Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Food Processing Technology

Curriculum
For the Academic Year 2018-19

Three Year Degree Programme in B. Voc Food Processing Technology

(Six Semester Pattern)

UG First Year
Semester I and II

Syllabus Approved by Board of Studies in Biotechnology
with effect from June, 2018

Rajarshi Shahu Mahavidyalaya, Latur
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B. Voc. Food Processing and Technology

Introduction: Food processing is the branch of Food Science, where a set of techniques and methods are used to change the raw ingredients into prepared food. It is a procedure in which food is prepared for consumption purposes by humans and animals. Food processing is the transformation of agricultural products into food, or of one form of food into other forms. Food processing includes many forms of processing foods, from grinding grain to make raw flour to home cooking to complex industrial methods used to make convenience foods.

Food processing is a broad term, in itself, which includes processing, preservation, manufacturing, packaging, and canning various food items. In India, Food Processing industry is gaining momentum as the consumer food industry. The modern food processing techniques have prompted the feasibility of the development of the present-day stores.

Food processing industries lead to the highest employment in all industry. So, giving employment indirectly to the almost lakhs of people. Food processing industry in India provides numbers of direct and indirect employment opportunities because it somehow connects the Agriculture to the Manufacturing. In the upcoming years, there will be good demand for healthy, modern food products. India is the second largest producer of food next to China.

It is expected that in upcoming of few years the total food production in India is maybe double and there is an opportunity for the graduates of food processing technicians. The most common areas of employment are Canning, Dairy and Food Processing. Packaging. Frozen Food Refrigeration and Thermo Processing. Some of the sub-sectors of the food processing industry are Fruits & Vegetables Processing. Fisheries, Milk & Milk Products, Meat & Poultry, Alcoholic Beverages & Soft Drinks and Grain processing. You can also employ in the consumer product groups like confectionery, chocolates and cocoa products, Soya-based products, mineral water, high protein foods, soft beverages, alcoholic and non-alcoholic fruit beverages, etc. Taking into consideration of the importance of food processing technology Rajarshi Shahu Mahavidyalaya, Latur (Autonomous), have taken an initiative to introduce a new emerging field as a under graduate Programme in Food technology under the faculty of science. B. Voc Food Processing Technology is a Three-year degree program which is started in the academic year 2018-19.

B. Voc Food processing has been designed on Accordance with the changing scenario in the field of food sciences, its demand and necessary needs. to uplift betterment of society and environment. The designed syllabus of food technology is effectively implemented from 2018. The committee members of BoS in food technology also took the local need and employability of graduate students while framing the syllabus, keeping in view of the guidelines given in the UGC curriculum. The number of objectives is taken into consideration while reforming the syllabus.

Local, Regional and Global relevance of Syllabus:

Curriculum developed and implemented have relevance to the local, regional and global developmental needs which is give back in Programme Specific Outcomes/ Programme Outcomes and Course Outcomes of the Programmes extend by the College.

Global and local focus has slowly shifted to using knowledge of Food Science for innovative technology development that is being used for betterment of human life. Many fundamental and modern research field comes under the Food Processing Technology e.g., Environmental Studies, Food quality and analysis, Introduction to Information Technology and Dairy Technology. etc.

Title of programme: B. Voc. Food Processing Technology

Learning Objectives of the programme:

The main objective is to create technologically skilled minds for the understanding theoretical and practical knowledge essential for implementation from LAB to LAND further it will useful in processing of food. It helps effectively to inculcate scientific temper and social attitude to solve various problems related to wastage of food material.

The member of Board of Studies from various organizations has a strong recommendation for Job oriented syllabus is to be included. Accordingly. The necessary changes have been effectively implemented in Curriculum.

Programme Specific outcomes/ Programme Outcomes:

At the end of the program the student will be able to:

1. Apply knowledge of food science or food processing technology to the society.
2. Processing of raw material to edible food products by using technical knowledge.
3. Apply research-based knowledge and food technological methods to development of new product
4. Entrepreneurship development

B. Voc. Programme:

The B. Voc. Programme has been designed as per National Skill Qualification Framework (NSQF) emphasizing on skill-based education

Duration of Program:

The duration of Program is 3 years with 3 exit points.

Sr. No.	Award	Duration	Core level/ responding/ NSQF
1	Diploma	1 Year	5
2	Advanced Diploma	2 Year	6
3	B. Voc Degree	3 Year	7

Note:

1. After successful completion of second semester (1st Year) a **Diploma** will be awarded to the candidate.

2. After successful completion of fourth semester (2nd Year) an **Advance Diploma** will be awarded to the candidate.

3. After successful completion of six semesters (3rd Year) B. Voc. **Degree** will be awarded to the candidate

Eligibility criteria for admission:

12th class or equivalent from any stream.

Total number of seats:

B. Voc. (Food processing & Technology): 50

Fees for Course: As per University/College rules.

Admission / Selection procedure: Admission by merit through Registration

Teacher's qualifications: As per UGC/University/College rules

Standard of Passing: As per UGC/University/College rules

Nature of question paper with scheme of marking:
As per UGC/University/College rules

List of books recommended: Included in syllabus

Laboratory Equipment's, Instruments, and Measurements etc.:

The department of Food processing and Technology has well equipped laboratories with all necessary and advance instrumentation facility.

