B.Sc., FOOD AND DAIRY TECHNOLOGY

Syllabus

Program Code: UFD

2018 - Onwards

MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS)

Re-accredited with "A" Grade by NAAC

PASUMALAI, MADURAI – 625 004

Qualification for Admission

Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Government of Tamil Nadu, CBSE Board with Science as one of the subjects in Higher Secondary Education.

Duration of the Course

The students shall undergo the prescribed B.Sc (Food and Dairy Technology) course of study for a period of three academic years (six semesters).

Subject of Study

Part I: Tamil
Part II: English
Part III:
1. Core Subjects
2. Allied Subjects
3. Electives

Part IV :
1. Non Major Electives
2. Skill Based Subjects
3. Environmental Studies
4. Value Education

Part V :
Extension activities

The scheme of Examination

The components for continuous internal assessment are:

Two tests and their average	--15 marks
Seminar /Group discussion	--5 marks
Assignment	--5 marks
Total	--25 marks

Pattern of the questions paper for the continuous Internal Assessment

(For Part I, Part II, Part III , NME & Skilled Paper in Part IV)

The components for continuous internal assessment are:

Part –A	
Six multiple choice questions (answer all)	6 x01= 06 Marks
Part –B	
Two questions (‘either …. or ‘type)	2 x 07=14 Marks
Part –C	
One question out of two	1 x 10 =10 Marks

Total	30 Marks

Pattern of the question paper for the Summative Examinations:

Note: Duration- 3 hours

Part –A	
Ten multiple choice questions	10 x01 = 10 Marks
(No Unit shall be omitted; not more than two questions from each unit.)	
Part –B	
Five Paragraph questions (‘either …. or ‘type)	5 x 07 = 35 Marks
(One question from each Unit)	
Part –C	
Three Essay questions out of five	3 x 10 =30 Marks
(One question from each Unit)	

Total	75 Marks

The Scheme of Examination (Environmental Studies and Value Education)

Two tests and their average	--15 marks
Project Report	--10 marks*
Total	--25 marks

** The students as Individual or Group must visit a local area to document environmental assets – river / forest / grassland / hill / mountain – visit a local polluted site – urban / rural / industrial / agricultural – study of common plants, insects, birds – study of simple ecosystem – pond, river, hill slopes, etc.

Question Paper Pattern

Pattern of the Question Paper for Environmental Studies & Value Education only) (Internal)

Part –A

(Answer is not less than 150 words)

Four questions (‘either …. or ‘type) 4 x 05=20 Marks

Part –B

(Answer is not less than 400 words)

One question (‘either …. or ‘type) 1 x 10=10 Marks

Total 30 Marks

Pattern of the Question Paper for Environmental Studies & Value Education only) (External)

Part –A

(Answer is not less than 150 words)

Five questions (either or type) 5 x 06 =30 Marks

(One question from each Unit)

Part –B

(Answer is not less than 400 words)

Three questions out of Five 3 x 15 = 45 Marks
each unit (One question from each Unit)

Total 75 Marks

Minimum Marks for a Pass

40% of the aggregate (Internal +Summative Examinations).
No separate pass minimum for the Internal Examinations.
27 marks out of 75 is the pass minimum for the Summative Examinations.

PROGRAMME EDUCATIONAL OUTCOMES (PEOs):

PEO1: To enhance the entrepreneurial abilities through the product development, and learn to earn schemes.

PEO2: As part of curriculum our students will go to internship for 60 days where they acquire adequate knowledge on processing and quality methods.

PEO3: Equip the student's knowledge through project. Hence students can learn the research activities.

PEO4: To learn the science behind the processing of food and its impacts on nutritive value of food stuffs.

PROGRAMME SPECIFIC OUTCOMES

PSO1: Enlighten the student's disciplinary knowledge about the functioning of milk procurement organizations.

PSO2: Enable the students with leadership still and reflective thinking to acquire skill in the processing of various food items.

PSO3: Apply analytical reasoning and problem solving skill in the field of selection preservation packaging distributing and using un safe and nutritious food.

PSO4: Enhance the communication skills and digital literacy through experimental learning practicing and holding self confidence

PSO5: Equip the students with moral and ethical values

PSO6: Adhere cooperation and team work

PSO7 ; Create proficiency toppers will get an opportunity to pursue their higher studies and do their research on M.Sc Food and Dairy Technology and M.Sc Food and Nutrition in well reputed and recognized institutions like NDRI, CFTRI, and DFRL etc

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
COURSE PATTERN

Study Component	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	Total Hours	Total Credit	No.of course	Total Marks
Part-I Tamil	6(3)	6(3)	6(3)	6(3)			24	12	04	400
Part-II English	6(3)	6(3)	6(3)	6(3)			24	12	04	400
Part-III Core subjects	4(3) 2(1)	4(3) 2(2)	6(5) 4(3)	6(5) 4(4)	5(4) 5(4) 4(4) 4(3) 4(4)	4(3) 12(10) 10(10)	92	78	19	1900
Elective					4 (4) 4 (3)	4(3)				
Allied subject-I	4(4)	4(3)		4(4)			12	11	03	300
Allied subject-I(P)	2(1)	2(1)	4(4)				08	06	03	300
Part-IV Skilled Based subjects	2(2) 2(2)	2(2) 2(2)	2(2)	2(2)			12	12	06	600
Environmental studies/Value education	2(2)	2(2)					04	04	02	200
Non Major Elective			2(2)	2(2)			04	04	02	200
Part-V Extension Activities				0(1)				01	01	100
Total	**30 (21)**	**30 (21)**	**30 (22)**	**30 (24)**	**30 (26)**	**30 (26)**	**180**	**140**	**44**	**4400**

SEMESTER –I

Subject code	Subjects	No. of Courses	Hours / week	Credits	Maximum Marks		
					Int.	Ext	Total
18UTAG11	**Part –I Tamil** தற்கால கவிதையும் உரைநடையும்	1	6	3	25	75	100
18UENG11	**Part –II English Subject** Exploring Language Through Literature-1	1	6	3	25	75	100
18UFDC11 18UFDCP1	**Part –III Core Subject** Fundamentals of Dairying Fundamentals of Dairying – Practical	1 1	4 2	3 1	25 40	75 60	100 100
18UFDA11 18UFDAP1	**Part –III Allied Subject** Introduction to Food Science Introduction to Food Science – Practical	1 1	4 2	4 1	25 40	75 60	100 100
18UFDS11	**Part –IV Skill Subject** Work Shop Practices on CIP	1	2	2	25	75	100
18UFDS12	Preservation Techniques of Fruits and Vegetables	1	2	2	25	75	100
18UEVG11	**Part –IV Mandatory Subject** Environmental Studies	1	2	2	25	75	100
	Total	**9**	**30**	**21**	**255**	**645**	**900**

SEMESTER – II

18UTAG21	**Part –I Tamil** பக்தி இலக்கியமும் நாடகமும்	1	6	3	25	75	100
18UENG21	**Part –II English Subject** Exploring Language Through Literature-II	1	6	3	25	75	100
18UFDC21	**Part –III Core Subject** Physiochemical aspects of Milk	1	4	3	25	75	100
18UFDCP2	Physiochemical aspects of Milk-Practical	1	2	2	40	60	100
18UFDA21	**Part –III Allied Subject** Food Chemistry	1	4	3	25	75	100
18UFDAP2	Food Chemistry- Practical	1	2	1	40	60	100
18UFDS21	**Part –IV Skill based Subject** Dairy Plant Design and Layout	1	2	2	25	75	100
18UFDS22	Office Automation (Computer Subject)	1	2	2	25	75	100
18UVLG21	**Part –IV Mandatory Subject** Value Education	1	2	2	25	75	100
	Total	**9**	**30**	**21**	**255**	**645**	**900**

SEMESTER -III							
Subject code	**Subjects**	**No. of Courses**	**Hours /Week**	**Credits**	**Maximum Marks**		
					Int	**Ext**	**Total**
18UTAG31	**Part –I Tamil** காப்பிய இலக்கியமும் சிறுகதையும்	1	6	3	25	75	100
18UENG31	**Part –II English Subject** Exploring Language Through Literature-III	1	6	3	25	75	100
18UFDC31	**Part-III Core Subject** Food and Dairy Processing Techniques	1	6	5	25	75	100
18UFDCP3	Food and Dairy Processing Techniques-Practical	1	4	3	40	60	100
18UFDAP3	**Part-III Allied Subject** Skill Development in food preparation-Practical	1	4	4	40	60	100
18UFDS31	**Part-IV Skill based Subject** Food Product Development and Marketing	1	2	2	25	75	100
18UFDN31	**Part-IV Non Major Elective** Nutrition for Health and Fitness	1	2	2	25	75	100
	Total	**7**	**30**	**22**	**205**	**495**	**700**

SEMESTER -IV							
Subject code	**Subjects**	**No. of Courses**	**Hours/ Week**	**Credits**	**Maximum Marks**		
					Int	**Ext**	**Total**
18UTAG41	**Part –I Tamil** பழந்தமிழ் இலக்கியமும் புதினமும்	1	6	3	25	75	100
18UENG41	**Part –II English Subject** Exploring Language Through Literature-IV	1	6	3	25	75	100
18UFDC41	**Part-III Core Subjects** Food and Industrial Microbiology	1	6	5	25	75	100
18UFDCP4	Food and Industrial Microbiology – Practical	1	4	4	40	60	100
18UFDA41	**Part-III Allied Subject** Food Safety and Quality Control	1	4	4	25	75	100
18UFDS41	**Part -IV Skill based Subject** Fundamentals on milk chilling machineries	1	2	2	25	75	100
18UFDN41	**Part IV -Non Major Elective** Food Preservation and Safety	1	2	2	25	75	100
18UEAG40 to 18UEAG49	**Part-V Extension Activities**	1	0	1	100	-	100
	Total	**8**	**30**	**24**	**290**	**510**	**800**

SEMESTER-V							
Subject Code	**Subjects**	**No. of Courses**	**Hours /Week**	**Credits**	**Maximum Marks**		
					Int	**Ext**	**Total**
18UFDC51	**Part-III Core Subjects** Technology of Dairy Products	1	5	4	25	75	100
18UFDCP5	Technology of Dairy Products-Practical	1	4	4	40	60	100
18UFDC52	Effluent Treatment and Environmental Safety	1	5	4	25	75	100
18UFDCP6	Effluent Treatment and Environmental Safety -Practical	1	4	3	40	60	100
18UFDE51 18UFDE52 18UFDE53	**Part –III Elective Subject** Human Nutrition Food Packaging Technology Processing of Marine Products	1	4	4	25	75	100
18UFDEP1 18UFDEP2 18UFDEP3	**Part –III Elective – Practical** Human Nutrition- Practical Food Packaging Technology - Practical Processing of Marine Products - Practical	1	4	3	40	60	100
18UFDC53	Dairy By - Products Technology	1	4	4	25	75	100
	Total	**7**	**30**	**26**	**220**	**480**	**700**

