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

2022 – 2025 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.) – Batch 2022 - 2025

SEMESTER	Part	Subject Code	Title of the Paper		Instruction hours/week	Contact hours	Tutorial	Duration of Examination	Examination Marks			Credit
									CA	ESE	TOTAL	
I	I	TAM 2201/ HIN2201/ FRE2201	Language T/H/F/ M Paper I	Language	6	86	4	3	50	50	100	3
	II	ENG2101	English paper I	English	6	86	4	3	50	50	100	3
	III	BF22C01	**Core I** Food Science	CC	4	56	4	3	50	50	100	4
	III	BF22C02	**Core II** Food Chemistry	CC	3	41	4	3	50	50	100	3
	III	BF21CP1	**Core Practical I** Food Science Practical	CC	3	45	-	3	25	25	50	3
	III	BF22A01	**Allied I** Principles of Nutrition	GE	3	41	4	3	50	50	100	4
	III	BF21AP1	**Allied Practical I** Nutrition Practical	GE	3	45	-	3	25	25	50	3
	IV	NME22B1/ NME22A1 / NME21ES	Basic Tamil / AdvancedTamil / Introduction to Entrepreneurship	AEC	2/ 2/2	28/ 28/ 26	2/2 /4	-/-/2	50/ 50/ 100	50/ 50/ -	100/ 100/100	2
	I	TAM2202/ HIN2202/ FRE2202	Language T/H/F Paper – II	Language	6	86	4	3	50	50	100	3
	II	ENG2102	English Paper II	English	6	86	4	3	50	50	100	3
	III	BF22C03	**Core III** Food Microbiology	CC	5	71	4	3	50	50	100	4

II	III	BF22CP2	**Core Practical II** Microbiology Practical	CC	3	45	-	3	25	25	50	3
	III	BF22A02	**Allied II** Principles of Biochemistry	GE	5	71	4	3	50	50	100	3
	III	BF22AP2	**Allied Practical II** Biochemistry Practical	GE	3	45	-	3	25	25	50	3
	VI	NM12GAW	Foundation Course I General Awareness	AEC	-	Self Study Online	100	-	Grade	-		
	IV		Online Course									
	IV	NME22B2/ NME22A2	Basic Tamil II / Advanced Tamil II	AEC	-	-	-	-	-	-	Grade	-
	V	21PELS1	Professional English For LifeSciences	AEC	3	45	3	-	50	50	100	2
III	I	TAM2203A/ HIN2203A / FRE2203A	Language T/H/F/ Paper I	Language	4	58	2	3	50	50	100	3
	II	ENG2203A	English paper I	English	4	58	2	3	50	50	100	3
	III	BF22C04	**Core IV** Unit Operations	CC	4	58	2	3	50	50	100	3
	III	BF22C05	**Core V** Principles of Management	CC	4	58	2	3	50	50	100	3
	III	TH22A03/ BF22A03	**Allied III** Numerical and Statistical techniques / Basics of Accountancy	CC	5	73	2	3	50	50	100	5
	III	BF22CP4	**Core Practical III** Unit operations Practical	CC	4	60	-	3	25	25	50	3
	III	BF22SB01/ BF21SBCE	**SBS-1** Instrumentational techniques / **Coursera**	GE	3	45	-	2	100	-	100	3
	IV	NM22EVS	**Foundation Course II** Environmental studies	AEC	Self Study				100	-	100	Grade
	IV	NM22UHR	**Foundation Course-III** (Universal Human Values and Human Rights)		2	30	-	-	100	-	100	2
	VI		Internship		4 weeks						100	2
	VI	JOB2019	Job Oriented Course									Grade
IV	I	TAM2204A HIN2204A FRE2204A	Language T/H/F Paper IV	Language	4	58	2	3	50	50	100	3

	II	ENG2204A	English paper IV	English	4	58	2	3	50	50	100	3
	III	BF22C06	**Core VI** Food Processing and Preservation	CC	5	73	2	3	50	50	100	3
	III	BF22CP4	**Core Practical IV** Food Preservation Practical	CC	3	75	-	3	25	25	50	3
	III	BF22C07	**Core VII** Principles of Marketing	CC	4	58	2	3	50	50	100	3
	III	BF22A04	**Allied IV** Bakery and Confectionery Technology	CC	5	73	2	3	50	50	100	3
	III	BF22SB02/ BF22SBCE	**Skill based Subject** Basics of Computer and Programming / Coursera -	SEC	3	45	-	2	100		100	3
	V		**Extension Activities** NSS/NCC/YRC/Sports and Games/Ecowatch/Yinet/ Rotaract			-	100	100	1			
		NM22DTG	**Design Thinking**	Finishing school –Part A	2	4		100	-	100	2	
		COCOACT	**Co-Curricular Activities**					100		100	1	
			JOC – Bakery and Confectionery (Offered to other departments)									

SEMESTER I

COURSE NUMBER	COURSE NAME
BF22C01	CORE - I FOOD SCIENCE

Category	L	T	P	Credit
Theory	56	4	-	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
- 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	Outline the different functions of food and different methods of cooking to relate the composition and nutritive value of cereals, millets, pulses,nuts & oil seeds	K1
CLO2	Classify the vegetables and fruits & analyze the loss of nutrients duringvegetable cookings	K2
CLO3	Classify the types of meat, fish, poultry and milk products & explain their cooking methods	K3
CLO4	Analyze the medicinal values of spices & appraise the processing of tea and cocoa beans	K4