Rules and regulations and ordinance if any:
As per UGC/University/College rules

Course Duration: Each theory Course is of 60 contact hours
Medium of the language: English

Rajarshi Shahu Mahavidyalaya, Latur
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Department of Food Processing Technology
Course Structure of B.Voc. Food Processing Technology Second Year

B. Voc. II [Food Processing Technology] Semester I

		Course Code	Course Title	Credits	Hrs / Week	CIA	Ext. Exam	Marks
Semester I	FPT.GE1	U-PRE-206	Practical English-I (General Education)	4	4	40	60	100
	FPT.GE2	U-STM-207	Statistical Methods (General Education)	4	4	40	60	100
	FPT.GE3	U-IIT-208	Introduction to Information Technology (General Education)	4	4	40	60	100
	Total Credit (A)			**12**		**Total Marks (A)**		**300**
	FPT.SCT1	U-IFP-209	Introduction to Food Processing	4	4	40	60	100
	FPT.SCT2	U-IFM-211	Introductory Food Microbiology	4	4	40	60	100
	FPT.SCT3	U-IDT-213	Introductory Dairy Technology	4	4	40	60	100
	FPT.SCP1	U-LAC-210	Lab Course I	2	3	20	30	50
	FPT.SCP2	U-LAC-212	Lab Course II	2	3	20	30	50
	FPT.SCP3	U-LAC-214	Lab Course III	2	3	20	30	50
		Total Credit (B)		**18**		**Total Marks (B)**		**450**
		Total Credit (Sem – I) (A + B)		**30**		**Total Marks (A+B)**		**750**

B.Voc. II [Food Processing Technology] Semester II

		Course Code	Course Title	Credits	Hrs / Wee k	CIA	Ext. Exam	Mar ks
Semester-II	FPT.GE1	U-PRE-305	Practical English II (General Education)	4	4	40	60	100
	FPT.GE2	U-ENS-306	Environmental Studies (General Education)	4	4	40	60	100
	FPT.GE3	U-MAF-307	Mathematical Foundation (General Education)	4	4	40	60	100
	Total Credit (A)			**12**		**Total Marks (A)**		**300**
	FPT.SCT1	U-BFP-308	Basics of Food Packaging	4	4	40	60	100
	FPT.SCT2	U-FQA-310	Food quality and analysis	4	4	40	60	100
	FPT.SCT3	U-FBC-312	Food Biochemistry	4	4	40	60	100
	FPT.SCP1	U-LAC-309	Lab Course IV	2	3	20	30	50
	FPT.SCP2	U-LAC-311	Lab Course V	2	3	20	30	50
	FPT.SCP3	U-LAC-313	Lab Course VI	2	3	20	30	50
		Total Credit (B)		**18**		**Total Marks (B)**		**450**
		Total Credit (Sem-II) (A+ B)		**30**		**Total Mark s (A+B)**		**750**
		Total Credit (Sem I +Sem II)		**60**		**Total Marks (Sem I +Sem II)**		**1500**

Note: GE- General Elective, SCT- Selective course theory and SCP- Selective course practical.

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I Semester

Course Title: Practical English I **Course Code:** U-COE-206

Marks: 100 **Hours:60** **Credit: 04**

Learning Objectives:

- To enhance communication skills by giving adequate exposure in listening and speaking skills and the related sub-skills.
- To create confidence in oral and interpersonal communication by reinforcing the basics of pronunciation.
- To recognize and make use of sentence structures in English
- To understand Written Communication

Course Outcomes:

On the successful completion of the course, student will be able to-

- gain knowledge about Speech and Basics of Grammar.
- acquaint the knowledge about listening style to be the better speaker of English language
- understand the proper style of English for oral communication and can use words and sentences with proper accent and intonation.
- understand the Comprehension and Composition

Unit-I: **(18L)**

Fundamentals of Speech and grammar:

Fundamentals of Speech and Basics of Grammar; Phonetics: Sounds – vowels and Consonants (44). Stress: i) Monosyllabic ii) Disyllabic iii) Polysyllabic; Intonation- i) Falling Tone ii) Rising Tone. Functional Grammar: i) Word Classes ii) Article iii) Preposition iv) phrases v) Clauses vi) Vocabulary.

Unit-II: **(16L)**

Aspects of Communication:

Communication through body language: i) Eye contact. ii) Gesture. iii) Posture; Communication through Technology: i) Email. ii) PPT.

Unit III: **(18L)**

Oral Communication:

Introduction: self, friend and guest. Dialogue: 1) Formal (05) 2) Informal (05). Group Discussion: i) Social Problem ii) Political iii) Academic iv) Sports v) Media. Sports v) Media.

Unit IV: **(08L)**

Written Communication:

Written Communication: Comprehension, Composition, Précis Writing

Recommended Textbooks and References:

1. Balasubramanium, T. 1981.A Textbook of Phonetics for Indian Students. New Delhi: Macmillan.
2. Sethi, J. & P. V. Dhamija, 1997.A Course in Phonetics and Spoken English. New Delhi, Prentice-Hall.
3. Crystal, David. 1985. Rediscover Grammar with David Crystal Longman.
4. Bakshi, R. N.A Course in English Grammar Orient Longman.
5. Dwivedi, R.K. and A. Kumar. Macmillan Foundation English Published by Macmillan India Ltd.
6. Communicative English I, Aruna Prakashan Latur.
7. Communicative English II, Macmillan India Ltd.
8. Krishna Mohan, Meera Banerji 2009.Developing Communication Skills by Macmillan India Ltd.
9. English for Effective Communication. Oxford University Press, 2013

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I Semester

Course Title: Statistical Methods **Course Code:** U-STM- 207

Marks: 100 **Hours:60** **Credit: 04**

Learning Objectives:

- To enhance students' numerical ability Which further be used to qualify national level
- To impart detailed understanding Measures of central frequency.
- To provide the information on Measures of Dispersion.
- To understand the basic information about types of correlations, Regression and their properties

Course Outcomes:

On the successful completion of the course, student will be able to-

- understand the problems on presentation of statistical data.
- acquaint the knowledge about advantages and disadvantages of A.M, G.M and H.M.
- gain knowledge about moments and measures of skewness and Kurtosis.
- understand the two-way frequency table.

Unit-I: **(12L)**

Elementary statistic:

Introduction, classification of data, presentation of statistical data, presentation of statistical data, values of variable and frequency, cumulative frequency distribution, diagrammatic presentation of statistical data, type of graphs, charts and diagrams, Histogram Bar chart, pie chart, frequency polygon, OGIVE

Unit-II: **(16L)**

Measures of central frequency:

Introduction, central tendency of data, mean, properties of arithmetic mean, Short cut method of calculating A.M for discrete series, Calculation of arithmetic mean for grouped frequency, Distribution: continuous series, calculation of arithmetic mean from grouped frequency

distribution with open end class, geometric mean, Harmonic mean, advantages and disadvantages of A.M, G.M and H.M. median quartiles deciles and percentiles, mode.

