

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 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 students 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 students disciplinary knowledge about the functioning of milk procurement organizations.

PSO2: Enable the students with leadership skill 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	Part –III Core Subject Fundamentals of Dairying	1	4	3	25	75	100
18UFDCP1	Fundamentals of Dairying – Practical	1	2	1	40	60	100
18UFDA11	Part –III Allied Subject Introduction to Food Science	1	4	4	25	75	100
18UFDAP1	Introduction to Food Science – Practical	1	2	1	40	60	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	Part-III Elective Subjects Entrepreneurial Development Programme	1	4	3	25	75	100
18UFDE62	Poultry and Meat Processing Technology						
18UFDE63	Functional Foods and Nutraceuticals						
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



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

Programme : UG

Semester : V

Subject Code: 18UFDC51

Part III : Core

Hours : 05

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.N Mathur, 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



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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



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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



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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



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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 - whey - 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 characteristics - 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



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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.



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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: Cellulosic 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 (2ndEdn). 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.



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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



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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.



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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.

CO5: Contact 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.



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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.



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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).



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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.



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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.

Unit – 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”. 3rd Ed. Chapman & Hall, 2006.
3. Marine Products Export Review by MPEDA publications



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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 through fortification and supplementation of foods. Beneficial effect of spices, honey, spirulina etc.

Unit-IV:

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

Unit-V:

Herbs as Functional foods - Herbal medicine–Herbs as 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



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Programme : UG	Part III	: Core subject
Semester : VI	Hours	: 12
Subject Code: 18UF DPR1	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



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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	}	40
Submission		

External

Project Report	}	60
Viva Voce		

Total - **100**