VIRUDHUNAGAR HINDU NADARS' SENTHIKUMARA NADAR COLLEGE
(An Autonomous Institution Affiliated to Madurai Kamaraj University)
[Re-accredited with 'A' Grade by NAAC]
Virudhunagar – 626 001.

Course Name: **Bachelor of Vocational**
Discipline: **Food Safety and Quality Management**
(FOR THOSE WHO JOIN IN 2023 AND AFTER)
Duration of the Course: Three Years
COURSE SCHEME:

Semester	Part	Title of the Paper	Hrs	Theory	Skill	Total	Int.+Ext.= Total	Local	Regional	National	Global	Professional Ethics	Gender	Human Values	Environment & Sustainability	Employability	Entrepreneurship	Skill Development	Subject Code	Revised / New / No Change / Interchanged & Percentage of revision
I	Part-I	Communicative English - Paper I	6	2	2	4	25+75=100		✔			✔						✔	**EV22E11**/ EV15E1	No change
	Core-1	Basics of Food, Food Safety and Quality Management	6	3	3	6	25+75=100			✔		✔						✔	**B22FSC11**	Revised – 70%
	Core 2 Apprenticeship	Apprenticeship at any Food Industry for BFFSQM	6	0	4	4	100 (Internal)		✔			✔						✔	**B22FSC12/** B19FSC12	No change
	Allied 1	Food Microbiology - I	5	2	2	4	25+75=100			✔		✔						✔	**B22FSA11**	Revised – 60%
	Allied 2	Food Microbiology Practical - I	5	0	4	4	40+60=100			✔		✔						✔	**B22FSAP11**	Revised – 80%
	SBE 1	Food Packaging	2	1	1	2	25+75=100				✔	✔						✔	**B22FSS11**/ B19FSS11	No change
	Part-IV SLC	Value Education	-	3	0	3	25+75=100		✔					✔				✔	**U22VE11**	
		Industrial Visit & Report	0	0	3	3	50 (Internal)		✔			✔							**B22FSIV11**/ B19FSIV1	No change
		Total	**30**	**11**	**19**	**30**	**750**													

Semester	Part	Title of the Paper	Hrs	Theory	Skill	Total	Int.+Ext.= Total	Local	Regional	National	Global	Professional Ethics	Gender	Human Values	Environment & Sustainability	Employability	Entrepreneurship	Skill Development	Subject Code	Revised / New / No Change / Interchanged & Percentage of revision
II	Part-I	Communicative English -II	6	2	2	4	25+75=100		✔			✔						✔	**EV22E21/** EV15E2	No change
	Core-3	Food Laws and Standards (FLS)	6	3	3	6	25+75=100			✔		✔						✔	**B22FSC21**	Revised- 40%
	Core 4 Apprenticeship	Apprenticeship at any Food Industry for FLS	6	0	4	4	100 (Internal)		✔			✔						✔	**B22FSC22/** B19FSC22	No change
	Allied 3	Food Microbiology - II	5	3	2	5	25+75=100			✔		✔						✔	**B22FSA21**	Revised – 20%
	Allied 4	Food Microbiology Practical - II	5	0	4	4	40+60=100			✔		✔						✔	**B22FSAP21**	Revised – 70%
	SBE 2	Basics of Computers for Reports Maintenance	2	1	1	2	25+75=100		✔			✔						✔	**B22FSS21**	Revised – 20%
	Part-IV SLC	Environmental Studies	-	2	-	2	25+75=100			✔					✔				**U22ES21**	No change
		Industrial Visit & Report	0	0	2	2	50 (Internal)		✔			✔						✔	**B22FSIV21/** B19FSIV2	No change
		Total	**30**	**12**	**18**	**29**	**750**		✔											

SEMESTER - I
COMMUNICATIVE ENGLISH - PAPER I

Contact Hours per week : 6 **Subject Code: EV22E11**/ EV15E1
Contact Hours per semester: 90 (Theory 60 + Skill 30) **Credits:** 4 (2 Theory + 2 Skill)

Section- A: Theory (2 credits)

COURSE OUTCOMES (CO):

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

CO1: provide the vital information required to understand the concepts underlying various communication skills.
CO2: cover the several aspects of communication in oral and written modes.
CO3: facilitate acquisition of necessary language skills.
CO4: learn the basic grammar of English language
CO5: apply knowledge of word power and grammar rules in Formal and Informal letter writings

Unit I – Grammar **12 hours**

i. Parts of Speech
ii. Tenses – Present, Past, Future

Unit II – Reading Skill **12 hours**

i. Comprehension of a Passage / Story / News

Unit III – Writing Skill **12 hours**

i. Narration of story
ii. Translation of sentences, short passages
iii. Letter writing (Informal Letters)

Unit IV – Phonetics **12 hours**

i. Vowels, Consonants, Diphthongs
ii. Transcription of words

Unit V – Speaking Skill **12 hours**

i. Introducing oneself and others
ii. Situational Communication – Greeting, Complimenting, Requesting etc.

Note: 2, 4 units are considered as a Language laboratory
(Allocation: 12 hours Laboratory, 18 Hours theory)

TEXTBOOK:

1. V.JeyaSanthi and R. Selvam, 2015. *Advanced Skills for Communication in English*: Book I, New Century Book House

REFERENCE BOOKS:

1. G.Radhakrishna Pillai - *Emerald English Grammar & Composition*, Emerald Publishers
2. Board of Editors - *Synergy – Communication in English and Study Skills*, Orient Blackswan

3.	Dr.S.Vincent	- *Let's Speak English (A Course in Spoken English)*Soundra Publications
4.	K.R.Lakshminarayanan, T.Murugavel	- *Communication Skills in English*, SciTech Publications, Chennai.
5.	G.Radhakrishna Pillai, K.Rajeevan	- *Spoken English for You: Level One* Emerald Publishers
6.	Bikram K.Das	- *Functional Grammar and Spoken and Written Communication in English*, Orient Longman Pvt., Ltd.
7.	A.R.Thorat, B.S.Valke, S.B.Gokhale	- *Enriching Your Competence in English* Orient Longman Pvt. Ltd.

Section –B Skill Components

Contact Hours per semester: 30 **Credits: 2**

1. To impart and enhance communicative competency for professional mobility
2. To equip the student with necessary skills for employment
3. To prepare students for career in media
4. To develop ability of all students to read, write, listen, speak and think critically
5. To produce students with advanced skills in writing, reading and reasoning.

Core 1 - BASICS OF FOOD, FOOD SAFETY AND QUALITY MANAGEMENT

Contact hours per week : 6 **Subject Code: B22FSC11**

Contact hours per semester : 90 (60 Theory + 30 Skill**)** **Credits: 6 (**3 Theory + 3 Skill**)**

COURSE OUTCOMES (CO):

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

CO1: become familiar with the safe handling of foods.
CO2: get acquaint with the principles and methods of food quality control.
CO3: recognize the quality management system and recognize the importance of quality assurance system in food industry.
CO4: understand the food regulation and standards at the national and international levels.
CO5: identify general principles of food safety risk management

Section - A: Theory

Objectives:

1. To explain biological, chemical and physical hazards.
2. To understand the need for food safety system.
3. To understand the different phases and framework of project management.
4. To identify general principles of food safety risk management.
5. To understand and be aware of food safety practices.

Unit I **12 hours**

Food - definition - importance - basic 5 food groups - function of food - factors affecting while cooking the food – methods of cooking foods - cereals and grains - fruits and vegetables, milk and milk products, meats, poultry and its product, sea foods and canned food - food safety - definition - importance of safe foods - safe handling of foods.

Unit II **12 hours**

Quality Control - definition, principles in food processing - protecting food from contamination - Total Quality Management (TQM) - definition, principles, concept of TQM, scope and need of TQM and benefits of TQM.

Unit III **12 hours**

Food regulation and standards in India - National - BIS, AGMARK and PFA, Essential Commodities Act - FPO, MPO, Milk and Milk Products Order, Standard of Weights and Measures Act, Export Inspection Council and Consumer Protection Act - Food Safety and Standard Authority of India (FSSAI) - principles, functions and duties - Risk analysis- risk assessment, risk management and risk communication.

Unit IV **12 hours**

Project Management - introduction - three phases - 7 S of project management - project: A conversion process - role and strategy in project management.

Unit V **12 hours**

Other food safety practice - Good Practice in Agriculture, animal husbandry; Manufacturing; Retail Practices, Transport Practices and Nutritional Labelling - Traceability Studies.

REFERENCE BOOKS:

1. Srilakshmi,B. (2015). *Food Science.* New Delhi: New Age International Ltd.
2. Early, R. (1995). *Guide to Quality Management Systems for the Food Industry*. Blackie, Academic and Professional, London.
3. Gould, W.A. and Gould, R.W. (1998). *Total Quality Assurance for the Food Industries*. CTI publications Inc, Baltimore.
4. Askar, A. and Treptow, H. (1993). *Quality Assurance in Tropical Fruit Processing.* Springer - Verlag. Berlin
5. Parmar, M. (2014). *Food Safety and Preservation.* Black Prints, New Delhi.

Section - B Skill Component

Contact hours per semester: 30 **Credits: 3**

1. To purchase chemicals, standards and lab needs.
2. To identify the risk factors of the food.
3. To prepare the report of the quality of the food.
4. To study the FSSAI regulations followed in the manufacture of foods.
5. To study the good manufacturing practices by visiting an industry

Core II: APPRENTICESHIP AT ANY FOOD INDUSTRY FOR BFFSQM

Section –B Skill component

Contact Hours per week : 6 **Subject Code: B22FSC12/** B19FSC12

Contact Hours per semester: 90 **Credits: 4**

COURSE OUTCOMES:

1. To study about the importance of Food Safety Display Board (FSDB) in an industry.
2. To study about the FSSAI regulations of a product in the nearby industry.
3. To analyze the FSSAI license number for a product.
4. To visit the food testing labs in the industry.
5. To study the color code followed by FSDB in various business sectors.

ALLIED 1 FOOD MICROBIOLOGY – I

Contact Hours per week : 5 **Subject Code: B22FSA11/** B19FSA11
Contact Hours per semester: 75 (45 Theory + 30 Skill) **Credits: 4 (2 Theory + 2 Skill)**

COURSE OUTCOMES (CO):

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

CO1: identify the important pathogens and spoilage microorganisms in foods and the conditions under which they will grow.

CO2: assess the conditions under which the important pathogens are commonly inactivated, killed or made harmless in foods.

CO3: utilize laboratory techniques to identify microorganisms in food.

CO4: aware the principles involving food preservation via fermentation processes.

CO5: describe beneficial roles of microorganisms

Section- A: Theory

Objectives:

1. To explain the applied aspects of microbiology.
2. To identify sources of food microorganisms.
3. To state emerging food borne pathogens and reasons for their emergence.
4. To describe beneficial roles of microorganisms.
5. To describe different screening and enumeration techniques of microorganisms.

Unit I **9 hours**

Microbiology: Introduction and developments - Structure of Prokaryotic cells – Sterilization – Types of Media - Media Preparation- Growth of Bacteria – Gram's staining Technique.

Unit II **9 hours**

Food Microbiology: origin and scope – Microorganism in Food - Common Bacterial and fungal groups in food – Importance in food - Food Borne Diseases - Beneficial roles of Microorganisms.

Unit III **9 hours**

Food contamination – source of contamination - Food Spoilage – Types of spoilage – factors affecting the spoilage – role of microorganism in food preservation.

Unit IV **9 hours**

Analytical techniques in Microbiology – Enumeration of Microorganism in food – Detection of pathogens in food: Dye reduction test & Methylene Blue reduction test.

Unit V **9 hours**

Detection of *Bacillius & E.coli* – Rapid detection techniques for food microorganisms – immunological methods – Indicator organisms- Biosensor.

TEXT BOOKS:

1. Ananthanarayanan and J.Panicker, 2005. *Text book of Microbiology*. Orient blackswan Publication.
2. Ray, B., Bhunia, A. 2007. *Fundamental Food Microbiology*, 4th Edition. CRC Publication

3. Sharma, 2019. Text Book of Food Science and Technology. CBS Publication

REFERENCE BOOKS:

1. Adams,MR., 2018. *Food Microbiology*. New Age International Private Limited
2. Foster, WM, 2020. *Food Microbiology*. CBS Publication
3. Frazier W. 1995. *Food Microbiology*. 4th edition, Tata McGraw Hill, India.

Section – B Skill components

Contact Hours per semester: 30 **Credits: 2**

1. To demonstrate the observation of bacteria in microscope.
2. To ensure the quality of a food by microbiological analysis.
3. To study about the identification of various bacteria in food products.
4. To evaluate the nutritional value and mineral content of food.
5. To test the food sample for a particular type of mold and yeast.

