



*Progressive Education Society's*

**Modern College Of Arts, Science and  
Commerce, Ganeshkhind, Pune - 411  
016**

**(NEP 2023-24)**

Syllabus for  
**T.Y.B.Voc (Food Processing  
Technology)**

## INTRODUCTION

The University Grants Commission (UGC) has launched a scheme on skills development based higher education as part of college education, leading to Bachelor of Vocation (B. Voc.) degree with multiple exits such as Diploma/Advanced Diploma under the National Skill Qualification framework (NSQF). The B. Voc. Programme is focused on providing undergraduate studies which would also incorporate specific jobs and their NOSs (National Occupational standards) along with broad based general education. This would enable the graduates completing B. Voc. to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge.

Under National Skills Development Corporation, many Sector Skill Council representing respective industries have/are being established. One of the mandates of Sector Skill Councils is to develop National Occupational Standards (NOSs) for various jobs in their respective industries. It is important to embed the competencies required for specific jobs roles in the higher education system for creating employable graduates.

This course will identify and fill the skill gaps. The mandate of this program is to create a course with industry-academia collaboration that will produce skilled workforce satisfying specific needs of the industry. This course will offer multiple needs of the industry. The structure will allow offer multiple needs of the industry. The structure will allow students to have thorough theoretical knowledge coupled with rigorous hands on training in both laboratory and industry.

Unique Features of the Course:

- The skill development component is to equip students with appropriate knowledge, practice and attitude, so they are ready to work.
- The skill development components will be relevant to the industries as per their requirements.
- The curriculum is embed with National Occupational Standards (NOSs) of

specific job roles within the industry sector(s).

- The overall design of the skill development component along with technologies in food process engineering.
- The curriculum should also focus on work-readiness skills in each of the three years. Curriculum should also focus on work-readiness skills in each of the three years. Curriculum is designed to match industrial needs with greater emphasis on practical work, on the job training and industrial internship.

### **Program Objectives:**

- To provide judicious mix of skills relating to a profession and appropriate content of General Education.
- To ensure that the students have adequate knowledge and skills, so that they are ready to work at each exit point of the programme.
- To provide flexibility to the students by means of pre-defined entry and multiple exit points.
- To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements. Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.

### **Suggested internal assessment tools for courses:**

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Students Seminar
3. Short Quizzes / MCQ Test
4. Home Assignments
5. Tutorials/ Practical
6. Oral test
7. Research Project
8. Group Discussion
9. Open Book Test
10. Written Test
11. PPT presentation

12. Industrial Visit

13. Viva

### **Teaching Methodology:**

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys
5. Power Point Presentations
6. Visit to Industries
7. Research Papers & Projects
8. E-content

# Subject List

## T.Y.B.Voc (Food Processing Technology) Sem V

T.Y.B.Voc (Food Processing Technology) Minor (Dairy Technology) Semester V						
	Subject Name		Credits		Evaluation	
			Th	Pr	CIE	SEE
Major	BVO35101	Bakery and confectionary Technology	2	-	20	30
	BVO35102	New Product Development	2	-	20	30
	BVO35103:	Waste Management in Food Industry	2	-	20	30
	BVO35104:	Pr on Bakery and confectionary Technology	-	2	20	30
	BVO35105	Pr. On New Product Development	-	2	20	30
Major DSE	BVO35106:	Emerging trends in food Technology	2	-	20	30
	BVO35107	Functional and Nutraceutical Foods	2	-	20	30

Minor	BVO35208:	Dairy Chemistry and Microbiology	2	-	20	30
	BVO35209:	Pr. On Dairy Chemistry and Microbiology	-	2	20	30
VSC, SEC (VSEC) Skill Based	BVO35410	Pr. on Waste Management in Food Industry	-	2	20	30
FP/CC/OJT/CEP	BVO35611	Field Survey	-	2	20	30

<b>T.Y.B.Voc (Food Processing Technology) Minor (Dairy Technology) Semester VI</b>						
	Subject Name		Credits		Evaluation	
			Th	Pr	CIE	SEE
Major	BVO36101	Meat, Fish and Poultry Processing	2	-	20	30
	BVO36102	Entrepreneurship Development	2	-	20	30
	BVO36103:	Food Laws and Regulations	2	-	20	30
	BVO36104	Pr. on Meat, Fish and Poultry Processing	-	2	20	30
	BVO36105:	Pr. on Entrepreneurship Development	-	2	20	30

Major DSE	BVO36106:	Food Warehouse Technology	2	-	20	30
	BVO36107:	Food Extrusion Technology	2	-	20	30
Minor	BVO36208:	Packaging of Milk and Milk Products	2	-	20	30
	BVO36209:	Pr. On Packaging of Milk and Milk Products	-	2	20	30
FP/CC/OJT/CEP	BVO36610	OJT	-	4	40	60

**Credit Allocation:** - CC-Core Course, EC-Elective Course, PR-Practical, PJ-Project, AECC-Ability Enhancement Compulsory Courses, SEC-Skill Enhancement Courses.

