III			
Learning Outcome	**Theory (10 hrs)**	**Practical (15 hrs)**	**Duration (25 hrs)**
1. Differentiate between different kinds of businesses	1. Introduction to entrepreneurship 2. Types of business activities	1. Role-play on different kinds of businesses	03
2. Describe the significance of entrepreneurial values	1. Meaning of value 2. Values of an Entrepreneur 3. Case study on Qualities of an entrepreneur	1. Role-play on qualities of an entrepreneur	03
3. Demonstrate the attitudinal changes required to become an entrepreneur	1. Difference between the attitude of entrepreneur and employee	1. Interviewing employees and entrepreneurs	03
4. Develop thinking skills like an entrepreneur	1. Problems of entrepreneurs 2. Problem-solving 3. Ways to think like an entrepreneur	1. Group activity on identifying and solving problems	04
5. Generate business ideas	1. The business cycle 2. Principles of idea creation 3. Generating a business idea 4. Case studies	1. Group activity to create business ideas	04
6. Describe customer needs and the importance of conducting a Customer survey	1. Understanding customer needs 2. Conducting a customer survey	1. Conducting a customer survey	04

7. Create a business plan	1. Importance of business planning 2. Preparing a business plan 3. Principles to follow for growing a business 4. Case studies	1. Activity on developing a business plan	04
Total			**25**

UNIT 5: GREEN SKILLS– III			
Learning Outcome	**Theory (07 hrs)**	**Practical (08 hrs)**	**Duration (15 hrs)**
1. Describe the importance of the main sector of the green economy	1. Meaning of ecosystem, food chain and sustainable development 2. Main sectors of the green economy- E-waste management, green transportation, renewal energy, green construction, and water management	1. Discussion on sectors of green economy 2. Preparing posters on various sectors for promoting green economy 3. Writing an essay or a short note on the important initiatives for promoting green economy.	06
2. Describe the main recommendations of policies for the green economy	1. Policies for a green economy	1. Discussion on initiatives for promoting the green economy	03
3. Describe the major green sectors/areas and the role of various stakeholders in the green economy	1. Stakeholders in the green economy	1. Group discussion on the role of stakeholders in the green economy 2. Preparation of posters on green sectors and their stakeholders 3. Making solar bulbs.	03

4. Identify the role of government and private agencies in the green economy	1. Role of the government in promoting a green economy 2. Role of private agencies in promoting green economy	1. Discussion on the role of Government and Private Agencies in promoting a green economy. 2. Posters on green sectors.	03
Total			**15**

PART B– VOCATIONAL SKILLS– GRADE 11

S.No.	Units	Duration (Hrs.)
1.	Unit 1: Operational Planning, Work Area Maintenance, and Production Organization	45
2.	Unit 2: Market Milk – Production, Processing, Quality Assessment, and Hygiene	35
3.	Unit 3: Production of Indigenous and Fat-Rich Dairy Products	45
4.	Unit 4: Management of Dairy Plant Operations and Production Systems	40
	Total	**165**

UNIT 1: OPERATIONAL PLANNING, WORK AREA MAINTENANCE, AND PRODUCTION ORGANIZATION			
Learning Outcome	**Theory (15 Hrs)**	**Practical (20 Hrs)**	**Duration (35 Hrs)**
1. Understand process, product, and formulation flow charts. 2. Identify work requirements from production planning and supervisor instructions. 3. Estimate manpower and material requirements for planned production. 4. Plan capacity	1. Introduction to Process Flow Chart, Product Flow Chart, and Formulation Flow Chart. 2. Components of Production Planning and Role of Supervisors. 3. Estimation of Manpower and Material Requirements (Raw & Packaging Material). 4. Capacity Utilization and Batch Size Planning.	1. Prepare a sample process flow chart for a dairy product (e.g., paneer, ghee). 2. Calculate manpower and raw material requirements for a given production plan. 3. Develop a simple capacity utilization plan for a small-scale production order.	20