Allied 2 – FOOD MICROBIOLOGY PRACTICAL – I

Section –B Skill component

Contact hours per week : 5 **Subject Code: B22FSAP11**
Contact hours per semester: 60 **Credits: 4**

COURSE OUTCOMES (CO):

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

CO1: aware the various Culture media and their applications and also understand various physical and chemical means of sterilization

CO2: demonstrate theory and practical skills in microscopy and their handling techniques and staining procedures

CO3: understand the basic microbial structure and function and study the comparative characteristics of prokaryotes and eukaryotes

CO4: utilize the aseptic techniques and be able to perform routine culture handling tasks safely and effectively

CO5: evaluate the various Physical and Chemical growth requirements of bacteria and get equipped with various methods of bacterial growth measurement.

1. Microbiology laboratory Rules and regulations of Safety measures
2. Basic microbiology laboratory practices
3. Cleaning and Methods of sterilization
4. Cultivation and sub-culture of microbes
5. Staining Techniques – Simple and Gram's staining
6. Serial dilution techniques for Spread and Streak plate method
7. Direct Microscopic examination of foods
8. Nutritional requirements of microorganisms
9. Effect of physicochemical factors on growth of microorganisms
10. Observation of microorganisms in curd
11. Observation and Identification of mould in bread.

REFERENCE BOOKS:

1. J. G. Cappucino and N. Sherman, 2014. *Microbiology: A laboratory manual*, 11th Edition, Pearson publications United States.
2. Prescott L.M., Harley J.Pand Klein D.A, 2005. *Microbiology*. Sixth edition, McGraw Hill, Boston.

SBE 1: FOOD PACKAGING

Contact hours per week : 2 **Subject Code: B22FSS11**/ B19FSS11
Contact hours per semester : 30 (20 Theory + 10 Skill) **Credits: 2** (1 Theory + 1 Skill)

Section- A: Theory

COURSE OUTCOMES (CO):

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

CO1: explain the principles and current practices of processing techniques and the effects of processing parameters on product quality.

CO2: understand the properties and uses of various packaging materials.

CO3: describe the basic principles and practices of cleaning and sanitation in food processing operations.

CO4: evaluate the quality and safety of packaging.

CO5: utilize the Aseptic and shrink packaging methods

Unit I **4 hours**

Food packaging: Introduction – Principles - Function - Methods of packaging for different foods, Interactions between packaging material and foods.

Unit II **4 hours**

Packaging of various food commodities – fruits, vegetables, meat, fish, poultry and processed foods. Types of packaging- Modified atmospheric packaging (MAP).

Unit III **4 hours**

Packaging materials: Qualities – types - paper, polythene, wood, metal and environmental friendly materials - Deteriorative changes in foodstuff, shelf life of packaged foodstuff, methods to extend Shelf-life.

Unit IV **4 hours**

Methods of packaging of various food – Evaluation of quality and safety of packaging materials – Different testing procedures

Unit V **4 hours**

Printing of packages – Barcodes and other marking, Sealing equipment – Labeling and its laws; Aseptic and shrink packaging, transport packaging, Cost consideration in selecting packaging materials.

TEXTBOOKS:

1. P. Jacob John. 2017. *A handbook on food packaging*. Daya Publishing House, New Delhi.
2. Cruz. 2019. *Food Packaging: Innovations and Shelf-Life.* CRC Press

REFERENCE BOOKS:

1. NIIR Board of Consultants Engineers, 2020. *Food Packaging Technology Handbook*. NIIR Project Consultancy Services
2. GL Robertson, 2012. *Food Packaging: Principles and Practice.* CRC Press

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Section- B: Skill components

Contact hours per semester: 10 hours **Credits: 1**

1. To study about proper food handling during packaging.
2. To analyze the packaging method of various food commodities in industries.
3. To study the shelf life of packaged food stuff in an industry.
4. To evaluate the quality and safety of packaging materials.
5. To study about cost consideration in selecting packaging materials.

INDUSTRIAL VISIT & REPORT

Credits: 4 **Subject Code: B22FSIV11**/ B19FSIV1

Course Outcomes:

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

CO1: visits industries which offer a great source to gain practical knowledge.

CO2: observe and learn as to how theatrical concepts are put to into action, thereby aiding their practical learning.

CO3: exposed to real working environment and shown how things are done in an organization.

It helps to narrate and compile the information and data that is used to construct and assess about the company's safety and risk management programs.

Format: Introduction, review on instrumentation, labors, and processing. Prediction of future of the company

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SEMESTER - II

COMMUNICATIVE ENGLISH – PAPER II

Contact Hours per week : 6 **Subject Code: EV22E21/** EV15E2

Contact Hours per semester: 90 (Theory 60 + Skill 30) **Credits:** 4 (2 Theory + 2 Skill)

Section- A: Theory (2 credits)

COURSE OUTCOMES (CO):

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

CO1: understand basic mathematics, data interpretations.
CO2: learn about effective presentation of data.
CO3: acquire knowledge about applications of Differentiation
CO4: enrich the knowledge about methods of data collection
CO5: demonstrate the Computations

Unit I – Grammar **12 hours**

i. Concord, Voice, Speech, Article, Preposition
ii. Error Spotting

Unit II – Conversational English **12 hours**

i. Dialogue building on various situations

Unit III – Business English **12 hours**

i. Letter writing (Formal Letters & Resume)
ii. Memo / Notice / Agenda / Minutes Writing
iii. Report writing

Unit IV – Situational Speech **12 hours**

i. Welcome address / Vote of thanks
ii. Group Discussion

Unit V – Writing Skill **12 hours**

i. Describing a thing / place / person
ii. Writing Stories from outline

Note: (Allocation: 24 hours Laboratory, 36 hours theory)

TEXTBOOK

1. V.JeyaSanthi and A. Sankar- *Advanced Skills for Communication in English*: Book II:

REFERENCE BOOKS:

1. G.Radhakrishna Pillai - *Emerald English Grammar & Composition*, Emerald Publishers
2. Board of Editors - *Synergy – Communication in English and Study Skills*, Orient Blackswan
3. Dr.S.Vincent - *Let's Speak English (A Course in Spoken English)*Soundra Publications
4. K.R.Lakshminarayanan, T.Murugavel - *Communication Skills in English*, SciTech Publications, Chennai.
5. G.Radhakrishna Pillai, K.Rajeevan - *Spoken English for You: Level One* Emerald Publishers
6. Bikram K.Das - *Functional Grammar and Spoken and Written Communication in English*, Orient Longman Pvt., Ltd.
7. A.R.Thorat, B.S.Valke, S.B.Gokhale - *Enriching Your Competence in English* Orient Longman Pvt. Ltd.

Section –B Skill Components

Contact Hours per semester: 30 **Credits: 2**

1. To enrich the students knowledge in the English language.
2. To equip the student with necessary skills for employment
3. To prepare students for career in media
4. To develop ability of all students to read, write, listen, speak and think critically
5. To produce students with advanced skills in writing, reading and reasoning.

Core 3 - FOOD LAWS AND STANDARDS (FLS)

Contact hours per week : 6 **Subject Code: B22FSC21**
Contact hours per semester : 90 (60 Theory + 30 Skill) **Credits: 6** (3 Theory + 3 Skill)

COURSE OUTCOMES (CO):

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

CO1: explore the history and basic ideas underlying quality management and have a detailed knowledge of the role of food laws and standards in modern management.
CO2: demonstrate knowledge of food laws and standards systems, their implementation and the practical steps needed for implementation.
CO3: aware of how to control and maintain a quality management system.
CO4: select and apply appropriate regulations and standards and evaluate data generated.
CO5: utilize the licensing and registration of food business

Section - A: Theory

Unit I **12 hours**

Food Safety and Standard Authority of India (FSSAI) - establishment - composition - selection committee - Chief Executive Officer - function - qualification - duties - Central Advisory Committee - Food Authority - function - duties - proceeding.

Unit II **12 hours**

Food Safety and Standards Regulations, 2011 - licensing and registration of food business - packaging and labeling - food products and additives - prohibition and restriction on sales - contaminants, toxins and residues.

Unit III **12 hours**

Food Safety and Standards Regulations, 2017 - food recall procedure - import foods - approval for non-specified food and food ingredients - organic foods.

Unit IV **12 hours**

Food Safety and Standards Regulations, 2018 - alcoholic beverages - fortification of foods - recognition and notification of laboratories - advertising and claims - packaging

Unit V **12 hours**

Other Laws and Standards Related to Food and food Products - National Agencies for Implementation of International Food Laws and Standards - Accreditation System for Conformity Assessment Bodies.

REFERENCE BOOKS:

1. LexisNexis 2019. *The Food Safety and Standards Act, 2006* - Universal's, New Delhi, India.
2. Sree Lakshmi. *Food Science*, New age international publishers, Chennai.
3. Dziezak, J.D. 1987. *Rapid methods for analysis of foods*. Food Technol. 41(7): 56-73.

Section - B: Skill components

Contact hours per semester: 30 **Credits: 3**

1. To study the international food laws and standards in determining the quality of a food.
2. To analyze the safety and quality of a food.
3. To study about laws governing food products.
4. To study about export related laws and regulations for a food.
5. To study the violation of laws in various food products.

Core – 4: APPRENTICESHIP AT ANY FOOD INDUSTRY FOR FLS

Contact hours per week : 6 **Subject Code : B22FSC22**/B19FSC22
Contact hours per semester : 90 **Credits : 4 (Skill)**

Section- B: Skill components

1. To analyze the food laws and standards followed in an industry.
2. To prepare a report on the quality of a product in the nearby industry.
3. To analyze the laws during the export of a food product in an industry.
4. To visit the food testing labs in the industry.
5. To study various acts followed in the preparation of food in industry.

ALLIED -3: FOOD MICROBIOLOGY – II

Contact hours per week : 5 **Subject Code: B22FSA21**
Contact hours per semester : **75** (45 Theory + 30 Skill) **Credits:** 5 (3 Theory + 2 Skill)

COURSE OUTCOMES (CO):

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

CO1: aware the role and significance of microbial inactivation, adaptation and environmental factors (i.e., aW, pH, temperature)
CO2: analyze the growth and response of microorganisms in various environments.
CO3: identify the conditions, under which the important pathogens and spoilage microorganisms are commonly inactivated, killed or made harmless in foods.
CO4: demonstrate the Quality testing of Milk
CO5: acquire knowledge of food preservation techniques

Section- A: Theory

Unit I **9 hours**

Food as a substrate for microorganisms- Role of microbes (mould, yeast, bacteria) in food- Contamination of food: Definition, Sources of contamination - plants, animals, sewage, soil and water - General food spoilage and spoilage of heated canned foods

Unit II **9 hours**

Food preservation: Principles of preservation, methods of food preservation - Asepsis, Removal of microorganisms, High temperature, Low temperature, Salting, Smoking, freezing, dehydration, active packaging, Drying and Radiation: cyclotron, UV, IR.

Unit III **9 hours**

Types of preservatives: Natural and artificial; Contamination, Preservation and Spoilage of Cereals, Vegetables, Meat, Poultry and Fish. Food sanitation and control.

Unit IV **9 hours**

Contamination, Preservation and Spoilage of Milk and Milk products- Quality testing of Milk: Dye reduction test and Phosphatase test - Preparation of fermented food products: Yogurt, Sauerkraut and Vinegar.

Unit V **9 hours**

Food borne diseases: Bacterial food intoxication (*Botulism, Staphylococcus*), Bacterial food infection (*Salmonella, Clostridium, Vibrio*) - Fungal food intoxication (Mycotoxin, Aflatoxin and Patulin)

TEXT BOOKS:

1. Ananthanarayanan and J.Panicker, 2005. *Text book of Microbiology*. Orient Long Publ.
2. Ray, B., Bhunia, A. 2007. *Fundamental Food Microbiology*, 4th Edition. CRC Publication
3. Sharma, 2019. Text Book of Food Science and Technology. CBS Publication

REFERENCE BOOKS:

1. Adams, MR., 2018. *Food Microbiology*. New Age International Private Limited
2. Foster, WM, 2020. *Food Microbiology*. CBS Publication

3. Frazier W. 1995. *Food Microbiology*. 4th edition, Tata McGraw Hill, India.

Section –B Skill component

Contact hours per semester: 30 **Credits: 2**

1. To ensure the quality of a food by microbiological analysis.
2. To demonstrate the microscopic observation of bacteria in microscope.
3. To study about the identification of various bacteria in food products.
4. Visual and sensory evaluation of a food product.
5. To collect the sample and ensure the quality by triplicates.