**Total - Credits for First years Programme.**

## Semester VI

### BVO35101: Bakery and confectionary Technology (2) (T)

#### Course outcomes:-

1. Students understand the scope, essential equipment, and hygiene practices crucial for bakery and confectionery operations.
2. Students analyze the properties and processing techniques of various flours and additives used in bakery production.
3. Students demonstrate knowledge of ingredients, methods, and quality aspects in the production of bread and biscuits.
4. Students apply appropriate techniques for making cakes, pastries, and basic confectionery, along with identifying common faults.
5. Students gain insights into chocolate and sugar confectionery production processes and the use of specialized equipment.

Sr. No	Topics	Lectures (30 L)
1	Module 1: Fundamentals of Bakery & Confectionery	6
	Introduction & Scope of bakery and confectionery industry, Basic terminologies, Equipment: Small & large tools used in production, Bakery equipment: Electric & non-electric ovens (OTG, deck, rotary, diesel, brick), Maintenance and service of equipment, Hygiene and Sanitation: Importance of hygiene in bakery, Personal & work area hygiene	
2	Module 2: Bakery Ingredients & Processing	6
	Wheat grain structure, types, and quality parameters (gluten, grading), Flour quality tests – color, gluten, water absorption, Characteristics & suitability of different flours, Milling: Roller milling, break rolls, reduction rolls, Enriched bakery products with alternative flours (soya, groundnut, whole wheat), Flour additives & improvers	
3	Module 3: Bread & Biscuit Technology	6
	Bread Ingredients and Functions : Essential (flour, salt, yeast, water, sugar) and optional (eggs, milk, oils), Bread making processes: Straight and sponge methods, Characteristics & defects of bread (internal & external), Soft wheat products: Cookies, biscuits, crackers – ingredients & production methods	
4	Module 4: Cakes, Pastry & Confectionery	6
	Cakes: Ingredients and functions, Cake-making methods: Sugar batter, flour batter, sponge, all-in-one, Cake faults and remedies, Pastry making: Types of pastry, sugar cookery stages, Confectionery: Scope, raw materials (moistening, leavening agents), Decorative elements: Fondants, chocolate work, marzipans, cream fillings	
5	Module 5: Advanced Confectionery & Equipment	6
	Chocolate processing: Ingredients and Functions, Manufacturing stages. High boiled sweets: Composition, types, properties, Toffee & Fondant: Ingredients, types, preparation methods, Starch derivatives, glucose syrup production	



## **BVO35102 New Product Development (2) (T)**

### **Course outcomes :-**

1. Students understand the definitions, need, and categories of new product development (NPD) in the food industry.
2. Students learn the various phases of NPD from idea generation to commercialization. Students understand the design process, formulation, testing, and packaging development in product and process design.
3. Students gain knowledge of prototype development through pilot-scale production and iterative product testing.
4. Students apply sensory evaluation techniques to assess product quality using different test methods.
5. Students analyze shelf life studies, packaging interactions, and test marketing strategies for food products.
6. Students explore recent trends, innovations, and case studies related to food product development and packaging.

Sr. No	Topics	Lectures (30 L)
1	Module 1: Introduction and overview:	4
	Definitions, Product, NPD, Innovation creation. Need of NPD, Categories of NPD	
2	Module 2: Phases of NPD :	6
	Idea generation, Idea Screening, Concept Development, Marketing strategy development, Business analysis, Product development, Marketing, Commercialization.	
3	Module 3: Product design and process development:	6
	Introduction, Design process, Steps in product design and process development. Product testing, Product formulation, Packaging development.	
4	Module 4: Prototype Development.	6
	Prototype Development: Pilot-scale production, Iterative refinement, Product Testing.	
5	Module 5: Shelf life study of Food and Test Marketing	6
	Shelf Life Study of Food Products: Accelerated vs. Packaging-material interaction, Test Marketing Strategies: Geographic rollout, Metrics, Consumer Testing: Focus groups, surveys. Sensory Evaluation Techniques: Discrimination, Descriptive, Hedonic tests, Panel members.	
6	Module 7 : Case Studies	2
	Recent Trends, Updates, New Products, Processes, Packaging.	

## **BVO35103: Waste Management in Food Industry (2) (T)**

### **Course outcomes :-**

1. Students understand the types, sources, and quantification of food industry waste along with the concept of 3Rs.
2. Students learn various waste treatment and disposal techniques including biological and thermal methods.
3. Students understand the design, operation, and regulatory aspects of effluent and solid waste management systems.
4. Students analyze waste generation, characterization, and segregation practices across different food sectors.
5. Students explore waste minimization strategies and resource recovery through by-product utilization and zero-waste case studies.