SEMESTER–VI							
Subject code	**Subjects**	**No. of Courses**	**Hours /Week**	**Credits**	**Maximum Marks**		
					Int	**Ext**	**Total**
18UFDC61	**Part-III Core Subjects** Bakery and Confectionary	1	4	3	25	75	100
 18UFDE61 18UFDE62 18UFDE63	**Part-III Elective Subjects** Entrepreneurial Development Programme Poultry and Meat Processing Technology Functional Foods and Nutraceuticals	1	4	3	25	75	100
18UFDPR1	Project	1	12	10	40	60	100
18UFDINP	In plant Training	1	10	10	40	60	100
	Total	**4**	**30**	**26**	**130**	**270**	**400**


FIRST SEMESTER

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENTOF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018-2019 and after)

Programme : B.Sc (F&D Tech) **Part III : Core**
Semester : I **Hours : 04**
Subject Code : 18UFDC11 **Credits : 03**

FUNDAMENTALS OF DAIRYING

Course Outcomes

CO1: To understand the organization and functioning of milk procurement at farmer's level, private and government levels.
CO2: To enlighten the students about the processing and marketing of milk.
CO3: To impart technical knowledge and skills required to successfully run a dairy farm

Unit I:

Advantages in dairying. Principal involved in successful dairying. Dairy development programs implemented in India. Operation flood programme**.** Government schemes in dairy development.

Unit II:

Systems for dairy farming – mixed farming and specialized dairy farming. General care of lactating animals – preparation for milking – methods of milking. Clean milk production.

Unit III:

Methods for procurement of milk; transportation of milk; pricing of milk; milk collection centers and its functions. Marketing of milk.

Unit IV:

Cooperative dairying – structure of dairy cooperatives, primary milk cooperative societies; district milk producer's cooperative union– objective and functions.

Unit V:

Economics of dairy farm - income and expenditure. Estimating the cost of production of milk.

Text Book:

Jagadish Prasad, **Principles and Practices of Dairy Farm Management,** Kalyani Publishers, Ludhiana (1992).

Reference Books:

1. Aneja.R.P, B.N Mathur, R.C Chandra and A.K. Banerjee, **Technology of Indian Milk Products**, Dairy India year book, A- 25 Priyadarshinivihar, Delhi 110092, India (2002).
2. **Dairy India year book,** A- 25 Priyadarshinivihar, Delhi 110092, India (2007).
3. Jagadish Prasad, **Principles and Practices of Dairy Farm Management,** Kalyani Publishers, Ludhiana (1992).
4. Ramasamy. D., **Dairy technologist hand book**, International book distributing Co. Luknow (1999).
5. Robinson, **Modern Dairy Technology,**Vol.I, **Advances in Milk Processing,** Chapman and Hall India, Madras (1986).

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENTOF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018-2019 and after)

Programme : B.Sc (F&D Tech)	**Part III : Core**
Semester : I	**Hours : 02**
Subject Code : 18UFDCP1	**Credits : 01**

FUNDAMENTALS OF DAIRYING – PRACTICAL

Course Outcomes

CO1: To provide hands on experiences with the principles and practices essential in the production of clean milk

CO2: To acquire skills in handling milking machines and milking

CO3: To learn about the price fixing and significance of marketing of milk through modern dairy industry visit

1. Preparation and Layout of dairy farm for 20cows
2. Demonstration of clean milk production.
3. Hands on training in methods of milking.
4. Study about mechanism of milking machine.
5. Techniques of milk price fixing
6. Visit to a modern dairy farm.
7. Visit to village dairy cooperative, Dairy union & Dairy Federation.
8. Visit to chilling center.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENTOF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018-2019 and after)

Programme : B.Sc (F&D Tech) | **Part III : Allied**
Semester : I | **Hours : 04**
Subject Code : 18UFDA11 | **Credits : 04**

INTRODUCTION TO FOOD SCIENCE

Course Outcomes

CO1: To enable the students to understand the science behind the processing and preparation of food products.
CO2: To describe the importance of various foods and their nutritive value.
CO3: To enlighten the students about the various methods of cooking

Unit I:

Introduction to Food Science: Food Science definition, scope of studying food science; Basic five food groups; Food Pyramid and Balanced diet; Cooking – Definition, objectives of cooking; Cooking methods-Moist heat & Dry heat methods, advantages and disadvantages.

Unit II:

Cereals and Millets: Composition and nutritive value of cereals; Structure of wheat and Rice, cereal products – wheat, rice, fermented and unfermented products. Millets: Nutritive value and composition, Role of cereals in cookery.

Unit III:

Pulses and Nuts-Oilseeds: Composition and nutritive value of pulses, Factors affecting cooking quality of pulses; Pulse products, role of pulses in cookery; Nuts and Oilseeds: Composition and nutritive value, Role of oilseeds in cookery.

Unit IV:

Vegetables and Fruits: Classification, composition and nutritive value of vegetables, and fruits; Concept of maturity, ripening, changes during ripening, post-harvest changes in fruits, vegetables - maturation, changes in maturation, pigments in fruits & vegetables, Role of fruits and vegetables in cookery.

Unit V:

Meat, Fish and Egg: Structure, composition and nutritive value of egg, uses of egg in cookery, structure & composition of meat, types of meat, post mortem changes in meat, methods of cooking meat, classification & composition of poultry, processing of poultry, selection & nutritive value of fish, methods of preservation of fish.

Text Book:

1. Srilakshmi, B, **Food Science,** New Age International Private Limited Publishers, New Delhi; Chennai (1997).

References Books:

1. Srilakshmi, B, **Food Science,** New Age International Private Limited Publishers, New Delhi; Chennai (1997).
2. Mudambi, R.S. and Rajagopal, M.Y. **Fundamentals of Food and Nutrition**, Wiley Eastern Limited: New Delhi (1991).
3. Swaminathan, M., **Food Science and Experimental Foods**, Ganesh and Company, Madras (1988).
4. Mudambi, R.S. and Rao. S, **Food Science**, Wiley Eastern Limited, New Delhi (1987).
5. Potter, N.M. and Birch, G.G., **Food Science**, AVI, West Port: Conn (1986).
6. Bennion, et.al., **Introductory Foods**, Macmillan, New York (1985).

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENTOF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018-2019 and after)

Programme	**: B.Sc (F&D Tech)**	**Part III**	**: Allied**
Semester	**: I**	**Hours**	**: 02**
Subject Code	**: 18UFDAP1**	**Credits**	**: 01**

INTRODUCTION TO FOOD SCIENCE – PRACTICAL

Course Outcomes:

CO1: To provide hands on experiences with the principles and practices essential in processing and preparation of food products.

CO2: To acquire skills in handling appliances in laboratories

CO3: To enable the students to understand the science behind various cooking methods.

1. Display of basic five food groups.
2. Cooking of foods by using gas as medium - Roasting & baking.
3. Cooking of foods by using water or steam as medium – Boiling & pressure cooking.
4. Cooking of foods by using microwave.
5. Effect of cooking on cereal starches and proteins.
6. Preparation of sprouted legumes and malt powder.
7. Preparation of nuts based dishes.
8. Effect of cooking, acid & alkali on pigments.
9. Evaluation of meat quality.
10. Evaluation of egg quality.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENTOF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018-2019 and after)

Programme	**: B.Sc (F&D Tech)**	**Part III**	**: Skill**
Semester	**: I**	**Hours**	**: 02**
Subject Code: 18UFDS11		**Credits**	**: 02**

WORKSHOP PRACTICES ON CIP

Course Outcomes

CO1: To understand the importance of cleaning in place.

CO2: To explore the concept of CIP in food and dairy industries to keep clean.

CO3: To know about the various source of effluent and their recycling in dairy industry

Unit I:

CIP- Expansion – definition – Importance of CIP - Application of CIP in food and Dairy Industry - CIP applicable dairy machineries.

Unit II:

Methods and Purpose of cleaning and sanitizing of dairy equipment's. Selection and use of dairy cleaners and sanitizers. Various chemicals used for CIP of dairy plant.

Unit III:

Different types of cleaning solutions, detergent and sanitizers required for cleaning in dairy industries. Types of cleaning. Cleaning procedure. Cleaning efficiency- Factors affecting the effectiveness of the CIP cleaning agents.

Unit IV:

Present trends in cleaning and sanitation in dairy plants. Bio Detergents. Rays: Ultraviolet and Ultrasonic technique.

Unit V:

Types of Dairy waste from different sections, waste treatment: primary and secondary treatment. RO-Technique for waste disposal, wastes recycling.

Text Book:

1. **Advances in cleaning and sanitation in Food Industry,** Division of Dairy Technology, NDRI Deemed University, Karnal, New Delhi .

References Books:

1. **Advances in cleaning and sanitation in Food Industry,** Division of Dairy Technology, NDRI Deemed University, Karnal, New Delhi .

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENTOF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018-2019 and after)

Programme	**: B.Sc (F&D Tech)**	**Part III**	**: Skill**
Semester	**: I**	**Hours**	**: 02**
Subject Code: 18UFDS12		**Credits**	**: 02**

PRESERVATION TECHNIQUES OF FRUITS AND VEGETABLES

Course Outcomes

CO1: To understand the opportunity behind processing of fruits and vegetables and its marketing channel ability.
CO2: To provide in-depth knowledge on production of processed fruits and vegetable products and the waste utilization techniques.
CO3: To develop knowledge in skillful and profitable utilization of fruits and vegetables

Unit I:

Status and scope of fruits and vegetable industry in India, Factor affecting composition and quality of fruits and vegetables. Importance of fruits & Vegetables in the diet. Low temperature storage of fruits and vegetables storage. Requirements and types of **storages structures.**

Unit II:

Definition of Preservatives- types of preservatives commonly used in food industry, limits of usage of preservatives. General methods of preservation of whole fruits/vegetables and processed fruits and vegetables. Technology of extraction of juices from different types of fruits.

Unit III:

Fruit beverages: Squashes, syrups, nectars, ready to serve (RTS), crushes, cordial etc. Technology of carbonated soft drinks. Carbonation of soft drink.

