KANNUR UNIVERSITY

FYUGP

FOOD TECHNOLOGY SYLLABUS

(w.e.f. 2024 Admission)

KANNUR UNIVERSITY

VISION AND MISSION

Vision

To establish a teaching, residential and affiliating University and to provide equitable and just access to quality higher education involving the generation, dissemination and a critical application of knowledge with special focus on the development of higher education in Kasargod and Kannur Revenue Districts and the Manandavady Taluk of Wayanad Revenue District.

Mission

- To produce and disseminate new knowledge and to find novel avenues for application of such knowledge.
- To adopt critical pedagogic practices which uphold scientific temper, the uncompromised spirit of enquiry and the right to dissent.
- To uphold democratic, multicultural, secular, environmental and gender sensitive values as the foundational principles of higher education and to cater to the modern notions of equity, social justice and merit in all educational endeavours.
- To affiliate colleges and other institutions of higher learning and to monitor academic, ethical, administrative and infrastructural standards in such institutions.
- To build stronger community networks based on the values and principles of higher education and to ensure the region‘s intellectual integration with national vision and international standards.
- To associate with the local self-governing bodies and other statutory as well as non- governmental organizations for continuing education and also for building public awareness on important social, cultural and other policy issues.

About the program

A four-year degree in Food Technology offers students a comprehensive understanding of the scientific principles and technological innovations crucial to the food industry. This program integrates disciplines such as food science, microbiology, chemistry, engineering, and nutrition to equip students with the skills necessary for the processing, preservation,

and distribution of food products. Throughout the curriculum, students delve into topics like food chemistry, food microbiology, food engineering, and food safety regulations. Practical training in laboratories and industry settings enhances their ability to apply theoretical knowledge to real-world challenges. Graduates of a four-year Food Technology degree are prepared for careers as food technologists, quality assurance managers, research scientists, and product developers in various sectors of the food industry, contributing to the advancement of food safety, quality, and innovation globally.

Graduates of Food Technology can pursue various career paths in the food industry, including roles such as food technologist, quality assurance manager, product development scientist, food safety specialist, research associate, and regulatory affairs officer. They may work in food manufacturing companies, research institutions, government agencies, or food consulting firms.

A four-year Bachelor of Science (Honors) in Food Technology program is designed to provide students with an in-depth understanding of the scientific principles, technological advancements, and regulatory frameworks crucial to the food industry. This specialized degree integrates disciplines such as food science, microbiology, chemistry, engineering, and nutrition, equipping students with comprehensive knowledge and practical skills needed for various roles within the field.

Graduate Attributes

Kannur University is fundamentally dedicated to nurturing well-rounded individuals with a comprehensive set of graduate attributes. Graduates from Kannur University emerge equipped with a multidisciplinary approach, allowing them to integrate knowledge across various domains for a holistic understanding of complex issues. With a strong emphasis on critical thinking and effective problem-solving skills, Kannur University's graduates demonstrate intellectual curiosity and the ability to tackle challenges creatively. Proficient in communication and social interaction, they engage adeptly in diverse settings, fostering Kannur University FYUGP – Regulations and Curriculum Framework - 2024 collaboration and effective interpersonal connections. Moreover, the graduates embody effective citizenship and leadership, showcasing a sense of responsibility, community engagement, and leadership qualities. With a global perspective, ethical grounding, and a commitment to environmental sustainability, our students are well-prepared for active participation in an

interconnected world. Embracing self-directed and lifelong learning, they continually adapt to evolving challenges, embodying the university's commitment to producing resilient, knowledgeable, and socially responsible individuals.

Program Outcomes (POs):

Program Outcomes (POs) serve as a foundational framework defining the skills, knowledge, and attributes that students at Kannur University are expected to acquire upon completion of a specific academic program. Tailored to the unique goals of each program, POs articulate the overarching learning objectives that guide curriculum design and assessment. These outcomes encompass a diverse range of competencies, including critical thinking, problem-solving, effective communication, and discipline-specific expertise. POs play a crucial role in shaping educational experiences, ensuring alignment with academic standards and industry expectations. By articulating clear and measurable expectations, POs contribute to the continuous improvement of academic programs and provide a roadmap for students to develop into well-rounded, competent professionals within their chosen fields.

PO1: Critical Thinking and Problem-Solving-Apply critical thinking skills to analyse information and develop effective problem-solving strategies for tackling complex challenges.

PO2: Effective Communication and Social Interaction-Proficiently express ideas and engage in collaborative practices, fostering effective interpersonal connections.

PO3: Holistic Understanding-Demonstrate a multidisciplinary approach by integrating knowledge across various domains for a comprehensive understanding of complex
issues.

PO4: Citizenship and Leadership-Exhibit a sense of responsibility, actively contribute to the community, and showcase leadership qualities to shape a just and inclusive society.

PO5: Global Perspective-Develop a broad awareness of global issues and an understanding of diverse perspectives, preparing for active participation in a globalized world.

PO6: Ethics, Integrity and Environmental Sustainability-Uphold high ethical standards in academic and professional endeavours', demonstrating integrity and ethical decision- making. Also acquire an understanding of environmental issues and sustainable practices, promoting responsibility towards ecological well-being.

PO7: Lifelong Learning and Adaptability-Cultivate a commitment to continuous self-directed learning, adapting to evolving challenges, and acquiring knowledge throughout life.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO1. To provide adequate knowledge and skills necessary for all levels of positions in the various sectors of the food industry across the world

PSO2. To provide required operational and managerial skills in Food Production, Distribution and Marketing.

PSO3. To develop the required skills in Accounts, Management, Entrepreneurship, Research Methodology

PSO4. The ability to apply and evaluate standard practices, Laws and regulation in food production

PSO5. To enhance the communication skills for a better career in the Food Industry.

PSO6. Develop the experimental and analytical skills in BSc Food Technology that can be of useful applications in allied areas of knowledge.

PSO7. To provide the basic knowledge in food safety, food science and nutrition

PSO8. Develop understanding of the fundamental concepts of BSc Food Technology needed for a deeper study of related fields of knowledge viz. Food Chemistry, Food Microbiology and Food Engineering etc

PSO9. Develop the skills to analyse preservation, processing, packaging and storage of foods

List of Courses (Category-wise)

Disciple Specific Core (DSC) courses (Major):

Sl. No	Semester	Course Code	Course Title	Credit				Hours/week				Marks		
				L*	T*	P*	Total	L	T	P	Total	CE	ESE	Total
1	I	KU1DSCFTY101	FUNDAMENTALS OF FOOD TECHNOLOGY	3	0	1	4	3		2	5	35	65	100
2	II	KU2DSCFTY104	FOOD PROCESSING AND PRESERVATION	3	0	1	4	3		2	5	35	65	100
3	III	KU3DSCFTY201	FOOD MICROBIOLOGY I	3	0	1	4	3	0	2	5	35	65	100
4		KU3DSCFTY202	FOOD CHEMISTRY	3	0	1	4	3	0	2	5	35	65	100
5	IV	KU4DSCFTY205	FOOD ANALYSIS I	2	0	2	4	2	0	4	6	35	65	100
6		KU4DSCFTY206	NUTRITION SCIENCE	3	0	1	4	3	0	2	5	35	65	100
7.		KU4DSCFTY207	TECHNOLOGY OF CEREALS, PULSES AND OILSEED	3	0	1	4	3	0	2	5	35	65	100
8	V	KU5DSCFTY301	TECHNOLOGY OF SPICES AND PLANTATION CROPS	3	0	1	4	3	0	2	5	35	65	100
9		KU5DSCFTY302	TECHNOLOGY OF FRUITS AND VEGETABLES	3	0	1	4	3		2	5	35	65	100
10		KU5DSCFTY303	ENTERPRENEURSHIP DEVELOPMENT	4	0	0	4	4		0	4	30	70	100
11	VI	KU6DSCFTY304	DAIRY TECHNOLOGY	3	0	1	4	3		2	5	35	65	100
12		KU6DSCFTY305	TECHNOLOGY OF ANIMAL FOOD	3	0	1	4	3		2	5	35	65	100
13		KU6DSCFTY306	BASICS OF FOOD ENGINEERING	4	0	0	4	4		0	4	30	70	100
14	VII	KU7DSCFTY401	FOOD MICROBIOLOGY II	3	0	1	4	3	0	2	5	35	65	100
15		KU7DSCFTY402	FOOD SAFETY AND FOOD LAWS	4	0	0	4	4		0	4	30	70	100
16		KU7DSCFTY403	FOOD PACKAGING TECHNOLOGY	3	0	1	4	3		2	5	35	65	100
17		KU7DSCFTY404	FOOD BIOCHEMISTRY	3	0	1	4	3		2	5	35	65	100
18		KU7DSCFTY405	FOOD INDUSTRY MANAGEMENT	4	0	0	4	4		0	4	30	70	100
19	VIII	KU8DSCFTY406	FOOD ANALYSIS II	3	0	1	4	3		2	5	35	65	100
20		KU8DSCFTY407	FOOD STORAGE AND INFESTATION CONTROL	4	0	0	4	4		0	4	30	70	100
21		KU8DSCFTY408	FOOD PROCESS ENGINEERING	3	0	1	4	3		2	5	35	65	100

Discipline Specific Core (DSC) courses (Minor):

Sl. No	Semester	Course Code	Course Title	Credit				Hours/week				Marks		
				L*	T*	P*	Total	L	T	P	Total	CE	ESE	Total
1	I	KU1DSCFTY102	PERSPECTIVES OF FOOD SCIENCE AND TECHNOLOGY	3	0	1	4	3	0	2	5	35	65	100
2		KU1DSCFTY103	FOOD MICROBIOLOGY	3	0	1	4	3	0	2	5	35	65	100
3	II	KU2DSCFTY105	FOOD SCIENCE AND NUTRITION	4	0	0	4	4	0	0	4	30	70	100
4		KU2DSCFTY106	FOOD PRESERVATION	3	0	1	4	3	0	2	5	35	65	100
5	III	KU3DSCFTY203	FOOD SAFETY AND HYGIENE	4	0	0	4	4	0	0	4	30	70	100
6		KU3DSCFTY204	CHEMISTRY OF FOODS	3	0	1	4	3	0	2	5	35	65	100

Discipline Specific Elective (DSE) courses:

Sl. No	Semester	Course Code	Course Title	Credit				Hours/week				Marks		
				L*	T*	P*	Total	L	T	P	Total	CE	ESE	Total
1	V	KU5DSEFTY301	FOOD SAMPLING AND INSPECTION	4	0	0	4	4	0	0	4	30	70	100
2		KU5DSEFTY302	FOOD PLANT OPERATIONS	4	0	0	4	4	0	0	4	30	70	100
3		KU5DSEFTY303	FOOD SAFETY SATANDARDS AND CERTIFICATION	4	0	0	4	4	0	0	4	30	70	100
		ANY TWO ELECTIVES SHOULD BE STUDIED IN V SEM												
5	VI	KU6DSEFTY304	FOOD COST ACCOUNTING	4	0	0	4	4	0	0	4	30	70	100
6		KU6DSEFTY305	SENSORY EVALUATION	3	0	1	4	3	0	2	5	35	65	100
7		KU6DSEFTY306	FOOD PRODUCT DEVELOPMENT	4	0	0	4	4	0	0	4	30	70	100
8		KU6DSEFTY307	NUTRACEUTICALS, FOOD ALLERGIES, INTOLERANCES AND CONSUMER SCIENCE	4	0	0	4	4	0	0	4	30	70	100
		ANY TWO ELECTIVES SHOULD BE STUDIED IN VI SEM												
9	VIII	KU8DSEFTY401	TECHNOLOGY OF BAKERY AND CONFECTIONARY	3	0	1	4	3	0	2	5	35	65	100
10		KU8DSEFTY402	DIETITICS AND HEALTH	4	0	0	4	4	0	0	4	30	70	100
11		KU8DSEFTY403	TECHNOLOGY OF BEVERAGES	3	0	1	4	3	0	2	5	35	65	100
12		KU8DSEFTY404	FOOD MARKETING	4	0	0	4	4	0	0	4	30	70	100
13		KU8DSEFTY405	FOOD INDUSTRIAL WASTE MANAGEMENT	4	0	0	4	4	0	0	4	30	70	100
		ANY THREE ELECTIVES CAN BE STUDIED IN VIII SEM OR ANY THREE MOOC COURSES												

GENERAL FOUNDATION COURSES (MDC, VAC, SEC)

Multi-Disciplinary Courses (MDC):

Sl. No	Semester	Course Code	Course Title	Credit				Hours/week				Marks		
				L*	T*	P*	Total	L	T	P	Total	CE	ESE	Total
1	I	KU1MDCFTY101	FOOD PROCESSING TECHNOLOGY	2	0	1	3	2	0	2	4	25	50	75
2	II	KU2MDCFTY102	FOOD CONSERVATION	2	0	1	3	2	0	2	4	25	50	75
3	II	KU2MDCFTY103	DAIRY SCIENCE	2	0	1	3	2	0	2	4	25	50	75

Value Added Courses (VAC):

Sl. No	Semester	Course Code	Course Title	Credit				Hours/week				Marks		
				L*	T*	P*	Total	L	T	P	Total	CE	ESE	Total
1	III	KU3VACFTY100	FOOD MARKETING	2	0	1	3	2	0	2	4	25	50	75
2	IV	KU4VACFTY101	MANAGEMENT CONCEPT AND PRINCIPLES	3	0	0	3	3	0	0	3	25	50	75
3		KU4VACFTY102	FOOD TOURISM	3	0	0	3	3	0	0	3	25	50	75

Skill Enhancement Courses (SEC):

Sl. No	Semester	Course Code	Course Title	Credit				Hours/week				Marks		
				L*	T*	P*	Total	L	T	P	Total	CE	ESE	Total
1	IV	KU4SECFTY100	NEW PRODUCT DEVELOPMENT	2	0	1	3	2	0	2	4	25	50	75
2	V	KU5SECFTY101	BAKERY AND CONFECTIONARY TECHNOLOGY	2	0	1	3	2	0	2	4	25	50	75
3	VI	KU6SECFTY102	FOOD INFORMATICS	3	0	0	3	3	0	0	3	25	50	75

Internship & Dissertation:

Sl. No	Semester	Course Code	Course Title	Credit				Hours/week				Marks		
				L*	T*	P*	Total	L	T	P	Total	CE	ESE	Total
1.	VI	KU6INTFTY301	INTERNSHIP	0	0	2	2	0	0	4	4	15	35	50
2.	VIII	KU8RPHFTY301	RESEARCH PROJECT	0	0	12	12	0	0	24	2 4	90	210	300

*L-Lecture, T-Tutorial, P-Practical

EVALUATION SCHEME

1. The evaluation scheme for each course contains two parts: internal evaluation (about 30%) and external evaluation (about 70%). Each of the Major and Minor courses is of 4-credits. It is evaluated for 100 marks, out of which 30 marks is from internal evaluation and 70 marks, from external evaluation, but DSC course with practical is evaluated for 100 marks, out of which 35 marks is from internal evaluation and 65 marks, from external evaluation Each of the General Foundation course is of 3-credits. It is evaluated for 75 marks, out of which 25 marks is from internal evaluation and 50 marks, from external evaluation.

2. The 4-credit Discipline Specific Courses are of two types: (i) courses with only theory and (ii) courses with 3-credit theory and 1-credit practical.
    a. In 4-credit courses with only theory component, out of the total 5 modules of the syllabus, one open-ended module with 20% content is designed by the faculty member teaching that course, and it is internally evaluated for 10 marks. The internal evaluation of the remaining 4 theory modules is for 20 marks.
    b. In 4-credit courses with 3-credit theory and 1-credit practical components, out of the total 5 modules of the syllabus, 3 modules are for theory and the fourth module is for practical and, one open-ended module with 20% content, is designed by the faculty member teaching that course. The theory component is evaluated for 50 marks externally and 15 marks internally and the teacher specific module is evaluated for 10 marks internally. The practical component is evaluated for 15 marks externally and 10 marks internally.

3. All the 3-credit courses (General Foundational Courses) are of two types: (i) courses with only theory and (ii) courses with 2-credit theory and 1-credit practical.
    a. In 3-credit courses with only theory component, out of the total 5 modules of the syllabus, one open-ended module with 20% content is designed by the faculty member teaching that course, and it is internally evaluated for 10 marks. The evaluation of the remaining 4 theory modules is for 50 marks externally and 15 marks internally.

    b. In 3-credit courses with 2-credit theory and 1-credit practical components, out of the total 5 modules of the syllabus, 3 modules are for theory and the fourth module is for practical. The theory component is evaluated for 35 marks externally and 7 marks internally and the teacher specific module is evaluated for 8 marks internally. The practical (fourth module) is evaluated in 15 marks externally and 10 marks internally.

Sl. No	Nature of the Course		Internal Evaluation in Marks (about 30% of the total)		External Exam			Total Marks
			Open-ended module	On the other 4 modules	4 modules	3 modules + 1 practical		
						Theory	Practical	
1	4-credit course	only theory (5 modules)	10	20	70	-	-	100
2		Theory (4 modules + 1 Practical)	10	15T + 10P	-	50	15	100
3	3-credit course	only theory (5 modules)	10	15	50	-	-	75
4		Theory (4 modules) + Practical	8	7T+ 10P	-	35	15	75

EXTERNAL EVALUATION OF THEORY COMPONENT

External evaluation carries 70% marks. Examinations will be conducted at the end of each semester. Individual questions are evaluated in marks and the total marks are converted into grades by the University based on 10-point grading system.

PATTERN OF QUESTION PAPER FOR DISCIPLINE SPECIFIC COURSES (ONLY THEORY)

Duration	Type	Total No. of Questions	No. of Questions to be Answered	Marks for Each Question	Ceiling of Marks
2 Hours	Short Answer	8	6	3	18
	Paragraph/ Problem	6	4	6	24
	Essay	3	2	14	28
				Total Marks	70

QUESTION PATTERN OF PRACTICAL EXAM FOR DISCIPLINE SPECIFIC COURSES

RECORD	PROCEDURE	WORK DONE	VIVA	Total
2	2	8	3	15

PATTERN OF QUESTION PAPER FOR DISCIPLINE SPECIFIC COURSES (THEORY & PRACTICAL)

Duration	Type	Total No. of Questions	No. of Questions to be Answered	Marks for Each Question	Ceiling of Marks
1.5 Hours	Short Answer	8	6	2	12
	Paragraph/ Problem	6	4	6	24
	Essay	2	1	14	14
				Total Marks	50

PATTERN OF QUESTION PAPER FOR FOUNDATION COURSES (MDC, VAC & SEC) (ONLY THEORY)

Duration	Type	Total No. of Questions	No. of Questions to be Answered	Marks for Each Question	Ceiling of Marks
2 Hours	Short Answer	8	6	2	12
	Paragraph/ Problem	6	4	6	24
	Essay	2	1	14	14
				Total Marks	50

PATTERN OF QUESTION PAPER FOR FOUNDATION COURSES (MDC, VAC & SEC) (THEORY & PRACTICAL)

Duration	Type	Total No. of Questions	No. of Questions to be Answered	Marks for Each Question	Ceiling of Marks
2 Hours	Short Answer	4	3	3	9
	Paragraph/ Problem	3	2	6	12
	Essay	2	1	14	14
				Total Marks	35

QUESTION PATTERN OF PRACTICAL EXAM FOR FOUNDATION COURSES (MDC, VAC & SEC)

RECORD	PROCEDURE	WORK DONE	VIVA	Total
2	2	8	3	15

Semester I

KU1DSCFTY101: FUNDAMENTALS OF FOOD TECHNOLOGY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
I	DSC A1	100-199	KU1DSCFTY101	3+1	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L + 10P	50L + 15P	100	2

COURSE DESCRIPTION:

Food technology encompasses fundamental concepts essential for understanding the production, processing, and preservation of food. It includes knowledge of food chemistry, which explores the composition and reactions of food components like proteins, carbohydrates, lipids, vitamins, and minerals. It aims to foster a comprehensive understanding of food, nutrition, composition of different food, food and future, research institutions and journals.