Mapping with Programme Outcomes

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

H- High; M-Medium; L-Low

Core- I Food Science (BF22C01) **(41Hrs)**

Syllabus

Unit I Food Science (11Hrs)

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, processing and refining of oils. Specificnuts and oil seeds – coconut, flax seeds, almonds, groundnut, soyabean, 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 – vegetablecookery, 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 (11 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

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
BF22C02	Core II FOOD CHEMISTRY

Category	L	T	P	Credit
Theory	41	4	-	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	Explain the structure of mono & di carbohydrates	K3
CLO2	Understand the different properties of water	K2
CLO3	Classify amino acids, proteins and enzymes and analyze the factorsaffecting enzyme action	K4
CLO4	Gain knowledge on Chemistry of vitamins; Introduce knowledge on Industry 4.0	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 (BF22C02) (41 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 (8 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 (8 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 andfactors affecting enzyme action, Industrial application of enzymes.

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

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

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

Course Designers:

1. Dr. M. Guhapriya

2. Mrs. R. Sugantha

3. Dr. M.C.Anitha

COURSE NUMBER	COURSE NAME
BF22A01	ALLIED- I PRINCIPLES OF NUTRITION

Category	L	T	P	Credit
Theory	41	4	-	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	List and explain the sources, functions, requirements & deficiency of Minerals; Classify food groups and explain the scope & importance of nutrition	K1
CLO2	Calculate and interpret the energy values of food & explain the functions, digestion and absorption of carbohydrates, proteins and fats	K2
CLO3	Categorize fat soluble and water-soluble vitamins and their functions	K3
CLO4	Relate the water and electrolyte balance to the various functions of the body and role of dietary fibre in maintaining a healthy lifestyle	K4

Mapping with Programme Outcomes

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

H-High; M-Medium; L-Low

Allied Paper -I Principles of Nutrition (BF22A01) (41 Hrs)

Syllabus **Unit I**

Introduction and Importance of Nutrition (8 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.

Unit II Proximate principles (9 Hrs)

Energy – sources – determination of energy value of foods – physiological energy value of foods Basal Metabolic rate – factors affecting BMR – thermogenic effect of foods.Carbohydrate, proteins and fat – classification, functions, digestion and absorption, sources and requirements. Protein quality of foods – Protein Efficiency Ratio (PER), Biological Value (BV) and Net Protein Utilization (NPU), supplementary value of proteins.

Unit III Vitamins (8 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 (8Hrs)

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 **(8Hrs)**

Dietary Fibre: Components, sources, functions.

Water Balance: Introduction, water intake and loss, exchange of water in the body- water exchange between plasma and interstitial fluid, Dehydration, water intoxication, water excretion, thirst.

Electrolyte Balance: Introduction, electrolyte concentration in intracellular and extracellular fluids, active transport across cell membranes, variation in electrolyte concentration and ECF volume, hypernatremia, hypernatremia, hyperkalemia and hypokalemia.

Text Books

S.No	Name of theAuthors	Title of the Book	Publishers	Year of Publication
1.	Srilakshmi, B	Nutrition Science	New age international Pvt. 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

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

Course Designers:

1. Dr. M. Guhapriya

2. Mrs. R. Sugantha

COURSE NUMBER	CORE PRACTICAL –I
BF21CP1	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 & beverages
understand the effect of dry & moist heat methods of cooking

gain knowledge on browning of fruits & effect of acid/alkali/heat onvegetables
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	Interpret the effect of acid, alkali, heat, color, texture and taste on vegetables	K1
CLO2	Classify the food into five groups	K2
CLO3	Demonstrate the enzymatic and non-enzymatic browning in fruits and vegetables	K3
CLO4	Demonstrate and differentiate the enzymatic and non-enzymatic browning in vegetables	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 (BF21CP1) (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, steamcooking, pressure cooking, grain identity
4. Separation of gluten from wheat
5. Cooking of Pulses and dhal – soaked, unsoaked, effect of hard water, soft waterand 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, tasteof vegetables
8. Study of enzymatic and non-enzymatic browning in fruits
9. Milk- scum formation, preparation based on coagulation of milk proteins- cottagecheese,basundi, khoa, cream of tomato soup, fruit milkshakes, fruit custard.
10. Study the structure of egg- factors affecting coagulation of egg proteins and foamformation- - 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

Pedagogy: Demonstration and hands on practical's

Course Designers:

1. Dr. M. Guhapriya

2. Mrs. R. Sugantha

Text Books

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
1	Manay Shakunthala, N andShadaksharaswamy 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

3. 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

COURSE NUMBER BF21AP1	ALLIED PRACTICAL –I NUTRITION PRACTICALS

Category	L	T	P	Credit
Allied	-	-	45	3

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 vitamin C, Iron and Calcium content in foods.