Unit IV:

Jams and Jellies: Selection of fruits, preparation, Theory of jell formation, failure and remedies in jam and jelly making. Candied fruits, glazed fruits, and crystallized fruits.

Unit V:

Definition of Pickles, Raw materials for preparation of pickles and pickling process. Spoilage in pickle. Methods of preparation, curing techniques, defects and remedies in pickle. Concept of fermented and non-fermented pickles.

Text Book:

Girdharilal,G.S. et.al.., **Preservation of Fruits and Vegetables**, Publications and Information Division, ICAR: New Delhi (1986).

Reference Books:

1. Arthey, D. and Ashurst, P.R., **Fruit Processing,** Blackie Academic & Professional, London (1996).
2. Girdharilal,G.S. et.al.., **Preservation of Fruits and Vegetables**, Publications and Information Division, ICAR: New Delhi (1986).
3. Sumati,R et.al., **Fundamentals of Food and Nutrition,** Wiley eastern Limited: Madras (1991).

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENTOF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018-2019 and after)

Programme : B.Sc (F&D Tech) **Part IV: Mandatory**
Semester : I **Hours : 02**
Sub code : 18UEVG11 **Credits : 02**

ENVIRONMENTAL STUDIES

COURSE OUTCOMES		
CO1: To gain knowledge on the importance of environmental education and ecosystem. **CO2:**To acquire knowledge about environmental pollution- sources, effects and control measures of environmental pollution **CO3**: To understand the various energy sources, exploitation and need of alternate energy resources. Disaster management To acquire knowledge with respect to biodiversity, its threats and its conservation and appreciate the concept of interdependence **CO4:** To make the student to understand the various pollution problems control mechanisms.		
UNIT I	:	**Environment and Earth:** Environment – Meaning – Definition - Components of Environment – Types of Environment. Interference of man with the Environment. Need for Environmental Education. Earth – Formation and Evolution of Earth– Structure of Earth and its components – Atmosphere, Lithosphere, Hydrosphere and Biosphere. **Natural Resources:** Renewable Resources and Non-Renewable Resources. Natural Resources and Associated Problems. Use and Exploitation of Forest, Water, Mineral, Food, Land and Energy Resources.
UNIT II	:	**Ecology and Ecosystems:** Ecology – Meaning - Definition – Scope – Objectives – Subdivisions of Ecology. **Ecosystem**–Concept - Structure - Functions – Energy Flow – Food Chain and Food Web – Examples of Ecosystems (Forest, Grassland, Desert, Aquatic).
UNIT III	:	**Biodiversity:** Definition – Biodiversity at Global, National and Local Level. Values of Biodiversity – Threats to Biodiversity – Conservation of Biodiversity. **Biodiversity of India:** Biogeographical Distribution – Hotspots of Indian Biodiversity – National Biodiversity Conservation Board and Its functions. Endangered and Endemic Species of India
UNIT IV	:	**Pollution Issues:** Definition – Causes – Effects and Control Measures of Air, Water, Soil, Marine, Noise, Thermal and Nuclear Pollutions. **Global Issues:** Global Warming and Ozone Layer Depletion. Future plans of Global Environmental Protection Organisations.
UNIT V	:	**Sustainable Development:**Key aspects of Sustainable Development – Strategies for Sustainable Development - Agriculture – Organic farming – Irrigation – Water Harvesting – Water Recycling – Cyber Waste and Management. **Disaster Management:**Meaning – Types of Disasters - Flood and Drought – Earth quake and Tsunami – Landslides and Avalanches – Cyclones and Hurricanes – Preventions and Consequences. Management of Disasters -

Text Book:

Study Material for **Environmental Studies**, Mannar Thirumalai Naicker College, Pasumalai, Madurai – 625 004.

Reference Books:

1. Study Material for **Environmental Studies**, Publications Division, Madurai Kamaraj University, Madurai – 625 021.
2. R.C. Sharma and Gurbir Sangha,**Environmental Studies**, Kalyani Publishers, 1, Mahalakshmi Street, T.Nagar, Chennai – 600 017.
3. Radha,**Environmental Studiesfor Undergraduate Courses of all Branches of Higher Education, (Based on UGC Syllabus),** Prasanna Publishers & Distributors, Old No. 20, Krishnappa Street, (Near Santhosh Mahal), Chepak, Chennai – 600 005.
4. S.N.Tripathy and Sunakar Panda,**Fundamentals of Environmental Studies**, Vrinda Publications (P) Ltd. B-5, Ashish Complex, (opp. To Ahicon Public School), MayurVihar, Phase-1, Delhi– 110 091.
5. G.Rajah,**Environmental Studies** for All UG Courses, (Based on UGC Syllabus), Margham Publications, 24, Rameswaram Road, T.Nagar, Chennai – 600 017.


SECOND SEMESTER

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENTOF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018-2019 and after)

Programme : B.Sc (F&D Tech)	**Part III : Core**
Semester : II	**Hours : 04**
Subject Code : 18UFDC21	**Credits : 03**

PHYSIO - CHEMICAL ASPECTS OF MILK

Course Outcomes

CO1: To learn about the distribution of major minerals in milk

CO2: To understand the physio chemical components present in milk and its structure, role, and chemical interactions

CO3: To understand their effects of nutritional quality and functional properties important to health.

Unit I:

Anatomy of Mammary gland and physiology of milk secretion - factors affecting milk yield - Strategies to improve fat and SNF content of milk – Production of Clean milk.

Unit II:

Milk - definition - physical and chemical properties of milk -factors affecting quality of milk. Composition of milk.

Unit III:

Physical forms of milk constituents - Lactose, protein, fat and minerals - physical properties and application of milk constitutes in food industry.

Unit IV:

Chemical state of milk constituents: Lactose, protein, fat and minerals - structure and effect of heat on milk, effect of acid on milk and effect of enzymes on milk.

Unit V:

Milk: Nutritive value of milk and energy calculation Colostrum: composition – importance of colostrum.

Text Book:

Mathur MP, Roy DD and Dinakar P., ***Textbook of Dairy Chemistry***, ICAR (1999).

Reference Books:

1. Mathur MP, Roy DD and Dinakar P., ***Textbook of Dairy Chemistry***, ICAR (1999).
2. Anantha Krishnan, C.P., **Technology of milk processing**, Sri Lakshmi Publications, Chennai -10 (1991).
3. Eeckles.CH.Combs, W.B and Macy.H, **Milk and Milk Products**, Tata McGraw Hill Publishing Co.Pvt.Ltd., New Delhi (1955).
4. Sukumar De, **Outlines of Dairy Technology**, Oxford University Press, New Delhi (1980).
5. Wong N.P, Jenness.R. Keeney.M. Marth E.H, **Fundamentals of Dairy Chemistry**, CBB Publishers and Distributors, New Delhi (1998).

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENTOF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018-2019 and after)

Programme	**: B.Sc (F&D Tech)**	**Part III**	**: Core**
Semester	**: II**	**Hours**	**: 02**
Subject Code	**: 18UFDCP2**	**Credits**	**: 02**

PHYISCO CHEMICAL ASPECTS OF MILK- PRACTICAL

Course Outcomes

CO1: To acquire technique to estimate the fat and SNF in milk

CO2: To enable the students to physiochemical aspects of milk practical and to know about the chemical changes occurring during production

CO3: To know about the role and action of physio-chemical aspects of milk

1. Sampling of milk.
2. Sensory evaluation of milk.
3. Determination of specific gravity of milk.
4. Estimation of fat in milk by using Gerber's method.
5. Estimation of fat in milk by using milk analyzer.
6. Estimation of protein in milk.
7. Estimation of lactose in milk.
8. Estimation of TS and SNF content in milk.
9. Determination of acidity in milk.
10. Determination of P^H in milk.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENTOF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018-2019 and after)

Programme : B.Sc (F&D Tech) **Part III : Allied**
Semester : II **Hours : 04**
Subject Code : 18UFDA21 **Credits : 03**

FOOD CHEMISTRY

Course Outcome

CO1: To understand the physio chemical properties of food

CO2: To enable the students to gain knowledge regarding the physical and chemical properties of the food constituents.

CO3: To understand the terms and describe the general chemical structure of major components of foods.

Unit I:

Physiochemical properties of food – Colloids, Crystalloids – definition, Classification of colloidal system, Properties of colloidal system, Definition and properties of solutions, Sols, Gels & Suspensions, Foams, Emulsions- definition and its properties, Moisture in foods, hydrogen bonding, bound water, water activity in foods and determination of moisture.

Unit II:

Carbohydrates: Sugars: chemistry, classification of sugars, sources and characteristics, Functional role of sugars in foods, Sweeteners – Types and its characteristics, Starches- Native and Modified, Characteristics, Functional properties.

Unit III:

Lipids: Classification and Chemistry of lipids, properties and fat, functional properties of lipids, Deep fat frying- definition, factors affecting, deteriorative changes in fats and oils - auto oxidation, lipolysis, thermal decomposition, hydrogenation, rancidity- definition, types, prevention of rancidity.

Unit IV:

Protein: Classification, structure, composition, physio-chemical properties of proteins. Functional properties of proteins, Effect of heat acid, alkali on animal and vegetable proteins.

Unit V:

Food Hydrocoloids: Definition, Classification of hydrocoloids, Gums-definition, types, functions, food applications, Non- starch **polysaccharide**- cellulose, pectin- Definition, functions, food application.

Text Book:

Meyer, **Food Chemistry**, AVI Publications, New York (1991).

Reference Books:

1. Potter,N.N. and Hotchkiss, J.H, **Food Science**, 5th Edition, CBS Publishers and Distributors, New Delhi (1996).
2. SeemaYadav, **Food Chemistry**, Anmol Publications Pvt.Ltd., New Delhi (1997).
3. Meyer, **Food Chemistry**, AVI Publications, New York (1991).
4. Ronsivalli,.L.J. and Vieira, E.R, **Elementary Food Science**, 3rd Edition, Chapman and Hall, New York (1992).
5. H.D.Belitz,W.Grosch and P.Schieberie, **Food Chemistry,** 4th edition, springer Publications (2009).
6. SrinivasanDamodaran, KirkL.Parkin and Owen R.Fennema, **Food chemistry,** (4thedition)CRC Press (2007).
7. JohnM.DeMan, **principles of Food Chemistry**, springer publications (1999).

