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 2017–2018 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 question paper (Summative Examinations)

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

The question paper may have 3 parts.

Duration of the Summative Examinations is 3 hours

Part –A

Five questions (answer all) 5 x02 = 10 Marks

(One question from each Unit)

Part –B

Five questions (‘either …. or ‘type) 5 x 07 = 35 Marks

(One question from each Unit)

Part –C

Three questions out of five 3 x 10 =30 Marks

(One question from each Unit)

Total 75 Marks

Question paper pattern

(For part IV – Environmental Studies and Value Education only)

Part –A

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

Part –B

Three questions out of Five 3 x 15 = 45 marks

Total 75 marks

Note: No unit shall be omitted; not more than two question from each unit

Pattern of the Question paper (Internal)

Part –A

Five questions (answer all) 5 x02=10 Marks

Part –B

Two questions (‘either …. or ‘type) 2 x 05=10 Marks

Part –C

One questions out of two 1 x 10 =10 Marks

Total 30 Marks

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

Part –A

Four questions (‘either …. or ‘ type) 4 x05=20 Marks

Part –B

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

Total 30 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.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENTOF B.Sc.,FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2017 and after)

Table:1: 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)	6(5) 6(5) 10(8) 8(8)	84	71	17	1700
Part-III Elective Elective (P)					4(4) 4(3)		8	7	2	200
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
15UTAG11	**Part –I Tamil /Alternate Subject** Tamil –I: **இக்காலக் கவிதையும் சிறுகதையும்**	1	6	3	25	75	100
15UENG11	**Part –II English Subject** English-I: Language Through Literature-1	1	6	3	25	75	100
	Part –III Core Subject						
17UFDC11	Fundamentals of Dairying	1	4	3	25	75	100
17UFDCP1	Fundamentals of Dairying – Practical	1	2	1	40	60	100
	Part –III Allied Subject						
17UFDA11	Introduction to Food Science	1	4	4	25	75	100
17UFDAP1	Introduction to Food Science – Practical	1	2	1	40	60	100
17UFDS11	**Part –IV Skill Subject** Work Shop Practices on CIP	1	2	2	25	75	100
17UFDS12	Preservation Techniques of Fruits and Vegetables	1	2	2	25	75	100
15UEVG11	**Part –IV Mandatory Subject** Environmental Studies	1	2	2	25	75	100
	Total	**9**	**30**	**21**	**255**	**645**	**900**

SEMESTER – II

15UTAG21	**Part –I Tamil /Alternate Subject** Tamil –II: இடைக்கால இலக்கியமும் புதினமும்	1	6	3	25	75	100
15UENG21	**Part –II English Subject** English-II: Language Through Literature-II	1	6	3	25	75	100
17UFDC21	**Part –III Core Subject** Physio-chemical aspects of Milk	1	4	3	25	75	100
17UFDCP2	Physio-chemical aspects of Milk - Practical	1	2	2	40	60	100
17UFDA21	**Part –III Allied Subject** Food Chemistry	1	4	3	25	75	100
17UFDAP2	Food Chemistry- Practical	1	2	1	40	60	100
17UFDS21	**Part –IV Skill based Subject** Dairy Plant Design and Layout	1	2	2	25	75	100
17UFDS22	Office Automation (Computer Subject)	1	2	2	25	75	100
15UVLG21	**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**
15UTAG31	**Part-I Tamil/Alternate Subject** காப்பிய இலக்கியமும் நாடகமும்	1	6	3	25	75	100
15UENG31	**Part -II English Subject** English-III: Language through Literature-III	1	6	3	25	75	100
17UFDC31	**Part-III Core Subject** Food and Dairy Processing Techniques	1	6	5	25	75	100
17UFDCP3	Food and Dairy Processing Techniques-Practical	1	4	3	40	60	100
17UFDAP3	**Part-III Allied Subject** Skill Development in food preparation-Practical	1	4	4	40	60	100
17UFDS31	**Part-IV Skill based Subject** Food Product Development and Marketing	1	2	2	25	75	100
17UCHN31	**Part-IV Non Major Elective** Waste Water Treatment	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**
15UTAG41	**Part-I Tamil/Alternate** சங்க இலக்கியமும் உரைநடையும்	1	6	3	25	75	100
15UENG41	**Part -II English Subject** Language through Literature-IV	1	6	3	25	75	100
17UFDC41	**Part-III Core Subjects** Food and Industrial Microbiology	1	6	5	25	75	100
17UFDCP4	Food and Industrial Microbiology – Practical	1	4	4	40	60	100
17UFDA41	**Part-III Allied Subject** Food Safety and Quality Control	1	4	4	25	75	100
17UFDS41	**Part -IV Skill based Subject** Fundamentals on milk chilling machineries	1	2	2	25	75	100
17UCHN41	Polymer Chemistry	1	2	2	25	75	100
15UEAG40 to 15UEAG49	**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**
17UFDC51	**Part-III Core Subjects** Technology of Dairy Products	1	5	4	25	75	100
17UFDCP5	Technology of Dairy Products-Practical	1	4	4	40	60	100
17UFDC52	Effluent Treatment and Environmental Safety	1	5	4	25	75	100
17UFDCP6	Effluent Treatment and Environmental Safety -Practical	1	4	3	40	60	100
17UFDC53	Dairy By - Products Technology	1	4	4	25	75	100
17UFDE51 17UFDE52 17UFDE53	**Part –III Elective Subject Human Nutrition** Food Packaging Technology Processing of Marine Products	1	4	4	25	75	100
17UFDEP1 17UFDEP2 17UFDEP3	**Part –III Elective – Practical Human Nutrition- Practical** Food Packaging Technology - Practical Processing of Marine Products - Practical	1	4	3	40	60	100
	Total	**7**	**30**	**26**	**220**	**480**	**700**

