PSGR
Krishnammal College for Women

College of excellence nirf 2023 – 4th rank

Autonomous and Affiliated to Bharathiar University Reaccredited with A++ grade by NAAC,

An ISO 9001: 2015 Certified Institution

Peelamedu, Coimbatore-641004

DEPARTMENT OF FOOD PROCESSING TECHNOLOGY AND MANAGEMENT

CHOICE BASED CREDIT SYSTEM (CBCS)

&

LEARNING OUTCOMES- BASED CURRICULUM FRAMEWORK (LOCF)

BACHELOR OF FOOD PROCESSING TECHNOLOGY AND MANAGEMENT

2023 – 2026 Batch

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DEPARTMENT OF FOOD PROCESSING TECHNOLOGY AND MANAGEMENT

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.

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B.SC FOOD PROCESSING TECHNOLOGY AND MANAGEMENT
CHOICE BASED CREDIT SYSTEM (CBCS) & LEARNING OUTCOME BASED CURRICULARFRAMEWORK (LOCF)

BACHELOR OF SCIENCE (B.Sc.) – Academic Year 2023-2024

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	TAM 2301A/ HIN2301A/ FRE2201A	Language T/H/F/ Paper I	Language	4	58	2	3	25	75	100	3
	II	ENG2301A	English paper I	English	4	58	2	3	25	75	100	3
	III	BF23C01	**Core I** Food Science	CC	4	58	2	3	25	75	100	4
	III	BF23C02	**Core II** Food Chemistry	CC	3	43	2	3	25	75	100	3
	III	BF23CP1	**Core Practical I** Food Science Practical	CC	3	45	-	3	25	75	100	3
	III	BF23C03	**Core III** Principles of Management	CC	5	73	2	3	25	75	100	4
	III	BF23A01	**Allied I** Principles of Nutrition	GE	5	73	2	3	25	75	100	4
	IV	NME23B1/ NME23A1/ NME23ES	Basic Tamil / Advanced Tamil / Introduction to Entrepreneurship	AEC	2	28	2	-	100	-	100	2
II	I	TAM2302A/ HIN2302A/ FRE2302A	Language T/H/F Paper – II	Language	4	58	2	3	25	75	100	3

	II	ENG2302A	English Paper II	English	4	58	2	3	25	75	100	3
	III	BF23C04	**Core IV** Food Microbiology	CC	4	58	2	3	25	75	100	3
	III	BF23CP2	**Core Practical II** Microbiology Practical	CC	3	45	-	3	25	25	50	3
	III	BF23C05	**Core V** Properties of Food	CC	5	73	2	3	25	75	100	3
	III	BF23A02	**Allied II** Nutritional Biochemistry	GE	5	73	2	3	25	75	100	3
	III	BF23AP2	**Allied Practical II** Biochemistry Practical	GE	3	45	-	3	15	35	50	3
	IV	NME23B2/ NME23A2	Basic Tamil II / Advanced Tamil II	AEC	-	-	-	-	100	-	100	Grade
	V	23PEAS1	Professional English ForLife Sciences	AEC	2	30	-	-	100	-	100	2
	VI	NM23GAW	**Foundation Course I** General Awareness	AEC	-	Self Study	-	-	100	-	100	Grade
	VI		Online Course	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	ENG2303A	English Paper III	E	4	58	2	3	25	75	100	3
	III	BF23C06	Unit Operations	CC	5	73	2	3	25	75	100	3
	III	BF23C07	Fundamentals of Food Processing	CC	4	58	2	3	25	75	100	3
	III	TH23A34/ BF23A03	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/ IV	III	CS23SBGP/ BF23SCE1	**GEN-AI/** **Coursera-** Fundamentals of Food Safety and Microbiology	SEC	3	44/ 45	1/-	-	100	-	100	3
III	IV	NM23DTG	Design Thinking	AEC	2	30	-	-	100	-	100	2

	IV	NM22UHR	Universal Human Values and Human Rights #	AECC	-	-	-	-	100	-	100	Gr.
	IV	BFINST1	Field Work/Institutional Training (30 days)	DSE	-	-	-	-	-	-	100	2
	VI	JOB2019	Job Oriented Course	-	-	-	-	-	-	-	-	Gr.
I - V	VI	16BONL1 16BONL2	Online Course 1 Online Course 2	ACC	-	-	-	-	-	-	-	-

L – Language **E - English**
CC – Core Courses **CA – Continuous Assessment**
GE – Generic Elective **ESE - End Semester Examination**
AEC – Ability Enhancement Course **SEC- Skill 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**