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENTOF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018-2019 and after)

Programme : B.Sc (F&D Tech) **Part III : Allied**
Semester : II **Hours : 02**
Subject Code : 18UFDAP2 **Credits : 01**

FOOD CHEMISTRY – PRACTICAL

Course Outcomes

CO1: To conduct appropriate laboratory experiments common to basic food chemistry and getting appropriate result.

CO2: To gain hands- on-experience in food chemistry laboratory techniques.

CO3: To demonstrate the food chemistry concepts discussed in lecture.

1. Demonstration of food testing laboratory equipments.
2. Estimation of moisture and dry matter content of the foods.
3. Estimation of starch content of food by anthrone method.
4. Estimation of crude fibre content of the foods.
5. Estimation of protein content of food by kjeldhal method.
6. Determination of fat content of food by soxhlet method.
7. Estimation of Vitamin C content of food.
8. Determination of ash content of foods.
9. Qualitative tests for minerals – Calcium, phosphorus & iron.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENTOF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018-2019 and after)

Programme	**: B.Sc (F&D Tech)**	**Part III**	**: Skill**
Semester	**: II**	**Hours**	**: 02**
Subject Code	**: 18UFDS21**	**Credits**	**: 02**

DAIRY PLANT DESIGN AND LAYOUT

Course Outcomes

CO1: To understand the system of processing strategy and operation strategy
CO2: To understand the knowledge regarding dairy industry construction.
CO3: To develop Skills in drawing dairy plant layout and its processing section and equipments.

Unit I:

Dairy plants: Location of plant, site selection. Designing dairy plant - Choice of building construction materials, floors for different section of dairy.

Unit II:

Arrangement of different sections in dairy, utility/service sections, offices and workshop.

Unit III:

Dairy equipment design, codes and regulation. Special features of dairy industry. Arrangement of equipment, milk pipe lines.

Unit IV:

Maintenance of dairy plant flooring and drainage lines, water supply, boiler house, service lines for electricity, water, steam and refrigeration.

Unit V:

Design of pressure vessel, storage tank, milk coolers, pasteurizing plants, off flavour treatment equipment, evaporation systems - evaporator; milk dryers; spray dryer and roller dryer; ice cream freezers and packaging machine.

Text Book:

1. A Prof Lalt Chander, **Text Book of Dairy Plant Layout and Design**, ICAR Govt. of India (2010).

Reference Books:

1. Tuffel Ahmad, **Dairy Plant Engineering and Management,** KitabMachal Distributers, New Delhi (1995).
2. Ananthakrishnan .C. P and N. N. Sinha, **Technology and Engineering of Dairy Plant Management**, Lakshmi Publication, Ansari road, Delhi (1987).
3. Ramasamy.D, **Dairy Technologists HandBook**, International Book Distributing Co, Lucknow. (1999).

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENTOF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018-2019 and after)

Programme : B.Sc (F&D Tech)	**Part III : Skill**
Semester : II	**Hours : 02**
Subject Code : 18UFDS22	**Credits : 02**

OFFICE AUTOMATION

Course Outcomes

CO1: To enhance optimal utilization of resources.

CO2: To enhance and upgrade the existing system by increasing its efficiency and effectiveness.

CO3: To improve the working methods by replacing the existing manual system with the computer based system

Unit-I

Modern office – Office Automation - Meaning – Definition – Nature – Functions and Importance.

Unit-II

Office Management – Meaning – Definition – Nature – Elements of Office Management – Functions of office management.

Unit-III

Office Machine and Equipments – Advantages of using machines – Disadvantages of machines – Types of Modern machines and equipments.

Unit-IV

Office communication devices – Meaning – Definition – Kinds of communication.

Unit-V

Office forms – Meaning – Definition – Advantages – Classification of forms.

Text book:

Mr.Kathiresan and Dr.Radha, **Office Management**, Presanna Publisher Chennai, 2012.

Reference Books:

1. K.Chopra, **Office Management**, Himalaya Publisher, Mumbai, 2014.
2. B.N.Tandon, **Manual of Office Management and Correspondence,** S.Chand and Sons Ltd, New Delhi, 2015.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENTOF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018-2019 and after)

Programme	**: B.Sc (F&D Tech)**	**Part IV**	**: Mandatory**
Semester	**: II**	**Hours**	**: 02**
Sub code	**: 18UVLG21**	**Credits**	**: 02**

VALUE EDUCATION

COURSE OUTCOMES

CO1: Clarifying the meaning and concept of value - value education.

CO2: To inspire **students** to develop their personality and social **values** based on the principles of human **values.**

CO3: Developing sense of Love, Peace and Brotherhood at Local, national and international levels.

CO4: To enable the students to understand the social realities and to inculcate an essential value system towards building a health society

UNIT I	:	**Values and The Individual:** Values – Meaning – Definition – Importance – Classification of Values, Value Education – Meaning – Need for Value Education. Values and the Individual – Self-Discipline – Meaning – Tips to Improve Self-Discipline. Self-Confidence – Meaning - Tips to Improve Self-Confidence. Empathy – Meaning – Role of Empathy in motivating Values. Compassion – Role of Compassion in motivating Values. Forgiveness – Meaning - Role of Forgiveness in motivating Values. Honesty – Meaning – Role of Honesty in motivating Values. Courage – Meaning – Role of Courage in motivating Values.
UNIT II	:	**Religions and Communal Harmony:** Religions – Meaning **–** Major Religions in India - Hinduism – Values in Hinduism. Christianity – Values in Christianity. Islam – Values in Islam. Buddhism – Values in Buddhism. Jainism – Values in Jainism. Sikhism – Values in Sikhism. Need for Religious Harmony in India. Caste System in India – Need for Communal Harmony in India. Social Justice – Meaning – Factors Responsible for Social Justice.
UNIT III	:	**Society and Social Issues:** Society – Meaning – Values in Indian Society. Democracy – Meaning – Values in Indian Democracy. Secularism – Meaning – Values in Indian Secularism. Socialism – meaning – Values in Socialism. Social Issues – Alcoholism – Drugs – Poverty – Unemployment.

UNIT IV	:	**Human Rights and Marginalised People:** Human Rights – Meaning – Problem of Violation of Human Rights in India – Authorities available under the Protection of Human Rights Act in India. Marginalised People like Women, Children, Dalits, Minorities, Physically Challenged – Concept – Rights – Challenges. Transgender – Meaning – Issues.
UNIT V	:	**Social Institutions in Value Formation:** Social Institutions – Meaning – Important Social Institutions. Family – Meaning – Role of Families in Value Formation. Role of Press & Mass Media in Value Formation – Role of Social Activists – Meaning Contribution to Society – Challenges.

Text Book:

Text Module for **Value Education**, Mannar Thirumalai Naicker College, Pasumalai, Madurai – 625 004

Reference Books:

1. Text Module for **Value Education**, Publications Division, Madurai Kamaraj University, Madurai – 625 021.
2. N.S.Raghunathan, **Value Education**, Margham Publications, 24, Rameswaram Road, T.Ngar, Chennai – 600 017.
3. Dr.P.Saravanan, and P.Andichamy, **Value Education**, Merit India Publications, (Educational Publishers), 5, Pudumandapam, Madurai-625001.


THIRD SEMESTER

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme : UG	**Part III : Core**
Semester : III	**Hours per week : 06**
Subject Code: 18UFDC31	**Credit : 05**

FOOD AND DAIRY PROCESSING TECHNIQUES

Course Outcomes:

CO1: To understand the science behind processing of foods and its impact on nutritive value of food stuffs.
CO2 : To provide in-depth knowledge on production of processed food products.
CO3 : To enable students to acquire skill in processing of various food items.
CO4: To improve the students entrepreneurial skill

Unit I:

Cereal and pulse Processing: Processing of rice, wheat, millets-basic processing methods, Cereal Products: Flours, processed products of rice, flakes, puff; By products utilization; Processing of pulses and legumes; Pulse products- Dhal, flour, texturized vegetable protein.

Unit II:

Nuts and Oil Seeds Processing: Oil processing, byproducts utilization, Hydrogenated fat and margarine; physiochemical properties of vegetable oils.

Unit III:

Milk processing-

Milk reception – weighing, sampling and grading of milk - filtration- clarification - mechanism. Basics involved in platform test. MBRT. **Milk Preservation**- Meaning, objectives and basic principles. Methods of Milk Preservation- preservatives.

Unit V:

Standardization: definition,methods, process. Homogenization – definition, types, mechanism of homogenizer, uses. **Heat treatment of milk:** pasteurization – definition, types, mechanism. Sterilization – definition, types, mechanism. UHT processing. **Packaging** – Definition, types of packaging materials, purpose. Storage: various storage conditions practiced in milk and milk products.

Unit V:

Food processing unit operations:

Mixing and agitation: dimensional analysis; power for agitation; agitation of liquids; gas-liquid systems; gas-solid suspensions; agitator scale up.

Filtration: batch filtration; continuous filtration; industrial filters; settling and sedimentation; centrifugation.

Drying: mechanism of drying, rate of drying and time of drying, calculations, classification and types of dryers, dryers used in industries and special drying methods - tray, fluidized bed, spray, freeze, tunnel, microwave.

Text Book:

1. Srilakshmi, B., **Food Science**, New Age International (P) Ltd., Publishers, New Delhi (2005).

Reference Books:

1. Robinson, **Modern Dairy Technology**, Vol.I, **Advances in Milk Processing,** Chapman and Hall India, Madras(1986).
2. Aneja.R.P, Mathur.B.N, R.C Chandra and A.K. Banerjee, **Technology of Indian MilkProducts, Dairy India year book**, A- 25 Priyadarshinivihar, Delhi 110092, India (2002).
3. **Dairy India year book**, A- 25 Priyadarshinivihar, Delhi 110092, India. (2007).

MANNAR THIRUMALAI NAICKER COLLEGE(Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part III**	**: Core**
Semester	**: III**	**Hours per week**	**: 04**
Subject Code	**: 18UFDCP3**	**Credit**	**: 03**

FOOD AND DAIRY PROCESSING TECHNIQUES – PRACTICAL

Course Outcomes:

CO1: To make the students familiar with operations in food and dairy units
CO2: To acquire knowledge on dairy processing techniques.
CO3: To enable the students familiar with food processing techniques.
CO4: To develop the skill involved in Food and Dairy Processing Techniques through doing the experiments.

