PSGR Krishnammal College for Women

College of excellence nirf 2024 – 7th rank

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

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

2024 – 2027 Batch

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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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BACHELOR OF SCIENCE IN FOOD PROCESSING TECHNOLOGY AND MANAGEMENT
CHOICE BASED CREDIT SYSTEM (CBCS) & LEARNING OUTCOME BASED CURRICULAR FRAMEWORK (LOCF)
2024 -2027 BATCH & ONWARDS

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

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

	III	BF24C06	Fundamentals of Food Processing	CC	4	58	2	3	25	75	100	3
	III	TH24A23/ BF24A03	Numerical and Statistical Techniques/ Basics of Accountancy	GE	5	73	2	3	25	75	100	4
	III	BF23CP3	Unit Operations Practical	CC	3	45	-	3	15*	35*	50*	3
	III	BF24SB01	Generative AI for Food Industry	SEC	3	41	4	-	100	-	100	3
	IV	NM23DTG	Design Thinking	AEC	2	30	-	-	100	-	100	2
	IV	BF24INST1	Field Work/Institutional Training	DSE	-	-	-	-	-	-	100	2
I - III	VI	COM15SER	Community Services 30 hours	GC	-	-	-	-	-	-	-	Gr.
I - V	VI	24BONL1 24BONL2 24BONL3	Online Course I Online Course II Online Course III	ACC	-	-	-	-	-	-	-	-

L – Language E - English

CC – Core Courses CA – Continuous Assessment

GE – Generic Elective ESE - End Semester Examination AEC – Ability Enhancement Course ACC-Additional Credit Course

AECC - Ability Enhancement Compulsory Course, # - Self Study

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

Examination System

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

Question Paper Pattern

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

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

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

CA Question from each unit comprising of

One question with a weightage of 2 Marks : 2 x 3 = 6 Marks

One question with a weightage of 5 Marks : 5 x 3 = 15 Marks

(Internal Choice at the same CLO level)

One question with a weightage of 8 Marks : 8 x 3 = 24 Marks

(Internal Choice at the same CLO level)

Total **= 45 Marks**

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

Language and English – UG

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

Core & Allied (Theory)

Question from each unit comprising of

One question with a weightage of 2 Marks: 2 x 5 = 10 Marks

One question with a weightage of 5 Marks: 5 x 5 =25 Marks

(Internal Choice at the same CLO level)

One question with a weightage of 8 Marks : 8 x 5 = 40 Marks

(Internal Choice at the same CLO level)

Total = 75 Marks

Continuous Internal Assessment (CA)

Language, English, Core & Allied

CIA Test	- 5 Marks (Conducted for 45 marks after 50 days)
Model Exam	- 7 Marks (Conducted for 75 marks after 85 days - Q.P. Pattern (2,5,8 Marks) (Each Unit 15 Marks)
Sem/Ass/Quiz	- 5 Marks
Class Participation	- 5 Marks
Attendance	- 3 Marks (91-100% attendance: 3 Marks; 81-90% attendance: 2 Marks; 75-80% attendance: 1 Marks)
Total	**: 25 Marks**

Core Practical (25 marks)

Lab performance	: 7 marks
Regularity	: 5 marks
Model	:10 marks (Conducted for 75 marks)
Attendance	: 3 marks
Total	**: 25 Marks**

ESE Practical Pattern

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

Evaluation pattern for Core courses in COURSERA –

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

Skill Based Theory

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

Introduction to Entrepreneurship

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

Design Thinking

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

Field Training / Institutional Training

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

Viva : 25 marks

Work diary : 15 marks

Report : 50 marks

Attendance : 10 marks

Total : 100 marks

SEMESTER I

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

Preamble

To enable the students to

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium

Food Science (BF24C01) **(58Hrs)**

Syllabus

Unit I Food Science (12Hrs)

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

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

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

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

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

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

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

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

Unit III Vegetables and Fruits (10 Hrs)

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

Unit IV Meat, Fish and Poultry (12 Hrs)

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

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

Poultry – classification, composition and nutritivevalue.

Unit V Egg, Milk and Sugar (11Hrs)

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

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

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

Text Books

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

Reference Book

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

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

Pedagogy

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

Course Designers:

1. **Dr. N. Deepa Sathish**

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium; L-Low

PRINCIPLES OF MANAGEMENT - BF24C02 (73 Hours)

UNIT – I (14 Hours)

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

*__Functions of Management*__-IKS in management.

UNIT – II (15 Hours)

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

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

UNIT – III (15 Hours)

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

UNIT – IV (14 Hours)

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

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

UNIT – V (15 Hours)

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

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

TEXT BOOKS:

Sl. No.	Author(s)	Title of the Book	Publisher	Year & Edition
1.	Harold Koontz and Heinz Weihrich	Essentials of Management	Tata McGraw Hill	2023 10th Edition

2.	Dr. Mishra & Gupta	Principles of Management	SBPD PublishingHouse	2021 1st Edition

REFERENCE BOOKS:

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

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

Blended Learning Links:

SI.No.	**Units**	**Topics**	**Blended Learning Links**
1	1	Scope, Features and Levels of Management	https://www.youtube.com/watch?v=X_0LEIQbgwg
2		Functions of Management	https://www.youtube.com/watch?v=pzSRAM5Hvg4
3	2	Nature, Characteristics and Importance of Planning	https://www.youtube.com/watch?v=zuM3u0du_5g
4		Features of decision making	www.youtube.com/watch?v=KWy_m6QfFhw
5	3	Principles of Organizing	https://www.youtube.com/watch?v=v9YkwuPPWxQ https://www.youtube.com/watch?v=p7zjC-HPCYM
6		Importance of Organization	https://www.youtube.com/watch?v=UEXrsZ3vkx0
7	4	Characteristics of control – Importance of controlling	https://www.youtube.com/watch?v=__x1O5xaAsY https://www.youtube.com/watch?v=0HeAbUD4H78
8	5	Ethics in food industry	https://www.youtube.com/watch?v=5Qxd7scGnas

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

Preamble

To enable the students to

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium

Principles of Food and Nutrition (BF24A01) (73 Hrs)

Syllabus

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

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

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

Unit II Proximate principles (15 Hrs)

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

Unit III Energy, Water and Electrolytes (15 Hrs)

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

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

Unit IV Vitamins (14 Hrs)

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

Unit V Minerals **(14 Hrs)**

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

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

Text Books

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

Pedagogy

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

Course Designers:

1. Dr. N. Deepa Sathish

2. Ms. Santhiya R

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

Preamble

To enable the students to

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

Course Learning Outcomes

On successful completion of the course

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

Mapping with Programme Learning Outcomes

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

S- Strong

FOOD SCIENCE PRACTICAL (BF24CP1)

Total Hours :45 **Credit:3**

Syllabus

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

Text Books

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

Reference Books

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1.	Paul and Paulmer	Food Theory and Application	John Wiley and sons, New York	1972
2.	Norman N. Potter and Joseph H. Hotchkiss,	Food Science	CBS Publishers 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.N.Deepa Sathish
2. Ms. Sujithra S