Course Prerequisite: Basic knowledge in nutrients gained during a +2 level.

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Know the relationship between food, nutrition and functional foods.	U
CO2	To Remember the basic Food groups like cereals, pulses, oilseeds, fruits vegetables, spices, meat, fish, poultry, sea food, milk and dairy products.	R
CO3	Apply the scientific method of enquiry as it relates to the measurement of sensory, chemical and physical properties of foods	Ap
CO4	To develop an insight among the students about the existing modern techniques and their applications in food processing preservation.	c

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔	✔		✔	✔		✔	✔	✔
CO 2	✔						✔	✔	✔
CO 3				✔			✔		✔
CO 4							✔		✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	INTRODUCTION TO FOOD NUTRITION	
1	**FOOD SCIENCE AND FSSAI** a) Definition and Possibility of Food science and technology, Functions of food, Food Groups. b) FSSAI **FOOD AND NUTRITION** a) Food as a source of nutrition NUTRIENTS a) Water, Carbohydrates, Proteins, Lipids, b) Vitamins and minerals c) Food is more than nutrients **FOOD PRESERVATION** 1. a) Principles	**15**
	COMPOSITION AND NUTRITIVE VALUE	
2	1. Wheat and Rice – Structure 2. Pulses and legumes 3. Nuts and Oilseeds 4. Milk 5. Egg – Structure 6. Flesh foods (Meat, Poultry and Fish) 7. Fruits and Vegetables – Classification 8. Spices and Plantation products – Classification 9. Phytonutrients	**15**
	FOOD AND THE FUTURE	

3	1. GM foods, Organic Food 2. Functional food – Nutraceuticals, Probiotics and Prebiotics 3. NPD (New Product Development) 4. Major Sectors of Food Processing Industry, National and International Research Institutes – CFTRI, DFRL, NIFTEM, CIFT, NDRI	**10**
	PRACTICAL IN FOOD TECHNOLOGY	
4	1. Standardisation of NaOH 2. Standardisation of HCl 3. Qualitative test for carbohydrates – Molisch_s test, Benedict_s test, Iodine test, Anthrone test, Selivanoff_s test. 4. Specific reactions of reducing sugars. Benedict's test, Fehling's test, picric acid test, ferricyanide test. Seliwanoff's test and osazone reaction of sugars. 5. Qualitative Test of Proteins (Biuret test, Lowry's test, xanthoproteic test, Millon's test) 6. Sensory evaluation 7. Industrial visit	**30**
5	**Teacher Specific Module**	**5**
	Directions: Sensory evaluation of food	

Essential Readings

1. Potter N, Hotchkiss JH. Food Science. CBS publishers and distributers
2. S. Manany, N S. Swamy Food Facts and Principles. New Age International Publishers
3. Murano, Peter S. Understanding Food Science and Technology. Thomson
4. Sumati R Mudambi, Rajagopal M V. Fundamentals of Food and Nutrition. New Age International Publishers
5. Shubhangini A Joshi. Nutrition and Dietetics. Tata McGraw Hill Education Private Limited
6. Vijaya Khader. Text Book of Food Science and Technology. ICAR

Suggested Readings:

1. Food Science by N Potter
2. Food Science by b. Srilakshmi

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Viva-Voce	5
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU1DSCFTY102: PERSPECTIVES OF FOOD SCIENCE AND TECHNOLOGY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
I	DSC B1	100-199	KU1DSCFTY102	3+1	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L+10P	50L+15P	100	2

COURSE DESCRIPTION:

This course aims to introduce students to the interdisciplinary field that combines elements of food science, technology, nutrition, and research. Its goal is to develop a thorough understanding of food and nutrition, including the composition of various food types, emerging trends in food technology, and the role of research institutions and journals in advancing the field. This course seeks to provide a foundational knowledge base that integrates scientific principles with practical applications in the food industry.

Course Prerequisite: Basic knowledge in Food and Nutrients gained during a +2 level**.**

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Know the relationship between food, nutrition and functional foods.	U
CO2	To Remember the basic Food groups like cereals, pulses, oilseeds, fruits vegetables, spices, meat, fish, poultry, sea food, milk and dairy products.	R
CO3	Apply the scientific method of enquiry as it relates to the measurement of sensory, chemical and physical properties of foods	Ap
CO4	To develop an insight among the students about the existing modern techniques and their applications in food processing preservation.	c

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO0
CO 1	✔			✔	✔			✔	
CO 2	✔						✔	✔	
CO 3	✔			✔					
CO 4	✔	✔	✔	✔	✔	✔	✔	✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	FOOD NUTRIENTS	
1	**FOOD AND NUTRITION** a) Food as a source of nutrition NUTRIENTS a) Water, Carbohydrates, Proteins, Lipids, b) Vitamins and minerals c) Food is more than nutrients	10
	FOOD GROUPS	
2	1. Cereals - Structure, composition and nutritive value of wheat and rice, rice and wheat products 2. Pulses and legumes - Composition and nutritive value, Toxic constituents present in pulses 3. Nuts and oilseeds - composition and nutritive value, Toxins, Role of nuts and oilseeds-in cookery 4. Fruits and vegetables - Classification, Composition and nutritive value 5. Spices and Plantation products - Classification, Composition and nutritive value 6. Milk - Composition and nutritive value, Role of milk and	**20**

	milk products in cookery, Milk substitutes 7. Eggs - Structure, Composition and nutritive value, Quality of egg, role of egg in cookery 8. Flesh Foods (meat, poultry, fish)- Composition and nutritive value, Classification	
	FOOD AND FUTURE	
3	1. GM foods, 2. Organic Food 3. Functional food – Nutraceuticals, Probiotics and Prebiotics 4. NPD (New Product Development)	**10**
	Practical in Food science	
4	1. Qualitative test for carbohydrates – Molisch _s test, Benedict _s test, Iodine test, Anthrone test, Selivanoff _s test. 2. Qualitative Test of Proteins (Biuret test, Lowry‘s test, xanthoproteic test, Millon‘s test) 3. Specific reactions of reducing sugars. Benedict‘s test, Fehling‘s test, picric acid test, ferricyanide test. Seliwanoff‘s test and osazone reaction of sugars.	**30**
5	**Teacher Specific Module**	**5**
	Directions: Sensory evaluation of food	

Essential Readings

1. Potter N, Hotchkiss JH. Food Science. CBS publishers and distributers
2. S. Manany, N S. Swamy Food Facts and Principles. New Age International Publishers
3. Murano, Peter S. Understanding Food Science and Technology. Thomson
4. Sumati R Mudambi, Rajagopal M V. Fundamentals of Food and Nutrition. New Age International Publishers
5. Shubhangini A Joshi. Nutrition and Dietetics. Tata McGraw Hill Education Private Limited
6. Vijaya Khader. Text Book of Food Science and Technology. ICAR

Suggested Readings:

1. Potter N, Hotchkiss JH. Food Science. CBS publishers and distributers
2. B Srilakshmi Food Science New Age International Publishers

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU1DSCFTY103: FOOD MICROBIOLOGY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
I	DSC C1	100-199	KU1DSCFTY103	3+1	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L+10P	50L+15P	100	2

COURSE DESCRIPTION:

The Food Microbiology course provides an in-depth exploration of microorganisms relevant to food safety, quality, and preservation. Students will study the characteristics, growth, and behaviour of bacteria, yeasts, molds, and viruses in food systems. Emphasis is placed on understanding their roles in food spoilage, foodborne illnesses, and methods for microbial control. The course covers principles of food preservation techniques such as heating, cooling, fermentation, and chemical preservation. Additionally, students will learn about microbial risk assessment, food safety regulations, and emerging trends in food microbiology research. Practical aspects include laboratory sessions to cultivate skills in microbial identification, testing, and quality assurance in food production. This course equips students with essential knowledge and skills to ensure the safety and quality of food products in the food industry.

Course Prerequisite: Basic knowledge in Biology gained during a +2 level

COURSE OUTCOMES

	Expected Outcome	**Learning Domains**
CO1	Understand about microorganisms associated with food	U
CO2	Understand Fermentation and fermented food products	U
CO3	Understand control of microorganisms by using various methods	Ap
CO4	Understand spoilage of different foods by microorganisms	U

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1				✔	✔	✔		✔	
CO 2						✔	✔	✔	
CO 3						✔		✔	
CO 4	✔	✔	✔	✔	✔	✔	✔	✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	INTRODUCTION TO FOOD MICROBIOLOGY	
1	**1.** Introduction to food microbiology a) Definition b) Scope of food microbiology 2. History of Microbiology a) Biogenesis versus abiogenesis 3. Antonie van Leeuwenhoek **4.** Louis Pasteur a) Contributions of Louis Pasteur b) Swan neck experiment 5. Robert Koch a) Contributions of Robert Koch b) Koch's Postulates 6. Sources of contamination of food- animals, plants, soil, air, sewage, contamination during handling and processing. 7. Perishable, semi perishable and non- perishable foods 8. Factors influencing microbial growth – Extrinsic and Intrinsic factors	10
	MICROSCOPY, STAINING & CULTURE TECHNIQUES	
2	1. MICROSCOPY – Bright field, Dark field, Phase contrast, Fluorescent, Scanning and Transmission electron microscopy (principle, methodology, specimen preparation and Use) and atomic force microscopy. 2. STAINING - types of stains used for bacteria with examples a) Staining techniques - Simple, Negative b) Differential Staining (Gram & Ziehl Nielsen), c) Special Staining (Capsule, flagella & endospore) d) Fungal staining 3. CULTURE TECHNIQUES a) Bacteriological Media – classification- solid, liquid, semi-solid	10

	Media b) Selective, Differential, Enrichment Media c) Methods of isolating pure culture: Serial dilution, Pour plate, streak plate, stroke Culture.	
	FOOD BORNE DISEASES	
3	Food Borne Diseases: Definition, Classification (Food borne intoxications, Food borne infections & Toxi - infection), 1. Staphylococcal intoxication, 2. Botulism, 3. Neurolathyrism, 4. Aflatoxins, 5. Egotism, 6. Epidemic dropsy, 7. Typhoid fever, 8. Salmonellosis, 9. Bacillus cereus food poisoning, 10. E. coli diarrhea, 11. Cholera, 12. Shigellosis, 13. Brucellosis.	**20**
	PRACTICAL FOR FOOD MICROBIOLOGY	
4	1. Staining techniques – simple staining, gram staining 2. Isolation of pure culture: Pour plate, Streak plate 3. Microbial analysis of Milk- MBRT	30
5	**Teacher Specific Module**	**5**
	Directions: Sources of contamination in food	

Essential Readings:

1. Banwart GJ ,1989. Basic Food Microbiology. AVI publishers
2. JayJM, Loessner MJ & Golden D A 2005. Modern Food Microbiology. Springer Verlag
3. Anantha Narayanan R Jayaram Panikkar CK 2009 Text book of microbiology. University Press VT Ltd, Hyderabad
4. Prescott, L.M, Harley, J.P and Klein, D.A Microbiology. McGraw Hill New York
5. Frazier J& Westhoff DC. 1988. Food Microbiology. McGraw Hill, New York.
6. Pelczar JM & Reid RD. Microbiology. Tata McGraw Hill
7. Black, JG. Microbiology. Principles and Explorations John Will

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Viva-Voce	5
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU1MDCFTY101: FOOD PROCESSING TECHNOLOGY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
I	MDC	100	KU1MDCFTY101	2+1	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
2	2	0	15L+10P	35L+15P	75	1.5

COURSE DESCRIPTION

The Food Processing Technology course delves into the principles, methods, and applications of transforming raw ingredients into safe, nutritious, and marketable food products. It covers various processing techniques such as thermal processing (including pasteurization and sterilization), chilling, freezing, drying, and fermentation. Students will learn about the importance of food processing in enhancing shelf life, improving safety, and maintaining nutritional quality. The course also addresses the role of food additives, packaging, and preservation methods in food processing.

Course Prerequisite: Basic knowledge in science gained during a +2 level**.**

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Learn about food processing	U
CO2	Commercial methods of food processing	A
CO3	An idea about sensory attributes in food	U
CO4	Practical knowledge in sensory evaluation of food	An

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔			✔					
CO 2	✔		✔						
CO 3	✔					✔		✔	
CO 4	✔	✔						✔	

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	INTRODUCTION TO FOOD PROCESSING	
1	1. Definition and history of food processing. 2. Importance, advantages of Food processing and nutritional losses in food processing. 3. Primary processing, secondary processing and tertiary processing, 4. Advantages and disadvantages. 5. Objectives and method of conventional cooking methods.	**10**
	COMMERCIAL METHODS OF PROCESSING	
2	1. High temperature method- Blanching, pasteurisation and sterilisation. 2. Low temperature method- freezing 3. Drying, 4. Canning, 5. Fermentation, 6. Irradiation.	**10**
	SUBJECTIVE ANALYSIS	

3	1. Sensory attributes, 2. Sensory evaluation and types, 3. Factors influencing and application of sensory evaluation. 4. Sensory panel, recruitment and selection criteria.	**5**
PRACTICAL FOR FOOD PROCESSING		
4	1. Difference test, 2. paired comparison test, 3. duo trio test, triangle test 4. Rating test, 5. Ranking test 6. Numerical scoring test, 7. Composite scoring test.	30
5	**Teacher Specific Module**	**5**
	Directions: - Hurdle technology, Hydrostatic Pressure , Pulsed Electric Field	

Essential Readings

1 Food Science, Norman N Potter and Joseph H Hotchkiss, (1986),4th edition, CBS publishers

2. Food Processing technology, P, J Fellows (2009) 3rd edition Wood head publishers.

3. Khetarpaul, N. (2005). Food processing and preservation. Daya Books

4. Srilakshmi, B, food science, new age International (P) limited, New Delhi,2005

5 Manay, S, Sadaksharaswamy.M, Food facts and principles, new age international (P) Limited, New Delhi, 2008

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		35
Continuous Evaluation L		15
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	2
d)	Seminar	5
e)	Viva-Voce	2
Total L		50

Any components from the above table can be taken for CE not exceeding 7 Marks. Teacher specific module is evaluated for 8 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

Semester II

KU2DSCFTY104- FOOD PROCESSING AND PRESERVATION

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
II	DSC A2	100-199	KU2DSCFTY104	3+1	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L+10P	50L+15P	100	2

COURSE DESCRIPTION:

The Food Preservation course focuses on the principles, techniques, and importance of preserving food to ensure its safety, quality, and shelf-life extension. Students will explore various preservation methods including thermal processing (such as canning and pasteurization), chilling and freezing, drying, fermentation, irradiation, and the use of chemical preservatives. Emphasis is placed on understanding the factors influencing microbial growth and spoilage in food, as well as the mechanisms by which preservation methods inhibit microbial activity and enzymatic degradation.

Course Prerequisite: Basic Knowledge in Science COURSE

OUTCOMES:

CO No.	Expected Outcome	Learning Domains
1	Understanding of thermal processes, their industrial, and ability to apply this knowledge in various contexts.	U
2	Apply knowledge and skills related to preserving products at low temperature. Practical skills in implementing and optimizing low temperature preservation methods, along with an awareness of safety measures and quality control.	Ap
3	Apply knowledge of the biological processes and chemical methods of preservation.	Ap
4	Demonstrate knowledge of innovative preservation methods and also gain insights into sustainable practices, quality control and regulatory considerations with in the dynamic field of food science.	Ap
5	Create basic knowledge on recent trends in food preservation.	C

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔		✔	✔					✔
CO 2	✔				✔			✔	✔
CO 3	✔				✔	✔		✔	✔
CO 4	✔				✔				✔
CO 5	✔	✔	✔	✔	✔	✔	✔	✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	PRESERVATION BY ALTERING TEMPERATURE	
1	Introduction to food preservation a) Importance of food preservation b) Aims, principles and methods of food preservation. Preservation by High Temperature a) Principles and application b) Pasteurization c) Blanching d) Sterilization e) UHT f) Asceptic preservation g) Microwave assisted thermal sterilisation Preservation by Low Temperature a) Refrigeration b) Chilling injury Freezing a) Principle b) Freezing rate, Quick freezing, Slow freezing, IQF	**15**

	c) Types of freezers- Air blast, Contact, Immersion, Fluidized bed and Cryogenic freezers. Quality of frozen foods a) Retrogradation b) Protein denaturation c) Freezer burn	
	PRESERVATIVES AND FERMENTATION	
2	1. Natural preservatives – Class I preservatives 2. Chemical Preservatives - Sulphur dioxide, Benzoic acid, Sorbic acid, Propionic acid, Acetic acid. 3. Canning: principle, steps involved in canning, types of containers used, heat penetration into containers, pH classification of foods, corrosion of cans. 4. Fermentation a) Principles, Significance b) Types of fermentation- Acetic, Lactic and Alcoholic 5. Preservation by controlling water activity: High sugar products, IMF, curing and effect of salt of food preservation. **6.** Dehydration a) Principles, Types of drying methods b) Natural drying c) Driers in food industry: drum, spray, fluidized bed, air drier, vacuum drier, tunnel drier. Dehydrofreezing, freeze drying. Drying pre-treatments – blanching & sulphuring 7. Smoking Principle, Advantages and disadvantages	**10**
	NOVEL AND NON-THERMAL PRESERVATION	
3	1. Irradiation Principles (mode of action) – Application of irradiation Specific types of radiation treatment. Measurement & Uses of irradiation. Novel preservation techniques **2.** Hurdle technology: Principles applications and advantages. **3.** Hydrostatic Pressure Processing: Principles applications and advantages. **4.** Pulsed Electric Field: Principles applications and advantages. **5.** Ultrasonication: Principles applications and advantages. **6.** Novel Thermal Technologies **7.** Ohmic Heating: Principles applications and advantages. **8.** Infrared Heating: Principles applications and advantages. **9.** Induction Heating: Principles applications and advantages. **10.** Bacteriocins: Principles applications and advantages. **11.** Microfiltration: Principles applications and advantages.	15

	12. Bactofugation: Principles applications and advantages. **13.** Dielectric Heating: Principles applications and advantages. 14. Nanotechnology: Principle, application and advantages	
	PRACTICAL IN FOOD PRESERVATION	
4	a) Blanching of Vegetables. b) Dehydration of Vegetables using Cabinet drier c) Determination of Moisture using a) Hot air oven b) Distillation method Infrared method d) Dehydration of fruits in sugar syrup e) Qualitative Determination of Benzoic acid and SO2 f) Determination of Acidity & Ph g) Determination of TSS	**30**
5	**Teacher Specific Module**	**5**
	Directions: 15 Days internship	

Essential Readings

1. Fennema Owen R. Principles of food Science. Marcel Dekkar, Inc
2. Murano, Peter S. Understanding Food Science and Technology Thomson
3. Khader, Vijaya Textbook on Food Storage and Preservation Kalyani Publishers
4. Pruthi JS Quick Freezing Preservation of Foods Allied publishers Limited
5. Potter N N.& Hotchkiss 1997 Food Science CBS Publishers
6. Desrosier NW James N,1977 Technology of Food Preservation CBS Publishers
7. Arti Sanhla Food Preservation. Principles and practices
8. Manay, N.S, Shadaksharaswamy, M., Foods: New Age international (P) publishers, New Delhi 2004 S
9. Hafiur Rahman M., 1999, Hand book of food preservation. Marcel Dekker, Inc, New York.
10. Subbulakshmi G and Udippi S.A Food Processing and Preservation Foods: New Age international (P) publishers, New Delhi 2001

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU2DSCFTY105: FOOD SCIENCE AND NUTRITION

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
II	DSC B2	100-199	KU2DSCFTY105	4	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4	0	0	30	70	100	2

COURSE DESCRIPTION:

A course in Food Science and Nutrition delves into the intricate relationship between food, health, and science. Students explore the fundamental components of food—carbohydrates, proteins, lipids, vitamins, and minerals—learning how these nutrients contribute to human nutrition and well-being. Through the lens of food chemistry, they study the chemical reactions that occur during food processing and cooking, as well as the role of additives in food preservation and enhancement.