1) Clot on boiling test.
2) Alcohol test.
3) MBRT
4) Phosphatase test
5) Fermentation
6) Milling of cereals
7) Rice flakes and puffs
8) Milling of legumes.
9) Oil extraction.
10) Methods involved in standardisation of milk

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part III**	**: Allied**
Semester	**: III**	**Hours per week**	**: 04**
Subject Code	**: 18UFDAP3**	**Credit**	**: 04**

SKILL DEVELOPMENT IN FOOD PREPARATION -PRACTICAL

Course Outcomes:

CO1:To develop the basic skills in food preparation**.**
CO2:To understand the principles of preservation in food preparation**.**
CO3: To develop entrepreneurial skills .
CO4: To improve this knowledge on preservation techniques.

1. Preparation of squash and syrup
2. Preparation of Jam and Jelly
3. Preparation of Pickle
4. Preparation of cakes
5. Preparation of Confectionary- Fondant, fudge and brittles
6. Preparation of khoa
7. Preparation of Gulabjamun
8. Preparation of dahi and yoghurt
9. Preparation of channa , Rasogolla and Rasamalai
10. Preparation of paneer

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part IV**	**: Skill**
Semester	**: III**	**Hours per week**	**: 02**
Subject Code	**: 18UFDS31**	**Credit**	**: 02**

FOOD PRODUCT DEVELOPMENT AND MARKETING

Course Outcomes:

CO1: To understand various aspects of development of a food product.
CO2: To acquire knowledge on the sensory evaluation of food products.
CO3: To impart knowledge on marketing and commercialisation of a product.
CO4: To enable them a good training skill in industry level.

Unit I:

Food product development: Definition and Need for Product development, Factors influencing product development, Classification and Characteristics of food product, Phases in food product development,

Unit II:

Sensory evaluation – Definition, need and importance of sensory evaluation, Processes involved in product assessment – Sensory panel, Consumer testing; Acceptance test – Definition, Types, Panel members for acceptance test;

Unit III:

Marketing of food product: Food Marketing, Historical phases of food marketing, Components of food marketing, Requisites of selling a product; Trends in Food Market; Marketing methods, Advantages and disadvantages of marketing methods; Market testing – Where, When, How, What to market; Evaluating the results; Failures in the Market places – Causes of failure – external and internal reasons.

Unit IV:

Product launch- Meaning, Benefits, Steps to launch a new product. Commercialization of product- Meaning, Key aspects, Commercialization process, Action.

Unit V:

Economic evaluation of food product: Costing / Pricing- Steps for determining product price; Calculation of selling price; Product cost- Variable and Fixed cost; Categories of Product Cost- Material, Labor, Overhead cost, Breakeven point.

Text Book:

1. Fuller G W, **New Food Product Development**: **From Concept to Market place,** CRC Press, (1994), New York.

Reference Books:

1. Man C M D and Jomes A A, **Shelf life Evaluation of Foods**, Blackie Academic and Professional, (1994), London.
2. Olickle, J K, **New Product Development and value added**, Food Development Division, Agriculture, (1990), Canada.
3. Graf E and Saguy I S, **Food Product Development**: **From concept to the Market Place**, Van Nostrand Reinhold (1991), New York.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme : UG **Part IV : NME**
Semester : III **Hours per week : 02**
Subject Code : 18UFDN31 **Credit : 02**

NUTRITION FOR HEALTH AND FITNESS

Course Outcomes:
CO 1: To understand the role of food and nutrients.
CO 2: To apply knowledge in the maintenance of health and disease processes.
CO 3: To provide theoretical enlightenment about fitness for life.
CO4: To develop skill in the aea of Nutrition for Health and Fitness.

Unit-1

Introduction to Human Nutrition: Definition, History, Recent Developments, Role of Nutrition in Maintaining Health, Classification of Nutrients.

Unit -2

Nutrients - Classification, Macro nutrients - Carbohydrate, Protein and Fat - Functions, Deficiency, Sources.

Unit -3

Micro nutrients - Vitamins and Minerals - Functions, Deficiency, Sources.

Unit-4

Therapeutic Diets for Different Diseases: Obesity, Diabetes Mellitus, Cardiovascular Diseases, Kidney Diseases and Cancer - Symptoms (Clinical findings), Dietary Guidelines.

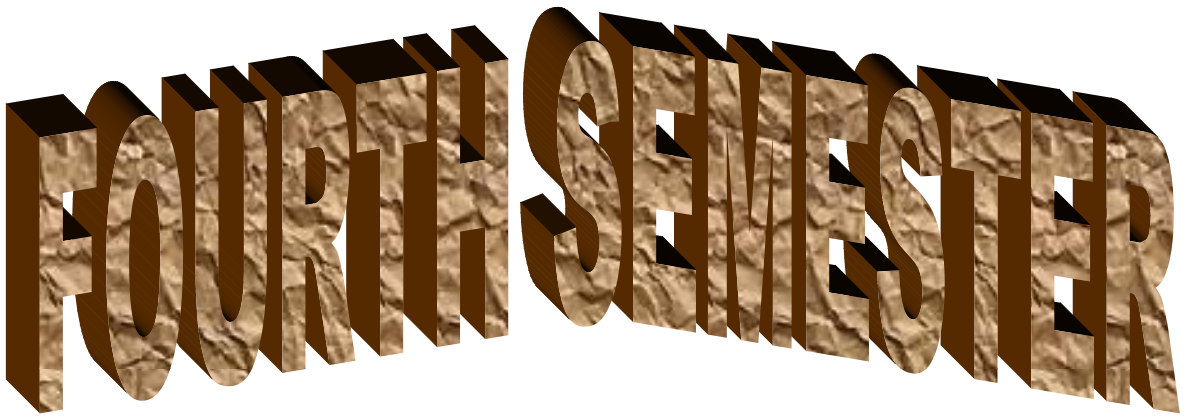
Unit -5
Fitness - Meaning, Components, types of exercises - aerobic and anaerobic, Energy expenditure for fitness, BMI, RDA.

Text Books:

1. Srilakshmi. B, Human Nutrition (For B.Sc Nursing Students)New Age International Publishers, New Delhi.

Reference Books:

1. Indian Council of Medical Research : Nutrient Requirements and Recommended-Dietary Allowance for Indians, New Delhi.
2. Thangam.E.Philip(1965): Modern Cookery, Orient Longman, II edition. Vol II,
3. Robinson. B, Lawler. C. H, M. R.; CheiToweth, W. L. and Garwick, A. E.: Normal and Therapeutic Nutrition. 17th Ed. Mac Millan Publishing Co. Bombay.


FOURTH SEMESTER

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part III**	**: Core**
Semester	**: IV**	**Hours per week**	**: 06**
Subject Code	**: 18UFDC41**	**Credit**	**: 05**

FOOD AND INDUSTRIAL MICROBIOLOGY

Course Outcomes:

CO1: To enable the students to understand the role of microbes in food, health and disease.
CO2: To study the microbes in relation to food spoilage, food borne diseases and food preservation.
CO3: To understand the different media used in microbial isolation and their differences.
CO4: To improve the hands on training in miuobiological labs.

Unit I:

Introduction, incidence and growth factors -Scope of micro biology, History and Classification, Characterization and Identification of micro-organisms, Microbes in Air, water and soil, Factors affecting the growth of microbes in food, control and its destruction – Physical and chemical methods.

Unit II:

Microbiology of cereals and cereal products,Meat and fish – Contamination, Spoilage and preservation – Cereal grains, flour, Bakery products – Bread, cakes ; meat and fish.

Unit III:

Microbiology of milk, egg, poultry and canned foods – Contamination, spoilage and preservation.

Unit IV:

Food fermentation – Definition, steps, microbial cultures used in food industry, fermented dairy products, food chemicals derived from fermentation – amino acid, enzymes, lactic acid, citric and vinegar.

Unit V:

Industrial application: Isolation and Screening: Isolation techniques, screening methods for industrial applications, Improvement and Preservation of Industrial cultures - Importance, development of strains, Preservation methods. Sterilization - Principles, sterilization of equipments, medium, and air.

Text Books:

1. Food Microbiology, W C Frazier and D C Westh off, McGraw Hill Book Company, NY.

Reference Books:

1. Food processing and preservation, Sivasankar. B, PHI Learning private limited, 2015, Delhi.
2. Industrial Microbiology, Prescott. S C and Dunn.C G, McGraw Hill Book Co.
3. Industrial Microbiology, A H Patel Mac Millan Press.

MANNAR THIRUMALAI NAICKER COLLEGE(Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part III**	**: Core**
Semester	**: IV**	**Hours per week**	**: 04**
Subject Code	**: 18UFDCP4**	**Credit**	**: 04**

FOOD AND INDUSTRIAL MICROBIOLOGY – PRACTICAL

Course Outcomes:

CO1: To obtain basic knowledge to operate all equipment in food microbiology laboratory effectively.
CO2: To isolate characterize micro organisms associated with different food products.
CO3: To equip the students in microbiological analysis of water and soil.
CO4: To improve hands on training.

1) General care and maintenance of laboratory instruments.
2) Practicing and handling of common bacteriological apparatus and equipments.
3) Cleaning, sanitization and sterilization of apparatus and equipments.
4) Preparation of Agar media.
5) Preparation of PDA media.
6) Preparation of Nutrient agar.
7) Preparation and use of agar plates and agar slants.
8) Microscopic view of microorganisms.
9) Gram's staining techniques.
10) Estimation of microorganisms in soil and water.

MANNAR THIRUMALAI NAICKER COLLEGE(Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme : UG	**Part III : Allied**
Semester : IV	**Hours per week : 04**
Subject Code : 18UFDA41	**Credit : 04**

FOOD SAFETY AND QUALITY CONTROL

Course Outcomes:

CO1: To enable the students to learn the various aspects of food safety and processing.
CO2: To understand about food laws and labeling.
CO3: To enable the students to apply the HACCP for food production.
CO4: To learn about the processing and packaging technique.

Unit I:

Introduction to Food Safety & Quality Control - Definition, factors affecting food safety, importance of food safety, Threats to safety of food supply, Food quality – definition, Principles of food quality, Food safety assurance system - definition, HACCP- Definition, Need, Benefits, Principles of HACCP, Guidelines for application of HACCP.

Unit II:

Food additives: Food additive - Definition, uses in food, classification, types - Food colours, flavoring agents, Artificial sweeteners, Preservatives, Antioxidants, emulsifying and stabilizing agents, anti-caking agents, sequestrants, anti-foaming agents, buffering agents. Food Adulteration - definition, Adulterants - definition, Classification of adulterants, Harmful effects of adulterants, Methods of detection of adulterants.

Unit III:

Food laws and Regulations: National food legislation –FSSAI. International Organization and Agreements – FAO, WHO, Codex Alimentarius, Codex India, Halal.