Course Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Calculate the energy value of foods and the energy requirements ofindividual	K3
CLO2	Estimate the quantity of macro nutrients in food	K2
CLO3	Estimate Vitamin C, Iron and Calcium content in foods	K2

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

H-High; M-Medium; L-Low

ALLIED PRACTICAL- I (BF21AP1) NUTRITION PRACTICAL

Total Hours: 45 **Credits: 3**

1. Calculation of energy values in foods from food composition tables
2. Preparation of food exchange lists
3. Calculation of basal metabolic rate of an individual.
4. Calculation of energy requirements of an individual per day.
5. Methods of Assessing Nutritional status of an individual- BMI, Head circumference, Upper arm, mid arm circumference, skin fold thickness
6. Preparation and standardization of recipes, portion control and calculation of nutritive value
7. Preparation of a day's diet and calculation of Nutritive value- Pregnant Woman, Lactating Mother, Infants, School going children, Adolescents, Adult man, Adult Woman, Elderly people
8. Preparation of a day's diet and calculation of Nutritive value- Formulation, evaluationand calculation of nutritive value – Weaning food and Iron rich food
9. Formulation, evaluation and calculation of nutritive value - Sports Drink
10. Formulation, evaluation and calculation of nutritive value for conditions of underweight and obesity

Pedagogy: Demonstration and hands on practical's

Course Designers:

1. Dr. M. Guhapriya

2. Mrs. R. Sugantha

Text Books

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
1	A.Y.Sathe`	A first course in food Analysis	New Age International Publishers	1999
2	Dr. Geetha Swaminathan Ms. Mary George	Laboratory Chemical Methods in Food Analysis	Margham Publishers	2002
3	Kirk, RS and Sawyer, R.	Pearson's Chemical Analysisof Foods.	Longman Scientific and Technical	1991

Reference Books

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1.	Pomrenz Y & Meloan CE	Food Analysis - Theory and Practice.	CBS	1996
2.	Food safety and standards Authority of India, Ministry of health and family welfare	FSSAI Manual of methods for analysis offoods	Government ofIndia	2016
3.	David T Plummer	An Introduction to Practical Biochemistry	Tata McGraw Hill	2007, thirdedn.

SEMESTER II

COURSE NUMBER	COURSE NAME
BF22C03	**CORE– III FOOD MICROBIOLOGY**

Category	L	T	P	Credit
Theory	71	4	-	4

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	Explain the types and characteristics of microorganisms	K1
CLO2	Understanding the importance of microbes in food industry and identify the factors affecting the growth of microorganisms	K2
CLO3	Analyze the sustainability in an eco-friendly manner, to acquire knowledge on biofilms	K3
CLO4	Appraise the spoilage and food borne disease caused by microbes and apply the methods involved in the detection of microbes	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 -III - FOOD MICROBIOLOGY (BF22C03) (71 Hrs)

Syllabus

UNIT-I Introduction to Microbiology (12 Hrs)

Definition - Microbiology in daily life - General characteristics of microbes - physiological, cultural characteristics - Importance of microbes in food industry (desirable and undesirable). Microbiology in Food Sanitation, Contamination of food through various sources – animals, plants, water & air.

UNIT-II - Microbiology of Foods (15 Hrs)

Food as substrate for micro - organisms - Hydrogen ion concentration (pH)/ Moisture requirements: concept of water activity, oxidation-reduction potential, nutrient content, inhibitory substances and biological structure, bacterial growth curve and factors affecting the growth of microorganisms.

Unit III - Microorganisms important in food industry (16 Hrs)

Microbial and fermented food – fermented milk, cheese, vegetables, meat, fish, beer and vinegar. Food ingredients & additives. Microbial enzymes and food processing, Food bio preservatives of microbial origin.

Bioentrepreneurship- Food waste treatment using microbes and sustainable business with eco-friendly conditions.

Biofilms – Introduction to bio-films in nature, various stages in bio-films development and applications in food industry

Unit IV Food Spoilage (14 Hrs)

General principles and causes of spoilage, classification of food by ease of spoilage, chemical changes caused by microorganisms in food, Important food spoilage bacteria in plant based and animal based foods.

Food Borne Diseases

Food borne infections and intoxications - food poisoning-botulism – salmonellosis - gastroenteritis, food borne pathogens-Clostridium, Bacillus cereus, Staphylococcus aureus, Vibrio, Campylobacter, Yersinia.

Unit V Enumeration of Microbes (14 Hrs)

Detection & Enumeration of microbes in foods; Indicator organisms and microbiological criteria; Rapid and automated microbial methods pathogens: Direct count of cells- using counting chamber, fluorescent dyes, indirect count, viable count, Most probable number, direct

and indirect method of microbial biomass - Biosensors for food bacterial count.

