

**DEPARTMENT OF HOME SCIENCE
S.V.U. COLLEGE OF SCIENCES
SRI VENKATESWARA UNIVERSITY: TIRUPATI**



**M.S. FOOD TECHNOLOGY
(Self-Supporting Course) PROGRAMME**

**Restructured P.G. Programme (CBCS) As Per NEP 2020,
National Higher Education Qualification Frame Work (NHEQF) and Guidelines of
APSCHE**

**To Be Implemented With Effect from the Academic
YEAR 2025-26**

**SYLLABUS
Choice Based Credit System (CBCS)**

SRI VENKATESWARA UNIVERSITY COLLEGE OF SCIENCES
DEPARTMENT OF HOME SCIENCE
CHOICE BASED CREDIT SYSTEM (C.B.C.S) SYLLABUS as per NEP2020
(WITH EFFECT FROM THE ACADEMIC YEAR 2024 -2025 onwards)

M. S. FOOD TECHNOLOGY (FTE)

The programme does focus on nurturing employability/entrepreneurship/skill development. The outcomes of each programme have the emphasis on commitment and contribution to the interest of the society as a whole and perform well in their careers.

Programme Specific Outcomes (PSO'S)

1. Identify and select sources of potential knowledge and information in the field of Food Technology.
2. Apply and incorporate the technology with regard to food processing, innovative product development, food standards and quality control in food industries, research laboratories, food quality control laboratory etc.,

Programme Objectives:

1. To provide the theoretical and practical knowledge with regard to the various aspects of food i.e., science, Technology, microbiology and quality control measures involved in food products as well as their preservation techniques.
2. To identify, Understand and analyze the difficulties related to food technology and make the students to take proper decisions for the same.
3. To make the students learn about concepts in designing and developing of new food products to meet the current demands of consumers as well as industries.
4. To enable the students to get scientific knowledge through different food technology papers so that they can enhance their skills towards research and development.
5. To acquire the knowledge through different aspects such as unit operations in food processing, food packaging, preservation methods, dairy processing and bakery, confectionery, meat, poultry and fish processing and preservation methods.
6. To strengthen the students skills to work in different groups as well as an individual while they enter into the food industries, institutions, research and quality control laboratories, academic institutions and governmental agencies.
7. To provide effective interpersonal skills by conducting seminars and Presentations in each paper.
8. To attain the knowledge with regard to government policies and regulations of food quality and safety.
9. To facilitate the student to understand the personal and professional ethics towards the role of food technologist in the whole process of food product development.
10. To make the students to find the solutions for the problems occurred in industries by applying effective technologies in developing of by products as well as value added foods.
11. To assist the students towards entrepreneur through new food product development by conducting market research, shelf life studies and test marketing of food products.
12. To gain the knowledge and skills related to Academic, research, employee and entrepreneurial roles in the broad field of food technology for their holistic development.

Programme Educational Objectives (PEO) - To enable students to:

1. Understand the methods and techniques of production, processing, preservation, packaging and labeling, safety and quality assurance of different foods.
2. Gain knowledge in development of new food products and evaluation in terms of physical, chemical, microbiological, safety attributes, sensory and shelf life.
3. Acquire skills in food formulations, processing, preservation and evaluation of foods for their safety with reference to standards nationally and globally.
4. Apply of food processing and preservation technologies in research and food industry

Programme Outcomes:After successful completion of the program, the student is able to:

1. Demonstrate and apply comprehensive knowledge and understanding gained in food Science, food chemistry, microbiology, Technology of various foods and food products, food processing, Food product development quality control and Community nutrition in an integrated manner to the development, processing, and preservation of safe, nutritious, and high-quality foods.
2. Identify, Understand and analyze problems related to food technology and make suitable decisions to find an appropriate solution for the same as identify the factors responsible for food spoilage, food contaminants and adulterants and the methods to detect and control the same.
3. Design and develop food products by apply the concepts of Food Technology in creative manner to meet the needs and demands of the customers and industry. Formulate and develop tailor made products as per the needs of customers such as specialty foods.
4. Students develop a scientific knowledge with a sense of enquiry through various food technology papers. Able to strengthen research skills in order to meet the global challenges associated within all aspects of the food science and technology to develop their capacity to undertake research into the science of foods from farm to fork.
5. Demonstrate knowledge in various aspects of food and its application in food industry, concept of unit operations in food processing, conventional and advanced methods of food science, processing, preservation, methods of packing, post-harvest practices bakery and confectionery, meat, poultry and fish processing, food fermentation, dairy processing so as to develop food products. Able to Utilize advanced instruments and technologies to process and analyze food products and to solve food safety and quality related problems.
6. Able to work as individual as well as in teams with others from different backgrounds and confident to work in diverse socio-cultural settings with multicultural groups and teams in food industries, institutions, food research and quality control laboratories, academic institutions and governmental agencies as well as an entrepreneur.
7. Able to communicate orally and in writing related to discipline-specific, technical and non-technical aspects with effective interpersonal skills. seminars and Presentations in each paper enhances their confidence, ability to express themselves & presentation skills. Can effectively communicate scientific knowledge to meet the needs of industry and the consumer for the production and marketing of safe and quality foods.

8. Have knowledge in regulations governing on legal, safety, security and health issues and Able to follow food laws, regulations and safety standards in application of food additives preservatives etc. and apply the principles of Hazard Analysis and Critical Control Points (HACCP) to ensure safe food processing.
9. Understand and apply personal and professional ethics and responsibilities of food technologist in product development, quality, documentation and publications.
10. Find solutions for industrial and societal problems by effective utilization of byproducts, developing value added foods and transfer of technologies for sustainable development.
11. Screen business ideas, conduct market research, acceptability, quality control, shelf life studies and test market of the food products to avoid risks in commercialization of food products.
12. Acquire ability to gain knowledge and skills which are necessary throughout their life as professionals seeking to expand their career prospects into a wide range of Academic, research, employee and entrepreneurial roles in the broad field of food technology for their holistic development.

SRI VENKATESWARA UNIVERSITY: COLLEGE OF SCIENCES
DEPARTMENT OF HOME SCIENCE
CHOICE BASED CREDIT SYSTEM (C.B.C.S) SYLLABUS AS PER NEP 2020
(WITH EFFECT FROM THE ACADEMIC YEAR 2025-2026 onwards)
FOOD TECHNOLOGY (FTE)

SEMESTER-I

Sl.No	Components of Course	Code	Title of the Course	Hrs/Week	No. of Credits	SEE	IA	Total
1	CC	FTE -101	Community Nutrition	4	4	70	30	100
2		FTE -102	A-Food Science and Experimental Foods	4	3	50	25	75
			B-Dynamics in Food Preparation					
3		FTE -103	A-Food Microbiology and Safety	4	3	50	25	75
			B-Food Hygiene and Sanitation					
4	P	FTE 104	Practical -I(102+103)	6	2	35	15	50
5	SOC	FTE -105	A-Food chemistry and Analysis	4	3	50	25	75
			B-Food Additives and Adulteration					
6		FTE 106	A- Cereals, legumes and Oilseed Technology	4	3	50	25	75
			B- Snack Food Technology					
7	P	FTE -107	Practical-II (105+106)	6	2	35	15	50
			Total	36	20	340	160	500
8	Audit Course	FTE -108	Indian Knowledge systems-1	4	0	0	100	0

SEMESTER-II

Sl.No	Components of Course	Code	Title of the Course	Hrs/Week	No. of Credits	SE E	IA	Total
1	CC	FTE-201	Research Methodology in Biosciences	4	4	70	30	100
2		FTE-202	A-Food Processing and Preservation Technology	4	3	50	25	75
			B-Fermentation Technology					
3		FTE-203	A-Dairy Technology	4	3	50	25	75
			B- Basic Food Engineering					
4	P	FTE-204	Practical -III(202+203)	6	2	35	15	50
5	SOC	FTE -205	A-Food Safety and Quality Control	4	3	50	25	75
			B-Food Laws and Regulations					
6		FTE-206	A-Bakery and Confectionary Technology	4	3	50	25	75
			B- Beverage Technology					
7	P	FTE-207	Practical-IV (205+206)	6	2	35	15	50
8	OOTC	FTE-208	Open Online Transdisciplinary Course-1	-	2	-	100	100
			Total	36	22	340	260	600
9	Audit Course	FTE-209	Indian Knowledge systems-2	4	0	0	100	0

SEMESTER-III

Sl.No	Components of Course	Code	Title of the Course	Hrs/Week	No. of Credits	SE E	IA	Total
1	CC	FTE -301	Unit Operations in Food Industry	4	4	70	30	100
2		FTE -302	A- Fruit and Vegetable Technology	4	3	50	25	75
			B- Nutrition During Life Span					
3		FTE -303	A- Livestock and Sea Food Technology	4	3	50	25	75
			B- Food Toxicology					
4	P	FTE -304	Practical -V(302+303)	6	2	35	15	50
5	SOC	FTE -305	A- Food Product Development and Commercialization	4	3	50	25	75
			B- Food Wastage Management					
6		FTE -306	A-Food Packaging	4	3	50	25	75
			B- Food Business Management					
7	P	FTE -307	Practical-VI (305+306)	6	2	35	15	50
8	OOTC / OE	FTE-308	Open Online Transdisciplinary Course -2 (OR)	-	2	-	100	100
			Essentials of Home Science (Open Elective)	4	2	70	30	100
*	Seminar/Tutorial/Remedial classes and Quiz as part of Internal assessment			4	-	-	-	-
Total				40	22	340	260	600

SEMESTER-IV

Sl.No	Components of Course	Code	Title of the Course	Hrs/Week	No. of Credits	SEE	IA	Total
1.	OOSDC	FTE-401-A	Technology of Spices, Condiments and Plantation crops (OR)	4	4	70	30	100
			Open Online Skill DevelopmentCourse	-	4	100	-	100
		FTE-401-B	Food Quality Management System (OR)	4	4	70	30	100
			Open Online Skill DevelopmentCourse	-	4	100	-	100
2.	PW	FTE-402	Project Work- Orientation Classes (Dissertation- 200 Marks, Seminar- 50 Marks, Viva-voce- 50 Marks)	24	12	300	0	300
*	Conducting classes for competitive exam, communication skills, UGC/CSIR and NET examinations			12	-	-	-	-
Total				44	20	500		500
TOTAL SEMESTERS				144	84		880	2400

SEMESTER-I

CORE COURSE

FTE - 101: COMMUNITY NUTRITION

**Common to all specializations of M.Sc Home Science –
Food Science Nutrition and Dietetics (HSFS), Human Development and Child Welfare (HSHD),
Extension Management and Communication Technology (HSEM) and MS Food Technology
(FTE)**

Course Objectives- To enable the students to:

1. Know about composition of the food and their functions.
2. Understand the consequences of deficiency of taking nutrients.
3. Apply skills for planning diets for nutritional disorders.
4. Apply the techniques to plan menus for different socio-economic groups.

THEORY

UNIT-I: Concept of Community Nutrition

- Definition of Health, Nutrition and Community Nutrition-Factors Affecting Community Nutrition and Health- Food habits
- Nutritive values of different foods, Functions of foods and nutrients – cereal grains, millets, pulses, nuts and oil seeds fruits and vegetables, milk and milk products, meat, egg, poultry and fish, spices and condiments.
- Nutritional requirements-Recommended Dietary Allowances-Balanced diet-Menu planning for different socio economic groups

UNIT – II: Nutrition in Life Cycle

- Pregnancy - Physiological changes-Complications - Nutritional Requirements
- Lactation-Physiological changes- Nutritional Requirements
- Infancy-Growth and Development-Breast Feeding-Composition of Human Milk- Nutritional Requirements- Weaning and Supplementary Foods
- Preschool and School going children –Importance of nutrition- Nutritional requirements - Nutrition related problems in children.
- Adolescents and Adults: Physiological changes- Nutritional Requirements- Nutritional problems: Eating disorders- Nutrition in Adult hood period on the basis of gender& activities
- Elderly: Physiological changes-Nutritional requirements- Problems during old age

UNIT – III: Major Nutritional Problems of the Community

- Protein Energy Mal-nutrition: Types of Malnutrition, Ecology of malnutrition- environmental, social, and economical factors. Classification of PEM- causes, signs and symptoms, Treatment and Preventive measures.
- Common Nutritional Deficiencies in the Community
Etiology - Signs and Symptoms-Prevention and Control of-
-Vitamin A deficiency-
-Iron deficiency (anaemia)
-Iodine deficiency

UNIT – IV: Strategies to resolve common nutritional problems

- Food Fortification-Food Supplementation and Enrichment.
- Government Policies and Programmes - Integrated Child Development Services (ICDS)- Balawadi Nutrition Programme (BNP)- Targeted Public Distribution System (TPDS) - Food For Work (FFW). Nutrition Programmes- Special Nutrition Programme (SNP), PradhanMantriPoshan Shakti Nirman (PM POSHAN)-Scheme for Adolescent Girls (SAG).
- Prophylaxis Programmes-Vitamin A- Anaemia-Iodine.

REFERENCES

1. Suryatapa Das (2023) “Textbook of Community Nutrition” (2023), 6th Edition, Academic Publishers, Kolkata.
2. Gopalan, C. (1992). *Basic issues in combating malnutrition*- NFI Publication.
3. Gopalan, C. (1990). *Women nutrition in India*. NFI Publication.
4. Jelliffe, D.B.(1966).*Assessment of nutritional status of the community*, WHO Monograph, Series No. 53. WHO Geneva
5. Mehtab S. Bamji. (1996).*Text book of human nutrition*, Oxford & IBH Co.PVT.LTD, New Delhi,.
6. Seymour L. HarpenM.D.(1979).*Quick reference to clinical nutrition* Sutor, C.W. and Hunter, M.F. (1980).*Nutrition principles and application in health promotion*, J.B. Lippincot Company, Philadelphia
7. Swaminathan, M. (1990). *Essentials of food and nutrition*, Vol. I and Vol. II Ganesh and co. Madras

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

CO 1 Know about the nutritional problems of the community.

CO 2Acquire knowledge about food groups, RDA and steps in planning a diet.

CO3 Skills in planning and calculating nutritive values for different nutritional disorders.

CO4Apply the techniques to plan menus for different socio economic groups

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2			2					2		
CO2	3	3	3	2			3					2		
CO3	3	3	3	2					2			2		
CO4	3	3	3	2			3		2			2		

High-1, Medium-2, Low-3

CORE COURSE

FTE: 102-A: FOOD SCIENCE AND EXPERIMENTAL FOODS

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Course Objectives - To enable the students to:

1. Acquire knowledge on Plant and Animal foods composition, processing and preservation of nutritive values.
2. Understand the principles of cookery of different foods and methods of evaluation.
3. Learn about different processing techniques on nutritive quality of foods.
4. Apply skills in standardization of foods using different processing techniques.

THEORY

UNIT-I: Cereals and Pulses

- Cereals and Millets: Structure, Composition and functional properties.
- Starch: Characteristics, Gelatinization, Factors affecting gelatinization, modified food starches-Applications.
- Pulses and Legumes: Composition, anti-nutritional factors, Effect of cooking.