Allied 4 –FOOD MICROBIOLOGY PRACTICAL – II

Contact Hours per week : 5 **Subject Code: B22FSAP21**
Contact Hours per semester: 60 **Credits: 4 (Skill)**

COURSE OUTCOMES (CO):

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

CO1: understand the beneficial role of microorganisms in fermented foods and in food processing and the microbiology of different types of fermented food products – dairy, pickles, Legume and cereal based food products

CO2: acquire knowledge of microbial techniques for isolation of pure cultures of bacteria, fungi and algae

CO3: aware the spoilage mechanisms in foods and thus identify methods to control deterioration and spoilage

CO4: recognize and describe the characteristics of important pathogens and spoilage microorganisms in foods.

CO5: identify ways to control microorganisms in foods and thus know the principles involving various methods of food preservation

Section –B Skill component

1. Isolation of Microbes from Food Samples
2. Characterization of microbes based on morphological and physiological characteristics
3. Evaluation of microbial quality of food and water sample
4. Standard Plate count method
5. Enumeration of fungi (Yeast and moulds) in food sample – Haemocytometer.
6. Assessment of Air using surface impingement method
7. Most Probable Number (MPN) method- Detection of *Coli* forms, *Pseudomonas* and Indicator organisms.
8. Bacteriological testing of milk with kits
9. Interpretations of Microbiological Data and its inferences

References:

1. J. G. Cappucino and N. Sherman, 2014. *Microbiology: A Laboratory Manual*, 11th Edition, Pearson publications United States.
2. P. Gunasekaran, 1996, *Microbiology: A laboratory manual*, New Age International Publishers, New Delhi.

SBE 2: BASICS OF COMPUTERS FOR REPORTS MAINTENANCE

Contact hours per week: 2 **Subject Code: B22FSS21**
Contact hours per semester: 30 (20 Theory + 10 Skill) **Credits: 2** (1 Theory + 1 Skill)

COURSE OUTCOMES (CO):

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

CO1: enrich the knowledge to produce a quality manual.
CO2: understand the regulation of certification and accreditation.
CO3: acquire knowledge and insight of different quality management systems i.e. product quality management, safety and environmental management.
CO4: demonstrate the auditing and auditing systems.
CO5: critique the current state of the art in Quality Management

Section- A: Theory

Unit I **4 hours**

Introduction to Computers: History of Computers – generation of Computers – Characteristics of Computers – Classification of Computers – Components of Computers – Block Diagram – Hardware Vs Software – System Software Vs Application Software – Programming Language.

Unit II **4 hours**

Input Devices: Key board - Mouse – Touch Pad / Touch Screen Magnetic Ink Character Recognition (MICR) – Optical Character Recognition (OCR) – Optical Mark Recognition (OMR) – Output Devices: Monitor – Printers – Plotter Storage Devices: Magnetic tape – Hard Disk – Floppy Disk –Pen drive - CD-ROM, DVD Blue Ray Disc etc., - System Memory – RAM – ROM – PROM– EPROM.

Unit III **4 hours**

Open office – MS office – Word Processing – Spread sheet – Power point presentation – Introduction to internet – Browsers – Search engines – Email – Google educational applications.

Unit IV **4 hours**

Interpretation – Meaning of interpretation – Technique of interpretation – Precaution in interpretation – Interpretation of tables and figures.

Unit V **4 hours**

Reporting – Significance of report writing – Different steps in writing report – Types of reports – Mechanics of writing reports – Precautions of writing research reports.

References:

1. Barbara Kasser, 1998. "*Using the internet*" Fourth edition, EE Edition, New Delhi.
2. Dinesh Maidasani, 2008. "*Learning Computer fundamentals, MS Office and Internet and Web Technology*", Firewall media.
3. Alexis Leon Mathews Leon, 2012. "*INTERNET for EVERONE*", Leon Vikas Press, Chennai.

Section- B: Skill components

Contact hours per semester: 10 **Credits: 1**

1. To learn the basic anatomy of a computer.
2. To connect the hardware components in a computer.
3. To type a report on the word document.
4. To store the data in Microsoft excel.
5. To learn the management of E-mail in a computer.

INDUSTRIAL VISIT & REPORT

Credits: 2 **Subject Code: B22FSIV21/**B19FSIV2

Course Outcomes:

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

CO1: visits industries which offer a great source to gain practical knowledge.

CO2: observe and learn as to how theatrical concepts are put to into action, thereby aiding their practical learning.

CO3: exposed to real working environment and shown how things are done in an organization.

It helps to narrate and compile the information and data that is used to construct and assess about the company's safety and risk management programs.

Report Format: Introduction, review on instrumentation, labors, and processing. Prediction of future of the company

Course Name: **Bachelor of Vocational**
Discipline: **Food Safety & Quality Management**
(FOR THOSE WHO JOIN IN 2019 AND AFTER)
Duration of the Course: **Three Years**

COURSE SCHEME

Semester	Semester	Subject	Hour	Credit	Int+Ext= Total	Local	Regional	National	Global	Professional Ethics	Gender	Human Values	Environment & Sustainability	Employability	Entrepreneurship	Skill Development	Subject Code	Revised/ New/ No Change/ Interchanged If Revised % of Change
III		Soft Skill Development	6	4	25+75=100	✔				✔						✔	B19FSC31	New
	Core 5	Principles of Food Safety and Quality Management (PFSQM)	6	7	25+75=100			✔		✔						✔	B19FSC32	New
	Core 6 - Training	Training at any Food Industry for PFSQM	6	2	100 (Internal)		✔			✔				✔			B19FSC33	New
	Allied 5	Food Chemistry -I	6	6	25+75=100			✔		✔						✔	B19FSA31	New
	Allied 6 Lab	Food Chemistry -I Practical	4	5	40+60=100			✔		✔						✔	B19FSP31	New
	Self Study	**Electives** 1. **Food Processing in Pulses and Oil seeds** 2. Food Processing in Cereals 3. Food Processing in Fruits and Vegetables	2	4	25+75=100			✔		✔						✔	**B19FSE31**/ B19FSE32/ B19FSE33	New
		Industrial Trip Report (Minimum 2 trips)		2	50 (Internal)		✔			✔					✔		B19FSIV3	New
		Marketing, business administration and International trade	6	4	25+75=100				✔	✔						✔	B19FSC41	New
	Core 7	Food Commodities and Food Preservation Technology (FCFP)	6	7	25+75=100			✔		✔						✔	B19FSC42	New

IV	Core 8 - Training	Training at any Food Industry for FCFP	6	2	100 (Internal)		✔			✔					✔		B19FSC43	New
	Allied 9	Food Chemistry -II	6	6	25+75=100			✔		✔						✔	B19FSA41	New
	Allied 10 Lab	Food Chemistry –II Practical	4	5	40+60=100			✔		✔				✔			B19FSP41	New
	Self Study	**<u>Electives</u>** 1**. Food Processing in Poultry and its Products** 2. Food Processing in Fish and its Products 3. Processing in Water Quality Analysis	2	4	25+75=100			✔		✔						✔	**B19FSE41**/ B19FSE42/ B19FSE43	New
		Minor Project at any industry		2	50 (Internal)		✔			✔					✔		B19FS4PR	New
		Total	**30**	**60**	**650**	✔												

SEMESTER – III
SOFT SKILL DEVELOPMENT - Part III

Contact hours per week: **6** **Subject code: B19FSC31**
Contact hours per semester: **60** (30Theory + 30Skill) **Credits: 4** (**2**Theory + **2** Skill)
Course outcomes:
Students, after successful completion of the course , will be able to

CO1 : Describe and analyze the principles of food processing design and production techniques.
CO2 : Demonstrate the capacity to research, assimilate and apply advances in food processing technology.
CO3 : Understand the principles of quality management systems.
CO4 : Use and apply quality management systems to food processing.

Section –A Theory

Unit 1 **(10 Hrs)**

Meaning of soft skills – Soft skills versus hard skills – The importance of soft skills in the competitive job market today – Selling your soft skills – Attributes regarded as soft skills – Identifying your soft skills – Enhancement of your soft skills through training.

Unit 2 **(10 Hrs)**

What is resuming? – The importance of a resume in an interview – Details to be included in a resume – Do's for resume preparation – Don't' for resume preparation – Resume preparation for freshers – Resume preparation for candidates with experience.

Unit 3 **(15 Hrs)**

Meaning of career goal – The importance of "Know Thyself" or self assessment – What is SWOT analysis – Long term goal and short term goal – Career opportunities today – Source of career information – Importance of career guidance.

Unit 4 **(15 Hrs)**

What is GD? – Necessity of GD in an interview – Characters tested in a GD – Skills required in a GD – Types of GD – Body language in a GD – Movements and gestures to be avoided in GD – Topics for GD – GD etiquette.

Unit 5 **(10 Hrs)**

Why an interview – Types of interview – Anticipated interview questions – Body language in an interview dress code in an interview – Do's in interview – Don'ts in an interview – Post interview etiquette – Salary negotiation in an interview.

Reference Books:

1. Barbara Kasser, "Using the internet" Fourth edition, EE Edition, New Delhi, 1998.

Section –B Skill Component

Contact hours per semester: **30** **Credits: 2**

- Study of individual soft skills, its importance and develops through proper training.
- Learning the resume preparation methods and enhance the freshers to attend interview.
- Determination of career goal of individuals and learn present opportunities in the field.
- Developing the individuals for group discussion and know its importance to get a job.
- Study of the types of interviews and learn the parameters should be followed in it.

Core 5 - PRINCIPLES OF FOOD SAFETY AND QUALITY MANAGEMENT (PFSQM)

Contact hours per week: 6 **Subject code: B19FSC32**
Contact hours per semester: **75** (45 Theory + 30 Skill) **Credits:** 7 (4 Theory + 3 Skill)

Course outcomes:

Students, after successful completion of the course, will be able to

CO1 : Analyze and communicate issues relevant to food processing technology and food quality management systems.
CO2 : Perform experiments assessing the effect of processing conditions on quality parameters.
CO3 : Communicate the science and technology involved in food processing and quality assurance through IT implemented reports and presentations.
CO4: Review and report upon the latest scientific literature pertaining to the areas of Food Processing and Quality Assurance.

Section- A: Theory

Unit 1 **(15 Hours)**

Principles of quality control - Raw material process control and Product inspection. Food adulteration and hygiene - definition, Common adulterants in different foods and methods of detecting adulterated foods.

Unit 2 **(15 Hours)**

Food additives - Definitions, types, action - Leavening agents: definitions and classifications. sweetening agents, flavors, stabilizers, color – uses and optimum level Color of foods - Natural colors, certified artificial colors, non-certified colors, uses and optimum levels.

Unit 3 **(15 Hours)**

Enzymes of importance in food processing - Amylases, Proteases, lipases, oxidoreductases, hydrolases. Standards for foods - Milk and milk products, Fruits and Vegetables, Beverages and Fleshy foods

Unit 4 **(15 Hours)**

Consumerism - Definition, Consumer protection act, Consumer Education, Legal modes of protection act and Machinery for redressal of consumer grievances.

Unit 5 **(15 Hours)**

Evaluation of quality of foods: Sensory Evaluation of foods - Requirement for conducting sensory tests, Types of test, limitation of sensory evaluation.

Text Books:

1. Adams M.R. & Moss M.O. Food Microbiology, New Age International Private Ltd. Publications, London.
2. Frazier W.C. & Westhoff D.C. Food Microbiology, Fifth Edition, McGraw Hill Publications, New York.
3. Sri Lakhsmi Food Science 7th Edition

Reference Books:

1. Peppler H. J., 1979, Microbial Technology, Volumes I and II- Academic press, New York.

Section –B Skill Component

Contact hours per semester: **30** **Credits: 3**

- Study of the impact of food adulteration and adulterated foods.
- Analysis of safety of food materials and food processing techniques.
- Study of the violations in the food additives and adulterations.
- Study of the food laws governing the food products.
- Learning the quality of foods and evaluation tests to maintain the quality of foods.

Core – 6 TRAINING (AT ANY FOOD INDUSTRY FOR (PFSQM)

Credits: 2 **Subject Code: B19FSC33**

Course outcomes:

Students, after successful completion of the course, will be able to

CO1: Narrate and compile the information and data that is used to construct and assess about the company safety and risk management programs.

CO2: Introduction review on instrumentation, labors and processing. And predict the company future developments.

List of Industrial Visits Areas:

Masala food products,
Milk and milk products,
Frozen food products,
Heat and control food products,
Animal nutrition food products,
Agro foods products,
Foods and Beverages products,
Seafood products,
Poultry and egg products,
Vegetables sauce manufacture,
Sugar and sugar recipe and Jam and pickles products

Allied 5 - FOOD CHEMISTRY-I

Contact hours per week: 5 **Subject code: B19FSA31**

Contact hours per semester: **75** (45 Theory + 30 Skill) **Credits:** 6 (4 Theory + 2 Skill)

Course Outcomes:

Students, after successful completion of the course, will be able to

CO1 : Learn the food materials and its origin

CO2 : Know the various nature of food materials and its importance

CO3 : Analyze the various food materials based on its physical and chemical properties.

