



PSGR
Krishnammal College for Women



Affiliated to Bharathiar University \ Autonomous \ College of Excellence \ Accredited with A++ Grade \ Ranked 9th in NIRF

**DEPARTMENT OF FOOD PROCESSING TECHNOLOGY AND
MANAGEMENT**

CHOICE BASED CREDIT SYSTEM (CBCS)

&

LEARNING OUTCOMES- BASED CURRICULUM FRAMEWORK (LOCF)

**BACHELOR OF SCIENCE IN FOOD PROCESSING TECHNOLOGY AND
MANAGEMENT**

2024 – 2027 Batch



PROGRAMME LEARNING OUTCOMES (PLO's)

After Completion of the program, the students will

- PLO1** : Acquire the knowledge about the chemical, biochemical, physical, microbiological changes that occur during processing and preservation of any food.
- PLO2** : Possess the ability to identify, and solve problems related to Food manufacturing
- PLO3** : Be able to differentiate between processed and safely processed food
- PLO4** : Apply better/good practices and be more innovative in developing the food products as per the current requirements of the market.
- PLO5** : Acquire skills to analyze different food products and interpret the results in an effective manner.
- PLO6** : Be equipped to transfer this knowledge to the consumer

PROGRAMME SPECIFIC OUTCOME

- PSO1** : Graduates with sufficient knowledge in the areas of food science, food chemistry, food processing and preservation of foods.
- PSO2** : Development of a food technologist, food analyst, nutritionist and an administrator
- PSO3** : Equip themselves to higher levels of learning and/or for the development of new products, that will accommodate to start up new venture in areas of food processing.
- PSO4** : Shall keep themselves abreast with the current trends to meet the food industry challenges.



**BACHELOR OF SCIENCE IN FOOD PROCESSING TECHNOLOGY AND
MANAGEMENT CHOICE BASED CREDIT SYSTEM (CBCS)
LEARNING OUTCOMES- BASED CURRICULUM FRAMEWORK (LOCF)**

**SYLLABUS & SCHEME OF EXAMINATION
2024 - 2027
BATCH**

Sem	Part	Course Code	Title of the Course	Course Type	Instruction hours/week	Contact hours	Tutorial	Duration of Examination	Examination Marks			Credits	
									CA	ESE	TOTAL		
I	I	TAM2301A/ HIN2301A/ FRE2301A	Tamil Paper I/ Hindi Paper I/ French Paper I	L	4	58	2	3	25	75	100	3	
	II	ENG2301A	English Paper I	E	4	58	2	3	25	75	100	3	
	III	BF24C01	Food Science	CC	4	58	2	3	25	75	100	3	
	III	BF24C02	Principles ofManagement	CC	5	73	2	3	25	75	100	4	
	III	BF24A01	Principles of Food and Nutrition	GE	5	73	2	3	20 [#]	55 [#]	75 [#]	3	
	III	BF24CP1	Food Science Practical	CC	3	45	-	3	15 [*]	35 [*]	50 [*]	3	
	III	BF24AP1	Nutritional Menu Planning Practical	GE	3	45	-	3	15 [*]	35 [*]	50 [*]	2	
	IV	Non Tamil Students											2
		NME23B1 / NME23A1	Basic Tamil I/ Advanced Tamil I	AEC	2	28	2	-	100	-	100		
		Students with Tamil as Language											
NME23ES		Introduction to Entrepreneurship	AEC	2	30	-	-	100	-	100			
I - V	VI	COM15SER	Community Service (30 hours)	GC	-	-	-	-	-	-	-	Gr.	
I-V	VI	24BONL1 24BONL2 24BONL3	Online Course 1 Online Course 2 Online Course 3	ACC	-	-	-	-	-	-	-		

II	I	TAM2302A/ HIN2302A/ FRE2302A	Tamil Paper II Hindi Paper II	L	4	58	2	3	25	75	100	3
	II	ENG2302A	English Paper II	E	4	58	2	3	25	75	100	3
	III	BF24C03	Fundamentals of Food Chemistry and Properties	CC	5	73	2	3	25	75	100	3
	III	BF24C04	Food Microbiology	CC	4	58	2	3	25	75	100	3
	III	BF23CP2	Microbiology Practical	CC	3	45	-	3	15 [#]	35 [#]	50 [#]	3
	III	BF24A02	Nutritional Biochemistry	GE	5	73	2	3	20 ^{\$}	55 ^{\$}	75 ^{\$}	3
	III	BF24AP2	Biochemistry Practical	GE	3	45	-	3	15 [#]	35 [#]	50 [#]	2
	IV	NME23B2* / NME23A2*	Basic Tamil II/ Advanced Tamil II	AEC				-	100	-	100	
	IV	NM23GAW	General Awareness	AEC	SS	100	-	100	Gr.			
	IV	NM24UHR	Universal Human Values and Human Rights	AEC	2	30	-	-	100	-	100	2
I - IV	VI	COM15SER	Community Service (30 hours)	GC	-	-	-	-	-	-	-	Gr.
I-V	VI	24BONL1 24BONL2	Online Course 1 Online Course 2	ACC	-	-	-	-	-	-	-	-
III	I	TAM2303A/ HIN2303A/ FRE2303A	Tamil Paper III/ Hindi Paper III/ French Paper III	L	4	58	2	3	25	75	100	3
	II	ENG2403A	English Paper III	E	4	58	2	3	25	75	100	3
	III	BF24C05	Unit Operations	CC	5	73	2	3	25	75	100	3
	III	BF24C06	Fundamentals of Food Processing	CC	4	58	2	3	25	75	100	3

	III	TH24A23/ BF24A03	Numerical and Statistical Techniques/ Basics of Accountancy	GE	5	73	2	3	25	75	100	4
	III	BF23CP3	Unit Operations Practical	CC	3	45	-	3	15*	35*	50*	3
	III	BF24SB01	Generative AI for Food Industry	SEC	3	41	4	-	100	-	100	3
	IV	NM23DTG	Design Thinking	AEC	2	30	-	-	100	-	100	2
	IV	BF24INST1	Field Work/Institutional Training	DSE	-	-	-	-	-	-	100	2
I - III	VI	COM15SER	Community Services 30 hours	GC	-	-	-	-	-	-	-	Gr.
IV	I	TAM2304A/ HIN2304A/ FRE2304A	Tamil Paper IV Hindi Paper IV French Paper IV	L	4	58	2	3	25	75	100	3
	II	ENG2404A	English Paper IV	E	4	58	2	3	25	75	100	3
	III	BF24C07	Advanced Food Processing and Food Preservation	CC	5	73	2	3	25	75	100	3
	III	BF23CP4	Food Preservation Practical	CC	3	45	-	3	15*	35*	50*	3
	III	BF24C08	Principles of Marketing	CC	4	58	2	3	25	75	100	3
	III	BF24A04	Bakery and Confectionery Technology	GE	5	73	2	3	15*	35*	50*	3
	IV	BF23SCE1	Fundamentals of Food Safety and Microbiology	SEC	3	45	-	-	100	-	100	3
	IV	NM23EII	Entrepreneurship and Innovation (IgniteX)	AECC	2	30	-	-	100	-	100	2
	IV	NM24EVS	Environmental Studies	AECC	SS	-	-	-	-	-	-	Gr.
	V	COCOACT	Co-Curricular Activities	ST				100	-	100	1	

	VI	24BONL1 24BONL2 24BONL3	Online Course I Online Course II Online Course III	ACC	-	-	-	-	-	-	-	-
V	III	BF24C09	Food Biotechnology	CC	5	73	2	3	25	75	100	3
	III	BF24C10	Food Product Development	CC	4	58	2	3	25	75	100	3
	III	BF23E01/ BF24E02	Convenience Foods/ Food Entrepreneurship	DSE	4	58	2	3	25	75	100	3
	III	BF23CP5	Food Processing & Food Bioprocessing Practical	CC	3	45	-	3	15*	35*	50*	2
	III	BF24CP6	Food Product Development and Marketing Practical	CC	4	60	-	3	25	75	100	2
	IIIA	BF23SBP1	Food Analysis Practical	SEC	3	41	4	-	100	-	100	3
	III	BF23AC1/ BF24AC2	Environmental Issues in Food Industry/ Food Supply Chain	ACC	SS	-	-	3	25	75	100	5\$
	IV	NM21CS1	Cyber Security I	GC	2	30	-	-	100	-	100	Gr
	VI	BF24COM	Comprehensive Examination	GC	-	-	-	-	100	-	100	Gr
	III	BF23PROJ	Project and Viva Voce	DSE	5	-	-	-	25	75	100	5
	IV	BF23INST2	Fieldwork/ Institutional Training (30 days)	GC	-	-	-	-	100	-	100	2
I-V	VI	24BONL1 24BONL 2 24BONL 3	Online Course I Online Course II Online Course III	ACC	-	-	-	-	-	-	-	-

L – Language

E - English

CC – Core Courses

CA – Continuous Assessment

GE – Generic Elective

ESE - End Semester Examination AEC –

Ability Enhancement Course

ACC-Additional Credit Course

AECC - Ability Enhancement Compulsory Course, # - Self Study

*CA conducted for 25 and converted into 15, ESE conducted for 75 and converted into 35

Examination System

One test for the continuous assessment will be conducted on pre-determined dates, i.e., commencing on the 50th day from the date of reopening. The Model Exam will be conducted after completing 85th working days. Marks for ESE and CA with reference to the maximum for the course will be as follows

Question Paper Pattern

CA Question Paper Pattern and Distribution of marks - Language and English - UG

Section A 5 x 1 (No choice)	:	5 Marks
Section B 4 x 5 (4 out of 6)	:	20 Marks (250 words)
Section C 2 x 10 (2 out of 3)	:	20 Marks (500 words)
Total	:	45 Marks

Marks UG- Core and Allied - (First 3 Units)

CA Question from each unit comprising of

One question with a weightage of 2 Marks : $2 \times 3 = 6$ Marks

One question with a weightage of 5 Marks : $5 \times 3 = 15$ Marks

(Internal Choice at the same CLO level)

One question with a weightage of 8 Marks : $8 \times 3 = 24$ Marks

(Internal Choice at the same CLO level)

Total **= 45 Marks**

Model & End Semester Examination – Question Paper Pattern and Distribution of Marks

Language and English – UG

Section A	10 x 1 (10 out of 12) :	10 Marks
Section B	5 x 5 (5 out of 7) :	25 Marks (250 words)
Section C	4 x 10 (4 out of 6) :	40 Marks (600 - 700 words)
Total		75 Marks

:

Core & Allied (Theory)

Question from each unit comprising of

One question with a weightage of 2 Marks: $2 \times 5 = 10$ Marks

One question with a weightage of 5 Marks: $5 \times 5 = 25$ Marks

(Internal Choice at the same CLO level)

One question with a weightage of 8 Marks : $8 \times 5 = 40$ Marks

(Internal Choice at the same CLO level)

Total = 75 Marks

Continuous Internal Assessment (CA)

Language, English, Core & Allied

CIA Test - 5 Marks (Conducted for 45 marks after 50 days)

Model Exam - 7 Marks (Conducted for 75 marks after 85 days - Q.P. Pattern
(2,5,8 Marks) (Each Unit 15 Marks)

Sem/Ass/Quiz - 5 Marks

Class Participation - 5 Marks

Attendance - 3 Marks (91-100% attendance: 3 Marks; 81-90%
attendance: 2 Marks; 75-80% attendance: 1 Marks)

Total : 25 Marks

Core Practical (25 marks)

Lab performance : 7 marks

Regularity : 5 marks

Model : 10 marks (Conducted for 75 marks)

Attendance : 3 marks

Total : 25 Marks

ESE Practical Pattern

The End Semester Examination will be conducted for a maximum of 75 marks respectively with a maximum 15 marks for the record and other submissions if any.

Evaluation pattern for Core courses in COURSERA –

Internal Evaluation

Evaluation through COURSERA for CA only, COURSERA conducted for 100 & converted to 25, ESE evaluation for 75 marks

Skill Based Theory

Test I	:	30 Marks (Conducted for 50 marks and Converted to 30 Marks)
Test II	:	50 Marks
Lab Performance	:	10 Marks
Regularity	:	10 Marks
Total	:	100 Marks

Introduction to Entrepreneurship

Quiz	:	50marks
Assignment	:	25marks
Project / Case study	:	25marks
Total	:	100 Marks

Design Thinking

Quiz after each module of class hours	:	50 marks
Assignment after each unit	:	25marks
A project submission at the end of course	:	25 marks
Total	:	100 Marks

Field Training / Institutional Training

At the end of the II semester, the student must complete a 30 day internship in an industrial establishment/ organization approved by the concerned staff. The student must also maintain a work diary and submit a report in the V semester, followed by a viva voce

Viva	:	25 marks
Work diary	:	15 marks
Report	:	50 marks
Attendance	:	10 marks
Total	:	100 marks

SEMESTER I

COURSE CODE	COURSE NAME	Category	L	T	P	Credit
BF24C01	Food Science	Theory	58	2	-	3

Preamble

To enable the students to

- Learn the basic concepts of food science and different methods of cooking
- Understand the classification, composition and nutritive values of various foods
- Gain knowledge on the cooking of cereals, pulses, meat, fish and poultry, types of spices and beverages

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Gain knowledge on the basic concepts of food science	K1
CLO2	Recognize structure, nutritive value and role of various food groups and describe their nutritional contribution	K2
CLO3	Gain knowledge on various role of food groups in cookery and develop new cookery concepts	K3
CLO4	Demonstrate effect of processing and preservation on composition and quality changes in foods related to practical application	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	M	M	M	S	M
CLO2	S	M	S	S	S	M
CLO3	S	M	S	S	S	M
CLO4	S	M	S	S	S	M

S- Strong; M-Medium

Syllabus**Unit I Food Science****(12Hrs)**

Introduction to food science – definition, functions of food, Classification of foods ,food groups, food pyramid,and food in relation to health.

Cooking – objectives, preliminary preparations, Cooking methods – moist heat methods, dry heat methods, Combination methods – braising and microwave cooking, Recent methods-Ohmic cooking; Advantages and Disadvantages of cooking methods

Factors affecting cooking of foods, Gelatinization and factors affecting gel formation, denaturation, colloids, emulsion, foam and factors affecting foam formation and stability, fermentation, browning, rancidity.

Unit II Cereals, Pulses, Nuts and Oilseed and Spices**(13Hrs)**

Cereals and cereal products – structure, composition and nutritive value of wheat, rice, maize, jowar, ragi, bajra; Cereal starch –Types of starch, effect of moist heat and dry heat.

Pulses – composition and nutritive value, classification, toxic constituents, Effect of cooking and factors affecting cooking of pulses; Pulse cookery

Nuts & oil seeds – composition and nutritive value of coconut, flax seeds, almonds, groundnut, soya bean, sunflower seeds. Fats and oil- Refining of oils, Effect of heat on oil and Rancidity

Spices – general function, medicinal values , role of spices in cookery.