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

Preamble

To enable the students to

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

Course Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S-Strong

NUTRITIONAL MENU PLANNING PRACTICAL (BF24AP1)

Total Hours: 45 **Credits: 2**

1. Calculation of energy values in foods from food composition tables and Preparation of food exchange lists
2. Calculation of basal metabolic rate and energy requirements of an individual per day.
3. Preparation and standardization of recipes, portion control and calculation of nutritive value
    i. Controlling techniques - Weights and measures standard, household measures for raw and cooked food
    ii. Basic preparation of various foods from different food groups & their nutritive value(porridges,Salads, Beverages,Soups, desserts and puddings, custard, kheer, ice cream, poached, scrambled,fried omlette & eggnogs and meat preparations)

4. Preparation of a day's diet and calculation of Nutritive value
    a. Pregnant and Lactating Mother
    b. Infants
    c. School going children
    d. Adolescents
    e. Adults and
    f. Elderly people

5. Preparation of a day's diet and calculation of Nutritive value for various health conditions
    i. Weaning food
    ii. Iron rich food
    iii. Underweight
    iv. Obesity

6. Methods of Assessing Nutritional status of an individual- BMI, Head circumference, Upper arm, mid arm circumference, skin fold thickness

Text Books

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

Pedagogy

Demonstration and hands on practical's

Course Designers:

1. **Dr. N. Deepa Sathish**

SEMESTER II

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

Preamble

Enable the students to

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

Course Learning Outcomes

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

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

Mapping with Programme Outcomes

CLOs	PL O1	PL O2	PL O3	PL O4	PL O5	PL O6
CLO1	S	M	M	S	S	S
CLO2	S	M	M	S	S	S
CLO3	S	M	M	S	S	S
CLO4	S	M	M	S	S	S

S-Strong; M-Medium

Fundamentals of Food Chemistry and Properties (BF24C03) (73 hrs)

Syllabus

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Electrical Properties - Electrical conductivity and its measurement

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

Textbooks :

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

Reference Books

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

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

Course Designers:

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

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

Preamble

To enable the students to

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium

Food Microbiology (BF24C04) **(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 the food industry

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

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

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

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

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

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

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

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

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

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

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

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

Text Book

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

Reference Books

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

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

Course Designers:

1. Dr.N.Deepa Sathish

2. Ms. Santhiya R

3. Ms. Dharrshne S. V

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

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium

Microbiology Practical (BF23CP2)

Under DBT scheme

Total Hours: 45 **Credits : 3**

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

Pedagogy: Demonstration and hands on practical

Text Books

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

Reference Books

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

Course Designers:

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

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

Preamble

To enable the students to

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S - Strong; M-Medium

Nutritional Biochemistry (BF24A02) **(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	Ghosh, S., Chakraborty, S., and Sharma, S.	Nutritional Biochemistry: An Introduction	Wiley India	2022
2	Bender, D. A.	Nutritional Biochemistry of the Vitamins	Academic Press	2021, 2nd edition
3	Mahan, L. K., Escott-Stump, S.	Krause's Food & the Nutrition Care Process	Elsevier	2022, 16th edition

Reference Books

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

Pedagogy

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

Course Designers:

1. **Dr. N. Deepa Sathish**

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

Preamble

To enable the students to

- Identify sugars and amino acids.
- Estimate metabolites of blood and urine sample

Course Learning Outcomes

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

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

Mapping with Programme Outcomes

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

S- Strong; M- Medium;

Biochemistry Practical (BF24AP2)

Total hours: 45 **Credit: 2**

Qualitative analysis

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

Quantitative analysis :

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

Pedagogy: Demonstration and hands on practical

Text Books:

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

Reference Books

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

Course Designers:

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

SEMESTER III

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

Preamble

To enable the students to

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium

UNIT OPERATIONS (BF24C05) 73 Hours

Syllabus

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

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

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

Unit II Size reduction processes **14 hours**

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

Unit III Separation processes **15 hours**

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

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

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

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

Unit IV Drying and Evaporation **15 hours**

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

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

Unit V Distillation & Crystallization **15 hours**

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

Text Books

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

Reference Books

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

Blended learning links

S. No.	Unit	Topics	Links
1.	I	Introduction to Unit operations	https://youtu.be/C7Vey3qzRqw https://dl.icdst.org/pdfs/files1/0d697ccbbfd1ef3ec6dbf714d56fa24c.pdf
2.	II	Size reduction processes	https://youtu.be/f-tOL83XIQY https://nzifst.org.nz/resources/unitoperations/index.htm

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

Pedagogy

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

Course Designers:

1. **Dr. Sivasankari R**

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

Preamble

To enable the students to

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium

UNIT OPERATIONS PRACTICAL – BF23CP3 **45 Hours**

Syllabus

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

Text Books

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

Pedagogy: Demonstration and hands on practical

Course Designers:

1. Dr. Sivasankari R

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

Preamble

To enable the students to

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S - Strong; M-Medium

Fundamentals of Food Processing (BF24C06) 58 Hours

Syllabus

UNIT I Cereal and Pulse Processing 13 Hours

Cereals – Properties of paddy, Varieties and quality characteristics. **Paddy** – parboiling, physico-chemical changes during parboiling. Milling of rice - traditional and modern methods. **Wheat & Maize** - Milling –basic concepts, products and by-products. **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 Hours

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

UNIT III Nuts & Oilseeds processing 10 Hours

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

UNIT IV Dairy processing 10 Hours

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

UNIT V Flesh food processing 13 Hours

Meat – Sources of meat, Slaughtering – methods, ante mortem & postmortem changes, shelf life of meat. Processed meat products – cured, smoked, pickled, frozen, salted, canned and dehydrated meat. **Seafood** – Types, cuts of fish, pre-preparation and processing of fish – curing, smoking,

drying, chilling, salting, canning. & byproducts – fish oil, fish meal, fish silage, fish ambergris, fish squalene

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

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

Text Books

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

Reference books

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

Pedagogy

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

Course Designers:

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

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

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

NUMERICAL AND STATISTICAL TECHNIQUES (TH24A23)

Credits : 4 **Hours : 73**

Syllabus

Unit I **15 Hours**

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

Unit II **15 Hours**

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

Unit III **15 Hours**

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

Unit IV **15 Hours**

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

Unit V **13 Hours**

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

Text Books

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

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

Reference Books

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

MOOC learning

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

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

Lecture 02 Gaussian elimination with partial pivoting

Lecture 04 Jacobi and Gauss Seidel methods

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

Lecture 34 Simpsons 1/3rd rule and 3/8 rule https://nptel.ac.in/courses/111/106/111106112/ (6 Lectures by Prof. G.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 Designers:

1. Mrs K.Sharmilaa, Assistant Professor

2. Mrs.S Aishwarya, Assistant Professor

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

Preamble:

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

BASICS OF ACCOUNTANCY - BF24A03 **73 Hours**

Unit: I **14 Hours**

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

Unit: II **14 Hours**

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

Unit: III: **15 Hours**

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

Unit: IV: **15 Hours**

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

Unit: V: **15 Hours**

Ratio Analysis: ***Nature of Ratio Analysis - Significance* -** 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 (Theory Only).