Course Prerequisite: Basic knowledge in science gained during a +2 level

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Understand basic concepts of food nutrition	U
CO2	Explore the energy metabolism in food	An
CO3	Understand the concept of macronutrients in food	U
CO4	Understand the concept of micronutrients in food.	An

**Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1		✔		✔	✔			✔	✔
CO 2		✔			✔			✔	✔
CO 3		✔			✔			✔	✔
CO 4	✔	✔			✔			✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	BASIC CONCEPTS OF NUTRITION	
1	Nutrition and Health a) Inter Relationship between Nutrition and Health b) Physical, Mental, Social and Mental Health c) Balanced diet, BMI, Food guide, Pyramid and RDA d) Malnourishment- definition, types etiological factors and remedial measures. e) Menu Planning, Significance of Menu Planning, Menu planning for family. Factors influencing meal planning. f) Nutrigenetics and Genomics g) HFSS foods h) DASH diet	**10**
	ENERGY AND DISORDERS	
2	1. Energy value of foods, Calorie, Joule 2. Measurement of Calorific values of Food 3. Determination of Basal Metabolic Rate (BMR), 4. Respiratory Quotient (RQ), 5. Specific Dynamic Action (SDA) of foods, 6. Disorders- Kwashiorkor, Marasmus, Xerophthalmia, Beriberi, Pernicious anaemia, Scurvy, Rickets, Osteomalacia,	**10**
	CARBOHYDRATES, PROTEINS AND LIPIDS	
3	a) Definition, Classification and properties b) Sources, daily requirements, functions. c) Digestion, absorption and transportation d) Physiological disruptions	**10**
	VITAMINS AND MINERALS	
4	a) Characteristics b) Sources c) Physiological and biochemical functions d) Daily requirement e) Digestion, absorption and transportation **Dietary Fibre** Classification, sources, composition, properties & nutritional significance **WATER** Water and Its Use in the Body- Distribution, Requirements, Sources	**25**

5	**Teacher Specific Module**	**5**
	Directions: Balanced diet formulation	

Essential Readings

1. Nutrition Science, B. Sri Laksmi, New age international publishers
2. Dietetics, B. Sri Laksmi, New age international publishers
3. Food Facts & Principles by Shakunthala manay & Shadakhraswamy.
4. Food Science by Srilakshmi, second edition,2002.
5. Food science, Chemistry and Experimental foods by M. Swaminathan.
6. Food Science by Norman.N. Potter.

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation		70
Continuous Evaluation		30
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Viva-Voce	5
Total L		100

Any components from the above table can be taken for CE not exceeding 30 Marks

KU2DSCFTY106- FOOD PRESERVATION

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
II	DSC C2	100-199	KU2DSCFTY106	3+1	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L+10P	50L+15P	100	2

COURSE DESCRIPTION:

The Food Preservation course focuses on the principles, techniques, and importance of preserving food to ensure its safety, quality, and shelf-life extension. Students will explore various preservation methods including thermal processing (such as canning and pasteurization), chilling and freezing, drying, fermentation, irradiation, and the use of chemical preservatives. Emphasis is placed on understanding the factors influencing microbial growth and spoilage in food, as well as the mechanisms by which preservation methods inhibit microbial activity and enzymatic degradation.

Course Prerequisite: Basic Knowledge in Science

COURSE OUTCOMES:

CO No.	Expected Outcome	Learning Domains
1	Understanding of thermal processes, their industrial, and ability to apply this knowledge in various contexts.	U
2	Apply knowledge and skills related to preserving products at low temperature. Practical skills in implementing and optimizing low temperature preservation methods, along with an awareness of safety measures and quality control.	Ap
3	Apply knowledge of the biological processes and chemical methods of preservation.	Ap
4	Demonstrate knowledge of innovative preservation methods and also gain insights into sustainable practices, quality control and regulatory considerations with in the dynamic field of food science.	Ap
5	Create basic knowledge on recent trends in food preservation.	C

**Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔	✔		✔	✔				✔
CO 2		✔			✔			✔	✔
CO 3		✔			✔			✔	✔
CO 4		✔			✔				✔
CO 5		✔			✔	✔			✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	PRESERVATION BY ALTERING TEMPERATURE	
1	Introduction to food preservation a) Importance of food preservation b) Aims, principles and methods of food preservation. Preservation by High Temperature h) Principles and application i) Pasteurization j) Blanching k) Sterilization Preservation by Low Temperature a) Refrigeration b) Chilling injury Freezing a) Principle b) Freezing rate, Quick freezing, Slow freezing, IQF Quality of frozen foods Retrogradation	**15**
	Protein denaturation Freezer burn	
	PRESERVATIVES AND FERMENTATION	

2	8. Natural preservatives – Class I preservatives 9. Chemical Preservatives - Sulphur dioxide, Benzoic acid, Sorbic acid, Propionic acid, Acetic acid. 10. Canning: principle, steps involved in canning, heat penetration into containers, pH classification of foods, corrosion of cans. 11. Fermentation Principles, Significance Types of fermentation- Acetic, Lactic and Alcoholic 12. Preservation by controlling water activity: High sugar products, IMF, curing and effect of salt of food preservation. **13.** Dehydration a) Principles, Types of drying methods b) Natural drying c) Driers in food industry: drum, spray, fluidized bed, air drier, vacuum drier, tunnel drier. d) Freeze drying. Drying pre-treatments – blanching & sulphuring 14. Smoking Principle, Advantages and disadvantages	**10**
NOVEL AND NON-THERMAL PRESERVATION		
3	**Novel preservation techniques** • Hurdle technology: Principles applications and advantages. • Hydrostatic Pressure Processing: Principles applications and advantages. • Pulsed Electric Field: Principles applications and advantages. **Novel Thermal Technologies** • Ohmic Heating: Principles applications and advantages. • Infrared Heating: Principles applications and advantages. • Induction Heating: Principles applications and advantages. • Bacteriocins: Principles applications and advantages. • Microfiltration: Principles applications and advantages. • Bactofugation: Principles applications and advantages.	15
PRACTICAL IN FOOD PRESERVATION		

4	a. Blanching of Vegetables. b. Determination of Moisture using a) Hot air oven b) Distillation method Infrared method c. Preparation of Jam d. Preparation of Jelly e. Preparation of preserve f. Determination of TSS g. Determination of Acidity & Ph h. Determination of Acidity & pH i. Determination of TSS	**30**
5	**Teacher Specific Module**	**5**
	Direction: **Irradiation** • Principles (mode of action) – Application of irradiation • Specific types of radiation treatment. • Measurement & Uses of irradiation.	

Essential Readings

1. Subalakshmi, G and Udipi, S.A. Food processing and preservation; New Age International Publishers, New Delhi, 2001.

2. Srilakshmi, B. Food Science. New Age International Publishers, New Delhi, 2003.

3. Potter, N.N. and Hotchkiss J. H. Food Science.CBS publishers and distributors. 1996.

4. Srivastava, R.PO and Kumar, S. Fruit and vegetable preservation, International Book distribution Company, Lucknow, 1994.

5. MC.Williams, M and Paine, H. Modern Food preservation. Surjeet Publications, Delhi, 1984.

6. Cruess, W.V. Commercial Fruits and Vegetable Products, Anees Offset press, New Delhi, 1997

7. Fellows, P.J. (2009). *Food Processing Technology: Principles and Practice* (3rd Ed.). Woodhead Publishing.

8. Rahman, M.S. (2007). *Handbook of Food Preservation* (2nd Ed.). CRC Press

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Viva-Voce	5
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU2MDCFTY102- FOOD CONSERVATION

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
II	MDC 2	100-199	KU2MDCFTY102	3	45

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
2	2	0	15L+10P	35L+15P	75	1.5

COURSE DESCRIPTION:

The Food Preservation course focuses on the principles, techniques, and importance of preserving food to ensure its safety, quality, and shelf-life extension. Students will explore various preservation methods including thermal processing (such as canning and pasteurization), chilling and freezing, drying, fermentation, irradiation, and the use of chemical preservatives. Emphasis is placed on understanding the factors influencing microbial growth and spoilage in food, as well as the mechanisms by which preservation methods inhibit microbial activity and enzymatic degradation.

Course Prerequisite: Basic Knowledge in Science

COURSE OUTCOMES:

CO No.	Expected Outcome	Learning Domains
1	Understanding of thermal processes, their industrial, and ability to apply this knowledge in various contexts.	U
2	Apply knowledge and skills related to preserving products at low temperature. Practical skills in implementing and optimizing low temperature preservation methods, along with an awareness of safety measures and quality control.	Ap
3	Apply knowledge of the biological processes and chemical methods of preservation.	Ap
4	Demonstrate knowledge of innovative preservation methods and also gain insights into sustainable practices, quality control and regulatory considerations with in the dynamic field of food science.	Ap
5	Create basic knowledge on recent trends in food preservation.	C

**Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔	✔		✔	✔				✔
CO 2		✔			✔	✔		✔	✔
CO 3		✔	✔		✔			✔	✔
CO 4		✔			✔				✔
CO 5	✔	✔	✔	✔	✔	✔	✔	✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	INTRODUCTION	
1	1. **Introduction, Importance, Principle, and Types of Food Preservation** 2. **Moisture Removal Preservation Techniques** o Concentration o Drying o Dehydration o Freeze Drying o Dehydro Freezing	**10**
	Temperature-Based Preservation Techniques	
2	1. **High and Low Temperature Preservation** o Pasteurization o Sterilization o Canning o Freezing o Refrigeration	**10**
	PRESERVATIVES, AND FERMENTATION	

3	1. **Preservatives** o Class I and Class II o Its Role o Permitted Preservatives and Levels 2. **Combination Techniques** • Types of Fermentation • Fermented Foods • Properties of Irradiation • Microwave Heating	**10**
	Preservatives, and Advanced Techniques	
4	**1. Preparation of:** • Jam • Jelly • Preserves • Glazed Crystallized Fruit • Sauces • Pickles 2) Determination of Acidity & pH 3) Determination of TSS	**10**
5	**Teacher Specific Module**	**5**
	Directions; Bacteriocins, Microfiltration, Bactofugation	

Essential Reading

1. Subalakshmi, G and Udipi, S.A. Food processing and preservation; New Age International Publishers, New Delhi, 2001.
2. Srilakshmi, B. Food Science. New Age International Publishers, New Delhi, 2003.
3. Potter, N.N. and Hotchkiss J. H. Food Science.CBS publishers and distributors. 1996.
4. Srivastava, R.PO and Kumar, S. Fruit and vegetable preservation, International Book distribution Company, Lucknow, 1994.
5. MC.Williams, M and Paine, H. Modern Food preservation. Surjeet Publications, Delhi, 1984.
6. Cruess, W.V. Commercial Fruits and Vegetable Products, Anees Offset press, New Delhi, 1997
7. Fellows, P.J. (2009). *Food Processing Technology: Principles and Practice* (3rd Ed.). Woodhead Publishing.
8. Rahman, M.S. (2007). *Handbook of Food Preservation* (2nd Ed.). CRC Press

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		35
Continuous Evaluation L		15
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	2
d)	Seminar	5
e)	Viva-Voce	2
Total L		50

Any components from the above table can be taken for CE not exceeding 7 Marks. Teacher specific module is evaluated for 8 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU2MDCFTY103: DAIRY SCIENCE

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
II	MDC	100 - 199	KU2MDCFTY103	2+1	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
2	2	0	15L+10P	35L+15P	75	1.5

COURSE DESCRIPTION

This course provides comprehensive knowledge of milk, its properties, processing, and product development. Students will explore the composition and physico-chemical properties of milk, understand milk hygiene practices, and examine market milk processing techniques including pasteurization, homogenization, and UHT treatment. The course also covers the manufacture and quality control of various milk products such as paneer, cheese, yoghurt, ghee, and frozen desserts. Through practical sessions, students will gain hands-on experience in milk testing, adulteration detection, and preparation of indigenous dairy products, promoting both industry readiness and entrepreneurial skills.

Course Prerequisite: Basic knowledge in science gained during a +2 level**.**

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Understand the composition and physico-chemical properties of milk	U
CO2	Identify and describe various milk products and their production processes	A
CO3	Perform basic laboratory analyses and quality testing of milk	An
CO4	Demonstrate the preparation of indigenous dairy products	An

Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔						✔	✔	✔
CO 2	✔						✔	✔	✔
CO 3	✔					✔	✔	✔	✔
CO 4	✔	✔				✔	✔	✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	Milk	
	- Composition of milk - Physico - chemical properties of milk - milk hygiene	5
	Market milk	
	Market milk: collection of milk- cooling and transportation– filtration/clarification- standardization- homogenization - pasteurization- UHT – sterilization, packaging.	10
	Milk products	
3	Milk products: Cream, Malai, Dahi /Curd, yoghurt, Channa / Paneer, Cheese, Ice cream , Frozen desserts, Evaporated milk, Condensed milk, Milk powder, Butter, Ghee, Chakka and Shrikhand,	**10**
	Practical	
4	1. Acidity of Milk & curd 2. Adulteration in milk 3. Determination of total solids, SNF and specific gravity of milk 4. Preparation of Khoa, Peda	30
5	**Teacher Specific Module**	**5**
	• Indigenous milk products	

Essential Readings

1 Sukumar D E. Outlines of Dairy Technology, Oxford University Press

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		35
Continuous Evaluation L		15
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	2
d)	Seminar	5
e)	Viva-Voce	2
Total		50

Any components from the above table can be taken for CE not exceeding 7 Marks. Teacher specific module is evaluated for 8 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

Semester III

KU3DSCFTY201- FOOD MICROBIOLOGY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
III	DSC A3	200 - 299	KU3DSCFTY201	3+1	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L+10P	50L+15P	100	2

COURSE DESCRIPTION:

Food Microbiology is the study of microorganisms in food environments. It covers the types of microbes that influence food safety, spoilage, and fermentation, including bacteria, fungi, and yeasts. The course examines microbial growth, metabolism, and control methods in food processing, storage, and preservation. Students will learn about foodborne pathogens, spoilage organisms, and the role of beneficial microbes in food production, along with techniques for detecting and preventing contamination to ensure food safety and quality.

Course Prerequisite: Basic Knowledge in Science

COURSE OUTCOMES:

CO No.	Expected Outcome	Learning Domains
1	Understand the history and foundational concepts of microbiology	U
2	Explain principles and applications of microscopy in studying microorganisms	A
3	Describe the structure, classification, and life processes of microorganisms	E
4	Perform staining and culture techniques for microbial identification and isolation	An
5	Apply basic laboratory practices and aseptic techniques in food microbiology	An

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔			✔				✔	
CO 2					✔			✔	
CO 3								✔	
CO 4				✔	✔	✔		✔	✔
CO 5				✔		✔		✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	HISTORY AND MICROSCOPY	
1	1. History, Development & Scope of Microbiology 2. Theories & Concepts - Spontaneous generation versus biogenesis, Germ theory of disease. 3. Contributions of Louis Pasteur, Robert Koch, Antony Van Leuven Hooke, Alexander Fleming, Jenner and Joseph Lister Microscopy 1. Bright field, 2. Dark field, 3. Phase contrast, 4. Fluorescent, 5. Scanning and Transmission electron microscopy (principle, methodology, specimen preparation and Use) 6. Atomic force microscopy.	**15**
	MICROORGANISMS	

2	Bacteria: a. Morphology, b. Shape, c. Arrangement of bacteria, d. Structure e. Physiology of bacteria: bacterial growth. f. Reproduction – binary fission, transformation, transduction and conjugation. g. Nutritional requirements- phototrophs, chemotrophs, autotrophs, Heterotrophs. *FUNGI:* 1. Characteristics, 2. Classification, yeast and mold. 3. Ascomycetes, basidiomycetes, deutromycetes. 4. Yeasts-reproduction-Sexual and Asexual	**10**
STAINING AND CULTURE TECHNIQUES		
3	Staining - types of stains used for bacteria with examples. Staining techniques - a. Simple, b. Negative, c. Differential (Gram & Ziehl Nielsen), d. special (Capsule, flagella & endospore) e. fungal staining (LPCB). Culture Techniques Bacteriological Media – a. classification- solid, liquid, semi-solid (consistency) b. Selective, Differential, Enrichment Media. Methods of isolating pure culture: a. Serial dilution, b. Pour plate, streak plate, stroke Culture.	15
PRACTICAL IN FOOD MICROBIOLOGY		
4	1. Introduction to equipments and glassware used in microbiology 2. Sterilization techniques: Dry heat and moist heat 3. Staining techniques – simple staining, gram staining 4. Isolation of pure culture: Pour plate, Streak plate	**30**
5	**Teacher Specific Module**	**5**
	Directions: Virus: 1. structure, 2. classification (dna viruses, rna viruses) *3.* Replication of viruses.	

Essential Readings:

1. Banwart G J ,1989. Basic Food Microbiology. AVI publishers
2. JayJM, Loessner MJ & Golden D A,2005. Modern Food Microbiology .Springer Verlag
3. Ananthanarayanan R Jayaram Paniker CK ,2009 Text book of microbiology.University Press Pvt Ltd, Hyderabad
4. Prescott, L.M, Harley, J.P and Klein, D.A Microbiology . McGraw Hill New York
5. Frazier J& Westhoff DC,1988. Food Microbiology. McGraw Hill, New York.
6. Pelczar JM & Reid RD Microbiology. Tata McGraw Hill

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

Practical's

Evaluation Type	Marks
End Semester Evaluation P	15
Continuous Evaluation P	10

a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU3DSCFTY202- FOOD CHEMISTRY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
III	DSC A4	200 - 299	KU3DSCFTY202	3+1	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L+10P	50L+15P	100	2

COURSE DESCRIPTION:

Food Chemistry is the study of the chemical composition and properties of food substances. The course explores the structure, function, and interactions of macronutrients (proteins, fats, carbohydrates), micronutrients (vitamins, minerals), and water in food. It also covers food additives, enzymes, flavors, and the chemical changes that occur during food processing, storage, and cooking. The course emphasizes how these chemical processes impact food quality, safety, and nutrition.