utilization of machinery based on production order and batch size.			
1. Clean and prepare production and storage areas as per organizational standards. 2. Maintain and sanitize machines and tools. 3. Ensure proper hygiene, documentation, and waste disposal before production. 4. Inspect and report equipment suitability.	1. Importance of Work Area Cleanliness and Hygiene Standards. 2. Sanitation Procedures for Machines and Tools. 3. Waste Management: Segregation and Safe Disposal (hazardous, food, packaging waste). 4. Inspection and Reporting Procedures for Tools and Equipment.	1. Demonstrate cleaning and sanitizing of machines and tools as per SOPs. 2. Create a checklist for work area preparation and hygiene documentation. 3. Segregate and dispose of waste in designated places. 4. Inspect tools and report faults using proper documentation format.	15
1. Organize tools and equipment for production. 2. Receive, check, and organize raw/packaging materials based on FIFO. 3. Allot responsibilities to assistants and helpers. 4. Maintain records of delivery documentation for ingredients.	1. Principles of Tool and Equipment Organization. 2. FIFO and Inventory Management in Production. 3. Role of Teamwork and Task Allocation in Production Planning. 4. Documentation: Delivery Notes and Temperature Logs	1. Arrange and label tools/equipment in a production area. 2. Organize raw and packaging materials according to FIFO. 3. Prepare a sample work allocation plan for helpers/assistant 4. Maintain a mock delivery record with temperature log.	10
Total			**45**

UNIT 2: MARKET MILK – PRODUCTION, PROCESSING, QUALITY ASSESSMENT, AND HYGIENE			
Learning Outcome	**Theory (15 Hrs.)**	**Practical (10 Hrs.)**	**Duration (25 Hrs)**
1. Explain pasteurization, homogenization, and heat treatments for milk. 2. Control time–temperature relationships and equipment accuracy.	1. Principles of milk standardization – fat and SNF adjustment. 2. Methods and equipment for pasteurization and homogenization. 3. Importance of time–temperature control in milk processing.	1. Standardise raw milk to desired fat and SNF levels for toned, full-fat, or low-fat milk. 2. Pasteurise and homogenise the standardised milk. 3. Monitor and control time–temperature relationships and check equipment calibration during processing.	10 Hrs
1. Classify market milk types (toned, double toned, skimmed, standardized, flavoured). 2. Explain process flow for each type. 3. Describe preparation of milk base and addition of flavour ingredients.	1. Classification of market milk types and their standards. 2. Processing flow charts for toned, skimmed, and flavoured milk. 3. Selection and role of flavouring agents and sweeteners.	1. Prepare the milk base according to desired flavour profile. 2. Evaluate flavouring ingredients for quality, compatibility, and sensory attributes. 3. Add flavouring ingredients and sweeteners. 4. Ensure thorough mixing and dissolution.	10 Hrs
1. Describe hygienic handling and storage practices for milk. 2. Explain quality control and assurance tests. 3. Understand	1. Importance of hygiene and sanitation in milk processing. 2. Quality assurance and testing of processed milk. 3. Packaging materials and procedures for market milk.	1. Pasteurise and homogenise flavoured milk mix to ensure product safety and stability. 2. Cool processed/flavoured milk to desired temperature. 3. Package milk products using	15 Hrs

packaging requirements for milk products.		approved materials and procedures.	
Total			**35**

UNIT 3: PRODUCTION OF INDIGENOUS AND FAT-RICH DAIRY PRODUCTS			
Learning Outcome	**Theory (15 Hrs.)**	**Practical (20 Hrs.)**	**Duration (35 Hrs)**
1. Identify and classify indigenous and fat-rich dairy products. 2. Understand their cultural, economic, and nutritional importance.	1. Introduction to Indigenous Dairy Products – History, Importance, and Cultural Significance. 2. Scope and Economic Value of Traditional Dairy Products. 3. Classification of Fat-Rich and Indigenous Dairy Products (Cream, Butter, Ghee, Khoa, Chhana, Paneer, etc.) 4. Challenges in Production, Quality, and Marketing.	1. Collect samples of local traditional dairy products and classify them. 2. Prepare a classification chart 3. Group discussion on importance of indigenous products.	15 Hrs
1. Standardise cream, produce butter and ghee maintaining quality and hygiene. 2. Evaluate quality parameters and troubleshoot defects.	1. Cream Processing – Separation, Standardisation, Pasteurisation, Homogenisation. 2. Types of Cream – Light, Whipping, Heavy, Clotted, Half-and-half 3. Butter Production – Churning, Washing, Salting, Texturing, Extrusion; Legal Standards. 4. Ghee Production – Clarification, Filtration, Cooling, Packaging; BIS Standards. 5. Quality parameters:	1. Operate cream separator and standardise cream. 2. Pasteurise & homogenise cream; perform fat testing. 3. Demonstrate butter making (churning, washing, salting) 4. Produce ghee and observe clarification stages. 5. Test ghee for flavour, colour, moisture.	10 Hrs