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

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

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

TEXT BOOKS:

REFERENCE BOOKS:

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

Blended Learning Links:

SI. No.	Units	Topics	Blended Learning Links
1	I	Introduction to IFRS- Concept and objectives & principles	https://www.youtube.com/watch?v=aL5UFu6Qtes

2		Kinds of Accounts	https://www.youtube.com/watch?v=AQvxKosUBf4&t=221s https://youtu.be/hvUY6i4rUVk
3	II	Meaning, Need for depreciation	https://www.youtube.com/watch?v=N5Wh2NNkqpU&t=1s https://youtu.be/fINkBABbqZU
4	III	Computerized accounting: Needs & Importance	https://youtu.be/BDTZuM7T4Kw
5	IV	Cost accounting: Types of cost	https://youtu.be/_z4-7xr6ur8 https://youtu.be/X3c4XOmP7AE
6		Management Accounting	https://youtu.be/eUMwwp5zDW0
7	V	Nature of Ratio Analysis, Significance	https://youtu.be/y132ILD4Vvg https://youtu.be/KjmGvEJqz3M https://www.youtube.com/watch?v=Wv5ojR1WaA4&t=1200s

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

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

Preamble:

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

Course Learning Outcome

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

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

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium

NM23DTG - DESIGN THINKING

Syllabus **(30 Hrs)**

UNIT – 1 **6 Hours**

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

UNIT – II **6Hours**

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

UNIT – III **6 Hours**

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

UNIT – IV **6 Hours**

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

UNIT – V **6 Hours**

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

Text Books:

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

Reference Books:

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

Blended Learning Links

UNIT	TOPICS	LINK
UNIT I	Introduction to Design Thinking	https://www.digimat.in/nptel/courses/video/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

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

Preamble

To enable the students to

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium

UNIT OPERATIONS (BF24C05) 73 Hours

Syllabus

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

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

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

Unit II Size reduction processes **14 hours**

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

Unit III Separation processes **15 hours**

Definition and Introduction to Separation; Types of Separators and its applications in food industry. **Mechanical Separations**: Screening and Screening equipment, sedimentation: principle, equipment and applications.

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

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

Unit IV Drying and Evaporation **15 hours**

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

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

Unit V Distillation & Crystallization **15 hours**

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

Text Books

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

Reference Books

S. No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1.	Raul R. Rodriguez and José M. G. Laencina	Principles of Food Engineering	CRC Press	2023 and 5th edition
2.	Gustavo V. Barbosa-Cánovas, José M. Aguilera, and Carmen A. García	Food Engineering: From Concept to Consumer	Springer	2023 and 1st edition

Module No.	Topic	CLOs	No. of hours	Content delivery method	Learning methods

3.	Richard W. Hartel, David G. Boulton, and Geoffrey H. H. McMaster	Food Engineering: Principles and Modern Applications	Wiley-Blackwell	2021 and 1st edition
4.	Dennis R. Heldman and Daryl B. Lund	Food Engineering Handbook	CRC Press	2021 and 3rd edition

Blended learning links

S. No.	Unit	Topics	Links
1.	I	Introduction to Unit operations	https://youtu.be/C7Vey3qzRqw https://dl.icdst.org/pdfs/files1/0d697ccbbfd1ef3ec6dbf714d56fa24c.pdf
2.	II	Size reduction processes	https://youtu.be/f-tOL83XIQY https://nzifst.org.nz/resources/unitoperations/index.htm
3.	III	Separation processes	https://youtu.be/P4otdiiY6X8 https://archive.org/details/unitoperationsin0000earl
4.	IV	Drying and Evaporation	https://youtu.be/XYkxqrwmrF8 https://www.academia.edu/29604704/UNIT_OPERATIONS_IN_FOOD_PROCESSING
5.	V	Distillation & Crystallization	https://www.scribd.com/document/511144815/Unit-operations-in-food-processing-notes

Pedagogy

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

Unit Operations - Contents and Presentation Schedule

Unit – I Introduction to Unit Operations					
1	Fundamentals of unit operations	CLO1 CLO3	1	Lecture – Chalk and Talk, Demonstration	Problem-based Learning
2	Processing of food products	CLO1 CLO3	1	PPT , Chalk and Talk,	Problem-based Learning
3	Handling of food products	CLO2 CLO3	1	Chalk and talk/ Picture	Participatory Learning
4	Pre-treatment operations	CLO2 CLO3	1	Chalk and talk/ Picture	Participatory Learning
5	Cleaning	CLO2 CLO4	1	PPT, Lecture / Demonstration	Problem-based Learning
6	De-hulling /De-husking	CLO2 CLO4	1	Chalk & talk, PPT, Picture	Experiential Learning
7	Peeling	CLO2 CLO4	1	Lecture , PPT	Participatory Learning
8	Mixing and Forming	CLO2 CLO4	1	Chalk & talk, PPT/Pictures	Experiential Learning
9	Sorting and Grading	CLO2 CLO4	1	Chalk & talk, PPT/Pictures	Experiential Learning
10	Indian Traditional Food Processing Techniques: Indigenous methods of pre-treatment operations - manual dehulling, traditional grinding stones,	CLO2 CLO4	1	Chalk and talk/ Picture	Experiential Learning
11	sun drying and age-old fermentation techniques.	CLO2 CLO4	1	Lecture, PPT, Pictures	Participatory Learning
12	Equipments used for cleaning, dehulling & Peeling	CLO2 CLO4	1	Chalk & talk, PPT/Pictures	Experiential Learning
13	Equipments used for Mixing, forming, sorting & Grading	CLO2 CLO4	1	Chalk & talk, PPT/Pictures	Experiential Learning
14	Size reduction and separation.	CLO2 CLO4	1	Lecture / Demonstration	Problem-based Learning

Unit – II Size reduction processes

15	Principles and theory of size reduction	CLO1 CLO3	1	Lecture , PPT	Problem-based Learning
16	Size reduction methods - compression, impact, shearing and cutting	CLO1 CLO3	1	Lecture / Seminar	Problem-based Learning
17	Cereal grinding and degree of grinding	CLO1 CLO3	1	Lecture / PPT	Problem-based Learning
18	Size reduction machinery	CLO2 CLO4	1	Lecture / Pictures	Participatory Learning
19	Crusher	CLO2 CLO4	1	PPT, Lecture / Demonstration	Problem-based Learning
20	Grinder	CLO2 CLO4	1	Chalk & talk, PPT, Picture	Experiential Learning
21	Attrition mills and hammer mill	CLO2 CLO4	1	Lecture , PPT	Experiential Learning
22	Hammer mill	CLO2 CLO4	1	Lecture , PPT	Experiential Learning
23	Ball mills & Rietz mill	CLO2 CLO4 CLO3	1	Chalk & talk, PPT/Pictures , Demonstration	Problem-based Learning
24	Standard sieves	CLO2 CLO4	1	Lecture / Demonstration	Problem-based Learning
25	Oil expression	CLO1 CLO3	1	Chalk and talk/ Picture	Experiential Learning
26	Extraction Techniques	CLO1 CLO3	1	Chalk and talk/ Picture	Experiential Learning
27	Hydraulic press	CLO2 CLO4	1	Lecture, PPT, Pictures	Participatory Learning
28	Screw press	CLO2 CLO4	1	Lecture / Demonstration	Problem-based Learning
Unit – III Separation processes					