<b>Sr. No</b>	<b>Topics</b>	<b>Lectures (30 L)</b>
1	Module 1: Introduction to Waste in Food Industry	6
	Definition and Types of Waste: Solid, Liquid, Gaseous, Sources of Waste in Various Food Sectors (Processing, Retail, etc.), Quantification and Composition of Food Waste, Introduction to 3Rs (Reduce, Reuse, Recycle)	
2	Module 2: Waste Treatment and Disposal Techniques	6
	Primary, Secondary, and Tertiary Wastewater Treatment, Composting and Vermicomposting, Anaerobic Digestion and Biogas Generation, Thermal Treatments: Incineration, Pyrolysis,	
3	Module 3: Waste management	6
	Effluent Treatment Plants (ETP): Design and Operation Basics, Solid Waste Disposal Techniques, Regulatory Standards and Guidelines (CPCB, FSSAI, etc.)	
4	Module 4: Waste Generation and Characterization	6
	Waste from Fruits & Vegetables, Dairy, Meat, Bakery, Beverages, Methods for Waste Auditing and Monitoring, Waste Segregation Techniques, Hazardous vs. Non-Hazardous Waste, Case Examples from Food Processing Units	
5	Module 5: Waste Minimization and Resource Recovery	6
	By-product Utilization (e.g., whey, peels, spent grains), Food Waste to Animal Feed, Biofuels, Enzymes, etc. Case Studies on Zero-Waste Facilities	

### **BVO35104: Pr on Bakery and confectionary Technology (2)**

#### **Course outcomes :-**

1. Students understand bakery equipment, units of measurement, and types of ovens used in bakery and confectionery.
2. Students evaluate the quality of raw materials and prepare various types of bread using different methods.
3. Students determine dough rising capacity and study the effect of key ingredients like yeast, fat, and sugar.
4. Students gain hands-on experience in preparing different types of biscuits and cookies including eggless variants.
5. Students acquire skills in preparing various cakes, applying icing techniques, and making basic confectionery items.
6. Students learn bakery unit setup, equipment maintenance, costing methods, and hygiene practices in the bakery industry.

Sr.No	Topic	Practicals (15P)
1.	Introduction of small and bakery equipment's and units of measurements.	01
2.	Study of different types of ovens used in bakery and confectionery	1
3.	Quality Analysis of Raw materials used in bakery and confectionery industry.	1
4.	Bakery: Basic Bread by different methods Bread rolls, Bread sticks, White bread, Brown bread, Soft rolls, Buns Milk bread, Whole wheat bread, Pizza base	02
5.	Determination of Dough rising capacity	01
6.	Preparation of salt and sweet biscuits and sweet and salty biscuits	01
7.	Preparation of Nan khatai and Melting Momonets cookies	01
8.	Preparation of chocochips cookies (With egg and eggless)	01
9.	Confectionery: Cakes by different methods: Vanilla Sponge cake, Fruit cake, Swiss roll, Chocolate sponge, eggless cake, multigrain cake, red velvet cake	02
10.	Icing : Fondant, Marzipan, Frosting, Dairy and non-dairy cream icing Preparation of toffee, Preparation of chocolate	01
11.	Equipment, maintenance and costing:	01

12.	Setting of bakery unit and its layout. Importance of costing and control, methods of costing and costing methodology in bakeries and confectioneries.	01
13.	Study of hygiene and sanitation in bakery industry and standard specifications of bakery ingredients	01

### BVO35105 Pr. On New Product Development (2) (P)

#### Course outcomes :-

1. Students generate new product ideas, develop concepts, and create product designs.
2. Students study the functionality and applications of ingredients like carbohydrates, proteins, fats, stabilizers, flavors, and colorants.
3. Students understand the process of prototype development and initial product trials.
4. Students apply sensory evaluation techniques to assess product quality and consumer acceptability.
5. Students learn the steps involved in process development from lab scale to manufacturing.
6. Students conduct consumer testing and design effective test market strategies.
7. Students analyze shelf-life, integrate R&D with manufacturing specifications, and present final product roll-out strategies.

Sr. no.	Content	Lectures (15P)
1	To Generate new product ideas, Product concepts, Product design.	2
2	To study ingredients technology – carbohydrates, proteins, fat, stabilizers, flavors, colorants.	2
3	To study Prototype development	2
4	Sensory evaluation of products	2
5	The Process development	2
6	Consumer testing, test market strategy	2
7	Shelf-life study, integration of R&D specification, manufacturing,	2
8	Product roll-out, presentation of products development.	1

## **BVO35106: Emerging Trends in Food Technology**

### **Course outcomes :-**

1. Students understand recent advancements, challenges, and innovations in food technology including novel food sources and automation.
2. Students learn advanced food processing technologies such as HPP, PEF, cold plasma, and 3D food printing.
3. Students explore smart and sustainable packaging solutions using biodegradable materials and intelligent systems.
4. Students study food safety, quality control, and authentication using AI, biosensors, and blockchain technologies.
5. Students gain insights into future trends like alternative proteins, personalized nutrition, and sustainable food systems.