Unit–III: (15L)

Measures of Dispersion:

Introduction, Dispersion, Range, Mean deviation, standard Deviation, Relative measure of Dispersion, moments and measures of skewness and Kurtosis: Introduction, moments, skewness, Kurtosis

Unit-IV: (17L)

Correlation and Regression:

Introduction, correlation, determination of correlation by Two-way frequency table, scatter diagram, co-variance method or karlpearson's method, Rank method, concurrent deviation method, properties of correlation, coefficient, regression equation of X on Y, Regression coefficients, properties of linear regression.

Recommended Textbooks and References:

1. Khan and Khanum: Fundamentals of Biosatistics (low price Third Revised edition) ;Ukaaz Publication Malick, S.C. and Arora Mathematical Analysis
2. Fundamental of Statistics: S.P.Gupta
3. Mathematics and Statistics By Suranjan Saha (Fifth Edition) New central Book Agency(P) ltd.
4. Jenny Olive – Maths :- a self study Guide – Cambridge Low prices edition
5. R.G. Bartle and D.R. Sherbert (2nd edition)-1992, John Wiley, New York
6. Baily N.T..J statistical methods in Biology

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I Semester

Course Title: Introduction to Information Technology **Course Code:** U-IIT-208

Marks: 100 **Hours:60** **Credit: 04**

Learning Objectives:

- To create awareness about Importance of Computers.
- To provide the information on basic computer organization.
- To inculcate the new approaches to storage fundamentals.
- To know the knowhow about computer arithmetic and basics of internet.

Course Outcomes:

On the successful completion of the course, student will be able to-

- acquaint the knowledge about characteristics of computer.
- gain knowledge about the role of I/O devices in a computer system.
- Understand the number system.
- gain knowledge about the primary storage system of the computer.

Unit I: **(15L)**

Introduction to Computers:

Introduction, Definition, Characteristics of computer, Evolution of Computer, Block Diagram of a computer, Generations of Computer, Classification of Computers, Applications of Computer, Capabilities and limitations of computer.

Unit II: **(15L)**

Basic Computer Organization:

Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch

Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non-Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.

Unit III: (15L)

Storage Fundamentals:

Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks, hard disks, Floppy disks, Optical Disks, Compact Disks, Zip Drive, Flash Drives**.**

Unit IV: (15L)

Computer Arithmetic and Basics of Internet:

Binary, Binary Arithmetic, Number System: Positional & Non-Positional, Binary, Octal, Decimal, Hexadecimal, converting from one number system to another, Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR, History of Internet, Applications of Internet, Web browsers, web Servers, creating email accounts, Managing emails, Search engines

Recommended Textbooks and References:

1. Computer Fundamentals by P. K. Sinha
2. Inside the PC by Peter Nortan
3. Fundamentals of Microprocessor and Microcontrollers by B. Ram

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B. Voc. Food Processing Technology

I Semester

Course Title: Introduction to Food Processing **Course Code:** U-IFP-209

Marks: 100 **Hours:60** **Credit: 04**

Learning Objectives: -

- To inculcate the new approaches to food processing.
- To know the knowhow about primary and secondary processing.
- To understand the information about methods in food processing.
- To provide information about introduction to plant food processing.

Course Outcomes: -

On the successful completion of the course, student will be able to-

- acquaint the knowledge about principles and methods involved in the processing foods.
- acquaint the knowledge about novel techniques and its application in food processing.
- development of skills in the perishable and Non-perishable food processing.
- understand the information about Fruit and vegetable processing.

Unit I: **(15L)**

Introduction to food processing:

Definition; Objectives; Scope of food processing industries; Sectors of food processing industry; Importance and future prospects; Classification of food – perishable and semi perishable food

Unit II: **(15L)**

Primary processing:

Cleaning, Sorting, Grading, Cutting, Seeding, Bleaching, Chilling and freezing Secondary

processing: Slicing, Pulping, Paste, Frying, Chilling and freezing, Milling Common food processing: Cooking, Baking, Frying, Roasting, Toasting, Grilling, Blanching, Extrusion, Pickling, Refining

Unit III: (15L)

Methods in Food Processing:

Microwave processing, Extrusion cooking, Ohmic Heating, Reverse osmosis, Electro dialysis, Ultrafiltration, High pressure processing, Super critical fluid extraction.

Unit IV: (15L)

Brief introduction to plant food processing:

Classification, Fruit and vegetable processing, Cereal and legume processing, Oil seeds processing. Brief introduction to animal food processing: Classification, Milk processing, Meat processing, Fish processing, Poultry processing

Recommended Textbooks and References:

1. Bender, A.E. 1978. Food Processing and Nutrition. Academic Press, London.
2. Potter, N.N., 2002, Food Science, CBS Publishers, ND.
3. Srilakshmi, B., 2001, Food Science, New Age International Pvt. Ltd., ND
4. Ramaswamy H & Marcotte M. 2006 Food Processing: Principles & Applications. Taylor & Francis.
5. Manay, N.S., 2001, Foods: Facts & Principles, Wiley Eastern Ltd., ND.
6. Fellows, P., 2005, Food Processing Technology: Principles & Practices, CRC Press, Woodhead Publishing Ltd., England.

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B. Voc. Food Processing Technology

I Semester

Course Title: Lab Course I **Course Code:** U-LAC-210

Marks: 50 **Credit: 02**

Learning Objectives: -

- To understand the techniques about food processing.
- To inculcate and augment the hands-on expertise on identification and description of common pulses.
- To Understand the working of tools and techniques in fruits processing.
- To provide Hands-on preparation of fried snacks

Course Outcomes: -

On the successful completion of the course, student will be able to-

- develop analytical skills to be employed in industries.
- get hands on approach to conduct experiments to seed germination and processing.
- get hands on approach to conduct experiments to extraction of juice by different methods.
- get hands on approach to conduct experiments to prepare of tomato juices, puree and sauces.