29	Definition and Introduction to Separation	CLO1 CLO3	1	Lecture – Chalk and Talk, Demonstration	Participatory Learning
30	Types of Separators and its applications in food industry	CLO1 CLO2 CLO4	1	PPT , Chalk and Talk	Problem-based Learning
31	Mechanical Separations	CLO1 CLO3	1	Chalk and talk/ Picture	Participatory Learning
32	Screening and Screening equipment	CLO2 CLO3	1	Chalk and talk/ Picture	Participatory Learning
33	Sedimentation: Principle	CLO1 CLO3	1	Chalk and talk/ Picture	Experiential Learning
34	Equipment and applications.	CLO2 CLO4	1	Lecture , PPT	Problem-based Learning
35	Principle involved in centrifugation	CLO1 CLO3	1	PPT, Lecture	Experiential Learning
36	Equipment involved in centrifugation	CLO2 CLO4	1	Chalk & talk, PPT, Picture	Experiential Learning
37	Liquid-liquid centrifugation,	CLO, CLO4	1	Lecture , PPT	Problem-based Learning
38	Liquid- solid centrifugation,	CLO2 CLO4	1	Chalk & talk, PPT/Pictures	Problem-based Learning
39	Clarifiers and de-sludging	CLO1	1	Chalk and talk/ Picture	Problem-based Learning
40	Decanting machines and its applications	CLO2 CLO4		Chalk and talk/ Picture	Problem-based Learning
41	Principles involved in filtration	CLO1 CLO3	1	Lecture, PPT, Pictures	Participatory Learning
42	Membrane separation	CLO2 CLO4	1	Lecture / Demonstration	Problem-based Learning
43	Pressure and vacuum filtration	CLO2 CLO4	1	Lecture, PPT, Pictures	Participatory Learning
Unit – IV Drying & Evaporation					

44	Introduction to drying and evaporation	CLO1	1	Lecture, PPT, Pictures	Participatory Learning
45	Theory of drying	CLO1 CLO3	1	Lecture – Chalk and Talk, Demonstration	Problem-based Learning
46	Factors influencing drying rate	CLO1 CLO2 CLO3	1	PPT , Lecture, Demonstration	Problem-based Learning
47	Different methods of drying	CLO1	1	Lecture, PPT, Pictures	Participatory Learning
48	Traditional methods	CLO3	1	Chalk and talk/ Picture	Experiential Learning
49	Modern methods	CLO3	1	Chalk and talk/ Picture	Experiential Learning
50	Types of driers	CLO2	1	PPT, Lecture , Videos	Participatory Learning
51	Basic principle of evaporation	CLO1 CLO3	1	Chalk & talk, PPT, Picture	Experiential Learning
52	Need for evaporation	CLO1 CLO3	1	Lecture , PPT	Participatory Learning
53	Design of evaporation system	CLO2 CLO4	1	Chalk & talk, PPT/Pictur es	Experiential Learning
54	Retention time	CLO1 CLO3	1	Chalk and talk/ Picture	Problem-based Learning
55	Types of Evaporators	CLO1 CLO3	1	Lecture, PPT, Pictures	Participatory Learning
56	Single effect evaporator	CLO2	1	Lecture / Demonstra	Problem-based

		CLO4		tion	Learning
57	Multiple effect evaporators	CLO2 CLO4	1	Lecture / Demonstra tion	Problem-based Learning
58	Thermo compression system	CLO, CLO4	1	Lecture, PPT, Pictures	Participatory Learning
Unit –V Distillation & Crystallization					
59	Theory of distillation	CLO1 CLO3	1	Lecture – Chalk and Talk,	Participatory Learning
60	Working	CLO1 CLO3	1	Lecture – Chalk and Talk,	Participatory Learning
61	Principles of distillation	CLO1 CLO2 CLO3	1	PPT , Chalk and Talk	Problem-based Learning
62	Applications in food industry	CLO2 CLO3 CLO4	1	Chalk and talk/ Picture	Experiential Learning
63	Liquid vapor equilibrium	CLO2 CLO3 CLO4	1	Chalk and talk/ Picture	Experiential Learning
64	Distillation of binary mixtures	CLO2	1	PPT, Lecture	Problem-based Learning
65	Simple distillation	CLO1 CLO3	1	Chalk & talk, PPT, Picture	Experiential Learning
66	Steam distillation	CLO1 CLO3	1	Lecture , PPT. Demonstration	Problem-based Learning
67	Vacuum distillation	CLO2 CLO4	1	Chalk & talk, PPT/Pictures	Experiential Learning
68	Fractional distillation.	CLO2 CLO4	1	Chalk & talk, PPT/Pictures	Experiential Learning
69	Theory of crystallization.	CLO1 CLO3	1	Chalk and talk/ Picture	Problem-based Learning
70	Working principle of crystallization.	CLO1 CLO3	1	Chalk and talk/ Picture	Problem-based Learning

71	Nuclei formation	CLO1 CLO3	1	Lecture, PPT, Pictures	Problem-based Learning
72	Crystallization equipments	CLO2 CLO4	1	Lecture, PPT/ Demonstration	Participatory Learning
73	Applications in food industries	CLO2 CLO4	1	Lecture, PPT, Pictures	Participatory Learning

Course Designers:

2. **Dr. Sivasankari R**

Name of the course	**Unit Operations**
Name of the Faculty	Dr. Sivasankari R
Participatory Learning	30 %
Experiential Learning	30%
Problem-based Learning	40 %

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

Preamble

To enable the students to

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6

CLO1	S	S	S	S	S	M
CLO2	S	S	S	S	S	M
CLO3	S	S	S	S	S	M
CLO4	S	S	S	S	S	M

S- Strong; M-Medium

UNIT OPERATIONS PRACTICAL – BF23CP3 **45 Hours**

Syllabus

11. Determination of density and porosity of food grains
12. Determination of drying characteristics of food materials.
13. Physical Properties of Extruded Foods
14. Determination of Size reduction in Ball Mill
15. Determination of particle size of granular foods by sieve analysis.
16. Estimation of thermal conductivity.
17. Analysis of flow rate through flow through pipes.
18. Estimation of Diffusion Coefficient
19. Estimation of vaporization efficiency and thermal efficiency of Steam Distillation
20. Visit to food processing industries