Unit III Vegetables and Fruits**(10 Hrs)**

Vegetables and Fruits – Classification, composition and nutritive value, selection, pigments, enzymes, flavor compounds:-bitter compound, Phytochemicals; ripening of fruits; Browning:- enzymatic and non-enzymatic browning, prevention of browning; Changes and effect of cooking.

Unit IV Meat, Fish and Poultry**(12 Hrs)**

Meat – classes of meat and related products, composition and nutritive value, post-mortem changes, ageing, tenderizing, curing, cuts, grades and meat cookery, Changes during cooking, methods of cooking

Fish- classification, composition and nutritive value, selection of fish, fish products, fish protein concentrate.

Poultry – classification, composition and nutritive value.

Unit V Egg, Milk and Sugar

(11Hrs)

Egg- Structure, composition, nutritive value, egg quality grading, effect of heat on egg proteins, functions of egg in cookery.

Milk- Composition, nutritive value, properties, effects of heat on milk, milk cookery and products and indigenous milk products

Sugar- Properties, sugar and related products, stages of sugar cookery, factors affecting crystallization; Sugar cookery and artificial sweeteners

Text Books

S. No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1.	Srilakshmi, B	Food Science	New Age International (P) Ltd., Publishers, New Delhi.	2005
2.	Potter, N.	Food Science	CBS Publishers and Distributors, Delhi.	2005
3.	Shakunthala Manay, N and Shadaksharswamy, M	Foods Facts and Principles	New Age International	2 nd Edn., 2001

Reference Book

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1.	Vijaya Khader	Text book of Food Science and Technology	ICAR, New Delhi.	2001
2.	Srivastava, R.P. and Sanjeev	Fruit and vegetable preservation – principles and practices	International Book Distributing	2002

	Kumar		Co., Lucknow.	
3.	Swaminathan, M.	Food Science and Experimental Foods	Ganesh and Co., Madras.	1995
4.	Sukhneet Suri	Food science nutrition and safety	Pearson Education Ltd.	2016

Pedagogy

Blended learning, lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz , seminar.

Course Designers:

- 1. Dr. N. Deepa Sathish**

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
BF24C02	Principles of Management	Theory	73	2	-	4

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recognize the concepts of management, functions, levels and modern management practices	K1
CLO2	Understand the application of managerial functions such as planning, organizing, staffing, controlling, coordination delegation and authority	K2
CLO3	Apply the management principles, theories, budgetary & non budgetary controls and AI in the food business management	K3
CLO4	Analyse the different management perspectives to take rational decisions and implement the best practices in Food Industry	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	M	M	S

S-Strong; M-Medium; L-Low

PRINCIPLES OF MANAGEMENT - BF24C02

(73 Hours)

UNIT – I (14 Hours)

Management: Introduction - Meaning & Definition - ***Scope – Features - Levels of Management***-Skills and Competencies - Management Theories: Maslow's Hierarchy of needs, Theory X, Y. Management Thoughts: Scientific, Modern Management thoughts - ***Functions of Management***-IKS in management.

UNIT – II (15 Hours)

Planning: Introduction -Meaning and Definition - ***Nature and Characteristics of Planning -Importance*** - Types of Plans - Planning process - Management by Objectives.

Decision Making: Introduction - Meaning and ***Features of decision making*** - Types of decision making - Decision making phases and process - AI assisted decision making in food industry. Creativity & its Stages - Application in Food business.

UNIT – III (15 Hours)

Organizing: Introduction - Meaning and Definition - ***Principles of Organizing*** - Formal and Informal Organization - **Importance of Organization*** - Delegation and Authority - Organizational structure in Food industry. Staffing - meaning- importance - Staffing process - Role of RPA in staffing.

UNIT – IV (14 Hours)

Controlling: Definition - ***Characteristics of control - Importance of controlling***- Control process - Effective control system - Limitations of controlling - Types of Control - Role of Controlling in Food industry.

Co-ordination: Meaning and Definition - Features, types and Benefits of co-ordination - Essentials for effective co-ordination.

UNIT – V (15 Hours)

Food Business Management - Definition, need, importance, process and sustainability of food business in Indian Economy. Application of AI in food business management - Sectors in Food industry - Emerging trends in food industry - ***Ethics in Food Business Management***

*** Highlighted Text offered in blended mode (Links Provided)**

TEXT BOOKS:

Sl. No.	Author(s)	Title of the Book	Publisher	Year & Edition
1.	Harold Koontz and Heinz Weihrich	Essentials of Management	Tata McGraw Hill	2023 10th Edition
2.	Dr. Mishra & Gupta	Principles of Management	SBPD PublishingHouse	2021 1st Edition

REFERENCE BOOKS:

Sl. No.	Author(s)	Title of the Book	Publisher	Year & Edition
1.	Gareth R. Jones & Jennifer M George	Contemporary Management	McGraw-Hill Education	2022 12th Edition
2.	Stephen P. Robbins, Mary Coulter and Neharika Vohra	Management	Pearson Prentice Hall, New Delhi	2022 15 th Edition

Pedagogy: Chalk &Talk, lecture, Seminar, PPT, Group Discussion, Activity and Case Study

Blended Learning Links:

SI.No.	Units	Topics	Blended Learning Links
1	1	Scope, Features and Levels of Management	https://www.youtube.com/watch?v=X_0LEIQbgwg
2		Functions of Management	https://www.youtube.com/watch?v=pzSRAM5Hvg4
3	2	Nature, Characteristics and Importance of Planning	https://www.youtube.com/watch?v=zuM3u0du_5g
4		Features of decision making	www.youtube.com/watch?v=KWy_m6QfFhw
5	3	Principles of Organizing	https://www.youtube.com/watch?v=v9YkwuPPWxQ https://www.youtube.com/watch?v=p7zjC-HPCYM
6		Importance of Organization	https://www.youtube.com/watch?v=UEXrsZ3vnx0
7	4	Characteristics of control – Importance of controlling	https://www.youtube.com/watch?v=__x1O5xaAsY https://www.youtube.com/watch?v=0HeAbUD4H78
8	5	Ethics in food industry	https://www.youtube.com/watch?v=5Qxd7scGnas

COURSE CODE	COURSE NAME	Category	L	T	P	Credit
BF24A01	Principles of Food and Nutrition	Theory	73	2	-	3

Preamble

To enable the students to

- Gain knowledge about nutrition and malnutrition, sources and functions of vitamins and minerals
- Determine the energy values of foods
- Learn the Know the importance of water and electrolyte balance in the body

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Gain basic knowledge on the basic concepts of nutrition, food groups and meal planning	K1
CLO2	Understanding the sources, digestion and absorption of carbohydrates, proteins and fats	K2
CLO3	Understand the role of food and nutrients in health and disease prevention.	K3
CLO4	Able to conceptualize, implement and evaluate the functions, requirements and effects of deficiency of nutrients	K4

Mapping with Programme Learning Outcomes

CLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	S	M	M
CLO2	S	S	S	M	M	M
CLO3	S	S	S	M	M	M
CLO4	S	S	S	S	M	M

S-Strong; M-Medium

Syllabus**Unit I Introduction to Nutrition and Meal planning (15 hours)**

Food as source of nutrients, functions of food; Nutrition-Definition, importance and scope of nutrition, Relation of nutrition to health, Malnutrition, Nutritional Care and Nutritional Status. Recommended Dietary Allowances (RDA)-Significance and factors affecting RDA, Reference man and women. General concepts about growth and development and through different stages of life and RDA for Indians

Meal planning- Definition, Principles of meal planning, Basic five food groups, Balanced diet, Exchange lists, and factors affecting meal planning, Dietary Guidelines for different age group.

Unit II Proximate principles (15 Hrs)

Carbohydrate, Proteins and Lipids- classification, functions, digestion and absorption, sources and requirements and Dietary fibre; Protein quality of foods-Protein Efficiency Ratio (PER), Biological Value (BV) and Net Protein Utilization (NPU)

Unit III Energy, Water and Electrolytes (15 Hrs)

Energy:-Sources, physiological energy value of foods, thermogenic effect of foods; Basal Metabolic Rate(BMR)- factors affecting BMR and energy allowance for various activities

Water-Daily requirement, Regulation and distribution of body water, Fluid Exchange, Overhydration, Dehydration and water intoxication; Electrolytes- Types, composition of body fluid, fluid and electrolyte balance and electrolyte imbalance

Unit IV Vitamins**(14 Hrs)**

Fat soluble vitamins – vitamins A, D, E and K – functions, sources, requirements and deficiency. Water soluble vitamins (thiamine, riboflavin, niacin, pyridoxine, folic acid, cyanocobalamin, biotin, pantothenic acid and ascorbic acid) – functions, sources, requirements and deficiency

Unit V Minerals**(14 Hrs)**

Minerals – calcium, phosphorus, iron, magnesium, sodium and potassium – functions, sources, requirements and deficiency.

Trace minerals – zinc, iodine, fluorine and chlorine – functions, sources, requirements and deficiency

Text Books

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1.	Srilakshmi, B	Nutrition Science	New age international Pvt. Ltd. New Delhi.	6 th Edn 2018
2.	Mudambi, S.R.,	Fundamentals of foods, nutrition and diet therapy	New Age International, New Delhi	2007
3.	Avanta Sharma	Principles of therapeutic nutrition and dietetics	CBS Publishers and Distributors, New Delhi	2014
4.	Dr. M. Swaminathan	Food and Nutrition	Bappco Publications	2 nd Edn., 2000

Reference Books

S. No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1.	Raheena Begum	A textbook of foods, Nutrition and dietetics	Sterling Publishers, New Delhi	2000
2.	Sunetra Roday	Food Science and Nutrition	Oxford University Press	2017
3.	Towsend, C.E., and Rath, R.	Nutrition and Diet Therapy	Delmar Publishers, New York.	2000
4.	Shashi Goyal	Food nutrition and Health	S.Chand and Company Pvt Ltd , New Delhi	2012

Pedagogy

Blended learning, lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar

Course Designers:

1. Dr. N. Deepa Sathish

2. Ms. Santhiya R

COURSE CODE	COURSE NAME	Category	L	T	P	Credit
BF24CP1	Food Science Practical	Practical	58	2	-	3

Preamble

To enable the students to

- Learn the preparation of various food products- milk, egg & beverages
- Understand the effect of dry & moist heat methods of cooking
- Gain knowledge on browning of fruits & effect of acid/alkali/heat on vegetables
- Determine melting point, smoking point and flash point of fats

Course Learning Outcomes

On successful completion of the course

CLO Number	CLO Statement	Knowledge Level
CLO1	Classify the food groups and understand its properties	K1
CLO2	Recognize the effect of processing on structural changes of different food	K2
CLO3	Gain knowledge on the factors affecting properties of food	K3
CLO4	Apply the concepts of the changes and develop products	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	S	S	S
CLO2	S	S	S	S	S	S
CLO3	S	S	S	S	S	S
CLO4	S	S	S	S	S	S

S- Strong

FOOD SCIENCE PRACTICAL (BF24CP1)

Total Hours :45

Credit:3

Syllabus

1. Study on organoleptic evaluation of foods
2. Effect of dry heat and moist heat on starch granules
3. Determination of gluten content in wheat
4. Cooking characteristics of pulses
5. Germination characteristics of pulses
6. Cooking characteristics of vegetables - effect of acid, alkali, heat and time
7. Study of enzymatic and non-enzymatic browning in fruits
8. Cooking characteristics of milk and its products.
9. Cooking characteristics of egg
10. Study on foam formation and stability
11. Study the shortening effects of fats and oils during cooking
12. Stages of sugar crystallization
13. Effect of temperature on taste

Text Books

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1	Manay Shakunthala, N And Shadaksharaswamy M.	Foods facts and Principles,	New Age International (P) Ltd Publishers,	2005
2	Swaminathan, M.	Food Science and Experimental Foods	Ganesh and Co.Madras.	1995
3	Usha Chandrasekar,	Food Science in Indian Cookery	Phoenix publishers House Private Limited	2002
4	Srilakshmi B.	Food Science	New Age International (P) Ltd Publishers	2005

Reference Books

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1.	Paul and Paulmer	Food Theory and Application	John Wiley and sons, New York	1972
2.	Norman N. Potter and Joseph H. Hotchkiss,	Food Science	CBS Publishers and distributors	1997
3.	Swaminathan M	Food Science, Chemistry and Experimental foods	Bappo Publishers company Ltd	1997
4.	Meyer LH,	Food Chemistry	CBS Publication	1987

Pedagogy: Demonstration and hands on practical's

Course Designers:

1. Dr.N.Deepa Sathish

2. Ms. Sujithra S

COURSE CODE	COURSE NAME	Category	L	T	P	Credit
BF24AP1	Nutritional Menu Planning Practical	Practical	-	-	45	2

Preamble

To enable the students to

- Gain knowledge on the energy value of foods and the energy requirements of individual
- Understand about the nutritional composition of food.
- Analyze the methods of assessing nutritional status of an individual

Course Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	To calculate the energy value of foods	K1
CLO2	To learn the standardization of menu planning	K2
CLO3	To learn energy requirements of an individual	K3
CLO 4	To gain knowledge on preparing a day's diet based on the nutritional status	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	S	S	S
CLO2	S	S	S	S	S	S
CLO3	S	S	S	S	S	S
CLO4	S	S	S	S	S	S

S-Strong

NUTRITIONAL MENU PLANNING PRACTICAL (BF24AP1)

Total Hours: 45

Credits: 2

1. Calculation of energy values in foods from food composition tables and Preparation of food exchange lists
2. Calculation of basal metabolic rate and energy requirements of an individual per day.
3. Preparation and standardization of recipes, portion control and calculation of nutritive value
 - i. Controlling techniques - Weights and measures standard, household measures for raw and cooked food
 - ii. Basic preparation of various foods from different food groups & their nutritive value (porridges, Salads, Beverages, Soups, desserts and puddings, custard, kheer, ice cream, poached, scrambled, fried omlette & egg-nogs and meat preparations)
4. Preparation of a day's diet and calculation of Nutritive value
 - a. Pregnant and Lactating Mother
 - b. Infants
 - c. School going children
 - d. Adolescents
 - e. Adults and
 - f. Elderly people
5. Preparation of a day's diet and calculation of Nutritive value for various health conditions
 - i. Weaning food
 - ii. Iron rich food
 - iii. Underweight
 - iv. Obesity
6. Methods of Assessing Nutritional status of an individual- BMI, Head circumference, Upper arm, mid arm circumference, skin fold thickness

Text Books

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1	Dr. C. Gopalan	Nutritive Value of Indian Books	ICMR and NIN	2021
2	Dr. C. Gopalan	Dietary Guidelines for Indians	ICMR and NIN	2024
3	Pomrenz Y & Meloan CE	Food Analysis - Theory and Practice	CBS	1996
4	Food safety and standards, Ministry of health and family welfare FSSAI Authority of India	Manual of methods for analysis of foods	Government of India	2016
5	David T Plummer	An Introduction to Practical Biochemistry	Tata McGraw Hill	2007,third edn
6	A.Y.Sathe	A first course in Food Analysis	New Age International Publishers	1999
7	Dr. Geetha Swaminathan and Ms. Mary George	Laboratory Chemical Methods in Food Analysis	Margham Publishers	2002

Pedagogy

Demonstration and hands on practical's

Course Designers:

1. Dr. N. Deepa Sathish

SEMESTER II

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
BF24C03	Fundamentals of Food Chemistry and Properties	THEORY	58	2	-	3

Preamble

Enable the students to

- Understand the types and important properties of food materials
- Gain knowledge about classification, structure and reactivity of food compounds
- Acquire knowledge about classification and structure of food materials

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand on types and classification of food and its components	K1
CLO2	Gain knowledge about structure and reactivity of food compounds	K2
CLO3	Demonstrate the effect of processing on the physiochemical properties	K3
CLO4	Understand the various engineering properties of foods	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	M	M	S	S	S
CLO2	S	M	M	S	S	S
CLO3	S	M	M	S	S	S
CLO4	S	M	M	S	S	S

S-Strong; M-Medium

Syllabus**Unit I – Chemistry of Carbohydrates, Amino acids, Proteins and Water 15 hrs**

Carbohydrates - occurrence and classification. Structure of monosaccharides, disaccharides and polysaccharides. Optical activity of sugars, reactions of monosaccharides, inversion of sucrose, Lactose and Lactulose. Changes in starch during processing.