SEMESTER–VI							
Subject code	**Subjects**	**No. of Courses**	**Hours /Week**	**Credits**	**Maximum Marks**		
					Int	**Ext**	**Total**
17UFDC61	**Part-III Core Subjects** Bakery and Confectionary	1	6	5	25	75	100
17UFDE61 17UFDE62 **17UFDE63**	**Part-III Elective Subjects** Entrepreneurial Development Programme Poultry and Meat Processing Technology **Functional Foods and Nutraceuticals**	1	6	5	25	75	100
17UFDPR1	Project	1	10	8	40	60	100
17UFDINP	In plant Training	1	8	8	40	60	100
	Total	**4**	**30**	**26**	**130**	**270**	**400**

மன்னர் திருமலை நாயக்கர் கல்லூரி (தன்னாட்சி)
DEPARTMENT OF FOOD AND DAIRY TECHNOLOGY
(For those who joined in 2017 and after)

வகுப்பு	:B.Sc (F&D Tech)	பகுதி I	: தமிழ்
பருவம்	: மூன்றாம்பருவம்	நேரம்	: 06
பாடக்குறியீட்டுஎண்	: 15UTAG31	மதிப்பீடு	: 03

காப்பிய இலக்கியமும் நாடகமும்

Course Outcomes:

CO1.தமிழில் எழுதிய முதல் காப்பியம் 2000 ஆண்டுகளுக்கு முற்பட்டது.
CO2 .காப்பியங்களை அறிமுகப்படுத்துவது, காப்பியச் சுவையினை மாணவர்களுக்கு உணர்த்துவது காப்பிய கால மக்களின் வாழ்வினைப் பண்பாட்டினை உணரச் செய்வது நோக்கமாகும்.
CO3.நாடகம் என்பது தமிழின் பழங்கதையாகும். நாடகத்தை மாணவர்களுக்கு உணர்த்துவதற்கு இலக்கிய நாடகம் என்ற நூலினை பாடமாக அமைக்கப்பட்டுள்ளது.
CO4: மாணவர்களின் மொழி ஆளுமை திறன் வளர்ப்பதற்கு இந்தப்பாடம் கற்பிக்கப்படுகிறது.