Question paper pattern

ESE Question Paper Pattern: 5 x 20 = 100 Marks

Question from each unit comprising of
One question with a weightage of 2 Marks : 2 x 5 = 10
One question with a weightage of 6 Marks (Internal Choice at the same CLO level) : 6 x 5 = 30
One question with a weightage of 12 Marks (Internal Choice at the same CLO level) : 12x5 =60
Total : 100 Marks

CA pattern

CIA Test : 5 marks (Conducted for 45 marks after 50 days)
Model Exam : 7 marks (Conducted for 75 marks after 85 days)
Seminar/Assignment/Quiz : 5 marks
Class Participation : 5 marks
Attendance : 3 marks
Total : 25 Marks

CA 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

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**.**

Skill Based Subject (Theory)

Test 1	: 30 marks
Test 2	: 50 marks
Assignment	: 10 marks
Seminar	:10 marks
Total	**: 100 Marks**

Skill Based Subject (Practical)

Test 1	: 30 marks
Test 2	: 50 marks
Lab performance	: 10 marks
Lab regularity	:10 marks
Total	**: 100 Marks**

Evaluation pattern for Gen-AI

Quiz	: 50 Marks (5 quizzes with each 10 marks)
Case study	: 25 Marks
Online Exam	: 25 Marks (Departments to plan and conduct the exam)
Total	:100 Marks

Institutional Training

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

SEMESTER I

COURSE NUMBER	COURSE NAME
BF23C01	CORE - I FOOD SCIENCE

Category	L	T	P	Credit
Theory	58	2	-	4

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
- Familiarize the 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 Outcomes

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

H- High; M-Medium; L-Low

Core- I Food Science (BF23C01) (58Hrs)

Syllabus

Unit I Food Science (12Hrs)

Introduction to food science – definition, functions of food, food groups, food pyramid, and food in relation to health. **Cooking** – objectives of cooking, preliminary preparations, Factors affecting cooking of foods. Gelatinization & factors affecting gel formation, denaturation, colloids, emulsion, foam & factors affecting foam formation & stability, fermentation, browning, rancidity. **Cooking methods** – moist heat methods, dry heat methods, Combination methods – braising and microwave cooking.

Unit II Cereals, Millets, Pulses, Nuts and Oil seeds (12Hrs)

Cereals and cereal products – structure, composition and nutritive value. Specific cereals – wheat, rice (composition and milling). **Millets** – maize, jowar, ragi, bajra (nutritive value and processing), cereal starch –introduction –effect of moist heat and dry heat. **Pulses** – composition and nutritive value, processing, toxic constituents, pulse cooking & factors affecting pulse cooking. **Nuts & oil seeds** – composition and nutritive value, processingand refining of oils. Specific nuts and oil seeds – coconut, flax seeds, almonds, groundnut, soya bean, sunflower seeds

Unit III Vegetables and Fruit (11 Hrs)

Vegetables – classification – composition and nutritive value, selection of vegetables, pigments – water insoluble and soluble enzymes, flavor compounds – bitter compounds – vegetable cookery, loss of nutrition during cooking and its prevention. Effect of cooking on pigments. **Fruits** – classification – composition and nutritive value, selection of fruits, ripening of fruits, enzymatic and non-enzymatic browning, prevention of browning.

Unit IV Animal Foods, Milk and Milk Products (12 Hrs)

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

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

protein concentrate, spoilage of fish. **Poultry** – classification, composition and nutritive value. **Milk**- Composition, nutritive value, properties, role of milk and milk products in cookery, effects of heat on milk, milk processing, milk products, indigenous milk products.

Unit V Sugar, Spices & Beverages (11Hrs)

Sugar- Properties, sugar and related products, factors affecting crystallization, role of sugar in cookery, artificial sweeteners **Spices** – general function, specific species & their medicinal values – Ajwain, Aniseed, asafoetida, cardamom, chillies, cinnamon, clove, coriander seed, cumin seed, fenugreek, garlic, ginger, nutmeg, mustard, onion, pepper, poppy seeds, saffron, turmeric, role of spices in cookery. **Beverages** – classification, coffee – processing, coffee beverage and methods of preparation- Espresso, soluble and decaffeinated coffee. Tea – Processing of tea, types of tea. Cocoa and chocolate – processing of cocoa beans, malted beverages-Amylase rich food.