CO4 : Learn the processes of preservation and storage without contamination and learn waste management system

Section- A: Theory

Unit 1 **(15 Hours)**

Introduction to food chemistry - Physio chemical properties of foods – Colloids - Foams and emulsions – Role of water in food products – Bound water in food products

Unit 2 **(15 Hours)**

Chemical composition, nutritive value and basic nutrients: Carbohydrates proteins and lipids - Essential nutritive factors: Vitamins (Fat soluble and water soluble) and minerals (Ca, K, Fe, I and P)

Unit 3 **(15 Hours)**

Anti-nutritive Factors: Natural toxic Compounds, food contaminants: Physical, Chemical and Biological (exogenic and endogenic) - hygienic toxicological quality of food - other components influencing food quality.

Unit 4 **(15 Hours)**

Food analysis - Sampling techniques of food products - Physical and Chemical analysis of foods, Instrumentation in food analysis: pH meter, Colorimeter and Bomb calorimeter.

Unit 5 **(15 Hours)**

Food preservation – Irradiation High temperature and low temperature – Preservatives: Natural and artificial

Text Books:

1. Sree Lakshmi, Food Science, New Age International Publishers, Chennai.
2. Silley P. and Forsythe S. (1996). Impedance Microbiology - A rapid change for Microbiologists - A review. Journal of Applied Bacteriology, 80: 223- 243
3. Dziezak J. D. 1987. Rapid methods for analysis of foods. Food Technology 41(7): 56-73.
4. Johnson Green, Perry, 2002. Diagnostic systems. In Introduction to Food Biotechnology, CRC Press, Florida.
5. Vennila, Principles on Preservation of Fruits and Vegetables

Reference Books:

1. Jellifie, D.B.: Assessment of the nutritional status of the Community; World Health Organization.

Section –B Skill Component

Contact hours per semester: **30** **Credits: 2**

1. Study of various origins and sources of foods.
2. Determination of food contents like water, sugars and proteins.
3. Determination of food contents like lipids, vitamins and food additives.
4. Study of food samples analyzing techniques for physical and chemical properties.
5. Study of food processing, packaging and preservation in industry.

Allied 6 - FOOD CHEMISTRY – 1 PRACTICAL

Contact Hours per week: 4 **Subject Code: B19FSP31**
Contact Hours per semester: 60 (60 Practical + 40 Skill) **Credits:** 5 (5 Skill)

Section –A

Course outcomes

Students, after successful completion of the course, will be able to
CO1: Learn moisture present in the food materials
CO2: Learn ingredient level of protein, fat, vitamins and pH values of the various food products
CO3: Estimate chemical components present in the food products
CO4: Learn the presence of pigments and micro chemicals

List of Experiments:

1. Calibration of Glassware
2. Moisture in Food Products by Hot-air oven-drying Method
3. Moisture in Food Products by Dean and Stark Method
4. Moisture in Food Products using Karl Fischer Titration Method
5. Determination of total, non-reducing and reducing sugars.
6. Determination of Protein in food sample by Lowry's method.
7. Protein Content in Food Products by Kjeldahl Method
8. Determination of Crude Fat in food sample by Soxhlet method.
9. Total fat in foods by Rose Gottleib Method
10. Starch in Cereal Grains by Acid Hydrolysis Method

Reference Books:

1. J. G. Cappucino and N. Sherman, 2014, Microbiology: A laboratory manual, 11/e, Pearson publications United States.

Self study paper: 1
FOOD PROCESSING IN PULSES AND OIL SEEDS

Contact Hours per week: Nil **Subject Code: B19FSE31**
Contact Hours per semester: Nil **Credits:** 4 (2 Theory + 2 Skill)

Course Outcomes:

Students, after successful completion of the course, will be able to
CO1. Understand the technology for Wheat Milling & Wheat based Food Products.
CO2. Acquire the knowledge of the technology for Rice Milling & Rice based other Food Products.
CO3. Know the technology for Oil Extraction & Oil Seed Processing along with equipments.

Unit 1

Introduction Wheat -Types, milling, flour grade, flour treatments (bleaching, maturing), flour for various purposes, Products and By-products. Rice – Physicochemical properties, milling (mechanical & solvent extraction), parboiling, ageing of rice, utilization of by products.

Unit 2

Corn – Milling (wet & dry), cornflakes, corn flour Barley- Milling (pearl barley, barley flakes & flour Oats – Milling (oatmeal, oat flour & oat flakes. Sorghum and millets – Traditional & commercial milling (dry &wet). Rye and triticale—milling (flour), uses.

Unit 3

Milling of pulses, Dry milling, Wet milling, improved milling method

Unit 4

Introduction, Extraction of oil and refining, Sources of protein (defatted flour, protein concentrates and isolates), properties and uses, protein texturization, fibre spinning

Unit 5

Alcoholic beverages: Beer, Wine, Distilled Spirits commercial usage.

Text Books:

1. Chakrabarty MM. 2003. Chemistry and Technology of Oils and Fats. Prentice Hall.
2. Dendy DAV & Dobraszczyk BJ. 2001. Cereal and Cereal Products. Aspen.
3. RJ & Bhati A. 1980. Fats and Oils - Chemistry and Technology. App. Sci. Publ.
4. Hoseney RS. 1994. Principles of Cereal Science and Technology. 2nd Ed. AACC.

Section –B Skill Component

Contact hours per semester: **30** **Credits: 2**

1. To develop proficiency skill in producing different processed pulses and oilseeds food products, operating& maintenance the modern equipment's& machineries
2. Make different processed food products with quality assurance, and Process of Packaging, Storing & marketing.
3. To acquaint with production and consumption trends, structure, composition, quality evaluation, and processing technologies for product development and value addition of various cereals, pulses and oilseeds.
4. Study of food processing, packaging and preservation in industry.

Self study paper: 2

FOOD PROCESSING IN CEREALS

Contact Hours per week: Nil **Subject Code: B19FSE32**
Contact Hours per semester: Nil **Credits:** 4 (2 Theory + 2 Skill)

Course outcomess:

Students, after successful completion of the course, will be able to
CO1. Understand the working of equipments related to Wheat & Rice Milling along with equipments related to Wheat based & Rice based Food Products.
CO2. Understand technology for Milling of Corn & Corn based other Food Products along with equipments and know how to operate it.

Unit 1

Present status and future prospects of cereals and millets, Morphology, physico-chemical properties of cereals, major and minor millets Chemical composition and nutritive value.

Unit 2

Paddy processing and rice milling: Conventional milling, modern milling Milling operations, milling machines, milling efficiency; Quality characteristics influencing final milled products. Parboiling, Rice bran stabilization and its methods, aging of rice; Enrichment of rice – Methods of enrichment; Rice fortification.

Unit 3

Corn milling: Dry and wet milling of corn, starch and gluten separation, milling fractions and modified starches. Barley: Malting and milling Oat/Rye: Processing, milling Sorghum: Milling, malting, pearling Millets (Pearl millets, finger millets)

Unit 4

Secondary and tertiary product processing of cereals and millets, By-products of cereals and millets processing - Processing of millets for food uses.

Unit 5

Processing of infant foods from cereals and millets. Breakfast cereal foods: Flaked, puffed, expanded, extruded and shredded.

Text Books:

1. Chakraverty, A. and Singh, R. P. 2014. Post Harvest Technology and Food Process Engineering. CRC Press, Boca Raton, FL, USA.
2. Khan, K. and Shewry, P. R. 2009. Wheat: Chemistry and Technology, 4th Ed., AACC International, Inc., St. Paul, MN, USA. Wrigley, C. 2004.
3. Encyclopedia of Grain Science. Academic Press, London, UK. Champagne, E. T. 2004. Rice: Chemistry and Technology, 3rd Ed., AACC International, Inc., St. Paul, MN, USA.
4. Chakraverty, A., Mujumdar, A.S., Vijaya Raghavan G.S. and Ramaswamy, H. S. 2003.
5. Handbook of Post Harvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices. Marcel Dekker, Inc., NY, USA.
6. White, P. J. and Johnson. L. Lawrence A. 2003. Corn: Chemistry and Technology, 2 nd Ed., AACC International, Inc., St. Paul, MN, USA. David A.V. Dendy and Bogdan J. Dobraszczyk. 2001.

Reference Books:

1. Cereal and Cereal Products: Technology and Chemistry. Springer-Verlag, US. Kent, N.L. and Evers, A.D. 1994.
2. Kent's Technology of Cereals: An Introduction for Students of Food Science and Agriculture, 4th Ed. Elsevier Science Ltd., Oxford, UK. Matz, Samuel A. 1991.
3. The Chemistry and Technology of Cereals as Food and Feed, 2nd Ed. Springer Science + Business Media, NY, USA. Araullo, E.V., D.B. De Padna and Graham. 1976.
4. Rice Post Harvest Technology. IDRC, Canada.

Self study paper: 3
FOOD PROCESSING IN FRUITS AND VEGETABLES

Contact Hours per week: Nil
Contact Hours per semester: Nil

Subject Code: B19FSE33
Credits: 4 (2 Theory + 2 Skill)

Course outcomes:
Students, after successful completion of the course, will be able to

CO 1: Understand Biological, Chemical & Physical Properties of Fruits & Vegetables.
CO2: Understand Technologies involved in Processing, Preservation & Value- Addition of Fruits & Vegetables.
CO3: Gain knowledge on Industrial Processes for Commercial Production of Jams, Jellies, Marmalade, Fruit Juices, Juice Powder, Dehydrated Fruits, and Canning of Fruits & Vegetables.
CO4: Understand Basics of New Food Products Development & Ideas Generation for Product Development.

Unit 1

Production and processing scenario of fruits and vegetables in India and world; Scope of fruit and vegetable processing industry in India.

Unit 2

Overview of principles and preservation methods of fruits and vegetables; Supply chain of fresh fruits and vegetables Primary processing and pack house handling of fruits and vegetables; Peeling, slicing, cubing, cutting and other size reduction operations for fruits and vegetables.

Unit 3

Minimal processing of fruits and vegetables; Blanching- operations and equipment. Canning:- Definition, processing steps and equipment; Cans and containers, quality assurance and defects in canned products.

Unit 4

Preparation and preservation of juices, squashes, syrups, sherbets, nectars and cordials. FSSAI specifications of crystallized fruits and preserves, jam, jelly and marmalades, candies. Preparation, preservation and machines for manufacture of above products.

Unit 5

Preparation, preservation and machines for manufacture of chutney, pickles, sauce, puree, paste, ketchup, papads and soup powders. Production of pectin and vinegar.

Text Books:

1. U.D. Chavan and J.V. Patil. 2013. Industrial Processing of Fruits and Vegetables. Astral International Pvt. Ltd., New Delhi. S. Rajarathnam and R.S. Ramteke. 2011.
2. Advances in Preservation and Processing Technologies of Fruits and Vegetables. New India Publishing Agency, New Delhi. Y.H. Hui. 2006.
3. Handbook of Fruits and Fruit Processing. Blackwell Publishing Ltd., Oxford, UK. W.V. Cruess. 2004. Commercial Fruit and Vegetable Products. Agrobios India, Jodhpur. 49 Y. H. Hui, Sue Chazala, Dee M. Graham, K.D. Murrell and Wai-Kit Nip. 2004.

4. Handbook of Vegetable Preservation and Processing. Marcel Dekker, Inc., NY, USA. A.K. Thompson. 2003. Fruit and Vegetables: Harvest, Handling and Storage, 2nd Ed. Blackwell Publishing Ltd., Oxford, UK.

Reference Books:

1. R.P. Srivastava and Sanjeev Kumar. 2002. Fruit & Vegetable Preservation: Principles and Practices, 3 rd Ed. International Book Distribution Co., Delhi. P.H. Pandey. 1997.
2. Post Harvest Technology of Fruits and Vegetables. Saroj Prakashan, Allahabad. Mircea Enachescu Dauthy. 1995.
3. Fruit and Vegetable Processing. FAO Agricultural Services Bulletin No.119. FAO of UN, Rome. Girdhari Lal, G.S. Siddappa and G.L. Tandon. 1959.
4. Preservation of Fruits and Vegetables. ICAR, New Delhi. EIRI Board of Consultants and Engineers. Manufacture of Snacks, Namkeen, Papads and Potato Products. EIRI, New Delhi.