UNIT-II: Fruits, Vegetables and Spices and Condiments

- Vegetables: Classification, Composition, Pigments and Flavors constituents - Cooking effect.
- Fruits: Classification, Composition, Pigments, Flavors constituents and Browning reactions.
- Spices and Condiments: Significance, Classification, composition and its role in foods.

UNIT-III: Sugars, Fats, Nuts and Oil seeds

- Sugars: Types of sugars and sugar syrups, Crystallization of sugars, Sugar cookery and applications.
- Fats and oils: Sources, Composition, Absorption, Functional properties of fat- Melting point, Smoke point and flash point.
- Nuts and Oil seeds: Classification, Nutritive value and toxic constituents.

UNIT-IV: Foods of Animal Origin

- Milk: Composition, Kinds of milk and Functional properties of Milk.
- Egg: Structure, composition and Functional properties of eggs.
- Meat and Poultry: Structure, Muscle composition, Heat-induced changes in meat, Tenderness – Tenderizers.
- Fish and Marine foods: Classification, Selection, Composition and cooking.

PRACTICALS:

1. Cereals and Pulses: Starch cookery- Gelatinization and Pulse cookery- Effect of cooking on pulses.
2. Vegetable and Fruits: Vegetables- Effect of time, temperature, media and cooking methods on pigments & Fruits- Enzymatic Browning - preventive measures.
3. Sugars and Fats: Fats-Smoke points, oil absorption and mayonnaise preparation & Sugar cookery- Stages of sugar cookery and its applications.
4. Milk and Egg cookery: Milk- factors affecting milk cookery-Temperature, pH, acid, base, and coagulation factor & Egg-Egg white foams, methods of cooking egg.
5. Meat and Fish cookery: Meat-role of tenderizers in meat cooking& Fish-Methods of cooking fish.

REFERENCES

1. Vaclavik, V. A., Christian, E. W., & Campbell, T. (2008). *Essentials of food science* (Vol. 42). New York: Springer.
2. Srilakshmi, B. (2003). *Food science*. New Age International.
3. Khader, V. (2019). *Text book of food science and technology*. Indian council of agricultural research.
4. Belle Lowe.(1998).*Experimental Cookery*, John Wiley& Sons, INC, New York.
5. SethiMohini.(2011).*Food Science: Experiments and Application*, second edition, Jain book Agency, New Delhi.
6. N.ShakuntalaManay& M. Shadaksharswamy. (2001).*Foods- Facts and Principles*, second edition, New Age International Publishers, New Delhi.
7. Norman N Potter.(2007).*Food Science*, Fifth edition, An Aspen Publication, Mariland.

Course Outcomes - After the completion of the course, the students will be able to:

CO 1. Acquire knowledge on the functional properties of Plant and Animal foods.

CO 2. Standardization of product by using accurate methods.

CO 3. Demonstrate the role of ingredients in cookery.

CO 4. Application of different techniques in evaluation of foods.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3											3	3	3
CO2	3		3		3		3		3		2	3	3	3
CO3	3	2	3	2	3					2		3	3	3
CO4	3	2	3	1	3	2	3		3		2	3	3	3

High-3, Medium-2, Low-1

CORE COURSE

FTE: 102-B: DYNAMICS IN FOOD PREPARATION

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Course Objectives - To enable the students to:

1. Learn the principles of safe food preparation and food pyramid.
2. Understand the role of foods in cookery.
3. Apply knowledge about effect of cooking on nutrients.
4. Estimate the effects of cooking on Nutrients.

THEORY

UNIT-I: Introduction

- Definition, Composition and Functions of food science.
- Food pyramid and Principles of safe food preparation.
- Food as source of physical sustenance, food as religious symbol.
- Importance of food in understanding human culture - variability, diversity, from basic ingredients to food preparation.

UNIT-II: Cooking Methods and Equipments

- Principles and objectives of Cooking.
- Cooking methods - roasting, broiling, steaming, boiling, pressure cooking, poaching, frying, stewing, braising, pot roasting, baking.
- Types of cooking equipments- weighing balances, Grill, Boiler, Oven and Microwave.
- Mechanical processing equipments- Vegetable Peeler, Chopper, Mixer, Slicing machine and mincing equipment.

UNIT-III: Safety and Storage of food handling

- Safety and sanitation-Principles of sanitation and personal hygiene;
- Equipment use and care - heating equipments, refrigerator, juicers, mixing and grinding devices, gas range, steamers; water filters.
- Basic safety measures for safe working.
- Principles of safe storage: safe holding temperature for foods;
- Sanitary refrigeration, safe cooling and reheating of foods; safe techniques for knife skills and hand tools.

UNIT-IV: Role of Ingredients in Cookery

- Role of cereals, pulses, fats/oils, milk and milk products, flesh foods, sugars, vegetables, fruits and spices in cookery.
- Application of ingredients and specialty ingredients in food preparations.
- Appropriate Selection of foods based on the nutrient composition and seasonal availability.
- Basic elements of presentation - garnishing; tools for garnishing and Plating of recipes.

PRACTICALS:

1. Standardization of weights and measures.
2. Standardization of portion sizes.
3. Methods of cooking.
4. Usage of various cooking equipments and its applications.
5. Preparation of various recipes.

REFERENCES

1. Srilakshmi,B.(2001). *Food Science*, 2nd edition New Age International (P) Ltd., Publishers, Bangalore, Chennai & Hyderabad.
2. Swaminathan, M.(1979). *Food science and Experimental foods*. Ganesh & Co., Madras.
3. Dr.M Swami Nathan. (2010). *Food and Nutrition Volume-2 Second Edition* the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
4. Shubhangini A.Joshi. (2010). *Nutrition and Dietetics Third Edition* Tata Mecgraw Hill Education Private Limited New Delhi.

Course Out comes – After completion of the course, students will able:

CO1 Acquire knowledge on Food Pyramid.

CO2 Identify role of foods on Cookery.

CO3 Gain knowledge on methods of Cooking.

CO4 Estimate the effects of cooking on Nutrients.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3											3	3	3
CO2	3		3		3		3		3		2	3	3	3
CO3	3	2	3	2	3					2		3	3	3
CO4	3	2	3	1	3	2	3		3		2	3	3	3

High-3, Medium-2, Low-1

CORE COURSE

FTE: 103-A: FOOD MICROBIOLOGY AND SAFETY

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Course Objectives - To enable the students to:

1. Obtain knowledge about important genera of microorganisms associated with food.
2. Acquaint food contaminants and their sources.
3. Understand the various factors associated with growth, food spoilage and food-borne diseases of different microorganisms.
4. Demonstrate the use of standard methods and procedures for the microbiological analysis of food.

THEORY

UNIT-I: Introduction to Food Microbiology

- Significance and role of pathogenic and beneficial microorganisms in food.
- Classification, morphological characteristics and nutritional requirements of microorganisms.
- Factors affecting growth of microorganisms, growth curve.

UNIT-II: Food Spoilage and Contamination

- General principles underlying spoilage: causes of spoilage and changes caused by microorganisms.
- Sources of contamination and types of spoilages among plant origin foods:
 - Cereals, Legumes, nuts and oil seeds
 - Fruits and Vegetable products
 - Spices and condiments

UNIT-III: Food Contamination and Spoilage of Animal origin and Processed Foods

- Sources of contamination and types of spoilages among :
 - Milk and Milk products
 - Eggs, poultry and Meat
 - Fish and Other sea foods
 - Sugars and sugar products
 - Processed foods

UNIT-IV: Food Borne Diseases and Food Safety

- Food borne diseases – Food Infections and Intoxication. Signs and symptoms of various Bacterial Food-borne poisoning and Non-bacterial food-borne poisoning.
- Food safety: concept, factors affecting food safety, biological hazards.
- Application of Microbiology in food industry.

PRACTICALS:

1. Laboratory safety rules and precautions.
2. Sterilization methods, Isolation techniques and Microbial Staining Techniques.
3. Media preparation and Microbial examination of food and food products.
4. Microbial examination of food products: Identification, isolation and confirmation
5. Detection of pathogenic organisms in foods and viable count.

REFERENCES

1. William.C.Frazier and Denni, S.C. Westhoff. (2004). *Food Microbiology*, 4th edition, Tata McGraw-Hill publishing company Ltd, New Delhi.
2. James,M.Jay.(2005). *Modern Food Microbiology*, 4th edition, CBS publishers and Distributors, New Delhi.
3. Adams,M.R. and Moss,M.O.(2003). *Food Microbiology*, Second edition, Panima Publishing Corporation, New Delhi.
4. Jay, J. M., Loessner, M. J., & Golden, D. A. (2008). *Modern food microbiology*. Springer Science & Business Media.
5. Banwart, G. (2012). *Basic food microbiology*. Springer Science & Business Media.
6. Matthews, K. R., Kniel, K. E., & Montville, T. J. (2017). *Food microbiology: an introduction*. John Wiley & Sons.

Course Outcomes - After the completion of the course, the students will be able to:

CO1 Identify the important genera and factors associated with food spoilage.

CO2 Elucidate the food contaminants in different types of food commodities.

CO3 Describe the characteristics of food borne diseases, infections and intoxications and their identification.

CO4 Demonstrate the use of standard methods and procedures for the microbiological analysis of food.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3									3	3	3	3
CO2	3	3		2							2	3	3	3
CO3	3	3										3	3	3
CO4	3	3			2			2			3	3	3	3

High-3, Medium-2, Low-1

CORE COURSE

FTE- 103-B: FOOD HYGIENE AND SANITATION

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Course Objectives - To enable the students to:

1. Know about concept of food hygiene, and importance of safe food and its storage.
2. Acquaint the students with importance of sanitation and health.
3. Design food hygiene and sanitation measures.
4. Control Measures to avoid microbial contamination.

THEORY

UNIT-I: Hygiene and Sanitation

- General principle of food hygiene.
- Personal hygiene and food handling habits.
- Sanitation in food Processing areas, sanitary aspects of building and equipment.
- Plant layout and design.

UNIT-II: Sanitation practices

- Hygiene and Sanitation in Food Service Institutions. Cleaning and disinfection
Personal hygiene, Waste disposal.
- Source of water, quality of water, water supply and its uses in food processing units.
- Establishing and maintaining sanitary practices in food industry, sanitation principle and the requirements for a food sanitation program, role of sanitization, general sanitary consideration and sanitary evaluation of food plants.

UNIT-III: Pest Control

- Safe and effective insect and pest control: Extraneous materials in foods, Principles of Insects and pest's control.
- Physical and chemical methods of control.
- Effective control of micro-organisms: microorganisms important in food sanitation, microorganisms as indicator of sanitary quality.
- Special requirements for high-risk foods. Safe food cooking temperature and storage techniques

UNIT-IV: Cleaning Practices

- Cleaning practices: Effective detergency and cleaning practices: Importance of cleaning technology, physical and chemical factors in cleaning, classification and formulation of detergents and sanitizers, cleaning practices.
- Methods of disposal of solid waste, liquid and gaseous waste, wet and dry cleaning-COP, CIP.

PRACTICALS:

1. Principles of hygiene and sanitation in food units.
2. Assessment of personal hygiene.
3. Assessment of surface sanitation by swab and rinse method.
4. Analysis of Water by MPN method.
5. Detection of pathogens in food using conventional microbiological tests.

REFERENCES:

1. Fellows P et al. Making Safe Food: A Guide to Safe Food Handling and Packaging for Smallscale Producers Practical. Action Publishing, 1998.
2. Frazier WC and West off DC. Food Microbiology, TMH, New Delhi, 2004.
3. IFST. Food Hygiene Training: A Guide to its Responsible Management, UK: Institute of Food Science and Technology 1992.
4. Lawley R, Curtis L and Davis J. The Food Safety Hazard Guidebook, RSC. 1. Publishing, 2004.
5. Manay NS and Shadakshaswamy M. Food Facts and Principles, New Age. International, 2004.
6. Marriott NG and Gravani RB. "Principles of Food Sanitation", New York: Springer, 2006.

Course Outcomes - After the completion of the course, the students will be able to:

CO1 Acquire skills in food handling, solid and liquid waste management and disposal.

CO2 Perform techniques related to food hygiene.

CO3 Skills in personal hygiene and environmental hygiene

CO4 Knowledge on CIP and COP techniques and its usages in different areas.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3									3	3	3	3
CO2		3	3	2							2	3	3	3
CO3	3	3										3	3	3
CO4	3	3	3		2			2			3	3	3	3

High-3, Medium-2, Low-1

FTE-104 :PRACTICAL-I (102+103)

FTE -102: A-Food Science and Experimental Foods

(OR)

B-Dynamics in Food Preparation

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FTE -103: A-Food Microbiology and Safety

(OR)

B-Food Hygiene and Sanitation

SKILL ORIENTED COURSE

FTE: 105-A: FOOD CHEMISTRY AND ANALYSIS

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Course Objectives -To enable the students to:

1. Acquire knowledge on chemical composition of different foods.
2. Understand the physical, chemical, and functional properties of foods.
3. Know the principles and working applications of different analytical techniques associated with food.
4. Perform skills in qualitative and quantitative estimation of nutrients in different foods.

THEORY

UNIT-I: Water Chemistry and Dispersed Systems

- Water chemistry – Structure of Water, Free, Bound and Entrapped Water.
- Water Activity and Relative Vapour pressure– Definition and measurement, factors affecting water activity, Moisture sorption isotherms, Hysteresis and Moisture Determination.
- Dispersions- Food as dispersed systems, Liquid dispersions.
- Colloids- Definition, Characteristics of Colloids, Gels, Emulsions, Foams.

UNIT-II: Carbohydrates and Lipids

- Carbohydrates – Classification , Structure, Physico – Chemical properties of Monosaccharide's-Pentoses, and Hexoses,
- Oligosaccharides – Di Saccharides-Maltose, Lactose, Sucrose –Crystallisation of sugars, Polysaccharides – Starch-Amylose and Amylopectin- Gelatinisation of starches and Hydrolysis of starch, Cellulose and Pectin- Structure and properties.
- Lipids – Nomenclature, classification – Milk fats, Animal fats, Vegetable fats.
- Physical properties – Crystallization, Plasticity
- Chemical properties – Thermal decomposition, Chemistry of Frying, Hydrogenation, Inter esterification, Rancidity of fats.

UNIT-III: Proteins and Amino Acids

- Proteins and amino acids – Classification, Structure, Physical properties.
- Functional properties –
 - Protein Denaturation, Protein hydration, Solubility,
 - Interfacial properties,
 - Emulsification and foaming, Gelation,
 - Dough formation.

UNIT-IV: Food Analysis

- Introduction to food analysis- Methods of sampling, Determination of Total ash, Principles and methods of chemical analysis
- Carbohydrates – Qualitative and Quantitative analysis of starch and sugars.
- Proteins – Electrophoresis, Micro-Kjeldahl method.
- Fats – Analysis of solid and liquid fats, Rancidity.
- Determination of Vitamin and Minerals – Vitamin-C, Iron, Phosphorus, Calcium.
- Basic principles and applications of spectroscopy- UV, UV- visible, AAS, AES.
- Chromatography- principles and applications of Chromatography- HPLC, GC/ MS and LC/ MS.