Practicals:

1. Milling of Wheat flour.
2. Identification and description of common pulses.
3. Preparation of fried snacks
4. Preparation of germinated foods.
5. Preparation of chapati, and baked goods (bread, biscuits and cakes)
6. To blanch a seasonal fruit or vegetable
7. Assess the quality of blanching process

8. Extraction of juice by different methods

9. Preparation of tomato juices, puree, sauces, ketchups, soup, paste

10. Preparation of tomato juices, puree, sauces, ketchups, soup, paste

11. Preparation of sauerkraut, gherkins, cauliflower, lime, mango and mixed pickles

12. Use of microwave for food processing

13. Visit to food industry

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B. Voc. Food Processing Technology

I Semester

Course Title: Introductory Food Microbiology **Course Code:** U-IFM-211

Marks: 100 **Hours:60** **Credit: 04**

Learning Objectives:

- To understand the information about significance of microbes in food science.
- To impart knowledge of chemical changes caused by microorganisms.
- To explain the role of principle of electro dialysis and ultra-filtration.
- To understand the information about food borne intoxications.

Course Outcomes:

On the successful completion of the course, student will be able to-

- acquaint the knowledge about principles and methods involved in the Microbiology of perishable as well as Non-perishable foods.
- gain knowledge about the contamination of foods.
- acquaint the knowledge about calculation of shelf life.
- understand the information about food borne viruses.

Unit I: **(15L)**

Introduction to Food Microbiology:

Importance and significance of microbes in food science, Microbial spoilage of foods.

Unit II: **(15L)**

Chemical changes caused by microorganisms:

Changes in nitrogenous organic compounds, non- nitrogenous organic compounds, organic acids, other compounds, lipids, pectic substances, Contamination of foods; Sources of contamination, Genera of bacteria, Maintenance of anaerobic conditions; Asepsis, removal of microorganisms; Intermediate moisture foods; Microbiology of cereal and cereal products. Microbiology of milk

and milk products, meat and meat products, poultry and eggs, fish and other sea foods, Microbiology of fruits and vegetables and canned foods. Microbiology of sugar and sugar products and salts and spices

Unit III: (15L)

Shelf life:

Calculation of shelf life, Shelf-life requirements, deteriorative reactions, accelerated

Testing Simulations of product: Package environment interaction, shelf-life simulation for moisture, oxygen, and light sensitive products. Reverse osmosis, Electro dialysis, Ultra-filtration, High pressure processing, Super critical fluid extraction.

Unit IV: (15L)

Food borne intoxications and infections:

Food borne intoxications and infections, types of food involved, toxicity and symptoms, chemical properties, environmental conditions. Food borne viruses: Polio, hepatitis A and E, noroviruses, rota viruses, prion diseases, types of food involved, toxicity and symptoms

Recommended Textbooks and References:

1. Food Microbiology by Frazier and Dennis
2. Modern Food Microbiology by James M. Jay
3. Basic Food Microbiology by Banawart GJ

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B. Voc. Food Processing Technology

I Semester

Course Title: Lab Course II **Course Code:** U- LAC-212

Marks 50 **Credit: 02**

Learning Objectives: -

- To give the information about introduction to laboratory technology of food Microbiology.
- This course aims to give the basic understanding about current status of food Microbiology.
- To provide Hands-on qualitative analysis of microorganisms from food material.
- To provide Hands-on microbial examination of cereal and cereal products.

Course Outcomes: -

On the successful completion of the course, student will be able to-

- learn the principles and methods involved in the Microbiology of perishable as well as Non-perishable foods.
- get hands on approach in microbial examination of vegetable and fruits.
- get hands on approach in microbial examination of meat and meat products.
- get hands on approach in microbial examination of eggs and poultry.

Practicals:

1. Isolation of bacteria and molds from foods
2. Microbial examination of cereal and cereal products: Identification,isolation and confirmation
3. Microbial examination of vegetable and fruits: Identification, isolation andconfirmation
4. Microbial examination of meat and meat products: Identification, isolationand confirmation
5. Microbial examination of fish and other sea foods: Identification, isolationand confirmation
6. Microbial examination of eggs and poultry: Identification, isolation andconfirmation
7. Microbial examination of milk and milk products: Identification, isolationand confirmation
8. Microbial examination of sugar, salts and spices

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B. Voc. Food Processing Technology

I Semester

Course Title: Introductory Dairy Technology **Course Code:** U-IDT-213

Marks: 100 **Hours:60** **Credit: 04**

Learning Objectives:

- To provide the information on introduction to milk and milk products.
- To develop comprehensive understanding regarding composition and structure of milk.
- To provide adequate knowledge about Market milk industry and milk products.
- To develop comprehensive understanding regarding manufacturing process of flavoured milk and Butter.

Course outcomes:

On the successful completion of the course, student will be able to-

- get knowledge about the types of milk products.
- acquaint knowledge about concept of protein and enzymes.
- understand the various stages of milk processing.
- acquaint knowledge about concept of manufacturing process of flavoured milk.

Unit I: **(15L)**

Introduction to Milk and milk products:

Definition, Production and processing status of milk Types of Milk Products. Physical properties of milk: Color, taste, pH and buffering capacity, refractive index, viscosity, surface tension, freezing, boiling point, specific heat, OR, electrical conductivity

Unit II: **(15L)**

Milk fat:

Composition and structure, and physical properties, crystallization, structure of fat granules, lipolysis, autoxidation, fat constants (saponification value, iodine value, RM value, Polenske

value, peroxide value). Protein and Enzymes: General structure, amphoteric nature, difference between casein and serum protein, different types of casein (acid and rennet), uses of casein, fractionation of protein. Enzymes- catalase, alkaline phosphatase, lipases and proteases.

Unit III: (15L)

Market milk industry and milk products:

Clean and hygienic milk production, Systems of collection of milk, Reception, Platform testing, Various stages of processing: Cooling/ chilling, Filtration, Clarification, Standardization, Homogenization, Pasteurization, Sterilization, Packaging and Storage, Cleaning and Sanitation

Unit IV: (15L)

Milk Products:

Flow diagram for manufacture of following milk products: Flavoured milk, Butter, ice-cream, milk powder.

Recommended Textbooks and References:

1. Aneja RP, Mathur BN, Chandhan RC & Banerjee AK. 2002. Technology of Indian Milk Products. Dairy India Publ., Delhi.
2. De S. 1980. Outlines of Dairy Technology. Oxford Univ. Press Publ., New Delhi.
3. Smit G. 2003. Dairy Processing – Improving Quality. CRC-Woodhead Publ.
4. Walstra P, Geurts TJ, Noomen A, Jellema A & Van Boekel MAJS. 1999. Dairy Technology – Principles of Milk Properties and Processes. Marcel Dekker.