Text Books

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

Pedagogy: Demonstration and hands on practical

Unit Operations Practical					
Module No.	**Topic**	**CLOs**	**No. of hours**	**Content delivery method**	**Learning methods**
1	Determination of density and porosity of food grains	CLO1	3	Demonstration	Problem-based Learning
2	Determination of drying characteristics of food	CLO3	6	Demonstration	Experiential Learning

Contents and Presentation Schedule

	materials.				
3	Physical Properties of Extruded Foods	CLO3	6	Demonstration	Problem-based Learning
4	Determination of Size reduction in Ball Mill	CLO1 CLO2 CLO3	3	Demonstration	Problem-based Learning
5	Determination of particle size of granular foods by sieve analysis.	CLO1	3	Demonstration	Problem-based Learning
6	Estimation of thermal conductivity.	CLO4	3	Demonstration	Experiential Learning
7	Analysis of flow rate through flow through pipes.	CLO1	6	Demonstration	Problem-based Learning
8	Estimation of Diffusion Coefficient	CLO1	3	Demonstration	Experiential Learning
9	Estimation of vaporization efficiency and thermal efficiency of Steam Distillation	CLO4	6	Demonstration	Experiential Learning
10	Visit to food processing industries	CLO1 CLO2 CLO3 CLO4	6	Industrial visit	Participatory Learning

Course Designers:

2. Dr. Sivasankari R

Name of the course	**Unit Operation Practical**
Name of the Faculty	Dr Sivasankari R
Participatory Learning	10%
Experiential Learning	40 %
Problem-based Learning	50 %

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

Preamble

To enable the students to

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S - Strong; M-Medium

Fundamentals of Food Processing (BF24C06) 58 Hours

Syllabus

UNIT I Cereal and Pulse Processing 13 Hours

Cereals – Properties of paddy, Varieties and quality characteristics. **Paddy** – parboiling, physico-chemical changes during parboiling. Milling of rice - traditional and modern methods. **Wheat & Maize** - Milling –basic concepts, products and by-products. **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 Hours

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

UNIT III Nuts & Oilseeds processing 10 Hours

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

UNIT IV Dairy processing 10 Hours

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

UNIT V Flesh food processing 13 Hours

Meat – Sources of meat, Slaughtering – methods, ante mortem & postmortem changes, shelf life of meat. Processed meat products – cured, smoked, pickled, frozen, salted, canned and dehydrated meat.

Seafood – Types, cuts of fish, pre-preparation and processing of fish – curing, smoking, drying, chilling, salting, canning. & byproducts – fish oil, fish meal, fish silage, fish ambergris, fish squalene

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

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

Text Books

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

Reference books

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

Pedagogy

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

Contents and Presentation Schedule

Module no	Topic	Knowledge level	No. Of periods	Content delivery method	Participatory/ Experimental/ Problem based Learning
UNIT I - CEREAL AND PULSE PROCESSING					
1	Cereals – Properties of paddy, Varieties and quality characteristics.	CLO 1 CLO 2	1	Chalk and Talk	Participatory Learning
2	Paddy – parboiling, physico-chemical changes during parboiling.	CLO 1 CLO 2 CLO 3	1	Chalk and Talk	Participatory Learning
3	Milling of rice – traditional methods	CLO 2 CLO 3	1	Lecture / Discussion	Participatory Learning
4	Milling of rice - modern methods	CLO 2 CLO 3	1	Lecture / OER	Experimental Learning
5	Wheat - Milling –basic concepts, products	CLO 1 CLO 2 CLO 3 CLO 4	1	Chalk and Talk	Participatory Learning
6	Maize - Milling –basic concepts, products	CLO 1 CLO 2 CLO 3 CLO 4	1	Lecture / Picture	Experimental Learning
7	By products of wheat & maize	CLO 2 CLO 3 CLO 4	1	Lecture / Picture	Experimental Learning
8	Millets – milling methods of sorghum	CLO 3 CLO 4	1	Lecture / Video	Experimental Learning
9	Millets – milling methods of finger millet & pearl millet	CLO 2 CLO 3 CLO 4	1	OER / Picture	Experimental Learning

10	Pulses – pre-treatment	CLO 1 CLO 2 CLO 3 CLO 4	1	Video / Picture	Participatory Learning
11	Pulse milling – traditional	CLO 2 CLO 3 CLO 4	1	Video / Picture	Participatory Learning
12	Pulse milling – modern	CLO 2 CLO 3 CLO 4	1	Video / Picture	Participatory Learning
13	Grain storage methods - traditional and modern	CLO 3 CLO 4	1	OER / Picture	Experimental Learning
UNIT II - FRUITS AND VEGETABLE PROCESSING					
14	Harvesting, Post harvest losses - causes	CLO 1	1	Lecture / Video	Participatory Learning
15	Processing: canning – principle and steps	CLO 2 CLO 3 CLO 4	1	Lecture / Video / Flipped classroom	Experimental Learning
16	Problems in canned foods	CLO 3	1	Research article reading	Problem-based Learning
17	Drying & dehydration – principles, drying curve, osmotic dehydration	CLO 1 CLO 2 CLO 3	1	Demonstration	Experimental Learning
18	Intermediate moisture foods – characteristics and importance	CLO 1 CLO 2 CLO 3	1	Demonstration	Experimental Learning
19	Minimal processing – principle techniques	CLO 1 CLO 2 CLO 3	1	Review article reading	Experimental Learning
20	Hurdle technology – principle techniques	CLO 2 CLO 3	1	Virtual lab	Experimental Learning
21	Fruits and vegetable processing – ketchup/sauce	CLO 2 CLO 3 CLO 4	1	Demonstration	Experimental Learning
22	Fruits and vegetable processing – fruit bar	CLO 2 CLO 3	1	Demonstration	Experimental Learning

23	Fruits and vegetable processing – soup powder	CLO 2 CLO 3 CLO 4	1	Demons tration	Experimental Learning
24	Fruits and vegetable processing – dehydrated fruits and vegetables	CLO 2 CLO 3 CLO 4	1	Video/ Lecture	Participatory Learning
25	Fruits and vegetable processing – fermented vegetables	CLO 2 CLO 3 CLO 4	1	Video/ Lecture	Participatory Learning
UNIT III: NUTS & OILSEEDS PROCESSING					
26	Handling and storage of oilseeds	CLO 1 CLO 2	1	Lecture / PPT	Participatory Learning
27	Processing of oil seeds	CLO 2 CLO 3 CLO 4	1	Video/ Lecture	Participatory Learning
28	Processing and production of coconut oil		1	Lecture / PPT	Participatory Learning
29	Processing and production of groundnut oil		1	Virtual lab	Experimental Learning
30	Processing and production of sesame oil		1	Lecture / PPT	Participatory Learning
31	Processing and production of sunflower oil		1	Virtual lab	Experimental Learning
32	Methods - traditional method - Ghani, expeller, hydraulic presser	CLO 2 CLO 4	**1**	Lecture / PPT	Participatory Learning
33	Methods - modern method - solvent extraction of oil and refining.	CLO 2 CLO 4	**1**	Lecture / PPT	Participatory Learning
34	Processing of cashewnut, arecanut, walnut	CLO 2 CLO 3 CLO 4	**1**	Lecture / PPT	Participatory Learning
35	Processing of hazelnut, almonds, pistachios	CLO 2 CLO 3 CLO 4	**1**	Case study / Pro-Con grid	Problem-based Learning
UNIT IV - DAIRY PROCESSING					
36	Physico - chemical properties of milk constituents	CLO 2 CLO 3	1	Lecture / PPT	Participatory Learning
37	Types of milk	CLO 1 CLO 2	1	Flipped classroom	Experimental Learning