	fat %, moisture, flavour, colour, microbiological safety. 6. Defects and corrective measures.		
1. Prepare khoa and khoa-based sweets maintaining texture and yield. 2. Apply spoilage control measures.	1. Khoa Production – Karahi and Steam-jacketed methods. 2. Factors affecting texture, yield, shelf-life. 3. Types of Khoa – *Pindi, Danedar, Dhap* and their uses. 4. Overview of khoa-based sweets (Burfi, Peda, Gulab Jamun). 5. Quality standards and spoilage control.	1. Prepare khoa using open pan method. 2. Prepare Burfi/Peda and evaluate sensory attributes. 3. Study common spoilage and suggest storage solutions. 4. Prepare flow chart of khoa production.	10 Hrs
1. Coagulate milk to produce chhana and paneer of correct texture and yield. 2. Practice packaging and identify common defects.	1. Principle of Coagulation – Role of acid/rennet. 2. Processing Steps – Coagulation, whey drainage, pressing, cutting, packaging. 3. Quality parameters – texture, moisture, microbiological quality. 4. Packaging materials and methods. 5. Common defects and corrective measures.	1. Demonstrate preparation of chhana/paneer. 2. Measure yield and compare with standards. 3. Practice hygienic packaging techniques. 4. Identify defects and suggest corrective actions.	10 Hrs
Total			**45**

UNIT 4: MANAGEMENT OF DAIRY PLANT OPERATIONS AND PRODUCTION SYSTEMS			
Learning Outcome	**Theory (10 Hrs.)**	**Practical (20 Hrs.)**	**Duration (30 Hrs)**
1. Understand dairy plant layout and workflow design principles.	1. Introduction to Dairy Plant Operations – Objectives, Functions, and Importance. 2. Workflow Layout –	1. Prepare a simple block diagram of a dairy plant layout. 2. Identify sections and flow of	15 Hrs

2. Identify different sections of a dairy plant and their functions 3. Recognise importance of smooth workflow for efficiency and hygiene.	Principles of Plant Layout (Product Flow, Personnel Flow, Hygiene Flow). 3. Sections of a Dairy Plant – Reception Dock, Processing Area, Packaging Section, Cold Storage, Dispatch. 4. Good Manufacturing Practices (GMP) and Safety Considerations in Layout Design.	materials in a model dairy plant or schematic. 3. Group activity: Discuss ideal workflow design for efficiency and hygiene.	
1. Understand production planning and scheduling for dairy operations. 2. Estimate manpower and raw material requirements. 3. Maintain process records and quality compliance.	1. Concept of Production Planning and Scheduling – Objectives and Benefits 2. Types of Production Systems – Continuous vs. Batch Operations. 3. Estimation of Raw Material and Manpower Requirements. 4. Preparation of Daily Production Plan, Batch Size, and Capacity Utilisation. 5. Process Documentation – Production Records, Quality Logs, Traceability.	1. Prepare a sample production plan for milk processing or product manufacture 2. Calculate raw material and packaging material requirement for a given batch size. 3. Practice maintaining production records and logs.	15 Hrs
1. Carry out preventive maintenance and basic troubleshooting of dairy equipment. 2. Understand and apply CIP procedures for plant hygiene	1. Introduction to Equipment Maintenance – Importance, Types (Preventive, Breakdown, Predictive). 2. Maintenance Schedule and Record Keeping. 3. Cleaning-in-Place	1. Demonstrate basic maintenance (lubrication, inspection) on common equipment like pumps or valves. 2. Perform CIP procedure on a milk pipeline or small equipment.	10 Hrs