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B. Voc. Food Processing Technology

I Semester

Course Title: Lab Course III **Course Code:** U-LAC-214

Marks: 50 **Credit: 02**

Learning Objectives: -

- To provide Hands-on qualitative and quantitative analysis of milk components.
- To provide Hands-on estimation of Specific Gravity of milk.
- To provide Hands-on estimate moisture content in milk.
- To provide Hands-on estimate skim milk protein by titration method.

Course Outcomes: -

On the successful completion of the course, student will be able to-

- understand the techniques and technologies of testing and processing of milk into various products and by products.
- get hands on approach in physical examination of milk.
- Understand the working of equipment's used in Milk and Milk Product Processing.

Practicals:

1. Physical examination of milk
2. Estimation of Specific Gravity of milk
3. To perform platform tests in milk. (Acidity and COB).
4. To estimate moisture content in milk.
5. To estimate skim milk protein by titration method.
6. To estimate milk fat by Gerber method, SNF and specific gravity of milk.
7. To check the efficiency of sterilization of milk by Turbidity test.
8. To prepare casein and calculate its yield.
9. Preparation of flavored milk
10. Visit to a milk industry

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B. Voc. Food Processing Technology

II Semester

Course Title: Practical English -II **Course Code:** U-COE-305

Marks: 100 **Hours:60** **Credit: 04**

Learning Objectives:

- To provide the information on basic skills of oral communication.
- To impart detailed understanding of effective communication skills.
- To provide adequate knowledge about reading skills.
- To impart detailed understanding of business letter and repot writing.

Course Outcomes:

On the successful completion of the course, student will be able to-

- get knowledge about the listening and speaking skills and the related sub-skills.
- acquaint knowledge about concept of listening style to be the better speaker of English language.
- understand the oral communication skills.
- understand the proper sentence structures making.

Unit I: **(12L)**

Oral Communication:

Telephonic Communication, Intercultural Communication To be assessed through MCQ, short /long answer questions.

Unit II: **(18L)**

Effective Communication Skills:

Interviews, Public Speaking/Speech To be assessed through MCQ, short /long answer questions, Team Work and Communication, Effective Communication, Working Effectively

Unit III: **(15L)**

Reading Skill:

Reading Instructions and guidelines, Rules, Procedures and Service level agreements To be assessed through MCQ, short /long answer questions.

Unit-IV: **(15L)**

Writing Skill:

Notice, Agenda and Minutes, Business letter and repot writing, Memo writing and Resume writing To be assessed through MCQ, short /long answer questions.

Recommended Textbooks and References:

1. Balasubramanium, T. 1981.A Textbook of Phonetics for Indian Students. New Delhi: Macmillan.
2. Sethi, J. & P. V. Dhamija, 1997.A Course in Phonetics and Spoken English. New Delhi, Prentice-Hall.
3. Crystal, David. 1985. Rediscover Grammar with David Crystal Longman.
4. Bakshi, R. N.A Course in English Grammar Orient Longman.
5. Dwivedi, R.K. and A. Kumar.Macmillan Foundation English Published by Macmillan India Ltd.
6. Communicative English I, Aruna Prakashan Latur.
7. Communicative English II, Macmillan India Ltd.
8. Krishna Mohan, Meera Banerji 2009.Developing Communication Skills by Macmillan India Ltd.
9. English for Effective Communication. Oxford University Press, 2013

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B. Voc. Food Processing Technology

II Semester

Course Title: Environmental Studies **Course Code:** U-EVS-306

Marks: 100 **Hours:60** **Credit: 04**

Learning Objectives:

- To create awareness about environment and its related issues.
- To understand the current environmental problems and its probable remedies.
- To impart detailed understanding about solid waste management.
- To provide adequate knowledge about need for a health and safety at work.

Course Outcomes:

On the successful completion of the course, student will be able to-

- explain core concepts about natural resources and associated problems.
- acquaint knowledge about links between human and natural systems. Understand the environmental problems and ways of addressing them.
- understand the Causes, effects and control measures of urban and industrial wastes.
- get knowledge about the skills required to maintain a health and safety at work.

Unit I: **(15L)**

Introduction to Natural Resources: Environment: Definition, Scope, Importance, Need for public awareness. Natural Resources: Renewable and Non-Renewable resources, Natural resources and associated problems.

Energy Resources: Needs, Types of energy and quantities available, growing energy needs, renewable and non-renewable energy resources, Use of alternate energy sources.

Water Resources: Uses of water, Over utilization of surface and ground water, Floods, Draughts, Dams: Benefits and problems.

Agricultural Resources: Changes caused by agriculture and overgrazing, Effects of modern agriculture, Fertilizer and pesticide problems, Water logging, Salinity.

Land Resources: Land as a resource, Effects on productivity, Man induced landslides, Soil erosion, Desertification

Unit II: (15L)

Ecosystems and Environmental pollution and its mitigation:

Concepts of an ecosystems, Structure and function of an ecosystem, Producers, Consumers, and Decomposers, Energy flow in an ecosystem, Ecological succession, Food chain, Food webs, Ecological pyramids, Introduction, Types, Characteristic features & Structure of following ecosystems Forest ecosystem, Grassland ecosystem, Desert ecosystem Aquatic ecosystem (Ponds, Streams, Lakes, Rivers, Oceans, Estuaries). SSC/N9005 15 Definition of Pollution; Causes, effects and control measures of (i) Air pollution, (ii) Water pollution, (iii)Soil pollution, (iv) Noise pollution.

Unit III: (15L)

Solid waste management:

Causes, effects and control measures of urban and industrial wastes, nuclear hazards, Environmental hazards and their mitigation, Role of an individual in pollution and abatement.

Unit V: (15L)

Maintain a healthy, safe and secure working environment:

Need For a Health and Safety at Work; Security Analyst's role; Emergency Situations; Skills Required to Maintain a Health and Safety at Work.