Text Books

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
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 Books

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

2. Mrs. R. Sugantha

3. Dr. M.C. Anitha

COURSENUMBER	COURSE NAME
BF23C02	Core II FOOD CHEMISTRY

Category	L	T	P	Credit
Theory	43	2	-	3

Preamble

Enable the students to

- Understand the types and important properties of water
- Gain knowledge about classification, structure and reactivity of carbohydrates
- Acquire knowledge about classification and structure of amino acids & proteins
- Learn the chemistry of vitamins and minerals
- Familiarize Industry 4.0

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 structure, types of food and its components	K1
CLO2	Understand the physiochemical properties of nutrient and the concepts of industry 4.0	K2
CLO3	Demonstrate the effect of processing on the physiochemical properties	K3
CLO4	Apply the concepts of industry 4.0 in relation to advances in chemistry of foods	K4

Mapping with Programme Outcomes

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

H-High; M-Medium; L-Low

CORE –II FOOD CHEMISTRY (BF23C02) (43 Hrs)

Syllabus

Unit I Water in Foods (8 Hrs)

Properties of foods - physiochemical properties of foods - chemical, functional and kinetic. Moisture in foods, role and type of water in foods (free, bound and entrapped water), water activity, Molecular mobility and food stability.

Unit II Carbohydrates, Fats & Oils (9 Hrs)

Carbohydrates - occurrence and classification. Structure of monosaccharides, optical activity of sugars, epimers, enantiomers, pyranose and furanose structures, reactions of monosaccharides, structure of Disaccharides- Maltose, Sucrose, Inversion of sucrose, Lactose, Lactulose, Polysaccharides- homopolysaccharides and hetero polysaccharides, retrogradation.

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

Unit III Chemistry of Amino acids, Proteins and Enzymes (9 Hrs)

Amino acids - Classification, essential amino acids, structure, properties of amino acids. **Proteins -** Classification, Structure of proteins - primary, secondary, tertiary and quaternaryand properties. **Enzymes** – classification, chemical nature and properties, Mechanism of enzyme action and factors affecting enzyme action, Industrial application of enzymes.

Unit IV - Chemistry of Vitamins and Minerals (9 Hrs)

Vitamins: History, structure of fat soluble and water soluble vitamins, occurrence of 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, Minerals during processing of foods.

Unit V Introduction to Industry 4.0 **(8 Hrs)**

Need – Reasons for Adopting Industry 4.0 - Definition – Goals and Design Principles. Technologies of Industry 4.0- Skills required for Industry 4.0- Advancements in Industry 4.0-

–Impact of Industry 4.0 on Society, Business, Government and People - Introduction to 5.0

Text Books

S. No	Authors	Title of the Book	Publishers	Year of Publication
1.	Shakunthala Manay, N. Shadaksharswamy, M	Foods Facts and Principles	New Age International	2nd Edn., 2001
2.	Meyer LH,	Food Chemistry	CBS Publication	1987
3.	Dr. H.-D. Belitz Dr.-Ing. W. Grosch	Food Chemistry	Springer-Verlag Berlin Heidelberg	1999
4.	P. Kaliraj, T. Devi	Higher Education for Industry 4.0 and Transformation ɒ Education 5.0,	CRC Press	2020

Reference Books

S. No	Authors	Title of the Book	Publishers	Year of Publication
1	John M. DeMan	Principles of Food Chemistry	Avi Publishing Co Inc.	1976
2	John M. de Man John W. Finley, W. Jeffrey Hurst, Chang YongLee	Principles of Food Chemistry	Springer	2018
3	Chesworth, JM., Stuchbury, T. and Scaife, JR	An Introduction to Agricultural Biochemistry.	Chapmanand Hall	1998

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

Course Designers:

1. Dr. M. Guhapriya

2. Mrs. R. Sugantha

3. Dr. M.C.Anitha

COURSE NUMBER	COURSE NAME
BF23A01	ALLIED- I PRINCIPLES OF NUTRITION

Category	L	T	P	Credit
Theory	73	2	-	4

Preamble

To enable the students to

- Gain knowledge about nutrition and malnutrition
- Determine the energy values of foods
- Learn the sources and functions of vitamins and minerals
- 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 Outcomes

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

H-High; M-Medium; L-Low

Allied Paper -I Principles of Nutrition (BF23A01) (73 Hrs)

Syllabus

UnitI Introduction and Importance of Nutrition (14 Hrs)

Nutrition – introduction, importance and scope of nutrition – balanced diet –food pyramid– Recommended Dietary Allowances (RDA) – Factors affecting RDA- Reference man &women Menu planning- Portion control - Malnutrition – Relation of nutrition to health.

Energy – sources – determination of energy value of foods – physiological energy valueof foods Basal Metabolic rate – factors affecting BMR – thermogenic effect of foods.