PRACTICALS:

1. Determination of Moisture – direct and indirect method
2. Determination of Starch and Sugars
3. Estimation of proteins - Micro-Kjeldahl method
4. Qualitative and quantitative analysis of fats and oils –Soxhlet method.
5. Determination of vitamins and minerals – Vitamin C, Ash –Iron, Phosphorus

REFERENCES

1. Lillian Hoagland Meyer. (2019).Food Chemistry”, First Edition, CBS publishers and Distributors, New Delhi.
2. Fennema R. (2019). Food Chemistry. Marcel Dekker Inc. New York.
3. Ranganna S. (2019). Handbook of analysis and quality control for fruits and vegetables, 2nd edition. Tata McGraw Hill.
4. Nielsen S.S. (2002). Introduction to the chemical analysis of foods, CBS Publishers and Distributors, Pvt. Ltd.

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

CO1 Acquire knowledge on the physico chemical properties of compounds in foods.

CO2 Apply the functional properties of foods in processing and preservation.

CO3 Perform skills in qualitative and quantitative estimation of nutrients in different foods.

CO4 Describe the chemical components and their functions in Food applications.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO	PSO
CO1	3	3			2	2							3	
CO2	3	3			2	3							3	
CO3	3				3	3		1				1		3
CO4	3				2	2		1				1		3

3-High, 2- Medium, 1- Low

SKILL ORIENTED COURSE

FTE: 105-B: FOOD ADDITIVES AND ADULTERATION

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Course Objectives- To enable the students to:

1. Familiarize the students with food additives concerning safe food production in accordance with national and international systems that ensure food quality and safety.
2. Aware the students with the use of different types of food additives, classification, biological status and legal limits according to the international and national food safety regulations.
3. Aware about the national and international regulations related to the food additives and their safety.
4. Understand the various food adulteration practices and study possible risk factors associated with food adulteration.

THEORY

UNIT-I: Introduction to food additives

- Food additives- definitions, classification according to the EU & US food laws.
- Additives applications and risk factors in food processing and preservation.
- Food additives for the preservation of foods-Natural additives, synthetic additives.
- Consumer attitude towards food additives.

UNIT-II: Different types of food additives & Applications

- Coloring agents, Flavoring agents, Flavor enhancers, Sweeteners, Anti-browning agents, Antioxidants, Antimicrobial agents, pH control & acidulants, Emulsifiers, Enzymes, Commercial starches, Food phosphates.
- Fat substitutes & replacers.
- Sugar substitutes & replacers.
- Additives for special dietary uses.
- Nutritional additives.
- Essential fatty acids as food additives.

UNIT-III: International regulations of food additives

- Nomenclature; International standards for safe use of food additives.
- Codex Alimentarius general standards for food additives.
- Codex General Standard for Food Additives (GSFA) Online Database.
- Food additives in the European Union.
- Food additives in the United States.
- FSSAI regulations on the use of food additives.

UNIT-IV: Food adulteration and detection

- Introduction, types of adulteration, impact of adulteration on health.
- Classification of food adulteration.
- Common food adulterants.
- Adulterant authentication in food materials- Physical authentication techniques, authentication by biochemical and analytical methods.
- Adulteration remedy strategies.

PRACTICALS:

1. Processing and preservation of food by different kinds of food additives.
2. Application of sugar replacers in various food products.
3. Application of fat replacers in various food products.
4. Identification of various food color adulteration.
5. Identification of ghee adulteration.

REFERENCES

1. Branen, A. L., Davidson, P. M., Salminen, S., & Thorngate, J. (Eds.). (2001). *Food additives*. CRC Press.
2. Smith, J., & Hong-Shum, L. (2011). *Food additives data book*. John Wiley & Sons.
3. Saltmarsh, M., & Saltmarsh, M. (Eds.). (2013). *Essential guide to food additives*. Royal Society of Chemistry.
4. Smith, J. (Ed.). (1991). *Food additive user's handbook*. Glasgow: Blackie.
5. Baines, D., & Seal, R. (Eds.). (2012). *Natural food additives, ingredients and flavourings*. Elsevier.
6. Sen, M. (2021). Food chemistry: role of additives, preservatives, and adulteration. *Food chemistry: the role of additives, preservatives and adulteration*, 1-42.

Course Out comes- After completion of this course, students will be able to:

CO1 Acquire knowledge on food additives and their applications.

CO2 Use of food additives and their classification according to the various international regulations.

CO3 Understand the national and international regulations to control food additives use.

CO4 Understand the various food adulteration practices and their detection mechanisms.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3			2					3		
CO2	3	3	3	2			3					2		
CO3	3	3	3	3					2			3		
CO4	3	3	3	3			3		3			3		

High-3, Medium-2, Low-1

SKILL ORIENTED COURSE

FTE: 106-A: CEREALS, LEGUMES AND OILSEED TECHNOLOGY

Course Objectives- To enable the students to:

1. Know the structure and composition of cereal grains, pulses and oil seeds.
2. Learn Post harvest technology and processing of cereals, pulses and oilseeds
3. Understand the mechanism of the equipment, Machinery and tools required for processing of cereals, pulses and oilseeds
4. Prepare and evaluate Traditional and commercially processed foods with cereals, pulses and oilseeds

THEORY

UNIT-1: Cereals and Millets

- Classification of cereals and millets, Basic Structure and Composition.
- Milling Technology - Conventional and advanced milling technologies, Turbomilling and air classification.
- Processing and byproducts of cereals & Millets: Parboiling-CFTRI hot soaking process, Chromate soaking process- advantages and disadvantages, Popping, flaking, Malting, Fermentation process and various biproducts.
- Breakfast & ready to eat cereals, Instant rice, Enrichment/Fortification and value addition of cereals.

UNIT- II: Pulses and Legumes

- Classification of pulses and legumes, Structure and Composition.
- Milling Technologies– Home scale milling, Cottage scale milling, Wet milling, Dry milling, Impact milling, Attrition milling, Knife milling, Direct pressure milling, Improved Dhal milling process (CFTRI method), CIAE Dhal milling process.
- Soaking and Germination of pulses and legumes- Biochemical changes, nutritional importance.

UNIT-III: Nuts and Oil Seeds

- Structure and Composition of common Nuts and Oil seeds.
- Milling and oil processing technology – Milling of various shell nuts, oil Extraction, processing and Refining, Hydrogenation of edible oils.
- Biproducts and Value-added snack foods of nuts and oil seeds.

UNIT-IV: Post Harvest Handling & Management

- Post harvest management- Handling, losses, causative factors, prevention and control measures.
- Storage house/Go downs facility- Layout design, Standards, Infrastructure, Pest control and management.
- Transportation and Quality control measures for Cereals, Legumes, Nuts and Oil seeds.

PRACTICALS:

1. Effect of Soaking, germination and malting process of cereals on physical and functional properties and fermentation processing of cereals and pulses.
2. Popping and flaking process of cereals & millets.
3. Preparation and evaluation of peanut butter.
4. Preparation and evaluation of ready to eat breakfast foods.
5. Visit to food industry to understand the real time operations of various.

REFERENCES

1. Owens, G. (Ed.). (2001). *Cereals processing technology* (Vol. 53). CRC Press.
2. Khader, V. (2019). *Text book of food science and technology*. Indian Council of Agricultural Research.
3. Potter, N. N., & Hotchkiss, J. H. (2012). *Food science*. Springer Science & Business Media.
4. Barr, S. (2019). *Technology of cereals, pulses and oilseeds*. Scientific e-Resources.
5. Joshi, M. (2018). *Textbook of field crops*. PHI Learning Pvt. Ltd.
6. Tyler, R., Wang, N., & Han, J. (2017). Composition, nutritional value, functionality, processing, and novel food uses of pulses and pulse ingredients. *Cereal Chemistry*, 94(1), 1-1.

Course Outcomes - After the completion of the course, the students will be able to:

- CO1** Gain knowledge about basic composition and structure of cereal grains, pulses and oil seeds.
- CO2** An in-depth understanding of the science and technology associated with Post-harvest technology and processing of cereals, pulses and oilseeds.
- CO3** Able to operate and handle the equipment, Machinery and tools required for processing of cereals, pulses and oilseeds.
- CO4** Prepare various food products including the by-products of cereal grains, pulses and oil seeds.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3											3	3	3
CO2	3	3		3	3							3	3	3
CO3	3				3	2						3	3	3
CO4	3		3		3				2	3	3	3	3	3

High-3, Medium-2, Low-1

SKILL ORIENTED COURSE

FTE: 106-B: SNACK FOOD TECHNOLOGY

Course Objectives- To enable the students to

1. Know the different kinds of snack foods and their scope in Indian snack industry.
2. Study the technologies and their impact on preparation of various snack foods.
3. Understand the requirement and mechanism of the machinery and tools required for production of various snack foods.
4. Prepare and quality evaluates the different kinds of snack foods and studies their scope for the future innovations.

THEORY

UNIT-1: Snack Food Ingredients

- Popcorn and other cereal based products.
- Fats, oils, emulsifiers: Frying natural fats and oils, emulsifiers, antioxidants.
- Important vegetable ingredients: Potatoes, onions, seasonings.
- Different types of dry nuts and fruits.
- Dairy products: Fluid milks, concentrated milk, dried milk.
- Water, salt, flavors and colors.

UNIT- II: Snack Food Products and processes

- Potato chips: Processing and quality factors.
- Snacks based on popcorn and puffing: popping & puffing procedure, different types of flavours, factors effecting quality of popping.
- Backed snacks: salty savory & sweetened backed snacks.
- Nut based snacks: peanuts, other dry nuts, salted and sugared nuts

UNIT-III: Equipment

- Extruding equipment: Extruder functions, design & operation.
- Equipment for frying, baking & drying: heat transfer mechanisms, specialized fryers, ovens, dryers.
- Equipment for popping: poppers, sifters, coaters, caramel corn plants.
- Equipment for potato chip processing: peelers, slicers, fryers, microwave dryers, chip sorters, packaging machines.

UNIT-IV: Packaging material and Packaging Equipment for Snack Foods

- Different types of containers required for snack food packaging.
- Special features required for packaging of certain snack packages.
- Folding cartons, preformed pouches.
- Form-fill-seal equipment.
- Inner lined containers and Rotoseal machines.
- Automatic packaging machines for flexible packaging.

PRACTICALS:

1. Market survey on different types of snack foods available in Indian market and their classification.
2. Preparation and quality evaluation of different kinds of snack foods based on cereals
a. Flavoured and salted popcorn. b. Puffed millet based snacks.
3. Preparation and quality evaluation of different kinds of snack foods based on dry nuts and fruits.
a. Salted, dried and roasted peanuts-Time and temperature impact on roasting quality.
b. Sugar coated dry nuts and their quality evaluation.
4. Preparation of Rooty vegetable chips with different edible oils-Time and temperature impact on frying quality of chips.
5. Operation of extruder and preparation extruded products as ready to make snack foods.

REFERENCES

1. Matz, S. A. (2012). *Snack food technology*. Springer Science & Business Media.
2. Bhattacharya, S. (2022). *Snack Foods: Processing and Technology*. Academic Press.
3. Lusas, E. W., & Rooney, L. W. (Eds.). (2001). *Snack foods processing*. CRC Press.
4. Serna-Saldivar, S. O. (2022). Overview and State-of-the-Art of the Snack Food Industry. In *Snack Foods* (pp. 1-24). CRC Press.
5. Willhoft, E. M. (1990). Packaging for Preservation of Snack Food. In *Snack Food* (pp. 349-371). Boston, MA: Springer US.

Course Outcomes - After the completion of the course, the students will be able to:

CO1 Understand the different types of snack foods and their importance in food business.

CO2 Understand the various technologies and their importance in preparation different types of snack foods.

CO3 Aware about the mechanism, operation and requirement of various machineries required for the production of various snack foods.

CO4 Apply appropriate technologies and methods to prepare various snack food products.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3						2	3	3	3
CO2	3	3			3			3			3	3	3	3
CO3	3			2	3			3	3	3	3	3	3	3
CO4	3		3	3	3	2		3	3		3	3	3	3

High-3, Medium-2, Low-1

FTE- 107: PRACTICAL-II: (105+106)

FTE: 105: A-Food chemistry and Analysis

(OR)

B-Food Additives and Adulteration

+

FTE: 106: A-Cereals, Legumes and Oilseed Technology

(OR)

B-Snack Food Technology

FTE-108: INDIAN KNOWLEDGE SYSTEMS-1

SEMESTER-II

CORE COURSE

FTE: 201: RESEARCH METHODOLOGY IN BIOSCIENCES

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Course Objectives- To enable the students to:

1. Know the basic principles of research.
2. Study the various concepts involved in scientific drafting and writing process.
3. Study the various elements in biostatistics applied in the science and technology.
4. Study the various techniques and methods involved in the food quality evaluation.

THEORY

UNIT- I: An Insight into Research

- Definition, meaning and Objectives of research.
- Significance of research, Scientific Methods and research approaches.
- Characteristics of good research.
- Criteria of good research.
- Types of Research- Quantitative and Qualitative, Descriptive and Analytical, Applied and Fundamental, Primary and Secondary, Exploratory and Conclusive.

UNIT-II: Research Process in Nutrition and Food Technology

- Research design: definition, purpose, characteristics of good research design.
- Sampling & Estimating Population Sampling: Representation Sample; Sample Bias; Sampling Techniques (Simple Random, Systematic, Stratified, Multistage, Cluster and Multiphase). Sampling Distribution.
- Design of experiments; Policies in regulating research in Nutrition and Food Technology.
- Guidelines for use of Humans, Animals, Plants and Herbs in research.
- Analytical techniques: Demographic, Diet and Nutritional, biological, clinical, biochemical, Toxicological and shelf life studies.

UNIT-III: Research Process and Design

- Research process-Steps and Phases
- Research problem: definition, identification and evaluation of the problem.
- Formulation of hypothesis: definition, nature and functions of hypothesis, importance of hypothesis, forms of hypothesis.
- Variables and tools - types.
- Data collection techniques
- Research writing-Background, Review, Materials and Methods, Results and Interpretation and Bibliography.
- Research integrity, publication ethics and authorships.

UNIT-IV: Statistical Tools for the Analysis of Research Data

- Introduction and definition statistics and parameters.
- Descriptive statistics: mean, median, mode, range, variance, standard deviation, histograms, box plots.
- Hypothesis testing: z-test, t-tests
- Regression analysis: simple linear, multiple and logistic regression.
- Analysis of variance (ANOVA): one way and two way ANOVA.
- Estimating Population Parameters: Testing of Hypothesis (Type I and Type II Errors, Level Of Significance); Paired & Unpaired T-Test for Testing Population Mean (S) & Proportion (S); Analysis of variance (ANOVA & ANCOVA).
 - Non-Parametric Tests - Chi – Square Test.
 - Analysis using data packages and Data software-Applications- Resources.
 - SPSS: Data entry; analysis and interpretation.
 - Graphpad: Data entry; analysis and interpretation.

REFERENCES:

1. Goh, K. M. (2023). Research Methodology in Bioscience and Biotechnology. Springer.
2. Pandey, P., & Pandey, M. M. (2021). *Research methodology tools and techniques*. Bridge Center.
3. Mishra, S. B., & Alok, S. (2011). Handbook of research methodology.
4. Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Age International.
5. Gupta, S. (2002). *Research methodology and statistical techniques*. Deep and Deep Publications.