Proteins-Classification, Structural properties of proteins - primary, secondary, tertiary and quaternary. Changes in proteins during processing.

Water - Moisture in Foods, Hydrogen Bonding, Bound Water, Water and its interaction with food components and food stability, Water Activity in Foods, True Solutions, Dispersions and Sols

Unit II - Chemistry of Fats & Oils, Vitamins, Minerals & Enzymes 15 hrs

Fats and oils - Classification, functions, fatty acids – occurrence, types, nomenclature, essential fatty acids, physical and chemical properties of fats and oils, modification of fats, hydrogenation, inter esterification, acetylation, winterization, deterioration of fats – rancidity.

Vitamins: Occurrence, structure of fat soluble and water soluble vitamins, vitamins as coenzymes, vitamin retention during processing and storage, vitamins as antioxidants and supplements

Minerals: Minerals in foods and its chemistry–sodium, potassium, magnesium, calcium, chloride, phosphorus and changes during processing of foods.

Enzymes – classification, chemical nature and properties, Mechanism of enzyme action and factors affecting enzyme action.

Unit III – Physical, Frictional & Rheological Properties of Foods 15 hrs

Physical Properties- measuring methods- Shape, size, volume, density, porosity, surface area and textural properties of foods.

Frictional properties - solid friction, rolling resistance, angle of repose & internal friction

Rheological Properties - Rheology of solids- Uniaxial stress, Young's modulus, Bulk modulus, Shear modulus, Rheology of liquid foods - Newton's law of viscosity, Viscous foods - Newtonian fluids, Non- Newtonian fluids, Plastic fluids, Time dependent properties, Viscosity measurement - Capillary flow viscometer, Orifice type viscometer, Falling ball viscometer, Rotational Viscometer.

Unit IV - Thermal , Aerodynamic & Mechanical Properties**14 hrs**

Thermal Properties - Definitions & significance- specific heat, enthalpy, conductivity and diffusivity, surface heat transfer coefficient.

Aerodynamic Properties - Drag coefficient, terminal velocity and their application in the handling and separation of food materials.

Mechanical properties - Definition, Types of mechanical damage, causes of damage, Mechanical damage in grains, fruits & vegetables, Damage of food materials under static, impact and vibration.

Unit V – Magnetic, Electrical & Electromagnetic Properties of Foods**14 hrs**

Magnetic properties - Materials, Magnetization, Magnetic field forces, Magnetic resonance

Electrical Properties - Electrical conductivity and its measurement

Electromagnetic properties- Electrical polarization, Microwave heating- Mechanism of microwave heating, Dielectric Properties- Conversion of microwave energy into heat

Textbooks :

S.No	Authors	Title of the Book	Publishers	Year of Publication and Edition
1	Fennema, O. R.	Fennema's Food Chemistry	CRC Press	2023 (5th Edition)
2	Damodaran, S., Parkin, K. L.	Fennema's Food Chemistry	CRC Press	2022 (5th Edition)
3	Belitz, H. D., Grosch, W., Schieberle, P.	Food Chemistry	Springer	2020 (5th Edition)
4	Manay, N. S., Shadaksharaswamy, M.	Food Facts and Principles	New Age International	2022 (4th Edition)

Reference Books

S.No	Authors	Title of the Book	Publishers	Year of Publication and Edition
1	Rao, M. A.	Engineering Properties of Foods	CRC Press	2022 (5th edition)
2	Barbosa-Canovas, G. V., Ortega-Rivas, E.	Food Structure Engineering: Processing, Properties and Applications	Wiley-Blackwell	2023 (1st edition)
3	Gorton, L., Tornberg, E., and Johansson, L.	Food Processing: Principles and Applications	Wiley-Blackwell	2021 (2nd edition)
4	Ramaswamy, H. S., and Mascheroni, R. H.	Food Process Engineering: Theory and Practice	CRC Press	2022 (3rd edition)

Pedagogy: Blended learning, lecture by chalk & talk, power point presentation, e- content, group discussion, assignment, quiz, seminar.

Course Designers:

1. Dr.N.Deepa Sathish
2. Ms.Sujithra S
3. Dr. Sivasankari R

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
BF24C04	Food Microbiology	THEORY	58	2	-	3

Preamble

To enable the students to

- Learn the types, structure and characteristics of microorganisms
- Understand the factors affecting the growth of microorganism
- Learn the causes of food spoilage and food borne disease
- Gain knowledge on the methods to enumerate the microbes

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	To gain knowledge on the types and characteristics of microorganism	K1
CLO2	To understanding the importance of microbes in food industry	K2
CLO3	To impart knowledge on spoilage and food borne disease caused by microorganisms	K3
CLO4	To enhance the understanding skills on hygiene and sanitation related to food safety	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	M	M	M	M
CLO2	S	S	M	M	M	M
CLO3	S	S	M	M	M	M
CLO4	S	S	M	M	M	M

S- Strong; M-Medium

Unit I Introduction to Microbiology**(12 Hrs)**

Definition - Microbiology in daily life - General characteristics of microbes - physiological, cultural characteristics. morphology and classification of microorganisms. Importance of microbes in the food industry

Food as substrate for microorganisms, Factors affecting the growth of microorganisms- intrinsic and extrinsic factors - Hydrogen ion concentration (pH), Moisture requirements - concept of water activity, oxidation-reduction potential; Growth of microorganisms - nutrient content, bacterial growth kinetics.

Unit II Microbiology of foods**(12 Hrs)**

Important food spoilage bacteria in plant based - cereal & cereal products; plantation crops - tea, coffee, cocoa, canned foods, fruits and sugars and animal based foods - milk and milk products, flesh foods - meat, fish, poultry, egg. Microbiological Examination of milk - MBRT, alkaline phosphatase test

Unit III Microbial food products**(12 Hrs)**

Microorganisms as food - probiotics and its uses. Indian Knowledge System (IKS) on food fermentation and fermented foods. Recent advancements in food fermentation

Definition and Principle -Fermentation, Fermenter, Fermented foods - milk products (curd, yogurt, cheese, kefir), Beverages (Toddy, Handiya, Palm Wine, Mahua, vinegar, beer) Vegetables (sauerkraut, kimchi, pickles), Meat (sausage)

Unit IV Food Borne Diseases**(11 Hrs)**

Definition of Food poisoning. Food borne infections - Bacteria (Salmonellosis, Gastroenteritis, E.Coli, shigellosis), Virus (Rotovirus, Hepatitis), Fungus (Apergillus, Pencillium, Fusarium) and intoxications with types - Symptoms, Control measures.

Food borne pathogens - Clostridium, Bacillus cereus, Staphylococcus aureus, Vibrio, Campylobacter, Yersinia

Unit V Food Spoilage and Sanitation**(11 Hrs)**

Food spoilage- Definition, classification of food by ease of spoilage. Food Sanitation, Contamination of food through various sources and cross contamination.

Food Safety and Food Defense:-Definition, Control of Microorganisms - disinfectants, antimicrobial agents and their mechanism of action

Text Book

S.No .	Authors	Title of the Book	Publishers	Year of Publication and Edition
1	William C Frazier & Dennis C Westhoff	Food Microbiology	Tata McGraw Hill Publications	2013, 5 th Edition
2	Adams M.Rand Moss M.O	Food Microbiology	New Age International Publication	1996, 2 nd Edition
3	K. Ramesh Vijaya	Food Microbiology	M J P Publication	2007, 1 st Edition
4	James M Jay	Modern Food Microbiology	Springer	2012, 5 th Edition

Reference Books

S. No	Authors	Title of the Book	Publishers	Year of Publication and Edition
1	Dubey, R.C.and D.K. Maheswari	A text book of Microbiology	S. Chand & Co	2005, 5 th edition
2	Pelczar, M.J., E.C.S.Chan&N.R.Krieg	Microbiology	McGraw –Hill New York	2002, 5 th edition
3	Postgate J	Microbes and Man	Cambridge Univ. Press,	2000, 4 th edition

Pedagogy: Lecture by chalk and talk, power point presentation, group learning, group discussion, assignment, quiz, peer learning, student seminar.

Course Designers:

1. Dr.N.Deepa Sathish
2. Ms. Santhiya R
3. Ms. Dharrshne S. V

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
BF23CP2	Microbiology Practical	CORE	-	-	45	3

Preamble

- To enable the students to
- Learn and apply cleaning and sterilization techniques
- Differentiate between the types of microorganisms
- Perform staining methods
- Determine the potability of water

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understanding the concepts and techniques	K1
CLO2	Recognizing the type of microorganism and employing different staining techniques	K2
CLO3	Examining the potability of water and bacterial counting by biosensors	K3

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	S	S	M
CLO2	S	S	S	S	S	M
CLO3	S	S	S	S	S	M
CLO4	S	S	S	S	S	M

S- Strong; M-Medium

Microbiology Practical (BF23CP2)
Under DBT scheme

Total Hours: 45

Credits : 3

1. Introduction to microscope, use of autoclave and Laminar air flow system and Laboratory safety and Biosafety measures
2. Cleaning and Sterilization techniques of glassware.
3. Preparation and sterilization of nutrient broth
4. Cultivation and sub – culturing of microbes
5. Morphological study of bacteria and fungi using permanent slides
6. Plating Techniques and preparation of slants using nutrient agar
7. Simple staining, Gram Staining, Negative staining methods for bacteria
8. Staining methods for fungi
9. Standard plate count or total plate count for milk or foods
10. Most probable number for water (MPN)
11. Swab Analysis of food surface areas and hands
12. Food bacterial count by biosensor techniques
13. To study bacterial growth curve
14. Visit to beverage industry

Pedagogy: Demonstration and hands on practical

Text Books

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
1	Dubey, R.C. and D.K. Maheswari	A textbook of Microbiology	S. Chand & Co., New Delhi	2005, 5 th edition
2	Pelczar, M.J., E.C.S.Chanand N.R. Krieg, Noel R	Microbiology	McGraw– HillNew York	2002, 7 th edition
3	Power C.B. and H.F.Daginawala	General Microbiology, Vol. I and II	Himalayans Publishing House, New Delhi	1989, 2 nd edition
4	Kanika Sharma	Manual of microbiology – Tools and Techniques	Anshan Ltd	2007, 1 st edition

Reference Books

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
1	Rangaswami,G D.J.Bagyaraj	Agricultural Microbiology	Asia publishing House, New Delhi	1992, 2 nd edition
2	Stanier, R.Y. J.Ingtaham, M.C.	The Microbial world	Prentice Hall, England. New Jersey	1986, 5 th edition
3	Tauro, P, Kapoor, K.K. and Yadav, K.S.	An Introduction to microbiology	Wiley New Delhi Publications,	1989, 4 th edition

Course Designers:

1. Ms. Santhiya R
2. Ms. S.V. Dharrshne

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
BF24A02	Nutritional Biochemistry	CORE	73	2	-	3

Preamble

To enable the students to

- Understand the metabolism of carbohydrates, proteins and lipids
- Learn the chemistry of enzymes
- Gain knowledge about the mechanistic behavior of hormones

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Introduce the concepts of metabolism of nutrients	K1
CLO2	Understand the properties of nucleic acids, characteristics of enzymes and functions of hormones.	K2
CLO3	Relate the reactions of metabolism with their functions	K3
CLO4	Explain the inborn errors	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	M	M	M	M
CLO2	S	S	M	M	M	M
CLO3	S	S	M	M	M	M
CLO4	S	S	M	M	M	M

S - Strong; M-Medium

Syllabus**UNIT-I Carbohydrate Metabolism****(14hrs)**

Fate of absorbed carbohydrate-utilization of glucose-Intermediary metabolism of carbohydrate, steps involved in Glycogenesis, Glycogenolysis, Glycolysis-EMP pathway- citric acid cycle-conversion of pyruvate, acetate, oxaloacetate, electron transport chain, oxidative phosphorylation, pentose metabolism, cori's cycle (excluding structures)

UNIT-II Protein and amino acid Metabolism**(15hrs)**

Protein – protein degradation pathway, enzymes for protein degradation. Protein metabolism- Removal of amino group- oxidative deamination, transamination-decarboxylation, transmethylation, disorder of amino acid metabolism and inborn errors of metabolism. Metabolism of ammonia-detoxification of ammonia-glutamine pathway-ornithine cycle.