Unit IV:

Food contamination: Contamination - Definition, Classification, Naturally occurring toxicants - Animal foods, Plant foods, Anti-nutritional substances, Pesticide residue, Veterinary drug residues, Miscellaneous - Dioxin, Acryl amide, Poly chlorinated biphenyl, Contaminants from plastics.

Unit V:

Packaging and Nutrition labeling: Packaging- Definition, Functions, Requirements, Packaging material - Definition, Classification, Packaging methods. Nutrition Labeling – definition and concepts and requirements.

Text Book:

1. David. A. Shapton, Naroh. F. Shapton, Principles and Practises for the Safe Processing of Foods, Butterworth- Heineman Ltd, Oxford. OX $_2$ 8 Dp (1991).

Reference Books:

1. Manay.S. and Shadaksharamasamy, **Food**: **Facts and Principles**.

2. Sara mora more Carol wallaPPce, **HACCP**. **A Practical Approach** Chapman and Hall (1997).

3. Potter, N. **Food Science**, CBS Publishes & Distributes. (1996), New Delhi.

4. Rekha.S, Singhtal.S, Pushpa, Gulgarni.R, **Hand book of indices of foodquality and authenticity.**

MANNAR THIRUMALAI NAICKER COLLEGE(Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part IV**	**: Skill**
Semester	**: IV**	**Hours per week**	**: 02**
Subject Code	**: 18UFDS41**	**Credit**	**: 02**

FUNDAMENTALS ON MILK CHILLING MACHINERIES

Course Outcomes:

CO1: To provide engineering knowledge on constructions and operations related to chilling machineries.
CO2: To provide knowledge on mechanisms and working principles of chilling machineries.
CO3: To provide hands on training to handle the chilling machineries.
CO4: To give them knowledge on increasing the shelf life of the product.

Unit I:

Preservation: Definition – types of preservation and the importance of food preservation. Preservation and transportation of milk – Location of chilling centres.

Unit II:

Refrigeration– definition – types – refrigeration cycle - vapours compression refrigeration system – desirable properties of refrigerants – Compressors – Condensers – Evaporators – Types of evaporators.

Unit III:

Refrigerant control devices – automatic expansion value, solenoid valve, pressure control and thermostat — Common troubles in refrigeration system.

Unit IV:

General care and maintenance of milk cooling - Types of cooler and functions - construction and component details of bulk milk coolers - description and merits of the system.

Unit V:

Chilling – Types of chilling – Plate chiller - construction and component details of plate chiller – Ice balance tank (IBT). Cold storage chain.

Text Book:

1. Aors.S.C and Domkundwar.s.1989- Refrigeration and air conditioning 5th edition- Dhanpat Rai and sons, New Delhi

Reference Book:

1. Tuffel Ahmad, Dairy Plant Engineering and Management KitabMachal Distributers (1995), New Delhi.
2. Prasad.M 2007 Refrigeration and air conditioning-New Age international, New Delhi
3. Jorden.R.C and Priester G.B.1957- Refrigeration and air conditioning prentice Hall, New Delhi

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part IV**	**: NME**
Semester	**: IV**	**Hours per week**	**: 02**
Subject Code	**: 18UFDN41**	**Credit**	**: 02**

FOOD PRESERVATION AND SAFETY

Course Outcomes:

CO 1 : To provide fundamental understanding of food spoilage and preservation.
CO 2: To equip with Commercial preservation technologies to maintain fresh and minimal processed food.
CO 3: To apply scientific knowledge on food safety.
CO4: To understand the skill in the area of food preservation and safety.

Unit-1

Food preservation: Food spoilage, Principles of food preservation, preservation methods.

Unit -2

Food Additives: Definition, Major categories of food additives, functions and uses

Unit -3

Food Adulteration - Adulteration, Adulterant - Definition, types - Intentional and Incidental, methods of detection.

Unit -4

Safe Food handling and Storage: Different Aspects of Food safety, Hygiene - Environmental, Personal, food handling, storage, wholesome food.

Unit -5

Food Preservation: Pickles, Sauce, Squash, jam, jelly - Skill development classes (Add on course - Certificate course).

Text Books:

Srilakshmi. B, **Food science,** New Age International Publishers, New Delhi.

Reference Books:

1. Srilakshmi. B, Human Nutrition (For B.Sc Nursing Students) New Age International Publishers, New Delhi.
2. Mudambi.R.S and Rajagopal.M.Y. **Fundamentals of Food and Nutrition**, Wiley Eastern Limited: (1991), New Delhi.
3. Swaminathan, M., **Food Science and Experimental Foods**, Ganesh and Company, (1988), Madras.


FIFTH SEMESTER

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme : UG **Part III : Core**
Semester : V **Hours : 05**
Subject Code: 18UFDC51 **Credit : 04**

TECHNOLOGY OF DAIRY PRODUCTS

Course Outcomes:

After completion of the course, the students will be able to:

CO1: Acquire knowledge on Milk and Milk products processing.

CO2: Study the working of equipments used in milk and milk products processing.

CO3: Expand the knowledge for preparation of different milk products

CO4: Interpret processing methods of market milk.

CO5: Create organizational legislation for quality control of milk and milk products.

Unit-I Cream

Cream- Classification- Composition- Nutritive value- Physico- chemical properties Pasteurization of cream-Manufacture of different types of cream -Packaging and Storage uses of cream- Possible defects and control measures.

Unit-II Butter

Butter-Classification-Composition- Nutritive value-Method of manufacture-butter churn method-continuous butter making-packaging and storage-over run-yield-uses-Defects and control measures.

Unit-III Ice Cream

Definition of ice cream - Classification- Composition- Nutritive value- Role of Constituents-Properties of mixture- Method of manufacture- Packaging-Hardening and storage- Defects and control measures.

Unit-IV Paneer

Paneer - composition- nutritive value- Manufacture of paneer- Tofu- composition-nutritive value- - Yield - Uses.

Unit - Condensed milk

Condensed milk - Composition- nutritive value- Physico-chemical properties-

method of manufacture–Sweetened Condensed milk- packaging and storage of condensed milk.

Text Book:

1. Sukumar De, Outlines of Dairy Technology, Oxford University Press, 1980,New Delhi.

Reference Books:

1. Aneja.R.P, B.NMathur, R.C Chandra and A.K. Banerjee, Technology of Indian Milk and Milk Products, Dairy India Publication 2002,New Delhi.
2. H. Douglas Goff, "The Dairy Science and Technology eBook" Dairy Science and Technology Education Series, University of Guelph, Canada.
3. **Robinson**, R. Advances in Milk Processing-Springer publication

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part III**	**: Core**
Semester	**: V**	**Hours**	**: 04**
Subject Code	**: 18UFDCP5**	**Credit**	**: 04**

TECHNOLOGY OF DAIRY PRODUCTS-PRACTICAL

Course Outcomes:
After completion of the course, the students will gain expertise in the:
CO1: Preparation of cream, butter and ice cream by using the appropriate machines
CO2: Analysis of various quality parameters of prepared dairy products.
CO3: Acquire the knowledge on platform and organoleptic test.
CO4: Enlighten the knowledge of fat rich products
CO5: Create milk based new by products

List of Practical's:

1. Preparation of cream
2. Acidity of cream
3. Estimation of fat in cream
4. Preparation of butter
5. Estimation of Free fatty acid
6. Estimation of butter fat
7. Preparation of ice cream
8. Estimation of ice cream fat
9. Preparation of Paneer
10. Preparation of condensed milk

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part III**	**: Core**
Semester	**: V**	**Hours**	**: 05**
Subject Code	**: 18UFDC52**	**Credit**	**: 04**

EFFLUENT TREATMENT AND ENVIRONMENTAL SAFETY

Course outcomes:

After completion of the course, the students will be able to:

CO1: Disseminate the knowledge pertaining to waste water treatment in dairy plants.

CO2: Understand environmental issues and remedial measures in dairy industrial sector.

CO3: Get In-depth understanding of specialist bodies of knowledge within the environmental discipline.

CO4: Predict and characterize the likely impacts of pollutants on the environment

CO5: Design of a generalized predictive controller for biological waste water treatment plant.

Unit I:

Water - Quality of farm and plant water – Routine and special methods for water analysis, purification of water – Requirement of water for farm and plant.

Unit II:

Wastes discharged from dairy plants-Economics of effluent discharge- Insight process.

Unit III:

General Characteristics of dairy waste – Types of sewage – Disposal methods. Primary treatment - Secondary treatment - water conservation-recycling - Standards of different treatment effluents.

Unit IV:

Types of Membrane separation process-Removal of fats and greases recovery of brine and cleaning solutions- Dairy products effluents

Unit V:

Types of pollution –Solid waste management- Environment protection Act, 1986- Central acts-State acts- Standards of different types treated effects.

Text Book:

1. Velazhagan.D, Pollution control operation calculation, Velava publishers – Chennai - 117

Reference Books:

1. Anantha Krishnan, C.P., **Technology of milk processing**, Sri Lakshmi Publications, (1991),Chennai -10.

2. Subhasish Biswas, Subhash Kumar Battacharyya, **Milk and milk products technology**, Jaypee Brothers medical publishers (P) Ltd, (2006),New Delhi.
3. **Dalzall**, J. M. **Food Industry and the Environment**- Springer publication

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part III**	**: Core**
Semester	**: V**	**Hours**	**: 04**
Subject Code	**: 18UFDCP6**	**Credit**	**: 03**

EFFLUENT TREATMENT AND ENVIRONMENTAL SAFETY- PRACTICAL

Course outcomes:

After completion of the course, the students will be able to:

CO1: Learn different methods of hazard analysis and control of hazards

CO2: Know about types of pollution, its sources, effects and control methodology and thereby environmental protection

CO3: Manage pollutants within environmental guidelines

CO4: Acquire pollution boards duties and responsibilities

CO5: Software for the integrated design for waste water lands

List of Practical's:

1. Estimation of Hardness of water.
2. Sample collection of effluent.
3. Estimation of BOD.
4. Estimation of COD.
5. Visit to Dairy effluent treatment plant.
6. Visit to sewage effluent treatment plant.
7. Visit to Tamil Nadu pollution control board.
8. Basic Concepts of Safety Measures.
9. TDS – Total Dissolved solids

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: F&D Tech**	**Part III**	**: Core**
Semester	**: V**	**Hours**	**: 04**
Subject Code	**: 18UFDC53**	**Credit**	**: 04**

DAIRY BY-PRODUCTS TECHNOLOGY

Course Outcomes:

After completion of the course, the students will be able to:

CO1: Identify different milk by products status.
CO2: Distinguish different methods of storage
CO3: Learn the efficient utilization of milk in Dairy industries
CO4: Adopt different dairy product processing methods
CO5: Utilization of different milk products

Unit-I

Status of Dairy industry - Introduction- Definition –Global status availability and utilization of dairy byproducts- Indian status availability and utilization of dairy byproducts.