Course Outcomes - After the completion of the course, the students will able to:

CO1 Understand the basic principles of research.

CO2 Understand the various concepts involved in scientific drafting and writing process.

CO3 Learn the various elements in biostatistics applied in the science and technology.

CO4 Understand various techniques and methods involved in the food quality evaluation.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	3		3	3							3	3	2
CO2	2			2	3							2	2	2
CO3	2	2	3	2	3	2			2	3		2	2	2
CO4	3	3		3	3	3		2	2		3	2	3	3

High- 3, Medium- 2, Low- 1

CORE COURSE

FTE: 202-A: FOOD PROCESSING AND PRESERVATION TECHNOLOGY

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Course Objectives - To enable the students to:

1. Understand the principles and scope of food processing and preservation.
2. Get an overview on various techniques/methods in food processing and preservation.
3. Acquire knowledge of emerging technologies and their applications in food processing and preservation.
4. Equip with skills required for process and preserve various food products.

THEORY

UNIT-I: Food Processing and Preservation – An Introduction

- Need, Purpose, Principles and Methods of food processing and preservation.
- Traditional Methods of food processing and preservation.
- Natural and Chemical Food Preservatives – types, permissible limits, safety aspects

UNIT-II: Preservation by High Temperatures

- Principles of thermal processing and its effect on quality of foods.
- Blanching, Canning, Retard, Extrusion, Pasteurization, UHT processing, Thermal Sterilization.
- Drying and Dehydration -Types, Methods and their suitability for different food products.
- Concentration – Types, Methods and their suitability for different food products.

UNIT-III: Preservation by Low Temperatures

- Principles of low temperature processing and its effect on quality of foods.
- Refrigeration, Freezing, Lyophilisation, Cryogenic Freezing, Dehydro-freezing, Freeze Concentration, IQF.

UNIT-IV: Advanced Food Processing Technologies

- Irradiation, High Pressure Processing, Pulse Electric Field, Microwave processing.
- Edible Coatings and Films, Nano technology, Hurdle Technology, Modified Atmosphere.

PRACTICALS:

1. Preservation of foods by traditional methods- Salt, Sugar and Spices.
2. Drying and dehydration of foods - Assessment of quality.
3. Refrigeration and Freezing of foods -Assessment of quality.
4. Preservation of foods with edible coatings and dips.
5. Visits to different commercial food processing units and Industries.

REFERENCES:

1. Fellows,P. and Ellis,H. (1990). *Food Processing Technology: Principles andPractice*,New York.
2. ShafiurRahman, (2011), Hand book of food preservation, CRC Press, Newyork.
3. Harry. W. Von Loesecke.(1998). *Drying and dehydration of Foods*, Allied Scientific,NewDelhi.
4. Jelen,P.(1985). *Introduction to Food Processing*, Prentice Hall, Reston Virginia, USA.
5. Norman, N. Potter, Joseph H. Hotchkiss.(1996). *Food Science*, 5th edition, CBS Publishers &Distributors, New Delhi.
6. Rama swamy,H. and Marcote,M. (2005).*Food processing- principals and applications*,CRC Press, Newyork

Course Outcomes - After the completion of the course, the students will be able to:

CO1 Conceptualize principles of traditional and novel food processing and preservation technology.

CO2 Understand the applications and limitations of food processing and preservation technology.

CO3 Comprehend the functions and applications of food preservatives and additives.

CO4 Apply appropriate technologies to process and preserve the foods to extend their shelflife.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3						2	3	3	3
CO2	3	2			3			1			2	3	3	3
CO3	3			2	3			3	3	2	3	3	3	3
CO4	3		3	3	3	2		3	3		3	3	3	3

High-3, Medium-2, Low-1

CORE COURSE

FTE: 202-B: FERMENTATION TECHNOLOGY

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Course Objectives- To enable the students to:

- Gain knowledge about fermentation technologies used in food industry,
- Learn role of microorganisms in fermentation
- Gain skills to control of fermentation processes.
- Acquire knowledge types of fermenters, equipment's & instruments used in fermentation.

THEORY

UNIT-I: Introduction

- Introduction to Fermentation technology, basic principles of food fermentation
- Status and role of fermentation in food industry.
- Definition, types, Benefits and Limitations of fermentation Technology.
- Role of ingredients used in fermentation Technology.
- Major types of organisms used in fermentation.

UNIT-II: Basic Concepts of Fermentation

- Fermenter design - parts & their functions
- Types of fermenter - batch, Continuous, Dual and Multiple
- Design of fermentation media- water, carbon and nitrogen source, Growth factors, precursors, aeration and antifoam agents.
- Factors affecting fermentation process.
- Control of fermentation – requirements for control, design of a fermentation control systems, sensors and controllers, control of incubation, aeration and agitation

UNIT-III: Types of cultures

- Microbial cultures in food fermentation and their maintenance.
- Types of cultures and its applications in food products.
- Bioreactors – types and designs.
- Probiotics, Prebiotics and symbiotics.
- Preservation of Industrially important microorganisms

UNIT-IV: Preservation by Fermentation

- Cereal and pulse based fermented foods.
- Fruits and Vegetables based fermented foods.
- Meat based fermented foods.
- Milk and Beverages based fermented foods.

PRACTICALS:

1. Study on effect of agitation on microbial growth in batch fermentation.
2. Estimation of Lactic acid Production.
3. Estimation of Alcohol Production.
4. Preparation of traditionally fermented food: Sauerkraut.
5. Preparation of fermented products.

REFERENCES:

1. Emt.el-Mansi & CFA. Bryce Fermentation Microbiology & Biotechnology, Taylor & Francis Ltd.(2004)
2. Stanbury, P.F., A. Whitaker & S.J. Hall. Principles of fermentation technology Oxford Press.(1997).
3. Peter F Stanbury, Allan Whitaker, Stephen J Hall. Principles of Fermentation Technology. (2016) Butterworth-Heinemann Press. UK.

Course Outcomes:

- CO1. The students learn role of microorganism in fermentation.
CO2. The students learn fermentation types.
CO3. Learn production technologies for different types of fermented food products.
CO4. Acquire knowledge on types of cultures and its applications.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3											3	3	3
CO2	3		3		3		3		3		2	3	3	3
CO3	3	2	3	2	3					2		3	3	3
CO4	3	2	3	1	3	2	3		3		2	3	3	3

High-3, Medium-2, Low-1

CORE COURSE

FTE: 203-A: DAIRY TECHNOLOGY

Course Objectives - To enable the students to:

1. Impart the knowledge of milk grading and their composition.
2. Illustrate the technologies of processing of milk and milk products.
3. Provide in-depth knowledge in various unit operations and developments in dairy processing.
4. Demonstrate the manufacturing of various dairy products and exemplify the quality of dairy products.

THEORY

UNIT-I: Milk

- Milk - Definition, Structure, Composition, Factors affecting composition of milk.
- Collection and Transportation of milk - Reception, sampling techniques, grading of milk, clarification, chilling at procurement site, Storage and Transportation.
- Processing - Homogenization, Pasteurization, sterilization, UHT processing of Milk.
- Cleaning of dairy equipment – Dairy effluents
- Quality parameters

UNIT-II: Milk Products

Process, Composition, Quality Standards, Varieties, and Nutritive Value of the following:

- Types of Market Milk - Whole milk, Low fat milk, Toned and Double toned milk, Skimmed milk, Condensed milk, concentrated milk, Fortified and Double fortified milk, flavored milk.
- Fat-Rich Dairy Products - Definition, composition, standards and method of manufacture of Cream, Butter, Ghee, and butter oil.
- Traditional Indian Dairy Products - Standards and method of manufacture of Khova, Khova based sweets, chenna, chenna based sweets, panner, and kheer.
- Evaporated products -Standards, types and method of manufacture of Condensed and Dried Milks.

UNIT-III: Fermented, Frozen and By products of Milk

- Fermented Milk products - Types of starter cultures, Role of starters in the preparation of various fermented milks and Types of fermented products – Yoghurt/Curd, Buttermilk and Kefir preparation.
- Cheese - Definition, standards and classification of cheese, Manufacture of different varieties of cheese.
- Ice cream - Definition, classification and composition and standards of ice cream and other frozen desserts, Stabilizers and emulsifiers-their classification.
- By products utilization - Various types of by-products, utilization of dairy by-products, processing and its application.

UNIT-IV: Advances in Dairy Technology

- Application of Membrane Technology (ultrafiltration, monofiltration, microfiltration, reverse osmosis, ion exchange and electrodialysis processes) in Fluid Milk Processing
- Irradiation of Milk
- Application of Stabilizers and Emulsifiers in Dairy Products

PRACTICALS:

1. Platform tests in milk (Acidity, COB, MBRT, Specific gravity and SNF)
2. Preparation of traditional Indian dairy products: Khoa-Basundi
3. Preparation of fermented milk products: Yoghurt/Curd-Buttermilk
4. Product development with bi-products of milk.
5. Visit to Dairy industry.

REFERENCES:

1. De, S. (1980). Outlines of dairy technology. *Outlines of dairy technology*.
2. Smit G. 2003. Dairy Processing – Improving Quality. CRC-Woodhead Publ.
3. Tamime, A. Y. (Ed.). (2008). *Structure of dairy products*. John Wiley & Sons.
4. Walstra, P. (1999). *Dairy technology: principles of milk properties and processes*. CRC Press.
5. Edgar, S., & Axel, M. (2017). *Milk and dairy product technology*. Routledge.

Course Outcomes - After the completion of the course, the students will be able to:

- CO1.** Gain knowledge of milk composition, types and grades of milk.
- CO2.** Comprehend the technology of processing of milk and milk products.
- CO3.** Apprehend the manufacturing and quality analysis of different dairy products.
- CO4.** Perceive hygiene and sanitation practices in dairy industry.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3											3	3	3
CO2	3		2	2	3							3	3	3
CO3	3	2	3		3	1		2	1	1	2	3	3	3
CO4	3	2						3		3	2	3	3	3

High-3, Medium-2, Low-1

CORE COURSE

FTE: 203-B: BASIC FOOD ENGINEERING

Course Objective To enable the students to:

1. Understand the basic Principles of food engineering.
2. Describe the types and properties of Refrigeration systems
3. An insight of agro processing equipment's like pasteurizer, spray drier and sealing equipment.
4. Enumerate processing equipment's and maintenance of processing equipment's

THEORY

UNIT-I: Basic Principles of Food Engineering

- Engineering properties of food materials: physical, thermal, aerodynamic, mechanical, optical and electromagnetic properties.
- Units, Dimensions and Conversions: Unit Operations, design of food process equipments, elements of measuring instruments- machine elements and electrical elements.

UNIT-II: Basics of Vapor Compression Cycle:

- Properties of steam and Moist air- Boilers operation, Pressure vessels.
- Evaporators-Types of Evaporators Boiler house and workshop.

UNIT-III: Refrigeration and Freezing in Food Industry

- Parts and Functions of a Refrigerator. Refrigeration Cycle. Types of Refrigerants. Concept of Refrigerator Load (one ton, etc.).
- Cryogenic Freezing and Individual Quick Freezing (IQF)

UNIT-IV: Plant Designs

- Plant designs process designs development and general design considerations. Process economics: Economic feasibility of projects using order of magnitude cost estimates plant and equipment cost estimations, product cost estimations; batch vs continuous operations.
- Factors to be considered for location and layout of food plants. Regulatory requirements of food industries.

PRACTICALS:

1. Effectiveness of Different kinds of refrigerants and their potential applications.
2. Examination of heat transfer in food processing by convection and conduction methods.
3. Determination cooking and eating quality of IQF products.
4. Viscosity measurement of various food products to understand their rheological properties.
5. Plant layout and process designing for the various food processing industries.

REFERENCES

1. Berk, Z. (2018). Food process engineering and technology. Academic press.
2. Das, H. 2005. Food Processing Operations Analysis. Asian Books.
3. Rao, G.C. 2006. Essentials of Food Process Engineering. BS Publications.
4. Rao, M.A, S.S.H. Rizvi and A.K. Datta. 2005. Engineering Properties of Food, 3rd edn. Taylor and Francis

Course Outcomes- After the completion of the course, the students will able to:

CO1 Ability to apply principles of food engineering in industry.

CO2 Able to operate Food processing equipment

CO3 Acquaint with refrigeration system and material handling.

CO4 Gain an insight of agro-processing equipment and handling techniques.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3	3						3	3	3
3CO2	2				3	3						3	3	3
CO3	2				3							3	3	3
CO4	2				3					2		3	3	3

High- 3, Medium- 2, Low- 1

FTE-204: PRACTICAL-III: (202+203)

FTE-202: A-Food Processing and Preservation Technology

(OR)

B-Fermentation Technology

+

FTE-203: A-Dairy Technology

(OR)

B-Basic Food Engineering

SKILL ORIENTED COURSE

FTE: 205-A: FOOD SAFETY AND QUALITY CONTROL

(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

Course Objectives -To enable the students to:

1. Understand the current food safety standards rules and regulations.
2. Gain knowledge on desirable and undesirable constituents and contaminants in foods.
3. Critically explains on subjective and objective methods.
4. Develop skills for quality analysis and quality assurance of food quality

THEORY

UNIT-I: Food Quality, Assessment and evaluation.

- Definition and Physico Chemical attributes.
- Subjective methods; Sensory/ Organoleptic evaluation-Difference, Preference and Scoring tests.
- Objective methods of evaluation.
- Chemical methods of evaluation.
- Microbial methods of evaluation.

UNIT-II: Food quality Standards

- Food Safety Standards Authority of India (FSSAI)- Rules and Regulations- Food products Standards and additive regulations, Prohibition and sales regulations, Packaging and Labelling regulations, Alcoholic beverages Regulations, Fortification food regulations, Food / Health supplements and Nutraceutical regulations and Organic food regulations.
- Food Licensing and Registration system
- International Food Safety Standards- ISO, CODEX, HACCP- Principles.

UNIT-III: Food Contaminants

- Food contaminants- Definition, Classification- Physical, Chemical, Biological Contaminants
- Unintentional /Undesirable constituents-Naturally occurring contaminants, Heavy metals, pesticide residues, products of microbial growth, Health hazards.
- Intentional/ Desirable constituents-chelating agents, acids, bases, buffer systems and salts; stabilizers, thickeners, polyhydrocalcinols, anticaking, firming, clarifying and bleaching agents; antioxidants, non- nutritional sweetness, antimicrobial agents, Gases and propellants.

UNIT-IV: Food contaminants and Standards of Quality

- Contaminants and quality standards in Milk and Milk products
- Contaminants and quality standards Fruit and Vegetable products
- Contaminants and quality standards Meat, Poultry, Eggs and Fish
- Contaminants and quality standards Fats and Oils

PRACTICALS:

Assessment of quality parameters and adulterants in different foods

1. Cereals, Pulses and Flours – Label information, detection of adulterants
2. Fats and oils – Label information, Adulterant tests, Iodine number and FFA Value
3. Fruit and vegetable products – Label information, Acidity , TSS, Sugars
4. Coffee and Tea, Honey – Label information, Detection of Adulterants
5. Milk and milk products- Label information, COB test, Acidity, MBRT, Detection of adulterants.