Course Prerequisite: Basic Knowledge in science

COURSE OUTCOMES:

CO No.	Expected Outcome	Learning Domains
1	Understand basic constituents of foods and their response to various physio-chemical alterations.	U
2	Create better understanding of food pigments and their control measurements.	C
3	Understand the importance of enzymes from various sources for chemical modification of foods	U
4	Analyse the factors which influence the textural quality of foods	An
5	Analyse the various constituents of foods	An

**Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔			✔	✔			✔	✔
CO 2	✔				✔			✔	✔
CO 3	✔	✔	✔		✔			✔	✔
CO 4	✔	✔	✔		✔	✔		✔	✔
CO 5	✔	✔	✔	✔	✔	✔	✔	✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	LIPIDS, PROTEINS AND CARBOHYDRATES	
1	LIPIDS 1. Lipids in food, 2. Classification, 3. Fatty acids, saturated, unsaturated, polyunsaturated fatty acids, 4. Chemical properties, reactions, rancidity, auto-oxidation, antioxidants, plasticity of fat, emulsion. 5. Fat constants Proteins 1. Food proteins, 2. Structure and classification of proteins 3. Properties of protein, 4. Physicochemical properties - Denaturation & reactions 5. Amino acids: Structure and classification of amino acids Carbohydrates 1. Classification, 2. properties and reactions of Monosaccharaides: Glucose & Fructose 3. Oligosaccharides: Maltose, lactose & Sucrose	**15**

	4. Properties- crystallization and inversion. 5. Polysaccharides: starch: components of starch, gelatization, retrogradation, modified starch, Cellulose, hemicellulose, pectic substances gums, dietary fibre.	
PIGMENTS, ENZYMES AND COLLOIDS		
2	Pigments – 1. Properties and Occurrence: 2. Chlorophyll, Carotenoids, Flavanoids, Anthocyanins,Anthoxanthins, Myoglobin. Enzymes 1. Definition, Occurrence, 2. Classification. 3. Properties of Enzymes- Specificity, Factors affecting enzyme activity. 4. Enzymes in food Industry. Colloids: 1. Colloidal chemistry, 2. Properties of solutions, 3. Sols & Suspensions, 4. Food colloids.	**10**
ADDITIVES AND BROWNING		
3	Food Additives 1. Definition, 2. Antioxidants , chelating agents, coloring agents, curing agents, flavors and flavor enhancers, humectants and anti-caking agents, preservatives, sweeteners, stabilizers, thickening agents, surface active agents, emulsifiers. Browning **1.** Enzyme activity, enzymatic browning, **2.** Non enzymatic browning, its prevention**.** **3.** Uses of Browning	15
PRACTICAL IN		
4	Chemical Analysis of Lipids a) Determination of Iodine value b) Determination of saponification value c) Determination of peroxide value d) Determination of Free Fatty Acid 2 Analysis of Protein	**30**

	a) Kjeldahl_s methods 3 Analysis of Water a) Total solids, b) Acidity of water, c) Alkalinity of water, d) Determination of Chloride e) Hardness of water. 5 Ash content	
5	**Teacher Specific Module**	**5**
	Directions: *Water* *a) Introduction, physical & chemical properties of water, moisture in foods, methods of moisture determination, hydrogen bonding, Free & bound water.* *b) Emulsion, Types, Emulsifying Agents*	

Essential Readings:

1. Ranganna S 2001.Hand book of analysis and quality control of fruits and vegetable
2. products Tata- McGraw- Hill. .
3. Meyer, L.H 1987 Food ChemistryCBS publishers.
4. Belitz, H.D 1999 Food Chemistry Springer Verlag
5. Fennema,OR. 1996 Food ChemistryMarcel Dekker
6. Nielson S 1994 Introduction to Chemical Analysis of Foods Jones & Bartlett
7. Pomrenz Y& Meloan CE 1996 Food Analysis Theory and Practice CBS
8. Manay,N.S,Shadaksharaswamy,M.,Foods:Facts andPrinciples New Age
9. International Publishers
10. Miller, Dennis D. Food Chemistry John Wiley and sons
11. Wong, Dominic W.S Mechanism and Theory in Food Chemistry. CBS publishers.
12. Sharma B.K. 2004, Instrumental Methods of Chemical Analysis. Goel Publishing House, New Delhi.

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5

c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU3DSCFTY203: FOOD SAFETY AND HYGIENE

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
III	DSC B3	200 - 299	KU3DSCFTY203	4	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4	0	0	30	70	100	2

COURSE DESCRIPTION:

Food Safety and Hygiene focuses on the principles and practices that ensure the safety and cleanliness of food during production, processing, storage, and preparation. The course covers topics such as foodborne pathogens, contamination prevention, sanitation procedures, and personal hygiene standards. Students learn about food safety regulations, hazard analysis, and the importance of proper handling techniques to prevent illness and ensure consumer health.

Course Prerequisite: Basic knowledge in science gained during a +2 level

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Understanding the Concept and meaning of Food Safety	U
CO2	Understanding national and international regulations	U
CO3	Evaluate the food safety	E
CO4	Remember hygiene and sanitation in food industry	R

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔		✔	✔	✔		✔	✔	✔
CO 2	✔		✔	✔			✔	✔	✔
CO 3	✔		✔	✔			✔	✔	✔
CO 4	✔			✔			✔	✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	CONCEPT AND MEANING OF FOOD SAFETY	
1	Concept and meaning of Food Safety, newer approaches to food safety. FDA, Evolution in Food laws and regulations- PFA, FPO, Food Safety and Standards Bill 2005.	**15**
	NATIONAL AND INTERNATIONAL REGULATIONS	
2	APEDA, BIS, MPEDA, CODEX Alimentarius, ISO, HACCP, GMP, GAP, GHP. AGMARK, JECFA, JEMRA and JMPRA	**15**
	FOOD SAFETY	
3	Importance of Food Safety, Food Hygiene, High risk food, Low risk food, Danger Zone, Personal hygiene	**10**
	HYGIENE AND SANITATION IN FOOD INDUSTRY	
4	Hygiene and sanitation requirement in food processing industries; Cleaning, sanitizing and pest control in food processing; storage and service areas. SSOP, CIP, Chlorination, Detergents, Disinfectants and Sanitizers.	15
5	**Teacher Specific Module**	**5**
	Directions: FSSAI	

Essential Readings

1. Richard A Sprenger, Hygiene for Management, Highfield.
2. Larousse, Jean Food Canning Technology Wiley-VCH
3. FSSAI

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation		70
Continuous Evaluation		30
a)	Test Paper- 1	5

b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Viva-Voce	5
Total L		100

Any components from the above table can be taken for CE not exceeding 30 Marks

KU3DSCFTY204- CHEMISTRY OF FOODS

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
III	DSC C3	200 - 299	KU3DSCFTY204	3+1	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L+10P	50L+15P	100	2

COURSE DESCRIPTION:

Food Chemistry is the study of the chemical composition and properties of food substances. The course explores the structure, function, and interactions of macronutrients (proteins, fats, carbohydrates), micronutrients (vitamins, minerals), and water in food. It also covers food additives, enzymes, flavors, and the chemical changes that occur during food processing, storage, and cooking. The course emphasizes how these chemical processes impact food quality, safety, and nutrition.

Course Prerequisite: Basic Knowledge in Science COURSE

OUTCOMES:

CO No.	Expected Outcome	Learning Domains
1	Understand basic constituents of foods and their response to various physio-chemical alterations.	U
2	Create better understanding of food pigments and their control measurements.	C
3	Understand the importance of enzymes from various sources for chemical modification of foods	U
4	Analyse the factors which influence the textural quality of foods	An
5	Analyse the various constituents of foods	An

**Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔			✔				✔	✔
CO 2	✔				✔			✔	✔
CO 3	✔							✔	✔
CO 4	✔				✔	✔		✔	✔
CO 5	✔				✔	✔		✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	LIPIDS, PROTEINS AND CARBOHYDRATES	
1	LIPIDS 6. Lipids in food, 7. Classification, 8. Fatty acids, saturated, unsaturated, polyunsaturated fatty acids, 9. Fat constants Proteins 6. Food proteins, 7. Structure and classification of proteins 8. Properties of protein, 9. Physicochemical properties - Denaturation & reactions Carbohydrates 6. Classification, 7. properties and reactions of Monosaccharaides: Glucose & Fructose 8. Oligosaccharides: Maltose, lactose & Sucrose 9. Properties- crystallization and inversion. 10. Polysaccharides: starch: components of starch, gelatization, retrogradation, modified starch, Cellulose, hemicellulose, pectic	**15**

	substances gums, dietary fibre.	
	PIGMENTS, ENZYMES AND COLLOIDS	
2	Pigments – 3. Properties and Occurrence: 4. Chlorophyll, Carotenoids, Flavanoids, Anthocyanins,Anthoxanthins, Myoglobin. Enzymes 5. Definition, Occurrence, 6. Classification. 7. Properties of Enzymes- Specificity, Factors affecting enzyme activity. 8. Enzymes in food Industry. Colloids: 5. Colloidal chemistry, 6. Properties of solutions, 7. Sols & Suspensions, 8. Food colloids.	**10**
	ADDITIVES	
3	Food Additives 3. Definition, 4. Antioxidants , chelating agents, coloring agents, curing agents, flavors and flavor enhancers, humectants and anti-caking agents, preservatives, sweeteners, stabilizers, thickening agents, surface active agents, emulsifiers. Browning **4.** Enzyme activity, enzymatic browning, **5.** Non enzymatic browning, its prevention**.** **6.** Uses of Browning	15
	PRACTICALS IN	
4	Chemical Analysis of Lipids a) Determination of Iodine value b) Determination of saponification value Analysis of Protein b) Kjeldahl_s methods 3 Analysis of Water f) Total solids, g) Acidity of water, h) Alkalinity of water, i) Determination of Chloride j) Hardness of water. 5 Ash content	**30**

5	**Teacher Specific Module**	**5**
	Directions: *Water* *c) Introduction, physical & chemical properties of water, moisture in foods, methods of moisture determination, hydrogen bonding, Free & bound water.* *d) Emulsion, Types, Emulsifying Agents*	

Essential Readings:

13. Ranganna S 2001.Hand book of analysis and quality control of fruits and vegetable
14. products Tata- McGraw- Hill. .
15. Meyer, L.H 1987 Food ChemistryCBS publishers.
16. Belitz, H.D 1999 Food Chemistry Springer Verlag
17. Fennema,OR. 1996 Food ChemistryMarcel Dekker
18. Nielson S 1994 Introduction to Chemical Analysis of Foods Jones & Bartlett
19. Pomrenz Y& Meloan CE 1996 Food Analysis Theory and Practice CBS
20. Manay,N.S,Shadaksharaswamy,M.,Foods:Facts andPrinciples New Age
21. International Publishers
22. Miller, Dennis D. Food Chemistry John Wiley and sons
23. Wong, Dominic W.S Mechanism and Theory in Food Chemistry. CBS publishers.
24. Sharma B.K. 2004, Instrumental Methods of Chemical Analysis. Goel Publishing House, New Delhi.

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU3VACFTY100: FOOD MARKETING

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
III	VAC	100	KU3VACFTY100	2+1	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
2	2	0	15L+10P	35L+15P	75	1.5

COURSE DESCRIPTION

This course provides a foundational understanding of marketing principles as applied to the food industry, with a focus on the unique characteristics of food products and consumer behavior. Students will learn about market segmentation, branding, packaging, labeling, and the stages of new product development specific to the food sector. The course also explores marketing channels, digital strategies, supply chain management, and export marketing. Ethical considerations, regulatory frameworks, sustainability, and corporate social responsibility (CSR) in food marketing are discussed to provide a holistic view of the current marketing environment. It prepares students for roles in food product management, branding, retail, and marketing strategy.

Course Prerequisite: Basic knowledge in science gained during a +2 level**.**

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Explain the fundamentals of marketing and the unique aspects of food products	U
CO2	Apply segmentation, targeting, and positioning strategies in food marketing	A
CO3	Demonstrate knowledge of food product development and branding strategies	C
CO4	Analyze food marketing channels and distribution systems	An
CO5	Evaluate ethical, regulatory, and sustainability issues in food marketing	E

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔		✔				✔	✔	✔
CO 2	✔		✔				✔	✔	✔
CO 3	✔					✔	✔	✔	✔
CO 4	✔	✔	✔			✔	✔	✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	Introduction to Food Marketing	
	- Fundamentals of Marketing - The Unique Characteristics of Food Products - Understanding Consumer Behavior in the Food Market - Market Segmentation and Targeting in the Food Industry - Positioning Food Products in the Market - The Role of Branding in Food Marketing	10
	Food Product Development and Branding	
	- Stages of Food Product Development - New Product Development (NPD) Process - Branding Strategies for Food Products - Packaging and Labeling in Food Marketing - Intellectual Property Rights (IPR) in Food Products	10
	Food Marketing Channels and Distribution	
3	- Understanding Marketing Channels in the Food Industry - The Role of Retailers and Wholesalers in Food Distribution - E-commerce and Digital Marketing in the Food Sector - Supply Chain Management in Food Marketing - Export Marketing of Food Products	**10**
	PRACTICUM	
4	1. Consumer Behavior Survey •Prepare a simple consumer survey on food buying preferences. •Collect and tabulate responses from 10–15 consumers. 2. Market Segmentation Exercise •Collect 5 food product ads and identify target segments.	25

	- •Present findings in class with justification for segmentation and positioning. 3. Case Study on Successful Food Product •Analyze a local/new food product's journey from development to market. 4. Food Product Concept Generation •In groups, ideate a new food product and define its USP. 5. Mock Branding Activity •Design a brand name, logo, and tagline for your product. 6. Packaging and Labeling Design •Design a simple label including mandatory labeling requirements.	
5	**Teacher Specific Module**	**5**
	• Food Branding	

Essential Readings

1. Kotler, P., & Keller, K. L. (2016). *Marketing management* (15th ed.). Pearson.
2. Solomon, M. R. (2017). *Consumer behavior: Buying, having, and being* (12th ed.). Pearson.
3. Parker, J. P. (2017). *Food and beverage marketing: Foundations and strategies*. Goodfellow Publishers.
4. Fuller, G. W. (2016). *New food product development: From concept to marketplace* (3rd ed.). CRC Press.
5. Aaker, D. A. (1996). *Building strong brands*. Free Press.
6. Roth, L., & Wybenga, G. L. (2012). *The packaging designer's book of patterns* (4th ed.). Wiley.
7. Rosenbloom, B. (2012). *Marketing channels* (8th ed.). Cengage Learning.
8. Chopra, S., & Meindl, P. (2016). *Supply chain management: Strategy, planning, and operation* (6th ed.). Pearson.
9. Larson, J., & Draper, S. (2018). *Digital marketing essentials* (2nd ed.). Stukent.
10. Eagle, L., & Dahl, S. (2015). *Marketing ethics & society*. SAGE Publications.
11. Fortin, N. D. (2017*). Food regulation: Law, science, policy, and practice* (2nd ed.). Wiley.
12. Carvill, M., Butler, G., & Evans, G. (2018). *Sustainable marketing: How to drive profits with purpose.* Bloomsbury Business.

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	2

d)	Seminar	5
e)	Viva-Voce	2
Total		75

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

SEMESTER IV

KU4DSCFTY205 - FOOD ANALYSIS I

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
IV	DSC A5	200 - 299	KU4DSCFTY205	4	90

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
2	2	0	15L+20P	35L+30P	100	1.5

COURSE DESCRIPTION:

This course provides an in-depth understanding of analytical techniques used in the chemical analysis of food components, focusing on lipids, proteins, carbohydrates, fibers, and additives. Students will gain proficiency in performing both quantitative and qualitative food analyses, including classic methods like the Kjeldahl protein determination, Soxhlet extraction, and Lane & Eynon sugar analysis, along with advanced techniques such as chromatography and electrophoresis. The course also emphasizes moisture and ash content determination, enzymatic testing, and food adulteration detection. This curriculum equips students with essential laboratory skills required in food quality control, R&D, and regulatory environments.

Course Prerequisite: Basic Knowledge in Science COURSE OUTCOMES:

CO No.	Expected Outcome	Learning Domains
1	Demonstrate proficiency in chemical analysis of food components	An
2	Understand the principles and applications of electrophoretic techniques in food analysis	U
3	Identify and quantify additives and adulterants in food	U
4	Analyze the composition and quality parameters of various food products	An
5	Apply chromatographic techniques for qualitative and quantitative food analysis	An

**Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔			✔				✔	✔
CO 2	✔				✔			✔	
CO 3	✔							✔	
CO 4	✔			✔	✔	✔		✔	✔
CO 5	✔			✔		✔		✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	CHEMICAL ANALYSIS	
1	1. Chemical Analysis of Lipids a) Determination of Iodine value b) Determination of saponification value c) Determination of peroxide value 2. Determination of Free Fatty Acid 3. Analysis of Protein Kjeldahl methods 4. Paper chromatography 5. Ash content	**25**
	ANALYSIS OF FOOD	
2	1. Determination of reducing sugar, total reducing sugar in honey/ jaggery/ sugar (Lane & Eynone Method). 2. Determination of Fructose: glucose ratio in honey (Iodiometry). 3. Determination of Gum Base Content in Bubble gum/ chewing gum/ Cocoa butter(soxhlet extraction method) 4. Detection and identification of synthetic food colours (Paper chromatographic method/ TLC) 5. Determination of Fat content in cocoa butter 6. Determination of acidity of extracted fat in cashewnuts / biscuits (Soxhletextraction method) 7. Estimation of crude fibre in fruits 8. Estimation of starch content in vegetables 9. Estimation of Protein (Colorimetric method) content in food 10. Estimation of invert sugar in Jaggery / Honey	**35**

	11 Test for chicoryin coffee 12 Determination of Peroxidase enzyme 13 Rehydration ratio of dried food	
CHROMATOGRAPHIC TECHNIQUES		
3	Theory of 1. Basic Principles, 2. Classification- 3. Adsorption chromatography, 4. Partition chromatography, 5. Ion exchange, 6. Paper chromatography, 7. Column chromatography, 8. Thin layer chromatography, 9. Gas chromatography, 10. High Pressure Liquid Chromatography. 11. GCMS	12
ELECTROPHORESIS		
4	Theory of 1. Basic Principles, 2. Types of Electrophoresis 3. Thin Layer Electrophoresis 4. Cellulose acetate electrophoresis , 5. Agarose Gel Electrophoresis [AGE] , 6. SDS-Polyacrylamide Gel Electrophoresis [PAGE] , 7. 2D Gel Electrophoresis, 8. Immunoelectrophoresis , 9. Capillary Electrophoresis	**13**
5	**Teacher Specific Module**	**5**
	Directions: Methods of Food Analysis. Moisture in foods - determination by different methods - ash content of foods, wet, dry ashing, microwave ashing methods; Significance of Sulphated Ash, water soluble ash and acid insoluble ash in foods; titratable Acidity in foods, determination of dietary fiber and crude fiber.	

Essential Readings:

1. Ranganna S 2001.Hand book of analysis and quality control of fruits and vegetable products Tata-McGraw- Hill. .
2. Nielson S 1994 Introduction to Chemical Analysis of Foods Jones & Bartlett
3. Pomrenz Y& Meloan CE 1996 Food Analysis Theory and Practice CBS
4. Food Safety Standard authority of India site manual

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		35
Continuous Evaluation L		15
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
f)	Viva-Voce	5
g)	Field Report	-
Total L		50

Any components from the above table can be taken for CE not exceeding 10 Marks. Teacher specific module is evaluated for 5 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		30
Continuous Evaluation P		20
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	10
g)	Report writing	5
Total		50

Any components from the above table can be taken for CE not exceeding 20 Marks

KU4DSCFTY206 - NUTRITION SCIENCE

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
IV	DSC A6	200 - 299	KU4DSCFTY206	3+1	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L + 10P	50L + 15P	100	2

COURSE DESCRIPTION:

This course introduces key techniques for analyzing food components such as lipids, proteins, carbohydrates, and additives. Students will learn both classical methods (e.g., Kjeldahl, Soxhlet, Lane & Eynon) and modern techniques like chromatography and electrophoresis. The course also covers moisture, ash, enzyme testing, and adulteration detection, preparing students for roles in food quality control, R&D, and regulatory labs.

Course Prerequisite: Basic Knowledge in Science

COURSE OUTCOMES:

CO No.	Expected Outcome	Learning Domains
1	Recall the functions, sources and role of nutrients in the maintenance of good health	R
2	Comprehend the significance of vitamins and minerals in maintenance of human health.	U
3	Summarize how dietary components, macronutrients (carbohydrates, proteins and fats) and micronutrients (vitamins and minerals), influence health and disease	R
4	Identify the basis of human nutritional requirements and recommendations.	A
5	Develop skill for food and nutrient analysis	An

**Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔	✔	✔	✔				✔	
CO 2	✔	✔	✔					✔	
CO 3	✔	✔	✔					✔	
CO 4	✔	✔						✔	
CO 5	✔	✔						✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	INTRODUCTION TO HUMAN NUTRITION AND ENERGY	
1	5. Dietary guidelines for Indians. My plate for the day. Concept of RDA/EAR. 6. Factors affecting nutrient intake of various age groups, Indian reference man and woman. 7. Units of energy, determining energy content of foods using Bomb Calorimeter, Gross Calorific Value and Physiological Fuel value of Foods. 8. Total energy expenditure measurement and components. Direct and Indirect calorimetry. 9. Basal metabolism - definition, factors affecting. BMR, measurement, Thermic effect of activity, thermic effect of food, adaptive thermogenesis, Energy requirement for different age groups.	**15**
	WATER AND CARBOHYDRATES	
2	1. Water- Distribution and functions in human body. Water balance from intake and output. 2. Water imbalance(Dehydration) and Intoxication (oedema) 3. Carbohydrate -Composition, classification, functions and food sources. Metabolic pathways of carbohydrates 4. Dietary and functional fiber and potential health benefits.	**10**
	VITAMINS AND MINERALS	

3	**1.** Fat soluble vitamins- A, D, E and K: - Functions, food sources, requirements, deficiency and toxicity. **2.** Water soluble vitamins–Thiamine, Riboflavin, Niacin, Pyridoxine, Folic acid, B12 and C: - Functions, food sources, requirements and deficiency. **3.** Minerals-Calcium, Phosphorous, Iron, Iodine:- Functions, food sources, requirements and deficiency/Toxicity .	15
PRACTICALS IN		
4	1. Height weight measurements and classification by BMI 2. Food Analysis Qualitative tests for a) Carbohydrates b) Protein c) Calcium d) Phosphorus e) Iron 3. Quantitative tests for a) Lactose in milk b) Vitamin C in food stuffs c) Calcium in foods	**30**
5	**Teacher Specific Module**	**5**
	Directions: *1.* Amino Acids – Essential and Non-Essential, Classification, functions of proteins. 2 Metabolism (Deamination, Transamination and Decarboxylation, Urea cycle), Requirements and sources. Methods of evaluating protein quality of foods (BV, PER, NPU, DIAAS). Protein Energy Malnutrition. 3 Fats and oils, Visible and invisible fats. Composition, functions, Types of fatty acids, Significance of Essential Fatty Acids classification. 4 Fat metabolism (Beta oxidation), ketone body formation, Food sources and requirements.	