Unit II Proximate principles (15 Hrs)

Carbohydrate, proteins and fat – classification, functions, digestion and absorption, sources and requirements. Proteinquality of foods – Protein Efficiency Ratio (PER), Biological Value (BV) and Net Protein Utilization(NPU), supplementary value of proteins.

Unit III Vitamins (14 Hrs)

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

Unit IV Minerals (15 Hrs)

Minerals – calcium, phosphorus, iron, magnesium, sodium and potassium – functions, sources, requirements and deficiency – signs and symptoms. Trace minerals – zinc, iodine, fluorine and chlorine – functions, sources, requirements and deficiency – signs and symptoms

Unit V Dietary Fibre, **Water and Electrolyte Balance (15Hrs)**

Dietary Fibre: Types, Components, sources, role in health

Water and Electrolytes:

Water – Daily requirement, Regulation and distribution of body water .Exchange of water in the body- water exchange between plasma and interstitial fluid. Overhydration, Dehydration and water intoxication

Electrolytes- Types, composition of body fluid, maintenance of fluid and electrolyte balance and electrolyte imbalance

Text Books

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

Reference Books

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
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 NUMBER	CORE PRACTICAL –I
BF23CP1	FOOD SCIENCE PRACTICALS

Category	L	T	P	Credit
Core	-	-	45	3

Preamble

To enable the students to

- learn the preparation of various food products- milk, egg & beveragesunderstand the e dry & moist heat methods of cooking
- gain knowledge on browning of fruits & effect of acid/alkali/heat on vegetablesdetermi 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 Outcomes

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

H- High; M-Medium; L-Low

CORE PRACTICAL - I FOOD SCIENCE PRACTICALS (BF23CP1) (45 Hrs)

Syllabus

1. Basic five food groups
2. Measuring of food- Solids, Liquids, Butter
3. Effect of dry heat and moist heat on starch granules- Roasting, boiling,steam cooking, pressure cooking, grain identity
4. Separation of gluten from wheat
5. Cooking of Pulses and dhal – soaked, unsoaked, effect of hard water, softwater and baking soda on cooking qualities of pulses
6. Germination of pulses- water quality, temperature, time taken, length of sprouts.
7. Study the effect of acid, alkali, heat and time on the colour, flavor, texture, taste of vegetables
8. Study of enzymatic and non-enzymatic browning in fruits
9. Milk- scum formation, preparation based on coagulation of milk proteins- cottage cheese, basundi, khoa, cream of tomato soup, fruit milkshakes, fruitcustard.
10. Study the structure of egg- factors affecting coagulation of egg proteins andfoam formation- - hardboiled egg, poached egg, egg custard,
11. Studies on foam formation and stability- foamy, soft peak, stiff peak, dry peak, preparation of omelet, fluffy omelet, soufflé, French salad dressing/mayonnaise,cake
12. Recipes to study the shortening effect of fats and oils
13. Study the different stages of crystallization of sugar recipe

Text Books

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
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 inIndian 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 of Publication
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 anddistributers	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. M. Guhapriya

2. Mrs. R. Sugantha

SEMESTER II

COURSE NUMBER	COURSE NAME
BF23C04	**CORE– IV FOOD MICROBIOLOGY**

Category	L	T	P	Credit
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	H	H	M	M	M	M
CLO2	H	H	M	M	M	M
CLO3	H	H	M	M	M	M
CLO4	H	H	M	M	M	M

H- High; M-Medium; L-Low

CORE -IV - FOOD MICROBIOLOGY (BF23C04) (58 Hrs)

Syllabus

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 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 & 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. Fermentation, Fermenter and its principle; processing of microbial & fermented food - milk products (curd, yogurt, cheese, kefir), vinegar, wine, beer, fermented vegetables (sauerkraut, kimchi,pickles), fermented meat - sausage. Microbiology of honey

Unit IV Food Borne Diseases (11 Hrs)

Food poisoning, Food borne infections (Salmonellosis, Gastroenteritis, E.Coli, shigellosis) 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.