3. Ensure compliance with sanitation standards.	(CIP) – Principles, Steps (Pre-rinse, Detergent Wash, Intermediate Rinse, Sanitisation, Final Rinse) 4. Sanitisation Protocols – Cleaning Agents, Concentrations, Contact Time. 5. Personal Hygiene and Safety During Cleaning Operations.	3. Check effectiveness of cleaning using simple swab/milk ring tests. 4. Prepare a sanitation schedule for a model dairy plant.	
Total			**40**

GRADE-12

PART A: EMPLOYABILITY SKILLS

S.No.	Units	Duration (hrs)
1.	Communication Skills- IV	25
2.	Self- management Skills- IV	25
3.	Information and Communication Technology Skills- IV	20
4.	Entrepreneurial Skills- IV	25
5.	Green Skills- IV	15
	Total	**110**

UNIT 1: COMMUNICATION SKILLS- IV			
Learning Outcome	**Theory (10hrs)**	**Practical (15hrs)**	**Duration (25hrs)**
1. Demonstrate active listening skills	1. Active listening- listening skill, stages of active listening 2. Overcoming barriers to active listening	1. Demonstration of the factors affecting active listening 2. Preparing posters of steps for active listening 3. Role-play on negative effects of not listening Actively	10
2. Identify the parts of speech	1. Parts of speech – using capitals, punctuation, basic parts of speech, supporting parts of speech	1. Group practice on identifying parts of speech 2. Group practice on constructing sentences	10
3. Write sentences	1. Writing skills to the following: • Simple sentence • Complex sentence • Types of object 2. Types of sentences 3. Active and Passive sentences 4. Statement/Declarative sentence 5. Question/Interrogative sentence 6. Emotion/Reaction or Exclamatory sentence 7. Order or	1. Group work on writing sentences and paragraphs 2. Practice writing sentences in the active or passive voice 3. Writing different types of sentences	5

	Imperative sentence 3. Paragraph writing		
Total			**25**

UNIT 2: SELF-MANAGEMENT SKILLS– IV			
Learning Outcome	**Theory (10hrs)**	**Practical (15hrs)**	**Duration (25hrs)**
1. Describe the various factors influencing motivation and positive attitude	1. Motivation and positive attitude 2. Intrinsic and extrinsic motivation 3. Positive attitude– ways to maintain positive attitude 4. Stress and stress management- ways to manage stress	1. Role-play on avoiding stressful situations 2. Activity on self-reflection	10
2. Describe how to become result oriented	1. How to become result oriented? 2. Goal setting– examples of result-Oriented goals	1. Pair and share activities on the aim of life	5
3. Describe the importance of self-awareness and the basic personality traits, types and disorders	1. Steps towards self-awareness 2. Personality and basic personality traits 3. Common personality disorders- • Suspicious • Emotional and impulsive • Anxious 4. Steps to overcome Personality disorders	1. Group discussion on self-awareness	10
Total			**25**

UNIT 3: INFORMATION AND COMMUNICATION TECHNOLOGY SKILLS- IV			
Learning Outcome	**Theory (06 hrs)**	**Practical (14 hrs)**	**Duration (20 hrs)**
1. Identify the components of a spreadsheet application	1. Introduction to spreadsheet application -types of a spreadsheet, creating a new worksheet, components of a worksheet.	1. Group practice on working with Libreoffice	02

2. Perform basic operations in a spreadsheet	1. Opening workbook and entering data – types of data, steps to enter data, editing and deleting data in a cell 2. Selecting multiple cells 3. Saving the spreadsheet in various formats 4. Closing the spreadsheet 5. Opening the spreadsheet. 6. Printing the spreadsheet.	1. Group practice on working with data on LibreOffice Calc.	03
3. Demonstrate the knowledge of working with data and formatting text	1. Using a spreadsheet for addition – adding value directly, adding by using cell address, using a mouse to select values in a formula, using sum function, copying and moving formula 2. Need to format cell and content 3. Changing text style and font size 4. Align text in a cell 5. Highlight text	1. Demonstration of basic calculations in LibreOffice Calc. 2. Group practice on formatting a spreadsheet in LibreOffice Calc.	02
4. Demonstrate the knowledge of using advanced features in spreadsheet	1. Sorting data 2. Filtering data 3. Protecting spreadsheet with password	1. Group practice on sorting data in LibreOffice Calc	03
5. Make use of the software used for making slide presentations	1. Available software presentation 2. Stapes to start LibreOffice Impress 3. Adding text to a presentation	1. Group practice on working with LibreOffice Impres stools 2. Group practice on creating a presentation in LibreOffice Impress	02

