Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Food Processing Technology

Curriculum
For the Academic Year 2022-23

Three Year Degree Programme in B. Voc Food Processing Technology

(Six Semester Pattern)

UG Second Year
Semester III and IV

Syllabus Approved by Board of Studies in Biotechnology with effect from June, 2022

Rajarshi Shahu Mahavidyalaya, Latur
(Autonomous)
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., Introduction to Cereal and Legume Processing, Fruits and Vegetables Processing, Principles of food Preservation 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 III

		Course Code	Course Title	Credits	Hrs / Week	CIA	Ext. Exam	Marks
Semester-III	FPT.GE1	U-SFS-417	Soft Skills I (General Education)	4	4	40	60	100
	FPT.GE2	U-BUM-418	Business Mathematics (General Education)	4	4	40	60	100
	FPT.GE3	U-FDA-419	Food Additives (General Education)	4	4	40	60	100
			Total Credit (A)	**12**				
	FPT.SCT1	U-PFP-420	Principles of food Preservation	4	4	40	60	100
	FPT.SCT2	U-ICL-422	Introduction to Cereal and Legume Processing	4	4	40	60	100
	FPT.SCT3	U-FFN-424	Fundamentals of Food and Nutrition	4	4	40	60	100
	FPT.SCP1	U-LAC-421	Lab Course VII	2	3	20	30	50
	FPT.SCP2	U-LAC-423	Lab Course -VIII	2	3	20	30	50
	FPT.SCP3	U-LAC-425	Lab Course-IX	2	3	20	30	50
			Total Credit (B)	**18**		**Total Marks (B)**		**450**
			Total Credit (Sem-III) (A + B)	**30**		**Total Marks (A+B)**		**750**
								750

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

		Course Code	Course Title	Credits	Hrs / Week	CIA	Ext. Exam	Marks
Semester – IV	FPT.GE1	U-SFS-515	Soft Skills-II (General Education)	4	4	40	60	100
	FPT.GE2	U-IIS-516	Food Business Management (General Education)	4	4	40	60	100
	FPT.GE3	U-ALR-517	Aptitude and Logical Reasoning-I (General Education)	4	4	40	60	100
			Total Credit (A)	**12**				
	FPT.SCT1	U-FSC-518	Food Spoilage and Control	4	4	40	60	100
	FPT.SCT2	U-QCR-519	Quality Control and regulations	4	4	40	60	100
	FPT.SCT3	U-FVP-520	Fruits and vegetable Processing	4	4	40	60	100
	FPT.SCP1	U -LAC-521	Lab Course - X	2	2	20	30	50
	FPT.SCP2	U-LAC-522	Lab Course- XI	2	2	20	30	50
	FPT.SCP3	U-LAC-523	Lab Course - XII	2	2	20	30	50
			Total Credit (B)	**18**		**Total Marks (B)**		**450**
			Total Credit (Sem-IV) (A + B)	**30**		**Total Marks (A+B)**		**750**
			Total Credit (Sem-III + Sem IV)	**60**				**1500**
	Note: GE- General Elective, SCT- Selective course theory and SCP- Selective course practical.							

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B. Voc. Food Processing Technology

III Semester

Course Title: Soft Skills I **Course Code:** U-SFS-417

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

Learning Objectives:

- To understand speaking, listening Skills and the related sub-skills to crack interview.
- To provide the information on how to write agenda and minutes for Business letter.
- To know the knowledge about nature and scope of soft skills.
- To inculcate the new approaches to develop effective teamwork Skills.

Course Outcomes:

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

- aware of listening and speaking skills as well as focus a lot on listening style to be the better speaker of English language.
- acquaint the knowledge about how to write memo, resume and curriculum Vitae.
- gain knowledge about the acquiring and advantages of soft skills.
- gain the Problem-solving Skills and they will speak English by using proper sentence structures.

Unit I: **(15L)**

Speaking and Listening Skill

Speaking and Listening Skills (Activity Based): Introduction (self, friends, guest and colleagues), Making Request, Oral Presentation, Interviews practice Listening- Interview, Radio Talk and Story To be assessed through MCQ, short /long answer questions.