UNIT-III Lipid Metabolism**(14 hrs)**

Fatty acid oxidation -activation and transport of fatty acid by acyl-CoA, β -oxidation-reaction sequence of β -oxidation, Ketosis-ketogenesis in liver-regulation of ketogenesis-metabolism of ketone bodies-prevention of ketosis (excluding structures)

UNIT-IV Enzymes**(15 hrs)**

Definition, classification, Mechanism of enzyme action- characteristics of enzyme active site. Coenzymes-Definition, classification, functions of action of co-enzymes- relation between vitamin and co-enzymes.) Isoenzymes – definition, Disorder of carbohydrate metabolism and inborn errors of metabolism

UNIT V Hormones**(15 hrs)**

Classification, functions, properties and chemical nature of hormones, hormones of Thyroid gland, parathyroid gland, adrenal gland, Islets of Langerhans, Pituitary gland, Gastrointestinal tract, hormonal regulation in carbohydrate metabolism, protein metabolism and fat metabolism, hormonal disorders, counter-regulatory hormone

Text Books

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
1	Ghosh, S., Chakraborty, S., and Sharma, S.	Nutritional Biochemistry: An Introduction	Wiley India	2022
2	Bender, D. A.	Nutritional Biochemistry of the Vitamins	Academic Press	2021, 2 nd edition
3	Mahan, L. K., Escott-Stump, S.	Krause's Food & the Nutrition Care Process	Elsevier	2022, 16 th edition

Reference Books

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
1	A. C. Deb	Fundamentals of Biochemistry	New Central Book Agency	2004, 8 th edition
2	J.H. Weil	General Biochemistry	Wiley Eastern Ltd, New Age International Ltd	1990, 6 th edition
3	B.C. Rajbir Singh	Biochemistry	Mittal Publishers	2002, 6 th edition

Pedagogy

Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

Course Designers:

1. Dr. N. Deepa Sathish

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
BF24AP2	Biochemistry Practical	Allied	-	-	45	2

Preamble

- To enable the students to
- Identify sugars and amino acids.
 - Estimate metabolites of blood and urine sample

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify techniques for sugars and amino acids	K1
CLO2	Qualitatively estimate the sugars and amino acids	K2
CLO3	Quantitatively estimate the metabolites in blood sample and urine sample	K3

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	M	S	S	M
CLO2	S	S	M	S	S	M
CLO3	S	S	M	S	S	M

S- Strong; M- Medium;

Biochemistry Practical (BF24AP2)

Total hours: 45

Credit: 2

Qualitative analysis

1. Qualitative - analysis of carbohydrates-monosaccharides,disaccharides and polysaccharides- starch
2. Qualitative analysis of amino acids

Quantitative analysis :

1. Estimation of blood glucose
2. Estimation of iron and heamoglobin content in blood
3. Estimation of urinary creatinine
4. Estimation of urinary urea
5. Estimation of amino acid by Ninhydrin method
6. Estimation of protein and albumin /globulin ratio

Pedagogy: Demonstration and hands on practical

Text Books:

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
1	Sadasivam and Manickam	Biochemical Methods	New Age International	1996, 2 nd edition
2	Geetha Swaminathan and Mary George	Laboratory chemical methods in food analysis	Margham Publications	2014, 5 th edition

Reference Books

S. No	Name of the Authors	Title of the Book	Publishers	Year of Publication
1	Beedu Sashidhar Tao,Vijay Deshpande	Experimental Biochemistry-A student companion	K.International pvt Ltd	2007, 1 st edition
2	David T Plummer	An Introduction to Practical Biochemistry	Tata McGraw Hill	2007, 3 rd edition
3	Divya Shanthi, Sowbhagya Lakshmi	An easy guide for practical Biochemistry	Jaypee Brothers medical Publishers pvt. Ltd	2010, 1 st edition

Course Designers:

1. Dr.N.Deepa Sathish
2. Ms. Santhiya R

SEMESTER III

COURSE CODE	COURSE TITLE	Category	L	T	P	Credit
BF24C05	Unit Operations	Theory	73	2	-	3

Preamble

To enable the students to

- gain knowledge on the principles of food process engineering and its significance in food industry.
- understand the units, dimensions and formulas related to food processing
- familiarize with food processing unit operations and provide knowledge on various unit operations involved in food industry.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basic concepts of unit operations in food processing	K1, K2
CLO2	Outline the working principles of various equipment & methods	K2
CLO3	Demonstrate the significance of processing methods in unit operations	K3
CLO4	Apply the knowledge of various operation methods in food processing industry	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	M	M
CLO2	S	S	M	M	M	M
CLO3	S	S	M	M	M	M
CLO4	S	S	M	M	M	M

S- Strong; M-Medium

Syllabus**Unit I Introduction to Unit operations****14 Hours**

Fundamentals of unit operation, processing and handling of food products. Pre-treatment operations- Cleaning, Dehulling/Dehusking, Peeling, Mixing and Forming, Sorting and Grading, Size reduction and separation.

Indian Traditional Food Processing Techniques: Indigenous methods of pre-treatment operations - manual dehulling, traditional grinding stones, sun drying and age-old fermentation techniques.

Unit II Size reduction processes**14 hours**

Size reduction: Principles, Theory, size reduction methods- compression, impact, shearing and cutting; cereal grinding, degree of grinding, size reduction machinery- crusher, grinder, attrition mills, hammer mill, ball mills, rietz mill; oil expression and extractions- hydraulic press, screw press

Unit III Separation processes**15 hours**

Definition and Introduction to Separation; Types of Separators and its applications in food industry.

Mechanical Separations: Screening and Screening equipment, sedimentation: principle, equipment and applications.

Centrifugation - principle, equipment involved in centrifugation, liquid-liquid centrifugation, liquid-solid centrifugation, clarifiers, desludging machines and its applications.

Filtration: Principles involved in filtration, membrane separation, Pressure and vacuum filtration.

Unit IV Drying and Evaporation**15 hours**

Drying – Theory of drying, Factors influencing drying rate, traditional and modern methods of drying and types of driers.

Evaporation - Basic principle, need for evaporation, design of evaporation system; retention time; types - single effect evaporator, multiple effect evaporators.

Unit V Distillation & Crystallization**15 hours**

Distillation: Theory, working principles and applications in food industry - liquid vapor equilibrium, distillation of binary mixtures, simple distillation, steam distillation, vacuum distillation, and fractional distillation. **Crystallization:** Theory, working principle, nuclei formation- equipment and applications in food industries.

Text Books

S. No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1	Prabhat K. Nema	Unit Operations In Food Processing	Nipa Books	2023 and 1 st edition
2	Zeki Berk	Food Process Engineering and Technology	Elsevier	2023 and 2 nd edition
3	C.J. Geankoplis	Transport Processes and Unit Operations	Pearson	2023 and 4 th edition
4	Warren L. McCabe, Julian C. Smith, Peter Harriott	Unit Operations of Chemical Engineering	McGraw-Hill Education	2023 and 9 th edition

Reference Books

S. No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1.	Raul R. Rodriguez and José M. G. Laencina	Principles of Food Engineering	CRC Press	2023 and 5 th edition
2.	Gustavo V. Barbosa-Cánovas, José M. Aguilera, and Carmen A. García	Food Engineering: From Concept to Consumer	Springer	2023 and 1 st edition
3.	Richard W. Hartel, David G. Boulton, and Geoffrey H. H. McMaster	Food Engineering: Principles and Modern Applications	Wiley-Blackwell	2021 and 1 st edition
4.	Dennis R. Heldman and Daryl B. Lund	Food Engineering Handbook	CRC Press	2021 and 3 rd edition

Blended learning links

S. No.	Unit	Topics	Links
1.	I	Introduction to Unit operations	https://youtu.be/C7Vey3qzRqw https://dl.icdst.org/pdfs/files1/0d697ccbffd1ef3ec6dbf714d56fa24c.pdf
2.	II	Size reduction processes	https://youtu.be/f-tOL83XIQY https://nzifst.org.nz/resources/unitoperations/index.htm

3.	III	Separation processes	https://youtu.be/P4otdiiY6X8 https://archive.org/details/unitoperationsin0000earl
4.	IV	Drying and Evaporation	https://youtu.be/XYkxqrwmrF8 https://www.academia.edu/29604704/UNIT_OPERATIONS_IN_FOOD_PROCESSING
5.	V	Distillation & Crystallization	https://www.scribd.com/document/511144815/Unit-operations-in-food-processing-notes

Pedagogy

Blended learning, lecture by chalk & talk, power point presentation, e-content, problems, group

Course Designers:

1. Dr. Sivasankari R

COURSE CODE	COURSE TITLE	Category	L	T	P	Credit
BF23CP3	Unit Operations Practical	Practical	-	-	45	3

Preamble

To enable the students to

- Gain knowledge on the basic principles of food processing techniques and its applications.
- Apply the skill of material balance and energy balance in unit operation processes.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Analyze the separation, collection and absorption efficiency of separators	K3
CLO2	Analyze performance evaluation of different types of mills and steam distillation process	K3
CLO3	Calculate the energy requirement and performance characteristics in size reduction process	K4
CLO4	Estimate the thermal efficiency of steam distillation	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	S	S	M
CLO2	S	S	S	S	S	M
CLO3	S	S	S	S	S	M
CLO4	S	S	S	S	S	M

S- Strong; M-Medium

Syllabus

1. Determination of density and porosity of food grains
2. Determination of drying characteristics of food materials.
3. Physical Properties of Extruded Foods
4. Determination of Size reduction in Ball Mill
5. Determination of particle size of granular foods by sieve analysis.
6. Estimation of thermal conductivity.
7. Analysis of flow rate through flow through pipes.
8. Estimation of Diffusion Coefficient
9. Estimation of vaporization efficiency and thermal efficiency of Steam Distillation
10. Visit to food processing industries

Text Books

S. No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1	G.V. Barbosa-Cánovas, J. Benavides, S. S. Sablani	Food Process Engineering and Technology	Elsevier	2021, 3 rd edition
2	P. R. Ashurst, M. D. Haug	Food Processing: Principles and Applications	Wiley-Blackwell	2021, 2 nd edition
3	R. Paul Singh, Dennis E. Heiss	Introduction to Food Engineering	Elsevier	2020, 5 th edition
4	James R. Whitaker, D. H. Lee	Transport Phenomena in Food Processing	Wiley	2021, 3 rd edition
5	David J. McClements, Vassilis A. R. Pappa	Extrusion Cooking: Technologies and Applications	Elsevier	2020, 2 nd edition

Pedagogy: Demonstration and hands on practical

Course Designers:

1. Dr. Sivasankari R

COURSE CODE	COURSE TITLE	Category	L	T	P	Credit
BF24C06	Fundamentals of Food Processing	Theory	58	2	-	3

Preamble

To enable the students to

- Understand about the production, harvesting & importance of different food commodities
- Gain knowledge on the ideologies of food processing
- Familiarize with importance of processing in food industries

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	To gain knowledge on basic trends and production of different food	K1, K2
CLO2	To know about the processing involved in processing of different food	K2
CLO3	To enable students to learn the different methods and techniques in processing	K3
CLO4	To study about the equipment used for processing of foods	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	M	M
CLO2	S	S	M	M	M	M
CLO3	S	S	M	M	M	M
CLO4	S	S	M	M	M	M

S - Strong; M-Medium

UNIT I Cereal and Pulse Processing**13 Hours**

Cereals – Properties of paddy, Varieties and quality characteristics. **Paddy** – parboiling, physico- chemical changes during parboiling. Milling of rice - traditional and modern methods.

Wheat & Maize

- Milling –basic concepts, products and by-products. **Milletts** – milling methods of sorghum, finger millet & pearl millet. **Pulses** – pre-treatment and milling – methods (traditional & modern)
Grain storage methods - traditional and modern

UNIT II Fruits and Vegetable processing**12 Hours**

Harvesting, Post harvest losses - causes, Processing: canning – principle and steps, problems in canned foods. Drying & dehydration – principles, drying curve, osmotic dehydration. Intermediate moisture foods – characteristics and importance. Minimal processing & Hurdle technology – principle techniques. Fruits and vegetable processing – ketchup/sauce, fruit bar, soup powder, dehydrated fruits and vegetables, fermented vegetables

UNIT III Nuts & Oilseeds processing**10 Hours**

Handling and storage - processing of oil seeds - coconut, groundnut, sesame, sunflower; methods - traditional method - Ghani, expeller, hydraulic presser & modern method - solvent extraction of oil and refining. Processing of cashewnut, arecanut, walnut, hazelnut, almonds, pistachios

UNIT IV Dairy processing**10 Hours**

Physico - chemical properties of milk constituents, quality evaluation of milk – processing of milk, types of special milks and milk products – milk powder, butter, cheese, ghee, yoghurt; Insanitation of milk

UNIT V Flesh food processing**13 Hours**

Meat – Sources of meat, Slaughtering – methods, ante mortem & postmortem changes, shelf life of meat. Processed meat products – cured, smoked, pickled, frozen, salted, canned and dehydrated meat. **Seafood** – Types, cuts of fish, pre-preparation and processing of fish – curing, smoking, drying, chilling, salting, canning. & byproducts – fish oil, fish meal, fish silage, fish ambergris, fish squalene

Poultry – ante and post mortem inspection, Processing of poultry, different cuts of poultry meat

Egg – processing of egg products – frozen egg, egg powder (WEP,EYP,EWP)

Text Books

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1	B.Sivashankar	Food Processing & Preservation	PHI Learning	2009
2	Sukumar De	Outlines of Dairy technology	Oxford university Press	1980
3	Sahay, K. M. and K.K.Singh	Unit operation of Agricultural Processing	Vikas Publishing House Pvt. Ltd., New Delhi	2004
4	Srivastava, R.P. and Kumar,	S Fruit and Vegetable Preservation: Principles and Practices.	International Book Distributing Co. Lucknow	1998
5.	Nanda Vikas	Meat, Egg and Poultry	Tech Sar Pvt Ltd	2014

Reference books

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1.	P.Fellows	Food Processing Technology- principles & Practices	CRC press	2000
2.	Earle, R.L.	Unit Operations in Food Processing	Pergamon Press. Oxford. U.K	2003
3.	Chakraverty A, Mujumdar A.S, Raghavn G.S.V & Ramasamy H.S	Hand book of Post Harvest Technology	Marcel Dekker Press, USA	1998

Pedagogy

Blended learning, lecture by chalk & talk, power point presentation, e-content, group

Course Designers:

- 1. Dr.N.Deepa Sathish**
- 2. Ms. Santhiya R**

COURSE NUMBER	COURSE TITLE	CATEGORY	L	T	P	CREDIT
TH24A23	Numerical and Statistical Techniques	THEORY	73	2	-	4

Preamble

- To present students the Basic concepts of Numerical Methods and Statistics.
- To enable the students to find the practical applications to the real world problems.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall basic Mathematics and Statistical concepts	K1
CLO2	Interpret results from the application of standard statistical and numerical methods.	K2
CLO3	Understand the concepts of Numerical differentiation and Theoretical distributions	K3
CLO4	Applying numerical and statistical methods to solve complex problem.	K3
CLO5	Analyse and evaluate the accuracy of common numerical and statistical methods.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	M	S	S
CLO3	S	S	S	M	S
CLO4	S	S	S	S	M
CLO5	S	M	S	S	S

S- Strong; M-Medium; L-Low

NUMERICAL AND STATISTICAL TECHNIQUES (TH24A23)

Credits : 4

Hours : 73

Syllabus

Unit I

15 Hours

Solution of Linear Simultaneous Equations: Gauss elimination - **Gauss Jordan** - Gauss Jacobi methods - simple problems. **Interpolation: Newton Forward** and Backward Interpolation Formulae.

Unit II

15 Hours

Numerical Differentiation: Newton's Forward Difference - Newton's Backward Difference, **Numerical Integration**: Introduction: Trapezoidal rule, Simpson's 1/3 and 3/8 rules.

Unit III

15 Hours

Correlation analysis: Introduction - Significance of the study of correlation - correlation and causation - **Types of correlation** - Methods of studying correlation - Graphic method - Karl Pearson's coefficient of correlation - **Properties of the coefficient of the correlation** - Rank correlation coefficient - Features of Spearman's correlation coefficient, **Regression analysis**.

Unit IV

15 Hours

Probability: Introduction - probability defined - **Importance of the concept of probability** - Calculation of probability - Theorems of probability (statements only) – **Mathematical expectation**-Simple problems.

Unit V

13 Hours

Theoretical Distributions: **Binomial distribution** - **Poisson distribution and Normal distribution** (without derivations & proof).