REFERENCES

1. VanishaNambiar. (2004). A Text book on “Food Contamination and Safety “ ANMOL Publications Pvt.Ltd. New Delhi .
2. S.N.Mahindru . (2004). Food Safety –Concept and Reality, APH Publishing corporation, Ansari road ,Darya ganj, New Delhi.
3. Rajesh Mehta and J.George . (2005). Food Safety Regulation concerns and Trade – The developing country perspective ,Mac millan India Ltd.
4. Amerine, M.A.,Pangborn RM, and Roessler BB. (1965). Principles of Sensory evaluation of foods”, Academic press New York.
5. The prevention of food adulteration Act, 1954 and Prevention of food adulteration Rules, 1955. (1998). Federation of Indian Industry, New Delhi.
6. Norman N. Potter, Joseph H. Hotchkiss (1996) “Food Science” 5thEdition.CBS Publishers and Distributors, New Delhi.
7. <https://www.fssai.gov.in>

Course Outcomes - After the completion of the course, the students will be able to:

CO1 Gain knowledge in current rules and regulations of food safety standards and quality assurance.

CO2 Identify the contaminants and additives in foods.

CO3 Select the appropriate analytical technique when presented with a problem.

CO4 Demonstrate practical proficiency in a food quality analysis.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3						3				3	3	
CO2	3	3						3				3	3	
CO3	3	2		1	3	1		3				3		3
CO4	3	2		1	3	1		3				3		3

3-High, 2- Medium, 1- Low

SKILL ORIENTED COURSE

FTE: 205-B: FOOD LAWS AND REGULATIONS

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Course Objectives-To enable the students to:

- To gain the knowledge with regard to the importance of Food Safety.
- To familiarize students with national and international laws governing food production, import and export.
- To analyze the safety operations involved in food system.
- To know the HACCP standards in different food industries.

THEORY

UNIT – I: Introduction

- Introduction to concepts of food quality, food safety, food quality assurance and food quality management;
- Objectives, importance and functions of quality control

UNIT – II: National and International Regulatory Agencies

- Role of national and international regulatory agencies, Bureau of Indian Standards (BIS), AGMARK, Food Safety and Standards Authority of India (FSSAI)
- International Food Standards- WHO- FAO-Codex Alimentarius Commission-ISO- Principles, Rules and Regulations
- International organization for standards (ISO) and its standards for food quality and safety (ISO 9000 series, ISO 22000, ISO 15161, ISO 14000)

UNIT – III: Quality Management

- HACCP; Quality manuals, documentation and audits; Export import policy, export documentation
- Total Quality Management; GMP & GHP; GLP, GAP; Sanitary practices
- Laboratory quality procedures and assessment of laboratory performance; Applications in different food industries

UNIT – IV: Adulterants and Contaminants

- Food adulteration: Definition, common adulteration in natural and processed foods.
- Food contamination-Physical, Chemical and Biological.
- Methods of detection of Physical, Chemical and Biological contamination.

PRACTICALS:

1. GHP and GMP in a Food industry
2. Developing the Process Flow sheet for the Food Establishment Including all the Inputs, Outputs and Interim Loops
3. Hazard Identification (Physical, Chemical and Biological)
4. Food Laws- Hygienic Requirements for Manufacturing Premises as Prescribed by Law
5. Visit to a nearby Food Establishment

REFERENCES:

1. Mathur, P. (2018). Food Safety and Quality Control. Hyderabad: Orient BlackSwan Pvt. Ltd.,
2. Jung H. Han, Innovations in Food Packaging, Academic Press, 2014.
3. Scott A. Morris, Food and Package Engineering, Wiley-Blackwell Publishing, 2011.

Course Outcomes-After completion of the course, the student should be able to

CO 1.To understand the regulations followed in various food industries.

CO 2.To define the food labeling patterns.

CO 3.To analyze the safety operations involved in food system

CO 4. To know the HACCP standards in different food industries.

CO-PO Mapping

Cours e	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	3						1	3	3			3
CO2						2			3			3
CO3						3		3	3			3
CO4						3		3	3			3

High-1, Medium-2, Low-1

SKILL ORIENTED COURSE

FTE: 206-A: BAKERY AND CONFECTIONARY TECHNOLOGY

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Course Objectives: To enable the students to:

- To acquaint students with the principles and role of ingredient in bakery
- To familiarize students with processing techniques, quality parameters, and nutritional comparisons of baked products.
- To learn about the various ingredients used in confectionery product.
- To study the technology & ingredients involved in production of confectionery product.

THEORY

UNIT-I: Science and Technology of Bakery

- Introduction, Types, Principles of bakery.
- Ingredients, enzymes, Additives, leavening agents and their role in Bakery products.
- Science and Technology of Baking process.
- Dough Rheology.

UNIT-II: Science and Technology of Confectionery

- Introduction, Types, Principles of Confectionery.
- Ingredients, Sweeteners, syrups, enzymes, Additives, and their role in confectionery products.
- Science and Technology of confectionery process.
- Crystallization.

UNIT-III: Process and Manufacturing of bakery and Confectionery Products

- Formulations, Methods of dough making, process and Manufacture of Breads.
- Process and Manufacture of cakes, cookies and other bakery products.
- Formulations, process and Manufacture of Sugar confectionery.
- Formulations, process and Manufacture of Chocolate confectionery.
- Health and Specialty bakery and Confectionery Products.

UNIT-IV: Standards and specifications of bakery and Confectionery Products

- Quality control of ingredients, additives and products of bakery.
- Quality control of ingredients, additives and products of Confectionery.
- FSSAI standards and specifications for bakery and confectionary products.

PRACTICALS:

1. Process and Preparation of bread and cakes.
2. Process and Preparation of cookies, Biscuits and other bakery products.
3. Process and Preparation Sugar confectionary.
4. Process and Preparation chocolate confectionary.
5. Process and Preparation Healthy bakery and confectionary products.

REFERENCES:

1. Dubey SC. 2002. Basic Baking. The Society of Indian Bakers, New Delhi.
2. Francis FJ. 2000. Wiley Encyclopedia of Food Science & Technology. John Wiley & Sons.
3. Manley D. 2000. Technology of Biscuits, Crackers & Cookies. Second Edition. CRC Press.
Pyler EJ. Bakery Science & Technology. Third Edition. Vols. I, II. Sosland Publ.
4. Qarooni J. 1996. Flat Bread Technology. Chapman & Hall.

Course Outcomes:

CO1. The student will gain an understanding of processing techniques utilized in the bakery and confectionery industry

CO2. The student will comprehend the role of convenience food technology as an important aspect of commercial foods.

CO3. Perform skills in qualitative and quantitative estimation of nutrients in different foods.

CO4. Prepare various food products including bakery and confectionary.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2										2	3	
CO2	3	2										1	3	
CO3	3		3									1		3
CO4	3			2	2							2		3

3-High, 2- Medium, 1- Low

SKILL ORIENTED COURSE

FTE: 206-B: BEVERAGE TECHNOLOGY

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Course Objectives-To enable the students to:

- Acquaint with the particulars of manufacturing industrial beverages.
- Familiarize with the quality requirements of bottled beverages.
- Get an overview on various techniques/methods in beverage technology.
- Equip with skills required for process and preserve various food products.

THEORY

UNIT-I: Introduction

- History and Status of Beverage Industry in India and globally.
- Classification and types of beverages.
- Beverage Ingredients and their Functions – sweeteners, bulking agents, acidulants, flavorings, preservatives.
- Role of enzymes and clarifying agents in beverage industry.

UNIT-II: Water

- Packaged Drinking Water – Manufacturing Process, Raw and Processed Water, and Water Treatment.
- Types of Bottled Water – Mineral Water, Spring Water, Flavored Water, Carbonated Water.
- Quality Standards of Bottled and Packaged Water.

UNIT-III: Carbonated and Non-Carbonated Beverages

- Carbonated Beverages - ingredients, processing techniques, and standards.
- Fruit- and Vegetable-based Beverages – ingredients, processing techniques, and standards.
- Synthetic Beverages - ingredients, processing techniques, and standards.
- Indigenous Beverages for Domestic and Commercial Use – sugarcane juice, cashew apple extract, coconut palm sap.
- Beverages used in the Sports Industry – types, ingredients, processing techniques, and standards

UNIT-IV: Alcoholic Beverages

- Distillation and Distilled Liquors – whisky, rum, gin, vodka, brandy.
- Fermentation and Fermented Alcohols – wine, ciders, sake.
- Carbonated Alcohols – beer, champagne.
- Indigenous Alcohol Production – urak, feni, toddy.

PRACTICALS:

1. Quality analysis of raw water.
2. Determination of brix value, pH and acidity of beverages.
3. Preparation of synthetic beverage.
4. Preparation of carbonated and non-carbonated beverages.
5. Visit to carbonation unit or mineral water plant.

REFERENCES:

1. Hui YH et al 2004. Handbook of Food and Beverage Fermentation Technology. Marcel Dekker.
2. Priest FG & Stewart GG. 2006. Handbook of Brewing. Second Edition. CRC.
3. Richard P Vine. 1981. Commercial Wine Making - Processing and Controls. AVI Publishing.
4. Varnam AH and Sutherland JP. 1994. Beverages: Technology, Chemistry and Microbiology.
5. Chapman & Hall. Woodroof JG and Phillips GF.1974. Beverages: Carbonated and NonCarbonated. AVI Publishing.

Course Outcomes:

CO1. Understand the processing techniques used in the beverage industry.

CO2. Comprehend the role of ingredients on beverage manufacture.

CO3. Apply appropriate technologies to process and preserve the beverages.

CO4. Gain knowledge on standards and specifications of beverages.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3											3	3	3
CO2	3		3		3		3		3		2	3	3	3
CO3	3	2	3	2	3					2		3	3	3
CO4	3	2	3	1	3	2	3		3		2	3	3	3

High-3, Medium-2, Low-1

FTE- 207: PRACTICAL-II: (105+106)

FTE: 205: A-Food Safety and Quality Control

(OR)

B-Food Laws and Regulations

+

FTE: 206: A-Bakery& Confectionary Technology

(OR)

B-Beverage Technology

FTE-208: INDIAN KNOWLEDGE SYSTEMS-II

FTE-209: INDIAN KNOWLEDGE SYSTEMS-2

SEMESTER-III
CORE COURSE

FTE:301: UNIT OPERATIONS IN FOOD INDUSTRY

Course Objective To enable the students to:

1. Understand the principle of Unit operation and machinery requirements for various food processing industries.
2. Learn important preliminary mechanical operations in food processing industries.
3. Know the different pre and post processing operations material handling of various food processing industries etc.
4. Impart knowledge on Safety, sanitation and establishment of food safety management systems in food industry.

THEORY

UNIT-I: Unit Operations and Machinery

- Unit operations and machinery requirement for different types of Food Industries and processing Units of
 1. Fruits and Vegetables,
 2. Cereals, Pulses and legumes,
 3. Oil seed processing,
 4. Milk and Milk products,
 5. Eggs, poultry and meat products,
 6. Fish and Sea foods,
 7. Beverages,
- Other management Systems in Food Industry: Power, Water and Man power.

UNIT-II: Mechanical Operations

- Size reduction: Introduction, Grinding and Cutting and required Equipment.
- Filtration: Definition, Different types of membranes used in filtration process.
- Mixing of liquids and solids: mixing equipment, mixing index & mixing time; Agitation and blending- types of agitators, Homogenization- Types of homogenizers.

UNIT-III: Material Processing and Handling

- Storage systems- Classification and types, Operations, Applications, advantages and disadvantages
- Conveyor systems- Classification and types, Principles and their operations, Applications, advantages and disadvantages.
- Elevator systems- Classification and types, Principles and their operations, Applications, advantages and disadvantages.

UNIT-IV Food Safety & Sanitation

- Food safety operations: Safety and sanitation -Plant Safety and Plant Hygiene, Personal Hygienic Practices.
- Food Safety Management Systems (FSMS)- Prerequisite Programmes (PRPs), Maintenance of HACCP, Good Manufacturing Practices (GMP), Implementation of ISO-9000, 22000 series, CIP and COP

REFERENCES

1. Saravacos, G. D., &Kostaropoulos, A. E. (2002). *Handbook of food processing equipment* (Vol. 2012, pp. 331-381). Kluwer Academic/Plenum.
2. Earle, R. L. (2013). *Unit operations in food processing*. Elsevier.
3. Ranken, M. D. (Ed.). (2012). *Food industries manual*. Springer Science & Business Media.
4. Ahmed, J., & Rahman, M. S. (Eds.). (2012). *Handbook of food process design, 2 Volume Set*. John Wiley & Sons.
5. Lelieveld, H. L., &Motarjemi, Y. (Eds.). (2013). *Food safety management: A practical guide for the food industry*. Academic Press.
6. Swainson, M. (2018). 3 The food safety and quality management system (FS & QMS). *Swainson's Handbook of Technical and Quality Management for the Food Manufacturing Sector*, 29.

Course Outcomes- After the completion of the course, the students will able to:

CO1Understand and comprehend the principle of unit operations in food industry

CO2Operate important preliminary operations in food processing industries

CO3Skilled up with various pre and post processing material handling operations.

CO4Gain knowledge on apply various food safety management systems to run various food processing industries.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3							3	3	3
CO2	3				3	1						3	3	3
CO3	3	2						1				3	3	3
CO4	3				3							3	3	3

High- 3, Medium- 2, Low- 1

CORE COURSE

FTE: 302-A: FRUIT AND VEGETABLE TECHNOLOGY

Course Objectives- To enable the students to:

1. Attain an overview on the classification and composition of fruits and vegetables.
2. Acquaint with the post-harvest handling technologies of fruits and vegetables to reduce postharvest losses and their value addition.
3. Skill up with the knowledge of processing and preservation of fruits and vegetables.
4. Impart the expertise in Production and manufacture of fruits and vegetable-based food products and preserves.

THEORY

UNIT-I: Fruits and Vegetables

- Production and processing scenario of fruits and vegetables in India and world.
- Fruit and vegetable science: Definition, Classification, Morphology, Structure, Composition and Nutrition value.
- Maturity Indices and standards- Horticultural maturity, Physiological maturity, Maturity indices for various fruits and vegetables.

UNIT-II: Post Harvest Losses and management of Fruits and Vegetables

- Post harvest management: Importance and scope of post-harvest management, Causes of post-harvest losses, Impact of post-harvest losses.
- Post-harvest physiology: Ripening, Changes during ripening-physical, chemical & biological; Ripening of climacteric and non-climacteric fruits, Current ripening methods.
- Sites of post-harvest losses- Field level, transportation, storage, processing, packaging and marketing.

UNIT-III: Storage, Transportation and Handling

- Post Harvest Handling operations: Cleaning- Cleaning and washing of fruits and vegetables, types of cleaners; Sorting and grading- Sorting, grading, methods of grading- Size grading, Color grading, Specific gravity grading.
- Pretreatments of fresh produces- Chemical treatment, Waxing/Coatings, Pre-cooling, Curing, Vapor heat treatment, Irradiation.
- Technology of storage practices: Controlled atmosphere storage, Modified atmosphere storage, Hypobaric storage, Cold storage, Zero energy cool chambers.