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 Publication
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. **Dr. M. Guhapriya**
2. **Ms. R. Sharmila**
3. **Ms. Santhiya R**
4. **Dr. M.C. Anitha**

COURSE NUMBER	Course Name
BF22CP2	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	K2
CLO3	Employing different staining techniques	K3
CLO4	Examining the potability of water and bacterial counting by biosensors	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	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 (BF22CP2)-
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

Course Designers:

1. Dr. M. Guhapriya
2. Mrs. R. Sugantha
3. Ms. Santhiya R
4. Dr. M.C.Anitha

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 – HillNew York	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 Publication
1	Rangaswami, G and D.J.Bagyaraj	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 Delh	1989

COURSE NUMBER	COURSE NAME
BF22A02	ALLIED–II PRINCIPLES OF BIOCHEMISTRY

Category	L	T	P	Credit
Theory	71	4	-	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	Introducing the concepts of metabolism	K1
CLO2	Understanding the properties of nucleic acids, characteristics of enzymes and functions of hormones.	K2
CLO3	Relating the reactions of metabolism with their functions	K3
CLO4	Explaining the mechanisms involved	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 - PRINCIPLES OF BIOCHEMISTRY (BF22A02) (71Hrs)

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), disorder of carbohydrate metabolism and inborn errors of metabolism.

UNIT-II Protein and amino acid Metabolism (14hrs)

Protein –turnover, half life, signals for protein break down, 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.

Nucleic acids-chemistry of nucleic acids, DNA and Gene, RNA-structural organization-chemistry of RNA-comparison between DNA and RNA, properties of nucleic acids-biological significance of nucleic acids (excluding structures)

UNIT-III Lipid Metabolism (14 hrs)

Fatty acid oxidation -activation and transport of fatty acid by acyl-CoA, β-oxidation-reaction sequenceof 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, specificity, Mechanism of enzyme action- characteristics of enzyme active site. Co-enzymes-Definition, classification, functions-mode of action of co-enzymes-relation between vitamin and co-enzymes, Isoenzymes -Definition, characteristics, structure of LDH, Enzyme regulation-Allosteric enzymes- competitive and Non-competitive inhibition-allosteric inhibition and covalent modification.

UNIT V Hormones (14 hrs)

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

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
BF22AP2	**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	Identifying techniques for sugars and amino acids	K1
CLO2	Qualitatively estimating the sugars and amino acids	K2
CLO3	Quantitatively estimating the metabolites in blood sample and urine sample	K3
CLO4	Quantitatively estimating the metabolites in 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 (BF22AP2)

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. AnithaText 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 NUMBER	COURSE NAME
BF22C04	CORE- IV UNIT OPERATIONS

Category	L	T	P	Credit
Theory	58	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	H	H	H	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 Paper -IV UNIT OPERATIONS (BF22C04) (58 hrs)

Syllabus

Unit I Introduction to Unit operations (11 hrs)

Introduction and importance of physical properties; Properties of food material and their significance in equipment design, 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 (11 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, standard sieves; oil expression and extractions- hydraulic press, screw press

Unit III Separation processes (12 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, decanting machines and its applications.

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

Unit IV Drying & Evaporation (12 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 evaporator, thermo compression system.

Unit V

Distillation & Crystallization (12 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 in food industries.

Text Book

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
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 of Publication
1.	Richardson, J.E. etal.,	Coulson & Richardson's Chemical Engineering" Vol.2 (Particle Technology & Separation Processes	5th Edition, Butterworth – Heinemann / Elsevier	2003
2.	McCabe W.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 Engineerin	McGrawHill. 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. Mrs. A L Iswarya
Dr.M.C.Anitha

COURSE NUMBER	COURSE NAME
BF22CP4	CORE PRACTICAL III – UNIT OPERATIONS PRACTICAL

Category	L	T	P	Credits
Practical	-	-	60	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	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 III –UNIT OPERATIONS PRACTICALS – BF22CP4 (60 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 NUMBER	COURSE NAME
BF22SB01	SKILL BASED SUBJECT 1– INSTRUMENTATIONAL TECHNIQUES

Category	L	T	P	Credit
Theory	45	-	-	3

Preamble

To enable the students to

- learn the fundamentals of basic analytical procedures
- gain knowledge about different method of separation and purification techniques
- familiarize the volumetric and colorimetric methods of analysis

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Learn the fundamentals of basic instrumental techniques	K1
CLO2	Understand the theoretical principles and various methods of analysis	K2
CLO3	Relate the practical skills of analysis using various instrumentation techniques	K3
CLO4	Apply the various techniques in analysis	K4

Mapping with Programme Learning Outcomes

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

H: High, M: Medium, L: Low

SKILL BASED SUBJECT I–INSTRUMENTATIONAL TECHNIQUES (BF22SB01) (45 hrs)

Syllabus

Unit I Prerequisites to Analysis (9 hrs)

Laboratory Hygiene and Safety- Storage and Handling of Chemicals- Calibration of burette, pipette and volumetric flask, Care and use of analytical balance, actual weighing process, errorsin weighing, requirements of a good balance, electronic balance.

Unit II Volumetric analysis (9 hrs)

Definition, Standardisation, Experimental requirements for Volumetric Analysis, Concentration units, Types of Titrations, Indicators for Acid Base Titrations, Precipitation titrations, Redox Titrations, Self-Indicators, External Indicators, Complexometric titrations.

Unit III Separation and Purification Techniques (9 hrs)

Precipitation- Solvent extraction- Chromatography: Basic Principles and Types, Separation techniques: Dialysis, Distillation: Theory of distillation, Technique, Fractional and steam, electrophoresis, sedimentation, ultra-filtration, ultracentrifugation, iso-electric focusing Tests for purity- Melting point, boiling point, Refractive Index, density,

Unit IV Colorimertric analysis and Spectroscopy (9 hrs)

Colorimetric Analysis: Lambert's law, Beer's law, methods of colour measurement or colour comparison, basic principles and working of Colorimenter, Spectrophotometer, fluorescence,
IR, AAS, MS, NMR. Applications.