INDUSTRIAL VISITS

Contact Hours per week: Nil
Contact Hours per semester: Nil
Subject Code: B19FSIV3
Credits: 2 (2 Skill)

Course Outcomes:

Students, after successful completion of the course, will be able to

CO1: Industrial visits offer a great source to gain practical knowledge.

CO2: Students can observe and learn as to how theatrical concepts are put to into action, thereby aiding their practical learning.

CO3: Students are exposed to real working environment and shown how things are done in an organization.

Keeping this objective at hand, the department organizes excursion tours cum industrial visits which are within the framework of the curriculum. The excursions and industrial visits are for the academic year students which are relevant to the stream of study of the programme.

Semester – IV

MARKETING, BUSINESS ADMINISTRATION AND INTERNATIONAL TRADE

Contact hours per week: 6
Contact hours per semester: **60**
Subject code: B19FSC41
Credits: 4 (2 Theory + 2 Skill)

Section –A Theory

Course outcomes:

Students, after successful completion of the course, will be able to

CO1 : Contribute to economic development by maintaining consumer confidence in the food system and providing a regulatory foundation for international trade in food

CO2: Create and modify food safety and quality assurance system components such as policies, procedures, and instructions, based on scientific principles.

CO3: Recommend means to mitigate and control risks through cleaning and sanitation, traceability, HACCP, Good Manufacturing and Good Agricultural Practices

Unit 1 **(15 Hours)**

Introduction to Financial Accounting: Recording of transactions, Preparation of Final Accounts; Fundamentals of Financial Management: Steps in Capital Budgeting, Working Capital Management; Factors affecting Working Capital, NPV.

Unit 2 **(10 Hours)**

Overview of marketing management; market structure and consumer buying behavior; marketing opportunities analysis.

Unit 3 **(10 Hours)**

Market measurement; product policy and planning; pricing decisions; promotion-mix decisions.

Unit 4 **(15 Hours)**

Basis, trends and composition of India's Foreign trade. Institutes for promotion of Indian agricultural / horticultural trade and export inspection agencies. Export documentation, Procedures.

Unit 5 **(10 Hours)**

Trade Act regulations relating to maintaining hygienic conditions, Consumer Protection Act 1986; international marketing and international trade; exports. Role of Institute like Export/Import Bank and ECGC (Export Credit Guarantee Corporation)

Text Books:

1. Adams M. R. & Moss M. O. Food Microbiology, New Age International Private Ltd. publications, London.
2. Frazier W. C. & Westhoff D. C. Food Microbiology Fifth Edition, McGraw Hill publications, New York.

Reference Books:

1. Export / import policy by Govt. of India. Export / import data by DGCIS - Calcutta. Export documentation by Nashi Publication.
2. Darrah L.B.1971. Food Marketing. The Ronald Press Comp. New York.
3. Kacker M. 1982. Marketing and Economic Development, Deep and Deep Pub., New Delhi.

Section –B Skill Component

Contact hours per semester: **30** **Credits: 2**

- Understanding the financial accounting and fundamentals of financial management.
- Study of marketing management and analysis of marketing opportunities.
- Learning the market measurement and product policy, planning and pricings.
- Study of composition of foreign trade and export credit guarantee corporation.
- Study of trade act regulations, consumer act and international marketing.

Core 7 - FOOD COMMODITIES AND FOOD PRESERVATION TECHNOLOGY (FCFP)

Contact hours per week: 6 **Subject code: B19FSC42**
Contact hours per semester: **60** **Credits: 7** (4 Theory + 3 Skill)

Course outcomes:

Students, after successful completion of the course will be able to

CO1: Identify the important pathogens and spoilage microorganisms in foods and the conditions under which they will grow.
CO2: Identify the conditions under which the important pathogens are commonly inactivated, killed or made harmless in foods.
CO3: Know the principles involving food preservation via fermentation processes.

Section –A Theory

Unit 1 **(15 Hours)**

Cereals (Rice and Wheat), Millets (Ragi and Bajra) and Pulses (Moong Dhal and Black gram dhal) - Storage, Nutritional aspects and cost.

Unit 2 **(15 Hours)**

Milk and Milk products - Selection Quality and Cost, Processing, Storage, Nutritional aspects, shelf life and spoilage.

Unit 3 **(10 Hours)**

Eggs, Meat, Fish and Poultry - Quality selection, storage, cost, nutritional aspects - Vegetables and Fruits - storage, nutritional aspects of raw and processed products

Unit 4 **(10 Hours)**

Sugar and sugar Products - Types of natural sweeteners, storage and use as preserves, Fats and oils - Processing, storage, cost and nutritional aspects. Salt - types & uses

Unit 5 **(10 Hours)**

Objectives and techniques of food preservation, canning, lacquering, thermal process time and spoilage in canned foods - Preservation by fermentation - curing, pickling and hurdle technology.

Reference Books:

1. Food Science by Potter, Fruits and vegetable processing by Cruss.
2. Preservation of Fruits & Vegetables by IRRI.
3. Lavies, S (1998): Food Commodities Ltd. London.
4. Hughes 0. and Bennion M. (1970); Introductory Foods, Macrnillan & Co., New York.
5. Pyke M. (1974); Catering Service and Technology, John Murrey Publication, London.
6. B. Shrilakshmi: Food Science Manne Sakuntala : Food Science.

Section –B Skill Component

Contact hours per semester: **30** **Credits: 3**

- Study of nature of milk, cereals, millets and its processing, storage and spoilage.
- Learning the nature of egg, meat, fish and its processing, storage and spoilage.
- Study of nature of sugar, fat, salt and its processing, storage and spoilage.
- Learning the physical and chemical methods of preservations.
- Study of various types of food preservations and fermentation technology.

Core – 6 TRAINING (AT ANY FOOD INDUSTRY FOR FCFP)

Credits: 2 **Subject Code: B19FSC43**

Course outcomes:

On successful completion of this module the student will:

CO1 It helps to narrate and compile the information and data that is used to construct and assess about the company safety and risk management programs.

CO2 Format: Introduction review on instrumentation, labors and processing. And predict the company future developments.

Cocoa food products, Coffee manufacture company, Orange juice Frozen & Preservation Company, Grains, wheat, soybeans, soybean oil, rice, oats, and corn production and Preservation Company. Sugar and sugar recipes, jam, jellies and pickles products and Preservation Company.

Allied 7 - FOOD CHEMISTRY-II

Contact hours per week: 6 **Subject code: B19FSA41**
Contact hours per semester: 75 **Credits: 6** (4 Theory + 2 Skill)

Course outcomes:

Students, after successful completion of the course, will be able to

CO1: Know the spoilage and deterioration mechanisms in foods and methods to control deterioration and spoilage.

CO2: Enlist the principles that make a food product safe for consumption.

CO3: Get knowledge about the transport processes and unit operations in food processing as demonstrated both conceptually and in practical laboratory settings

CO4: Operate the mass and energy balances for a given food process and describe the unit operations required to produce a given food product.

Section –A Theory

Unit 1 **(12 Hours)**

Food and its functions constitution of chemicals in food – Basic five Food groups – Functional foods and nutraceuticals – Definition and health benefits.

Unit 2 **(16 Hours)**

Introduction to nutrition: Definition, nutritional status, good nutritional status, poor nutritional status, malnutrition, and Biological functions of nutrients.

Unit 3 **(16 Hours)**

Food and our body: digestion and absorption of food Buccal digestion, gastric digestion and intestinal digestion - factors affecting digestion and absorption

Unit 4 **(16 Hours)**

Energy metabolism: Introduction, unit of measurement, energy value of food – Bomb calorimetry; Total energy requirements of the body - Reference man and reference woman; basal metabolic rate, factors affecting the BMR

Unit 5 **(15 Hours)**

Nutritional assessments of humans: Clinical findings, nutritional anthropometry, biochemical tests and biophysical method.

Text books:

1. Adams M. R. & Moss M. O. Food Microbiology, New Age International Private Ltd. publications, London
2. Frazier W. C. & Westhoff D.C. Food Microbiology Fifth Edition, McGraw Hill publications, New York.

Reference Books:

1. Jellifie D. B. Assessment of the nutritional status of the Community; World Health Organization.
2. Sain D. R., Lockwood R., Scrimshaw N. S: Methods the Evaluation of the Impact of Food and Nutrition programmes, United Nations University. Aurand L.W. and Woods A.E. 1973. Food Chemistry. AVI, Westport.
3. Birch G.G., Cameron A.G. and Spencer M. 1986. Food Science, 3rd Ed. Pergamon Press, New York.

Section –B Skill Component

Contact hours per semester: **30** **Credits: 2**

- Study of chemical constituents, scope and importance of chemicals in food.
- Learning the nutritional statuses like malnutrition, poor nutrition and good nutrition.
- Study of various metabolic functions in body and influences of various factors.
- Measurement of various levels of energy value in body and factors affecting BMR.
- Study of nutritional assessment of humans and clinical studies.

Allied 8 – FOOD CHEMISTRY – II PRACTICAL

Contact hours per week: 4 **Subject code: B19FSP41**
Contact hours per semester: 60 (60+ 40) **Credits: 5**

Section – A

Course outcomes:

Students, after successful completion of the course, will be able to

CO1: Explain the principles and current practices of processing techniques and the effects of processing parameters on product quality.
CO2: Apply principles from general chemistry, biology, physics, statistics, and mathematics to food science problems
CO3: Generate nutritional panels for food products using the vital program. Hygiene and sanitation, including good manufacturing practice

List of Experiments:

1. Determination of pH in food sample.
2. Estimation of Vitamin C in food sample.
3. Determination of Pigments in food sample.
4. Estimation of Ash content in food products.
5. Estimation of calcium in food products.
6. Estimation of iron in food products.
7. Estimation of zinc in food products.
8. Estimation of Iodine in food products.

9. Determination of food adulterants in food products – Honey, Turmeric and Pepper.
10. Determination of tin in food products.

Reference Books:

1. Fennema, O.R. Ed. 1976. Principles of Food Science: Part-I Food Chemistry. Marcel
2. Dekker, New York.
3. Meyer, L.H. 1973. Food Chemistry. East-West Press Pvt. Ltd., New Delhi.
4. Potter, N.N. 1978. Food Science. 3rd Ed. AVI, Westport

Self study paper: 1
FOOD PROCESSING IN POULTRY AND ITS PRODUCTS

Contact Hours per week: Nil **Subject Code: B19FSE41**
Contact Hours per semester: Nil **Credits: 4**

Course outcomes:

Students, after successful completion of the course, will be able to

CO1: Know the significance and necessity of organized animal products sector, humane slaughtering of poultry and value addition of poultry egg.
CO2: Understand need and importance of livestock, egg and poultry industry
CO3: Learn the structure, composition and nutritional quality of animal products.
CO4: Learn the processing and preservation of poultry foods.
CO5: Understand technology behind preparation of various poultry food products and byproduct utilization.
CO6:. Gain knowledge on status & scope of Poultry industry worldwide.

Unit 1

Introduction to Livestock and poultry population in India, Development of poultry industry in India and its need in nation's economy, Glossary of live market terms for birds.

Unit 2

Sources and importance of poultry. Structure, classification and composition of muscle and types - Pre-slaughter operations and slaughtering operations for poultry.

Unit 3

Preservation of poultry by chilling, freezing, pickling, curing, cooking and smoking, canning, dehydration, radiation, chemical and biological preservatives. Novel methods: Low dose irradiation; High pressure treatment, hurdle barrier - concept for- poultry.

Unit 4

Quality of eggs - internal and external quality evaluation, candling, albumen index, haugh unit, shape index and yolk index. Grading of eggs. Pasteurization, dehydration, freezing and desugarization of egg.

Unit 5

Liquid egg products, egg powder, value added egg products (meringues and poached egg). Packaging of egg and egg products.

Text Books:

1. Vikas Nanda. 2014. Meat, Egg and Poultry Science & Technology. I.K. International Publishing House Pvt. Ltd., New Delhi.
2. Meat Processing-Improving Quality. Woodhead Publishing Ltd., Cambridge, England. B.D. Sharma. 1999.
3. Meat and Meat Products Technology Including Poultry Products Technology. Jaypee Brothers Medical Publishers Pvt. Ltd, New Delhi.

Reference Books:

1. Egg Science and Technology, 4th Ed. Food Products Press, NY, USA. R.A. Lawrie. 1985.
2. Brigitte Maas-van Berkel, Brigiet van den Boogaard and Corlien Heijnen. 2004. Preservation of Fish and Meat. Agromisa Foundation, Wageningen. FAO. 2003.
3. Code of Practices of Canned Fishery products. FAO, UN, Rome.
4. Brend W. Rautenstrauss and Thomas Liehr. 2002. Fish Technology. Springer-Verlag, US. G.M. Hall. 1997.
5. Fish Processing Technology, 2nd Ed. Chapman & Hall, London, UK.