Recommended Textbooks and References:

1) Introduction to Environment - M. N. Sastri, Himalaya Publishing House, New Delhi.
2) Environmental Studies - H. Kaur, Pragati Prakashan, Meerut
3) Environmental Studies - ErachBharucha, University press Pvt. Ltd., Hyderabad
4) Environmental Studies - S. V. S. Rana, Rastogi Publication, Meerut
5) Environmental Studies - C. P. Kaushik, New age international Ltd. New Delhi
6) Environmental Studies - Arumugam, Saras Publication Kanyakumari

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B. Voc. Food Processing Technology

II Semester

Course Title: Mathematical Foundation **Course Code:** U-MAF-307

Marks 100 **Hours:60** **Credit: 04**

Learning Objectives:

- To provide the information on fundamentals of mathematics.
- To impart detailed understanding of determinants.
- To develop comprehensive understanding regarding Vectors & Matrices.
- To provide adequate knowledge about permutation & combination.

Course Outcomes:

On the successful completion of the course, student will be able to-

- get knowledge about the understanding of set theory, vectors and matrices in applied science.
- understand the minors & co-factors of the elements of the determinant.
- acquaint knowledge about concept of vectors & matrices.
- get knowledge about the Binomial theorem.

Unit I: **(15L)**

Set Theory:

Introduction, Definition of set, Representation of set, ϵ-notation, Types of sets, Equality of sets, Subset of set, Union of sets, Intersection of sets, Disjoint sets, Universal set, Complement of set, Difference of sets, Venn diagram, Application of sets.

Unit II: **(15L)**

Determinants:

Formation of determinants, Minors & Co-factors of the elements of the determinant, Properties

of determinant, Application of determinants in Business problems.

Unit-III: (15L)

Vectors & Matrices:

Vectors, Matrices, Difference between matrices and determinants, Types of matrices, Equality of matrices, Matrix addition- multiplication, Scalar multiplication, System Of Linear Equations, Transpose, Adjoint, Inverse of a square matrix, Solution of linear equation by matrix method, Elementary transformation, Solution of linear equation by Gauss-Jordan Elimination method, Rank of matrix, Linear dependence & independence of vectors, Linear Combination, Application of matrices in solving problems relating to business and
economics, Application of matrix algebra input output analysis.

Unit IV: (15L)

Permutation & Combination:

Definition, Properties, Theorems, Problems, Binomial theorem, independent term, Middle term, Theories.

Recommended Textbooks and References:

1. A Textbook of Business Mathematics -Padma lochan Hazarika (S. Chand)
2. Basic Business Mathematics & Statistics -S. Saha-New central book agency (P) Ltd

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B. Voc. Food Processing Technology

II Semester

Course Title: Basics of Food Packaging **Course Code:** U-BFP-308

Marks: 100 **Hours:60** **Credit: 04**

Learning objectives:

- To provide the information on introduction of food packaging.
- To impart detailed understanding of Food packaging systems.
- To develop comprehensive understanding regarding Introduction of packaging materials.
- To provide adequate knowledge about Packaging Technology.

Course outcomes:

On the successful completion of the course, student will be able to-

- learn the components, preparations and importance of food packaging.
- get knowledge about the advances in food packaging.
- acquaint knowledge about concept of Types of packaging materials their characteristics.
- understand the Biodegradable plastics.

Unit I: **(15L)**

Introduction to food packaging:

Introduction of Food packaging, need of food packaging, Role of packaging in extending shelf life of foods, Designing of package materials, Testing of package materials, Testing of package performance, Principles in the development of safe and protective packing, Safety assessment of food packaging materials

Unit II: **(15L)**

Food packaging systems:

Product characteristics and package requirements, Introduction of food packaging system,

Different forms of packaging, Rigid, semi-rigid, flexible forms of packaging, Different packaging system for-Dehydrated foods, Frozen foods, Dairy products, Fresh fruits, Vegetables, Meat, Poultry, Sea foods.

Unit III: (15L)

Introduction of packaging materials:

Types of packaging materials their characteristics and uses, Use of paper as a packaging material-Pulping, Fibrillation, Beating, Types of papers, Testing methods. Use of glass as a packaging material- Composition, Properties, Types, Methods of bottle making. Use of metals as a packaging material- Tinplate containers, Tinning process, Components of tinplate, Tin free steel (TFS), Types of cans, Aluminum containers, Lacquers. Use of plastics as a packaging material-Types of plastics, Plastic films, laminated plastic materials, Co-extrusion.

Unit IV: (15L)

Equipments of Packaging:

Package accessories and advances in Packaging Technology-Introduction, Active packaging, Modified atmosphere packaging, Aseptic packaging, Packages for microwave ovens, Biodegradable plastics, Edible gums, Coatings. Packaging equipment and machinery- Vacuum packaging machine, CA & MA packaging machine, Gas packaging machine, Seal and shrink-packaging machine. Form & fill sealing machine, Aseptic packaging systems, Retort pouches, bottling machines, Carton making machines, Package printing machines.

Recommended Textbooks and References:

1. Gordon L. Robertson, Food Packaging: Principles and Practice, Third Edition,2013.
2. Gordon L. Robertson, Food Packaging and Shelf Life: A Practical Guide,2010.
3. Ruben Hernandez, Susan E. MSelke, John Culter, John D. Culter, Plastics Packaging: Properties, Processing, Applications, and Regulations,2000.
4. Walter Soroka, Fundamentals of Packaging Technology-Fourth Edition
5. Paine FA and Paine HY, A Handbook of Food Packaging, Blackie Academic and Professional, 1992.

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B. Voc. Food Processing Technology

II Semester

Course Title: Lab Course IV **Course Code:** U-LAC-309

Marks: 50 **Credit: 02**

Learning objectives:

- To provide Hands-on Identification of different types of packaging materials.
- To provide Hands-on determination of tensile strength of given material.
- To provide Hands-on determination of tearing strength of paper.
- To provide Hands-on measurement of thickness of packaging materials.