Essential Readings:

1. Gibney, M.J., Lanham- New, S.A., Cassidey, A. and Vorster H.H. (2009). Introduction to Human Nutrition, Second Edition, The Nutrition Society Textbook Series, Blackwell Publishing.
2. Mahtab, S, Bamji, Kamala Krishnasamy, Brahmam, G.N.V. (2012)Text Book of Human Nutrition, Third Edition, Oxford and IBH Publishing Co. P. Ltd., New Delhi.
3. Raghuramulu N., Madhavan Nair K and Kalyanasundaram S (2003)A manual of laboratory techniques,NIN,Hyderabad.
4. Satyanarayana, U. and Chakrapani, U.(2018)Biochemistry.7th edition. Elsivier/ Books and Allied.

Suggested Readings:

1. Srilakshmi, B. (2017) Nutrition Science, New Age International (P) Ltd., New Delhi.
2. SunetraRoday (2017). Food Science and Nutrition, Oxford University Press, New Delhi.

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU4DSCFTY207 - TECHNOLOGY OF CEREALS, PULSES AND OILSEED

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
IV	DSC A7	200 - 299	KU4DSCFTY207	3 + 1	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L + 10P	50L + 15P	100	2

COURSE DESCRIPTION:

This course provides in-depth knowledge of the processing technologies and nutritional attributes of cereals, millets, bakery and confectionery products, pulses, nuts, and oilseeds. It covers the milling processes, value-added products, by-products, and food applications, along with the technological aspects of baking and confectionery. The practical component includes hands-on training in quality assessment, product preparation, and evaluation of physical and chemical parameters.

Students will explore traditional and modern methods of processing, understand the role of different ingredients in bakery and confectionery production, and learn about nutritional changes during various processing methods like germination and fermentation.

Course Prerequisite: Basic Knowledge in Science

COURSE OUTCOMES:

CO No.	Expected Outcome	Learning Domains
1	Understand the processing and technology of cereals and rice	U
2	Demonstrate knowledge of pulse processing and oilseed technology	U
3	Prepare and evaluate common cereal- and bakery-based food products	U
4	Perform standard analytical and functional tests on cereals and bakery products	An
5	Analyze the technological aspects of millets and baked goods	An

**Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔			✔				✔	
CO 2	✔							✔	
CO 3	✔							✔	
CO 4	✔							✔	✔
CO 5	✔							✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	CEREALS.	
1	1. Wheat: Milling of wheat, wheat types, Maida, semolina, Gluten. 2. Rice: Milling of rice, by-products of rice milling – Husk, Bran, Broken rice Parboiling- Merits and demerits, Curing, Aging of rice, 3. Rice products – Flaked rice, Puffed rice. 4. Technologyof oats and Barley.	**15**
	MILLETS, BAKERY AND CONFECTIONARY	
2	1. Sorghum, pearl and finger millet 2. Baking Principles of baking, classification of baked foods. 3. Bread: Bread making –Role of ingredients, Bread faults & remedies, staling of bread. 4. Cake: Cake making, Role of ingredients, Types of making, cake faults and remedies. 5. Biscuit: Biscuits & Cookies, Crackers and Wafers, technology of Biscuits, faults & Remedies. 6. Confectionary: Raw materials, hard candy, Toffee, Caramel.	**10**

PULSES, NUTS AND OILSEEDS		
3	1. PULSES: Processing- Soaking, Germination, Decortication, Cooking and Fermentation. Changes during germination, Anti nutritional factors, Factors affecting cooking time. 2. Traditional and commercial milling method. 3. Pre conditioning, dry milling, wet milling 4. Nuts & Oil seeds 5. Sources, Processing of oil seeds – Soya bean, coconut. Hydrogenation. Refining of fats & oils, bleaching, de-odourising, hydroxylation, shortening, margarine. Protein isolates, Texturized vegetable protein. 6. Milling of oil seeds: mechanical expression, super critical fluid extraction, screw press, hydrolytic press, solvent extraction methods. 7. Pre conditioning of oil seeds, refining of oil seeds, stabilization of rice bran, by product utilization.	15
PRACTICALS IN		
4	1. Determination of moisture 2. Determination of Ash 3 Sedimentation value 4 Determination alcoholic acidity 5 Estimation of Gluten 6 Determination of Water absorption power 7 Qualitative analysis of gluten – Pelshanke value 8 Determination of falling number 9 Preparation of Bread 10 Preparation of Biscuit & cookies 11 Preparation of Cake 12 Determination of Physical parameters of wheat and rice	**30**
5	**Teacher Specific Module**	**5**
	Directions: Composition and types of oats, corn and barley	

Essential Readings:

- Hui, Y.H, Bakeryproducts, Science and Technology, Black Well publishing, 2006
- Matz S.A; Bakery Technology and Engineering; 3 edn, CBS Publishers and distributers
- Faridi H, The science of cookie and cracker production; CBS Publishers and distributers
- DendyD A V & Dobraszczyk BJ Cereals and cereal products, Aspen
- Kent NL 1983Technology of cereals Pergamon press
- E J Pyler. Bakeryscience Technology. Vol I, II. Sosland Publications.
- Manley D. 2000. Technologyof Biscuits, Crackers and Cookies. CRC press.
- Faridi H. Science of Cookie & Cracker Production
- S. Manany, N S. Swamy Food Facts and Principles. New Age International Publishers
- Srivastava RP & Kumar S .2003 Fruit and Vegetable preservation Principles and Practices. Interntional Book Distributors
- Srilakshmi B. Food Science . New Age International Publishers
- Sahay KM &. Singh KK, 1994. Unit operations of Agricultural processing Vikas Publishing House
- Vijaya khader.Text book of Food Science and Technology. ICAR

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU4VACFTY101 - MANAGEMENT CONCEPT AND PRINCIPLES

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
IV	VAC	100 - 199	KU4VACFTY101	3	45

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
3	0	0	25L	50L	75	1.5

COURSE DESCRIPTION:

This course introduces students to the fundamental concepts, principles, and functions of management. It covers the entire managerial process from planning and organizing to staffing, directing, and controlling. Emphasis is also placed on motivation and leadership theories that influence employee performance. The course integrates modern management techniques and emerging concepts such as Total Quality Management (TQM), Management Information Systems (MIS), ISO standards, and change and stress management.

Through case studies, demonstrations, and group activities, students will gain both theoretical insights and practical understanding of real-world managerial challenges and solutions.

Course Prerequisite: Basic knowledge in science gained during a +2 level**.**

COURSE OUTCOMES:

CO No.	Expected Outcome	Learning Domains
1	Understand the fundamentals concept of management.	U
2	Learn the concepts and competence of planning	U
3	Acquire the knowledge of Organization and & staffing.	U
4	Understand the importance of effectiveness of directing & coordination	U
5	Analyse the importance, process & types of controlling.	An
6	To learn about the managerial idea, in the field of Management	A

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO 9
CO 1	✔	✔	✔		✔				
CO 2	✔	✔	✔		✔				
CO 3	✔	✔	✔		✔		✔		
CO 4	✔	✔	✔		✔	✔			
CO 5	✔	✔	✔		✔			✔	✔
CO6	✔	✔	✔		✔			✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	MANAGEMENT	
1	Functions of management-: Planning-concept and importance - Planning process- Steps in Planning—barriers to effective planning.	**10**
	ORGANISING AND STAFFING	
2	Organizing- Nature and purpose of organization-Types of organization –line, functional, line and staff. Staffing: Concepts - manpower planning – process and importance. Functions of management -: Directing: Meaning-definition- principles –techniques of direction.	**10**
	MOTIVATION	
3	Motivation: - concept and importance – Theories: Maslow_s Need Hierarchy – Herzberg – Theory X and Theory Y – Leadership: concept – styles – leadership and management-– Controlling: meaning- definition-essentials of effective control system	**10**

EMERGING CONCEPTS IN MANAGEMENT		
4	Emerging concepts in management – Kaizen – TQM – TPM – MIS – ISO – Change management – Stress management – Fish bone (ISHIKAWA) Diagram –Logistic management.	10
5	**Teacher Specific Module**	**5**
	• For effective learning teachers can use group activities like role-play and demonstrations and employ case studies of experts in the field.	

Essential Readings

1. KS Chandrasekaretal, History of Management Thoughts, Vijaynicole
2. C.B.Gupta, Management Theory and Practice -Sultan chand& sons
3. L.M.Prasad, Principles and practice of Management- Sultan chand& sons
4. T N Chhabra, Principles, and practice of Management- DhanpatRai& Co.
5. Manmohan Prasad, Management concepts and practice –Himalaya Publishing House

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment/ Seminar	5
d)	TSM	10
Total		75

KU4VACFTY102 - FOOD TOURISM

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
IV	VAC	100 – 199	KU4VACFTY 102	3	45

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
3	0	0	25L	50L	75	1.5

COURSE DESCRIPTION

This course provides a comprehensive introduction to the dynamic and growing field of **Food Tourism**, focusing on the cultural, economic, and environmental dimensions. Students will explore how food shapes travel experiences, reflects cultural identity, and drives regional development. The course delves into the evolution and trends in food tourism, the importance of sustainability, and the roles of various stakeholders including tourists, communities, and businesses.

Students will also examine how food tourism is marketed and managed, and how to design authentic and responsible culinary experiences that align with global trends and local values. Practical and teacher-specific modules enhance learning through experiential activities such as virtual food tours and event planning simulations.

Course Prerequisite: Basic knowledge in science gained during a +2 level**.**

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Understand the scope, history, and stakeholders of food tourism	U
CO2	**Explore the cultural and regional influences on food tourism**	E
CO3	Assess the principles and practices of sustainable food tourism	C
CO4	Apply marketing and management principles in food tourism	A

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO 9
CO 1	✔	✔							
CO 2	✔	✔							
CO 3	✔	✔					✔		
CO 4	✔	✔				✔			

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	INTRODUCTION TO FOOD TOURISM	
1	Definition and Scope of Food Tourism Historical Development and Evolution Key Stakeholders: Tourists, Local Communities, and Businesses Current Trends and Future Directions	**10**
	CULTURAL AND REGIONAL INFLUENCES	
2	Understanding Culinary Traditions and Regional Cuisines The Role of Food Festivals and Culinary Events Food as a Cultural Identity and Heritage	**10**
	SUSTAINABLE FOOD TOURISM	
3	Principles and Importance of Sustainable Tourism Impacts of Food Tourism on Local Economies and Environments Best Practices and Strategies for Sustainable Food Tourism Evaluating and Measuring Sustainability in Food Tourism	**10**
	MARKETING AND MANAGEMENT IN FOOD TOURISM	
4	Developing Food Tourism Products and Experiences Crafting Effective Marketing Strategies and Campaigns Managing Food Tourism Operations and Experiences Future Trends and Innovations in Food Tourism	10
5	**Teacher Specific Module** • FOOD TOUR	**5**

Essential Readings

1. Hall, C. M., & Mitchell, R. (2005). ―*Food Tourism Around the World: Development, Management and Markets*‖. Routledge.
2. McKercher, B., & du Cros, H. (2002). ―*Cultural Tourism: The Partnership Between Tourism and Cultural Heritage Management*‖. Haworth Press.
3. Richards, G. (2015). *"Food and the Tourism Experience: Theoretical Perspectives and Empirical Evidence".* Routledge.
4. Selwood, J., & Berridge, G. (2019). ―*Food Tourism: A Practical Guide"*. CABI.

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	5
e)	Viva-Voce	2
Total		75

Any components from the above table can be taken for CE not exceeding 17 Marks. Teacher specific module is evaluated for 8 marks.

KU4SECFTY100 - NEW PRODUCT DEVELOPMENT

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
IV	SEC	100	KU4SECFTY100	2+1	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
2	2	0	15L+10P	35L+15P	75	1.5

COURSE DESCRIPTION

This course introduces the core principles and practical applications of New Product Development (NPD) in the food sector. Students will explore the entire lifecycle of developing a food product—from idea generation to commercialization—focusing on formulation, processing, standardization, sensory evaluation, and market positioning. The course also addresses modern trends such as robotics and automation in food manufacturing, food labeling, and innovative packaging.

The curriculum emphasizes the importance of understanding consumer insights, regulatory compliance, product costing, and shelf-life stability. Additionally, students will gain hands-on experience in food quality assessment using various sensory evaluation techniques, both subjective and objective.

Course Prerequisite: Basic knowledge in science gained during a +2 level**.**

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	To understand the basics of new food development and standardization	U
CO2	To understand the subjective and objective evaluation techniques of foods	U
CO3	To analyze the food labels and different types of food packaging on food products	An

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO 9
CO 1	✔	✔							
CO 2	✔	✔							
CO 3	✔	✔					✔	✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	FUNDAMENTALS OF NEW PRODUCT DEVELOPMENT	
1	1. Introduction to NPD 2. Steps in food product development and Standardization- 3. Steps in food product development: Idea generation, Screening, feasibility, regulation technology, formulation, ingredients, processing, facilities, Packaging, distribution, shelf life, safety and finances,	**5**
	STANDARDIZATION AND MARKETING OF NEW PRODUCTS	
2	1. Standardization of food product: Definition, formulation and standardization of recipes, Steps involved in standardization, Significance of food standardization 2. Market Survey, Analysis and Consumer Insights 3. Costing, Pricing and Marketing 4. Timeline for NPD	**10**
	EVALUATION OF FOOD QUALITY	
3	1. Sensory Evaluation of foods-Definition, Sensory characteristics of food: Appearance (colour), Flavor, texture, psychological factors, 2. sensory Tests: Importance of testing food quality, trained panel members, testing laboratory preparation of samples, Techniques of smelling , tasting and testing time, design of experiment, Score card 3. Subjective evaluation techniques/ Types of tests-Difference tests: paired comparison test, duo-trio test, triangle test, Rating tests – Ranking, Single sample, Two sample and Multiple sample, difference tests, Hedonic scaling, Numerical scoring, Composite scoring, Sensitivity tests : threshold test , dilution test	**10**

PRACTICAL		
4	**1.** New Food product development (2 Products) **2.** Project on Robotics and automation in food manufacturing.	30
5	**Teacher Specific Module**	**5**
	• Food product labeling and food packaging	

Essential Readings

1 Food Science, Norman N Potter and Joseph H Hotchkiss, (1986),4th edition, CBS publishers
2. Food Processing technology, P, J Fellows (2009) 3rd edition Wood head publishers.
3. Khetarpaul, N. (2005). Food processing and preservation. Daya Books
4.Srilakshmi, B, food science, new age International (P) limited, New Delhi,2005
5 Manay, S, Sadaksharaswamy.M, Food facts and principles, new age international (P) Limited, New Delhi, 2008

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		35
Continuous Evaluation L		15
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	2
d)	Seminar	5
e)	Viva-Voce	2
f)	TSM	8
Total		50

Any components from the above table can be taken for CE not exceeding 7 Marks. Teacher specific module is evaluated for 8 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

Semester V

KU5DSCFTY301- TECHNOLOGY OF SPICES AND PLANTATION CROPS

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
V	DSC A8	300 - 399	KU5DSCFTY301	3+1	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L+10P	50L+15P	100	2

COURSE DESCRIPTION:

Technology of Spices and Plantation crops provides comprehensive knowledge about the cultivation, processing, and value addition of spices and plantation crops. It covers the agronomic practices, post-harvest technology, and industrial applications of major and minor spices, as well as plantation crops such as tea, coffee, cocoa etc. The course also explores modern processing techniques, quality control, global trade, and sustainable production practices. By the end of the course, students will gain insights into the role of spices and plantation crops in the agricultural economy, along with the latest advancements in biotechnology, organic farming, and precision agriculture in this sector.

Course Prerequisite: Basic Knowledge in Science

COURSE OUTCOMES:

CO No.	Expected Outcome	Learning Domains
1	Understanding of various processing technology in spices.	U
2	Analyzing Quality attributes of spices	An
3	Create knowledge about Chemical Composition of spices and Manufacturing technology of spice oil and oleoresin	C
4	Evaluate proximate composition of different spices	E
5	Understand processing of plantation crops	U
6	Create Practical Knowledge in spice technology	C

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔		✔	✔					
CO 2	✔		✔	✔	✔			✔	
CO 3	✔		✔	✔				✔	
CO 4	✔		✔	✔	✔				✔
CO 5	✔	✔	✔	✔		✔			✔
CO6	✔	✔	✔	✔					✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	INTRODUCTION TO SPICES	
1	1. Spices: Definition, Classification, Chemical composition and uses, Post harvest technology 2. Quality control of spices, Standards and FSSAI specifications of Major Spices 3. Therapeutic value of Major Spices and value addition in Spices, unit operations in Spices 4. Spice oil and Oleoresins: Extraction techniques	**15**
	MAJOR SPICES	

2	1. **Pepper: Refining** and processing of Pepper, Pepper products: - White pepper, dehydrated green pepper, Pepper oil, Oleoresin. 2. **Chilies: D r y i n g** of chilies, quality attributes of Chilies and Paprika 3. **Cardamom:** Composition, Drying of fruits, Bleaching, Grading, Cardamom products, Essential oil and Oleoresins **4. Ginger: C u r i n g** , Bleaching, Grading Ginger Products, Ginger oils, Ginger Oleoresin, Dehydrated Ginger, Bleached Ginger **5. Turmeric** Curing, Grading, Turmeric powder, Essential oil, Oleoresin	**15**
	MINOR SPICES	
3.	1. Processing and utilization of Minor spices-herbs, leaves and spartan seasonings 2. Caraway seed, cassia and cinnamon-composition and its utilization. 3. Processing of Clove-stages of harvest-cleaning & drying 4. Coriander-uses, harvesting, drying 5. Processing of Nutmeg and Mace	10
4.	**PRACTICALS** 1. Determination of Moisture content in spices 1. Extraction of oil from Spices 2. Extraction of oleoresins from Spices 3. Determination of ash in spices 4. Determination of acid insoluble ash 5. Determination of acid value in spices. 6. Determination of specific gravity of spices. 7. Packaging study of spices 8. Preparation of Spice Masala, Pickle Powder and Curry powders 9. Determination of Adulterants in Spices 10. Determination of Bulk density and True density in Spices	30
5	T**eacher Specific Unit** Direction: A visit to tea/coffee/ chocolate/ Spices and condiments industry Plantation crops: Tea, Coffee, Cocoa, Vanilla	5

Essential Readings:

1. Pruthi, J.S. (2001). Spices and Condiments: Chemistry, Microbiology, Technology. CBS Publishers & Distributors, New Delhi.
2. Ravindran, P.N., Nirmal Babu, K., & Shylaja, M. (2003). Botany and Crop Improvement of Spices. New India Publishing Agency.
3. Chattopadhyay, P.K. (2007). Spices and Plantation Crops. Oxford & IBH Publishing.
Sharma, J.R. (2006). Genetics and Breeding of Spices. New India Publishing Agency.
4. Rethinam, P., & Jayadas, N.D. (2010). Advances in Plantation Crops Research. Allied Publishers.
5. Peter, K.V. (2004). Handbook of Herbs and Spices. Woodhead Publishing.
6. Journal of Spices and Aromatic Crops (Indian Society for Spices)
7. Indian Journal of Arecanut, Spices & Medicinal Plants
8. Industrial Crops and Products (Elsevier)
9. Advances in Agronomy – Articles on spice and plantation crops
10. Spices Board of India Publications

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks.
Teacher specific module is evaluated for 10 marks.