Microbiology in Food Sanitation, Contamination of food through various sources and cross contamination. Definition - Food Safety and Food Defense. Control of Microorganisms - disinfectants, antimicrobial agents & their mechanism of action; Introduction to Food additives; Definition & importance of food bio preservatives

Text Book

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	William C Frazier & Dennis C Westhoff	Food Microbiology	Tata McGraw Hill Publications	2013
2	Adams M.R and Moss M.O	Food Microbiology	New Age International Publication	1996
3	K. Ramesh Vijaya	Food Microbiology	M J P Publication	2007
4	James M Jay	Modern Food Microbiology	Springer	2012
5	Azeredo et.al.	Critical review on biofilm methods	Taylor & Francis Group	2016
6	Alvarez-Ordóñez et.al.	Biofilms in Food Processing Environments: Challengesand Opportunities	Annual Review of Food Science and Technology	2019

Reference Books

S. No	Authors	Title of the Book	Publishers	Year of P
1	Dubey, R.C. and D.K. Maheswari	A text book of Microbiology	S. Chand & Co	2005
2	Pelczar, M.J., E.C.S.Chan & N.R. Krieg.	Microbiology	McGraw –Hill New York	2002
3	Postgate J	Microbes And Man	Cambridge Univ. Press,	2000
4	Power C.B. and H.F.Daginawala.	General Microbiology	Himalaya publishing house	1989

5	Galie et. al.	Biofilms in the food industry: Health aspects and control methods	Frontiers in Microbiology	2018
6	O'Toole et. al.	Microtiter dish biofilm formation assay	Journal of visualized Experiments	2011

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

Course Designers:

1. **Ms. Santhiya R**

COURSE NUMBER	Course Name
BF23CP2	CORE PRACTICAL – II Microbiology Practical

Category	L	T	P	Credit
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	PLO 1	PLO2	PLO 3	PLO4	PLO5	PLO6
CLO1	H	H	H	H	H	M
CLO2	H	H	H	H	H	M
CLO3	H	H	H	H	H	M
CLO4	H	H	H	H	H	M

H- High; M-Medium; L- Low

CORE PRACTICAL II -FOOD 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 practicals

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 text book of Microbiology	S. Chand & Co., New Delhi	2005
2	Pelczar, M.J., E.C.S.Chan and N.R. Krieg, Noel R	Microbiology	Mc Graw – Hi	2002

3	Power C.B. and H.F.Daginawala	General Microbiology, Vol. I and II	Himalayans Publishing House, New Delhi	1989
4	Kanika Sharma	Manual of microbiology – Tools and Techniques	Anshan Ltd	2007

Reference Books

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

Course Designers:

1. Ms. Santhiya R

COURSE NUMBER	COURSE NAME
BF23C05	CORE– V PROPERTIES OF FOODS

Category	L	T	P	Credit
Theory	73	2	-	3

Preamble

To enable the students to

- To impart knowledge related to various engineering properties of food materials
- To make aware related to the determination of the various engineering properties of food materials.
- To acquaint about the applications of engineering properties of foods in processing of foods and designing of equipments
- To make students able to suggest suitable alteration in the processing of the characteristics 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	Discuss the concepts of engineering properties of food materials.	K1
CLO2	Understand and apply the engineering properties determination techniques for characterisation of foods.	K2
CLO3	Suggest the modifications in the processing line for maintaining the quality retention in processing of foods.	K3
CLO4	Apply the concept of engineering properties in the development of novel food processing techniques.	K4

Mapping with Programme Learning Outcomes

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

H- High; M-Medium; L-Low

CORE– V PROPERTIES OF FOODS (BF23C05)

Syllabus 73 hrs

Unit I : Physical & Frictional Properties (15 hrs)

Physical Properties of food and measuring methods- Shape, size, volume, density, porosity and surface area. Structure of seeds & grains.

Basic concepts of friction in food materials, solid friction, rolling resistance, angle of repose and internal friction

Unit II : Rheological properties (15 hrs)

Introduction to rheology, 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 dependant properties, Viscosity measurement - Capillary flow viscometer, Orifice type viscometer, Falling ball viscometer, Rotational Viscometer.

Unit III :Thermal & Electrical Properties (15 hrs)

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

Electrical Properties of Foods - Introduction , Electrical conductivity - Solid and liquid foods , Measurement of electrical conductivity.

Unit IV :Aerodynamic & Mechanical Properties (13 hrs)

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

Mechanical properties related terms and their 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 & Electromagnetic Properties (15 hrs)

Introduction to magnetic properties of foods - Materials, Magnetization - Application of Magnetic field

forces, Magnetic resonance - Application of NMR.

Introduction to Electromagnetic Properties of foods - Electrical polarization, Microwave heating - Mechanism of microwave heating, Dielectric Properties - Conversion of microwave energy into heat, Microwave heating of foods, Application of electromagnetic field.