UNIT-IV: Fruit and Vegetable Products

- **Fruit Products:** Definition, Manufacturing Process and Quality Standards of Fruit pulp, puree, concentrate, Soft drinks, Jams, Jellies, Marmalades, Preserves, Candied Fruits, Bars, Dehydrated Fruits.
- **Vegetable Products:** Definition, Manufacturing Process and Quality Standards of Vegetable Products- Shredded vegetables, Pickles, Tomato puree, Paste, Ketchup, Sauce, and Dehydrated vegetables.

PRACTICALS:

1. Vegetable and fruit Maturity Indexes at post harvesting stage.
2. Physical & chemical tests and pretreatments for the fruits and vegetables
(A) (i) Check for Firmness of fruits and vegetables by Penetrometer, (ii) Estimation of total soluble solids (TSS), (iii) Estimation of pH and acidity of various fruits.
(B) Pretreatments of fruits and vegetables by chlorine solution, sulfite solution, acidic solution.
3. Fruit ripening and delay process.
(A) Ripening by ethylene.
(B) Delay fruit ripeness with calcium carbide (CaC_2) and silver nitrate (AgNO_3).
4. Fruit Juice/Pulp Extraction and Concentration- Preparation of Jams, Jellies & squash .
5. Visits to fruit and vegetable processing industries.

REFERENCES

1. Vainio, H., & Bianchini, F. (Eds.). (2003). *Fruit and vegetables* (Vol. 8). IARC.
2. Jacob, P. (2008). *A handbook on post harvest management of fruits and vegetables*. Daya Books.
3. Tiwari, U., & Cummins, E. (2013). Fruit and vegetables. *Handbook of plant food phytochemicals*. Wiley-Blackwell, Chichester, United Kingdom, 107-137.
4. Thompson, A. K. (2008). *Fruit and vegetables: harvesting, handling and storage*. John Wiley & Sons.
5. VijayaKhader. (2004). *Preservation of fruits and Vegetables*, 2nd edition, Kalyani publishers, Ludhiana.
6. GirdhariLal, G.S. Siddappa & G.L. Tandon. (1998). *Preservation of Fruits and Vegetables*. ICAR, New Delhi.
7. Srivastava.P.R. and Sanjeev Kumar. *Fruit and vegetable preservation* - 3rd Edition. International Publishers, Delhi.

Course Outcomes - After the completion of the course, the students will able to:

CO1 Apply Post-Harvest handling technologies to reduce the postharvest losses.

CO2 Learn the processing and preservation methods to prevent the spoilage of Fruit & vegetables.

CO3 Develop various Fruits & vegetables based products and preserves

CO4 Assess the quality of fruit and vegetables and their products.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3		3	3							3	3	3
CO2	3			3	3							3	3	3
CO3	3	3	3	2	3	2			2	3		3	3	3
CO4	3	3		2	3	2		2	2		3	3	3	3

High- 3, Medium- 2, Low- 1

CORE COURSE

FTE: 302-B: NUTRITION DURING LIFE SPAN

Course Objectives - To enable the students to:

1. Gain knowledge on the importance of nutrition during life span.
2. Enlighten the principles and working applications during dietary modifications.
3. Comprehensive knowledge on analyzing the nutritional requirements.
4. Apply Computational skills in the Nutritional allowances during life span.

THEORY

UNIT-I: Nutrition during Pregnancy & Lactation:

- Nutrient requirement during pregnancy, intake and gaps, prenatal and antenatal nutritional importance, metabolic adjustments in pregnancy.
- Nutrition intervention and pregnancy outcome, Nutritional management, problems and Complications.
- Nutritional requirements during lactation, physiology of milk production, effects of lactation on Nutrition composition of Human-Milk,
- Factors affecting breast milk quality and comparative advantages & disadvantages of breast and formula feeding.

UNIT-II: Nutrition during Infancy & Early child hood period:

- Nutritional requirements, concerns and overall development during Infancy.
- Need for infant formulae, types of infant formulae, care in Preparation, and importance of preparation of weaning foods.
- Home prepared versus commercial weaning foods, Feeding problems-Lactose and cow's milk protein intolerance.
- Pre-school children: Age, growth & development, nutrient requirements, Intake and gaps. Effects of Macro & Micro nutrient malnutrition on physical and mental development.

UNIT-III: Nutrition during School-going children & Adolescents:

- Dietary patterns and factors to be considered. Implications of childhood obesity and other nutritional concerns. Healthy food choices during childhood.
- Growth during adolescence, nutritional requirements, hormonal influences, age of menarche-factors affecting, physiological problems and nutritional issues in adolescence.
- Nutritional requirements and RDA. Behavioural characteristics and feeding problems.

UNIT-IV: Nutrition during adulthood and old age:

- Nutritional requirements for adult man and woman. Nutritional concerns, RDA, nutritional guidelines and work efficiency. Physiological changes in aging, effects of aging on nutritional health.
- Modification in diet, feeding old people. Nutritional concerns in old age and their management.

PRACTICALS:

1. Planning and preparation of diet for Pregnant and Lactating women.
2. Planning and preparation of weaning foods.
3. Planning and preparation of diet for Pre-school, School going child.
4. Planning and preparation of diet for Adolescent and Adult.
5. Planning and preparation of diet for old age.

REFERENCES

1. Seth V and Singh K. Diet planning through life cycle: Part 1. Elite publishing house pvt ltd, New Delhi. 2006.
2. Mahtab S. Bamji, Kamala Krishna Swamy and G N V Brahmam. Text book of Human Nutrition. Oxford and IBH Publishing, New Delhi. 2009.
3. Michelle McGuire, Kathy A Beer Man. (2011). Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA
4. Shils, M.E., Olson, J.A., Shike, N. and Ross, A.C.(Ed)(1999). Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.
5. Whitney, E.N. and Rolfes, S.R.(1999). Understanding Nutrition, 8th Edition, West/Wadsworth, An International Thomson Publishing Co.

Course Out comes- After completion of this course, students will be able to:

CO1 Acquire knowledge on nutritional requirements at various stages.

CO2 Apply the knowledge of nutrition during planning and preparation of diet.

CO3 Assess and compare diet and nutritional requirements relative to age, developmental and disease status.

CO4 Evaluate nutrition products for composition, quality, and appropriateness of use and formulate dietary interventions to address nutritional deficiencies.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PS
CO1	3	3		2			2					2	3	
CO2	3	3	3	2			3					2	3	
CO3	3	3	3	2					2			2		3
CO4	3	3	3	2			3		2			2		3

3-High, 2- Medium, 1- Low

CORE COURSE

FTE: 303-A: LIVE STOCK AND SEA FOOD TECHNOLOGY

Course Objectives- To enable the students to:

1. Understand the grades, structure, composition and nutritional quality of various livestock and seafood
2. Comprehend the slaughtering, carcass processing, post-mortem changes.
3. Illustrate the processing technology of meat, poultry, fish and eggs.
4. Develop skills in value addition of meat, fish and poultry products.

THEORY

UNIT-I: Fresh Meat Technology:

- History and development of meat industry, Current status of meat industry.
- Judging, grading and anatomy of live meat animals (Buffalo, Sheep, Goat, Pigs).
- Structure, composition and essential nutrients of flesh foods.
- Stunning, slaughtering and dressing operations of food animals, Different types of muscle cuts.
- Antemortem changes; Post mortem changes- Pre rigor processing, Rigor mortis; Factors influencing meat quality; PSE and DFD in meat quality.

UNIT-II: Meat Processing and preservation

- Modern Meat Processing: Comminution, Emulsification, Meat extension, Pre-blending, Hot processing.
- Principles of Meat Preservation: Moisture Control, Temperature Control, Microbial control.
- Preservation of meats by chemical agents and advanced technologies.

UNIT-III: Egg and Poultry Products Technology:

- Preservation and maintenance of egg: Egg cleansing, Oil treatment, Cold storage- Thermo stabilization, Immersion in liquids.
- Candling and Grading of eggs, Quality identification of shelled eggs and factors influencing the quality
- Pre-slaughter handling, transportation and primary and secondary processing of poultry.
- Processing and preservation of poultry meat products.

UNIT-IV: Sea Food Technology

- Present status of Fish, Shrimp and Prawns processing in India.
- Classification of Fish, commonly cultivated fish, shrimp and prawns; Selection, Grading and Procurement of fish, Shrimp and Prawns.
- Processing and preservation of fish and shrimp- Canning, Individual Quick freezing (IQF), Curing, Smoking and Drying of fish; Antibiotics used in the processing of fish and shrimp.
- Different types of fish and shrimp products- IQF fish fillets, IQF shrimp, Cooked IQF shrimp.
- Utilization of fish processing waste.

PRACTICALS:

1. Processing and identification of different types of meat cuts (Pig, Goat, Chicken) and Mincing processing of meat and preparation of various meat products-Chicken patties, meat balls.
2. Preservation of meats by chemicals & antibiotics.
3. Grading and candling of eggs- Determination of air sac size, Determination of egg integrity, Identification of fertilized eggs,
4. Physical quality inspection and safety of fish & shrimp
5. (i) Identification of different body parts and deveining of shrimp.
(ii) preparation of different processed commercial products- IQF shrimp, cooked IQF shrimp, IQF fish fillets.

REFERENCES

1. Varnam, A., & Sutherland, J. P. (1995). *Meat and meat products: technology, chemistry and microbiology* (Vol. 3). Springer Science & Business Media.
2. Ranken, M. D. (2000). *Handbook of meat product technology* (Vol. 246). Oxford: Blackwell science.
3. Sahoo, J., & Chatli, M. K. (2015). *Textbook on Meat, Poultry and fish technology*. Daya Publishing House.
4. Nychas, G. J. E., Marshall, D. L., & Sofos, J. N. (2007). Meat, poultry and seafood. *Food microbiology: fundamentals and frontiers*, (Edn. 3), 105-140.
5. Thornton, H. (1952). Textbook of meat inspection. Including the inspection of rabbits, poultry and fish. *Textbook of meat inspection. Including the inspection of rabbits, poultry and fish.*, (2nd Edit).

Course Outcomes- After the completion of the course, the students will able to:

CO1Acquire knowledge of the structure, composition, nutritional quality of various, livestock and seafood.

CO2Understand the slaughtering, carcass processing methods used for processing meat.

CO3Gain an insight of the concept and methods of processing technology of meat, poultry and fish.

CO4Prepare various value-added products of egg, meat, poultry and sea foods.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	3
CO2	3										3		3	3
CO3	3				3				2		1	3	3	3
CO4	3				3			2			2	3	3	3

High-3, Medium-2, Low-1

CORE COURSE

FTE: 303-B: FOOD TOXICOLOGY

Course Objectives- To enable the students to:

5. Know the basic principles of food toxicology.
6. Study the qualitative and quantitative analysis of various food toxicants.
7. Study the natural toxins present in animal food materials.
8. Study the natural toxins present in plant food materials.

THEORY

UNIT-1: Principles of Toxicology

- Definition and Scope.
- Dose-response.
- Safety
- Absorptions.
- Translocation.
- Storage.
- Excretion.
- .

UNIT-II: Natural Toxins in Animal Foods

- Toxins occurring in animal liver: bile acids, vitamin A.
- Toxins occurring in marine animals: scombroid poisoning, saxitoxin, tetramine, pyropheophorbide-A, tetrodotoxin, ciguatoxin.

UNIT-III: Natural Toxins in Plant Foods

- Natural goitrogens-mode of toxic action.
- Cyanogenic glycosides-cyanide toxicity.
- Favism.
- Lathyrism.
- Lecitins/Hemagglutinins.
- Enzyme inhibitors-protease inhibitors, cholinesterase inhibitors.
- Vasoactive amines.
- Mutagens in natural plants.

UNIT- IV: Determination of Toxicants in Foods

- Qualitative and quantitative analysis of toxicants in foods.
- Sample preparation for the determination of toxicants in foods: sampling, extraction, cleanup, chromatography.
- Toxicity testing: acute toxicity, genetic toxicity, metabolism, chronic toxicity, sub-chronic toxicity, teratogenesis

PRACTICALS:

1. Estimation of free amines in marine foods.
2. Different processing techniques to eliminate the goitrogens in various plant foods.
3. Sampling and extraction preparation techniques for the estimation of toxic substances.
4. Estimation of glycosidic amines through the gas chromatography (GC).
5. Screening and documentation of different types of food toxicants and their effect on food trade and human health.

REFERENCES

1. Shibamoto, T., & Bjeldanes, L. F. (2009). Introduction to food toxicology.
2. Sachan, A., & Hendrich, S. (Eds.). (2017). Food toxicology: current advances and future challenges.
3. Gupta, P. K. (2016). *Fundamentals of toxicology: essential concepts and applications*. Academic Press.
4. Hathcock, J. (Ed.). (2012). *Nutritional Toxicology V1* (Vol. 1). Elsevier.
5. Nikinmaa, M. (2014). *An introduction to aquatic toxicology*. Elsevier.

Course Outcomes - After the completion of the course, the students will able to:

CO1 Understand the basic principles and importance toxicology in foods.

CO2 Learn the qualitative and quantitative analysis of toxicants in various foods.

CO3 Understand the natural toxins present in the animal-based foods and their health risks.

CO4 Understand the natural toxins present in the plant-based foods and their health risks.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3		3	3							3	3	3
CO2	3			3	3							3	3	3
CO3	3	3	3	2	3	2			2	3		3	3	3
CO4	3	3		3	3	3		2	2		3	3	3	3

High- 3, Medium- 2, Low- 1

FTE-304: PRACTICAL - V: 302+303

**FTE-302: A- Fruit and vegetable Technology
(OR)**

B- Nutrition During Life Span

+

**FTE-303: A- Livestock and Sea food Product Technology
(OR)**

B- Food Toxicology

SKILL ORIENTED COURSE

FTE: 305-A: FOOD PRODUCT DEVELOPMENT AND COMMERCIALIZATION

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Course Objectives - To enable the students to:

1. Illustrate the new product categories in food market and their characteristics.
2. Elucidate the process of new food product development in food industry.
3. Exemplify various specialty food products and their applications.
4. Acquire the skill to design and development of new food product and analyze the quality of the product.

THEORY

UNIT- I: New Food Products

- New food product: Definition, Characteristics, Need for New food product development.
- Classification of new food products: Line extensions - Repositioning of existing products - New form of existing product - Reformulation - New packaging - Innovative products - Creative products and Value added products.

UNIT-II: New Food product development Process

- Ideation/Idea generation, Concept development, Consumer research, Product design and Formulation.
- Process development: Prototype development and scale up.
- Quality assessment of new developed products: Sensory Evaluation, Shelf-Lifestudies.
- Packaging and labeling.

UNIT-III: Food Product Commercialization and Marketing

- Costing and Pricing, Test Market, Product launching, Product life cycle.
- Entrepreneurship, concept, Types, qualities and functions of an entrepreneur.
- Ethics and Intellectual property/ Patents in food product development.
- Artificial Intelligence in Food product development

UNIT-IV: Food Products with reference to

- Traditional Foods.
- Health foods, Medical foods, Therapeutic foods, Herbal foods, Fortified foods.
- Infant foods, Geriatric foods, Sports drink.
- Functional foods, Designer foods and Nutraceuticals.
- Probiotics, Prebiotic and Symbiotics.