Sr. No	Topics	Lectures (30 L)
1	Module 1: Introduction to Recent Trends in Food Technology (6 Lectures)	6
	Overview of food technology advancements, Emerging challenges and opportunities in food processing, Role of AI, IoT, and automation in food industries, Novel food sources: Algae, plant-based proteins, cultured meat, Regulatory and ethical considerations in food innovation, Case studies of recent breakthroughs	
2	Module 2: Advanced Food Processing Technologies (6 Lectures)	6
	Pulsed Electric Field (PEF) technology, Cold Plasma and Ultrasound in food preservation, Microwave and Ohmic heating techniques, 3D Food Printing, Fermentation advancements and probiotic innovations	
3	Module 3: Smart and Sustainable Food Packaging (6 Lectures)	6
	Edible and biodegradable packaging materials, Active and intelligent packaging systems, Nanotechnology in food packaging, RFID and blockchain for traceability, Packaging solutions for extended shelf life, Case studies on sustainable packaging initiatives	
4	Module 4: Food Safety, Quality, and Authentication (6 Lectures)	6
	Rapid detection techniques for foodborne pathogens, AI and Machine Learning in food quality control, Biosensors and smart diagnostics, Food fraud detection and authentication technologies, Blockchain applications in food safety, Case studies on food safety innovations	
5	Module 5: Future Trends and Innovations in Food Technology (6 Lectures)	6
	Alternative protein sources: Insect-based, lab-grown, and precision fermentation, Personalized nutrition and nutrigenomics, Internet of Things	

	(IoT) in food supply chains, Future outlook: Industry trends and career opportunities	
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### **BVO35107: Functional and Nutraceutical Foods (2) (T)**

#### **Course outcomes :-**

1. Students understand the definition, classification, and future prospects of nutraceuticals based on their chemical and biochemical nature.
2. Students learn the concepts, development, and challenges of functional foods in relation to food science and technology.
3. Students explore the role of antioxidants and nutraceuticals in managing diseases like diabetes, cancer, and cardiovascular conditions.
4. Students identify various functional food sources and their health benefits including cereals, dairy, fruits, and medicinal plants.
5. Students gain knowledge of marketing strategies and regulatory guidelines for functional foods and nutraceuticals.

<b>Sr. No</b>	<b>Topics</b>	<b>Lectures (30 L)</b>
1	Module 1: Nutraceutical	6
	Historical perspective; definition, nature, nutraceutical compounds and their classification based on chemical/biochemical nature with suitable and relevant descriptions; scope and future prospects.	
2	Module 2: Functional food	6
	Overview; definition, classification; functional food, functional food science, food technology and its impact on functional food development; key issues in Indian functional food industry and nutraceutical	
3	Module 3: Antioxidants, Nutraceuticals for Disease Management	6
	Concept of free radicals and antioxidants; antioxidants role as nutraceuticals and functional foods, Functional food and nutraceuticals for Disease management, Management of cardiovascular diseases, Diabetes , Cancer, Hypertension and Obesity by nutraceutical compounds and their mechanisms of action	
4	Module 4: Food Sources	6
	Different foods as functional food: cereal products (oats, wheat bran, rice bran, etc.), fruits and vegetables, milk and milk products, legumes, nuts, oil seeds and sea foods, herbs, spices and medicinal plants. Coffee, tea and other beverages as functional foods/drinks and their protective effects.	
5	Module 5: Marketing and regulatory issues for functional foods and nutraceuticals:	6
	CODEX Guidelines, EU guidelines and FSSAI guidelines, Food Safety standard regulation for fortified foods and nutraceuticals (2018)	

**BVO35410 Pr. on Waste Management in Food Industry (2) (P)**

**Course outcomes :-**

<b>Sr. no.</b>	<b>Content</b>	<b>Lectures (15P)</b>
1	Study of different waste management in food industry	2
2	Study of ETP;	2
3	waste water analysis;	2
4	waste material recovery;	2
5	water filtration;	2
6	By product utilization.	1
7	anaerobic digestion of food industry waste water,	2
8	waste water treatment of brewery winery and distillery,	1
9	utilization of plant by products for the recovery of proteins, dietary fibers, anti-oxidants and their use as neutraceutical	2

### **BVO35208: Dairy Chemistry and Microbiology.**

#### **Course outcomes :-**

1. Students understand the importance of dairy microbiology, microbial ecology of milk, and quality control in dairy products.
2. Students learn about foodborne pathogens, microbial control methods like pasteurization, and the role of probiotics in dairy safety.
3. Students explore the chemical composition of milk, focusing on proteins, lipids, carbohydrates, and their functionality in dairy processing.
4. Students analyze the physicochemical changes in milk during processing, including heat-induced alterations and quality assessment of dairy products.

<b>Sr. No</b>	<b>Topics</b>	<b>Lectures (30 L)</b>
1	Module 1: Fundamentals of Dairy Microbiology	7
	Introduction to dairy microbiology: Importance and scope. Microbial ecology of milk and dairy products. Good and Bad Microorganism in Dairy. Sources of microbial contamination in milk. Microbiological quality control of raw milk. Common spoilage microorganisms in dairy products. Starter cultures and their role in dairy fermentation.	
2	Module 2: Pathogens and Safety in Dairy Microbiology	8
	Foodborne pathogens associated with dairy products. Pasteurization and sterilization of milk: Role in microbial control. HACCP and Good Manufacturing Practices (GMP) in dairy industry. Antibiotic residues and their impact on dairy microbiology. Detection techniques for dairy microbes: Traditional and modern methods. Probiotics and their applications in fermented dairy products	
3	Module 3: Dairy Chemistry - Milk Composition and Properties	7
	Chemical composition of milk: Carbohydrates, proteins, and lipids. Milk proteins: Casein, whey proteins, and their functionality. Lipid profile of milk: Fat globule structure and fatty acid composition. Carbohydrates in milk: Lactose and its role in dairy processing. Minerals, vitamins, and bioactive compounds in milk. Factors affecting milk composition and quality	
4	Module 4: Dairy Chemistry - Changes During Processing	8