Text Book

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	Shafiur Rehman	Food Properties Handbook	CRC Press Inc. New York	1995
2	Nuri N. Mohsenin	Physical Properties of Plant and Animal Materials	Gordon and Reach Science Publishers	1970
3	Nuri N. Mohsenin	Thermal Properties of Food & Agricultural materials	Gordon and Reach Science Publishers	1970
4	Sahay K M and Singh K K	Unit operations of Agricultural Properties	Vikas Publising House Pvt Ltd, New Delhi	2004

Reference Books

S. No	Authors	Title of the Book	Publishers	Year of P
1	M.A.Rao and S.S.H.Rizvi	Engineering Properties of Foods	Mercel Dekker inc. New York	1998
2	J.H.Prentice	Measurements in the Rheology of Food Stuffs	Elsevier Applied Science Publishers	1984

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

Course Designers:

1. **Ms.Sujithra.**

COURSE NUMBER	COURSE NAME
BF23A02	**ALLIED–II NUTRITIONAL BIOCHEMISTRY**

Category	L	T	P	Credit
Theory	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 he 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	H	H	M	M	M	M
CLO2	H	H	M	M	M	M
CLO3	H	H	M	M	M	M
CLO4	H	H	M	M	M	M

H- High; M-Medium; L-Low

ALLIED –II - NUTRITIONAL BIOCHEMISTRY (BF23A02) (73Hrs)

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 aminoacid metabolism and inborn errors of metabolism. Metabolism of ammonia-detoxification of ammonia-glutamine pathway-omithine 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	G.S. Sandhu	Textbook of Biochemistry	Campus Books	2004
2	N. Mallikarjuna Rao	Medicinal Biochemistry	New Age International pvt.Ltd	2nd Edn., 2006
3	L. Veerakumari	Biochemistry	MJP Publishers	2004

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	Reprint, 2004
2	J.H. Weil	General Biochemistry	Wiley Eastern Ltd,New Age International Ltd	6th Edn., 1990
3	B.C. Rajbir Singh	Biochemistry	Mittal Publishers	1st Edn., 2002

Pedagogy

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

Course Designers:

1. Dr. M. Guhapriya

2. Mrs. R. Sugantha

3. Dr. M.C. Anitha

COURSE NUMBER	Course Name
BF23AP2	ALLIED PRACTICAL – II Biochemistry Practical

Category	L	T	P	Credit
Allied	-	-	45	3

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
CLO4	S	S	M	S	S	M

S- Strong; M- Medium; L-Low

ALLIED PRACTICAL II BIOCHEMISTRY

PRACTICAL (BF23AP2)

Total hours: 45

Credit : 3

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

Quantitative analysis

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

Pedagogy: Demonstration and hands on practical

Course Designers:

1. Dr. M. Guhapriya

2. Mrs. R. Sugantha

3. Dr. M.C. Anitha

Text Books:

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

Reference Books

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

SEMESTER III

COURSE CODE	COURSE NAME	Category	L	T	P	Credit
BF23C06	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

UNIT OPERATIONS (BF23C06) (73 hrs)

Syllabus

Unit I Introduction to Unit operations (14 hrs)

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.

Unit II Size reduction processes (14 hrs)

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 hrs)

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 hrs)

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 hrs)

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

infood industries.

Text Books

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1	Rao D.G. (2010)	Fundamentals of food engineering.	PHI learning private limited.	2010
2	Sahay, K. M. and K.K.Singh	Unit operation of Agricultural Processing	Vikas Publishing House Pvt. Ltd., New Delhi	2004
3	Earle, R.L.	Unit Operations in Food Processing	Pergamon Press. Oxford. U.K	2003
4	Geankoplis, C.J.	Transport Process and Unit Operations	Prentice - Hall of India Private Limited, New Delhi.	1999

Reference Books

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1.	Richardson,J.E. etal.,	Coulson & Richardson's Chemical Engineering" Vol.2 (Particle Technology & Separation Processes	5th Edition, Butterworth – Heinemann / Elsevier	2003
2.	McCabeW.L., Smith J.C.	Chemical Engineering". Volume I to V	The Pergamon Press. New York	1999
3.	McCabe,W.L., J.C.Smith and P.Harriot	Unit Operations of Chemical Engineering	Mc GrawHill. Inc. Kosaido Printing Ltd. Tokyo, Japan,	2001
4.	S.K. Ghosal, S.K. Sanyal and S. Dutta.	Introduction to chemical engineering	TMH Publications	1993

Pedagogy

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

Course Designers:

1. **Dr. M. Guhapriya**
2. **Mrs. R. Sugantha**
3. **Dr.M.C.Anitha**
4. **Mrs A L Iswarya**
5. **Ms. Sujithra S**

COURSE CODE	COURSE NAME	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 andits 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

UNIT OPERATIONS PRACTICAL – BF23CP3 (45 Hrs)

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

Pedagogy: Demonstration and hands on practicals

Course Designers:

1. Dr. M. Guhapriya

2. Mrs. R. Sugantha

3. Dr.M.C.Anitha

4. Mrs A L Iswarya

COURSE CODE	COURSE NAME	Category	L	T	P	Credit
BF23C07	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

Fundamentals of Food Processing (BF23C07) (58 hours)

Syllabus

UNIT I Cereal and Pulse Processing (13 hrs)

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. **Millets** – 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 hrs)

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 hrs)

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 hrs)

Physico - chemical properties of milk constituents, quality evaluation of milk – processing of milk and milk products – milk powder, butter, cheese, ghee, yoghurt. Equipments – working principle of retort, pasteurizer, evaporator & condenser, boilers.

UNIT V Meat, Fish and Poultry processing (13 hrs)

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. **Fish** – cuts of fish, pre-preparation and processing of fish – curing, smoking, drying, chilling,

salting,canning. & byproducts – fish oil, fish meal, fish silage, fish ambrigeris, 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. Sujithra.S**
3. **Ms. Santhiya R**
4. **Ms. Dharrshne S V**

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
TH23A34	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\PLOs	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 (TH23A34)

Credits : 4 **Hours : 73**

Syllabus

Unit I **15 Hrs**

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

Unit II **15 Hrs**

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 Hrs**

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 Hrs**

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 Hrs**

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.Srinnivasan, 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 Designer:

1. Mrs K.Sharmilaa, Assistant Professor

2. Mrs.S Aishwarya, Assistant Professor

COURSE NUMBER	COURSE NAME	Category	L	T	P	Credit
BF23A03	BASICS OF ACCOUNTANCY	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	Understand the fundamental concepts, principles and standards relevant to accounting	K1
CLO2	Identify and comprehend various financial transactions and their underlying purposes	K2
CLO3	Apply acquired knowledge to analyse business transactions and utilize techniques for computing final accounts with appropriate adjustments	K3
CLO4	Analyse financial statements using various accounting tools & techniques and to aid in financial decision-making processes	K4

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium

BASICS OF ACCOUNTANCY - BF23A03 (73 Hours)

Unit: I (14 Hours)

Accounting - Meaning, Objectives - Types of Accounting - Accounting Concepts**. *Introduction to IFRS - Concept and objectives & principles* -** Overview of Indian and International accounting standard- Accounting Principles - ***Kinds of Accounts**** (Theory Only**)**. 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 andProfit 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 **(Theory only).**

Unit: IV: (15 Hours)

Cost accounting: Definition - ***Types 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**** - Cash Budget: Meaning - Preparation of cash budget **(Simple problems only)**

Unit: V: (15 Hours)

Ratio Analysis: ***Nature of Ratio Analysis - Significance* -** Type**s** - 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. Application of AI and Robotic process automation in accounting (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	2023 1st Edition
2.	S P Jain and Narang K.L,Simmi Agrawal & Monika Sehgal	Financial Accounting	Kalyani Publishers	2021 12th Edition
3.	Shashi K.Gupta, Sharma R.K & Neeti Gupta	Cost & Management Accounting	Kalyani Publishers	2020 15th Edition

REFERENCE BOOKS:

Sl. No.	Author(s)	Title of the Book	Publisher	Year & Edition
1.	Ravi M Kishore	Cost and Management Accounting	Taxmann Publications Private Limited	2021 6th Edition
2.	S.N. Maheswari, Suneel K. Maheshwari, Sharad K. Maheshwari	Financial Accounting for BBA	Vikas Publishing House Private Limited	2023 7th 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	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	2	Meaning, Need for depreciation	https://www.youtube.com/watch?v=N5Wh2NNkqpU&t=1s https://youtu.be/fINkBABbqZU
4	3	Computerized accounting: Needs & Importance	https://youtu.be/BDTZuM7T4Kw
5		Cost accounting: Types of cost	https://youtu.be/_z4-7xr6ur8 https://youtu.be/X3c4XOmP7AE
6	4	Management Accounting	https://youtu.be/eUMwwp5zDW0
7	5	Nature of Ratio Analysis, Significance	https://youtu.be/y132ILD4Vvg https://youtu.be/KjmGvEJqz3M https://www.youtube.com/watch?v=Wv5ojR1WaA4&t=1200s

COURSE CODE	COURSE NAME	Category	L	T	P	Credit
CS23SBGP	Generative- AI	Theory	44	1	-	3