Unit II: **(15L)**

Effective Writing Skill:

Effective Writing Skill; Work place Instructions and guidelines (10 samples collection) Notice, Agenda and Minutes (10 samples collection) Business letter, Memo, Resume and Curriculum Vitae (10 samples) Conducting Meeting To be assessed through MCQ, short /long answer questions.

Unit III: **(15L)**

Introduction to Soft Skills:

Definition of Soft skills, need of soft skills, Nature and scope of soft skills, Acquiring and Advantages of soft skills. To be assessed through MCQ, short /long answer questions.

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

Soft Skills:

Critical, Creative and Positive thinking, Self-Management, Problem-solving Skills, Effective teamwork Skills, To be assessed through MCQ, short /long answer questions.

Recommended Textbooks and References:

1. Seven habits of highly effective peoples – Stephen Covey
2. You can heal your life – Dr. Lueis Hey
3. How to win and influence people – Dell Karnogi
4. Granthawali - Swami Vivekananda

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B. Voc. Food Processing Technology
III Semester

Course Title: Business Mathematics **Course Code: U-BUM-418**

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

Learning objectives

- To understand the knowledge of representation of set and their types.
- To solve the problems on probability.
- To explain the role of representation of data using frequency distribution diagram.
- To know the knowledge about R-Software.

Course Outcomes:

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

- acquaint the knowledge about Venn diagram Determinants and application of determinants in business problems.
- gain knowledge about the principle of mathematical induction.
- understand the knowledge about measure of central tendency.
- understand various software which is helpful in research work.

Unit I: **(15L)**

Fundamental Mathematics:

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 Determinants, Minors & Co-factors of the elements of the determinant, Properties of determinant, Application of determinants in Business problems.

Unit II: **(15L)**

Probability:

Probability: Introduction, basic terminology, types of events, Conditional probability, Bayes theorem, Addition theorem, multiplication theorem. Principle mathematical induction, basics distribution: Binomial distribution, Bernoulli distribution, Normal distribution & Passion distribution.

Unit III: **(15L)**

Biostatistics:

Various types of data (Raw data, grouped data), Representation of data using frequency distribution diagram (Simple/ Multiple/ Subdivided bar diagram, Pie diagram), Graphs: Bar graphs, difference graph, line graph, Histogram, polygon, curve sampling methods. Measure of central tendency: Mean, Median, Mode. Measures of dispersion: Variance, Standard deviation, Coefficient of variance.

Unit IV: **(15L)**

Computer:

Introduction of R-Software: Basics, why R & installation procedure, help, demonstration, examples, packages & libraries, command line, data editor & R studio.

Basics of Calculation: Basics & R as a Calculator, built in functions and assignments, Functions & Matrices, Matrix Operations, Missing data & logical operators, conditional executions, loops, Sequences.

Recommended Textbooks and References:

1. A Textbook of Business Mathematics -Padmalochan Hazarika (S. Chand)
2. Basic Business Mathematics & Statistics -S. Saha -New central book agency(P) Ltd
3. Mathematics & Statistics -S. Saha-New central book agency (P) Ltd
4. R Software for Beginners Mr. A. J. Waghmare & Mr. M. S. Wavare

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B. Voc. Food Processing Technology

III Semester

Course Title: Food additives **Course Code: U-FOA-419**

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

Learning Objectives

- To help in understanding the basics of food additives.
- To acquire knowledge on naturally occurring food additives.
- To study and understand the taste and flavouring agents in food material.
- To provide information antioxidants & chelating agents.

Course Outcomes:

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

- acquaint the knowledge about intentional & unintentional food additives.
- understand the process of classification of food colorants and its chemical nature.
- gain the knowledge about classification of natural & synthetic flavours.
- To provide information on artificial sweeteners & non-nutritive sweeteners.

Unit I: **(15L)**

Introduction to Food Additives:

Scope of food additives; Functions and uses of Food Additives; Classification- Intentional & Unintentional Food additives; Types of food additives. Toxicology and Safety Evaluation of Food Additives: Effects of Food Additives; Food Additives generally recognized as safe (GRAS).