Unit V Other methods of Analysis (9 hrs)

pH metry, conductometry, polarimetry , potentiometry, Thermo gravimetry - Introduction, basic principles, types, procedure & applications, SDS PAGE, Agaros gel, Native gel , Radio Immuno Assay, Scintillation counting(Solid, Liquid, gas) , Elisa,

Text Books

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
1	Hagris, L.G	Analytical Chemistry – principles and Techniques	Englewood Cliffs, NJ : Prentice-Hall,	1988
2.	Mahindru,S.N.	Food additives. Characteristics, detection and estimation	Tata Mc Graw-Hill Publishing Company Limited	2000
3.	S M Khopkar	Basic Concepts of Analytical Chemistry	New Age International Publishers	2008

Reference Books

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
1	S. Suzzane Neilsen	Introduction to Chemical Analysis of Foods	CBS Publishers and Distributers	2002
2	Pomrenz Y & Meloan CE	Food Analysis - Theory and Practice.	CBS	1996
3.	Skoog, D.A., andLeary, J.J.	Principles of Instrumental Analysis,	Cengage	2014

Pedagogy: Blended leasrning, lecture by chalk and talk, power point presentation, group learning, groupdiscussion, assignment, quiz, peer learning, student seminar

Course Designers:

1. **Dr.M.C.Anitha**
2. **Ms.Iswarya A.L**
3. **Ms.Krishnapriya**

Module No	Topic	No. of Periods	Contact Delivery method	CLO's
Unit I (9 hours)				
1	Laboratory Hygiene and Safety Storage and Handling of Chemicals	3 hours	Lecture + Discussion	CLO 2, CLO 3, CLO 4
2	Calibration of burette, pipette and volumetric flask Care and use of analytical balance	2 hours	Lecture + Demonstration	CLO 2, CLO3, CLO 4
3	Actual weighing process Errors in weighing	2 hours	Lecture + Discussion	CLO 2, CLO 3
4	Requirements of a good balance Electronic balance	2 hours	Lecture + Discussion	CLO 2, CLO 3
Unit II (9 Hours)				
Module No	**Topic**	**No. of Periods**	**Contact Delivery method**	**CLO's**
1	Definition, Standardisation, Experimental requirements for Volumetric Analysis	3 Hours	Lecture +Discussion	CLO 1, CLO 2, CLO 3, CLO 4
2	Concentration units, Types of Titrations, Indicators for Acid Base Titrations,	2 hours	Lecture +Discussion	CLO 1, CLO2, CLO 3, CLO 4
3	Precipitation titrations, Redox Titrations, Self-Indicators	2 hours	Lecture +Discussion	CLO 1, CLO2, CLO 3
4	External Indicators, Complexometric titrations.	2 hour	Lecture +Discussion	CLO 1, CLO 2 CLO 3
Unit III (9 Hours)				
1	Precipitation- Solvent extraction	1 hour	Lecture	
2	Chromatography: Basic Principles and Types	2 hours	Lecture + PowerPoint Presentation	CLO2, CLO 3, CLO 4
3	Separation techniques: Dialysis	1 hour	Lecture + PowerPoint Presentation	CLO 2, CLO 3

4	Distillation: Theory of distillation, Technique, Fractional and steam, electrophoresis, sedimentation, ultra-filtration, ultracentrifugation, iso-electric focusing	3 hours	Lecture + PowerPoint Presentation	CLO 2, CLO 3, CLO 4
5	Tests for purity- Melting point, boiling point, Refractive Index, density,	2 hours	Lecture + PowerPoint Presentation	CLO 2, CLO 3
Unit IV (9 Hours)				
1	Colorimetric Analysis: Lambert's law, Beer's law,	3 hours	Lecture + Discussion +PowerPoint	CLO 1, CLO 2, CLO 3
2	methods of colour measurement or colour comparison, basic principles and working of Colorimenter	3 hours	Lecture + Discussion + PowerPoint	CLO 1, CLO 2, CLO 3, CLO 4
3	Spectrophotometer, fluorescence, IR, AAS, MS, NMR. Applications.	3 hours	Lecture + Discussion + PowerPoint	CLO 2, CLO 3, CLO 4
Unit V (9 Hours)				
1	pH metry, conductometry, polarimetry, potentiometry, Thermo gravimetry -	4 hours	Lecture + PowerPoint Presentation	CLO 2, CLO 3, CLO 4
2	SDS PAGE, Agaros gel, Native gel	2 hours	Lecture + PowerPoint Presentation	CLO 3, CLO 4
3	Radio Immuno Assay	1 hour	Lecture + PowerPoint Presentation	CLO 3, CLO 4
4	Scintillation counting (Solid, Liquid, gas)	1 hour	Lecture + PowerPoint Presentation	CLO 3, CLO 4
5	Elisa	1 hour	Lecture + PowerPoint Presentation	CLO 2, CLO 3