Preamble

The objective of this course is to understand the breadth and depth of Generative Artificial Intelligence (Gen AI) and to impart knowledge on its ethical implications, practical applications, and emerging 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 fundamental concepts and ethical considerations of Generative AI.	K2
CLO2	Apply AI principles in practical settings using basic AI tools and platforms	K3
CLO3	Develop advanced skills in specialized AI applications such as text analysis, natural language processing, and image recognition.	K3
CLO4	Explore emerging trends in AI, integrating advanced AI tools into diverse professional practices.	K4

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4	PO5
CLO1	S	S	S	S	M
CLO2	S	S	S	S	S
CLO3	S	S	M	S	S
CLO4	S	M	S	M	S

S- Strong; M-Medium

SBS I: Gen-AI - CS23SBGP (45 Hrs)

Unit 1: Introduction to Gen AI (9 hours)

Understanding Gen AI: Definition and scope of Gen AI - Overview of its applications in various fields - Introduction to essential skills needed for Gen AI. Ethical Considerations: Discussion on ethical guidelines and responsible use of AI - Understanding the impact of AI on society and individuals.

Hands-on Activity: Exploring AI Tools

- Working with appropriate content creation Gen-AI tools to engage with ChatGPT to explore various subjects, simulate interviews, or create imaginative written content.
- Working with appropriate writing and rephrasing Gen-AI tools to drafting essays on designated topics and refining the content with improved clarity, coherence, and correctness.

Unit 2: Basic AI Concepts (8 hours)

Introduction to AI: Basic concepts and terminology of artificial intelligence - Examples of AI in everyday life - Real-world examples of AI applications in different domains. Machine Learning Basics: Understanding the principles of machine learning - Overview of supervised and unsupervised learning.

Hands-on Activity: Simple AI Projects

- Working with appropriate educational content creation Gen-AI tools to generate quizzes and flashcards based on classroom material.
- Working with appropriate language learning Gen-AI tools to practice and enhance language skills through interactive exercises and games across multiple languages.

Unit 3: AI in Practice (9 hours)

Text Analysis and Natural Language Processing (NLP): Introduction to NLP concepts and techniques - Hands-on exercises analyzing text data and extracting insights. Image Recognition and Processing: Basics of image recognition algorithms and techniques - AI Tools for Text and Image Processing

Hands-on Activity: Text and Image Projects

- Working with appropriate image processing Gen-AI tools to experiment with AI-generated images.
- Working with appropriate object recognition Gen-AI tools to identify various objects such as text, images, products, plants, animals, artworks, barcodes, and QR codes.

Unit 4: AI for Productivity and Creativity **(9 hours)**

AI-enhanced Productivity and creativity Tools: Overview of productivity and creativity tools enhanced with AI capabilities - Tips for integrating AI into daily tasks and workflows. AI and Jobs: Exploring how AI impacts jobs and industries - Discussion on opportunities and challenges - Exploration of AI-powered creative tools and applications.

Hands-on Activity: Productivity and Creativity

- Working with appropriate content creation Gen-AI tools to generate interactive videos / blog posts / art / drawing / music and storytelling experience.
- Working with appropriate resume generation Gen-AI tools to create professional resumes efficiently.

Unit 5: Future of Gen AI and Final Project **(9 hours)**

Emerging Trends in Gen AI - Applications of Generative AI - Ethical and Societal Impact of Gen AI - Future Directions and Challenges - Case Studies in Generative AI.

Hands-on Activity: Trends in Gen AI

- Working with appropriate speech generation Gen-AI tools to customize synthetic speech for virtual assistance across different applications.
- Working with appropriate data analysis Gen-AI tools to perform data analysis, visualization, and predictive modeling tasks.
- Working with appropriate Gen-AI design tools to simplify the creation of visually appealing presentations.
- Working with appropriate website builder Gen-AI tools to develop professional websites with AI assistance.

Pedagogy

Demonstration of AI Tools, Lectures and Case studies.

Course Designer

1. **Mrs. S. Ponmalar**

COURSE CODE	COURSE NAME	Category	L	T	P	Credit
NM22DTG	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

NM22DTG - DESIGN THINKING

Syllabus **(30 Hrs)**

UNIT – 1 **(6 Hours)**

Design Thinking Overview: Introduction to Design Thinking and Design ResearchStrategies - 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 andIdeate - 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 AmbrosePaulHarris	Design Thinking	AVA Publishing Switzerland	2010
3	Sambhrant Srivastavaand 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 - BusinessInnovation	MJV Press	2011
2	Moritz Gekeler	A practical guide to designthinking	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/10910 4109/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. htmlhttps://youtu.be/ls2mqHs02B0
UNIT IV	Define	http://acl.digimat.in/nptel/courses/video/10910 4109/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/10910410 9/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