6. Open, close and save slide presentations	1. Open, Close, Save and Print a slide presentation	1. Practice exercises on steps to save, close, open and save a presentation	01
7. Demonstrate the operations related to slides and texts in the presentation	1. Working with slides and text in a presentation- adding slides to a presentation, deleting slides, adding and formatting text, highlighting text, aligning text, changing text colour	1. Group practice on working with font styles and types in LibreOffice Impress	04
8. Demonstrate the use of advanced features in a presentation	1. Advanced features used in a presentation 2. Inserting shapes in the presentation 3. Inserting clipart and images in a presentation 4. Changing slide layout	1. Group practice on working with slides in LibreOffice Impress	03
Total			**20**

UNIT 4: ENTREPRENEURIAL SKILLS- IV			
Learning Outcome	**Theory (10hrs)**	**Practical (15hrs)**	**Duration (25hrs)**
1. Describe the concept of entrepreneur shi p and the types and roles and functions entrepreneur	1. Entrepreneurship and entrepreneur 2. Characteristics of entrepreneurship 3. Entrepreneurship-art and science 4. Qualities of a successful entrepreneur 5. Types of entrepreneurs 6. Roles and functions of an entrepreneur 7. What motivates an entrepreneur 8. Identifying opportunities and risk-taking 9. Startups	1. Group discussion on the topic “An entrepreneur is not born but created”. 2. Quiz on various aspects of entrepreneurship.	10

2. Identify the barriers to entrepreneurs hip	1. Barriers to entrepreneurship 2. Environmental barriers 3. No or faulty business plan 4. Personal barriers	1. Fishbowl of fears- group discussion about what we fear about entrepreneurship 2. Facing an Interview.	05
3. Demonstrate the knowledge of entrepreneuri al attitude and competencies	1. Entrepreneurial attitude 2. Entrepreneurial competencies 3. Decisiveness, 4. Initiative 5. Interpersonal skills- positive attitude, stress management 6. Perseverance 7. Organisational skills- time management, goal setting, efficiency, managing quality.	1. Group discussion on business ideas 2. Group practice on best out of waste 3. Group discussion on the topic of lets grow together 4. Group practice on a snowball fight. 5. Activity on rating friends and self for entrepreneurial qualities. 6. Playing games, such As "Who am I".	10
Total			**25**

UNIT 5: GREEN SKILLS- IV			
Learning Outcome	**Theory (05 hrs)**	**Practical (10 hrs)**	**Duration (15 hrs)**
1. Identify the benefits of the green jobs	1. Green jobs 2. Benefits of green jobs 3. Green jobs in different sectors: • Agriculture • Transportation • Water conservation • Solar and wind energy • Eco-tourism • Building and construction • Solid waste management • Appropriate technology	1. Group discussion on the importance of green job.	8

2. State the importance of green jobs	1. Importance of green jobs in • Limiting green house gas emissions • Minimizing waste and pollution • Protecting and restoring ecosystems • Adapting to the effects of climate change	1. Preparing posters on green jobs. 2. Activities on tree plantation.	7
Total			**15**

PART B–VOCATIONAL SKILLS-GRADE 12

S.No.	Units	Duration (Hrs)
1.	Unit 1: Production and Technology of Cultured and Frozen Dairy Products	35
2.	Unit 2: Concentrated and Dried Dairy Products: Principles and Practices	45
3.	Unit 3: Dairy Industry: By-products	40
4.	Unit 4: Food Safety and Team Management FSMS: HACCP, GMP	45
	Total	**165**