Course outcomes:

On the successful completion of the course, student will be able to-

- understand packaging materials and its importance in food Industry
- adapt and utilize packaging materials for right application in Food Industry.
- understand the testing methods for packaging material to assure quality

Practicals:

1. Identification of different types of packaging and packaging materials
2. Determination of tensile strength of given material
3. To perform different destructive tests for glass containers
4. To perform non-destructive tests for glass containers
5. Determination of tearing strength of paper
6. Measurement of thickness of packaging materials
7. To perform grease-resistance test in plastic pouches
8. Determination of bursting strength of packaging material
9. Determination of water-vapour transmission rate

10. Demonstration of can-seaming operation

11. Testing of chemical resistance of packaging materials

12. Edible packaging of Food Samples

13. Determination of drop test of food package

14. Visit to relevant industries

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B. Voc. Food Processing Technology

II Semester

Course Title: Food Quality and Analysis **Course Code:** U-FQA-310

Marks 100 **Hours:60** **Credit: 04**

Learning objectives:

- To provide the information on Food Hazards.
- To impart detailed understanding of Sampling & analysis of Foods.
- To provide adequate knowledge about Food Hazards of Biological Origin.
- To develop comprehensive understanding regarding Hygiene and Sanitation in Food Service Establishments.

Course outcomes:

On the successful completion of the course, student will be able to-

- get knowledge about the different hazards in food chain and their control.
- acquaint knowledge about concept of Chemical Analysis of food.
- understand the Food borne pathogens.
- understand the Food Safety Measures.

Unit I: **(15L)**

Food Hazards of Physical and Chemical Origin:

Definition, Types of hazards, biological, chemical (naturally occurring, environmental and intentionally added), physical hazards, Impact on health, Factors affecting Food Safety. Importance of Safe Foods.

Unit II: **(15L)**

Analysis of Food:

Sampling & analysis of Foods, Sampling – Objectives, Guidelines, Methods, Chemical Analysis: Moisture, Fat, Protein, Crude fibre; Microbial: DMC, Coliform determination.

Unit III: **(15L)**

Food Hazards of Biological Origin:

Introduction, Indicator Organisms, Food borne pathogens: bacteria, Food borne pathogens: viruses, Food borne pathogens: eukaryotes, Seafood and Shell fish poisoning, Mycotoxins.

Unit IV: **(15L)**

Hygiene and Sanitation in Food Service Establishments:

Introduction, Sources of contamination, Control methods using physical and chemical agents, Waste Disposal, Pest and Rodent Control, Personnel Hygiene, Food Safety Measures

Recommended Textbooks and References:

1. Handbook of food toxicology by S. S. Deshpande
2. The food safety information handbook by Cynthia A. Robert, 2009
3. Nutritional and safety aspects of food processing by Tannenbaum SR
4. Microbiological safety of food by Hobbs BC, 1973
5. Food Safety Handbook by Ronald H. Schmidt, Gary E. Rodrick
6. 1. Lawley, R., Curtis L. and Davis,J. The Food Safety Hazard Guidebook, RSC publishing, 2004
7. De Vries. Food Safety and Toxicity, CRC, New York, 1997
8. Marriott, Norman G. Principles of Food Sanitation, AVI, New York, 1985
9. Forsythe, S J. Microbiology of Safe Food, Blackwell Science, Oxford, 2000 &Sons; USA, 1987

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B. Voc. Food Processing Technology

II Semester

Course Title: Lab Course V **Course Code: U-LAC-311**

Marks 50 **Credit: 02**

Learning objectives:

- To provide Hands-on detection of adulteration in food products.
- To provide Hands-on quantitative analysis of food.
- To evaluate different treatment methods for sensory evaluation.
- To provide Hands-on detection of non-permitted food additives.

Course outcomes:

On the successful completion of the course, student will be able to-

- get hands on approach to conduct experiments to processing and packaging technique.
- understand about food laws and labeling.
- to apply the HACCP for food production.
- get hands on approach to conduct experiments to determine Efficacy study of hand sanitizers.

Practicals:

1. Proximate analysis of marketed food products including Moisture, Ash,Crude Fat, Crude Protein, Carbohydrates
2. Detection of adulteration in food products viz. milk, ghee, honey, spices,
3. Detection of adulteration in pulses, oils, sweets etc.
4. Detection of non-permitted food additives in market food samples
5. Cut-out analysis of canned food
6. Test of sensory evaluation
7. Hazard analysis of packed food
8. Coliform determination from water

9. Efficacy of food grade disinfectant
10. Efficacy study of hand sanitizers

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B. Voc. Food Processing Technology

II Semester

Course Title: Food Biochemistry **Course Code:** U-FBC-312

Marks 100 **Hours:60** **Credit: 04**

Learning objectives:

- To provide comprehensive background of food chemistry.
- To impart detailed understanding of Proteins and protein structures.
- To provide adequate knowledge about Physico chemical properties of fat.
- To impart detailed understanding of Minerals and Vitamins.

Course outcomes:

On the successful completion of the course, student will be able to-

- understand the Classification of Carbohydrates
- acquaint knowledge about Essential amino acids.
- get the knowledge about Digestion & absorption of lipids.
- acquaint knowledge about Nutritive values of foods.

Unit I **(15 L)**

Introduction to Food Biochemistry:

Introduction to different food groups and importance of food chemistry; Water in foods and its properties. Carbohydrate: Sources of food carbohydrates; Physico-chemical and functional properties; chemistry and structure of homosachharides and heterosachharides.

Unit II: **(15 L)**

Amino acids and Proteins:

Proteins and protein structures; Essential amino acids, Proteins: Sources and physico-chemical and functional properties; Metabolism of proteins (digestion and absorption); Nitrogen balance and nitrogen pool Purification of proteins; Common food proteins.

Unit II: **(15 L)**

Lipids and Fats:

Sources and physico chemical and functional properties; PUFA [Poly- unsaturated Fatty Acids] hydrogenation and rancidity; Saponification number, iodine value, Reichert-Meissl number, Polenske value; Lipids of biological importance like cholesterol and phospholipids. Digestion & absorption of lipids.

Unit IV: **(15 L)**

Minerals and Vitamins:

Sources and structures of minerals & vitamins; Effectof processing and storage of vitamins; Pro vitamins A & D; Vitamins as antioxidants. Food Pigments & Flavouring Agents: Importance, types and sources of pigments – their changes during processing and storages.