Practical's

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Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU5DSCFTY302- TECHNOLOGY OF FRUITS AND VEGETABLES

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
V	DSC A9	300 –399	KU5DSCFTY302	3+1	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L+10P	50L+15P	100	2

Course Description

Technology of Fruits and Vegetables provides a comprehensive understanding of the post-harvest handling, processing, preservation, and value addition of fruits and vegetables in the food industry. It covers the scientific principles and technological advancements in processing, storage, and packaging to enhance the shelf life, quality, and nutritional value of fruits and vegetable products. The course also emphasizes the role of modern food technology in minimizing post-harvest losses, improving sustainability, and ensuring food safety. Additionally, quality control, regulatory standards, and market trends related to fruit and vegetable processing will be explored.

Course Prerequisite: Basic Knowledge in Science

COURSE OUTCOMES:

CO No.	Expected Outcome	Learning Domains
1	Equip students with advanced knowledge of processing of fruits and vegetables	U
2	Provide knowledge about various technologies used in the production and packaging of fruits and vegetables	A
3	Apply knowledge of preservation methods	A
4	Understand the preparation specification and quality control of products	U
5	Familiarize different aspects of post-harvest technology along with storage practices and storage disorders	A
6	Create basic knowledge on recent trends in processing techniques of fruits and vegetables	C

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO4	PSO 5	PSO6	PO7	PO8	PO9
CO 1	✔		✔						
CO 2	✔		✔						
CO 3	✔		✔						
CO 4	✔		✔					✔	✔
CO 5	✔		✔					✔	✔
CO 6	✔		✔					✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
POST HARVEST TECHNOLOGY OF FRUITS AND VEGETABLES		
1	1. Pre- and post-harvest physiology, maturation changes and maturity indices for harvesting, Quality control of spices, Standards and FSSAI specifications of Major Spices 2. Ripening, changes during ripening-climacteric and non-climacteric. Post harvest treatment to hasten and delay ripening 3. Post harvest handling: sorting, grading, packaging, storage and transportation 4. Storage disorders: physiological disorder, chilling injury, freezing injury 5. Storage practices: cold storage, controlled atmospheric & modified atmospheric storage and hypobaric storage, cellar storage, zero energy cool chamber 6. Primary processing - grading, sorting, cleaning, washing, peeling, slicing blanching, wax coating	**15**
PROCESSING AND PRESERVATION TECHNOLOGY OF FRUITS AND VEGETABLES		
2	1. Canning: classification of canning fruits- pineapple, oranges, canning of vegetables – peas, carrots, syrups and brines for canning 2. Jack fruit- value added products from Jack Fruit 3. Drying and Dehydration: Enzyme inactivation, sulphuring, sun drying- grapes and dates. Dehydration of fruits and vegetables Browning: Enzymatic Browning, it‘s prevention Benefits of preserved Fruits and Vegetables	**10**

PECTIN AND OTHER FOOD PRODUCTS		
3	1. Pectin: Definition of pectin, classification, pectic enzymes, properties, Jelly grade of pectin, Testing of pectin 2. Processing of jam, jelly, marmalade, preserves, candy, glazed and crystallized fruits definition and it's FSSAI Specifications 3. RTS, Squashes, Cordials, syrups, sherbet, crush. - Preparation and FSSAI specifications 4. Fruit juice and concentrates: unit operation and equipment, aroma recovery and restoration; aroma recovery systems. fruit juices (lime, mango) and Fruit juice powder 5. Pickles and chutneys: Types and production, packaging of pickles and chutneys, spoilage 6. Alcoholic beverages – processing of wine, beer, arak	**15**
PRACTICALS		
4	1. Determination of TSS 2. Determination of acidity in Fruit juice 3. Lye peeling 4. Extraction of tomato pulp and preparation of tomato paste 5. Preparation of Tomato Ketchup 6. Preparation of Jam and Jelly 7. Preparation of Squash 8. Dehydration of Fruits & Vegetables 9. Determination of Rehydration ratio 10. Determination of sulphur dioxide 11. Determination of salt content in Pickles 12. Estimation of vitamin C	**30**
5	**Teacher Specific Unit** Direction: Industrial visit Tomato products: Tomato juice, Puree and Ketchup - Specifications	**5**

Essential Readings:

1. Cruess, W.V. – Commercial Fruit and Vegetable Products
2. Srivastava, R.P., & Kumar, S. – Fruit and Vegetable Preservation: Principles and Practices
3. Verma, L.R., & Joshi, V.K. – Post-Harvest Technology of Fruits and Vegetables (Vol. 1 & Vol. 2)
4. Salunkhe, D.K., & Kadam, S.S. – Handbook of Fruit Science and Technology: Production, Composition, Storage, and Processing
5. Bates, R.P., Morris, J.R., & Crandall, P.G. – Principles and Practices of Small- and Medium-Scale Fruit Juice Processing
6. Barrett, D.M., Somogyi, L., & Ramaswamy, H.S. – Processing Fruits: Science and Technology
7. Thompson, A.K. – Postharvest Technology of Fruits and Vegetables

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks.
Teacher specific module is evaluated for 10 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU5DSCFTY303- ENTERPRENEURSHIP DEVELOPMENT

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
V	DSC A10	300 - 399	KU5DSCFTY303	4	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4	0	0	30L	70P	100	2

Course Description

This course provides a comprehensive understanding of entrepreneurship in the food and agriculture sectors, focusing on the principles of entrepreneurship, innovation, business development, and project management. It covers the fundamental concepts of entrepreneurship, including the characteristics and qualities of entrepreneurs, differences between entrepreneurs and managers, and the significance of planning and evaluation in business. Additionally, the course covers business ethics, corporate social responsibility, venture capital, contract farming, joint ventures, and Public-Private Partnerships (PPP). The marketing aspect includes strategies in the food processing industry, supply chain management, digital marketing, and consumer behaviour. Finally, students will gain insights into e-commerce, social entrepreneurship, sales management, and customer relations, preparing them to successfully establish and manage businesses in the food and agriculture sectors.

Course Prerequisite: Basic Knowledge in Science

COURSE OUTCOMES:

CO No.	Expected Outcome	Learning Domains
CO1	Equip students with knowledge of Entrepreneurial terminologies.	U
CO2	Provide knowledge about various Agencies supporting Entrepreneurial growth of the individual	C
CO3	Apply knowledge of fundamental issues of women Entrepreneurship	Ap
CO4	Understand the preparation and specification of projects for various business related to food sectors.	U
CO5	Familiarize different aspects of food business supporters for Entrepreneurship development.	U

* Remember (R), Understand (U), Apply (AP), Analyse (An), Evaluate (E), Create (C)

Mapping of COs with PSOs and POs :

	PSO 1	PSO 2	PSO 3	PSO4	PSO 5	PSO6	PSO7	PSO8	PSO9
CO 1	✔				✔				
CO 2	✔				✔				
CO 3	✔				✔				
CO 4	✔				✔				
CO 5	✔		✔		✔				

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	ENTREPRENEURSHIP	
1	1. Concept of entrepreneur, entrepreneurship and enterprise. Entrepreneurial characteristics, Distinction between an entrepreneur and a manager. Qualities of an entrepreneur. 2. Agri & Food -entrepreneurship-concept, need and scope. Innovation and entrepreneurship, Risks involved with entrepreneurship. 3. Women entrepreneurship- Role, importance & problems. 4. Importance of planning, budgeting, monitoring, evaluation and follow up in running an enterprise 5. Environmental analysis techniques and SWOC analysis	**15**
	MANAGEMENT	
2	1. Generation, incubation and commercialization of ideas and innovations. 2. Managing Competition in modern world and Entrepreneurship Development Programmes. 3. Meaning and characteristics of a project, Project Life cycle, Project Management and its need- Identification, feasibility study, selection, planning, evaluation and controlling. 4 Project appraisal & evaluation. 5. Calculation of project cost and break-even analysis.	**15**
	SCHEMES	

3	1 Government schemes and incentives for promotion of Entrepreneurship & an understanding on industries promotional institutions. 2. Micro, Small& medium enterprises- classification, objectives. 3. Characteristics of MSME's, Advantages & disadvantages of MSME's. 4. DIC, KVIC, SIDBI, IDBI, NABARD, MOFPI, EDII. 5. KITCO, KFC, SIDCO, KCIDC & KINFRA.	**10**
	BUISINESS	
4	1. Business ethics & social responsibility of an enterprise. 2. Venture capital, contract farming and joint ventures 3. Public- Private partnership (PPP) and its relevancy 4. Overview of food industry inputs: Characteristics of Indian food processing industries and export 5. Marketing strategy in Food processing industry. marketing process, overview, advertising and promotion, distribution and supply chain management channels. Direct and online marketing 6. E-commerce and social media Social Entrepreneurship – Concept 7. Consumer buying behaviour, sales management and sales promotion. customer relations.	**15**
Teacher specific module		
5	1. Mini Project: Business Plan Preparation and Presentation 2. Case Study Analysis of Successful Startups (Local/Global)	

Essential Readings:

1. **Hisrich, R.D., Peters, M.P., & Shepherd, D.A.** – *Entrepreneurship* (McGraw Hill)
2. **Gupta, C.B., & Srinivasan, N.P.** – *Entrepreneurship Development in India* (Sultan Chand & Sons)
3. **Desai, V.** – *Small Scale Industries and Entrepreneurship* (Himalaya Publishing House)
4. **Khanka, S.S.** – *Entrepreneurial Development* (S. Chand Publishing)
5. **Francis, A.** – *Food and Agribusiness Marketing in Developing Countries: Selected Readings* (Springer)
6. **Rao, M.V. & Shekhar, S.** – *Food and Agribusiness Management* (PHI Learning)
7. **Acharya, S.S. & Agarwal, N.L.** – *Agricultural Marketing in India* (Oxford & IBH Publishing)
8. **Chandra, P.** – *Projects: Planning, Analysis, Selection, Financing, Implementation, and Review* (McGraw Hill)
9. **Kuratko, D.F.** – *Entrepreneurship: Theory, Process, and Practice* (Cengage Learning)
10. **Gopal, C.** – *Introduction to Project Management* (New Age International Publishers)
11. **Lal, M. & Sahai, D.** – *Entrepreneurship Development* (Excel Books)
12. **Patankar, A.** – *Government Schemes and Financial Assistance for Entrepreneurs*

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		70
Continuous Evaluation L		30
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	5
f)	Viva-Voce	5
g)	Field Report	5
Total L		100

Any components from the above table can be taken for CE not exceeding 30 Marks.
Teacher specific module is evaluated for 10 marks.

KU5DSEFTY301- FOOD SAMPLING AND INSPECTION

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
V	DSE A 11	300 - 399	KU5DSEFTY301	4	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4	0	0	30L	70L	100	2

Course Description

This course provides an in-depth understanding of food sampling techniques, inspection methods, and regulatory compliance essential for ensuring food safety and quality. It covers fundamental aspects of sampling, including objectives, types, statistical designs, and procedures for collecting and analysing food samples. Students will gain knowledge about different sampling plans, microbial assessment techniques, and the role of food analysts in maintaining food safety standards. The course further explores food inspection in establishments, including ethical guidelines, inspection types, documentation procedures, and risk-based inspection systems (RBIS). Special emphasis is given to product risk ranking and

Course Prerequisite: Basic Knowledge in Science

COURSE OUTCOMES:

CO	CO Statement	Learning Domains
CO1	Develop essential knowledge of FSSAI and Indian food legislation, as well as food-related organizations.	U
CO2	Help understand the numerous food regulations of Indian food laws.	Ap
CO3	Gain in-depth understanding of international food regulatory authorities.	Ap
CO4	Awareness of laws related to marketing and patents.	U
CO5	Gain an understanding of updates and amendments related to food laws	Ap

* Remember (R), Understand (U), Apply (AP), Analyse (An), Evaluate (E), Create (C)

Mapping of COs with PSOs:

	PSO 1	PSO 2	PSO 3	PSO4	PSO 5	PSO6	PSO7	PSO8	PSO9
CO 1	✔			✔					
CO 2	✔			✔		✔	✔		
CO 3				✔					
CO 4		✔	✔	✔				✔	✔
CO 5		✔	✔	✔				✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	SAMPLING	
1	1. Objective and Types of sampling 2. Circumstances for Drawing Sample. 3. Procedure for taking samples for analysis. 4. Sample Size 5. Statistical design for sampling	**15**
	DOCUMENTATION	
2	1. Types of sampling plans. 2. Two & Three class attributes plan for microbial assessment. 3. Suitable container. 4. Documentation. 5. Analysis of food samples by Food Analyst 6. Food Laboratories, Function and Indian Food Laboratory Network	**15**
	FOOD ESTABLISHMENTS	
3	1. Inspection in Food Establishments. 2. Code of Ethics, Type of Inspections. 3. Procedure of Inspection, Documents to be Inspected. 4. Risk based Inspection System (RBIS), Product Risk Ranking. 5. Food Safety Compliance through regular inspections and sampling.	**15**
	MANUFACTURING	
4	1. General Manufacturing. 2. Milk and Milk Product Processing 3. Catering 4. Meat Processing and Slaughter house 5. Storage & Warehouses 6. Transport and Retail	**10**
	TEACHER SPECIFIC MODULE:	
5	1. In-Plant Training in Food Processing unit (10-15 days) 2. Industrial visit	**5**

Essential Readings:

Schilling, E.G. & Neubauer, D.V. – *Acceptance Sampling in Quality Control* (CRC Press)
Singh, P. & Singh, A. – *Food Analysis and Quality Control* (New India Publishing)
Pomeranz, Y. & Meloan, C.E. – *Food Analysis: Theory and Practice* (Springer)
Cochran, W.G. – *Sampling Techniques* (Wiley)
Jacob, C.J. – *Inspection Manual for Food Safety Officers* (Food Safety and Standards Authority of India - FSSAI)
Bryan, F.L. – *Hazard Analysis and Critical Control Point (HACCP) Systems* (Springer)
Lelieveld, H.L.M., Holah, J. & Napper, D. – *Hygiene in Food Processing* (Woodhead Publishing)
Forsythe, S.J. – *The Microbiology of Safe Food* (Wiley-Blackwell)
Bamforth, C.W. – *Food, Fermentation, and Micro-organisms* (Wiley-Blackwell)
FSSAI Manual of Methods of Analysis of Foods – *(Official document from FSSAI, India)*
Downes, F.P. & Ito, K. – *Compendium of Methods for the Microbiological Examination of Foods* (American Public Health Association - APHA)
Hobbs, B.C. & Roberts, D. – *Food Poisoning and Food Hygiene* (Hodder Arnold)
Mortimore, S. & Wallace, C. – *HACCP: A Practical Approach* (Springer)
Troller, J.A. – *Sanitation in Food Processing* (Academic Press)
Roday, S. – *Food Hygiene and Sanitation* (McGraw Hill)

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		70
Continuous Evaluation L		30
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		100

Any components from the above table can be taken for CE not exceeding 15 Marks.
Teacher specific module is evaluated for 10 marks.

KU5DSEFTY302- FOOD PLANT OPERATIONS

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
V	DSE A12	300 - 399	KU5DSEFTY302	4	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4	0	0	30L	70L	100	2

Course Description

This course provides a comprehensive understanding of the fundamentals of food business management, covering aspects such as market analysis, plant setup, business organization, financial planning, and operations management. Students will gain insights into the regulatory requirements for food industries, selection of machinery, and sourcing raw materials. Students will explore food plant operations and management**,** including the role of different departments such as purchasing, production, quality control, sales, distribution, and marketing. Key operational aspects like production scheduling and staffing are also covered to provide a complete understanding of managing a food processing enterprise effectively. By the end of the course, students will have the necessary knowledge to establish, manage, and sustain a food business**,** ensuring operational efficiency and profitability while adhering to regulatory guidelines.

Course Prerequisite: Basic Knowledge in Science

COURSE OUTCOMES:

CO	**CO Statement**	Learning Domains
CO1	Develop essential knowledge of FSSAI and Indian food legislation, as well as food-related organizations.	U
CO2	Help understand the numerous food regulations of Indian food laws.	Ap
CO3	Gain in-depth understanding of international food regulatory authorities.	Ap
CO4	Awareness of laws related to marketing and patents.	U
CO5	Gain an understanding of updates and amendments related to food laws	Ap

* Remember (R), Understand (U), Apply (AP), Analyse (An), Evaluate (E), Create (C)

Mapping of COs with PSOs:

	PSO 1	PSO 2	PSO 3	PSO4	PSO 5	PSO6	PSO7	PSO8	PSO9
CO 1	✔			✔					
CO 2	✔			✔		✔	✔		
CO 3				✔					
CO 4		✔	✔	✔				✔	✔
CO 5		✔	✔	✔				✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	FOOD BUISINESS	
1	1. Scope for Food Business 2. Consumer market and product survey. 3. Location and layout of food plants – Selection Factors, Regulatory requirements of food industries. 4. Selection of Machineries and raw materials.	**15**
	ORGANIZATION	
2	1. Forms of business organization – sole proprietorship – partnership. 2. Private and public limited. 3. Cooperative unit. 4 Small Farmers Agri Business Consortium, Farmers Producer Company.	**15**
	FBO	
3	1 FBO (Food Business Operator) 2. SWOT Analysis of Food Industry. 3. Estimation of Cost of production. 4. Break-even Analysis. 5. Supply chain Management in Food Industries. 6. Online Marketing 7. Direct Marketing	**15**
	FOOD PLANT	
4	1. Food Plant Operations - Role of management in planning, organising and controlling 2. Purchase Department 3. Production Department, Quality Assurance / Control	**1 0**

	4. Sales 5. Distribution and Marketing 6. Production Schedule 7. Staffing	
TEACHER SPECIFIC MODULE		
5	Food Business and SWOT Analysis	

Essential Readings:

1. **Philip Kotler, Kevin Keller** – *Marketing Management* (Pearson)
2. **Hisrich, R.D., Peters, M.P., & Shepherd, D.A.** – *Entrepreneurship* (McGraw Hill)
3. **Gupta, C.B., & Srinivasan, N.P.** – *Entrepreneurial Development* (Sultan Chand & Sons)
4. **Desai, V.** – *Small-Scale Industries and Entrepreneurship* (Himalaya Publishing House)
5. **Khanka, S.S.** – *Entrepreneurial Development* (S. Chand Publishing)
6. **James M. Jay** – *Modern Food Microbiology* (Springer)
7. **Heldman, D.R. & Lund, D.B.** – *Handbook of Food Engineering* (CRC Press)
8. **Toledo, R.T.** – *Fundamentals of Food Process Engineering* (Springer)
9. **Coulson, J.M. & Richardson, J.F.** – *Chemical Engineering: Vol. 6 - Design* (Butterworth-Heinemann)
10. **Ramaswamy, H. & Marcotte, M.** – *Food Processing: Principles and Applications* (CRC Press)
11. **Chandra, P.** – *Projects: Planning, Analysis, Selection, Financing, Implementation, and Review* (McGraw Hill)
12. **Kachru, U.** – *Exploring the Supply Chain: Theory and Practice* (Excel Books)
13. **Waters, D.** – *Supply Chain Management: An Introduction to Logistics* (Palgrave Macmillan)
14. **Panneerselvam, R.** – *Production and Operations Management* (Prentice Hall India)
15. **Mortimore, S. & Wallace, C.** – *HACCP: A Practical Approach* (Springer)
16. **Singh, P. & Singh, A.** – *Food Analysis and Quality Control* (New India Publishing)
17. **FSSAI Manuals & Guidelines** – *(Food Safety and Standards Authority of India - Official Documents)*

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		70
Continuous Evaluation L		30
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		100

Any components from the above table can be taken for CE not exceeding 15 Marks.
Teacher specific module is evaluated for 10 marks.