UNIT 1: PRODUCTION AND TECHNOLOGY OF CULTURED AND FROZEN DAIRY PRODUCTS			
Learning Outcome	**Theory (15 Hrs)**	**Practical (20 Hrs)**	**Duration (35 Hrs)**
1. Understand the principles of fermentation and lactic culture use. 2. Explain processing steps for curd, lassi, yoghurt, and shrikhand. 3. Maintain temperature and culture	1. Introduction to cultures used in fermented dairy products. 2. Principles of fermentation– role of lactic acid bacteria. 3. Processing steps and flow charts for curd, lassi, yoghurt, and shrikhand. 4. Quality parameters – acidity, texture,	1. Prepare curd, lassi, and yoghurt under controlled fermentation conditions. 2. Measure acidity and observe textural changes. 3. Prepare shrikhand and evaluate sensory quality.	10 Hrs

control for quality products.	flavour, and shelf-life.		
1. Explain the process and conditions for ripening fermented dairy products 2. Understand microbial, enzymatic, and physicochemical changes during ripening 3. Ensure quality through controlled process parameters.	1. Principles and stages of ripening – temperature, humidity, and microbial action. 2. Role of enzymes and biochemical changes during ripening. 3. Process control parameters and defects during maturation. 4. Storage and packaging requirements.	1. Demonstrate ripening of cultured dairy products under monitored conditions. 2. Record pH, flavour, and consistency changes. 3. Identify common defects and corrective measures.	10 Hrs
1. Understand formulation, ingredients, and overrun control in frozen desserts. 2. Operate equipment for freezing, blending, and packaging. 3. Evaluate quality and sensory characteristics.	1. Ingredients and formulation – fat, MSNF, stabilisers, emulsifiers, flavours. 2. Ice cream manufacturing steps – pasteurisation, homogenisation, ageing, freezing, hardening. 3. Types of frozen desserts and quality standards. 4. Product defects and prevention.	1. Develop an ice cream mix formula of standard composition. 2. Operate small-scale freezer for ice cream processing. 3. Evaluate overrun, texture, and flavour. 4. Package finished product using suitable materials.	10 Hrs
1. Explore modern trends and innovation in dairy desserts. 2. Apply creativity in developing value-added dairy-based desserts.	1. Introduction to innovative dairy desserts – mousse, kulfi, probiotic desserts. 2. Role of functional ingredients and health benefits. 3. Product development and marketing trends.	1. Develop a prototype of an innovative dairy dessert. 2. Conduct sensory evaluation and feedback analysis. 3. Present concept for commercialization	05 Hrs
Total			**35**

UNIT 2: CONCENTRATED AND DRIED DAIRY PRODUCTS: PRINCIPLES AND PRACTICES			
Learning Outcome	**Theory (10Hrs)**	**Practical (20Hrs)**	**Duration 30(Hrs)**
1. Understand methods and principles of milk concentration. 2. Operate evaporation systems and monitor process parameters. 3. Evaluate product quality and stability.	1. Principles of evaporation and concentration techniques (single, multiple effect evaporators). 2. Processing steps for condensed and evaporated milk. 3. Quality parameters – fat, solids, viscosity, flavour.	1. Operate a model evaporator for milk concentration. 2. Prepare and compare condensed milk samples. 3. Test moisture and viscosity parameters.	15 Hrs
1. Describe principles of milk drying processes. 2. Operate spray and roller dryers safely and efficiently. 3. Recognize factors influencing powder quality.	1. Principles of spray and roller drying – atomization, heat transfer, air flow. 2. Process variables and their effect on quality. 3. Product standards and moisture control during drying. 4. Applications in food industry.	1. Demonstrate milk powder production on batch dryer setup. 2. Compare characteristics of spray- and roller-dried powder. 3. Evaluate moisture and flow properties.	15 Hrs
1. Identify BIS/FSSAI standards for concentrated and dried dairy products. 2. Understand shelf-life, packaging, and storage conditions. 3. Evaluate product deterioration and protection methods.	1. Dairy product standards (BIS/FSSAI/Codex). 2. Packaging requirements – materials, sealing, labeling. 3. Storage conditions – temperature, humidity control. 4. Applications and utilization in reconstitution	1. Choose suitable packaging for milk powder and condensed milk. 2. Conduct storage trials and observe shelf stability. 3. Prepare product label as per regulatory standards.	15 Hrs
Total			**45**