கூறு:1 காப்பிய இலக்கியம்

சிலப்பதிகாரம் - வழக்குரைகாதை
மணிமேகலை - பாத்திரம் பெற்றகாதை
சீவகசிந்தாமணி - விமலையார் இலம்பகம்
(26பாடல்கள்)

கூறு:2

கம்பராமாயணம் - அங்கதன் தூது படலம்
பெரியபுராணம் - திருநீலநக்கநாயனார் புராணம் - முதல் 38பாடல்கள்
சீறாப்புராணம் - மானுக்குப் பிணைநின்ற படலம்.
இயேசுகாவியம் - 1. விபசாரத்தில் பிடிபட்ட பெண்
2. பணக்கார வாலிபன்
3. ஊசியின் காதில் ஒட்டகம் நுழைவது எளிது

கூறு:3நாடகம் - இலக்கியநாடகங்கள் - ஜெயந்திநாகராஜன்

கூறு:4 இலக்கணம்

பா வகைகள்

1. வெண்பா
2. ஆசிரியப்பா
3. கலிப்பா
4. வஞ்சிப்பா

அணிகள்

1. உவமைஅணி
2. உருவகஅணி
3. பிறிதுமொழிதல் அணி
4. தற்குறிப்பேற்றணி
5. வஞ்சப்புகழ்ச்சிஅணி
6. சிலேடைஅணி
7. வேற்றுமைஅணி
8. உயர்வுநவிற்சிஅணி

கூறு:5 இலக்கியவரலாறும் படைப்பாற்றலும்

அ. ஐம்பெருங்காப்பியங்கள்,
இஸ்லாம், கிறித்தவர்களின் தமிழ்த் தொண்டு,
நாடக இலக்கியவரலாறு

ஆ. கடிதம் வரைதல்
பாராட்டுக்கடிதம், புகார்க்கடிதம், விண்ணப்பக்கடிதம்

பாட நூல்கள்:

1. சிலப்பதிகாரம்,மணிமேகலை,சீவகசிந்தாமணி,கம்பராமாயணம்,பெரியபுராணம், இயேசுகாவியம்,சீறாப்புராணம் **(கூறு 1,2)**
2. இலக்கியநாடகங்கள் – ஜெயந்திநாகராஜன்
தாமரைபப்ளிகேஷன்ஸ் (பி) லிட்
41B,சிட்கோ இண்டஸ்டிரியல் எஸ்டேட்
அம்பத்தூர்,சென்னை – 600098 **(கூறு 3)**

3. **நற்றமிழ் இலக்கணம் (கூறு 4)**
டாக்டர் சொ. பரமசிவம், எம். ஏ. எம்.லிட்., பி.எச்.டி,
பட்டுப் பதிப்பகம், 1269, 32-ம் தெரு,
'ஐ'பிரிவு,அண்ணாநகர் மேற்கு,
கம்பர் குடியிருப்பு,
சென்னை – 600 040
முதற்பதிப்பு –1966
13-ம் பதிப்பு –2013

4. **தமிழ் இலக்கியவரலாறு (கூறு 5)**
மு. வரதராசன்,
சாகித்திய அகாதெமி,
இரவீந்திரபவன், 35,பெரோஸ்கோ சாலை,
புதுதில்லி,–110001
முதற்பதிப்பு – 1972
இருபத்தி மூன்றாம் பதிப்பு : 2007

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

Class	**: B.Sc (F&D Tech)**	**Part II**	**: English**
Semester	**: III**	**Hours**	**: 06**
Sub Code	**: 15UENG31**	**Credits**	**: 03**

LANGUAGE THROUGH LITERATURE –III

Course Outcomes:

CO1: To enable the students to get acquainted with the fundamental knowledge of the purpose of grammar.
CO2: To enable the learners to apply grammatical knowledge in spoken English and written English with the grammatical structure.
CO3: To impart a working knowledge of the basic rules of the English language through literature
CO4: To enable the learners to understand communication skill of the English language through literature.

Unit - I Prose Passage

Jawaharlal Nehru- A Glory Has Departed
John Holt – Discipline is a Great Teacher

Unit - II Poetry Passage

Nissim Ezekiel - Night of the Scorpion
A.K.Ramamujan – A River

Unit – III Drama

Arthur Miller – The Death of a Salesman

Unit - IV Vocabulary-II

One word substitution
Spotting the error
Idioms and Phrases/ Phrasal verbs

Unit - V Composition

Drafting Advertisements.
Developing the hints.

Text Books:

1. G. RadhakrishnaPillai, **English for Success**, Emerald Publication,Chennai,2012.
2. Lewis, Norman, **Word Power Made Easy**, Pocket Books, New York,1978.
3. C.N.Srinath, **Indian Verse in English**, Macmillan Publishers Indian Ltd,2003.
4. A.Shanmugakani, **Prose for Communication**, Manimekala Publishing house, 2008.