PRACTICALS:

New Food Product Development and Marketing

1. Ideation and Concept Development.
2. Formulation and Standardization.
3. Sensory evaluation
4. Shelf life Studies.
5. Food and Nutrition labeling and packaging.

REFERENCES:

1. Debashri, Ray.(2002). *Nutritional Challenge and Total Quality Management*, 1stedition;Sarup and Sons, New Delhi.
2. Gordon W.Fuller (2011), *New Food Product development*, 3rd edition, CRC press, Newyork.
3. Howard R.Moskowitz,(2009), *An integrated approach to new product development*, CRC press, Newyork.
4. Man, C.M.D. and Jones, A.A.(1994).*Shelf life Evaluation of Foods*, Blackie Academic and Professional, London.
5. Mike Stringer and Colin Dennis.(2002). *Chilled foods A comprehensive guide*, 2ndedition ,Woodhead publishing limited, Cambridge, England, 2000.
6. Oickle, J.G. (1990).*New Product Development and Value Added*, Food Development Division Agriculture, Canada.
7. <https://www.fssai.gov.in>

Course Outcomes - After the completion of the course, the students will be able to:

CO1 Apply a product development process to generate ideas, develop concept to test market.

CO2 Design food and nutritional label of food products.

CO3 Demonstrate the skills to conduct the organoleptic evaluation of food product.

CO4 Work collaboratively with a team in food product development.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		3		3	3	3		3	3	3	3	3	3
CO2	3		3		2		3	2	3		3	3	3	3
CO3	3		3		3	3				1	3	3	3	3
CO4	2		3			3	3		2		3	3	3	3

3-High, 2- Medium, 1- Low

SKILL ORIENTED COURSE

FTE: 305-B: FOOD WASTE MANAGEMENT

(Common to MS Food Technology and M.Sc. Food Science Nutrition & Dietetics Course)

Course Objectives: To enable the students to:

- Know about the different wastes that are producing by the various food industries.
- Understanding of problems of food processing industrial waste.
- Become aware of Environment and health impacts food wastemismangement.
- Understand engineering, financial and technical options for wastemangement.

THEORY

UNIT-I: Introduction

- Definition, Classification, nature, disposal practices, impacts on environment and economy;
- Types of food processing wastes; Types, availability and utilization of by-products of cereals, legumes and oilseeds, fruits and vegetables processing industries, sugar and agro based industries waste. Solid waste management. Waste water characteristics and treatment methods.

UNIT-II: Forms of Waste from Industries

- Concept, scope and maintenance of waste management and effluent treatment
- Temperature, pH, Oxygen demands (BOD & COD), fat, oil and grease content, metal content
- Forms of phosphorous and Sulphur in waste waters, microbiology of waste, other ingredients like insecticide, pesticides and fungicides residues

UNIT-III: Process of Waste

- Waste treatment and disposal, design, construction, operation and management of institutional community and family size biogas plants, concept of 57ermin-composting,
- Pre-treatment of waste: sedimentation, coagulation, flocculation and floatation, Secondary treatments: trickling filters, oxidation ditches, activated sludge process, rotating biological contractors, lagoons.

UNIT-IV: Utilization of Waste

- Waste utilization in various industries, furnace sand boilers run on agricultural wastes and by products
- Briquetting of biomass as fuel, production of charcoal briquette, generation of electricity using surplus biomass, producer gas generation and utilization.

PRACTICALS:

1. Categorize food waste into avoidable and unavoidable waste.
2. Analyze the sources of food waste and Propose strategies to reduce waste.
3. Process to set up a composting system and monitoring the composting process.
4. Investigation of portion control, food preservation, and reprocessing of leftovers and their impact on waste reduction.
5. Review existing local, national, or international food waste policies and Assess the effectiveness of these policies.

REFERENCES:

1. Kreit F & Goswami DY, Energy Management and Conservation Handbook. CRC Press, 2nd edition, 2016
2. Amihud Kramer, Bernard A. Twigg, 2017: Quality control for the food industry, Fundamentals & Applications, Volume 1, 3rd Edition, Medtech Scientific International Ltd., Kolkata
3. Patrick DR., Fardo SW, Richardson RE & Steven, Energy Conservation Guidebook. The Fairmont Press, 3rd edition, 2015
4. Dev raj, Rakesh Sharma and V K Joshi, 2011: Quality control for value addition in food processing, Newindia publishing agency, Pitam Pura, New Delhi.
5. Arvanitoyannis I. 2007. Waste Management for the Food Industries. First Edition. Academic Press.

Course Outcomes:

CO 1. The student will be able to apply the principles of microbiology and biotechnology in handling wastes produced by the food industry

CO 2. The student will be able to develop processes for utilization of food waste.

CO 3 Perform skills in estimation required parameters in different samples.

CO 4 Gain the knowledge in conversion of by-products into useful products.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3			3	3	3	3	3	3	3	3	3
CO2	2		2	2		3	3				3	3	3	3
CO3	2					3	3			2	3	3	3	3
CO4	3	3	3	2	3	3	3	3	3	3	3	3	3	3

High-3, Medium-2, Low-1

SKILL ORIENTED COURSE

FTE: 306-A: FOOD PACKAGING

Course Objective-To enable the students to:

1. Provide knowledge on packaging and packaging materials
2. An overview of the scientific and technical aspects of food packaging.
3. Enable the students to understand the regulations of packaging and packaging material testing.
4. Apply the new innovations in food packaging to improve product stability and/or to extend the product shelf-life.

THEORY

UNIT- I: Introduction of Packaging Materials

- Introduction, Principles and Functions of Packaging
- Type of packaging materials: Paper and Paperboard, Plastics and thermos foams, Glass, Metals and composite laminates-Tetra pack
- Primary, Secondary, Tertiary packaging materials; Packaging equipment;

Unit-II: Food and Packaging:

- Selection of packaging material for different foods.
- Packaging-Food Interactions: Flavor absorption, Migration, Permeation, Sorption; Nutrient loss, Role of the food matrix, Role of differing packaging materials.
- Factors effecting the food packaging interactions- Composition of packaging material, Properties of food material, storage conditions.

Unit-III: Graphics and Packaging Design

- Introduction, Packaging and modern merchandising.
- Functions of packaging graphics: Brand identity, Product information and Communication, labeling protocols and standards.
- Packaging Design: Importance, Packaging Structure, Convenience, Functional Features, Brand Representation, Sustainability and Impact on consumer attraction.

UNIT- II: Advanced Food Packaging System

- Active and Intelligent Packaging Techniques: Active packaging technology, intelligent packaging technology, Consumers perception towards novel packaging systems.
- Aseptic Packaging Technology- Introduction, Technology, Applications, advantages and disadvantages, Suitable packaging materials.
- Packaging for high Pressure Processing- Introduction, Technology, Applications, Advantages and Dis advantages, Suitable packaging materials.
- Modified/Controlled Atmosphere Packaging technology (MAP/CAP)- Introduction, Technology, Applications, advantages and disadvantages, Suitable packaging materials.

PRACTICALS:

1. Classification of various packages based on material and rigidity.
2. Measurement of thickness of packaging materials.
3. Measurement of basic weight and grammage of paper and paperboards.
4. Measurement of water absorption of paper and paper boards (Cobb Test).
5. Measurement of grease resistance of papers.

REFERENCES

1. Emblem, A. (Ed.). (2012). *Packaging technology: Fundamentals, materials and processes*. Elsevier.
2. Piergiovanni, L., & Limbo, S. (2016). *Food packaging materials* (pp. 33-49). Basel, Switzerland:: Springer.
3. Yam, K. L. (Ed.). (2010). *The Wiley encyclopedia of packaging technology*. John Wiley & Sons.
4. Paine, F. A., & Paine, H. Y. (2012). *A handbook of food packaging*. Springer Science & Business Media.
5. Han, J. H. (Ed.). (2005). *Innovations in food packaging*. Elsevier.
6. Athavale, S. P. (2018). *Hand Book of Printing, Packaging and Lamination: Packaging Technology*. Notion Press.

Course Outcomes- After the completion of the course, the students will able to:

CO1Exposure about packaging, packaging materials and packaging methods.

CO2Comprehend the overview of the scientific and technical aspects of food packaging

CO3Acquire knowledge on regulations of packaging and testing.

CO4Able to utilize some of the new innovations in food packaging to improve product stability and/or to extend the product shelf-life.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		1									3	3	3
CO2	3		1					2			1	3	3	3
CO3	3		1					3			3	3	3	3
CO4		3	3		2			2	2	2	3	3	3	3

High- 3, Medium- 2, Low- 1

SKILL ORIENTED COURSE

FTE 306-B: Food Business Management

Course Objective To enable the students to:

1. Understand the principle components of food business management.
2. Learn important preliminary requirements for food business management and operation.
3. Know the deep elements of Entrepreneurship, Business Planning, Financial and Cost Management of various food business settings.
4. Impart knowledge on Marketing, Consumer behaviour, Quality aspects, sustainability & Innovations in advanced food business management.

THEORY

Unit I: Introduction to Food Business

- **Scope and classification of food businesses:** India and global perspective, Structure of the Indian and global food industry.
- **Role of food technologists in food business:** Scientific and technical strategies to improve the food business.
- **Emerging trends in food business:** organic, clean label, plant-based, ready-to-eat and lab grown foods.
- **Hybridization and advanced food business opportunities and future trends:** Smart food technologies, Alternative foods, Functional and personalized nutrition, Direct to consumer (D2C) and subscription type (Food as service (FaaS)), Cloud kitchen, Form to fork business models.

Unit II: Basics of Food Business Management

- **Principles of management:** planning, organizing, staffing, directing, and controlling; Basic requirements compensating elements for food business management.
- **Sources & Utilization:** raw materials, financial sources, human resources, infrastructure and utilities, technical knowledge sources, information & networking for marketing and distribution, waste utilization and sustainability.
- **Supply chain and logistics:** Supply chain management for perishable goods; Cold chain logistics and warehousing; Inventory control and distribution strategies; E-commerce and digital platforms in food marketing.

Unit III: Food Entrepreneurship, Business Planning, Financial and Cost Management

- Idea generation and feasibility analysis; Components of a food business plan; Project report preparation and techno-economic feasibility; Government schemes and funding agencies (e.g., MSME, PMFME, NABARD, APEDA).
- Basics of food business accounting; Cost analysis: fixed, variable, and break-even; Pricing strategies for food products; Budgeting and working capital management.
- **Human Resources & Management:** Definition, importance, functions of human resource management in food business.

Unit IV: Marketing, Consumer Behaviour, sustainability & Innovations

- **Fundamentals of marketing:** 4Ps in the context of food; Market segmentation, targeting, and positioning; Branding, packaging, and labeling strategies; Role of technology and digital transformation on food product marketing.
- **Consumer Needs & Market Dynamics:** Understanding the food consumer; Consumer behaviour and buying decision Process; Market research and consumer requirements; Responding and addressing consumer needs.
- **Sustainability and Innovation:** Waste management and valorization in food production; Role of technology and digital transformation; Innovations in product, process and business models.

Practicals:

1. Market Survey – Prepare a report on Micro, Small, Medium and Large Food Businesses.
2. Ideation- select a food business and report writing.
3. Functions and principles of management.
4. Visit to a small and medium Food Business centers.
5. Visit to a Food processing industry.

REFERENCES

7. Davis, B., Lockwood, A., Pantelidis, I., Alcott, P. (2013). Food and Beverage Management. United Kingdom: Taylor & Francis.
8. Food Production Management. United States, Canning Trade, 2007.
9. Mor, R. S., Kamble, S. S., & Sangwan, K. S. (Eds.). (2022). *Operations and Supply Chain Management in the Food Industry: Farm to Fork*. Springer Nature.
10. Entrepreneurial Finance: Planning And Managing Small Businesses. N.p., Academic Guru Publishing House.
11. Jongen, W.M.F., & Meulenbergh, M.T.G. (Eds.). (04 Sep. 2023). Innovation in agri-food systems. Leiden, The Netherlands: Wageningen Academic. <https://doi.org/10.3920/978-90-8686-666-3>.
12. Sustainable Food Supply Chains: Planning, Design, and Control Through Interdisciplinary Methodologies. United Kingdom, Elsevier Science, 2019.
13. Sustainable Food Systems from Agriculture to Industry: Improving Production and Processing. Netherlands, Academic Press, 2018.

Course Outcomes- After the completion of the course, the students will able to:

CO1 Understand and comprehend the principle of food business management

CO2 Operate important preliminary operations in food business strategies.

CO3 Skilled up with various Food Entrepreneurship, Business Planning, Financial and Cost Management plans.

CO4 Gain knowledge on apply various Marketing, Consumer Behaviour, Quality, sustainability & Innovations techniques in food business management.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3							3	3	3
CO2	3				3	1						3	3	3
CO3	3	2						1				3	3	3
CO4	3				3							3	3	3

High- 3, Medium- 2, Low- 1

FTE-307: PRACTICAL - VI: 305+306

FTE-305: A- Food Product Development and Commercialization

(OR)

B- Food Wastage Management

+

FTE-306: A- Food Packaging

(OR)

B- Food Business Management

FTE-308: Open Online Transdisciplinary Course -2

Or

Open Elective

SEMESTER-IV

OPEN ONLINE SKILL DEVELOPMENT COURSES

Or

FTE: 401-A: TECHNOLOGY OF SPICES, CONDIMENTS AND PLANTATION CROPS

Course Objectives - To enable the students to:

1. Identify various spices, condiments and plantation crops.
2. Learn post-harvest technologies and processing of spices, condiments and plantation crops.
3. Illustrate various value-added products of spices, condiments and plantation crops.
4. Perceive Standards, specifications, packaging and Quality control measures of spices, condiments and plantation crops.

THEORY

UNIT-I: Introduction

- Commercial value of Spices, Condiments, plantation crops and their products in global market.
- History, definition, classification and composition of spices, condiments and Plantain crops.
- Classification of Spices and condiments-based on parts used, aromatic origin, family and mixed: major and minor spices
- Post-Harvest Technology of spices, condiments and Plantain crops.
- Quality control measures of spices, condiments and plantation crops.

UNIT-II: Spices and condiments

- Production technologies and processing of Major - Pepper, Cardamom, Ginger, Red and Green Chilli, Turmeric and Minor Spices- Cumin, Coriander, Cinnamon, Fenugreek, Garlic, Nutmeg, Clove, Mint, Vanilla.
- Sources, Processing of Flavoring agents and extracts, Flavoring components and concentrates.
- Value added products of spices and condiments.

UNIT-III: Plantation crops-A

- Coffee: Bean processing – Grading, blending, roasting of seeds, grinding, brewing; Coffee varieties & processing - Decaffeinated Coffee, Instant Coffee, extraction, Dehydration, Aromatization; Plant and machinery for coffee processing.
- Tea: Tea processing- leaves gathering, Grading, leaf processing; Types of tea & processing - dust tea, black tea, green tea, Oolong tea, Instant tea; Plant layout and machinery for tea processing.