	Physicochemical changes in milk during processing and storage. Heat-induced changes in milk proteins and enzymes. Lipid oxidation and flavor defects in dairy products. Rennet and acid coagulation: Chemistry of cheese-making. Chemical aspects of butter, yogurt, and ice cream production. Chemical and microbiological quality assessment of dairy products. Dairy product adulteration and detection methods.	
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### **BVO35209: Pr. On Dairy Chemistry and Microbiology**

#### **Course outcomes :-**

1. Students understand Sampling and microbial analysis of milk.
2. Students learn about foodborne pathogens and Isolation and Identification of Lactic Acid Bacteria (LAB)
3. Students explore the chemical composition of milk, focusing on proteins, lipids, carbohydrates, and their functionality in dairy processing.
4. Students analyze the physicochemical changes in milk during processing, including heat-induced alterations and quality assessment of dairy products.

Sr. No	Topics	Practicals (15P)
1	Sampling and Microbiological Analysis of Raw Milk – Collection, storage, and plating techniques.(MBRT)	1
2	Standard Plate Count (SPC) of Milk – Estimation of total bacterial load in milk samples.	1
3	Detection of Coliform Bacteria in Milk – Presumptive and confirmatory tests for coliforms (MPN test).	1
4	Isolation and Identification of Lactic Acid Bacteria (LAB) from Fermented Dairy Products – Streaking and biochemical characterization.	1
5	Antibiotic Residue Detection in Milk – Commercial test kits and microbial inhibition methods.	1
6	Detection of Pathogenic Bacteria in Dairy Products – Identification of pathogens	1
7	Enumeration of Yeasts and Molds in Dairy Products – Sabouraud Dextrose Agar(SDA) method.	1
8	Microbiological Quality Control of Pasteurized and Sterilized Milk – Effect of heat treatment on microbial load.	1
9	Determination of Fat Content in Milk – Gerber method and Rose-Gottlieb method.	1
10	Estimation of Protein Content in Milk – Kjeldahl method.	1

11	Determination of Lactose Content in Milk – Lane-Eynon method or Benedict's test.	1
12	Estimation of Acidity and pH of Milk and Dairy Products – Titration method.	1
13	Detection of Adulterants in Milk – Tests for starch, urea, detergent, and formalin.	1
14	Estimation of Total Solids and SNF (Solids-Not-Fat) in Milk – Gravimetric method.	1
15	Study of Rennet Coagulation and Casein Precipitation in Milk – Effect of pH and temperature on casein precipitation.	1

## Semester VI

### BVO36101 : Meat, Fish and Poultry Processing (2) (T)

#### Course outcomes :-

1. Students understand the importance of meat, fish, and poultry processing for entrepreneurship, sanitation, and safety practices, including various slaughter methods.
2. Students explore the chemical composition and quality characteristics of meat, including preservation methods like freezing, curing, and smoking.
3. Students learn the classification, composition, and preservation methods of fish, focusing on quality attributes and suitable processing techniques.
4. Students study poultry processing, including slaughtering stages, meat quality parameters, and methods like tumbling, smoking, and deboning.
5. Students analyze the structure, composition, and quality characteristics of eggs, along with processing, storage, and preservation methods.
6. Students understand the laws, regulations, and safety standards in the meat, fish, and poultry industry, including the use of by-products and certification requirements.

Sr. No	Topics	
1	<b>Unit 1: Introduction of Meat, Fish , Poutry Processing</b> Importance of meat processing for entrepreneurship development and Meat plant sanitation and safety.Pre-slaughter transport and care and antimortem inspection Scientific methods of slaughtering and Religious methods of slaughter- Jewish, Halal, jhatka methods, stunning techniques -Mechanical, electrical, chemical	
2	<b>Unit 2: Processing of Meat:</b> Structure, Chemical Composition of Meat muscle. Quality Characterisitcs of Meat :Visual Identification, Juiciness ,Firmness Tenderness and Flavour, Water holding capacity, Marbling, Thaw Rigor and storage conditions, Palatability Characters of meat and factors affecting meat quality, tumbling and massaging, Postmortem changes in Meat- Rigor	

	Mortis, Biochemical changes associated with Rigor Mortis, Preservation Methods of Meat : Canning, Pickling, Curing, Dehydration, Freezing, Salting, Chilling, Smoking, Irradiation	
<b>3</b>	<b>Unit 3: Introduction, Principle and methods of fish Processing</b> Introduction and Classification of fish (fresh water and marine), composition of fish. Quality of fish suitable for processing : Appearance, odour, flavor ,texture, ingredients, packaging defects and blemishes , size and weight . Preservation methods : Salting, Curing, Pickling, Cooking, Canning, Drying and Dehydration).	
<b>4</b>	<b>Unit 4: Introduction, Principle and methods of Poultry Processing</b> Poultry, Structure and Compositions .Stages of Slaughtering of poultry birds, post-mortem, anti-mortem inspection and grading of meat . Methods Of Poultry Processing: Tumbling and Massaging, Smoking , Deboning and Grinding. Quality Of Poultry :Meat Quality parameters, Meat Colour- pigments, Meat Tenderness, Discolouration and Toughness	
<b>5</b>	<b>Unit 5: Importance of egg production</b> Egg structure: Composition, Quality characteristics: Shell Colour, Egg White Colour and Yolk Colour, processing, storage and Preservation methods of egg : Pickling and canning of eggs	