Self study paper: 2
FOOD PROCESSING IN FISH AND ITS PRODUCTS

Contact Hours per week: Nil — **Subject Code: B19FSE42**
Contact Hours per semester: Nil — **Credits: 4**

Course outcomes:

Students, after successful completion of the course, will be able to
CO 1. Know about the significance & necessity of organized animal product sector.
CO 2. Acquire the ability of value- addition Fish.
CO 3. Understand the processing, preservation & quality control of Fish in Food Industry.
CO 4. Gain knowledge of manufacturing practices of fish based by products & their processing techniques.

Unit 1

Introduction Status of fishery industry in India. Chilling and Freezing of fish Relationship between chilling and storage life, MAP, general aspects of freezing, freezing systems (air blast freezing), changes in quality of chilled and frozen storage and thawing.

Unit 2

Fish Curing and Smoking Drying and salting of fish, water activity and shelf-life , salting process, salting methods (brining, pickling, kench curing, gaspe curing), types of salts, dried and salted fish products- pindang, fishwood, dried shrimp.

Unit 3

Canning of fish - Principles of canning, classification based on pH groupings, effect of heat processing on fish, storage of canned fish, pre-process operations, post process operations, cannery operations for specific canned products.

Unit 4

Quality of fresh fish. Processing of fish. Manufacturing of fish paste, fish sauces, fish oil, fish protein concentrate.

Unit-5

Fermented fish and flowchart of Indigenous products - Concept of other Sea foods Crabs, lobsters, prawns, shrimps and shell- fish.

Text Books:

1. Hui, Y. H. (2010). Handbook of Poultry Science and Technology.
2. . Fernandes, R. (2009). Fish and Seafood.
3. Varnam, A. H. & Sutherland, J. P. (1995). Meat and Meat Products: Technology, Chemistry and Microbiology: Champan & Hill, London.

Reference Books:

1. Lawrie, R. A. (1998). Lawrie's Meat Science (6th ed.): Woodhead, Cambridge.
2. Kerry, J., Kerry, J. & Ledward, D. (2002). Meat Processing Improving Quality: CRC Press, USA.

Section –B Skill Component

Contact hours per semester: **30** **Credits: 2**

1. Maintains various records in processing plants like Hazard analysis work sheet, HACCP plan form, Tunnel freezer register, Plate freezer registers, Consolidated daily production register, Daily sanitation check list, Check list for personal hygiene, Chlorination register, Register for analytical report, Raw material evaluation register, Register for pre-processing summary and Register for processing.
2. To provide an understanding of the technology for handling, processing, preservation and bi-product utilization of fish and fish products processing
3. Evaluates various inspection systems and Works with HACCP in Sea food industry.

Self study paper: 3
PROCESSING IN WATER QUALITY ANALYSIS

Contact Hours per week: Nil **Subject Code: B19FSE43**
Contact Hours per semester: Nil **Credits: 4**

Course outcomes:

Students, after successful completion of the course, will be able to
CO1: Understand the principles and operation of water treatment systems
CO2: Know the suitability of the design of treatment plants and unit processes
CO3: Evaluate process operations and performance
CO4:Understand coagulation, flocculation, and sedimentation, filtration, and disinfection processes.

Unit 1

Quantity of Water: Per-capita demand, design period, population forecast, fluctuation in demand General requirement: Sources of water, necessity of treatment, water quality standards for various water uses.

Unit 2

Principles of sedimentation: Types of settling and settling equations, design criteria and design of settling tanks. Principle of Coagulation and Flocculation – types of coagulants, coagulant aids.

Unit 3

Disinfection: different types of disinfectants, factors affecting disinfection, methods of disinfection and chemistry of chlorination, Ions causing hardness, Langelier index, Winkler's method.

Unit 4

Adsorption Process: Types, factors affecting adsorption, kinetics and equilibrium – different isotherm equations and their applications.

Unit 5

Water Softening:: Ion exchange, electro-dialysis, Reverse Osmosis, Ultra filtration Distribution system design and analysis, distribution reservoirs and service reservoirs.

Text Books:

1. Peavy, H.S., Rowe and Tchobonoglous,G., (1985), "Environmental Engineering", McGraw Hill
2. Raju, B.S.N., (1995), "Water Supply and Wastewater Engineering", Tata McGraw Hill Pvt. Co. Ltd., New Delhi.
3. Fair, G.M., Geyer J.C and Okun, (1969) "Water and Wastewater Engineering" Vol II, John Wiley Publications.

Reference Books:

1. Weber W.J., (1975) "Physico - Chemical Processes for Water Quality Control".
2. AWWA, (1971), "Water Quality and Treatment "McGraw Hill.
3. CPHEEO Manual, (1991), "Water Supply and Treatment", GOI Publications

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PROJECT WORK

Contact Hours per week: 2 **Credit : 2**
Contact Hours per Semester: NIL **Subject Code: B19FS4PR**

Course Outcomes:

Students, after successful completion of the course, will be able to

CO1: Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
CO2: Acquire the skills to communicate effectively and to present ideas clearly and coherently to

specific audience in both the written and oral forms.

CO3: Acquire collaborative skills through working in a team to achieve common goals.

CO4: Learn on their own, reflect on their learning and take appropriate actions to improve it.

CO5: Learn to work in groups, they will also learn independently through self-reflection and evaluation of their own work processes.

The aim of project work (lab work) is to inculcate students to learn adequate knowledge on research methodology in the subject and prepare them for pursuing research in experimental or computational areas of the subject. Student's allotment is done by lot system. The project work study is to be undertaken under the guidance of a Teacher of the Department. The guiding teacher will make continuous internal assessment of the Project Work. No teacher shall be permitted to guide more than eight students in a semester for Project Work under his/her supervision. The project work will be evaluated by the external examiner.

- Project will be done by the second year students in the fourth semester under the guidance of respective guides.
- For projects internal marks (Max 50) will be awarded by the respective guide and external examinations.
- Minimum number of pages for B.Voc. Project thesis shall be 30.

Course Name: **Bachelor of Vocational**
Discipline: **Food Safety & Quality Management**
(FOR THOSE WHO JOIN IN 2021 AND AFTER)
Duration of the Course: **Three Years**

COURSE SCHEME:

Semester	Part	Subject	Hour	Credit	Int+Ext= Total	Local	Regional	National	Global	Professional Ethics	Gender	Human Values	Environment & Sustainability	Employability	Entrepreneurship	Skill Development	Subject Code	Revised/ New/ No Change/ Interchanged If Revised % of Change
V	Core- 9	Food Safety and Quality Management Systems	6	7	25+75=100		✔			✔						✔	B19FSC51	New
	Core 10	Food Toxicology	6	6	25+75=100				✔	✔						✔	B19FSC52	New
	Core 11	International Food Legislations & Standards	6	5	25+75=100			✔		✔						✔	B19FSC53	New
	Core 12 Lab	LAB: Food safety and quality management Systems	5	3	40+60=100				✔	✔				✔			B19FSP51	New
	Core 13 Training	Apprenticeship at any food industry for Food Safety And Quality Management systems	5	3	100 (Internal)			✔		✔					✔		B19FSC54	New
	Core 14	Food Preservation Fruits and Vegetables	2	4	25+75=100		✔			✔						✔	B19FSC55	New
		Industrial Visit & Report (Minimum 2 trips)	0	2	100 (Internal)			✔		✔				✔			B19FSIV5	New
	Core 15	Medicinal Plants compounds Separation and Quality control	6	7	25+75=100	✔							✔			✔	B19FSC61	New
	Core 16	Hygienic designs of food process equipment.	6	6	25+75=100			✔		✔						✔	B19FSC62	New
	Core 17	Food Analysis and	5	5	25+75=100	✔				✔						✔	B19FSC63	New

VI		Adulteration Testing (FAAT)																
	Core 18 Lab	LAB :Food Adulteration Testing	5	3	40+60=100		✔			✔				✔			B19FSP61	New
	Core19 Training	Apprenticeship at any food industry for Food Analysis And Adulteration testing.	5	3	100 (Internal)		✔			✔					✔		B19FSC64	New
	Core 20	Processed food packaging in milk products	3	4	25+75=100			✔		✔						✔	B19FSC65	New
		Industrials Visit Report	0	2	100 (Internal)		✔			✔				✔			B19FSIV6	New
		Total	**30**	**60**	**650**													

Semester – V

Core 9 – FOOD SAFETY AND QUALITY MANGEMENT SYSTEMS

Contact Hours per week: 6 **Subject Code:** B19FSC51
Contact Hours per semester: **75** (45Theory + 30Skill)
Credits: 7 (4 Theory + 3 Skill)

Course Outcome
Students will be able to understand

CO 1: Know the principles involving food management systems and food standardization.

CO 2: Explain the principles and current practices International Standard Organizations.

CO 3: Describe the basic principles and practices followed in food testing laboratories

CO 4: Identify the requirements of International and national food standardization.

Section- A: Theory

Unit I **(15 Hrs)**

International Standardization Organization (ISO), Joint FAO/WHO Food Standards Program. Codex Alimentarius Commission (CAC), Other International Organizations Active in Food Standard Harmonization. Advantages of Utilizing International Standards. Rapid Alert system.

Unit II **(12 Hrs)**

European Committee for Standardization (CEN), PAN American Standards Commission (COPANT), Euro-Asian Council for Standardization, FDA, EPA, EU, ASEAN, EFSA (European Food Safety Authority)

Unit III **(16 Hrs)**

Trends in Food Standardization, An Overview and structure of 9001:2000/2008, Clause wise Interpretation of ISO 9001:2000, Case Studies, An overview and Structure of 22000:2005, Clause wise Interpretation of ISO 22000:2005, Case Studies.

Unit IV **(16 Hrs)**

An Overview and Requirement of ISO 17025-Requirements Specific to Food Testing Laboratories- Need and Importance of food testing lab- Physical and Chemical Parameters-Requirement Specific to Food Testing Laboratories-Biological Parameters- General Topics : Related to Food Testing Laboratories.

Unit V **(16 Hrs)**

Introduction to HACCP and its management- BRC Food and BRC IOP Standards: An Overview – International Food Standard (IFS)- SQF: 1000 SQF: 2000- Global Gap and India Gap.

Text Books:

1. Sree lakshmi, Food science, new age international Publishers, Chennai.
2. Silley, P and S. Forsythe, (1996). Impedance Microbiology- a rapid change for microbiologists- A review. Journal of Applied Bacteriology, 80: 223- 243
3. Dziezak, J. D. 1987. Rapid methods for analysis of foods. Food Technol. 41(7): 56-73.
4. Johnson Green, Perry (2002). Diagnostic systems. In Introduction to Food Biotechnology, CRC Press, Florida.

Reference books:

1. Peppler, H. J., 1979, Microbial technology, Volumes I and II- Academic press, New York
2. Inteaz Alli. 2004. Food quality assurance - Principles & practices. CRC Press. New York.
3. Sara Mortimore and Carol Wallace. 2013. HACCP - A practical approach. Third edition. Chapman and Hall, London.
4. Roday, S. 1998. Food Hygiene and Sanitation, Tata McGraw-Hill Education.

Section –B Skill component

Contact Hours per semester: **30** **Credits: 3**

1. To ensure the quality and standards of food management systems.
2. To study the food quality standardization of ISO 9001-2000 series.
3. To study the food quality standardization of ISO 22000-2005 series.
4. To study the physical and chemical parameters followed in food testing laboratory.
5. To collect the sample and ensure the quality by international standardization techniques

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Core 10 - FOOD TOXICOLOGY

Contact hours per week: 6 **Credits:** 6 (3 Theory + 3 Skill)

Contact Hours per semester: **75** (45 Theory + 30 Skill) **Subject Code:** B19FSC52

Course Outcome

Students after successful completion of course will be able to

CO 1: Identify the important pathogens which causing toxicity in food and the conditions under which they will grow.

CO 2: Identify the conditions under which the important pathogens are commonly inactivated, killed or made harmless in foods.

CO 3: Utilize laboratory techniques to identify microorganisms in food.

CO 4: Know the contamination of food borne pathogens with various environmental factors.

Section- A: Theory

Unit I **(15 Hrs)**

Introduction to food toxicology: Scope, history and development of toxicology. Principles of food toxicology. Classifications and divisions in Toxicology.

Unit II **(15 Hrs)**

Natural toxicants present in foods - plants, animal, marine and microbial toxins. Types of these dangerous chemical substances and their effects on living organisms.