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

Class	**: B.Sc (F&D Tech)**	**Part III**	**: Core**
Semester	**: III**	**Hours**	**: 06**
Subject Code	**: 17UFDC31**	**Credits**	**: 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 entrprenurial 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:

Material will be provided by the department

Reference Books:

1. Robinson, **Modern Dairy Technology**, Vol.I, **Advances in Milk Processing,** Chapman and Hall India, Madras(1986).
2. Aneja.R.P, B.N Mathur, 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).
4. Desoresier,W.N. and James, N., **The Technology of Food Preservation**, CBS SPublishers and Distributors:New Delhi(1987).
5. Srilakshmi, B., **Food Science**, New Age International (P) Ltd., Publishers, New Delhi (2005).
6. Potter, N. and Hotch Kiss, J.H, **Food Science**, 5th Edition, CBS Publishers and Distributors, New Delhi (1996).
7. Julians, B.O, **Rice Chemistry and Technology**, 2nd edition, American Association Chemists, St. Paul Mimesota, USA (1985).
8. Charley, H., **Food Science**, 2nd edition, John Wiley & Sons, New York (1982).

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

Class	**: B.Sc (F&D Tech)**	**Part III**	**: Core**
Semester	**: III**	**Hours**	**: 04**
Subject Code	**: 17UFDCP3**	**Credits**	**: 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 2017 and after)

Class	**: B.Sc (F&D Tech)**	**Part III**	**: Allied**
Semester	**: III**	**Hours**	**: 04**
Subject Code	**: 17UFDAP3**	**Credits**	**: 04**

SKILL DEVELOPMENT IN FOOD PREPARATION -PRACTICALS

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 2017 and after)

Class	**: B.Sc (F&DTech)**	**Part IV**	**: Skill**
Semester	**: III**	**Hours**	**: 02**
Subject Code	**: 17UFDS31**	**Credits**	**: 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:

Material will be provided by the Department**.**

Reference Books:

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

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

Class	**: B.Sc (F&D Tech)**	**Part IV**	**: NME**
Semester	**: III**	**Hours**	**: 02**
Subject Code	**: 17UCHN31**	**Credits**	**: 02**

WASTE WATER TREATMENT

Course Outcomes:

CO1: To understand about the soft water and hard water.

CO2: To know about the various external conditional methods.

CO3: To discern on the treatment of boiler feed water.

CO4: It is useful to analyse water and become an analyst.

Unit I

Introduction - Types of impurities present in water - Hardness of water - Estimation of hardness by EDTA method - Domestic water treatment - water quality standards.

Unit II

Sterilization - Boiling - Ozone gas treatment - Ultraviolet treatment - Chlorination – Break point chlorination.

Unit III

Boiler feed water - Scale and sludge formation - Comparison of sludge and scale - Boiler corrosion - Removal of carbon dioxide and dissolved oxygen.

Unit IV

Caustic embrittlement - Priming - Foaming - Requirements of boiler feed water - Internal conditioning - Colloidal conditioning - Phosphate conditioning - Calgon conditioning - Carbonate conditioning.

Unit V

External conditioning - Demineralization process - Regeneration of ion exchangers - Advantages and disadvantages of ion exchange process - Desalination - Reverse osmosis - Difference between internal conditioning and external conditioning.

Text Book:

1. R.Sivakumar, R.Jeyaprakasam & N.Sivakumar, "Engineering Chemistry" TATA McGRAW-Hill Pvt Ltd, New Delhi (2012).

References:

1. B.K.Sharma "Engineering chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001).
2. B. Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).
3. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi

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

வகுப்பு	:B.Sc (F&D Tech)	பகுதி I	: தமிழ்
பருவம்	: நான்காம்பருவம்	நேரம்	: 06
பாடக்குறியீட்டுஎண்	: 15UTAG41	மதிப்பீடு	: 03

சங்க இலக்கியமும் உரைநடையும்

Course Outcomes:

CO1 2000 ஆண்டுகளுக்கு முனபு எழுதப்பட்ட பாடல்கள் உலகின் சில மொழிகளுக்கிடையே மட்டுமே காணக்கிடைக்கின்றன. அந்த வகையில் தமிழ் மொழியிலுள்ள சங்க இலக்கியங்கள் காலத்தால் பழமையானவை.