Unit-II

Skim milk - Definition - composition- Physico-chemical properties of skim milk- Manufacture of skim milk powder- other uses of skim milk

Unit-III

Casein - Types of casein – Industrial casein - Processing methods –uses of caseins- rennet casein – manufacturing process - Edible casein definition.

Unit-IV

Whey-Definition & Standards of whey- types of whey-composition –manufacture of whey beverages - whevit - Yeast-whey -Whey protein concentrate –Lactose – definition – standards - Grades of lactose-method of manufacture - uses.

Unit-V

Butter milk – Definition, composition - types of butter milk - Lassi- Ghee residue and its characteristic s - utilization of ghee residues.

Text Book:

1. Sukumar De, Outlines of Dairy Technology, Oxford University Press, 1980,New Delhi.

Reference Books:

1. Aneja.R.P, Mathur.B.N, R.C Chandra and A.K. Banerjee, Technology of Indian Milk and Milk Products, Dairy India Publication 2002,New Delhi.
2. Douglas Goff.H, "The Dairy Science and Technology eBook" Dairy Science and Technology Education Series, University of Guelph, Canada.
3. **Robinson**, R. Advances in Milk Processing-Springer publication

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part III**	**: Elective**
Semester	**: V**	**Hours**	**: 04**
Subject Code: 18UFDE51		**Credit**	**: 04**

HUMAN NUTRITION

Course outcomes:

After completion of the course, the students will be able to:

CO1: Learn the basic information about human nutrition.

CO2: Understand the factors that affect the human nutrition.

CO3: Know the nutritional and energy requirements of human beings at different stages of life, in the physiological situations associated with nutrition.

CO4: Learn how to carry out and interpret the nutritional assessment of an individual

CO 5: Compile growth monitoring and promotion of different age group people.

UNIT I

Introduction - Concept and definition of terms-Nutrition, Malnutrition and Health: Scope of Nutrition. Minimum Nutritional Requirement and RDA. Dietary Guidelines for Reference Man and Reference Woman.

UNIT II

Nutrition During Pregnancy - Factors affecting pregnancy outcome, importance of adequate weight gain during pregnancy, antenatal care and its schedule, Nutritional requirements during pregnancy and modification of existing diet and supplementation, Deficiency of nutrients, specially energy, iron, folic acid, protein, calcium, iodine.

UNIT III

Nutrition during Lactation: Nutritional requirements during lactation, dietary management, food supplements, galactogogues, preparation for lactation. Hormonal control of lactation.

UNIT IV

Nutrition **during Infancy:** Infant physiology relevant to feeding and care, Breast feeding- colostrum, its composition and importance in feeding. Advantages of exclusive breast feeding. Basic principles of breast feeding. Weaning - Introduction of supplementary foods.

Unit V

Growth monitoring and promotion: Use of growth charts and standards, Preventions of growth faltering. Nutritional needs of toddlers, preschool, school going children- and adolescents - Dietary management.

Text Book:

1. B. Srilakshmi: Dietetics, New Age International Publishers.2006

Reference Books:

1. Robinson, C. H. Lawler, M. R.; Chei Toweth, W. L. and Garwick, A. E.: Normal and Therapeutic Nutrition. 17th Ed. Mac Millan Publishing Co.
2. Indian Council of Medical Research: Nutrient Requirements and Recommended-Dietary Allowance for Indians, New Delhi.
3. Thangam. E. Philip (1965): Modern Cookery, Orient Longman, II edition. Vol II, Bombay.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: F&D Tech**	**Part III**	**: Elective**
Semester	**: V**	**Hours**	**: 04**
Subject Code	**: 18UFDE52**	**Credit**	**: 04**

FOOD PACKAGING TECHNOLOGY

Course outcomes:

After completion of the course, the students will be able to:

CO1: Understand packaging materials and its importance in food Industry
CO2: Adapt and utilize packaging materials for right application in Food Industry
CO3: Standardize testing methods for packaging material to assure quality
CO4: Consumer packaging: Important functionally, but not attitudinally
CO5: Create testing techniques for recent trends in packaging

Unit-1

Introduction to Food packaging: Packaging terminology –definition, Functions of Food Package, Packaging environment. Characteristics of food stuff that influences packaging selection. Nitrogen purging - Aseptic Packaging.

Unit-II

Packaging systems and methods: Cellulosie and Polymeric packaging materials and forms: Food grade polymeric packaging materials, Rigid plastic packages- Regenerated cellulose film- plastic films- Aluminum foils and laminations- Special packaging methods- vacuum and gas packaging, shrink package, retort pouches- Bio degradable packages.

Unit-III

Packaging material and their properties: Glass and Metal containers: Glass: Composition, Properties, Bottle making and Closures for glass containers - Metal: Bulk containers; Tin-plate containers, Tin free steel containers, Aluminum containers-Latest development in metal cans and protective lacquers.

Unit-IV

Packaging of fresh and processed foods: Packaging of Fruits and vegetables,- Fats and Oils, Spices, meat, Poultry and sea foods, Dairy Products, Bakery, beverages, Dehydrated and frozen foods. Liquid and powder filling machines – like aseptic system, form and fill (volumetric and gravimetric), bottling machines. Form Fill Seal (FFS) and multilayer aseptic packaging machines.

Unit-V

Packaging designs and environmental issues in packaging : Food marketing and role of packaging-Packaging aesthetic and graphic design; Packaging Laws and Regulations, Safety aspects of packaging materials; sources of toxic materials and migration of toxins into food materials; Packaging material residues in food products; Environmental & Economic issues, recycling and water disposal.

Text Book:

1. Robertson,G.L. "Food Packaging: Principles and Practice (2nd Edn). Taylor & Francis.2006.

Reference Books :

1. Han,J.H. " Innovations in Food Packaging". Elsevier Academic Press, 2005.
2. Ahvenainen.R. "Novel Food Packaging Techniques". CRC Press. 2003.
3. Coles.R., Mc Dowell,D. and Kirwan,M.J. " Food Packaging Technology". CRC Press.2003.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part III**	**: Elective**
Semester	**: V**	**Hours**	**: 04**
Subject Code	**: 18UFDE53**	**Credit**	**: 04**

PROCESSING OF MARINE PRODUCTS

Course outcomes:

After the completion of course, the students will be able to:

CO1: Gain knowledge on the processing of marine and their by products
CO2: Understand about the Quality of the sea foods
CO3: Examine the quality of marine products and quality issues in storage
CO4: Learn the different processing methods (Canning, freezing)
CO5: Developing the different fish products

Unit-I:

Chemistry of sea food components - Proteins, Lipids. Protein hydrolysis in sea foods, oxidation of lipids in sea foods. Flavor of fish- Taste active component

Unit-II:

Quality of sea foods - Freshness quality of sea foods- Appearance, Color, Texture, Odor and Flavor, Destructive slow analyses, Alternative methods. Factors affecting the loss of quality in sea foods.

Unit-III:

Preservation of sea foods - Chilling of fresh fish, Freezing and frozen storage, Drying of sea foods, Smoking and other methods of preservation.

Unit-IV:

Canning of sea foods- Introduction, Unit operations in the Canning process- primary processing, heat treatment, packing and sealing, cooling. Production of canned sea foods – Mackerel, Salmon, Tuna, Shrimp and clams.

Unit-V:

Processing of by – products- Fish By-products : Protein, Peptides, Collagen and Gelatin, Fish oil. Crustaceans By-products: Chitin and Chitosan, Seaweed by-products and their applications

Text Books:

1. Shahidi and J.R. Botta, “Sea foods: Chemistry, Processing, Technology and Quality”, Springer Science Business media, 1996.

Reference Books:

1. Zdzislaw E. Sikorshi, “Sea foods: Resources, Nutritional Composition, and Preservation”, CRC Press, 2004.
2. Indian Fishery Hand Book by MPEDA publications
3. Marine Products Export Review by MPEDA publications

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part III**	**: Elective**
Semester	**: V**	**Hours**	**: 04**
Subject Code: 18UFDEP1		**Credit**	**: 03**

HUMAN NUTRITION – PRACTICAL

Course Outcomes:

After completion of the course, the students will be able to:

CO1: Understand the physiology of pregnancy and lactation and how these influence on nutritional requirements.

CO2: Understand the process of growth and development form birth until old age.

CO3: Get familiar with the nutritional needs at different stages of growth

CO4: Adequate knowledge on nutritional importance

CO5: Make inferences and find evidences to prepare nutritious foods

List of Practical's:

1. Planning, preparing and serving a meal for low income family, middle income family and high income family.
2. Planning, preparing and serving a meal for a pregnant woman.
3. Planning, preparing and serving a meal for a lactating woman.
4. Planning, preparing and serving a meal for an infant.
5. Planning, preparing and serving a meal for a preschooler.
6. Planning, preparing and serving a meal for a school going child.
7. Planning, preparing and serving a meal for an adolescent.
8. Planning and preparation of any five packed lunches.
9. Planning, preparing and serving a meal for an adult (sedentary, moderate & heavy worker).
10. Planning, preparing and serving a meal for an old age person.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part III**	**: Elective**
Semester	**: V**	**Hours**	**: 04**
Subject Code: 18UFDEP2		**Credit**	**: 03**

FOOD PACKAGING TECHNOLOGY – PRACTICAL

Course outcomes:

After completion of the course, the students will be able to:

CO1: Check Barrier properties of Packaging materials to avoid cross contamination with air, water and printing ink

CO2: Apply and examine the knowledge of properties for selection of packaging materials for foods & food products

CO3: Select between different techniques of food packaging

CO4: Adopt business applications in mind.

C05: Contect new technological methods used in food packaging

List of Practical's:

1. Determination of bacterial counts of polymer – packed foods during storage
2. Determination of coli forms and fungal counts of polymer – packed foods during storage.
3. Determination of water vapour transmission rate of the given packaging material – polythene.
4. Estimation of water vapour transmission rate of the given packaging material – polypropylene.
5. Determination of grease resistance of papers used in food industry – butter paper & toffee wraps.
6. Determination of adhesive test of tapes
7. Determination of drop test using food packets
8. Estimation of water absorption test in paper based materials
9. Experiment on sealing of plastic cups
10. Experiment on ceiling of pouches.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part III**	**: Core**
Semester	**: V**	**Hours**	**: 04**
Subject Code	**: 18UFDEP3**	**Credit**	**: 03**

PROCESSING OF MARINE PRODUCTS - PRACTICAL

Course outcomes:

After completion of the course, the students will be able to:

CO1: Learn the sampling procedures

CO2: Adopt and handle testing methods.