## **BVO36102 Entrepreneurship Development (2) (T)**

### **Course outcomes :-**

1. Students understand the definition, nature, characteristics, and competencies of entrepreneurship, along with the significance of creativity and innovation in business.
2. Students explore the role and importance of MSME, government policy initiatives, and business laws relevant to micro, small, and medium enterprises.
3. Students learn how to identify business opportunities, generate ideas, and develop a business plan while understanding common reasons for business plan failure.
4. Students examine business crises, their causes, and strategies to avoid crises and business sickness.
5. Students understand business management, its functions, and the contributions of management theorists like Taylor and Fayol, focusing on planning, organizing, staffing, and leadership.

<b>Sr. No.</b>	<b>Entrepreneurship Development</b>	
1	<b>Introduction to Entrepreneurship</b> - definition- Entrepreneur and Entrepreneurship- Nature and characteristics of Entrepreneurship- Need of Entrepreneurship – Competencies of Entrepreneur Creativity and Innovation and significance – Process of Creativity sources of Innovation- Do's and Don't of Innovation	
2.	<b>MSME and Business Organizations</b> – Micro, Small and Medium Enterprises- Concept Role Importance of MSME- Government Policy Initiatives For MSME Schemes for MSME Business organization and Business Laws- Types of Business Organizations- Introduction to Business Laws, IIE, EDII	
3	<b>Business Opportunity Search</b> - Concept of Opportunity- How to Generate Business Idea- How to identify Business Opportunity .Business Plan- concept- Contents of Business Plan- Why does Business Plan fail? Institutions Supporting Business Enterprises- Central Level and state Level Institutions	

4	<b>Business Crises and Sickness-</b> Concept- Seven Business Crises- How to avoid Crises- Concept of Sickness- Reasons of Business Sickness Study of Biographies of Entrepreneur- Narayan Murthy – Cyrus Poonawala Business Ethics- Concept- Need of Business Ethics- Scope of Business Ethics Stress Management- concept of stress- Nature and Types of Stress- Symptoms and effect of stress- Sources of stress- stress Management – Personal and Organizational Approach	
5	<b>Business Management and its Functions:</b> Definition of Management and Administration, Development of Management Thought- contribution of Taylor and Fayol- Management Skills.	
	Functions of Management : <b>Planning, Organizing, Staffing, Directing, Controlling, Co-ordination Motivation, leadership and communication</b>	

### **BVO36103: Food Laws and Regulations(2) (T)**

#### **Course outcomes :-**

1. Students understand the need for food standards, their enforcement, and the differences between mandatory and voluntary food laws.
2. Students explore the role of the Food Safety and Standards Authority of India (FSSAI) and the significance of the Food Safety and Standards Act, 2006.
3. Students learn about FSS regulations, including licensing, contaminants, food additives, laboratory analysis, packaging, and labeling requirements.
4. Students study the key provisions of environmental protection, weights and measures, and consumer protection laws related to food safety.
5. Students gain knowledge of voluntary food laws such as AGMARK, Codex Alimentarius, BIS standards, and GMP regulations for food safety and quality

<b>Sr. No.</b>	<b>FOOD LAWS AND REGULATIONS</b>	<b>Lectures (30L)</b>
1.	Introduction to Food Laws and Regulations: Need for food standards and their enforcement, various types of laws (Mandatory/Regulatory and Voluntary/Optional);	<b>3</b>
2.	Food Safety and Standards Authority of India (FSSAI); Food Safety and Standards Act, 2006 (FSSA) – inception, importance and significance, discussion on important sections;	<b>8</b>

3.	FSS Regulations: Regulations on Licensing and Registration, Regulations on Contaminants, toxins and residues, FSS Regulations on Food product standards and food additives, FSS Regulations on Laboratory and sampling analysis; FSS Regulations on Packaging and Labelling; FSS Regulations on Prohibition and Restriction on sales.	<b>8</b>
4.	Environment (Protection) Act, 1986 . Standards of Weights and Measures Act, 1976 Essential Commodities Act, 1955. The Export (Quality Control and Inspection) Act, 1963 . The Insecticides Act, 1968 . Consumer Protection Act, 1986	<b>6</b>
5.	Introduction to various food laws (Voluntary) - Agmark Standards (AGMARK), Codex Alimentarius Standards, BIS Standards and Specifications, GMP Regulations, International organization for standardization	<b>5</b>

### **BVO36104: Pr. on Meat, Fish and Poultry Processing (2)**

#### **Course outcomes:-**

1. Students will understand the survey of different meat processing industries and different processed products from meat, fish and poultry.
2. They will understand the slaughtering process and cleaning and sanitation of meat and meat plant.
3. They will acquire the knowledge about different preservation methods such as canning and pickling.
4. They will acquire the knowledge about how to check quality of fish for processing.
5. They will understand how to produce fishmeal protein and fishmeal powder.
6. They will understand the processing of chicken and test quality.