Unit II: **(15L)**

Naturally occurring food additives:

Classification; Health Implications; Role in Foods Acidulants: Introduction; Different acidulants; Role in food processing. Food colorants: Introduction; Natural & Synthetic food colorants; Classification of Food colorants; Chemical nature; Impact on health.

Unit III: **(15L)**

Pigments:

Importance; Classification: Utilization as food colour. Taste and Flavouring agents: Introduction; Classification of flavours- natural & synthetic; Flavour enhancer/ Potentatior; Importance of taste and flavours; Role of flavouring agents in food processing. Food Preservatives: Introduction; Classification- Natural & chemical preservatives; Role in Food processing.

Unit IV: **(15L)**

Antioxidants & chelating agents:

Introduction; Role in foods; Types of antioxidants -natural & synthetic. Chelating agents- Naturally & synthetic; Applications of antioxidants and chelating agents Stabilizers, thickeners and Emulsifiers: Introduction; Types; Applications in food processing; Sweeteners: Introduction; Classification- Artificial sweeteners & Non-nutritive sweeteners; Health implications; Role in food processing.

Recommended Textbooks and References:

1. Natural Additives in Foods 1st ed. 2023 Edition by German Ayala Valencia.
2. Food Chemistry- Vol-I - Fennama O.R.
3. Food Chemistry - Mayer L.H.

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B. Voc. Food Processing Technology

III Semester

Course Title: Principles of food preservation **Course Code: U-PFP-420**

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

Learning Objectives:

- To create awareness about historical developments of food preservation.
- To provide information about types of dryers.
- To understand the types of preservatives and their uses.
- To study recent methods in food preservation.

Course Outcomes:

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

- acquaint the knowledge about microbial, physical, chemical and miscellaneous.
- understand the principle of intermediate moisture foods.
- gain the knowledge about various equipments and techniques related to food storage.
- get the knowledge about recent Methods in Food Preservation.

Unit I: **(12L)**

Introduction to food preservatives:

Introduction and historical developments of food preservation. Food Spoilage: Microbial, physical, chemical and miscellaneous. Heat Preservation and Processing: canning of foods, canning process, equipment, effect on food, aseptic process.

Unit II: **(18L)**

Dehydration:

water activity, drying process, types of dryers, dehydration effect in food. Concentration: Technology of concentration, equipment, process, and changes in food during concentration. Intermediate Moisture (IM) Foods: Principles, characteristics, advantages

Unit III: **(15L)**

Storage and it's type:

Requirements of refrigeration storage, changes in foods during refrigeration storage. Freezing and Frozen Storage: factors determining freezing rate, types of freezers, and changes in food

during freezing. Ionizing Radiation: Source; equipment; mechanism of preservation, effect on food. Microwaves: equipment and its effect on food. Household Preservation Methods: Salt curing, oiling and smoking. Chemical Preservation: types, uses and effects of class I and class II preservatives in foods.

Unit-IV **(15L)**

Technology in food preservation:

Recent Methods in Food Preservation: Pulse electric, Ultrasound, Infrared, High pressure, Ohmic heating, Hurdle technology, Nanotechnology in food processing.

Recommended Textbooks and References:

1. N.P. Norman and H.H. Joseph, 'Food Science', CBS Publishers & Distributors Pvt. Ltd., New Delhi, India.
2. W.C. Frazier and D.C. Westhoff, 'Food Microbiology', Tata McGraw Hill Publishing Company Ltd., New Delhi, India.
3. M. Kalia and S. Sangita, 'Food Preservation and Processing', Kalyani Publishers, New Delhi, India.
4. B. Sivasankar, 'Food Processing and Preservation', Prentice Hall of India Pvt. Ltd., New Delhi, India.
5. J.N. Desrosier and N.W. Desrosier, 'Technology of Food Preservation', CBS Publishers & Distributors Pvt. Ltd., New Delhi, India.
6. P. Fellows, 'Food Process Technology: Principles and Technology', CRC Press, Cambridge, England.
7. N. Khetarpaul, 'Food Processing and Preservation', Daya Publishing House, New Delhi, India.