CO3: Acquire personal hygiene

CO4: Gain the knowledge of EIA-technology

CO5; Identify the fumigation tools

List of Practicals:

1. Sampling procedure
2. Media preparation
3. Fumigation method
4. Discarding methods
5. Standard plate count methods
6. Identification of E.coli
7. Other fecal coli forms
8. Vibrio cholera
9. Salmonella
10. Visit to sea food processing industries.


SIXTH SEMESTER

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme : UG **Part III : Core**
Semester : VI **Hours : 04**
Subject Code: 18UFDC61 **Credits : 03**

BAKERY AND CONFECTIONERY

Course outcomes:

After completion of the course, the students will be able to:

CO1: Explain the standards and regulations followed in bakery and confectionary industry
CO2: Identify different food ingredients and its used in bakery products
CO3: Analyze bakery unit processing machinery effectively
CO4: Prepare various process flow line in confectionary and bakery products
CO5: Create new products and execute it in their own bakery

Unit - I:

Baking Industry - Baking industry and its scope in the Indian economy. History of Bakery- present trends, Bakery terms. Nutrition facts of bakery products.

Unit - II:

Cake Technology - Preparation of cakes - Ingredients and processes, Equipments used, product quality characteristics faults and corrective measures. Different types of icings.

Unit - III:

Bread, Buns and pizza base-Ingredients - Ingredients for process for breads, buns, pizza base, Equipments used, Product quality characteristics. Faults and remedies.

Unit - IV:

Cookies and Biscuits - Ingredients of cookies and their functions, Principles involved in cookies preparation, Methods for mixing cookies, Types of cookies, Faults and their cause in making cookies

Unit – V:

Confectionery products - Hard-boiled candies, toffees fruit drops, chocolates and other confectionaries - ingredients, equipments& processes, product quality parameters, faults and corrective measures.

Text Book:

1. Yogambal Ashokkumar., Textbook of Bakery and Confectionery, London 2014
2. Beckette, Industrial Chocolate Manufacture, Wiley-blackwell publisher, 3rd edition, 2009

Reference Books:

1. Arora.S.M., **Hand Book of Bakery Products**, Small Industry Research Institute: (1994),New Delhi.
2. Hamlyn, **The Best of Baking**, (1984), London.
3. Indira Kakati, **Egg Less Baking**, Sahibabad: Vikas Publishing House (1984).

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme : UG **Part III: Elective**
Semester : VI **Hours : 04**
Subject Code : 18UFDE61 **Credit : 03**

ENTREPRENEURIAL DEVELOPMENT PROGRAMME

Course outcomes:

After completion of the course, the students will be able to:

CO1: Understand the process and procedures for taking up entrepreneurial programmes

CO2: Develop an attitude for Entrepreneurship development

CO3: Understand different methods that can be used to minimize uncertainties at different stages of the entrepreneurial process

CO4: Understand different innovation and entrepreneurship theories and their implications

CO5: Understand the various scientific research methods commonly used to study innovation, entrepreneurship and new technology

Unit I:

Concept of Entrepreneurship and Managerial Characteristics- Managing an Enterprise-Motivation and Entrepreneurship Development- Generation, Women Entrepreneurship

Unit-II:

Incubation and Commercialization of Ideas and Innovations- Importance of Planning, Monitoring, Evaluation and Follow Up-Managing Competition and Entrepreneurship Development Programmes.

Unit III:

Agencies supporting Entrepreneurial Development Programme – SIDCO, DIC,TIIC, NSIC, MSME- Objectives, Programmers', Financial Assistance

Unit IV:

Dairy entrepreneurship development scheme (DEDS). Dairy processing and infrastructure development fund (DIDF), National rural livelihoods mission (NRLM)

Unit V:

Project proposal – Proposal format and content - Steps in its preparation, Feasibility testing, SWOT analysis.

Text book:

1. Vasant Desai., **Project Management and entrepreneurship**, Himalaya Publishing House, New Delhi (2000).

Reference Books:

1. Chunawalla S.A., **Sales Management**, Himalayan publishing House (1999), New Delhi.
2. Dr.N.Rajan Nair., Sajith R. **Nair Marketing**, Sutanchand and Sons, (2002), New Delhi.
3. David H. Moll., **Entrepreneurship**, prentice Hall of India, (1999), New Delhi.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme : UG **Part III : Elective**
Semester : VI **Hours : 04**
Subject Code: 18UFDE62 **Credit : 03**

POULTRY AND MEAT PROCESSING TECHNOLOGY

Course Outcomes:

After completion of the course, the students will be able to:

CO1: Understand the processing methods and importance of meat based Products
CO2: Develop handling and transportation of meat and Fish
CO3: Analyse Technology for processing of meat and it's byproducts
CO4: Importance of preservation techniques and Packaging for poultry products
CO5: Create innovative meat based products

Unit-1:

Meat composition from different sources; muscle structure and compositions; post-mortem muscle chemistry; Factors influencing the quality of meat. Meat Microbiology and safety.

Unit-II:

Slaughtering- Ante mortem inspection and handling, Stunning types, Slaughtering types. Steps in slaughtering (Pig, Cattle, Sheep/Goat)and dressing .Slaughter house operations-Hoisting rail and traveling pulley system; Modern abattoirs, typicallyout and features, Offal handling and inspection. Grading of meat-retail and whole sale cuts. Operational factors affecting meat quality. By product utilization .Meat plant hygiene– GMP and HACCP.

Unit-III:

Processing and preservation of meat: Chilling and freezing of meat, Canning, cooking, drying, pickling, curing and smoking; prepared meat products like sausages, kebabs, etc.. Intermediate moisture and dried meat products, Packaging of meat products.

Unit-IV:

Poultry: methods of slaughtering, Slaughtering equipment and operations, dressing, handling, storage and preservation of poultry meat. Spoilage and its control.Freezing and chilling of poultry. Whole sale and retail cuts. Eggs: Composition, handling, candeling, washing, coating, packaging and storage.

U n i t – V :

Commercially important marine products from India- Proximate composition, Postmortem changes in fish muscle. Handling, Preservation and transportation of fish. Indices of fish quality, Microbiology of fish and shellfish, Freezing of fish and shellfish.

Text Books:

1. Legarreta,I.G. " Handbook of Poultry Science and Technology"(Volume I and Volume II), John Wiley &Sons,Inc., Hoboken, 2010

Reference Books:

1. Mead M. "Poultry Meat Processing and Quality". Wood head Publ. 2004.
2. Pearson, A.M.&Gillett, T.A. " Processed Meat". 3rdEd. Chapman &Hall, 2006.
3. Marine Products Export Review by MPEDA publications

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme	**: UG**	**Part III**	**: Elective**
Semester	**: VI**	**Hours**	**: 04**
Subject Code	**: 18UFDE63**	**Credit**	**: 03**

FUNCTIONAL FOODS AND NUTRACEUTICALS

Course Outcomes:

After completion of the course, the students will be able to:

CO1: Understand about functional foods and its properties

CO2: Understand regarding Metabolic disorders and its relation with functional foods.

CO3: Learn the benefits of fortification in Food supplements

CO4: Understand the importance of Prebiotic and probiotic foods

CO5: Solve problems to new situations by applying Nutraceuticals knowledge.

Unit-I:

Introduction to Nutraceuticals –Historical Reviews-Teleology of nutraceuticals-Organization models for nutraceuticals – Classification of Nutraceuticals based on the sources– Animal, Plant and Microbial – Nutraceuticals in specific foods.

Unit-II:

Food recommended for metabolic disorder - Food recommended and restricted in metabolic disorders and disturbances, gastrointestinal disorders; fever and infection; liver, gall, bladder and pancreatic disturbances; blood, circulatory and cardiac diseases; urinary and musculo skeletal diseases; allergies.

Unit-III:

Nutritional deficiencies - Nutritional deficiencies and its correction trough fortification and supplementation of foods. Beneficial effect of spices, honey, spirulinaetc.

Unit-IV:

Health benefits of Micronutrients - Health benefits/ mode of action of PUFA/gamma linolenicacids, antioxidants, dietary fiber, oligosaccharides, sugar alcohols, peptides and proteins, glycosides, alcohols, iso- prenoidesand vitamins, choline, LAB, phenolics, flavonols, minerals

Unit-V:

Herbs as Functional foods - Herbal medicine–Herbsas ingredients in functional foods–actions of herbal and evidence of efficacy, Cruciferous vegetables and cancer prevention, Evolution of marketing environment for Functional foods and Nutraceuticals.

Text Book:

1. Robert E.C Wildman. Handbook of Nutraceuticals and Functional Foods, Ed., CRC Press LLC.ISBN– 0849387345, 2001.

Reference Books:

1. Nutraceuticals Designer foods III- Paul. a. Lachance-Food and Nutrition press. INC,USA
2. Developing New Functional Food and Nutraceutical Products –Cookbook- USA
3. Essential of functional foods –Marry scheward-Springer publication

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2018 and after)

Programme subject	**: UG**	**Part III**	**: Core**
Semester	**: VI**	**Hours**	**: 12**
Subject Code: 18UFDPR1		**Credit**	**: 10**

PROJECT AND VIVA – VOCE

Individual – 1 member

Record submission – A hard bound report to be submitted to the Department.

Evaluation – Project (oral) presentation followed by a brief Viva

Internal 40 Marks (Course teacher)

External 60 Marks (Course teacher and External members from other departments)

Course Description

The Project is conducted by the following Course Pattern.

Internal

Presentation
Submission } **40**

External

Project Report
Viva Voce } **60**

Total - 100

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2017 and after)

Programme	**: UG**	**Part III**	**: Core Project**
Semester	**: VI**	**Hours**	**: 10**
Subject Code:	**18UFDINP**	**Credits**	**: 10**

IN PLANT TRAINING

Each Group – 4 members

Area of learning – Raw material procurement, quality checking, processing & packaging methods.

Record submission – A hard bound report to be submitted to the Department.

Evaluation – Project (oral) presentation followed by a brief Viva

Course Description

The Project is conducted by the following Course Pattern.

Internal

Presentation Submission	**40**

External

Project Report Viva Voce	**60**
Total -	**100**