COURSE NUMBER	COURSE NAME
BF22C06	**CORE VI – FOOD PROCESSING AND PRESERVATION**

Category	L	T	P	Credit
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.
- learn the mode of irradiation, food preservatives and recent trends in preservative technology

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	Gaining knowledge on the recent techniques and advancements in processing and preservation	K2,K3

Mapping with Programme Learning Outcomes

CLOs	PLO1	POL2	PLO3	POL4	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 -VI - FOOD PROCESSING AND PRESERVATION (BF22C06) (73 Hrs)

Syllabus

UNIT-I Basic principles of food processing and preservation (15 hrs)

Food preservation - Need, importance, principals and methods. Perishable and non perishable foods. Water activity - definition and factors affecting water activity in food and its significance in food preservation, concept of shelf life. Food deterioration- causes

Food processing - Principles of heat and mass transfer- factors affecting - applications

Unit II Preservation by drying and high temperature (16 Hrs)

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,

Use of high temperature- principle and equipments: Methods - pasteurization, blanching, sterilization , canning- procedure, aseptic canning

Unit III Preservation by low temperature (16 hrs)

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.

Unit IV Non Thermal Processing (16Hrs)

Introduction to recent preservation techniques Irradiation- pulsed electric field, high pressure technology, ohmic heating, microwave heating, hurdle technology. Radio Frequency Pasteurization, Plasma-Activated Water**.**

Natural preservatives and chemical preservatives.

UNIT-V Recent Advances in Food Processing (10 hrs)

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

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	Norman N Potter Joseph H Hotchkiss	Food Science	CBS Publishers	2005
3	Norman W Desrosier James N Desrosier	The Technology of Food Preservation	CBS Publishers	2006
4	B. Sivasankar P	Food Processing and Preservation	PHI Learning Pvt. Ltd	2002

Reference Book

S. No	Authors	Title of the Book	Publishers	Year of Publication
1	Stewart GP and Amerine MA	Introduction to Food Science and Technology	Elsevier	2012
2	Vickie AV	Essentials of Food Science	Springer Science & Business Media	2012
3	James M Jay	Modern Food Microbiology	Springer	2012
4	Chris van Tulleken	Ultra-Processed People: The Science Behind Food That Isn't Food	W. W. Norton & Company	2023

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

Course Designers:

1. **Dr.M.C.Anitha**
2. **Ms. Santhiya**

COURSE NUMBER BF22CP4	CORE PPACTICAL -IV FOOD PRESERVATION PRACTICAL

Category	L	T	P	Credit
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
- understand the different techniques of fruit and vegetable processing in an industry

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	apply different methods to freeze and dry vegetables	K3
CLO2	employ processing methods to prepare food products	K3
CLO3	analyze the presence of food preservatives in food products	K4

Mapping with Programme Learning Outcomes

CLO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6
CLO1	H	H	H	H	H	H
CLO2	H	H	H	H	H	H
CLO3	H	H	H	H	H	H

H : High, M: Medium, L : Low

CORE PRACTICAL IV- FOOD PRESERVATION PRACTICALS- BF22CP4 (45 hrs)

Syllabus

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

Pedagogy: Demonstration and hands on practical

Text Books

S.No	Authors	Title of the Book	Publishers	Year of Publication
1	Girdhari Lal, G. S. Siddappa, G. L. Tandon,	Preservation of Fruits & Vegetables	Indian Council of Agricultural Research, Publications	1986
2	Shirley J.Vangrade, Margy Woodburn	Food preservation and safety,principles and practice	Surabhi publications	2005
3	Manoranjan kalia, Sangita sood	Food preservation and processing	Kalyani Publishers	2000

Reference Books

S. No	Authors	Title of the Book	Publishers	Year of Publication
1	Sivasankar B.	Food Processing and Preservation	Prentice Hall of India pvt. Ltd.	2005
2	P. Fellows	Food Processing Technology: Principles and Practice	CRC Press,	2000
3	Shafiur Rahman M.	Handbook of Food Preservation	CRC Press	2007
4	Ranganna S.	Handbook of Analysis and Quality Control for and Vegetable Products.	Tata-McGraw-Hill.	2001

Course Designers:

1. **Dr.M.C.Anitha**
2. **Mrs.M.Krishnapriya**

COURSE NUMBER- BF22C07	COURSE NAME – PRINCIPLES OF MARKETING	Category	L	T	P	Credit
		CORE 7	58	2	-	3

Preamble:

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

Course outcome

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 Outcome

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

S-Strong; M-Medium; L-Low

PRINCIPLES OF MARKETING - BF22C07 (58 Hours)

UNIT – 1 (12 Hours)

Introduction to Marketing: Meaning and Nature of Marketing - Market – Objectives and Characteristics- Marketing Functions- ***Marketing Management- Elements of marketing- mix**** - Consumer Behaviour- Factors influencing Buyer Behaviour. Customer Relationship Management: *** Definition-Need, Importance*** & Types.

UNIT – II (12 Hours)

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

UNIT – III (12 Hours)

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 – Labelling: ***Purpose and function of Labelling***.

UNIT – IV (11 Hours)

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

UNIT – V (11 Hours)

Latest trend in marketing - E Marketing- Tele Marketing- Marketing Technology (MarTech) - Social media marketing- green marketing, 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 food industry***.