Unit III **(15 Hrs)**

Food-borne disease: fungi, bacteria, viruses, protozoa and worms. Microbial toxins- Bacteriotoxins, Mycotoxins- Outbreak of Botulism- Plant toxins- Influence of water activity in pathogenecity- Screening and Identification of toxins

Unit IV **(15 Hrs)**

Environmental factors affecting microbial growth (Intrinsic/extrinsic) influencing growth of oxygenic microorganisms, Cultivation, identification and research of oxygenic microorganisms.

Unit V **(15 Hrs)**

Toxicants formed in Processed Foods (food mutagens, carcinogens), Hazardous chemical compounds arising from processing and storing of foods. Heating and Chemical Changes. Changes occuring during Frying Food in Oil and Fats. Conservation. Radiation and Microwave Energy. Identification of toxins – Spectroscopy- HPLC, LC- MS, MASS- Spectrometry for

Text books:

1. Shibamoto, T. and Bjeldanes, L. 2009. Introduction to Food Toxicology, 2nd Ed. Elsevier Inc., Burlington, MA. -- (SB).
2. Stine, K. and Brown, T. 1996. Principles of Toxicology. CRC Press, Inc. Boca Raton, FL. 3. Manahan, Stanley. 1992. Toxicological Chemistry, 2nd Edition. Lewis Publishers, Inc. Chelsea, MI.
3. Dziezak, J. D. 1987. Rapid methods for analysis of foods. Food Technol. 41(7): 56-73.
4. Adams MR & Moss MO. Food Microbiology, New age international (P) Ltd publications, London.
5. Frazier WC & Westhoff DC, Food Microbiology 5 th edition, McGraw Hill publications, New York.

Reference books:

1. Jellifie, D.B.: Assessment of the nutritional status of the Community; World Health Organization.
2. Püssa, Tönu. 2007. Principles of Food Toxicology. CRC Press, LLC. Boca Raton, FL. 5. Watson, David. 1998.
3. Natural Toxicants in Food. CRC Press, LLC. Boca Raton, FL. 6. Klaassen, Curtis (Ed.). 2008. Caserett and Doull's Toxicology, 7th Edition. McGraw-Hill. New York, NY.

Section –B Skill component

Contact Hours per semester: **30** **Credits:** 3

1. To study the impact and classification of food toxicology
2. To analyze the toxic substances in various living organisms.
3. To study the food borne diseases caused by various types of microorganisms.
4. To study the various environmental factors which influence the microbial growth.
5. To learn the various hazardous substances causing different types of mutations.

Core 11 - INTERNATIONAL FOOD LEGISLATIONS AND STANDARDS

Contact Hours per week: 6 **Credits:** 5 (3 Theory + 2 Skill)
Contact Hours per semester: **75** **Subject Code:** B19FSC53

Course Outcome:
Students after successful completion of course will be able to

CO1: Be able to explore the history and basic ideas underlying quality management and have a detailed knowledge of the role of food laws and standards in modern management.

CO2: Demonstrate knowledge of food laws and standards systems, their implementation and the practical steps needed for implementation.

CO3: Know how to control and maintain a quality management system.

CO4: Be able to select and apply appropriate Regulations and Standards and evaluate data generated.

Unit I **(15 Hrs)**

Concepts and trends in food legislation. International and federal standards: Codex alimentarious, ISO series, food safety in USA.

Unit II **(15 Hrs)**

Legislation in Europe: Directives of the official journal of the EU, council regulations, food legislation in UK.

Unit III **(15 Hrs)**

FSSAI and its role in Food Analysis- Regulating methods for food analysis, case studies. Enforcers of Food Laws Approval Process for Food Additives Nutritional Labeling

Unit IV **(15 Hrs)**

Food laws and regulations: national food legislation, other food legislations/ authorities and their role- essential commodities act, 1955, standard of weight and measures act, 1976, export(quality control and inspection) act, 1963, voluntary based product certifications (ISI mark of BIS and agmark),

Unit V **(15 Hrs)**

International organization and agreements-food and agricultural organization (FAO), world health organization(WHO), codex alimentary, codex India, joint FAO/WHO expert committee on food additives(JECFA), world trade organization(WTO), sanitary and phytosanitary measures(SPS) and technical barriers to trade(TBT), international organization for standardization(ISO)

Reference books:

1. WHO, 1998 world health report life in the 21st centuries. Report of the director general of WHO Geneva.
2. FAO food and nutrition paper manual of food quality control – part 14/1 (1979), to 14/8 (1986) FAO of the United Nations.
3. Curriculum on food safety. Directorate general of health services. Ministry of health and family welfare. Government of India. Nirman Bhavan, New Delhi.
4. Graham, H.D. 1980: the safety of foods, AVI publishing company Inc. Westport.

Reference books:

1. Peppler, H. J., 1979, Microbial technology, Volumes I and II- Academic press, New York

2.Curricula on food safety. Directorate general of health services. Ministry of health and family welfare. Government of India. Nirman Bhavan, New Delhi.

3. Graham, H.D. 1980: the safety of foods, AVI publishing company Inc. Westport.

Section –B Skill component

Contact Hours per semester: **30** **Credits:** 2

1. Study of the impact of food legislations and international standards in India.
2. Study of the impact of food legislations and international standards in other countries.
3. Study of the violations in the food additives food laws.
4. Study of the food laws governing organizations in India.
5. Study of the food laws governing organizations in international level

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Core 12 Lab: FOOD SAFETY AND QUALITY MANAGEMENT SYSTEMS

Contact Hours per week: 5 **Credits:** 3 (3 Skill)
Contact Hours per semester: **75** **Subject Code:** B19FSP51

Section- A: Theory

Course Outcome:

Students after successful completion of the course will be able to
CO 1: Acquire knowledge on food factory and its practices
CO 2: Industrial visits offer a great source to gain practical knowledge
CO 3: To familiarize about various International organizations related to food

Experiment No.1 **(15 Hrs)**

Development of GHP and GMP Plan for a food factory- a) Identifying the key focus areas for GHP& GMP b) Identifying gaps in its implementation c) Closure plans for identified gaps in a food factory/food outlet. Exercise b and c shall be covered in Experiment

Experiment No.2 **(15 Hrs)**

Visit to the nearby Food establishment (e.g. Food joint or food factory)

Experiment No.3 **(15 Hrs)**

Development of GHP and GMP Plan for a food factory a) Identifying gaps in its implementation b) Closure plans for identified gaps in a food factory/food outlet.

Experiment No.4 **(15 Hrs)**

Development of the process flow for the Food establishment including all the inputs, outputs & interim loops

Text books:

1. Adams M.R. & Moss M.O. Food Microbiology, New Age International Private Ltd. Publications, London.
2. Frazier W.C. & Westhoff D.C. Food Microbiology, Fifth Edition, McGraw Hill Publications, New York.
3. Sri Lakhsmi Food Science 7th Edition

Reference Books:

1. Peppler H. J., 1979, Microbial Technology, Volumes I and II- Academic press, New York.
2. Handbook of Laboratory quality Management system by WHO Pages: 1 – 246.
3. Manual of food quality control in microbiological laboratory by FAO of United Nations Rome P.No. 1 – 172.

Core – 13 TRAINING

APPRENTICESHIP AT ANY FOOD INDUSTRY FOR FOOD SAFETY AND QUALITY MANAGEMENT SYSTEMS

Contact Hours per week: 5 **Credits:** 3 (3 Skill)
Subject Code: B19FSC54

Course outcomes:

CO1: Students, after successful completion of the course, will be able to narrate and compile the information and data that is used to construct and assess about the company safety and risk management programs.

CO2: Introduction review on instrumentation, labors and processing. And predict the company future developments.

ACTIVITIES

Industrial Training Report should be submitted by the students along with attendance record and evaluation sheet to the Department immediately after the completion of the training. The training Food Industries will be evaluated on the basis of the following criteria:

- Regularity in maintenance of the Food Industry.
- Adequacy & quality of information recorded.
- Drawings, sketches and data recorded.
- Thought process and recording techniques used.

FOOD PRESERVATION IN FRUITS AND VEGETABLES

Contact Hours per week: 2 **Credits:** 4 (2 Theory + 2 Skill)
Subject Code: B19FSC55

Course Outcome:
Students after successful completion of course will be able to

CO1: Identify the spoilage in fruits and vegetables and state the reason for the spoilage following safety precautions.

CO2: Identify and select fresh fruits and vegetables with the help of checklist.

CO3: Identify spices and food additives by visual inspection.

CO4: Prepare and pack perishables for storage and then store under refrigerated conditions with safety precautions.

CO5: Prepare fruit juices with juice extracting machines with safety precautions and preserve fruit juices with addition of preservatives and determine the acidity and TSS content.

Unit I **(15 Hrs)**

Current status of production and processing of fruits and vegetables, Scope of fruits and vegetables preservation in India: Product mix, availability of raw material, manpower, capital, lack of awareness, marketing facility, transport facility, availability of containers, publicity and role of government.

UNIT II **(15 Hrs)**

Juice extraction: juice, history of juicing, types of juices, process flow diagram for fruit juice production, juice extraction process- fruit selection, sorting, washing, juice extraction, deaeration, straining/filtration, clarification, adding of sugars, fortification, bottling, sealing and storage; methods of juice preservation, causes of juice spoilage.

Unit III **(15 Hrs)**

Canning: Introduction, can manufacture, canning process - selection of fruits and vegetables, grading, washing, peeling, cutting, blanching, cooling, filling, exhausting, sealing, processing, cooling and storage; types of canning- pressure canning and water bath canning, common causes of spoilage in canning of foods.

UNIT IV **(15 Hrs)**

Minimally processed fruits and vegetables: Modified atmosphere packaging (MAP): Introduction, gases used in MAP, role of N2, O2 & Co2, Principles of MAP, Types of MAP active packaging & passive packaging, factors affecting MAP, graphical representation, application of MAP, effect of MAP on shelf-life, future research needed, advantages and disadvantages; and controlled atmosphere packaging (CAP): Introduction, gases used in CAP, factors affecting CAP- Temperature control, humidity control and gas control, advantages and disadvantages.

UNIT V **(15 Hrs)**

Statutory Provisions for Quality Control in India: Prevention of Food Adulteration act, Fruit Product Order act, AGMARK act, Vegetable Oil Product order; Food Standardization and regulatory agencies in India: Central Committee for Food Standards, Central and state food departments, State Food Laboratories / Food and Drug Administration, Bureau of Indian Standards, Food Corporation of India, Army Supply Corps and Central Insecticide Board.

Reference books/ Text books

1. R. P. Srivastava & Sanjeev Kumar Fruit and Vegetable Preservation: Principles & Practices International book distributing Co. Lucknow.
2. Giridhari Lal, G.S. Siddappa & G.L. Tondon Preservation of Fruits and Vegetables CFTRI, ICAR, New Delhi -12.
3. Y. H. Hui, S. Ghazala, D.M. Graham, K.D. Murrell & W.K. Nip Handbook of Vegetable Preservation and Processing Marcel Dekker (2003)

INDUSTRIAL VISIT & REPORT

Contact Hours per week : Nil
Contact Hours per semester: Nil
Subject Code : B19FSIV5
Credits : 2 (2 Skill)

Course Outcome:

Students, after successful completion of the course, will be able to

CO1: Industrial visits offer a great source to gain practical knowledge.

CO2: Students can observe and learn as to how theatrical concepts are put to into action, thereby aiding their practical learning.

CO3: Students are exposed to real working environment and shown how things are done in an organization.

Keeping this objective at hand, the department organizes excursion tours cum industrial visits which are within the framework of the curriculum. The excursions and industrial visits are for the academic year students which are relevant to the stream of study of the programme.

SEMESTER –VI

CORE – 14 MEDICINAL PLANTS COMPOUNDS SEPARATION AND QUALITY CONTROL

Contact Hours per week: 6
Contact Hours per semester: **75**
Credits: 7 (4 Theory + 3 Skill)
Subject Code: B19FSC61

Course Outcome:

Students will be able to understand at the end of the course

CO1: It constructs the fundamental methodology to prepare different strength of solutions.

CO2: It facilitates the fellow pupil to predict the sources of mistakes and errors.

CO3: It helps to develop the fundamentals of volumetric analytical skills.

CO4: It peculates the basic knowledge in the principles of electrochemical analytical techniques.

CO5: The student interpretation skills will be improved by the course content in terms of choice of analytical techniques to perform the estimation of different category drugs.

Unit I **(16 Hrs)**

Ethnobotany - Concept, scope and importance; principles and methods for conservation of medicinal and aromatic plants.

Unit II **(16 Hrs)**

Diversity of medicinal and aromatic plants, assessment of diversity; Chemical composition of medicinal plants – *Azadiracta indica*, *Asparagus racemosus, Aloe vera, Withania somnifera*, *Andrographis paniculata* .