KU5DSEFTY303- FOOD SAFETY STANDARDS AND CERTIFICATION

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
V	DSE A13	300 - 399	KU5DSEFTY303	4	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4	0	0	30L	70L	100	2

Course Description

This course offers a comprehensive overview of national and international food laws and regulatory frameworks. It traces the evolution of food legislation in India from the PFA to the FSSA, 2006, and explores the roles of FSSAI and other key bodies like APEDA, BIS, EIC, MPEDA, and the Spice Board. Core focus areas include FSSAI regulations on licensing, food standards, recalls, imports, fortification, advertising, packaging, and vegan foods. The course also covers global regulatory agencies such as ISO, FAO, WHO, WTO, and the Codex Alimentarius. Students will gain the knowledge needed for careers in food safety, quality control, and regulatory compliance.

Course Prerequisite: Basic Knowledge in Science

COURSE OUTCOMES:

CO	CO Statement	Learning Domains
CO1	Develop essential knowledge of FSSAI and Indian food legislation, as well as food-related organizations.	U
CO2	Help understand the numerous food regulations of Indian food laws.	Ap
CO3	Gain in-depth understanding of international food regulatory authorities.	Ap
CO4	Awareness of laws related to marketing and patents.	U

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)

Mapping of COs with PSOs:

	PSO 1	PSO 2	PSO 3	PSO4	PSO 5	PSO6	PSO7	PSO8	PSO9
CO 1	✔			✔					
CO 2	✔			✔					
CO 3				✔					

CO 4		✔	✔	✔				✔	✔
CO 5		✔	✔	✔				✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	INDIAN FOOD LAWS	
1	1. Evolution in Food laws and regulations-(PFA to FSSA) 2. Food Safety and Standards Act of India, 2006. 3. FSSAI, Structure and Functions. 4. APEDA, BIS, EIC, MPEDA, Spice Board. 5. a) Agricultural Produce Act, 1937 (Grading and Marketing) b) Export (Quality Control & Inspection), Act, 1963 and Rules c) Bureau of Indian Standards	**15**
	FSSAI RULES AND REGULATIONS	
2	1. Salient features of Food Safety and Standards (Licensing and Registration of Food Businesses) Regulation, 2011. 2. Food Safety and Standards (Food Products Standards and Food Additives) Regulation. 3. Prohibition and Restriction of Sales Regulation, 2011. 4. Food Recall Procedure) Regulation, 2017. 5. Import Regulation, 2017 6. Fortification of Food Regulation 2018 7. Advertising and Claims Regulation- 2018 8. Food Safety and Standards (Packaging) Regulation, 2018 9. Vegan Foods Regulations, 2022	**15**
	INTERNATIONAL AGENCIES IN FOOD REGULATION	
3	1 ISO, FAO, WHO, WTO.CODEX Alimentarious Commission. 2. GCC Food laws. 3. USFDA, EPA Regulations and European Union food regulation	**15**
	REGISTRATION, LICENSING AND PATENT	
4	1. FSSAI Registration and licensing 2. Patents and Trademark	
	TEACHER SPECIFIC MODULE	
5	Food Products Standards	**5**

Essential Readings:

1. **Food Safety and Standards Authority of India (FSSAI)** – *Manual of Food Laws and Regulations* (FSSAI Official Publications)
2. **Saxena, R.** – *Food Safety and Standards Act, 2006 with Rules & Regulations* (Commercial Law Publishers)
3. **Kumar, D. & Prasad, S.** – *FSSAI Food Safety and Standards Act, Rules & Regulations* (LexisNexis)
4. **Mehta, R. & George, J.** – *Food Safety Regulations Concerns and Trade: The Developing Country Perspective* (Macmillan)
5. **Ashish Bharat Singh** – *Food Safety and Standards Act, 2006 & FSSAI Regulations*
6. **Government of India** – *Agricultural Produce (Grading and Marking) Act, 1937*
7. **Government of India** – *Export (Quality Control & Inspection) Act, 1963*
8. **Bureau of Indian Standards (BIS)** – *Handbook on Indian Food Standards*
9. **Codex Alimentarius Commission (FAO/WHO)** – *Codex Standards for Food Safety* (FAO)
10. **FAO & WHO** – *Food Safety Risk Analysis: A Guide for National Food Safety Authorities* (FAO)
11. **USFDA** – *Food Regulations and Safety Standards in the U.S.* (USFDA Publications)
12. **WTO** – *Sanitary and Phytosanitary (SPS) Measures and Food Trade Regulations*
13. **European Commission** – *EU Food Law and Policy* (EU Publications)
14. **Narayan, P.** – *Intellectual Property Law in India* (LexisNexis)
15. **Bainbridge, D.** – *Intellectual Property* (Pearson)
16. **Kankanala, K.** – *Indian Patent Law and Practice* (Oxford University Press)

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		70
Continuous Evaluation L		30
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10

e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		100

Any components from the above table can be taken for CE not exceeding 15 Marks.
Teacher specific module is evaluated for 10 marks.

KU5SECFTY101 - BAKERY AND CONFECTIONARY TECHNOLOGY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
V	SEC	100 - 199	KU5SECFTY101	2+1	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
2	2	0	15L+10P	35L+15P	75	1.5

COURSE DESCRIPTION

This course offers an in-depth exploration of the principles and practices of bakery and confectionery technology, blending theoretical knowledge with practical skills. Students will learn about the science of baking, the functional roles of ingredients, processing techniques, and the equipment used in modern bakery and confectionery production. The course emphasizes hands-on product development, quality control, and food safety, preparing students for professional roles in the food industry or entrepreneurial ventures.

Course Prerequisite: Basic knowledge in science gained during a +2 level**.**

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	**Demonstrate understanding of the functional properties of ingredients** used in bakery and confectionery products	U
CO2	**Apply scientific and technological principles** to the preparation, processing, and evaluation of various bakery and confectionery items.	Ap
CO3	**Operate and manage baking and confectionery equipment** safely and efficiently in a production setting.	Ap

Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO 9
CO 1	✔	✔							
CO 2	✔	✔							
CO 3	✔	✔					✔	✔	✔

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	INTRODUCTION TO BAKING SCIENCE	
	1. History and evolution of bakery and confectionery. 2. Classification of baked products. 3. Bakery terms and definitions. 4. **Flour:** Types, properties, gluten formation. 5. **Leavening Agents:** Yeast, baking powder, baking soda. 6. **Fats, Sugar, Eggs, Salt, Water:** Roles and functionalities. 7. Dough conditioners, improvers, enzymes, emulsifiers.	5
	BAKERY PROCESSES AND EQUIPMENT AND BAKERY PRODUCTS	
	1. Dough mixing, fermentation, proofing, shaping, baking. 2. Cooling, slicing, packaging. 3. Equipment: Ovens, mixers, moulders, proofers. 4. Bread: White, whole wheat, multigrain. 5. Cakes: Sponge, pound, chocolate, fruit cakes. 6. Biscuits, cookies, muffins, pastries.	**10**
	CONFECTIONERY TECHNOLOGY	
	1. Classification of confectionery. 2. Sugar cookery: Crystallized vs non-crystallized products. 3. Chocolates, fondants, fudge, toffee, caramel. 4. Gel-based products: Gummies, marshmallows. 5. Use of sweeteners and additives.	**10**
	PRACTICAL	
	1. Bread Preparation: **2.** Cake Making Techniques: **3.** Cookies and Biscuits: **4.** Pastries and Muffins: **5.** Gluten-free/healthy bakery trials: **6.** Sugar Cookery Basics: **7.** Chocolates: **8.** Candies and Toffees: **9.** Gel and Marshmallow Products: **10.** Decorative Techniques:	30
	TEACHERSPECIFIC MODULE	**5**
	1. Quality parameters and faults in baked goods. 2. Food safety and sanitation practices. 3. HACCP in bakery and confectionery. 4. Packaging and shelf-life considerations	

Essential Readings

1. "The Technology of Cake Making" – A.J. Bent
2. "Baking Science and Technology" – E.J. Pyler
3. "Sugar Confectionery and Chocolate Manufacture" – E.B. Jackson
4. FSSAI manuals and relevant BIS standards

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		35
Continuous Evaluation L		15
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	2
d)	Seminar	5
e)	Viva-Voce	2
f)	TSM	8
Total		50

Any components from the above table can be taken for CE not exceeding 7 Marks. Teacher specific module is evaluated for 8 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

SEMESTER VI

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KU6DSCFTY304: DAIRY TECHNOLOGY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
VI	DSC A14	300 - 399	KU6DSCFTY304	3+1	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L + 10P	50L + 15P	100	2

COURSE DESCRIPTION:

This course introduces the fundamentals of milk, including its composition, sources, and importance. It covers milk collection, processing methods like pasteurization and homogenization, and the classification of various market milk types. Students will also explore a wide range of milk products—fermented, coagulated, fat-rich, dried, and traditional.

A practical component includes hands-on training in milk quality testing and basic dairy product preparation. Emphasis is placed on clean milk production and detecting adulteration to ensure quality and safety.

Course Prerequisite: Basic knowledge in nutrients gained during a +2 level.

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Understand the Composition and Importance of Milk	U
CO2	Apply Milk Collection and Processing Techniques	A
CO3	Classify and Identify Milk Products	An
CO4	Evaluate Milk Quality through Practical Testing	E
CO5	Promote Clean Milk Production and Hygiene Standards	A

****Remember ©, Understand (U), Apply (A), Analyse (An), Evaluate ©, Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔	✔	✔				✔	✔	✔
CO 2	✔	✔	✔				✔	✔	✔
CO 3	✔	✔				✔	✔	✔	✔
CO 4	✔	✔	✔			✔	✔	✔	✔
CO5	✔	✔					✔		

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
Introduction to Milk and Its Composition		
1	1. Definition and importance of milk. 2. Sources of milk: Cow, buffalo, goat, etc. 3. Major and minor constituents of milk. 4. Factors affecting milk quality and quantity. 5. Sources of contamination in milk. 6. Concept of clean milk production	**15**
Processing and Types of Market Milk		
2	1. Collection, cooling, and transportation of milk. 2. Filtration and clarification. 3. Standardization and homogenization. 4. Pasteurization, UHT, and sterilization. 5. Packaging of market milk. 6. Types of market milk: Toned milk, double toned milk, standardized milk, homogenized milk, and recombined milk.	**15**
Milk Products and Their Classification		
3	1. Fermented and coagulated products: Curd, yoghurt, acidophilus milk, kefir, koumiss. 2. Coagulated products: Paneer, channa, cheese. 3. Concentrated and dried products: Evaporated milk, condensed milk, milk powder. 4. Fat-rich products: Cream, butter, ghee. 5. Frozen desserts: Ice cream and frozen milk products. 6. Traditional and indigenous milk products: Chakka, shrikhand, etc. 7. Whey and edible casein products.	**10**
Practical – Milk Analysis and Quality Testing		
4	1. Determination of titratable acidity of milk. 2. Fat content in milk 3. Determination of total solids, SNF and specific gravityof milk 4. Determination of total ash in milk 5. Adulteration in milk 6. Acidity of butter 7. FFAof ghee 8. Preperation of Khoa and Peda	**30**
5	**Teacher Specific Module**	**5**
	Directions: Milk pasteurization	

Essential Readings

1. Sukumar D E. Outlines of Dairy Technology, Oxford University Press.

Suggested Readings:

1. Johnson, Webb. Fundamentals of Dairy Chemistry, CBS Publishers and Distributors.
2. Eckles, Clarence, Henry. Milk and Milk Products, Tata McGraw Hill Publishers.
3. Kurmann, Joseph A. Encyclopedia of Fermented Fresh Milk Products, CBS Publishers and Distributors.
4. Atherton, Henry V. Chemistry and Testing of Dairy Products, CBS Publishers and Distributors.
5. Johnson, Webb. Fundamentals of Dairy Chemistry, CBS Publishers.
6. Ananthakrishnan C P, Khan A Q, Padmanabhan P N. Technology of Milk Processing, Srilakshmi Publishers.
7. Walstra P, Geurts T. Dairy Technology, Marcel Dekker.
8. Edgar Spreer. Milk and Dairy Product Technology, Marcel Dekker

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Viva-Voce	5
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5

d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU6DSCFTY305: TECHNOLOGY OF ANIMAL FOOD

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
VI	DSC A 15	300 - 399	KU6DSCFTY 305	3+1	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L + 10P	50L + 15P	100	2

COURSE DESCRIPTION:

This course provides foundational knowledge of meat science, covering the structure, composition, and quality characteristics of meat and meat products. It includes techniques of animal slaughter, carcass dressing, inspection, and hygienic handling practices. The course also explores meat quality influencers such as breed, feed, and processing methods. Additional topics include by-products of meat, fish and egg preservation, grading, and storage. A practical component emphasizes quality assessment and safe preservation techniques for animal-origin foods.

Course Prerequisite: Basic knowledge in nutrients gained during a +2 level.

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Understand Meat Structure and Composition	U
CO2	Apply Slaughter and Processing Techniques	A
CO3	Assess Quality of Meat, Fish, and Eggs	An
CO4	Utilize and Classify Animal By-products	E
CO5	Implement Preservation and Storage Methods	E

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔		✔				✔	✔	✔
CO 2	✔		✔				✔	✔	✔
CO 3	✔			✔		✔	✔	✔	✔
CO 4	✔	✔	✔	✔		✔	✔	✔	✔
CO5	✔								

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	MEAT SCIENCE AND SLAUGHTER TECHNOLOGY	
1	1. Structure and composition of meat 2. Factors affecting tenderness of meat 3. Effect of cooking on texture, colour and flavour 4. Slaughter of meat animals – buffalo, sheep/goat, poultry, pig 5. Ante mortem and post-mortem examination of meat 6. Dressing of carcasses 7. Slaughterhouse operations and hygiene 8. Inspection and grading of meat	**15**
	MEAT QUALITY AND BY-PRODUCTS	
2	1. Effect of feed, breed and environment on meat quality 2. Meat quality parameters: colour, flavour, texture 3. Water Holding Capacity (WHC), emulsification capacity of meat 4. Meat by-products – importance, classification and uses 5. Manufacture of natural casings	**15**
	FISH AND FISH PRODUCTS	
3	1. Introduction to fish as food 2. Spoilage of fish – causes and prevention 3. Handling, storage and transportation of fish 4. Preservation methods: 5. Cold storage, freezing, smoking, pickling, canning, drying 6. Fish products: fish oils (body oil, liver oil), fish meal 7. Fish by-products: chitosan, pearl essence, glue, gelatin	**10**
	EGG AND EGG PRODUCTS	
4	1. Structure of egg 2. Grading of eggs 3. Changes during storage 4. Preservation techniques: refrigeration, freezing, thermal processing, dehydration, coating 5. Quality factors of eggs – measurement and evaluation 6. Effect of cooking on eggs	**30**
5	**Teacher Specific Module**	**5**
	Directions: Preservation of Meat Products	

Essential Readings

1. Gracey JF, Collins DS – Meat Hygiene, ELBS
2. Pearson AM, Gillet TA – Processed Meats, CBS Publishers
3. Lawrie RA – Meat Science, Tata McGraw-Hill
4. Mountney T, Carmen G, Prakhurst R – Poultry Products Technology, CBS Publishers
5. Ockerman HW, Hansen CL – Animal Byproduct Processing, Ellis Horwood
6. Gopakumar K – Tropical Fishery Products, Oxford
7. Jhingran VG – Fish and Fisheries of India, Hindustan Publishing Company
8. Biswas KP – Text Book of Fish and Fisheries Technology, Tata McGraw-Hill
9. Stadelman WJ – Egg Science and Technology, CBS
10. Parkhurst CR – Poultry Meat and Egg Production, CBS

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Viva-Voce	5
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

Practical's

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5

f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU6DSCFTY306: BASICS OF FOOD ENGINEERING

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
VI	DSC A 16	300 - 399	KU6DSCFTY306	4	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4	0	0	30P	70L	100	2

COURSE DESCRIPTION:

This course introduces the principles of heat transfer and their applications in food processing. It covers the fundamental modes of heat transfer—conduction, convection, and radiation—as well as the design and function of various heat exchangers used in the food industry. The course also explores refrigeration, freezing, evaporation, and drying systems, highlighting their roles in food preservation and processing. Additionally, students will learn about boiler operations and the rheology of food to understand fluid behavior during processing. A teacher-specific module introduces the concept of unit operations in food engineering.

Course Prerequisite: Basic knowledge in nutrients gained during a +2 level.

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Explain the Basic Modes of Heat Transfer	U
CO2	Classify and Describe Heat Exchangers	U
CO3	Apply Refrigeration and Freezing Principles	A
CO4	Understand Evaporation and Drying Techniques	U
CO5	Demonstrate Knowledge of Boilers and Food Rheology	E

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔		✔	✔			✔	✔	✔
CO 2	✔		✔	✔			✔	✔	✔
CO 3	✔			✔		✔	✔	✔	✔
CO 4	✔	✔	✔	✔		✔	✔	✔	✔
CO5				✔		✔			

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	FUNDAMENTALS OF HEAT TRANSFER & HEAT EXCHANGERS	
1	1. Modes of heat transfer – Conduction, Convection, Radiation 2. Classification and types of heat exchangers: Immersion and Non-contact type heat exchangers 3. Plate Heat Exchanger, Scraped Surface Heat Exchanger, Tubular Heat Exchanger, Double & Triple Tube Heat Exchanger, Shell & Tube Heat Exchanger 4. Pasteurization methods: LTLT, HTST, UHT, Pasteurization Equipment	**15**
	REFRIGERATION & FREEZING	
2	1. Principle of refrigeration, Vapour compression refrigeration cycle 2. Concept of freezing: Principle and rate of freezing 3. Freezing equipment and techniques	**15**
	EVAPORATION & DRYING SYSTEMS	
3	1. Principle of evaporation, Single and Multiple Effect Evaporation 2. Types of evaporators: Horizontal tube, Vertical tube, Falling film evaporator, Raising film evaporator 3. Drying Principles: Constant rate & falling rate period of drying 4. Types of driers: Drum drier, Cabinet drier, Tunnel drier, Spray drier, Fluidized bed drier.	**15**
	BOILERS & RHEOLOGY	
4	1. Boiler types and working: 2. Water tube and Fire tube boilers 3. Rheology of Food: 4. Definition, Rheological characteristics 5. Viscosity, Apparent viscosity – Newtonian and Non-Newtonian fluids	**10**
5	**Teacher Specific Module**	**5**
	Directions: 1. Introduction to Unit Operations in Food Processing 2. Definition and importance 3. Overview of common food engineering unit operations (general perspective)	

Essential Readings

1. Rao D G. Fundamentals of Food Engineering, PHI Learning Private Limited
2. Sahay KM & Singh KK, 1994. Unit Operations of Agricultural Processing, Vikas Publishing House
3. R S Khurmi & J K Gupta, A Textbook of Refrigeration & Air Conditioning, S. Chand

4. Singh RP, Heldman DR, 1993. Introduction to Food Engineering, Academic Press
5. Romeo Toledo T, Fundamentals of Food Process Engineering, CBS Publishers
6. Charm SE, Macabe WL, Smith JC & Hariot P, 1993. Unit Operations of Chemical Engineering, McGraw Hills

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		70
Continuous Evaluation L		30
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Viva-Voce	5
Total L		100

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

KU6DSEFTY304: FOOD COST ACCOUNTING

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
VI	DSE A17	300 - 399	KU6DSEFTY 304	4	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4	0	0	30	70	100	2

COURSE DESCRIPTION:

This course introduces students to the principles and practices of food costing essential in food production and service operations. It covers core concepts such as cost classification, material procurement, labour costing, overheads, and the role of costing in decision-making. Emphasis is placed on cost control measures, inventory management, and methods of wage calculation. The course also includes practical applications of management accounting, including accounting ratios and break-even analysis. A teacher-specific module engages students in preparing a cost sheet and analyzing cost efficiency for a food product developed in the lab.