<b>Sr. No</b>	<b>TOPICS</b>	<b>Practicals (15P )</b>
1.	Preliminary Meat Processing Operations	1
2.	Slaughtering and dressing of poultry bird and goat and	1
3.	Carryout survey of the different processed products from meat, fish and poultry and industries	1
4.	Carryout meat processing : cutting (carcassing), cleaning storage, sanitation	1
5.	Preparation of meat products: canning, pickling, preservation of meat	1

6.	Produce Dehydrated Meat/ Chicken	1
7.	Quality Evaluation Test of fish for processing	1
8.	Preparation of egg pickle	1
9.	Candling of Egg, Grading of egg	1
10.	Preservation of shell egg	1
11.	Evaluation of quality and grading of raw and boiled eggs	1
12.	Quality of fish for processing, study of processed fish products	1
13.	Preservation of meat/fish by freezing methods	1
14.	Prepare processed product from chicken and pickle, dried chicken	1
15.	Visit to slaughter house / Poultry industries and write a report on it.	1

### **BVO36105: Pr. on Enterpreurnship Development (2)**

#### **Course outcomes :-**

1. Students understand the importance of entrepreneurship and its role in economic development.
2. Students conduct online surveys in the food industry to gather insights for new product development.
3. Students create advertisements for promoting products and learn about effective marketing strategies.
4. Students identify the potential of entrepreneurs and understand the motivating factors behind entrepreneurship development.
5. Students conduct bank surveys to understand financial aspects of entrepreneurship and present failure stories for learning.
6. Students learn the process of entrepreneurship development and how to conduct market surveys to gauge product demand.

Sr. No	Topics	Lectures
1.	Introduction and importance of Entrepreneur & entrepreneurship	
2.	Quality and characteristics of entrepreneur & entrepreneurship.	
3.	Need of Entrepreneurship for developing country.	
4.	Role of Entrepreneurs.	
5.	Types of Entrepreneur	
6.	Reasons Why entrepreneur fail in the business	
7.	Online survey of food industry	
8.	Formulation of project	



9.	Report	
10.	Entrepreneurship development Program	
11.	Success Story	
12.	To prepare advertisement for popularization of product. And	
13.	Identifying potential of Entrepreneur	
14.	Motivating factor for Entrepreneurship development.	
15.	Bank online survey	
16.	Presentation of failure story	
17.	Process of Entrepreneurship development	
18.	How to conduct market survey and demand for Product	
19.		
20.		
21.		

## **BVO36106: Food Warehouse Technology (2) (T)**

### **Course outcomes :-**

1. Students understand the fundamentals of storage, warehouse design, and the economics behind storage operations.
2. Students learn about different types of storage, including cold storage, refrigerated storage, and the impact of environmental factors like temperature and humidity on food storage.
3. Students explore the principles of supply chain management and strategies for effective warehouse documentation and management.
4. Students gain knowledge of logistics management systems, including 3PL and 4PL operations, distribution management, and the role of IT in supply chain management.
5. Students understand the importance of pest control in warehouses, including pest identification and control measures for different food types.
6. Students study warehouse safety, damage control strategies, and the management of risks from natural events, fire, theft, and insurance coverage.

<b>Sr. No.</b>	<b>Topics</b>	<b>Lectures (30L)</b>
1.	<b>Introduction To Storage And Warehouse</b> Introduction- evaluation of storage, economics, Storage operations- storage terminology. Warehouse design and construction. Material used for warehouse construction	<b>6</b>
2.	<b>Types Of Storage And Respective Warehouse Designs</b> classification of storage, Cold storage and Refrigerated storage, storage of dry and processed foods, storage of fresh foods, storage temperature, storage humidity and other environmental factors affecting storage.	<b>6</b>
3.	<b>Supply Chain Management</b> Principles of supply chain management, Documentation and management of warehouse contents. Strategies of supply chain management. Demand supply prediction in supply chain management.	<b>6</b>
4.	<b>Logistics Management System:</b> Logistics: Strategies. Operations of Indian 3PLs, 4PL, Distribution Management- Perspectives of buyers, suppliers and producers. Application of IT in SCM, ERP, advance planning and scheduling	<b>6</b>
5.	<b>Pest Control In Warehouses</b> Pests Infesting Different Types Of Food Materials, Control Measures For Various Pests. Permitted Levels Of Pesticides.	<b>6</b>
6.	<b>Warehouse Safety And Damage Control</b>	<b>6</b>

	Reasons For Loss And Damage Of Food. Possibility And Extent Of Damage Arising From Natural Events. Strategies For Fire And Flood Control. Insurance Cover For The Stock And Building. Theft Protection And Security.	
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## **BVO36107: Food Extrusion Technology (T)**

### **Course outcomes :-**

1. Students understand the fundamentals of food extrusion, including its history, principles, and the components of an extruder.
2. Students learn about the selection and pre-processing of raw materials for extrusion, focusing on the role of starch, proteins, lipids, and additives in the process.
3. Students explore extrusion processing parameters like temperature, pressure, shear, and screw configuration, and how they affect product quality.
4. Students examine the various applications of food extrusion in products like breakfast cereals, snacks, meat analogs, and pet food, along with innovations in extrusion techniques.