UNIT-IV: Plantation crops - B

- Cocoa – Production, Composition, Grading, Processing, Cocoa Products (cocoa mass, cocoa powder, cocoa butter, cocoa-based beverages, malted beverages, cocoa liquor)
- Coconut – Production, Composition, Grading, Post-Harvest Technology, Processing and Products (coconut milk, desiccated coconut).
- Cashew nut Harvesting and Processing

REFERENCES:

1. Parthasarthy, V.A., Chattopadhyaya, P.K., Bose, T.K. 2006, Plantation crops. Vol 1&2, NayaUdyog, Kolkata, India.
2. NIIR board of consultants and engineers. The complete book on spices and condiments, Asia pacific business press, New Delhi.
3. Panda H. Handbook on spices and condiments (cultivation, processing and extraction). ASIA PACIFIC BUSINESS PRESS Inc.; 2010 Oct 1.
4. Nair K. Minor Spices and Condiments. Springer International Publishing; 2021.
5. Raghavan S. Handbook of spices, seasonings, and flavorings. CRC press; 2006 Oct 23.

Course Outcomes - After the completion of the course, the students will be able to:

CO1. Gain an in-depth knowledge on spices and condiments and.

CO2. Apply post-harvest and processing technologies to improve the quality and safety of spices, condiments and Plantain crops.

CO3. Recommend Standards, specifications, packaging and Quality control measures of spices, condiments and Plantain crops.

CO4. Able to prepare various value added products of spices, condiments and Plantain crops.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3										1	3	3	3
CO2	3			1	2							3	3	3
CO3	3							3	3		2	3	3	3
CO4	3		3						3	3		3	3	3

High-3, Medium-2, Low-1

OPEN ONLINE SKILL DEVELOPMENT COURSES

Or

FTE-401-B: Food Quality Management System

Course Objectives - To enable the students to:

5. Impart the knowledge on Food Quality.
6. Provide in-depth knowledge in various Quality Management systems.
7. To analyze the safety operations involved in food system.
8. Develop skills for quality analysis and management of food quality.

THEORY

UNIT-I: Introduction

- Introduction to quality management - Definition, Scope, Significance and Objectives of Quality management;
- Dimensions of quality in foods, Food quality evaluation techniques,
- Quality control Vs Quality assurance.

UNIT-II: Quality Management

- Quality of raw materials, equipment's, quality assurance, ingredient inspection, process control, assessing products for quality.
- Quality control of packaged foods - Intrinsic, extrinsic and shelf life limiting factors.
- Building inspection and routine cleaning programs, process control, microbial and fungal contaminants.

UNIT- III: Operational Procedure in Quality Management

- Fundamentals of Operational Procedures in Food production, GMP, GHP, SOP.
- Management Procedures and HACCP.
- Introduction to Sensory Science and Consumer Evaluation, Panel Selection, Training and Performance Monitoring, Bias in Sensory Analysis, Food Flavor's & texture profile analysis.

UNIT-IV: Management Tools

- Seven old and new Quality management tools, Implementation procedure for ISO 22000, QMS, ISO 9000, BIS, APEDA and Six sigma certifications.
- AGMARK and Codex Alimentary Commission regulations.
- Packaging and labeling regulations for food products.
- Regulations for food products export and imports.

REFERENCES

1. VanishaNambiar. (2004). A Text book on “Food Contamination and Safety “ ANMOL Publications Pvt.Ltd. New Delhi .
2. Rajesh Mehta and J.George . (2005). Food Safety Regulation concerns and Trade – The developing country perspective ,Mac millan India Ltd.
3. <https://www.fssai.gov.in>
4. Amihud Kramer, Bernard A. Twigg, 2017: Quality control for the food industry, Fundamentals & Applications, Volume 1, 3rd Edition, Medtech Scientific International Ltd., Kolkata
5. Swainson, M. (2018). 3 The food safety and quality management system (FS & QMS). *Swainson's Handbook of Technical and Quality Management for the Food Manufacturing Sector*, 29.

Course Outcomes - After the completion of the course, the students will be able to:

CO1 Gain knowledge in current rules and regulations of food quality.

CO2 Select the appropriate analytical technique for quality Management.

CO3 Acquire knowledge on regulations of food quality.

CO4 Apply appropriate methods for food quality management.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3						2	3	3	3
CO2	3	2			3			1			2	3	3	3
CO3	3			2	3			3	3	2	3	3	3	3
CO4	3		3	3	3	2		3	3		3	3	3	3

High-3, Medium-2, Low-1

FTE-402: PROJECT WORK

Dissertation:

The students will be placed as Interns in Food Industries/ Research Institutes/ Quality Control Laboratories for a period of 3-4 months to carry out their project work and submit the dissertations/Thesis.

Seminar:

The student has to present the seminar based on the project work done in the presence of Department Research Committee.

Viva-voce:

The viva-voce will be conducted on the project at the end of the semester.

Model Question paper
SRI VENKATESWARA UNIVERSITY: TIRUPATI
M.Sc Home Science Degree Examination
First Semester
Specialization: MS Food Technology
(NEP for the students admitted from 2024-25 onwards)
FTE-101: COMMUNITY NUTRITION

Time:

Max Marks: 70

SECTION- A4x5=20Marks

Answer any FOUR of the Following
Each question carries 5 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION- B4x12.5 =50 Marks

Answer ALL questions
Each Question carries 12.5 Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI

M.Sc Home Science Degree Examination

First Semester

Specialization: MS Food Technology

(NEP for the students admitted from 2024-25 onwards)

FTE: 102-B: DYNAMICS IN FOOD PREPARATION

Time:

Max Marks: 50

SECTION- A 5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B 4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

Model Question paper
SRI VENKATESWARA UNIVERSITY: TIRUPATI
M.Sc Home Science Degree Examination
First Semester
Specialization: MS Food Technology
(NEP for the students admitted from 2024-25 onwards)
FTE: 103-A: FOOD MICROBIOLOGY AND SAFETY

Time:

Max Marks: 50

SECTION- A5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

Model Question paper
SRI VENKATESWARA UNIVERSITY: TIRUPATI
M.Sc Home Science Degree Examination
First Semester
Specialization: MS Food Technology
(NEP for the students admitted from 2024-25 onwards)
FTE: 103-B: FOOD HYGIENE AND SANITATION

Time:

Max Marks: 50

SECTION- A5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

Model Question paper
SRI VENKATESWARA UNIVERSITY: TIRUPATI
M.Sc Home Science Degree Examination
First Semester
Specialization: MS Food Technology
(NEP for the students admitted from 2024-25 onwards)
HSFS: 105-A: FOOD CHEMISTRY AND ANALYSIS

Time:

Max Marks: 50

SECTION- A 5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B 4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI

M.Sc Home Science Degree Examination

First Semester

Specialization: MS Food Technology

(NEP for the students admitted from 2024-25 onwards)

FTE: 105-B: FOOD ADDITIVES AND ADULTERATION

Time:

Max Marks: 50

SECTION- A5x2=10Marks

Answer any FIVE of the Following

Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B4x10=40 Marks

Answer ALL questions

Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI

M.Sc Home Science Degree Examination

Third Semester

Specialization: MS Food Technology

(NEP for the students admitted from 2024-25 onwards)

FTE: 106-A: CEREALS, LEGUMES AND OILSEED TECHNOLOGY

Time:

Max Marks: 50

SECTION- A 5x2=10Marks

Answer any FIVE of the Following

Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B 4x10=40 Marks

Answer ALL questions

Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12. (a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI
M.Sc Home Science Degree Examination
Third Semester
Specialization: MS Food Technology
(NEP for the students admitted from 2024-25 onwards)
FTE: 106-B: SNACK FOOD TECHNOLOGY

Time:

Max Marks: 50

SECTION- A 5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B 4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12. (a).

(or)

(b).

Model Question paper
SRI VENKATESWARA UNIVERSITY: TIRUPATI
M.Sc Home Science Degree Examination
Second Semester
Specialization: MS Food Technology
(NEP for the students admitted from 2024-25 onwards)
FTE: 201: RESEARCH METHODOLOGY IN BIOSCIENCES

Time:

Max Marks: 70

SECTION- A4x5=20Marks

Answer any FOUR of the Following
Each question carries 5 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION- B4x12.5 =50 Marks

Answer ALL questions
Each Question carries 12.5 Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI

M.Sc Home Science Degree Examination

Second Semester

Specialization: MS Food Technology

(NEP for the students admitted from 2024-25 onwards)

FTE: 202-A: FOOD PROCESSING AND PRESERVATION

TECHNOLOGY

Time:

Max Marks: 50

SECTION- A 5x2=10Marks

Answer any FIVE of the Following

Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION- B 4x10=40 Marks

Answer ALL questions

Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI

M.Sc Home Science Degree Examination

Second Semester

Specialization: MS Food Technology

(NEP for the students admitted from 2025-26 onwards)

FTE: 202-B: FERMENTATION TECHNOLOGY

Time:

Max Marks: 50

SECTION- A 5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B 4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI
M.Sc Home Science Degree Examination
Second Semester
Specialization: MS Food Technology
(NEP for the students admitted from 2025-26 onwards)
FTE: 203-A: DAIRY TECHNOLOGY

Time:

Max Marks: 50

SECTION- A 5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION- B 4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12. (a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI
M.Sc Home Science Degree Examination
Second Semester
Specialization: MS Food Technology
(NEP for the students admitted from 2025-26 onwards)
FTE: 203-B: BASIC FOOD ENGINEERING

Time:

Max Marks: 50

SECTION- A 5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION- B 4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12. (a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI

M.Sc Home Science Degree Examination

Second Semester

Specialization: MS Food Technology

(NEP for the students admitted from 2024-25 onwards)

FTE: 205-A: FOOD SAFETY AND QUALITY CONTROL

Time:

Max Marks: 50

SECTION- A5x2=10Marks

Answer any FIVE of the Following

Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B4x10=40 Marks

Answer ALL questions

Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI

M.Sc Home Science Degree Examination

Second Semester

Specialization: MS Food Technology

(NEP for the students admitted from 2024-25 onwards)

FTE: 205-B: FOOD LAWS AND REGULATIONS

Time:

Max Marks: 50

SECTION- A5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI

M.Sc Home Science Degree Examination

First Semester

Specialization: MS Food Technology

(NEP for the students admitted from 2024-25 onwards)

FTE: 206-A: BAKERY AND CONFECTIONARY TECHNOLOGY

Time:

Max Marks: 50

SECTION- A5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI
M.Sc Home Science Degree Examination
First Semester
Specialization: MS Food Technology
(NEP for the students admitted from 2024-25 onwards)
FTE: 206-B: BEVERAGE TECHNOLOGY

Time:

Max Marks: 50

SECTION- A 5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION- B 4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

Model Question paper
SRI VENKATESWARA UNIVERSITY: TIRUPATI
M.Sc Home Science Degree Examination
Third Semester
Specialization: MS Food Technology
(NEP for the students admitted from 2024-25 onwards)
FTE: 301: UNIT OPERATIONS IN FOOD INDUSTRY

Time:

Max Marks: 70

SECTION- A 4x5=20Marks

Answer any FOUR of the Following
Each question carries 5 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION- B 4x12.5 =50 Marks

Answer ALL questions
Each Question carries 12.5 Marks

- 9.(a).
(b). (or)
- 10.(a).
(b). (or)
- 11.(a).
(b). (or)
12. (a).
(b). (or)

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI

M.Sc Home Science Degree Examination

Third Semester

Specialization: MS Food Technology

(NEP for the students admitted from 2024-25 onwards)

FTE: 302-A: FRUIT AND VEGETABLE TECHNOLOGY

Time:

Max Marks: 50

SECTION- A5x2=10Marks

Answer any FIVE of the Following

Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B4x10=40 Marks

Answer ALL questions

Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12. (a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI

M.Sc Home Science Degree Examination

Third Semester

Specialization: M.Sc., Food Science Nutrition and Dietetics
(NEP for the students admitted from 2024-25 onwards)

FTE: 302-B: NUTRITION DURING LIFE SPAN

Time:

Max Marks: 50

SECTION- A 5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B 4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12. (a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI

M.Sc Home Science Degree Examination

Third Semester

Specialization: MS Food Technology

(NEP for the students admitted from 2024-25 onwards)

FTE: 303-A: LIVE STOCK AND SEA FOOD TECHNOLOGY

Time:

Max Marks: 50

SECTION- A5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12. (a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI
M.Sc Home Science Degree Examination
Third Semester
Specialization: MS Food Technology
(NEP for the students admitted from 2024-25 onwards)
FTE: 303-B: FOOD TOXICOLOGY

Time:

Max Marks: 50

SECTION- A 5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B 4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12. (a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI

M.Sc Home Science Degree Examination

Second Semester

Specialization: MS Food Technology

(NEP for the students admitted from 2024-25 onwards)

**FTE: 305-A: FOOD PRODUCT DEVELOPMENT AND
COMMERCIALIZATION**

Time:

Max Marks: 50

SECTION- A 5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION- B 4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI

M.Sc Home Science Degree Examination

Second Semester

Specialization: MS Food Technology

(NEP for the students admitted from 2024-25 onwards)

FTE: 305-B: FOOD WASTE MANAGEMENT

Time:

Max Marks: 50

SECTION- A5x2=10Marks

Answer any FIVE of the Following

Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B4x10=40 Marks

Answer ALL questions

Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI
M.Sc Home Science Degree Examination
Third Semester
Specialization: MS Food Technology
(NEP for the students admitted from 2024-25 onwards)
FTE: 306-A: FOOD PACKAGING

Time:

Max Marks: 50

SECTION- A 5x2=10Marks

Answer any FIVE of the Following
Each question carries 2 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B 4x10=40 Marks

Answer ALL questions
Each Question carries 10Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12.(a).

(or)

(b).

SRI VENKATESWARA UNIVERSITY:: TIRUPATI
Model Question paper
M.Sc (Home Science) Degree Examination
Third Semester
FTE-306-B : Food Business Management

Time: Hrs

Max: 50 Marks

Part – A

Answer any four questions

Each question carry 2 marks

(5x2=10 Marks)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Part – B

Answer all questions

Each question carry 10 marks (4X10= 40 Marks)

9. a)

(Or)

b)

10. a)

(Or)

b)

11. a)

(Or)

b)

12. a)

(Or)

b)

Model Question paper

SRI VENKATESWARA UNIVERSITY: TIRUPATI

M.Sc Home Science Degree Examination

Fourth Semester

Specialization: MS Food Technology

(NEP for the students admitted from 2024-25 onwards)

**FTE: 401-A: TECHNOLOGY OF SPICES, CONDIMENTS AND
PLANTATION CROPS**

Time:

Max Marks: 70

SECTION- A 4x5=20Marks

Answer any Four of the Following

Each question carries 5 marks

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

S ECTION- B 4x12.5=50 Marks

Answer ALL questions

Each Question carries 12.5Marks

9.(a).

(or)

(b).

10.(a).

(or)

(b).

11.(a).

(or)

(b).

12. (a).

(or)

(b).

SRI VENKATESWARA UNIVERSITY:: TIRUPATI
Model Question paper
M.Sc (Home Science) Degree Examination
Fourth Semester
OOSDC- Optional Paper
FTE-401-B: Food Quality Management System

Time: 3 Hrs

Max: 70 Marks

Part – A

Answer any four questions
Each question carry equal marks **(4X5=20 Marks)**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Part – B

Answer all questions
Each question carry equal marks **(4X12.5 = 50**

Marks)

9. a)

(Or)

b)

10. a)

(Or)

b)

11. a)

(Or)

b)

12. a)

(Or)

b)