CO2 தமிழர்களின் கருத்து வளத்தையும் மொழி பழமையையும் பண்பாட்டுச் சிறப்பினையும் அறிந்து கொள்ள ஏதுவாக சங்க இலக்கிய நூல் அனைத்தும் பாடமாக வைக்கப்பட்டுள்ளது.

CO3 2000 ஆண்டுகளுக்கு முற்பட்ட மொழியை, இனத்தை, நாட்டை உணரும் வகையில் கட்டுரைகள் பாடத்திட்டத்தில் இடம் பெற்றுள்ளன.

CO4: மாணவர்களின் மொழி ஆளுமை திறன் வளர்ப்பதற்கு இந்தப்பாடம் கற்பிக்கப்படுகிறது.

கூறு:1 சங்க இலக்கியம்

பத்துப்பாட்டு – முல்லைப்பாட்டுமுழுவதும்

நற்றிணை – பாடல் எண் : 69,77,80,87,110

குறுந்தொகை – பாடல் எண் : 21,28,40,75,102

ஐங்குறுநூறு – பாடல் எண் : 301 முதல் 310 வரை

கலித்தொகை – பாடல் எண் : 2, 8

அகநானூறு – பாடல் எண் : 165, 196, 204

கூறு:2 சங்க இலக்கியம்

பதிற்றுப்பத்து –ஐந்தாம் பத்து –பாடல் எண் 45 வென்றிச் சிறப்பு

பரிபாடல் – ஏழாம் பாடல் – வையை – முதல் 50 வரிகள்

புறநானூறு – பாடல் எண் : 18,112, 191,192,208,

திருக்குறள் – வாய்மை, கள்ளுண்ணாமை,

நாலடியார் – பிறன்மனை நயவாமை பாடல் எண், 81, 82, 83, 84, 87

கூறு:3 உரைநடை

1.தமிழகமுத்துக்கள்

2. மதுரைமாநகரம்

3. சங்ககாலத்துஅங்கதம்

4. நன்மையும்உண்மையும்

5. தமிழ் இலக்கியங்களில் இதிகாசக் கருத்துக்கள்
6. பேராண்மை
7. விருந்து மற்றும் ஐம்பால்

கூறு:4 இலக்கணம்

1. அகத்திணை வகைகள்
2. புறத்திணை வகைகள்

கூறு:5 இலக்கியவரலாறு

பத்துப்பாட்டு
எட்டுத்தொகை
பதினெண்கீழ்க் கணக்கு

பாட நூல்கள்:

1. பத்துப்பாட்டு, எட்டுத்தொகை **(கூறு1, 2)**
2. நம்.சீனிவாசன்,**கட்டுரைத் தொகுப்பு,** தமிழ்த்துறை மன்னர் திருமலைநாயக்கர் கல்லூரி வெளியீடு, மதுரை – 625004, 2015 **(கூறு 3)**

3.நற்றமிழ் இலக்கணம் (கூறு 4)

-டாக்டர் சொ. பரமசிவம்,எம். ஏ. எம்.லிட்., பி.எச்.டி,
பட்டுப் பதிப்பகம், 1269, 32-ம் தெரு,
'ஐ'பிரிவு, அண்ணாநகர் மேற்கு,
கம்பர் குடியிருப்பு, சென்னை –600 040
முதற்பதிப்பு –1966
13-ம் பதிப்பு –2013

4.**தமிழ் இலக்கியவரலாறு (கூறு 5)**

மு. வரதராசன்,
சாகித்திய அகாதெமி,
இரவீந்திரபவன், 35,பெரோஸ்கோ சாலை,
புதுதில்லி – 110001
முதற்பதிப்பு – 1972
இருபத்தி மூன்றாம் பதிப்பு : 2007

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

Class	**: B.Sc (F&D Tech)**	**Part II**	**: English**
Semester	**: IV**	**Hours**	**: 06**
Sub Code	**: 15UENG41**	**Credits**	**: 03**

LANGUAGE THROUGH LITERATURE-IV

Course Outcomes:

CO1 To enable the students to get acquainted with novels.
CO2 To enable students to gain proficiency in the use of English Language by relating prose texts.
CO3 To develop their spoken writing skills through public speaker, Letter writing, group discussions, etc.,

CO4: To enable the learners to create communication skill of the English language through literature.