Introduction to human nutrition; Nutritive values of foods; Basal metabolic rate; Techniques for assessment of human nutrition, Dietary requirements and deficiency diseases of different nutrients.

Recommended Textbooks and References:

1. Lehninger, Nelson & Cox, Principle of Biochemistry, CBS Publication
2. Modern Experimental Biochemistry, Boyer, Pearson Education
3. Lubert stryer, Biochemistry, Freeman & Co, N.Y.
4. Voet & Voet, Fundamentals of Biochemistry, Jonh Willey & Sons
5. HamesNutrition and dietetics by Rose

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B. Voc. Food Processing Technology

II Semester

Course Title: Lab Course VI **Course Code:** U-LAC-313

Marks 50 **Credit: 02**

Learning objectives:

- To provide Hands-on Qualitative analysis of carbohydrates.
- To provide Hands-on determination of moisture in food sample.
- To provide Hands-on determination of protein in food sample.
- To provide Hands-on determination of crude fat in food sample.

Course outcomes:

On the successful completion of the course, student will be able to-

- get hands on approach to conduct experiments to determine total, non-reducing and reducing sugars
- get hands on approach to conduct experiments to determine Vitamin C in food sample.
- get hands on approach to conduct experiments on estimation of amino acids.

Practicals

1. Determination of Moisture in food sample
2. Determination of Protein in food sample
3. Determination of Crude Fat in food sample
4. Determination of Acidity and pH in food sample/beverages
5. Determination of total, non-reducing and reducing sugars
6. Determination of Vitamin C in food sample
7. Separation of sugars by Ascending Paper Chromatography
8. Separation of amino acids by Thin Layer Chromatography
9. Determination of BOD5 and COD of a sample of waste water
10. Preparation of cell-free extract: Bacterial cell by sonication, Chicken liver by homogenization

Summary of cross cutting issues:

Food Processing Technology includes a set of physical, chemical, or microbiological methods and techniques used to transmute/transform raw ingredients into food and its transformation into other food processing firms. As such, it ranges in complexity and Food processing includes traditional like heat treatment, fermentation, pickling, smoking, drying, curing and modern methods like pasteurization, ultra-heat treatment, high pressure processing, or modified atmosphere packaging. Food Processing Technology covers various topics such as Food Processing, Food Technology, Food Safety, Food Industry, Food Allergy, Food Microbiology, Food Biotechnology, Food Allergy, Food Addiction, Food Fortification, Food Nanotechnology, etc. It is expected to cover some critical issues in the designed curriculum for the development of Students. In our syllabus we tried to include following cross cutting issues.

Cross-cutting issues relevant to Professional Ethics, Gender, Environment and Sustainability, and Human Values into the curriculum:

Sr. No.	Course Name	Code	Relevant to Professional Ethics	Description
1.	Introduction to Information Technology	U-IIT-208	Professional Ethics	Students can understand the computer technology.
2.	Introduction to Food Processing	U-IFP-209	Professional Ethics	Students can get jobs in different food industries
3.	Introductory Food Microbiology	U-IFM-211	Professional Ethics	Students will get jobs in the Quality control lab.
4.	Introductory Dairy Technology	U-IDT-213	Professional Ethics	Students will get jobs in different dairy industries.
5.	Basics of Food Packaging	U-BFP-308	Professional Ethics	Students will get jobs in different food packaging industries
6.	Food quality and analysis	U-FQA-310	Professional Ethics	Students will get jobs in the Quality control lab.
7.	Food Biochemistry	U-FBC-312	Professional Ethics	Students will get jobs in the Quality control lab.

Sr. No	Course Name	Code	Relevant to	Description
1.	Environmental Studies	U-ENS-306	Environment and Sustainability	Students will be able to fulfill food security issues.

Curricula developed and implemented have relevance to the local, national, regional and global developmental needs:

Sr. No.	Course name	Course code	Linkage with Local/National/Regional/Global development
1.	Introduction to Food Processing	U-IFP-209	Skill in food processing.
2.	Introductory Food Microbiology	U-IFM-211	Skill in food microbiology lab.
3.	Introductory Dairy Technology	U-IDT-213	Research in dairy lab.
4.	Basics of Food Packaging	U-BFP-308	Skill in food packaging.
5.	Food quality and analysis	U-FQA-310	QC and QA
6.	Food Biochemistry	U-FBC-312	Skill in varies techniques in biochemistry.

Courses having focus on employability/ entrepreneurship/ skill development

Sr. No.	Name of the Course	Course Code	Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development			Year of introduction
			Employability	Entrepreneurship	Skill development	
1.	Statistical Methods	U-STM-207			Students will be aware of mathematical problems in research.	2018-19
2.	Introduction to Information Technology	U-IIT-208	Students can get jobs in different computer lab.	Start- up computer lab.	Students can understand the computer technology.	2018-19
3.	Introduction to Food Processing	U-IFP-209	Students can get jobs in different food industries.		Different skills are developed for processing of food.	2018-19
4.	Introductory Food Microbiology	U-IFM-211	Students will get knowledge about techniques in	Students can start their own	Students will learn about different processes involved in food	2018-19

			food microbiology.	food testing lab.	microbiology.	
5.	Introductory Dairy Technology	U-IDT-213	Students will get jobs in different dairy industries.		Students will learn the chemical composition of milk and its characteristics.	2018-19
6.	Environmental Studies	U-ENS-306	Students will get information about environmental issues.		Students will learn about environmental issues and their solutions.	2018-19
7.	Mathematical Foundation	U-MAF-307			Understand the basic concepts of central tendency.	2018-19
8.	Basics of Food Packaging	U-BFP-308	Students will get jobs in different food packaging industries.	Start up new food packaging industry.	Students will learn the principles and methods involved in the food packaging.	2018-19
9.	Food quality and analysis	U-FQA-310	Students will get job in Quality Control unit of different food industries.	This course Knowledge will help students to open the business about ensuring product quality.	Practical Knowledge will help to develop different skills for checking the quality of product.	2018-19
10.	Food Biochemistry	U-FBC-312	Students will get jobs in the biochemistry lab.		Students will learn about different techniques used in food biochemistry. Students will develop the skill of techniques.	2018-19