38	types of special milks	CLO 2 CLO 3 CLO 4	1	Lecture / PPT	Participatory Learning
39	Processing of milk and milk products – milk powder	CLO 2 CLO 3 CLO 4	1	Review article reading	Experimental Learning
40	Processing of milk and milk products – butter	CLO 1 CLO 2 CLO 3 CLO 4	1	Video / Observation	Experimental Learning
41	Processing of milk and milk products –ghee	CLO 3 CLO 4	1	Demonstration	Experimental Learning
42	Processing of milk and milk products – cheese	CLO 2 CLO 3 CLO 4	1	Lecture PPT	Participatory Learning
43	Processing of milk and milk products –yoghurt	CLO 2 CLO 3 CLO 4	1	PPT , Lecture/ Demonstration	Problem-based Learning
44	Quality evaluation of milk products	CLO 2 CLO 3 CLO 4	1	Chalk & talk, PPT, Picture	Experimental Learning
45	Insanitation of milk	CLO 2 CLO 3 CLO 4	1	Chalk and talk/ Picture	Participatory Learning
UNIT V: FLESH FOOD PROCESSING					
46	Meat – Sources of meat	CLO 1 CLO 2	1	Lecture / Video	Participatory Learning
47	Slaughtering – methods,	CLO 1 CLO 3	1	Chalk and talk/ Picture	Participatory Learning
48	Ante mortem & postmortem changes, shelf life of meat.	CLO 2 CLO 3	1	Case thinking, Quiz /Spotters	Problem - based Learning
49	Processed meat products – cured, smoked, pickled, frozen.	CLO 2 CLO 3 CLO 4	1	Spotters / Lecture	Experimental Learning
50	Processed meat products -, salted, canned and dehydrated meat	CLO 2 CLO 3 CLO 4	1	Spotters / Lecture	Experimental Learning
51	Seafood – Types, cuts of fish, pre-preparation and	CLO 1 CLO 2 CLO 3 CLO 4	1	Lecture / PPT	Participatory Learning
52	Processing of fish – curing, smoking, drying, chilling, salting,	CLO 2 CLO 3		Flipped classroom	Problem-based Learning

	canning	CLO 4	1		
53	Byproducts – fish oil, fish meal, fish silage, fish ambrigeris, fish squalene	CLO 1 CLO 2 CLO 3	1	Lecture/OER	Problem-based Learning
54	Byproducts – fish silage, fish ambrigeris, fish squalene	CLO 1 CLO 2 CLO 3	1	Virtual lab	Problem-based Learning
55	Poultry – ante and post mortem inspection,	CLO 2 CLO 3	1	Virtual lab	Problem-based Learning
56	Processing of poultry, different cuts of poultry meat	CLO 1 CLO 2	1	Virtual lab	Problem-based Learning
57	Egg – processing of egg products – frozen egg	CLO 2 CLO 3 CLO 4	1	Video / Observation	Experimental Learning
58	Egg powder (WEP,EYP,EWP)	CLO 2 CLO 3 CLO 4	1	Video / Observation	Experimental Learning

Course Designers:

3. **Dr.N.Deepa Sathish**
4. **Ms. Santhiya R**

Name of the course	**Fundamentals of Food Processing**
Name of the faculty	Ms Santhiya R
Participatory Learning	40 %
Experimental Learning	40 %
Problem–based Learning	20 %

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

Preamble

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

NUMERICAL AND STATISTICAL TECHNIQUES (TH24A23)

Credits : 4 **Hours : 73**

Syllabus

Unit I **15 Hours**

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

Unit II **15 Hours**

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

Unit III **15 Hours**

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

Unit IV **15 Hours**

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

Unit V **13 Hours**

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

Text Books

S.No	Author	Title of the book	Publishers	Year & Edition

1	B.S. Grewal	Numerical Methods in Engineering and Science with Programs in C & C++	Khanna Publishers	2014, XI
	Unit I : Chapter III &VII: 3.3:(3,4), 3.5:(1,2) &7.1-7.3 Unit II: Chapter VIII : 8.1, 8.2:(1,2),8.4,8.5:(I,II,III)			
2	S.P. Gupta	Statistical methods	Sultan Chand & Sons Publications	2005, XLXI

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

Reference Books

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

MOOC learning

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

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

Lecture 02 Gaussian elimination with partial pivoting

Lecture 04 Jacobi and Gauss Seidel methods

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

Lecture 34 Simpsons 1/3rd rule and 3/8 rule https://nptel.ac.in/courses/111/106/111106112/ (6 Lectures by Prof. G.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

Contents and Presentation Schedule

TH24A23 - NUMERICAL AND STATISTICAL TECHNIQUES					
Module No.	**Topic**	**No. of Hours**	**CLOs**	**Content delivery methods**	**Learning Methods**
UNIT I					
1	Solution of Linear Simultaneous equations	2	CLO1	Lecture, PPT	Participatory Learning
2	Gauss Elimination	2	CLO1, CLO2	Lecture, PPT	Participatory Learning
3	Gauss Jordan	3	CLO2	Video Lecture https://youtu.be/CsTOUbeMPUo	Experiential Learning
4	Gauss Jacobi methods	3	CLO3	Lecture, PPT	Participatory Learning
5	Interpolation: Newton Forward interpolation	3	CLO1, CLO2, CLO3	Video Lecture, Quiz https://youtu.be/4vFwT_ZIntg	Experiential Learning
6	Newton Backward interpolation	2	CLO3	Lecture, Assignment	Problem-based Learning
UNIT II					

7	Numerical Differentiation - Newton's Forward Difference.	3	CLO1, CLO2, CLO3	Lecture, Group Discussion	Experiential Learning
8	Newton's Backward Difference	2	CLO1, CLO2 CLO3, CLO4	Lecture, PPT	Problem-based Learning
9	Numerical Integration- Introduction	2	CLO1	Video Lecture https://youtu.be/zadUB3NwFtQ	Participatory Learning
10	Newton-Cotes Quadrature Formulas	1	CLO1	Lecture, Group Discussion	Experiential Learning
11	Trapezoidal rule	2	CLO2, CLO4	Lecture	Problem-based Learning
12	Simpson's 1/3 rule	2	CLO2, CLO4	Lecture, PPT	Experiential Learning
13	Simpson's 3/8 rule	3	CLO3, CLO4	Lecture, Assignment	Problem-based Learning
UNIT III					
14	Significance of the study of correlation	1	CLO2	Lecture, PPT	Experiential Learning
15	correlation and causation	2	CLO2	Lecture	Participatory Learning
16	Bowley's coefficient of skewness	1	CLO3	Lecture, PPT	Experiential Learning
17	Types of correlation	1	CLO2, CLO3	Video Lecture https://youtu.be/XWFMypQkZ7Y	Experiential Learning
18	Methods of studying correlation - Graphic method	1	CLO2, CLO3	Lecture, Group Discussion	Participatory Learning
19	Karl Pearson's coefficient of correlation	1	CLO1, CLO3	Lecture, Assignment	Experiential Learning