Text Books

S.No	Author	Title of the book	Publishers	Year & Edition
1	B.S. Grewal	Numerical Methods in Engineering and Science with Programs in C & C++	Khanna Publishers	2014, XI
		Unit I : Chapter III & VII: 3.3:(3,4), 3.5:(1,2) & 7.1-7.3 Unit II: Chapter VIII : 8.1, 8.2:(1,2), 8.4, 8.5:(I,II,III)		
2	S.P. Gupta	Statistical methods	Sultan Chand & Sons Publications	2005, XLXI

	Unit III: Volume I: Chapter 10,11.(pg: 329-341, 377- 412, 435- 454) Unit IV : Volume-II Chapter 1(till Baye's theorem) (pg: 751-771) Unit V : Volume-II Chapter 2 (pg:805-824, 826-834, 836-856)
--	--

Reference Books

S.No	Author	Title of the book	Publishers	Year of Publication
1	P.A.Navanitham	Business Mathematics And Statistics	Jai Publishing Company	2003
2	S.C Gupta and V.K. Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand & Sons Publications	2001
3	P.Kandasamy, K.Thilagavathy and K.Gunavathy	Numerical Methods	S.Chand and company LTD Reprint	2007
4	V.K.Kapoor	Fundamentals of Statistics	Applied Statistics Sultan Chand & Sons	2007

MOOC learning

<https://nptel.ac.in/courses/111/107/111107105/>

(Lectures by Prof. Ameeya Kumar Nayak and Prof. Sanjeev Kumar, Department of Mathematics, Indian Institution of Technology Roorkee)

Lecture 02 Gaussian elimination with partial pivoting

Lecture 04 Jacobi and Gauss Seidel methods

Lecture 20 Newton's Forward Difference & Newton's Backward Difference

Lecture 34 Simpsons 1/3rd rule and 3/8 rule <https://nptel.ac.in/courses/111/106/111106112/> (6

Lectures by Prof. G.Srinivasan, Department of Management Studies, Indian Institution of Technology Madras)

Lecture 12 Probability

Lecture 13 Rules of probability

Lecture 19 Binomial distribution

Lecture 20 Poisson distribution

Note

Question paper setters to confine to the above text books only

Course Designers:

1. Mrs K.Sharmilaa, Assistant Professor
2. Mrs.S Aishwarya, Assistant Professor

COURSE CODE	COURSE TITLE	Category	L	T	P	Credit
BF24A03	Basics of Accountancy	Theory	73	2	-	4

Preamble:

- To understand fundamental accounting principles and standards.
- To deepen knowledge of financial transactions and final accounts using double-entry book keeping and Indigenous Accounting Practices.
- To analyse financial data using ratio analysis, cost accounting, and AI-driven automation.
- To effectively communicate financial results using modern tools and sustainability reporting.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the fundamental concepts, principles, and standards of accounting, including IFRS, Indigenous Accounting Practices, and AI applications in accounting.	K1
CLO2	Identify and comprehend various financial transactions, book keeping methods, and computerized accounting systems, including cloud accounting.	K2
CLO3	Apply accounting techniques to analyze business transactions, prepare final accounts, cost sheets, and budgets while integrating AI for automation.	K3
CLO4	Analyze financial statements using ratio analysis, cost accounting tools, and AI-driven decision-making techniques for sustainability reporting.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	M	L
CLO2	S	S	M	S	M
CLO3	S	S	S	M	S
CLO4	S	S	S	L	L

S- Strong; M-Medium; L-Low

BASICS OF ACCOUNTANCY - BF24A03

73 Hours

Unit: I

14 Hours

Accounting - Meaning, Objectives - Types of Accounting - Accounting Concepts and Principles. Overview of Indian and International Accounting Standard - ***Introduction to IFRS - Concept and objectives & principles*** (Theory Only) - ***Kinds of Accounts***. Accounting Equation - Journal, Ledger (Preparation of Journal and Ledger).

Unit: II

14 Hours

Subsidiary Books: Purchase Book, Sales Book, Returns Book, Cash Book - Trial Balance - objectives and methods of preparing Trial Balance. ***Depreciation - Meaning, need for depreciation***- Methods: Straight line and Diminishing balance methods - (Simple Problems only).

Unit: III:

15 Hours

Final accounts - Trading, Profit and loss A/C, Balance sheet and its contents - Preparation of Trading and Profit and Loss Account - Balance Sheet - Treatment of adjustments (Simple Problems only). ***Computerized accounting - Needs & Importance*** - Introduction to Accounting Software's - Tally - Features & Benefits. Introduction to Cloud Accounting- Predictive Analytics in Cloud Accounting. **(Theory only).**

Unit: IV:

15 Hours

Cost accounting: Definition - ***Types of cost *** - Elements of Cost - Cost Sheet Formats & Preparation of cost sheet (Simple problems only) - Analyzing and managing food & beverage expenses (Theory only) - Cost Volume Profit Analysis - ***Management Accounting - Definition*** - Distinguish between Cost and Management accounting. Cash Budget: Meaning - Preparation of cash budget **(Simple problems only).**

Unit: V:

15 Hours

Ratio Analysis: ***Nature of Ratio Analysis - Significance*** - Types - Calculation of Ratios - Liquidity Ratio - Fixed Assets -Turnover Ratio - Operating Ratio - Stock Turnover Ratio - Debtors Turnover Ratio - Creditors Turnovers Ratio - Debt Equity Ratio (Simple problems only). Introduction to sustainability reporting (Theory Only).

(Theory and Problems in the ratio of 20% and 80% respectively)

*** Highlighted Text offered in blended mode (Links Provided)**

TEXT BOOKS:

Sl. No.	Author(s)	Title of the Book	Publisher	Year & Edition
1.	P C Tulsian, Bharat Tulsian, Tushar Tulsian	Financial Accounting	S Chand Publications	2024, 2 nd Edition
2.	Gupta MP, Agarwal BM	Financial Accounting	S Chand Publications	2023, 1 st Edition
3.	M.P. Gupta, Gupta Ajay	Cost & Management Accounting	Sultan Chand & Sons	2023, 1 st Edition

REFERENCE BOOKS:

Sl. No.	Author(s)	Title of the Book	Publisher	Year & Edition
1.	S.N. Maheswari, Suneel K. Maheshwari, Sharad K. Maheshwari	Financial Accounting for BBA	Vikas Publishing House Private Limited	2023, 7 th Edition
2.	S P Jain and Narang K.L, Simmi Agrawal & Monika Sehgal	Financial Accounting	Kalyani Publishers	2022, 12 th Edition
3.	Ravi M Kishore	Cost and Management Accounting	Taxmann Publications Private Limited	2021, 6 th Edition
4.	Shashi K. Gupta, Sharma R.K & Neeti Gupta	Cost & Management Accounting	Kalyani Publishers	2020, 15 th Edition

Blended Learning Links:

Sl. No.	Units	Topics	Blended Learning Links
1	I	Introduction to IFRS- Concept and objectives & principles	https://www.youtube.com/watch?v=aL5UFu6Qtes
2		Kinds of Accounts	https://www.youtube.com/watch?v=AQvxKosUBf4&t=221s https://youtu.be/hvUY6i4rUVk
3	II	Meaning, Need for depreciation	https://www.youtube.com/watch?v=N5Wh2NNkqpU&t=1s https://youtu.be/fINkBABbqZU

4	III	Computerized accounting: Needs & Importance	https://youtu.be/BDTZuM7T4Kw
5	IV	Cost accounting: Types of cost	https://youtu.be/_z4-7xr6ur8 https://youtu.be/X3c4XOmP7AE
6		Management Accounting	https://youtu.be/eUMwwp5zDW0
7	V	Nature of Ratio Analysis, Significance	https://youtu.be/y132ILD4Vvg https://youtu.be/KjmGvEJqz3M https://www.youtube.com/watch?v=Wv5ojR1WaA4&t=1200s

Pedagogy: Chalk &Talk, Lecture, Seminar, PPT, Group Discussion, Activity and Case Study.

COURSE CODE	COURSE TITLE	Category	L	T	P	Credit
NM23DTG	Design Thinking	Theory	30	-	-	2

Preamble:

1. To expose the students to the concept of design thinking as a tool for innovation
2. To facilitate them to analyze the design process in decision making
3. To impart the design thinking skills

Course Learning Outcome

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

CLO Number	CLO Statement	Knowledge Level
CLO 1	Understand the concepts of Design thinking and its application in varied business settings	K1
CLO 2	Describe the principles, basis of design thinking and its stages	K2
CLO 3	Apply design thinking process in problem solving	K3
CLO 4	Analyze the best practices of design thinking and impart them in business and individual day to day operations.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5
CLO 1	S	M	M	S	S
CLO 2	M	S	S	M	M
CLO 3	S	S	S	M	S
CLO 4	S	S	S	S	S

S-Strong; M-Medium

NM23DTG - DESIGN THINKING

Syllabus

(30 Hrs)

UNIT – 1

6 Hours

Design Thinking Overview: Introduction to Design Thinking and Design Research Strategies - Design Thinking Skills

UNIT – II

6Hours

Design Thinking Mindset: Principles of Design Thinking - Basis for design thinking -Design Thinking Hats - Design thinking team

UNIT – III

6 Hours

Empathize: Definition - Listen & Empathize with the Customers and / or Users - Tools and Techniques

UNIT – IV

6 Hours

Define : Definition - Defining the Problem - Tools and Techniques - Journey mapping and Ideate - definition - Ideation techniques

UNIT – V

6 Hours

Prototype: Definition - Prototype Alternate Solutions - Test the Solutions - Visualization -Story Telling - Cautions and Pitfalls - Best Practices

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year and Edition
1.	Christian Mueller-Roterberg	Handbook of Design Thinking Tips& Tools for how to design thinking	Amazon Kindle Version	2018
2	Gavin Ambrose Paul Harris	Design Thinking	AVA Publishing Switzerland	2010
3	Sambhrant Srivastava and Vijay Kumar	A Text Book of DESIGN THINKING	Vayu Education of India	2022

Reference Books:

S. No.	Author(s)	Title of the Book	Publisher	Year and Edition
1	Maurício Vianna Ysmar Vianna Isabel K. Adler Brenda Lucena Beatriz Russo	Design Thinking - Business Innovation	MJV Press	2011
2	Moritz Gekeler	A practical guide to design thinking	Friedrich- Ebert-Stiftung	2019
3	J. Berengueres	The Brown Book of DesignThinking	UAE University College, Al Ain	2014

Blended Learning Links

UNIT	TOPICS	LINK
UNIT I	Introduction to Design Thinking	https://www.digimat.in/nptel/courses/video/109104109/L01.html
	Design Thinking skills	https://www.youtube.com/watch?v=b-9Id-Jt_PI
UNIT II	Principles & Basis of Design Thinking	https://youtu.be/6-NRiom8K9Y
	Design Thinking hats	https://www.youtube.com/watch?v=bc-BvFQDmmk
UNIT III	Empathize	http://acl.digimat.in/nptel/courses/video/109104109/L02.html http://acl.digimat.in/nptel/courses/video/109104109/L03.html https://youtu.be/ls2mqHs02B0
UNIT IV	Define	http://acl.digimat.in/nptel/courses/video/109104109/L04.html https://youtu.be/veixQsRnZZU https://youtu.be/6-bDSKZJEAM
	Ideate	http://acl.digimat.in/nptel/courses/video/109104109/L11.html http://acl.digimat.in/nptel/courses/video/109104109/L12.html http://acl.digimat.in/nptel/courses/video/109104109/L13.html
UNIT V	Prototype	http://acl.digimat.in/nptel/courses/video/109104109/L15.html
	Testing	http://acl.digimat.in/nptel/courses/video/109104109/L16.html http://acl.digimat.in/nptel/courses/video/109104109/L17.html http://acl.digimat.in/nptel/courses/video/109104109/L18.html http://acl.digimat.in/nptel/courses/video/109104109/L19.html

SEMESTER IV

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF24C07	ADVANCED FOOD PROCESSING AND FOOD PRESERVATION	THEORY	73	2	-	3

Preamble

- To enable the students to understand the role of food preservation and its significance, acquire knowledge about preservation of food by drying, use of high and low temperature and learn the mode of irradiation, food preservatives and recent trends in preservative technology

Prerequisite

- Basic Knowledge on food science

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts of preservation and processing	K1,K2
CLO2	Identify the different treatment methods employed in processing of food	K2,K3
CLO3	Analyze the different methods of preservation using low temperature, high temperature and drying	K3
CLO4	Apply the recent techniques and advancements in processing and preservation	K2,K3

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	M	M	M	M
CLO2	S	S	M	M	M	M
CLO3	S	S	M	M	M	M
CLO4	S	S	M	M	M	M

S - Strong; M-Medium

Syllabus**UNIT-I Basic principles of food processing and preservation****14 Hours**

Food preservation - Need, importance, principles and methods. Natural preservatives and chemical preservatives. Food Additives and Bio preservatives; Perishable and nonperishable foods.; Food deterioration- causes.

Water activity - definition and factors affecting water activity in food and its significance in food preservation, Concept of shelf life

Food processing – Basic and Advanced Processing Methods-

Unit II Preservation by drying and high temperature**16 Hours**

Drying- Theory and Mechanism, drying characteristics of materials, preliminary processing, Sun drying vs dehydration; Driers - Air convection driers and types, Drum /Roller Drier, Vacuum drier, Belt drier, Tunnel drier, Spray drier, Rotary drier, Fluidized bed drier, Solar Hybrid Drier. Osmotic dehydration - principle, rehydration and dehydration ratio.

Use of high temperature- principle; Conventional methods: Blanching, Pasteurization, Sterilization, Canning; Advanced methods: Ohmic heating, Microwave heating, Infrared heating.

Unit III Preservation by low temperature**16 Hours**

Freezing and Refrigeration: Introduction to refrigeration, cold storage and freezing, definition, principle of freezing, freezing curve, changes occurring during freezing, Methods of freezing- Slow and Quick freezing, Cryogenic freezing, Dehydro freezing, Freeze drying. Thawing.

Zero energy cooling chamber (ZECC), Cellar storage

Unit IV Non Thermal Processing**16 Hours**

Introduction to recent preservation techniques - irradiation, pulsed electric field, high pressure technology, Ultrasound, Radio Frequency Pasteurization, Cold plasma, Ozone Technology, Hurdle technology

UNIT-V Recent Advances in Food Processing**11 Hours**

Classification of Food according to processing - Unprocessed or minimally processed foods, Processed culinary ingredients: Processed foods, Ultra-processed foods (UPFs). Real foods vs Processed foods and Ultra-processed foods.

Food Concentration- purpose, methods of concentration, changes during concentration, Intermediate moisture foods (IMF); Plant based meat alternatives; 3D Food Printing; Artificial Intelligence (AI) in predictive shelf-life modeling; Role of edible coatings and Nanotechnology

Text Book

S.No.	Authors	Title	Publishers	Year and Edition
1	William C Frazier & Dennis C Westhoff	Food Microbiology	MedTech Science Press	2024 and 6 th edn.
2	Ramaswamy, H. S., and Marcotte, M.	Food Processing: Principles and Applications	CRC Press	2022 and 5 th edn.
3	Norman W Desrosier James N Desrosier	The Technology of Food Preservation	Scientific International	2018 and 4 th edn. (Reprint)
4	Fellows, P. J.	Food Processing Technology: Principles and Practice	Woodhead Publishing	2023 and 5 th edn.