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

Text Book:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	C.N.Sontaki	Marketing Management	Kalyani Publishers	2022
2.	Tapan K Panda	Marketing Management	Taxmann	2022

Reference Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	Philip Kotler and Kevin Lane Keller	Marketing Management	Sixteenth Edition, Pearson Education, New Delhi.	2022
2.	Ramasamy and S. Namakumari	Marketing Management	Saga Publication India Pvt.Ltd: sixth edition	2018
3	Rajan Nair	Marketing Management	Sultan Chand and Sons New.	Reprint 2018
4	Seema Gupta	Digital Marketing	McGraw Hill	2017

Blended Learning Links

Sl. No.	Units	Topics	Blended Learning Links
1.	Unit-I	Marketing Management	https://www.youtube.com/watch?v=TL0K0AhI7kE
2.		Elements of Marketing mix	https://www.youtube.com/watch?v=dV1LbZg0if4 https://www.youtube.com/watch?v=018ywRj7WF8&feature=emb_imp_woyt
3.		Customer relationship Management: Definition, Need, Importance.	NPTEL Video: http://www.digimat.in/nptel/courses/video/110105145/L01.html https://www.youtube.com/watch?v=9S9proEmevU
4.	Unit- II	Product life cycle, Pricing: Objectives and methods	https://www.youtube.com/watch?v=zUTmwdGX4Sg https://www.youtube.com/watch?v=LX8VMdFwxro
5.	Unit –III	Packaging: Definition and functions Labelling: Purpose and function	https://www.youtube.com/watch?v=HYkHVX_g_7w

6.		Brand identity	https://www.marketing91.com/brand-identity/ https://www.youtube.com/watch?v=uq8hlvuFA54&feature=emb_imp_woyt https://www.youtube.com/watch?v=aucfhUZhMMk
7.	Unit-IV	Channel Objectives, Functions and Types of Channels	https://youtu.be/TnMzqaX_5Uw?si=PGT5DHxy0cWvtyCs
8.	Unit -V	Marketing Ethics	https://www.youtube.com/watch?v=G0K9HpIPlR8

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

COURSE NUMBER	COURSE NAME
BF22A04	**Allied IV - Bakery and ConfectioneryTechnology**

Category	L	T	P	Credit
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

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	Gain knowledge on 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	H	H	H	M	H	H
CLO2	H	H	H	M	H	H
CLO3	H	H	H	M	H	H
CLO4	H	H	H	M	M	M

H- High; M-Medium; L-Low

Allied Paper -IV Bakery and Confectionery technology (BF22A04) (73Hrs)

Syllabus

Unit I Classification of Bakery Products (12 hrs)

Introduction to Baking techniques, 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 used for manufacturing of bakery products. Equipment and tools used. Bakery layout and design. Demonstration of pastry products

Unit II Manufacturing of Bread and Cakes (16 hrs)

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, Cake faults and remedies. Demonstration of breads and cakes

Unit III Manufacturing of Biscuit and Cookies (16 hrs)

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 (15 hrs)

Introduction – types of confectioneries, 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).

Unit V Chocolate and traditional Confectioneries (14 hrs)

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

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

Text Book

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
1	Samuel A. Matz	Bakery Technology and Engineering	Chapman and Hall	2005
2	Cauvain, Stanley, P. and Young, Linda S	Technology of Bread Making	Aspen Publication	1999
3	Servet Gulum Sumnu and Serpil Sahin	FoodEngineering Aspects of Baking Sweet Goods	CRC Press	2008
4	Ferenc A. Mohos	Confectionery and Chocolate Engineering: Principles and Applications	Wiley Blackwell	2010

Reference Books

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
1	Bernard, W. Minifie	Chocolate, cocoa and Confectionery	CBS Publishers and Distributors	1997
2	Pomeranz. Y.	Modern Cereal Science and Technology	MVCH Publications	1987
3	http://eacharya.inflibnet.ac.in/index.php/content/index/594515d68007bef81d3c4dfb			

Pedagogy

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

Course Designers:

1. **Dr. M. Guhapriya**
2. **Ms. R. Sharmila**
3. **Dr.M.C.Anitha**

COURSE NUMBER	COURSE NAME
BF22SB02	**SBS-Basics of Computer and Programming**

Category	L	T		Credit
Skill Based Subject	45			3

Preamble

To enable the students to

- learn the basic concepts to expose the fundamental knowledge of hardware and software of computers
- understand the different types of food technology
- gain knowledge related to the applications of computation in food industries
- acquaint the industrial applications of food technology

Course Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	List the characteristics of fundamental knowledge of hardware and software of computers	K2
CLO2	Understand the different types of network and programming	K2
CLO3	Describe the different applications of computation in food industries	K4
CLO4	Outline the industrial applications of food technology and compare the statistical package	K3, K4

Mapping with Programme Learning Outcomes

Course	Programme Outcome					
CLOS	**PLO1**	**PLO2**	**PLO3**	**PLO4**	**PLO5**	**PLO6**
CLO1	H	H	H	H	H	H
CLO2	H	H	H	H	H	M
CLO3	H	H	H	H	H	H
CLO4	H	H	H	H	M	H

CLO5	H	H	H	H	H	H

H- High; M- Medium; L - Low

SBS -Basics of Computer (BF22SB02)

Syllabus

UNIT I :Introduction to computer 9 hours

Introduction to Computer: Introduction, Generation of computers, Classification of Computers, Definition: Hardware, Software & firmware Hardware components, the system bus. Computer memory and its types, memory hierarchy. Computer software - System software, application software, Types of software.. Operating system, its types, and services. Booting.