Unit - I Fiction:

Rabindranath Tagore - The Wreck
Charlotte Bronte – Jane Eyre

Unit - II Word Power

Martin Luther King – I have a dream
A letter from Abraham Lincoln to His son's Teachers

Unit - III Composition:

Letter Writing
Job Application (Resume) Hard and Soft.
Paragraph Writing

Unit - IV Public Speaking:

Welcome Address
Presidential address
Vote of Thanks

Unit - V Art of communication

Group Discussion
Interview

Text Books:

1. R.K. Narayan, **The English Teacher**,Indain Thought Publications, New Delhi,2007 .
2. G. RadhakrishnaPillai, **English for Success**,Emerald Publication,Chennai,2012.
3. Dr.S.Kanitha**, English for Employability**,New Century Book House Pvt,Ltd.,Chennai 2011.

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

Class : B.Sc (F&D Tech)	**Part III : Core**
Semester : IV	**Hour : 06**
Subject Code : 17UFDC41	**Credits : 05**

FOOD AND INDUSTRIAL MICROBIOLOGY

Course Outcomes:

CO 1 : To enable the students to understand the role of microbes in food, health and disease.
CO 2 : To study the microbes in relation to food spoilage, food borne diseases and food preservation.
CO 3 :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, CharacterizationandIdentification 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:

Material will be provided by the Department

Reference Books:

1. Food Microbiology, W C Frazier and D C Westhoff, McGraw Hill Book Company,NY.
2. Food processing and preservation,B.Sivasankar,PHI Learning private limitted, Delhi,2015
3. Industrial Microbiology, S C Prescott and C G Dunn, McGraw Hill Book Co.
4. Industrial Microbiology, A H Patel Mac Millan Press.

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

Class	**: B.Sc (F&D Tech)**	**Part III**	**: Core**
Semester	**: IV**	**Hours**	**: 04**
Subject Code: 17UFDCP4		**Credits**	**: 04**

FOOD AND INDUSTRIAL MICROBIOLOGY – PRACTICALS

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 2017 and after)

Class	**: B.Sc (F&DTech)**	**Part III**	**: Allied**
Semester	**: IV**	**Hours**	**: 04**
Subject Code	**: 17UFDA41**	**Credits**	**: 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:

Material will be provided by the department

Reference Books:

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).

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

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

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

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

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

Class : B.Sc (F&D Tech) **Part IV : Skill**
Semester : IV **Hours : 02**
Subject Code : 17UFDS41 **Credits :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 trainning 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.Tuffel Ahmad, Dairy Plant Engineering and Management KitabMachal Distributers New Delhi (1995).

Reference Book:

1.Tuffel Ahmad, Dairy Plant Engineering and Management KitabMachal Distributers New Delhi (1995).

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

Class : B.Sc (F&D Tech) **Part IV : NME**
Semester : IV **Hours : 02**
Subject Code : 17UCHN41 **Credits : 02**

POLYMER CHEMISTRY

Course Outcomes:

CO1: To realize about the Nomenclature of polymers.

CO2: To know the classification of polymers.

CO3: To study about the synthetic polymers.

CO4: To learn as good trainee in industrial level.

Unit I

Introduction-Functionality - Nomenclature of polymers- Tacticity - Classification of polymers -Thermoplastics and thermosetting resins.

Unit II

General purpose plastics-Engineering plastics - Addition and condensation polymerization – Vulcanization - Mechanism of vulcanization.

Unit III

Preparation, properties & uses of Poly Vinyl Chloride, Teflon, Lexan, Metlan, Perlon-U.

Unit IV

Preparation, properties & uses of Polyamides, Nylon-6, Nylon-66, Polyesters, Epoxy resins.

Unit V

Rubber -Introduction-Natural rubber-processing, uses and drawbacks of raw rubber

- Synthetic rubber - Butyl rubber - GR 1- SBR - GR S - Compounding of rubber.

Text Book:

1. R.Sivakumar, R.Jeyaprakasam & N.Sivakumar, "Engineering Chemistry"

TATA McGRAW-Hill Pvt Ltd, New Delhi (2012).

2. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi (2002).

References:

1. B.K.Sharma "Engineering chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001).

2. B. Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, NewDelhi(2008).