Books for Reference

S. No	Authors	Title	Publishers	Year and Edition
1	Stewart GP and Amerine MA	Introduction to Food Science and Technology	Elsevier	2012 and 2 nd edn.
2	Vickie AV	Essentials of Food Science	Springer Nature	2021 and 5 th edn.
3	Chris van Tulleken	Ultra-Processed People: The Science Behind Food That Isn't Food	W. W. Norton & Company	2023 and 1 st edn.

Pedagogy

- Lecture by chalk and talk, power point presentation, group learning, group discussion, assignment, quiz, peer learning, student seminar.

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF23CP4	FOOD PRESERVATION PRACTICAL	CORE	-	-	45	3

Preamble

- To enable the students to gain knowledge on the different methods of freezing and drying of vegetables, learn to process fruits and vegetables into jam, sauce, syrups and squashes, qualitatively determine the presence of food preservatives and understand the different techniques of fruit and vegetable processing in an industry

Prerequisite

- Basic Knowledge on food processing and food components

Course Learning Outcomes

- On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the methods and principles involved	K1
CLO2	Explain the underlying scientific principles, preservation mechanisms and techniques.	K2
CLO3	Apply standard laboratory and industrial techniques to prepare jams, jellies, marmalades, syrups, squashes, pickles, sauces, and chutneys following hygiene and quality standards.	K3
CLO3	Analyze the quality, texture, taste, and shelf-life of preserved food products	K4

Mapping with Programme Learning Outcomes

CLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6
CLO1	S	S	S	S	S	S
CLO2	S	S	S	S	S	S
CLO3	S	S	S	S	S	S
CLO4	S	S	S	S	S	S

S;Strong

Syllabus

1. Drying of fruits and vegetables
2. Freezing of fruits and vegetables
3. Preparation of jam
4. Preparation of jelly
5. Preparation of marmalade
6. Preparation of syrups
7. Preparation of squashes
8. Preparation of pickles- salt based, oil based, vinegar based.
9. Preparation of sauces/ketchup and chutneys and chutney powders
10. Industrial visit to Food preservation and processing unit

Text Book

S. No	Authors	Title	Publishers	Year and Edition
1	Girdhari Lal, G. S. Siddappa, G. L. Tandon,	Preservation of Fruits & Vegetables	Indian Council of Agricultural Research, Publications	2022 and 10 th edn.
2	Shirley J. Vangrade, Margy Woodburn	Food preservation and safety, principles and practice	Surabhi publications	2005 and 3 rd edn.
3	Manoranjan kalia, Sangita sood	Food preservation and processing	Kalyani Publishers	2020 and 2 nd edn. (Reprint)

Books for Reference

S. No	Authors	Title	Publishers	Year and Edition
1	P. Fellows	Food Processing Technology: Principles and Practice	CRC Press,	2022 and 4 th edn.
2	Shafiur Rahman M.	Handbook of Food Preservation	CRC Press	2020 and 3 rd edn.
3	Ranganna S.	Handbook of Analysis and Quality Control for and Vegetable Products.	Tata-McGraw-Hill.	2017 and 7 th edn.

Pedagogy

- Demonstration and hands on practical

Course Designers

1. Dr.N.Deepa Sathish
2. Ms. Santhiya R

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF24C08	PRINCIPLES OF MARKETING	THEORY	58	2	-	3

Preamble

- To understand the concepts of marketing in the business world.
- To assess the importance of marketing mix, market segmentation, branding, pricing, product mix, product life cycle.
- To analyze and select marketing channels of distribution in food business
- To adopt the latest marketing practices in modern business.
- To understand the importance of marketing analytics.

Prerequisite

- Basic understanding of business concepts and consumer behavior, with interest in marketing practices and trends.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basic concepts of marketing, buyer behaviour, branding, packaging, channel distribution and ethics in marketing	K1
CLO2	Recognize the importance of market segmentation, branding, pricing, product mix, product life cycle and its implications.	K2
CLO3	Apply the concepts of marketing mix, market segmentation, marketing channels, branding, pricing, packaging, labelling according to the recent trends.	K3
CLO4	Analyze the marketing mix, market segmentation, market channels and adopt latest E-marketing tools to enhance marketing decisions with paramount importance towards adopting ethics in marketing for the food products.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	L	M	S
CLO2	M	S	L	M	M
CLO3	S	S	M	S	M
CLO4	S	S	M	S	S

S-Strong; M-Medium; L-Low

PRINCIPLES OF MARKETING - BF24C08 - 58 Hrs

Unit I

(12 Hrs)

Introduction to Marketing: Meaning and Nature of Marketing - Market – Objectives and Characteristics- Marketing Functions- Marketing Management- Elements of Marketing- mix - Ethical Marketing and Strategic Insights from Indian Knowledge System- Consumer Behaviour- Factors influencing Buyer Behaviour. Customer Relationship Management: Definition-Need, Importance & Types.

Unit II

(12 Hrs)

Market segmentation –Effective market segmentation strategy -Product: Definition, Characteristics, product mix - Product Classification- Product Strategies- Product Life Cycle - New Product Development. Pricing: Pricing Objectives- Pricing Methods.

Unit III

(12 Hrs)

Branding and Packaging - Brand identity- Brand image – Brand Loyalty -Types of brands, Brand vs Branding. Trade Mark. Packaging -Definition and functions of food packaging– Methods and materials used for packaging - Safety considerations in food packaging – Smart Packaging - Labelling: Purpose and function of Labelling.

Unit IV

(11 Hrs)

Channel of Distribution: Channel Objectives-Channel Functions- Types of Channel-Channel Selection- Factors affecting Selection of Marketing Channel for the food industry -Marketing channel decisions. AI in the Channel of Distribution.

Unit V

(11 Hrs)

Latest trend in marketing - E Marketing- Tele Marketing- Social media marketing- green marketing -Marketing Technology (MarTech) Trends: Agentic AI - AI-Driven Personalisation - Extended Reality (XR) in Retail - Quantum Computing in Marketing Analytics - Voice Search Optimisation - AI-Powered Chatbots. Marketing Analytics, Content Marketing, AR & VR Intervention in Food Product Marketing, Seasonal Marketing for Food Products, Rural and Agricultural Marketing in India - Marketing Ethics in the food industry.

Text Book

S.No.	Authors	Title	Publishers	Year and Edition
1.	Philip Kotler and Kevin Lane Keller	Marketing Management	Pearson Education, New Delhi.	2025 and 17 th edn
2.	Kotler-i & Mukharjee	Essentials of Modern Marketing	Vikas Publishing House	2024 and 1 st edn
3.	C.N.Sontaki	Marketing Management	Kalyani Publishers	2022 and 7 th edn

Books for Reference

S.No.	Author(s)	Title	Publishers	Year and Edition
1.	Tapan K Panda	Marketing Management	Taxmann	2022 and 3 rd edn
2.	Seema Gupta	Digital Marketing	McGraw Hill	2022 and 3 rd edn
3.	Ramasamy and S. Namakumari	Marketing Management	Saga Publication India Pvt. Ltd: sixth edition	2018 and 6 th edn
4.	Rajan Nair	Marketing Management	Sultan Chand and Sons New.	2018 & 1 st edn

Pedagogy

- Chalk & Talk, lecture, Seminar, Power Point presentation, Group Discussion and Case Study.

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF24A04	BAKERY AND CONFECTIONERY TECHNOLOGY	THEORY	73	2	-	3

Preamble

- To enable the students to understand the rheological characteristics of the dough, explain the role of each ingredient and processes involved in baking technology, learn about manufacturing of confectionery products

Prerequisite

- Basic Knowledge on food chemistry and ingredients functionality

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	CLO Statement	Knowledge Level
CLO1	Understand the role of ingredients and its characteristics to design, formulate and prepare bakery products	K1
CLO2	Judge appropriate preparation, baking and decorating of bakery products	K2
CLO3	Demonstrate the safe operation & maintenance of baking equipments	K3
CLO4	Analyze the methods of making bread, biscuits and cookies and analyze faults and corrective measures and to describe and plan to set up a bakery unit	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	S	S
CLO2	S	S	S	M	S	S
CLO3	S	S	S	M	S	S
CLO4	S	S	S	M	M	M

S - Strong; M-Medium

Bakery and Confectionery Technology (BF24A04)
73Hours

Syllabus

Unit I Classification of Bakery Products

12 Hours

Introduction to Indigenous and Modern Baking techniques, Evolution of Baking methods, Bakery layout and design. Types of wheat, baking principles - Role of ingredients and its chemistry, Dough rheology, Classification of bakery products – Biscuits, Cookies, Bread, Cakes, Pastry products – puff, pancake, donuts, pie, macaroon, muffins and truffle. Equipment and tools used for manufacturing of bakery products.

Demonstration of pastry products

Unit II Manufacturing of Bread and Cake

16 Hours

Bread making methods- Straight dough/bulk fermentation, Sponge and dough, Activated dough development, Chorleywood bread process, No time process. Characteristics of good bread- Internal and external characteristics, Role of yeast, bread spoilage and remedies. Cake-types of cakes - role of ingredients - cake mixing methods – Preparation. Fancy cakes and preparation. Icing. Cake faults and remedies.

Demonstration of breads and cakes

Unit III Manufacturing of Biscuit and Cookies

16 Hours

Biscuit making - Ingredients and their functions. Types of dough – Developed dough, short dough, semi-sweet and enzyme modified dough and batters. Production of biscuits and cookies. Selection and preparation of mold; Cookies:- classification, Quality control for biscuits and cookies; faults and causes.

Demonstration of biscuits and cookies

Unit IV Confectionery and its types

16 Hours

Introduction – types of confectionery, importance of sugar confectionery. Ingredients used. Manufacturing of Caramel, Toffee and Fudge, Nougat, Praline, hard boiled candies, chewing gums, lozenges, marshmallows, fruit candy. Aerated confectionery- Methods. Equipment used. Confectionery product quality parameters, faults and corrective measures (compositional effects, prevention of re-crystallization, stickiness, etc).

Traditional confectioneries - Groundnut chikki, rasgulla, milk peda, soan papdi, etc.

Demonstration of confectionaries

Unit V Manufacturing of Chocolates

13 Hours

Cocoa products and its uses in confectionery; **Types of chocolates**—milk chocolate, white chocolate, dark chocolate, unsweetened chocolate, bittersweet chocolate, semi – sweet chocolate and equipment used.

Demonstration of chocolates

Text Book

S.No	Authors	Title	Publishers	Year and Edition
1	Wang, H., and Xu, Y.	Handbook of Bakery and Confectionery Technology	CRC Press	2023 and 2 nd edn.
2	Galli, M., and Rosell, C. M.	Bakery Products: Science and Technology	Wiley-Blackwell	2022 and 3 rd edn.
4	Ferenc A. Mohos	Confectionery and Chocolate Engineering: Principles and Applications	Wiley Blackwell	2010 and 2 nd edn.

Books for Reference

S.No	Authors	Title	Publishers	Year and Edition
1.	Lakshmi Jagarlamudi	Bakery and Confectionery Products: Processing, Quality Assessment, Packaging and Storage Techniques	CRC Press (Taylor & Francis)	2022 and 1 st edn.
2.	Anna Wirkijowska, Piotr Zarzycki, Agata Blicharz-Kania,	Functional Bakery Products: Technological, Chemical and Nutritional Modification	MDPI Books	2025 and 1 st edn.
3.	Nicola Lamb	Sift: The Elements of Great Baking	Ebury Press (UK)	2024 and 1 st edn.
4.	http://eacharya.inflibnet.ac.in/index.php/content/index/594515d68007bef81d3c4dfb			

SEMESTER V

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF24C09	FOOD BIOTECHNOLOGY	THEORY	73	2	-	3

Preamble

- To enable the students to gain knowledge on the principles of food biotechnology, understand the recent advances of biotechnology and its significance in food processing industry, gain insight on pre and probiotics; enzymes used in food processing and types of fermenters

Prerequisite

- Basic science knowledge including fundamentals of Biology, Chemistry, and Microbiology

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understanding the concepts of DNA and recombinant DNA technology	K1
CLO2	Acquiring knowledge on different types of probiotics, prebiotics, fermenters, enzymes and its application	K2
CLO3	Identifying the importance and health effects of food additives	K3
CLO4	Recognizing the concepts and significance of gene cloning and applying different applications of biotechnology in food processing and production	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	S	M	M
CLO2	S	S	S	S	M	M
CLO3	S	S	S	M	S	S
CLO4	S	S	S	M	S	S

S- Strong; M-Medium

Syllabus**UNIT I: Recombinant DNA Technology****16 Hours**

Introduction of recombinant DNA, DNA modifying enzymes: Restriction enzymes and other modifying enzymes, Cloning vectors, Steps in gene cloning, Application of rDNA technology in food processing GMOs - current guidelines for the production, labelling and traceability; trade related aspects.

UNIT II: Biotechnology in food Processing**13 Hours**

Biotechnological approaches – Role, its importance in food processing sector; Fermentation technology - Cereals, pulses, national and oriental foods, brewery - beer, wine, vinegar production, milk products (cheese, yoghurt), animal foods (meat and seafood products). Traditional food fermentation practices

UNIT III: Prebiotics and Probiotics**15 Hours**

Prebiotics - Definition, types of prebiotic, bifidogenic effects, health effects of prebiotics and probiotics, synbiotics. Bacterial food additives and dietary supplements.

Probiotics – Definition, potential benefits, Specific strains, advantages and disadvantages.

Bioactive peptides – Definition, Production, types & function

UNIT IV: Enzymes in Food Production**14 Hours**

Enzymes – Definition – Enzymes in Food production – Dairy, bread making, brewery, fish processing, fruit & vegetable & juice extraction, meat processing. Industrial production of enzymes

UNIT V: Fermenters**15 Hours**

Design of a Fermenter: Construction and working principle – Temperature controls, Aeration and agitation systems, Stirrer glands and bearings, Baffles, Valves and steam traps, Pressure-control valves.

Types of fermenters – batch and continuous, Airlift, Packed Bed, Fluidized Bed, Membrane, Bubble Column

Biosensors: Classification and application in food industry

Text Books

S. No	Authors	Title	Publishers	Year and Edition
1	H. J. Peppler, D. Perlman	Microbial Technology: Fermentation Technology.	Academic Press.	2018 and 2 nd Edn.
2	S.C. Bhatia.	Food Biotechnology	Springer	2019 and 2 nd Edn.
3	Kalidas Shetty and Dipayan Sarkar	Functional Foods and Biotechnology: Biotransformation and Analysis of Functional Foods and Ingredients	CRC Press	2020 and 1 st Edn.
4	Robert J. Whitehurst and Maarten van Oort	Enzymes in food Technology	Wiley - Blackwell	2010 and 1 st Edn.