Unit III **(12 Hrs)**

Principle, techniques and types of chromatography and spectroscopy. Basic water, juices and analytical methods applicable

Unit IV **(15 Hrs)**

Secondary metabolites – concept and importance, chemical structure and uses of secondary metabolites.

Unit V **(16 Hrs)**

Concept of quality control and its methods, quality assurance & total quality controls. Quality control of raw materials & finished products. Documentation concepts of statistical quality control.

Text Books / Reference:

1. Biochemical methods – Themaiya.
2. Biochemical methods – Sadashivam and Manikam
3. A text book of Quantitative inorganic analysis – I.A. Vogel.
4. Quantitative analysis – Day and Underwood.
5. Instrumental methods of Analysis – W. Merritt and Dean.

Section –B Skill component

Contact Hours per semester: **30** **Credits:** 3

1. To study the principles and conservative methods of aromatic compounds.
2. To analyze the diversity of microorganisms in various medicinal plants.
3. To study the principles and methods of various chromatography and spectroscopy.
4. To evaluate the chemical structure and importance of secondary metabolites.
5. To study the quality control and quality assurance of finished products.

Core 15 - HYGENIC DESIGN OF FOOD PROCESS EQUIPMENT

Contact Hours per week: 6 **Subject Code:** B19FSC62
Contact Hours per semester: **75** (45 Theory + 30 Skill) **Credits:** 6 (3 Theory + 3 Skill)

Course Outcome

The student will know about

CO1: The detailed interpretation pattern for the organic substances

CO2: Theoretical aspects of the various instrumental techniques

CO3: Practical aspects and troubleshooting techniques various instrumental techniques

CO4: Knowledge and skills in advanced instrumentation techniques for drug analysis

CO5: Theoretical aspects of hyphenated analytical techniques

CO6: Critical analysis of analytical problem and selection of appropriate analytical tool for the quantification of chemicals and excipients

Section- A: Theory

Unit I **(15 Hrs)**

Microbiologically safe continuous pasteurization of liquid foods, method for the assessment of in-line sterilisability of food processing equipment, Method for the assessment of bacteria-tightness of food processing equipment.

Unit II **(15 Hrs)**

Hygienic equipment design criteria: Hygienic design of closed equipment for the processing of liquid food, Hygienic design of equipment for open processing.

Unit III **(15 Hrs)**

Hygienic pipe couplings, Hygienic design of pumps, homogenisers and dampening devices, Passivation of stainless steel, method for assessing the bacterial impermeability of hydrophobic membrane filters.

Unit IV **(15 Hrs)**

General hygienic design criteria for the safe processing of dry particulate materials, Production and use of food grade lubricants, prevention and control of *Legionella* spp. (incl Legionnaires Disease) in Food Factories.- Food labeling and its importance

Unit V **(15 Hrs)**

Safe Storage and Distribution of Water in Food Factories, Safe and hygienic water treatment in food factories, Packing systems for solid foodstuffs, Air Handling in the Food Industry, Hygienic Engineering of fluid bed and spray dryer plants, Materials of construction for equipment in contact with food.

Section- B: Skill

Text books/ References:

1. Ahvenainen R. 2001. Novel Food Packaging Techniques. CRC.
2. Mahadeviah M & Gowramma R. 1996. Food Packaging Materials. Tata McGraw Hill.
3. Stanley S & Roger CG. 1998. Food Packaging. AVI Publ.
4. AACC. 2004. Storage of Cereal Grains and their Products.
5. Mahajan & Goswami. 2005. Food and Process Engineering.
6. Ojha TP & Michael AM. 2006. Principles of Agricultural Engineering. Jain Brothers.

Section – B: Skill Component

Contact Hours per semester: **30** **Credits:** 3

1. To study and analyze the food processing equipments.
2. To analyze the hygienic properties of food and food producing equipments.
3. To study about hygienic properties of pump, homogenizers and hydrophobic membrane filters.
4. To study the hygienic design criteria of lubricants and materials in food producing factory.
5. To study the safe storage, water treatments and packing system of foodstuffs.

Core 16 - FOOD ANALYSIS AND ADULTERATION TESTING (FAAT)

Contact Hours per week: 5 **Credits:** 5 (3 Theory + 2 Skill)
Contact Hours per semester: **75** **Subject Code:** B19FSC63

Course Outcome:

CO1: Be able to explore the history and basic ideas underlying quality management and have a detailed knowledge of the role of food laws and standards in modern management.
CO2: Demonstrate knowledge of food laws and standards systems, their implementation and the practical steps needed for implementation.
CO3: Know how to control and maintain a quality management system.
CO4: Be able to select and apply appropriate Regulations and Standards and evaluate data generated.

Unit I (15 Hrs)

Definition – History – Food science concept – Basic SI unit of length, volume and weight, temperature, relative density and pH – Physical and chemical properties of food – Boiling point, evaporation, melting point, smoke point, surface tension, osmosis, humidity, freezing point and specific gravity.

Unit II (15 Hrs)

Constituents of food, true solution, suspension, stability of colloidal system type of colloidal system in food – Sol, gel, emulsion, foam health food, ethnic food, organic food, functional food, nutraceuticals, fabricated foods, convenience foods, gm foods and space foods.

Unit III (15 Hrs)

Food additives – Antioxidants, sequestrants, preservatives, nutrient supplement, emulsifiers, stabilizers and thickening agents – Bleaching and maturing agent – Sweeteners, humectants and anti caking agents – Coloring and flavoring substance – Food adulteration: types of adulterants – Intentional and incidental adulterants – Methods of detection.

Unit IV (15 Hrs)

Population and sample methods of sampling – Sensory evaluation methods- Simple random sampling, systematic sampling, stratified random sampling summary measures –

Measures of central tendency – Arithmetic mean, Geometric mean, Harmonic mean, Median and Mode.

Unit V **(15 Hrs)**

Food safety and quality assurance – Definition evaluation of food – Subjective and objective food standards – PFA, BIS, AGMARK, FPO, FAQ and ISI.

Text Books / References:

1. Sree lakshmi, Food science, new age international Publishers, Chennai.
2. Silley, P and S. Forsythe, (1996). Impedance Microbiology- a rapid change for microbiologists- A review. Journal of Applied Bacteriology, 80: 223- 243
3. Dziezak, J. D. 1987. Rapid methods for analysis of foods. Food Technol. 41(7): 56-73.
4. Johnson Green, Perry (2002). Diagnostic systems. In Introduction to Food Biotechnology, CRC Press, Florida.

Section –B Skill component

Contact Hours per semester: **30** **Credits:** 2

1. To study about the physical and chemical properties of food.
2. To analyze the constituents and nutraceuticals of a food.
3. To study about the food additives, adulterants and detective methods.
4. To study about the food sampling methods and sampling measures.
5. To study the objective and subjective food standards in various food products.

Core 17 – LAB: FOOD ADULTERATION TESTING

Contact Hours per week: 5 **Credits:** 3 (3 Skill)
Contact Hours per semester: **75** **Subject Code:** B19FSP61

Course Outcome:

CO1: Analyze and communicate issues relevant to food processing technology and food quality management systems.

CO2: Perform experiments assessing the effect of processing conditions on quality parameters.

CO3: Communicate the science and technology involved in food processing and quality assurance through IT implemented reports and presentations.

CO4: Review and report upon the latest scientific literature pertaining to the areas of Food Processing and Quality Assurance.

Experiments:

1. Detection of Vanaspati in Ghee/Butter
2. Detection of Khesari flour in besan
3. Detection of Metanil yellow in turmeric/colourd sweet products
4. Detection of Argemone oil in edible oil

5. Detection of artificially colour / foreign matter in tea (dust/leaves)
6. Detection of sodium bicarbonate in jaggery.
7. Detection of rhodamine B in sweet potato.

Reference:

A treatise on Analysis of Food, Fats and Oils: A. R. Sen, N.K. Pramanik and S.K. Roy.

Section –B Skill component

Contact Hours per semester: **30** **Credits:** 3

1. To study about the toxic substances are added to food, or some valuable nutrients are removed from food items
2. To analyze the adulterated food is generally defined as impure, unsafe, or unwholesome food.
3. To study about the Food adulteration may be done intentionally or unintentionally.
4. To analyze the traders or manufacturers who want to make a quick economic profit sell adulterated food intentionally.
5. To analyze the unintentional adulteration happens when people are not aware of the rules, regulations and methods of preparing wholesome food.

Core – 18 TRAINING

APPRENTICESHIP AT ANY FOOD INDUSTRY FOR FOOD ANALYSIS AND ADULTERATION TESTING

Contact hours per week: 5 **Credits: 3**

Subject Code : B19FSC64

Course outcomes:

CO1: Students, after successful completion of the course, will be able to narrate and compile the information and data that is used to construct and assess about the company safety and risk management programs.

CO2: Introduction review on instrumentation and predict the company future developments.

ACTIVITIES

Industrial Training Report should be submitted by the students along with attendance record and evaluation sheet to the Department immediately after the completion of the training. The training Food Industries will be evaluated on the basis of the following criteria:

- Regularity in maintenance of the Food Industry.
- Adequacy & quality of information recorded.
- Drawings, sketches and data recorded.
- Thought process and recording techniques used.

PROCESSED FOOD PACKAGING IN MILK PRODUCTS

Contact Hours per week: 2 **Credits:** 4 (2 Theory + 2 Skill)
Subject Code: B19FSC65

Course Outcome:

CO1: The learner will be able to understand the current status of dairying, market milk industry, cooperative movement and operation flood (OF) programme in India.

CO2: The learner will be able to understand the food and nutritive value of milk, milk carbohydrate (Lactose), milk Fat, milk Protein, vitamins & minerals and milk Enzymes.

CO3: The learner will be able to understand the genetic factor and external factor.

CO4: At the end of this module the learner will be able to understand the Milk processing and dairy plant requirements and its management.

Unit I **(15 Hrs)**

Introduction, Importance of Packaging, History of Package Development, Packaging materials, a) Characteristics of basic packaging materials: Paper (paper board, corrugated paper, fibre board). Characteristics of Glass and Metal, Characteristics of Plastics, Foils and laminates, retort pouches. Package forms, Legal requirements of packaging materials and product information

Unit II **(15 Hrs)**

Packaging of milk and dairy products such as pasteurized milk, UHT-sterilized milk, Aseptic packaging, fat rich products-ghee and butter, Coagulated and desiccated indigenous dairy products and their sweet mead, Concentrated and dried milks including baby foods, Packaging of functional dairy/food products

Unit III **(15 Hrs)**

Modern Packaging Techniques; Vacuum Packaging, Modified atmosphere packaging (MAP), Eco-friendly packaging, Principles and methods of package sterilization, Coding and Labelling of Food packages,

Unit IV **(15 Hrs)**

Aseptic Packaging (AP), Scope of AP and pre-requisite conditions for AP, Description of equipment (including aseptic tank) and machines- Micro-processor controlled systems employed for AP, Package conditions and quality assurance aspects of AP

Unit V **(15 Hrs)**

Microbiological aspects of packaging materials, Disposal of waste package materials, Packaging Systems, Hazards from packaging materials in food.

Text Books / References:

1. Outlines of Dairy Chemistry, De S; Oxford.

2. Milk Processing and Technology by A Q Khan, Allahabad Publication.
3. Milk & Milk Processing; Herrington BL; 1948, McGraw-Hill Book Company.
4. Modern Dairy Products, Lampert LH; 1970, Chemical Publishing Company.

Section –B Skill component

Contact Hours per semester: **30** **Credits:** 2

1. To analyze the Visit to shop floor outfit and generate general ideas about the work atmosphere trade.
2. To study about the identify safety signs for danger, warning, caution & personal safety message and hygiene.
3. To analyze the use of personal protective equipment (PPE).
4. To study about the importance of cleanliness, hygiene, sanitation in self life and milk product.
5. To study of familiar Dairy Products and visit to market.
6. To analyze the visit to Milk Co-Op Society.
7. To study of packaging equipments and machinery used in dairy industry.
8. To analyze the collection of various types of packaging material used for the packaging of dairy products.
9. To analyze the Need and importance of packaging methods and storage conditions of dairy products.

INDUSTRIAL VISIT & REPORT

Contact Hours per week **:** Nil **Subject Code :** B19FSIV6

Contact Hours per semester: Nil **Credits** **:** 2 (2 Skill)

Course Outcome:

Students, after successful completion of the course, will be able to

CO1: Industrial visits offer a great source to gain practical knowledge.

CO2: Students can observe and learn as to how theatrical concepts are put to into action, thereby aiding their practical learning.

CO3: Students are exposed to real working environment and shown how things are done in an organization.

Keeping this objective at hand, the department organizes excursion tours cum industrial visits which are within the framework of the curriculum. The excursions and industrial visits are for the academic year students which are relevant to the stream of study of the programme.
