

MANNAR THIRUMALAI NAICKER COLLEGE
PASUMALAI, MADURAI- 625 004

(An Autonomous Institution Affiliated to Madurai Kamaraj University)

(Re-accredited with 'A' Grade by NAAC)



B.Sc., Food and Dairy Technology
SYLLABUS AND REGULATIONS

UNDER
CHOICE BASED CREDIT SYSTEM (CBCS)
(For those who joined during 2018-2019 and after)

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 x 01= 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 x 01 = 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	<u>--25 marks</u>

** 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

	30 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)

	75 Marks
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 SPECIFIC OUTCOMES

PSO1: To enlighten the student's knowledge about the functioning of milk procurement organizations.

PSO2: To enable students to acquire skill in processing of various food and dairy products.

PSO3: To understand the science behind the processing of food and its impacts on nutritive value of food stuffs.

PSO4: To apply Food Science and Dairy technology in the field of selection, preservation, packing, distributing and using safe and nutritious food.

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 -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



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).



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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



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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



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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 Jones 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.



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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 area 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.



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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 microbiological 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 Westhoff, 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.



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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.



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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.**



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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 valve, 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. Jordan.R.C and Priester G.B.1957- Refrigeration and air conditioning prentice Hall,
New Delhi



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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.