Sr. No	Topics	Lectures(30 L)
1	Module 1: Introduction to Food Extrusion	
	Overview of food extrusion – definition, history, and significance, Principles of extrusion – thermal and mechanical aspects, Classification of extruders – single- screw vs. twin-screw, Components of an extruder – barrel, screw, die, and cutting systems, Thermo-mechanical processing of food materials. Advantages and limitations of extrusion technology	
2	Module 2: Raw Materials and Pre-processing	
	Selection of raw materials for extrusion, Role of starch, protein, and lipids. Moisture content and its effect on extrusion properties. Pre-conditioning and pre-treatment of raw materials. Additives and functional ingredients in extruded foods. Extrusion of different food categories (snacks, cereals, pet food, meat analogs)	
3	Module 3: Extrusion Processing and Parameters	
	Process control in extrusion – temperature, pressure, and shear. Screw configuration and its impact on product quality. Die design and its influence on texture and shape. Residence time and its effect on final product properties. Cooking and texturization during extrusion. Real-time monitoring and troubleshooting in extrusion	
4	Module 4: Applications of Food Extrusion	
	Breakfast cereals and snack foods, Protein-based extruded products – meat analogs and textured vegetable proteins, Fortified and functional extruded foods, Pet food aquafeed extrusion, Innovations in extrusion – high-moisture extrusion, cold extrusion	

## Packaging of Milk and Milk Products

### Course outcomes :-

Sr. No	Topics	Lectures
1	Module 1: Introduction to Dairy Packaging	6
	Importance, functions, and role of packaging in dairy products. Types of dairy packaging: Primary, secondary, and tertiary packaging. Factors influencing packaging selection: Chemical, mechanical, and environmental considerations. Packaging regulations and food safety standards (FSSAI, FDA, EU, Codex Alimentarius)	
2	Module 2: Packaging Materials for Dairy Products	8
	Glass Packaging: Bottles and jars for milk, yogurt, and dairy beverages. Metal Packaging: Cans for condensed milk and dairy powders. Plastic Packaging: HDPE, PET, PP, polystyrene, and multilayer films. Paper-Based Packaging: Cartons, tetrapak, and laminated paperboards. Flexible Packaging Films: Pouches, sachets, and biodegradable alternatives. Barrier Properties of Packaging Materials: Oxygen, moisture, light protection, and mechanical strength	
3	Module 3: Dairy Packaging Equipment and Technologies	8
	Form-Fill-Seal (FFS) Machines: Types (vertical & horizontal), working principles, and applications. Bottling Machines: PET and glass bottle filling, capping, and sterilization techniques. Pouch Filling Machines: Packaging of milk and dairy-based beverages. Tetra Pak and Aseptic Packaging: Working principles, UHT milk packaging, and shelf-life extension. Vacuum and Modified Atmosphere Packaging (MAP): Applications in cheese, butter, and dairy powders. Smart and Active Packaging: Innovations for quality monitoring and product freshness	
4	Module 4: Packaging Applications for Different Dairy Products	8
	Fermented Dairy Products: Yogurt, probiotic drinks, and buttermilk packaging. Cheese and Butter Packaging: Wax coatings, foil wraps, vacuum-sealing techniques. Ice Cream and Frozen Dairy Desserts: Rigid tubs, laminated cartons, and flexible wraps. Dairy Powders and Infant Formula: Sachets, multilayer pouches, and metal cans. Innovative Dairy Product Packaging: Plant-based dairy alternatives, lactose-free, and fortified products	

### **BVO36209: Pr. On Packaging of Milk and Milk Products**

#### **Course outcomes :-**

<b>Sr. No</b>	<b>Practical</b>	<b>Lectures</b>
1	Identification of packaging materials	1
2	Flame Hot wire test	1
3	Water vapour transmission rate (WVTR)	
4	Testing of papers/ paperboards: Percentage moisture, Grease resistance, Water absorptiveness, Grammage, Tearing resistance, Bursting strength	
5	Testing of glass bottle – resistance to thermal shock	
6	Testing of plastics and laminates – Thickness, Grease resistance.	
7	Packaging of different dairy products by using prepak and vacuum packaging machines.	
8	Integration test, scalping	
	Labelling requirement of packaging	

Identification of packaging materials, Flame Hot wire test, Testing of papers/ paperboards: Percentage moisture, Grease resistance, Water absorptiveness, Grammage, Tearing resistance, Bursting strength. Testing of glass bottle – resistance to thermal shock. Testing of plastics and laminates – Thickness, Water vapour transmission rate (WVTR), Grease resistance. Packaging of different dairy products by using prepak and vacuum packaging machines. Microbiological evaluation of packaging materials (SPC, Y & M, spore count).