20	Coefficient of correlation and probable error	1	CLO1, CLO2	Lecture, Quiz	Problem-based Learning
21	Coefficient of determination	1	CLO2	Lecture	Experiential Learning
22	Properties of the coefficient of the correlation	1	CLO2, CLO3	Video Lecture https://youtu.be/-nhKXETLQnM	Problem-based Learning
23	Rank correlation coefficient	2	CLO4	Lecture, PPT	Experiential Learning
24	Features of Spearman's correlation coefficient,	2	CLO1, CLO3, CLO4	Lecture, PPT	Problem-based Learning
25	Regression analysis.	1	CLO1, CLO2, CLO3, CLO4	Video Lecture https://youtu.be/DtOYBxi4AIE	Participatory Learning
UNIT IV					
26	Probability: Introduction	2	CLO1, CLO2	Lecture, PPT	Participatory Learning
27	Probability defined	2	CLO2	Lecture, Assignment	Problem-based Learning
28	Importance of the concept of probability	2	CLO2	Video Lecture, Quiz https://youtu.be/oeyZNemZe04	Participatory Learning
29	Calculation of probability	2	CLO2, CLO3, CLO4	Lecture, Group Discussion	Participatory Learning

30	Theorems of probability	3	CLO1, CLO2	Lecture, PPT	Experiential Learning
31	Mathematical expectation- Simple problems.	2	CLO2, CLO3	Video Lecture https://youtu.be/qYQmXs a-LPs	Problem-based Learning
32	Probability: Introduction	2	CLO1, CLO2	Lecture, PPT	Participatory Learning
UNIT V					
33	Theoretical Distributions: Binomial distribution	2	CLO1, CLO2	Video Lecture https://youtu.be/e04_wUoscBU	Experiential Learning
34	Problems in Binomial	3	CLO2, CLO3	Lecture, PPT	Experiential Learning
35	Poisson distribution	2	CLO1, CLO2	Video Lecture https://youtu.be/cPOChr_kuQs	Experiential Learning
36	Problems in Poisson	3	CLO4	Lecture, PPT	Experiential Learning
37	Normal distribution	3	CLO1, CLO2	Video Lecture https://youtu.be/rzFX5NWojp0	Problem-based Learning

Course Designers:

3. Mrs K.Sharmilaa, Assistant Professor

4. Mrs.S Aishwarya, Assistant Professor

Name of the course	**Numerical and Statistical Techniques**
Name of the Faculty	Dr. K. Krishnaveni
Participatory Learning	40 %
Experiential Learning	27 %

Problem-based Learning	33 %

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

Preamble:

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

Course Learning Outcomes

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

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

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

BASICS OF ACCOUNTANCY - BF24A03 **73 Hours**

Unit: I **14 Hours**

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

Unit: II **14 Hours**

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

Unit: III: **15 Hours**

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

Unit: IV: **15 Hours**

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

Unit: V: **15 Hours**

Ratio Analysis: ***Nature of Ratio Analysis - Significance* -** 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 (Theory Only).

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

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

Highlighted Text offered in blended mode (Links Provided)

TEXT BOOKS:

REFERENCE BOOKS:

Sl. No.	Author(s)	Title of the Book	Publisher	Year & Edition
5.	S.N. Maheswari, Suneel K. Maheshwari, Sharad K. Maheshwari	Financial Accounting for BBA	Vikas Publishing House Private Limited	2023, 7th Edition
6.	S P Jain and Narang K.L, Simmi Agrawal & Monika Sehgal	Financial Accounting	Kalyani Publishers	2022, 12th Edition

7.	Ravi M Kishore	Cost and Management Accounting	Taxmann Publications Private Limited	2021, 6th Edition
8.	Shashi K. Gupta, Sharma R.K & Neeti Gupta	Cost & Management Accounting	Kalyani Publishers	2020, 15th Edition

Blended Learning Links:

SI. No.	Units	Topics	Blended Learning Links
1	I	Introduction to IFRS- Concept and objectives & principles	https://www.youtube.com/watch?v=aL5UFu6Qtes
2		Kinds of Accounts	https://www.youtube.com/watch?v=AQvxKosUBf4&t=221s https://youtu.be/hvUY6i4rUVk
3	II	Meaning, Need for depreciation	https://www.youtube.com/watch?v=N5Wh2NNkqpU&t=1s https://youtu.be/fINkBABbqZU
4	III	Computerized accounting: Needs & Importance	https://youtu.be/BDTZuM7T4Kw
5	IV	Cost accounting: Types of cost	https://youtu.be/_z4-7xr6ur8 https://youtu.be/X3c4XOmP7AE
6		Management Accounting	https://youtu.be/eUMwwp5zDW0
7	V	Nature of Ratio Analysis, Significance	https://youtu.be/y132ILD4Vvg https://youtu.be/KjmGvEJqz3M https://www.youtube.com/watch?v=Wv5ojR1WaA4&t=1200s

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

Contents and Presentation Schedule

UNIT-I (14 Hours)					
Module No.	**Topic**	**CLOs**	**No. of Hours**	**Content delivery methods**	**Learning Methods**
1	Accounting – Meaning, Objectives	CLO1, CLO2	1	Chalk & Talk, PPT	Participatory Learning
2	Types of Accounting	CLO,	1	Chalk & Talk,	Participatory Learning

		CLO2		PPT	
3	Accounting Concepts and Principles	CLO1, CLO2, CLO3	1	Chalk & Talk, PPT	Experiential Learning
4	Overview of Indian and International Accounting standard	CLO2, CLO3	2	Chalk & Talk, PPT	Participatory Learning
5	Introduction to IFRS - Concept, Objectives & Principles	CLO1, CLO2, CLO3	1	PPT, OER Video https://www.youtube.com/watch?v=aL5UFu6Qtes	Problem-based Learning
6	Accounting Principles	CLO1, CLO2, CLO3	1	Chalk & Talk, PPT	Participatory Learning
7	Kinds of Accounts	CLO1, CLO2, CLO3	1	PPT, OER Video https://www.youtube.com/watch?v=AQvxKosUBf4&t=221s	Participatory Learning
8	Accounting Equation	CLO1, CLO2, CLO3	2	Chalk & Talk, PPT	Experiential Learning
9	Journal	CLO2, CLO3, CLO4	2	Chalk & Talk, PPT	Experiential Learning
10	Ledger	CLO2, CLO3, CLO4	2	Chalk & Talk, PPT	Experiential Learning