Computer Network Design: Introduction: Computer Network, Type s- LAN, MAN & WAN, Data transmission modes. Serial & Parallel, Simplex, Half duplex & full duplex, Synchronous & Asynchronous transmission, Networking Devices-Repeaters, Hub, Switch, Bridge, Router, Gateway, and Modem,

Unit II : Database Concepts and Word Processing Tool 9 hours

Database, concepts and types, uses of DBMS/RDBMS in Agriculture Database design, creation, Database,Data Representation, Number systems (Binary, octal, Hexadecimal). Difference between ASCII & UNICODE (Different Encoding Schemes) Primary , Secondary Memory , Units used for measurement of memory , Input Output devices.

Microsoft Word and its applications , Font formatting, Paragraph formatting, Inserting images, auto shapes symbols, diagrams, header & footer, References, watermarks and Hyperlinks, Style & Formatting.

Unit III :Spreadsheet and presentation Tool 8 hours

Use of Spreadsheets for statistical analysis, evaluating mathematical & logical expressions. Use of Spreadsheets for Interpretation and graph creation.

PowerPoint Basics, Create Presentations, Insert and Modify Text, Work with Graphics and Media, Final Preparations, Deliver a Presentation.

Unit IV : Problem Solving and Programming **9 hours**

Introduction to Programming, types of computer programming languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to Python Programming: Data Types, Constants, Keywords, variables, input/output, Operators & Expressions, Control Structures.Applications of Python programming.

Unit V : Internet Basics and its Applications **8 hours**

Websites, Internet applications, Google Applications (G mail, Google search, G Drive, Google Docs, Google Sheet, Google Slides) and other Email Services, Industry customer approach. Applications of Artificial Intelligence, Internet of Things and Cloud Computing in food industry.

Practical Exercises

1. Resume Creation using Word Processing Tool
2. Prepare an assignment using Word Processing Tool
3. Preparation Marksheet using Spreadsheet.
4. Create worksheet with following fields Empno, Ename, Basic Pay(BP), Travelling Allowance(TA), Dearness Allowance(DA), House Rent Allowance(HRA), Income Tax(IT), Provident Fund(PF), Net Pay(NP) Given: DA= 30% of BP, HRA=20% of BP, TA=17.5% of BP, IT=15% of BP, PF=12.5% of BP
5. Create an Excel Worksheet for the monthly sales of a product and also represent the data by using bar chart?
6. Demonstrate financial functions using MS-Excel
7. Creating a Food item Table Using the Design View and generate report
8. Considering the sales data of a company, apply various slice and dice methods available in
9. pivot tables of MS Excel.
10. Create a sales data by considering the sales data of the company, and apply various slice and dice methods available in pivot table of MS- Excel
11. Create a graph for growth in Food processing sector and agriculture.
12. Prepare a presentation for thetopic "Innovative food processing techniques and technologies"
13. Create a annual report of your department using presentation tool.
14. Create a python programme to generate even numbers
15. Create a python programme to find the greatest of given two numbers

16. Create a python programme to find the sum, difference, product and division of given two numbers.

17. Create a python program to find the sub string

18. Create a Google document and Google sheet links.

Reference Books

S.No	Name of the Authors	Title of the Book	Publishers	Year of Publication
1	Priti Sinha, Pradeep K	Computer Fundamentals: Concepts, Systems and Applications – 6th Edition	BPB Publications	2004
2	Harjit Suman	Microsoft Office 365		2023
3	K. Varada Rajkumar, Dr. Marlapalli Krishna, S. Jaya Prakash	Basic Python Programming for Beginners	BlueRose Publishers	2021
4	Bonafice Benedict	Google App for Beginners: A Fundamental Guide to Mastering		2020
5	Allen Downey, Jeffrey Elkner, Chris Meyers	Learning with Python	Dreamtech Press	2015
6	John V Guttag	Introduction to Computation and Programming using Python	Prentice Hall of India	2016
7	Alexis Leon	Introduction to Computers	Leon Tech World	1999

Course Designers:

1. Dr. N. Deepa Sathish
2. Mrs. K. Geethalakshmi
3. Dr. R. Kowsalya

COURSE NUMBER- **NM22DTG**	COURSE NAME – **DESIGN THINKING**	**Category**	**L**	**T**	**P**	**Credit**
		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 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 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; L-Low

NM22DTG - DESIGN THINKING

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 andTechniques

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 of Publication
1.	Christian Mueller-Roterberg	Handbook of Design Thinking Tips& Tools for how to design thinking	Amazon Kindle Version	2018
2	Gavin AmbrosePaul 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 of Publication
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.html https://youtu.be/ls2mqHs02B0
UNIT IV	Define	http://acl.digimat.in/nptel/courses/video/10910410 9/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