UNIT 3: DAIRY INDUSTRY: BY-PRODUCTS			
Learning Outcome	**Theory (15Hrs)**	**Practical (15Hrs)**	**Duration (Hrs)**
1. Understand significance and potential of by-products in dairy sector. 2. Explore global utilization strategies. 3. Identify methods of by-product valorization.	1. Overview of dairy by-products – whey, skim milk, buttermilk, ghee residue. 2. Current status and scope for utilization in India and globally. 3. Economic importance and environmental aspects.	1. Conduct a case study on by-product utilization. 2. Prepare a presentation on value-added uses.	10 Hrs
1. Recognize uses of skim milk in product manufacture. 2. Develop understanding of casein and co-products.	1. Composition and utilization of skim milk. 2. Manufacture of casein and its derivatives. 3. Applications in food and non-food industries.	1. Prepare casein from skim milk. 2. Study solubility and functional properties.	10 Hrs
1. Understand composition and uses of whey. 2. Explore technologies for whey utilization.	1. Types of whey and its components. 2. Processing methods – concentration, drying, protein recovery. 3. Utilization in beverages, bakery, and functional foods.	1. Prepare whey beverage and analyze composition. 2. Observe protein concentration process	10 Hrs
1. Identify potential uses of buttermilk and ghee-residue. 2. Prepare value-added products from by-products.	1. Composition and properties of buttermilk and ghee-residue. 2. Traditional and modern uses. 3. Product development from by-products.	1. Prepare buttermilk beverage and ghee-residue-based sweets. 2. Evaluate sensory and nutritional quality.	10 Hrs
Total			**40**

UNIT 4: FOOD SAFETY AND TEAM MANAGEMENT FSMS: HACCP, GMP			
Learning Outcome	**Theory (15 Hrs)**	**Practical (20 Hrs)**	**Duration (35 Hrs)**
1. Understand principles and structure of FSMS. 2. Recognize importance of hazard prevention in dairy operations.	1. Concept and components of FSMS. 2. Food safety regulations (FSSAI, ISO 22000, Codex). 3. Overview of safety hazards in dairy plants.	1. Identify hazards and categorize them (biological, chemical, physical). 2. Develop a food safety checklist.	10 Hrs
1. Explain HACCP principles and process documentation 2. Apply hazard analysis to dairy processing steps.	1. HACCP system – seven principles. 2. Steps for hazard analysis, CCP identification, and record keeping. 3. Integration with FSMS.	1. Develop a sample HACCP plan for a dairy product (e.g., paneer, curd). 2. Practice CCP monitoring and corrective actions.	10 Hrs
	1. Implement hygiene standards in production areas. 2. Follow plant sanitation and personal hygiene protocols. 3. Maintain documentation as per GMP.	1. Components of GMP and GHP. Sanitation and hygiene requirements in dairy plants. 2. Record-keeping and compliance.	15 Hrs
1. Understand roles of teams in food safety operations. 2. Develop communication and coordination skills in safety management.	1. Principles of teamwork and leadership in FSMS. 2. Roles of supervisors and operatives in dairy safety. 3. Conflict resolution and communication strategies.	1. Group activity on team-based problem-solving in safety scenarios. 2. Prepare a team responsibility chart.	10 Hrs
Total			**45**

5. ORGANISATION OF FIELD VISITS

In a year, at least 5 visits to a nearby Dairy Processing Unit/ milk processing units should be organised for the students to expose them to the various routine activities undertaken at a milk processing unit/ industry.