Reference Books

S. No	Authors	Title	Publishers	Year and Edn
1	Chetan Sharma, Ajay Kumar, and Ramesh C. Ray.	Frontiers in Food Biotechnology	Elsevier	2023 and 1 st Edn
2	Celeste M. Todaro, Henry C. Vogel.	Fermentation and Biochemical Engineering Handbook.	William Andrew Press.	2022 and 2 nd Edn

Blended learning links:

S. No.	Unit	Topics	Links
1.	I	Recombinant DNA Technology	https://youtu.be/5ffl-0OYVQU?si=kX7RrE-d5I7tj4r
2.	II	Biotechnology in food Processing	https://youtu.be/NWdJQQP_zHM?si=1fQUQO1pibyD4usQ
3.	III	Prebiotics, Probiotics, Symbiotics & synbiotics	https://youtu.be/wYi0b5js2Fg?si=qqpEbG-HF32Gb_CZ
4.	IV	Enzymes in Food Production	https://youtu.be/577TUF51FAY?si=BUdJt-JUfyr4F1Bs
5.	V	Fermentors	https://youtu.be/azdVSr7DBlg?si=SjpaJteg7I80fCSc http://ecoursesonline.iasri.res.in/mod/page/view.php?id=51

Pedagogy

Blended learning, lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

Course Designers:

1. Dr.N.Deepa Sathish
2. Ms. Santhiya R
3. Dr.K.Sunitha Kumari

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF24C10	FOOD PRODUCT DEVELOPMENT	THEORY	58	2	-	3

Preamble

- To enable the students to understand the process of development of new food products, to learn and apply the various steps involved in the evaluation of a food product, learn the requirements of setting up a food processing unit

Prerequisite

- Basic understanding of Food Science, Marketing, and introductory concepts of Entrepreneurship

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Learn the trends and dimensions in food product development according to food consumption pattern	K1
CLO2	Acquire knowledge on the steps involved in food product testing and evaluation	K2
CLO3	Understand the techniques of setting up of a food processing unit and evaluating the behavior of market segment and end user	K3
CLO4	Apply the principles in food product development and design and develop entrepreneurial skills	K4

Mapping with Programme Learning Outcomes

CLOS	PLO1	PLO2	PLO 3	PL O4	PLO 5	PLO 6
CLO1	S	S	S	S	S	S
CLO2	S	S	S	S	S	M
CLO3	S	S	S	S	S	S
CLO4	S	S	S	S	M	S

S - Strong, M-Medium

Syllabus**Unit I- Food consumption pattern and Consumer behavior 10 Hours**

Trends in Food Consumption pattern. Economical, Psychological and Sociological Dimension of Food Consumption patterns. Trends in Social Change as a Base for New Product Development. Need of new product development

Consumer behaviour- Meaning, Market Research, understanding consumer behavior, Models of consumer behavior, Determinants and Factors influencing of Consumer Behavior: consumer and food relationship, Consumer satisfaction

Unit II New Product Development 11 Hours

Food Components, Types of Food Processing, Status of Food Processing Industry in India and Scope of Growth in Future

Defining new food products, classification and characterization of New Food Products. Principles and Purpose and Steps in New Product Development, Product Design and Specifications.

Unit III Standardization and Evaluation of New Product 12 Hours

Standardization, Portion size, Portion Control, Quantity Cooking Evaluation of new product - Nutritional, Sensory, (types of sensory tests – Analytical tests, Affective tests (preference and Acceptance tests) Development of score card), Shelf life, Cost calculation and SWOT Analysis

Unit IV Different types of foods in Market and Packaging 14 Hours

Traditional Foods, Weaning Foods, Convenience Foods, RTE, RTS, Extruded foods, IMF Foods, Speciality Products, Nutritional Supplements, Functional Foods, Nutraceuticals and Designer Foods, Sports Foods, Foods for Defence and Space foods. Suitable Packaging Materials for different Foods-Types, Selection evaluation

Unit V Funding Agencies, Marketing and Legal specifications 11 Hours

Institutional Support (Training and Finance) for Entrepreneurship Development. Financial Institutions (Central and State Government) banks/Funding Agencies; Marketing Strategies, and Product sales and Advertising Methods. Product License, Intellectual Property Rights (IPR), Copy Right, Patent and Trademark: - Definition, types and registration.

Text Books

S.No	Authors	Title	Publishers	Year and Edition
1.	Frewer, L. and Van Trijp, H	Understanding consumers of food products	CRC Press	2007 and 1 st Edn
2.	Norman. N. Potter & Joseph. H. Hotchkiss	Food Science	CBS Publishers	2012 and 5 th Edn
3.	Fuller, G.W.	Food, consumers and the food industry catastrophe or opportunity?	CRC Press	2001 and 1 st Edn
4.	Natarajan S	Fundamentals of Packaging Technology	PHI	2014 and 2 nd Edn

Name of the course	Food Product Development
Name of the Faculty	Ms. Santhiya R

Reference Books

S.No	Authors	Title	Publishers	Year and Edition
1.	S Roday	Food Hygiene and Sanitation	Tata Mc. Graw Hill	2017 and 2 nd Edn
2.	Michael H Morris	Corporate Entrepreneurship and Innovation in Corporations	CENGAGE Learning	2010 and 3 rd Edn
3.	Jerry Katz	Entrepreneurship Small Business	Tata McGraw-Hill Publishing Company Ltd	2007 and 3 rd Edn

Course Designers:

1. Dr.N.Deepa Sathish
2. Ms. Santhiya R

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF23E01	CONVENIENCE FOODS	THEORY	58	2	-	3

Preamble

- To enable the students to learn about the convenience food market, gain knowledge about convenience food and snack food, familiarize with the toxicological hazards and safety regulations

Prerequisite

- To enable the students to learn about the convenience food market, gain knowledge about convenience food and snack food, familiarize with the toxicological hazards and safety regulations

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the growth and trends of convenience foods	K1
CLO2	Acquire knowledge about processing of different types of convenience foods	K2
CLO3	Analyze the different equipment used in the snack food industry	K3
CLO4	Analyze the microbial, toxicological aspects and safety of convenience foods	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	S	S
CLO2	S	S	S	M	S	S
CLO3	S	S	S	M	S	S
CLO4	S	S	S	M	M	M

S - Strong; M-Medium

ELECTIVE I CONVENIENCE FOODS (BF23E01)

58 Hours

Syllabus

Unit I: Market trends of convenience foods

11 Hours

History, Definition, need for convenience and snack foods, classification of convenience foods, types of snack food having higher market value, consumption pattern of processed foods, pros and cons of convenience food industry, growth trends, retail market prospects of Indian convenience foods.

Unit II Convenience and Snack foods

13 Hours

Technology for breakfast cereals (RTE) – maize, rice, sorghum, ragi and legume based – roasted, toasted, puffed, popped, flaked; types and manufacturing of ready-to cook foods (RTC)

Snack Bars, grains & nuts – salted, spiced, sweetened, Batter-Based and Dough-Based Products, Fruit and vegetable based Snacks - Potato Chips and French Fries, Papad and Namkin, Banana Chips, fruit bars other ready to eat beverages

Unit III Equipment used in convenience food products

12 Hours

Equipment used in manufacturing of RTC and RTE, Heat transfer mechanism, specialized equipment for frying, Baking-Ovens, Electronic Ovens, Driers, Toasting ovens, Specialized Equipment for Popcorn processing, Poppers, Sifters, Coaters , other equipment like Peelers, Slicers, dicers, graders etc., AI based 3D printing in convenience food manufacturing.

Unit IV Extruded Products and it's Technology

12 Hours

Extrusion: definition, principles and types. Introduction to extruders, uses of extruders in the food industry, Classification of extruder, components and functions of an extruder; Noodle production, Cereal based pasta production and tortilla manufacture, Use of extruders in the snack processing industry, pre and post preparation of extruded foods; extruded baked type snacks, extruded fried type snacks. Modification of nutritional & functional properties of food components during extrusion.

Unit V Microbial and toxicological safety of convenience foods

10 Hours

Food – borne pathogens in convenience foods and its Microbial safety, AI sensors for microbial detection. Toxicological hazards- Acrylamide in ready to eat foods, furan in processed foods, biogenicamines and disinfection by products, Safety regulations.

Text Books

S.No	Authors	Title	Publishers	Year and Edition
1.	Gordon Young and Dennis Forte	Food and Feed Extrusion Technology: An Applied Approach to Extrusion Theory	Food Industry Engineering	2021 and 2 nd Edn.
2.	Hari Niwas Mishra, Pradyuman Kumar and Ajay Singh	Recent Advances in Ready-to-Eat Food Technology	CRC Press	2024 and 1 st Edn.
3.	Sergio O. Serna-Saldivar	Snack Foods: Processing, Innovation, and Nutritional Aspects	CRC Press	2022 and 1 st Edn.
4.	Dr. Prerana Shere, Dr. Rinku Agrawal	Extrusion Technology: Transforming Food Processing	B P International	2024 and 1 st Edn.

Reference Books

S.No	Authors	Title	Publishers	Year and Edition
1.	Alagi Parvarti	Convenience Foods Technology	Self Publisher	2023 and 1 st Edn.
2.	Suvendu Bhattacharya	Snack Foods: Processing and Technology	Academic Press Inc	2022 and 1 st Edn.

E- Resources

S. No.	Unit	Topics	Links
1.	I	Classification of convenience foods	https://youtu.be/Y61csMI0h54?si=v8SJ4Khnip_8cXxG
2.	II	Healthy breakfast cereals	https://youtu.be/X3goPrQKE20?si=JDLY7u71P4XbjX0e
3.	III	3D Printed Foods manufacturing	https://youtu.be/uqqB5aTE5kM?si=f7BEEmsR0_Y3OB7
4.	IV	Extrusion process	https://youtu.be/sod2fxPAS7I?si=5bKU9KQgnrAkNG8t
5.	V	Food borne pathogens	https://youtu.be/-lcad4oaR9w?si=a8hr-2A2qqVP2NYw
https://shodhganga.inflibnet.ac.in/bitstream/10603/101927/11/11_chapter%203.pdf https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/126105015/lec23.pdf https://www.globalmediajournal.com/open-access/role-relevance-and-significance-of-convenience-food-a-literature-review-approach.pdf			

Pedagogy

- Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

Course Designers:

1. Dr.N.Deepa Sathish
2. Ms. M.Priyanga

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF24E02	FOOD ENTREPRENEURSHIP	THEORY	58	2	-	3

Preamble

- To enable the students to acquire knowledge about importance of food business, aware of various ventures safety, familiarize the methods of developing an entrepreneurial setup

Prerequisite

- Basic understanding of business fundamentals and Food Sector.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understanding the different types of entrepreneurs, objectives, ventures	K1
CLO2	To gain knowledge about the systems and organization's involved in entrepreneurial setup	K2
CLO3	Recognize the location significance and the organizations in entrepreneurial development	K3
CLO4	Understand about the market potential, financial, demand and feasibility analysis	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	S	S
CLO2	S	S	S	M	S	S
CLO3	S	S	S	M	S	S
CLO4	S	S	S	M	M	M

S- Strong; M-Medium

FOOD ENTREPRENEURSHIP (BF24E02)

58 hours

Syllabus

Unit I Introduction to Food Entrepreneurship

12 Hours

Entrepreneurship: Meaning, definition and concepts, characteristics, functions, entrepreneurial traits. Types of entrepreneurs - Women entrepreneurship, significance, problems
Food Entrepreneurship, role of food entrepreneur in economic development, Challenges and factors affecting food entrepreneurial growth.

Unit II Entrepreneurship Development Program

12 Hours

Objectives, Steps, Need for training- target group- Contents of the training program. Special Agencies for Entrepreneurial Development and Training

Unit III Entrepreneurial Plan

12 Hours

Project Meaning, Features, Classification, Project identification, Stages in project identification, Project Life Cycle, Project formulation- Elements, Feasibility Analysis- Economic, Marketing, Financial and Technical, Demand Analysis, Market Potential Measurement, use of artificial intelligence in market research.

Unit IV: Setting up of micro small and medium food enterprises

11 Hours

Setting up of micro small and medium enterprises, Selection of factory location, location significance, Green channel, Bridge capital, Seed capital assistance, Margin money scheme, Causes, Remedies.

Unit V: Business Development and Opportunities in Food Industry

11 Hours

Emerging trends in food sector, Start-up ideas in food processing, Identification of market needs - Market survey and consumer preference analysis, Demand-based and resource-based opportunities, Transition from lab-scale to pilot-scale and commercial production. Challenges in scaling up (quality, cost, shelf life, packaging)

Text Books

S.No	Authors	Title	Publishers	Year and Edition
1.	K P Sudheer, V. Indira	Entrepreneurship Development in Food Processing	CRC Press	2021 and 1 st Edn.
2.	Dr Bhaskar Bora	Culinary Entrepreneurship: Starting and Managing Food Businesses	IP publishers	2024 and 1 st Edn.

Reference Books

S.No	Authors	Title	Publishers	Year and Edition
1.	Michael Politz	The Food and Beverage Magazine Guide to Restaurant Success-The Proven Process for Starting Any Restaurant Business From Scratch to Success	Wiley	2020 and 1 st Edn.
2.	Douglas Raggio and Heidi Scott	So You Wanna: Start a Food or Beverage Business	<u>Simon And Schuster Group USA</u>	2022 and 23 rd Edn.