UNIT- II (14 Hours)

Module No.	Topic	CLO LEVEL	No. of Hours	Content delivery methods	Learning Methods
1	Subsidiary Books	CLO1, CLO2	1	Chalk & Talk, PPT	Experiential Learning
2	Purchase Book	CLO1, CLO2	1	Chalk & Talk, PPT	Experiential Learning
3	Sales Book	CLO1, CLO2	1	Chalk & Talk, PPT	Experiential Learning
4	Returns Book	CLO1, CLO2	1	Chalk & Talk, PPT	Experiential Learning
5	Cash Book	CLO1, CLO2	2	Chalk & Talk, PPT	Experiential Learning
6	Trial Balance –	CLO1,	1	Chalk & Talk,	Participatory Learning

	Objectives, Methods	CLO2, CLO3		PPT	
7	Preparing Trial Balance	CLO4	2	Chalk & Talk, PPT	Experiential Learning
8	Depreciation - Meaning, Need for Depreciation	CLO1, CLO2, CLO3	1	PPT, OER Video https://www.youtube.com/watch?v=N5Wh2NNkqpU&t=1s https://youtu.be/fINkBABbqZU	Problem-based Learning
9	Methods: Straight line	CLO3, CLO4	2	Chalk & Talk, PPT	Experiential Learning
10	Diminishing balance methods	CLO3, CLO4	2	Chalk & Talk, PPT	Experiential Learning
UNIT- III (15 Hours)					
Module No.	**Topic**	**CLO LEVEL**	**No. of Hours**	**Content delivery methods**	**Learning Methods**
1	Final accounts	CLO1, CLO2	1	Chalk & Talk, PPT	Participatory Learning
2	Trading, Profit and loss A/C	CLO2, CLO3, CLO4	2	Chalk & Talk, PPT	Experiential Learning
3	Balance sheet and its contents	CLO2, CLO3, CLO4	2	Chalk & Talk, PPT	Experiential Learning
4	Preparation of Trading and Profit and Loss Account	CLO2, CLO3, CLO4	2	Chalk & Talk, PPT	Experiential Learning
5	Balance Sheet	CLO2, CLO3, CLO4	1	Chalk & Talk, PPT	Experiential Learning
6	Treatment of adjustments	CLO2, CLO3, CLO4	2	Chalk & Talk, PPT	Experiential Learning
7	Computerized accounting - Needs & Importance	CLO1, CLO2	1	PPT, OER Video https://youtu.be/BDTZuM7T4Kw	Problem-based Learning
8	Introduction to Accounting Software's Tally	CLO1, CLO2, CLO3	1	Chalk & Talk, PPT	Participatory Learning
9	Features & Benefits	CLO1, CLO2	1	Chalk & Talk, PPT	Participatory Learning
10	Introduction to Cloud	CLO1,	1	Chalk & Talk,	Participatory Learning

	Accounting	CLO2		PPT	
11	Predictive Analytics in Cloud Accounting	CLO2, CLO3	1	Chalk & Talk, PPT	Problem-based Learning
UNIT- IV (15 Hours)					
Module No.	**Topic**	**CLO LEVEL**	**No. of Hours**	**Content delivery methods**	**Learning Methods**
1	Cost accounting: Definition	CLO1	1	Chalk & Talk, PPT	Participatory Learning
2	Types of cost	CLO1, CLO2	1	PPT, OER Video https://youtu.be/X3c4XOmP7AE	Participatory Learning
3	Elements of Cost	CLO1, CLO2	1	Chalk & Talk, PPT	Problem-based Learning
4	Cost Sheet Formats	CLO2, CLO3	2	Chalk & Talk, PPT	Experiential Learning
5	Preparation of cost sheet	CLO2, CLO3, CLO4	2	Chalk & Talk, PPT	Experiential Learning
6	Analysing and managing food & beverage expenses	CLO2, CLO3	1	Chalk & Talk, PPT	Problem-based Learning
7	Cost Volume Profit Analysis	CLO2, CLO3, CLO4	2	Chalk & Talk, PPT	Experiential Learning
8	Management Accounting - Definition	CLO1	1	PPT, OER Video https://youtu.be/eUMwwp5zDW0	Participatory Learning
9	Distinguish between Cost and Management accounting	CLO1, CLO2	1	Chalk & Talk, PPT	Participatory Learning
10	Cash Budget: Meaning	CLO1	1	Chalk & Talk, PPT	Participatory Learning
11	Preparation of cash budget	CLO2, CLO3, CLO4	2	Chalk & Talk, PPT	Experiential Learning
UNIT-V (15Hours)					
Module No.	**Topic**	**CLO LEVEL**	**No. of Hours**	**Content delivery methods**	**Learning Methods**
1	Ratio Analysis	CLO1, CLO2	1	Chalk & Talk, PPT	Participatory Learning
2	Nature of Ratio Analysis - Significance	CLO1, CLO2	2	PPT, OER Video https://youtu.be/y132ILD4V	Participatory Learning

				vg https://youtu.be/KjmGvEJqz3M	
3	Types	CLO1, CLO2	1	Chalk & Talk, PPT	Participatory Learning
4	Calculation of Ratios	CLO2, CLO3, CLO4	2	Chalk & Talk, PPT	Experiential Learning
5	Liquidity Ratio	CLO2, CLO3, CLO4	1	Chalk & Talk, PPT	Experiential Learning
6	Fixed Assets Turnover Ratio	CLO2, CLO3, CLO4	1	Chalk & Talk, PPT	Experiential Learning
7	Operating Ratio	CLO2, CLO3, CLO4	1	Chalk & Talk, PPT	Experiential Learning
8	Stock Turnover Ratio	CLO2, CLO3, CLO4	1	Chalk & Talk, PPT	Experiential Learning
9	Debtors Turnover Ratio	CLO2, CLO3, CLO4	1	Chalk & Talk, PPT	Experiential Learning
10	Creditors Turnovers Ratio	CLO2, CLO3, CLO4	1	Chalk & Talk, PPT	Experiential Learning
11	Debt Equity Ratio	CLO2, CLO3, CLO4	2	Chalk & Talk, PPT	Experiential Learning
12	Introduction to sustainability reporting	CLO1, CLO2	1	Chalk & Talk, PPT	Problem-based Learning

Name of the course	Basics of Accountancy
Name of the Faculty	Dr. S.P.Deepikaa
Participatory Learning	26%
Experiential Learning	57%
Problem-based Learning	17%

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

Preamble:

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

Course Learning Outcome

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

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

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium

NM23DTG - DESIGN THINKING

Syllabus (30 Hrs)

UNIT – 1 6 Hours

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

UNIT – II 6Hours

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

UNIT – III 6 Hours

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

UNIT – IV 6 Hours

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

UNIT – V 6 Hours

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

Text Books:

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

Reference Books:

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

Blended Learning Links

UNIT	TOPICS	LINK
UNIT I	Introduction to Design Thinking	https://www.digimat.in/nptel/courses/video/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