Visits to a nearby Dairy processing industry/unit should facilitate the students to observe for themselves the following:

Location, milk collection area and storage area, weighing room, processing sections, storage chamber, production area, packing chamber, supply counter or room, cleaning and maintenance area, waste disposal area, etc. During the visit, students observe and obtain the following information from the owner or the supervisor of the processing unit/industry:

1. Approaches to manage of dairy processing unit.
2. Identification of categories of dairy and dairy products.
3. Identification of various types of ice cream processing equipment, machinery, tools and utensils used in industry.
4. Maintenance procedure of the production machines and their component.
5. Procedures followed for preparing the raw material to be used for production.
6. Standard practices to be followed for food production.
7. Understand roles and responsibilities of a Dairy Processing Technician.
8. Ways to ensure and implement food safety and personal hygiene at the
9. workplace.
10. Types of packaging material used
11. Types of products prepared
12. Hygiene and safety practices used
13. Quality parameters used for testing of the finished products
14. Total input and output handled annually
15. Manpower engaged
16. Total annual income
17. Profit/Loss (Annual)
18. Any other information

6. LIST OF EQUIPMENT AND MATERIALS

The list given below is suggestive and an exhaustive list should be prepared by the vocational teacher. Only basic tools, equipment and accessories should be procured by the schools so that the routine tasks can be performed by the students regularly for practice and acquiring adequate practical experience.

S. No.	Equipment/Tool	Quantity	Approx. Cost (₹)
A. Basic Handling & Storage			
1	Refrigerator (180–200L)	1	20,000
2	Deep Freezer (100–200L)	1	30,000
3	Stainless Steel Utensils (pans, ladles, buckets, molds, trays)	Set	20,000
4	Milk Cans (20–40L, SS/Aluminium)	2	3,000each
5	Multipurpose Stainless Steel Vat (50–100 L, for heating, pasteurization, khoa, sweets, etc.)	1	60,000
B. Small-scale Processing Units			
6	Small Pasteurizer (25–50L, electric)	1	40,000
7	Mini Cream Separator (60–100L/hr)	1	15,000
8	Small Homogenizer (hand/electric,50L/hr)	1	50,000
9	Paneer Press (manual)	1	10,000
10	Butter Churner (table-top, 10–15L)	1	8,000
11	Ghee Boiler(20L)	1	15,000
12	Ice Cream Maker (table-top, 5–10L)	1	30,000
13	Small Incubation Box/Curd Maker (20–30L)	1	10,000
14	Khoa/Mawa Making Pan (small, 20–25L)	1	25,000
15	Rasgulla/Rabri Cooking Vessel (SS with gas burner)	1	15,000
C. Packaging & Display			
16	Hand Sealer/Pouch Sealer	1	5,000
17	Cup Sealer (for ice cream/yoghurt cups)	1	15,000
18	Digital Weighing Balance (10 kg)	1	5,000
19	Display Cabinet/Showcase (for chilled products)	1	25,000
D. Testing & Learning Kits			
20	Lactometer	2	2,500 each
21	Gerber Centrifuge (fat testing kit)	1	10,000

22	Ph Paper Strips/Small pH Meter	1	5,000
23	School-level Milk Testing Kit (adulteration, fat, SNF)	1	15,000
E. Safety & Miscellaneous			
24	First Aid Kit	1	2,000
25	Aprons, Gloves, Head Caps (for students)	Set	5,000
26	Cleaning Brushes, Racks, SS Tables	–	10,000
Total			**₹476,000≈ ₹4.8Lakhs**

7. VOCATIONAL TEACHER'S/TRAINER'S QUALIFICATION AND GUIDELINES

Qualification and other requirements for appointment of vocational teachers/trainers on contractual basis should be decided by the State/UT. The suggestive qualifications and minimum competencies for the vocational teacher should be as follows:

Qualification	**Minimum Competencies**	**Age Limit**
Bachelors/Post-Graduation in dairy technology/ dairy sciences/food processing/ food technology from a recognized Institute /University, with at least 1 year work experience in industry.	• Effective communication skills (oral and written) • Basic computing Skills	18-37 years (as on Jan. 01(year)) Age relaxation to be provided as per Govt. rules

8. LIST OF CONTRIBUTORS

Course Coordinator

1. Dr. Rakesh Kumar Raman, Assistant Professor, Food Technology & Processing, Department of Humanities, Sciences, Education & Research (DHSER), PSS Central Institute of Vocational Education, Bhopal

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9. LIST of REVIEWERS:

1. Sector Skill Council for Food Processing (FICSI), New Delhi.

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