Course Prerequisite: Basic knowledge in nutrients gained during a +2 level.

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Understand the Basics of Food Costing	U
CO2	Apply Material Procurement and Inventory Control Methods	A
CO3	Calculate Labour Costs and Analyze Overheads	An
CO4	Use Management Accounting Tools for Decision-Making	E
CO5	Develop and Analyze a Cost Sheet for a Food Product	An

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔			✔	✔				✔
CO 2	✔		✔	✔	✔				✔
CO 3	✔			✔	✔	✔		✔	✔
CO 4	✔	✔		✔				✔	
CO5				✔					

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
Fundamentals of Food Costing (9 hours)		
1	1. Definition and meaning of food costing 2. Importance and objectives of costing in food operations 3. Cost units, cost centres, and methods of costing 4. Basic cost elements: Materials, labour, machines, overheads	**15**
Material Costing and Control (14 hours)		
2	1. Concepts and classification of materials 2. Procedures for material procurement: Purchasing, inspection, and receiving 3. Storage and issue of materials 4. Inventory control: 5. Minimum, maximum, reorder and danger levels 6. Economic Order Quantity (EOQ)	**15**
Labour Costing and Overheads (14 hours)		
3	1. Labour cost: Timekeeping and wage systems 2. Wage payment methods: Time wage, piece wage 3. Incentive plans: Halsey and Rowan plans 4. Labour turnover: Causes and implications 5. Classification and treatment of overheads: Manufacturing, administrative, selling, and distribution 6. Fixed, variable, and semi-variable cost behaviour	**10**
Management Accounting Applications (11 hours)		
4	1. Accounting ratios and their importance in cost analysis 2. Profitability, liquidity, and activity ratios with examples 3. Break-even analysis and its applications: 4. Break-even point (BEP), contribution, margin of safety, profit-volume ratio	**15**
5	**Teacher Specific Module**	**5**
	Directions: Develop a cost sheet for a new food product developed in the lab. Calculate breakeven point and perform cost analysis for the same. Present a cost efficiency report and suggestions for cost control	

Essential Readings

1. M.N. Arora – Cost Accounting: Principles and Practice, Vikas Publishing
2. Jain & Narang – Cost and Management Accounting, Kalyani Publishers
3. Lea R. Dopson & David K. Hayes – Food and Beverage Cost Control, Wiley
4. Colin Drury – Management and Cost Accounting, Cengage
5. Paul R. Dittmer & J. Desmond Keefe III – Principles of Food, Beverage, and Labour Cost Controls, Wiley
6. S.P. Iyengar – Advanced Cost Accounting
7. Maheshwari S.N. & Maheshwari S.K. – Accounting for Managers

8. FSSAI Manuals and Guidelines (if available, for India-specific costing context)

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		70
Continuous Evaluation L		30
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		100

Any components from the above table can be taken for CE not exceeding 20 Marks. Teacher specific module is evaluated for 10 marks.

KU6DSEFTY305: SENSORY EVALUATION

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
VI	DSE A18	300 - 399	KU6DSEFTY 305	3+1	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L + 10P	50L + 15P	100	2

COURSE DESCRIPTION:

This course introduces the principles and practices of sensory evaluation in food science. Students will explore the sensory attributes of food—appearance, texture, and flavor—and learn how human perception influences food preferences. The course covers both objective and subjective methods of evaluation, laboratory setup, sensory panel design, and the execution of various sensory tests. Special emphasis is given to understanding psychophysiological and environmental factors affecting sensory responses. Students will also gain skills in measuring texture and appearance using both visual and instrumental methods. A teacher-guided module includes conducting a sensory study on a new food product.

Course Prerequisite: Basic knowledge in nutrients gained during a +2 level.

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Understand the Scope and Mechanisms of Sensory Perception	U
CO2	Design and Conduct Sensory Evaluation Procedures	An
CO3	Apply Sensory Test Methods	A
CO4	Evaluate Food Texture and Appearance	E
	Conduct and Present a Sensory Evaluation Study	An

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1				✔	✔				✔
CO 2	✔		✔	✔	✔				✔
CO 3	✔			✔	✔	✔		✔	✔
CO 4	✔	✔		✔	✔		✔		
CO5				✔	✔				

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	INTRODUCTION TO SENSORY EVALUATION	
1	1. Definition and Scope of Sensory Evaluation. 2. Sensory Attributes of Food: Appearance, Texture, and Flavor. 3. Objective vs. Subjective Evaluation. 4. Sensory Perception of Flavor: 5. Mechanisms of taste, smell, retronasal smell 6. Somesthesis, kinesthesis, and chemesthesis (pepper heat, carbonation, metallic taste) 7. Multimodal perception	**15**
	SENSORY EVALUATION PROCEDURES	
2	1. Design and Requirements: 2. Sensory Laboratory Design, Sensory Booths 3. Types of Panels (Trained, Consumer), Criteria for Recruitment & Training 4. Sample Preparation & Serving: 5. Sample Size, Serving Temperature, Use of Palate Cleansers 6. Score Cards and Serving Order 7. Scaling Techniques: 8. Line Scales, Numeric Scales, Hedonic Scales	**15**
	SENSORY TESTS AND FOOD TEXTURE	
3	1. Types of Sensory Tests: 2. Discrimination Tests: Triangle, Duo-Trio, Paired Comparison 3. Descriptive Tests: Texture and Flavor Profile 4. Affective Tests: Preference, Ranking, Hedonic 5. Factors Affecting Measurements: 6. Psychological: Expectation Error, Mutual Suggestion, Distraction 7. Physiological: Adaptation, Synergy & Suppression 8. Environmental and Health-related Factors Food Texture: 1. Definition, Types: Visual, Auditory, Oral, and Tactile Texture 2. Attributes: Size, Shape, Mouthfeel, Phase Changes, Oral Crispiness, Crumbliness, Crunchiness 3. Texture Profile Analysis 4. Food Appearance: Color Vision Mechanism, Color Blindness 5. Appearance Attributes: Turbidity, Glossiness, Translucency 6. Color Measurement: Visual vs. Instrumental (Munsell Color Solids, Tristimulus, Tricolorimetry)	**10**
	PRACTICAL	
4	1. Familiarization with Sensory Laboratory Setup 2. Introduction to Sensory Characteristics of Foods (Appearance, Color, Flavor, Texture, Aroma)	**30**

	3. Difference Tests - **Paired Comparison Test, Duo-Trio Test, Triangle Test** 4. Rating and Ranking Tests - Ranking Test, Single Sample Test, Two-Sample & Multiple-Sample Tests 5. Hedonic Rating Test 6. Descriptive Sensory Analysis 7. Sensitivity Tests - Threshold Test, Dilution Test	
5	**Teacher Specific Module**	**5**
	Directions: Conduct a sensory evaluation study for a New Product Developed	

Essential Readings

1. Lawless, H.T., & Heymann, H. (2010). Sensory Evaluation of Food: Principles and Practices. 2nd Ed., Springer.
2. Kemp, S., Hollywood, T., & Hort, J. (2011). Sensory Evaluation: A Practical Handbook. Wiley-Blackwell.
3. Nielsen, S.S. (2004). Introduction to the Chemical Analysis of Foods. Jones & Bartlett.
4. Srilakshmi, B. (2005). Food Science. New Age International.

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Viva-Voce	5
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

Practical's

Evaluation Type	Marks
End Semester Evaluation P	15
Continuous Evaluation P	10

a)	Practical Test - 1	5
b)	Practical Test -2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks

KU6DSEFTY306: FOOD PRODUCT DEVELOPMENT

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
VI	DSE A 19	300 - 399	KU6DSEFTY 306	4	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4	0	0	30L	70L	100	2

COURSE DESCRIPTION:

This course provides students with foundational knowledge and practical skills in developing innovative food products. It explores current trends in the food industry, the importance of innovation, and the basics of product planning and management. Students will learn how to conduct market research, understand consumer behavior, generate creative food ideas, and develop prototypes. The course also covers key aspects of food testing, sustainable packaging, branding, pricing strategies, and regulatory compliance necessary for a successful product launch. A teacher-specific module tailors the content to reflect current industry needs and innovations.

Course Prerequisite: Basic knowledge in nutrients gained during a +2 level.

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Understand the Importance of Innovation in the Food Industry	U
CO2	Conduct Market Research and Analyze Consumer Behavior	An
CO3	Generate, Develop, and Test New Food Product Ideas	An
CO4	Plan for Sustainable Packaging and Branding	A
CO5	Prepare for Market Launch with Regulatory Compliance	C

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔	✔		✔				✔	✔
CO 2	✔	✔	✔	✔				✔	✔
CO 3	✔	✔		✔		✔		✔	✔
CO 4	✔	✔		✔				✔	
CO5		✔	✔		✔	✔			

COURSE CONTENTS

Contents for Classroom Transaction:

Modu le	Description	Teaching Hours
	INTRODUCTION TO FOOD PRODUCT DEVELOPMENT	
1	1. Food industry trends & history of food innovation 2. Why innovation is crucial in the food sector 3. Basics of product management and planning 4. Identifying target audience & concept planning 5. Feasibility analysis: technical, financial, and operational 6. Recognizing potential risks and challenges	**15**
	UNDERSTANDING CONSUMER BEHAVIOR	
2	1. Conducting market research & consumer analysis 2. Cultural influences on food choices 3. Role of social media & digital platforms 4. Factors affecting food choices: brand loyalty, trust, income, pricing	**15**
	IDEA GENERATION, PROTOTYPING & TESTING	
3	1. Brainstorming methods (e.g., SCAMPER, mind mapping) 2. Creative recipe development: nutrition, cost, documentation 3. Prototype development: serving size, packaging, storage, feedback 4. Sensory evaluation techniques and repeated testing 5. Microbiological, allergen, and stability testing 6. Sustainable packaging design & brand storytelling	**15**
	MARKET RESEARCH & PRODUCT LAUNCH	
4	1. Competitor & market analysis 2. Pricing strategies and consumer psychology 3. Launch essentials: FDA compliance, safety, labeling, certifications 4. Traceability and legal requirements	**10**
5	**Teacher Specific Module**	**5**
	• *Directions:* To be customized based on latest trends, innovations, or institutional goals	

Essential Readings

1. **"Food Product Development"** – M. Earle & R. Earle
2. **"New Food Product Development: From Concept to Marketplace"** – Gordon W. Fuller
3. **"Sensory Evaluation Techniques"** – Morten C. Meilgaard, Gail Vance Civille, B. Thomas Carr
4. **"Consumer-Led Food Product Development"** – Hal MacFie
5. **"Food Packaging: Principles and Practice"** – Gordon L. Robertson
6. **"Introduction to Food Process Engineering"** – P.G. Smith

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		70
Continuous Evaluation L		30
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		100

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

KU6DSEFTY307: NUTRACEUTICALS, FOOD ALLERGIES, INTOLERANCES AND CONSUMER SCIENCE

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
VI	DSE A 20	300 - 399	KU6DSEFTY 307	4	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4	0	0	30	70	100	2

COURSE DESCRIPTION:

This course explores the emerging field of nutraceuticals and functional foods, emphasizing their role in promoting health and preventing disease. Students will learn about the natural sources, active compounds, and classifications of nutraceuticals, and their application in managing chronic and lifestyle-related disorders. The course also addresses food allergies, toxins, and intolerances, with a strong focus on safety, biochemical mechanisms, and consumer education. Consumer science aspects—including socio-cultural, psychological, and economic influences on food choices—are integrated to understand preferences in both domestic and export markets. A teacher-specific module provides insights into toxin risks and consumer safety awareness.

Course Prerequisite: Basic knowledge in nutrients gained during a +2 level.

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Explain the Role of Nutraceuticals and Functional Foods	R
CO2	Understand Consumer Behavior and Preferences	U
CO3	Differentiate and Manage Food Allergies and Intolerances	E
CO4	Identify and Manage Food Toxins	R
CO5	Promote Food Safety and Consumer Awareness	A

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔	✔	✔				✔	✔	✔
CO 2	✔	✔	✔				✔	✔	✔
CO 3		✔				✔	✔	✔	✔
CO 4		✔	✔			✔	✔	✔	✔
CO5	✔	✔					✔		

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	NUTRACEUTICALS AND CONSUMER SCIENCE	
1	1. Nutraceuticals and functional foods: definition, concept, and classification 2. Natural sources and active components of nutraceuticals 3. Role of functional foods in disease prevention and health promotion 4. Relevance of nutraceuticals in the management of lifestyle and chronic disorders 5. Consumer science: socio-cultural, psychological, and economic considerations in food choices 6. Consumer preferences in domestic and export food markets	**15**
	FOOD ALLERGY	
2	1. Food allergies and sensitivities: definitions, types, and causes 2. Natural sources and chemistry of food allergens 3. Mechanisms of allergic responses to food 4. True and untrue food allergies 5. Allergenicity and safety assessment of genetically modified (GM) foods 6. Potential toxicity and allergenic concerns of GM consumables 7. Special focus on food safety in children's consumables	**10**
	FOOD TOXINS	
3	1. Natural toxins in food: classification and sources 2. Toxins of plant origin 3. Toxins of animal origin 4. Microbial toxins: bacterial, fungal, and algal toxins 5. Toxicity, natural occurrence, and food safety significance 6. Methods for detection and determination of toxicants in foods 7. Principles and strategies for toxin management and control	**20**
	COMMON FOOD INTOLERANCES	
4	1. Definitions and differentiation from food allergies 2. Types of food intolerances: Gluten sensitivity and lactose intolerance, Fructose and glucose intolerance, Wheat and alcohol intolerance, Yeast and histamine intolerance 3. Biochemical basis, symptoms, and dietary management 4. Role of food labeling and consumer awareness in managing intolerances	**10**
5	**Teacher Specific Module**	**5**
	Directions: Overview of major food toxins and their relevance in food safety Basic consumer awareness of foodborne risks and product perception	

Essential Readings

1. Wildman, Robert. Nutraceuticals and Functional Foods, 2nd Edition. Taylor and Francis, 2007.
2. Klaassen, Curtis; Watkins III, John B. (2015). Casarett & Doull‘s Essentials of Toxicology, 3rd Edition. McGraw-Hill Medical.
3. Tõnu Püssa (2013). Principles of Food Toxicology, 2nd Edition. CRC Press.
4. S.S. Deshpande, Ed. (2013). Handbook of Food Toxicology. CRC Press.

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		70
Continuous Evaluation L		30
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		100

Any components from the above table can be taken for CE not exceeding 20 Marks. Teacher specific module is evaluated for 10 marks.

KU6SECFTY102: FOOD INFORMATICS

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
VI	SEC	100 -199	KU6DSCFTY 102	3	45

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	0	0	25	50	75	1.5

COURSE DESCRIPTION:

This course introduces students to data handling, digital marketing, and technological advancements relevant to the food industry. It begins with foundational concepts in data collection, classification, and graphical representation. The course highlights the roles of key commodity boards and institutions supporting food businesses. Students will explore the use of social media, SEO, and mobile technologies for branding and promotion in the food sector. Emerging technologies like AI, nanotechnology, and 3D printing are also discussed. A teacher-specific module provides practical skills in basic computer applications and data handling tools for food informatics.

Course Prerequisite: Basic knowledge in nutrients gained during a +2 level.

COURSE OUTCOMES:

	Expected Outcome	**Learning Domains**
CO1	Organize and Present Food Data Effectively	A
CO2	Understand the Role of Food Boards and Authorities	U
CO3	Utilize Digital Tools for Food Business Promotion	An
CO4	Explore Emerging Technologies in the Food Industry	R
CO5	Apply Basic Computer and Data Skills in Food Informatics	A

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	PSO9
CO 1	✔	✔	✔				✔	✔	✔
CO 2	✔	✔	✔				✔	✔	✔
CO 3	✔	✔				✔	✔	✔	✔
CO 4			✔			✔	✔	✔	✔
CO5							✔		

COURSE CONTENTS

Contents for Classroom Transaction:

Module	Description	Teaching Hours
	INTRODUCTION	
1	1. Introduction to primary and secondary data 2. Census and sampling methods 3. Classification, tabulation, and graphical representation (bar chart, pie chart, histogram, ogive, etc.)	**10**
	FOOD COMMODITY AUTHORITIES AND BOARDS	
2	1. Kerala Cashew Board 2. Coconut Development Board 3. Tea Board of India 4. Coffee Board 5. Spices Board of India 6. National institutes like NRCB (National Research Centre for Banana)	**10**
	FOOD BUSINESS PROMOTION THROUGH SOCIAL MEDIA	
3	1. Branding, positioning, and marketing strategies 2. Use of platforms like Facebook, Twitter, and blogs for food product promotion 3. Basics of SEO (Search Engine Optimization) and website designing 4. Introduction to graphics, animations, and mobile apps for the food sector	**10**
	TRENDS AND UPDATES	
4	1. Use of data science in food and nutrition 2. Artificial Intelligence in food processing 3. Nanotechnology in the food industry 4. Sustainable and green food processing 5. 3D printing in food 6. Alternative proteins (e.g., lab-grown meat)	**10**
5	**Teacher Specific Module**	**5**
	Directions: Basic computer skills useful in food informatics Hands-on exposure to data entry, analysis, and presentation tools	

Essential Readings

1. FSSAI Website – www.fssai.gov.in

2. Marwaha, K. & Bansal, M. – Food Informatics, Studium Press
3. *Digital Marketing for Dummies* – Ryan Deiss & Russ Henneberry
4. *Social Media Marketing: A Strategic Approach* – Melissa Barker et al.

Assessment Rubrics:

Theory

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Viva-Voce	5
Total L		75

Any components from the above table can be taken for CE not exceeding 15 Marks. Teacher specific module is evaluated for 10 marks.

KU6INFTY 301 - INTERNSHIP

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
IV	IN	200	KU6INFTY301	2	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
0	4	0	15P	35P	50	1.5

The primary objective of this training is to provide an opportunity to the students to understand the actual work environment in the four core departments of the Industry. Students will be able to observe the latest technology applied and the latest trends followed in the Food industry. At the end of the training, the students communication skills, confidence level and overall personality will improve.

Training arrangement will be made by the Training Coordinator of the Institute. Once the student has been selected / deputed for Industrial Training by the institute, he/she shall not be permitted to undergo IT elsewhere. In case students make direct arrangements with the hotel for Industrial Training, these will necessarily have to be approved by the institute. Students selected through campus interviews will not seek Industrial Training on their own.

The students should undergo training from the date announced by the Institute. No student is allowed to deviate from the training schedule unless approved by the Principal of the Institute for a valid reason.

During the training, each student should maintain a log book. Students should enter the daily activities, skills acquired and the observations in the log book and get it signed by the immediate supervisor.

At the end of the training, each student should prepare a training report. The content of the training report will include the Certificate page for the Institute, Certificate page to be signed by the Examiners, Copy of the Certificate issued by the Industry, Introduction, Profile of the Industry, Organization structure of the industry, Functions of the departments, Duties Performed, skills acquired in each department, Observations on technology / latest trend and any other relevant information pertaining to leaning outcome.

Out total 50 marks, 15 marks will be for internal and 35 marks for external. The internal marks will be awarded at the end of the training bythe Training Manager or Personnel Manager or any competent authority of the industry who is closely monitoring the trainees based on the parameters given below

Punctuality	3 Marks
Attitude	2 Marks
Performance	10 Marks

End Semester Evaluation

Out of 35 marks for end semester evaluation, 5 marks is assigned for log book, 10 for the training report and 20 marks for the seminar/presentation before the panel of examiners. Panel of examiners will consist of one internal examiner and one external examiner appointed by the University. The presentation would be limited to only one

Key area of the student‘s interest.

Duringthe external examination, everystudent must produce the following compulsorily.

1. Training certificate -original along with attested photo copy
2. Log Book
3. Training report- 2 copies

After the examination, Original training certificate, one copy of the training report and the log book will be returned to the students.