E- Resources

S. No.	Unit	Topics	Links
1.	I	<u>How to Become a Food Entrepreneur</u>	https://youtu.be/2gY2Svhjbfq?si=QU6DbtP6iJ9rWQpw
2.	II	<u>Entrepreneurial Development Programme</u>	https://youtu.be/HGds1_uViU0?si=r3vRpbVyHgk6XrzI
3.	III	Artificial intelligence in market research	https://youtu.be/1PghNoTfTaI?si=bf78iCk7e57T_xzx
4.	IV	<u>Micro, Small & Medium Enterprises</u>	https://youtu.be/ESWj2bDLZJo?si=nYZoUkk1DsUVanTl
5.	V	<u>Role of institutions for financial support to entrepreneurs</u>	https://youtu.be/_bN9plcE1Jw?si=2cxSS9T4ZI5NOI__

Pedagogy

- Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar

Course Designers:

1. Dr.N.Deepa Sathish
2. Ms. Santhiya R

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF23CP5	FOOD PROCESSING & FOOD BIOPROCESSING PRACTICAL	PRACTICAL	-	-	45	2

Preamble

- To enable the students to acquire practical knowledge on characteristics of food, study the structure and physical properties of food materials, understand the sensory parameters of various food products, analyze the qualitative parameters of microorganisms in food products

Prerequisite

- Basic knowledge of Food Microbiology, Biochemistry, and fundamental concepts of Fermentation and food analysis techniques.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Describe the characteristics and determine the physical properties of foods	K1
CLO2	Understand the quality characteristics of food products upon processing	K2
CLO3	Gain knowledge on manufacturing and sensory evaluation of bioprocessed foods and access the characteristics of microorganisms	K3
CLO4	Apply the processing techniques in developing bioprocessed foods	K4

Mapping with Programme Learning Outcomes

CLOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6
CLO1	S	S	S	S	S	S
CLO2	S	S	S	S	S	S
CLO3	S	S	S	S	S	S
CLO4	S	S	S	S	S	S

S- Strong

CORE PRACTICAL- V

Food Processing & Food Bioprocessing practical (BF23CP5)

Total Hours: 45

1. Preparation & sensory analysis of wine from grapes
2. Experiments on rehydration characteristics of dried foods.
3. Preparation & Sensory analysis of probiotic dairy products:
 - a) Probiotic yoghurt
 - b) Kefir
 - c) Bulgarian buttermilk
 - d) Cheese
4. Studies on Minimal Processing of fruits and vegetables.
5. Preparation and calculation of overrun percentage of ice cream.
6. Experiment on osmotic dehydration characteristic of food materials (fruit preserves)
7. Studies on Textural Profile Analysis of Baked goods.
8. Preparation & sensory analysis oriental fermented products: -
 - a) Tempeh
 - b) Tofu
9. Anatomy of Fermentor, cleaning of Fermentor, Assembling and final pre-sterilization of Fermentor, Anatomy and calibration of fermentor electrodes / probes, Post – sterilization procedures, Aseptic techniques in inoculation of fermentors (Demonstration)
10. Qualitative assessment of Extracellular activities of microorganisms- amylase, gelatinase, lipase, caseinase (Demonstration)
11. Isolation of Plasmid DNA and Analysis by Agarose Gel Electrophoresis (Demonstration)
12. Estimation of DNA (DPA method) & Estimation of RNA (Orcinol method) from food product (Demonstration)

Text Books

S. No	Authors	Title	Publishers	Year and Edition
1	P. J. Fellows	Food Processing Technology: Principles and Practice	Woodhead Publishing	2017 & 4 th Edn
2	S. Suzanne Nielsen	Food Analysis	Springer	2017 & 5 th Edn
3	P. F. Stanbury, A. Whitaker	Principles of Food Fermentation	CRC Press	2017 & 3 rd Edn

Reference Books

S. No	Authors	Title	Publishers	Year and Edition
1	H. T. Lawless, H. Heymann	Sensory Evaluation of Food: Principles and Practices	Springer	2010 & 2 nd Edn
2	U. Satyanarayana	Biotechnology: Fundamentals and Applications	Books and Allied Pvt Ltd	2017 & 1 st Edn

Course Designers:

1. Dr.N.Deepa Sathish
2. Ms. Santhiya R

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF24CP6	FOOD PRODUCT DEVELOPMENT AND MARKETING PRACTICAL	PRACTICAL	-	-	60	2

Preamble

- To enable the students to identify suitable food groups for developing products, understand the steps involved new food product development with standardization, learn marketing techniques and launch the developed products

Prerequisite

- Basic understanding of Food Product Development and fundamentals of Food Processing

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Categorize appropriate food groups for the development of innovative food products	K1
CLO2	Demonstrate the process of food product development, from ideation and formulation to preparation and sensory evaluation	K2
CLO3	Apply principles of food packaging, labeling, and cost analysis to enhance shelf life, appeal, and regulatory compliance.	K3
CLO4	Design and implement a marketing strategy for a developed food product, including branding, promotion, and pricing.	K4

Mapping with Programme Learning Outcomes

CLOS	PLO1	PL O2	PLO 3	PL O4	PLO 5	PLO 6
CLO1	S	S	S	S	S	S
CLO2	S	S	S	S	S	M
CLO3	S	S	S	S	S	S
CLO4	S	S	S	S	M	S

S - Strong, M-Medium

Syllabus**A. Product Development and Standardization**

1. Cereal Based Foods
2. Pulse Based Foods
3. Fruit Juices, Squash, Jams and Preserves
4. Pickles, Ketchup, Sauce
5. Weaning Foods
6. Health Foods and Nutritional Supplements
7. Convenience foods, RTS and RTE foods
8. Innovative Food Product Development

B. Marketing of a product

1. Conducting market research and consumer behavior of a food product
2. Selection of packaging material, cost calculation and marketing
3. Designing a label for the developed product using advanced tools
4. Presentation of report

Reference Books

S.No	Authors	Title	Publisher	Year and Edition
1	Wing-Fu Lai (Ed.)	Materials Science and Engineering in Food Product Development	Wiley	2023 and 1st Edition
2	Hari Niwas Mishra, Pradyuman Kumar & Ajay Singh	Recent Advances in Ready-to-Eat Food Technology	CRC Press	2024 and 1st Edition
3	Sara R. Jaeger & Danica V. P. Delarue	A Handbook for Sensory and Consumer-Driven New Product Development	Woodhead Publishing (Elsevier)	2017 and 1st Edition
4	Megh R. Goyal, N. Veena & Ritesh B. Watharkar (Eds.)	Advances in Food Process Engineering: Novel Processing, Preservation, and Decontamination of Foods	Apple Academic Press	2023 and 1st Edition
5	Kshirod Kumar Dash & Mudassir Ahmad Malik (Eds.)	Emerging Techniques in Food Processing	New India Publishing Agency	2022 and 1st Edition

Course Designers:

Dr. N. Deepa Sathish

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF23SBP1	FOOD ANALYSIS PRACTICAL	PRACTICAL	-	-	41	3

Preamble

- To enable the students to learn to determine the quality parameters, gain knowledge in determining specific gravity, acidity of food samples, understand the estimation of nutrients in food

Prerequisite

- Fundamental laboratory techniques and instrumentation

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Estimate bulk density and specific gravity of food samples	K1
CLO2	Carry out experiments to determine nutrient content	K2
CLO3	Estimate moisture and ash content in foods	K3
CLO4	Apply different chemical test to find the salt and acidity content in Foods	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6
CLO1	S	S	S	S	S	S
CLO2	S	S	S	S	S	S
CLO3	S	S	S	S	S	S
CLO4	S	S	S	S	S	S

S- Strong

SKILL BASED SUBJECT – Food Analysis Practical (BF23SBP1)

Total hours: 45

1. Determination of pH of food samples using pH meter
2. Determination of moisture content
3. Determination of total ash in food samples.
4. Estimation of vitamin A in food samples.
5. Estimation of Ascorbic acid in food samples.
6. Estimation of calcium in food samples
7. Estimation of iron
8. Estimation of phosphorus
9. Determination of total phenols
10. Determination of total antioxidant capacity
11. Hands on Training/Short term course/Certificate course in Institution/Industry

Text Books

S.No	Authors	Title	Publishers	Year and Edition
1.	A.Y.Sathe`	A first course in food Analysis	New Age International Publishers	2016 and 2 nd Edn
2.	Dr. Geetha Swaminathan Ms. Mary George	Laboratory Chemical Methods in Food Analysis	Margham Publishers	2002 and 1 st Edn
3.	Kirk, RS and Sawyer, R.	Pearson's Chemical Analysis of Foods.	Longman Scientific and Technical	2011 and 9 th Edn
4.	S. Suzzane Neilsen	Introduction to the chemical analysis of foods	CBS	2010 and 2 nd Edn

Reference Books

S.N o.	Authors	Title	Publishers	Year and Edition
1.	Pomrenz Y & Meloan CE	Food Analysis- Theory and Practice.	CBS	2007 and 3 rd Edn
2.	Food safety and standards Authority of India, Ministry of health and family welfare	FSSAI Manual of methods for analysis of foods	Government of India	2020 and 2 nd Edn.
3.	David T Plummer	An Introduction to Practical Biochemistry	Tata McGraw Hill	2019 and 4 th Edn.

E References <https://nptel.ac.in/content/storage2/courses/122101001/downloads/le c-38.pdf>
<http://www.egyankosh.ac.in/bitstream/123456789/15897/1/Experiment-12.p>

Course Designers

1. Dr.N.Deepa Sathish
2. Ms Santhiya R

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF23AC1	ENVIRONMENTAL ISSUES IN FOOD INDUSTRY	THEORY	-	-	-	5*

Preamble

- To enable the students to understand the generation of waste from different food processing industries, acquire knowledge on air quality aspects, waste management and effluent treatment, understand the utilization of by products from food industry

Prerequisite

- Basic knowledge of Environmental Science and Food Processing

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CO Statement	Knowledge Level
CLO1	Understand about the various environmental issues related to food Industry	K1
CLO2	Perceive the air quality parameters required in a food industry setup	K2
CLO3	Summarize the methods of used in treatment of food industry waste and waste water treatment	K3
CLO4	Recognize the methods of utilizing wastes to make value added products	K4

Mapping with Programme Learning Outcomes

CLOS	PLO 1	PLO 2	PLO 3	PL O4	PLO 5	PLO 6
CLO1	S	S	S	S	S	S
CLO2	S	S	S	S	S	M
CLO3	S	S	S	S	S	S
CLO4	S	S	S	S	M	S

S- Strong; M- Medium

ALC I Environmental Issues in Food Industry (BF23AC1)

Syllabus

UNIT I Environmental issues of food industry

Introduction: Types of waste and magnitude of waste generation in different food processing industries; concept scope and maintenance of waste management and effluent treatment. Bioorganic pollution; microbial toxicants and pollutants, biodegradation. Environmental Protection Act and specification for effluent of different food industries.

UNIT II Air Quality Aspects

Control of Air Quality- Air duct design and room air distribution; air conditioning systems; air filtration systems, hygienic air quality for food industries, clean-room air conditioning; **Indoor Air Quality (IAQ)**; important pollutants of air; properties of particulate matter and air pollution control methods; legal requirements,

UNIT III Wastewater Treatment

Wastewater characteristics - Temperature, pH, Oxygen demands (BOD, COD, TOD), fat, oil and grease content, metal content, forms of phosphorous and Sulphur in waste waters, microbiology of waste, other ingredients like insecticide, pesticides and fungicides residues standards for disposal, measurement of organic content. Processing of wastewater treatment- Primary treatment, Secondary treatment, Operations in wastewater treatment- Physical unit, chemical unit, biological unit. **Advanced Treatment Methods-** membrane bioreactors (MBR), constructed wetlands and advanced oxidation processes (AOP)

UNIT IV Waste Disposal Management

Storage & Disposal of Waste-Types of waste generated; non-degradable & biodegradable wastes, biological treatment of food industry wastes- Biological composting, drying and incineration, Landfill Digester, Vermicomposting Pit, storage and disposal of liquid and gaseous waste; generation of biogas, extraction of specific components, use in animal feeds, zero emission plants; recovery & recycling of materials, pests & their control legal aspects related to storage and disposal

UNIT V Waste Utilization from food industries

Methods of utilizing wastes to make value added products- Characterization and utilization of by-products from cereals, oil processing, fruits & vegetable processing and sugar processing industries, Characterization and utilization of by-products from dairy, eggs, meat, fish and poultry processing industries.as case studies from each type of industries.

Text Books

S.No	Authors	Title	Publishers	Year and Edition
1.	H. Panda	The complete book on managing food processing industry waste	Asia Pacific Business Press Inc.	2020 and 2 nd Edn.
2.	Roday, S	Hygiene and Sanitation in Food Industry	Tata McGraw – Hill Publishing	2012 and 2 nd Edn.
3.	Moorthy, C.K.	Principles and Practices of Contamination Control and Clean rooms	Book Syndicate	2014 and 2 nd Edn.
4.	Potter, N. and Hotchkiss, J.H.	Food Science	CBS	2008 and 5 th Edn.

Reference Books

S.No	Authors	Title	Publishers	Year and Edition
1.	Wilson, C.L.	Microbial Food Contamination	CRC Press	2016 and 2 nd Edn.
2.	Hester, R.E. and Harrison, R.M.	Food Safety and Food Quality”, (Issues in Environmental Science and Technology),	RSC	2016 and 2 nd Edn.
3.	V.K. Joshi and S.K. Sharma	Food Processing Waste Management : Treatment and Utilization Technology	New India Publishing Agency	2011and 1 st Edn.

Pedagogy: Blended learning, lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

Course Designers:

1. Dr.N.Deepa Sathish
2. Ms. Santhiya R

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF23AC2	FOOD SUPPLY CHAIN	THEORY	-	-	-	5*

Preamble

- To enable the students to understand the importance of food supply chain, gain knowledge about online retailing in food logistics, know the application of supply chain management in various sectors

Prerequisite

- Basic knowledge of Supply Chain Management and Food Industry

Course Learning Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CLO1	Understand the fundamentals of supply chain management	K1
CLO2	Identify the ICT trends in agri-food logistics	K2
CLO3	Interpret the technology trends in International food supply chain system	K3
CLO4	Relate the demand and supply sustainability and understand the application of supply chain management in various sectors and the quality standards	K4

Mapping with Programme Learning Outcomes

CLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	S	S
CLO2	S	S	S	M	S	S
CLO3	S	S	S	M	S	S
CLO4	S	S	S	M	M	M

S- Strong; M-Medium

Food Supply Chain (BF23AC2)

Syllabus

Unit I Introduction to food supply chain

Food production, Entities in the agriculture supply chain, Agriculture and poverty alleviation, barriers to the development of the agri-industry. Future steps for the agriculture sector, **Agriculture 4.0:** Digital Transformation in Agriculture Food manufacturing - importance of food processing, Changing market conditions, Inventory management, procurement.

Unit II Logistics

The retail environment, Movement of food to the consumer, Online grocery retailing, Challenges to the future of food retailing, Purchasing models, Supplier segmentation, Sustainable procurement, Food Logistics- ICT future trends in agri-food logistics, Packaging in logistics, Temperature-controlled supply chains.

Unit III International food supply chain

Globalization vs. Local Sourcing. International food supply chains, Factors affecting the future of International food systems, Managing challenges in International food supply chains, global supply chain disruptions on food supply chains. Trends in supply chain relationships, Risk management and uncertainty. Technology trends in food supply chains- Traceability and use of technology.

Unit IV Challenges in food supply chain

Sustainable food supply chains, Measuring sustainability, Developing sustainability within food supply chains, Food hubs, Moving up the value chain, Factors affecting the future of the food supply chain, Balancing demand and supply sustainability.

Unit V Innovations and safety regulations

Food innovation-Product development in food supply chains-Innovations within food supply chains, Benefits and risks associated with FDI in retail sector of India. Food Manufacturing Restaurant and Hospitality Industry, Food supply chain regulations, safety and quality- Attributes to design food supply chains.

Text Books

S.No	Authors	Title	Publishers	Year and Edition
1	Chopra, S., and Meindl, P.	Supply Chain Management Strategy, Planning and Operation	Pearson Education	2023 and 7 th Edn
2	Pullman, M., and Wu, Z.	Food Supply Chain Management: Economic, Social and Environmental Perspectives	Taylor & Francis Group	2011 and 1 st Edn
3	Raghuram, G., and Rangaraj, N.	Logistics and Supply Chain Management: Cases and Concepts	Macmillan	2015 and 2 nd Edn
4	Simchi, L.D., Kaminski. P., and Simchi, L.E.	Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies	Irwin/McGraw- Hill	2014 and 3 rd Edn

Reference Books

S. No	Authors	Title	Publishers	Year and Edition
1	Janat, S.	Supply Chain Management: Text and Cases	Pearson Education	2015 and 2 nd Edn
2	Sanders N R	Supply chain management: A global perspective	Wiley publications	2016 and 2 nd Edn

Pedagogy

Blended learning, lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

Course Designers:

1. Dr.N.Deepa Sathish
2. Ms. Santhiya R