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B. Voc. Food Processing Technology
III Semester

Course Title: Lab Course VII **Course Code: U-LAC-421**

Marks: 50 **Credit: 02**

Learning Objectives:

- To provide Hands-on lab equipments.
- To provide Hands-on identification of spoiled on food material.
- To prepare product by using Salt as preservative.
- To prepare product by using Sugar as a preservative.

Course Outcomes:

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

- learn about different methods of preservation and their principles.
- get hands on approach to prepare food material using various preservatives.
- get hands on approach to blanching and canning process of food material.

Practicals:

1) Identification of lab equipment
2) Identification of class I & class II Preservatives.
3) Identification of spoiled food.
4) Preparation of product by using Salt as preservative (any two)
5) Preparation of product by using Sugar as a preservative (any two)
6) Preparation of product by using Oil as preservative (any two).
7) Preparation of product by using Chemical Preservative (any two)
8) Visit to the food preservation unit.
9) Visit to the irradiation unit.
10) Drying of fruits (any two)
11) Drying of Vegetable (any two)
12) Drying of seeds (any two)
13) Blanching of Vegetables.
14) Steaming of Vegetables.
15) Preservation of fruits by Syruping.

16) Introduction of freezing equipment

17) Visit to cold storage unit.

19) Visit to observe modern techniques of food preservation / drying unit.

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B. Voc. Food Processing Technology

III Semester

Course Title: Introduction to Cereal and Legume Processing **Course code:** U-ICL-422

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

Learning objectives

- To create awareness about the processing of major cereals like paddy, maize etc.
- To study the storage and handling techniques of cereals.
- To understand the information about byproducts obtained during processing along with their uses.
- To gain knowledge on processing and milling of cereals and pulses.

Course Outcomes:

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

- acquaint knowledge about quality characteristics influencing final milled products.
- get the knowledge about pearling and industrial utilization Millets.
- understand the Classification of legumes and oilseeds.
- gain the knowledge about factors affecting cooking quality of legumes.

Unit I: **(15L)**

Introduction and morphology of cereal grains:

Present status and future prospects of cereals and millets; Morphology: physico- chemical properties; chemical composition and nutritive value Rice: Paddy processing and rice milling: conventional milling, modern milling, milling operations, milling machines, milling efficiency, byproducts of rice milling. Quality characteristics influencing final milled products. Parboiling: rice bran stabilization and its methods; Aging of rice; Enrichment – need, methods processed foods from rice – breakfast cereals, flakes, puffing, canning and instant rice. Wheat: break system, purification system and reduction system; extraction rate and its effect on flour composition.

Unit II: **(15L)**

Barley, Sorghum and Millets:

Quality characteristics of flour and their suitability for baking. Barley: Malting and milling Sorghum: milling, Malting, Pearling and industrial utilization Millets: Importance of Millet, composition, processing of millets for food uses, major and minor millets Products.

Unit III: **(15L)**

Introduction and morphology of legumes and oilseeds:

Present status and future prospects of legumes and oilseeds; Morphology of legumes and oilseeds; Classification and types of legumes and oilseeds, Anti- nutritional compounds in legumes and oilseeds; Methods of removal of anti- nutritional compounds, Milling of legumes: home scale, cottage scale and modern milling methods, milling quality, efficiency and factors affecting milling; problems in dhal milling industry, Soaking and germination of pulses.

Unit IV: **(15L)**

Cooking quality and byproduct of legumes:

Cooking quality of legumes – factors affecting cooking quality, Oilseeds: composition, methods of extraction, Desolventization and refining of oils: degumming, neutralization bleaching, filtration, deodorization, etc. New technologies in oilseed processing, Utilization of oil seed meals for food uses i.e. high protein products like concentrate, isolates Byproduct of pulses and oil milling and their value addition.

Recommended Textbooks and References:

1. Advances in Cereal Science: Implications to Food Processing and Health Promotion (ACS Symposium Series) by Vieno Piironen and Joseph Awika
2. Technology of Functional Cereal Products (Woodhead Publishing Series in Food Science, Technology and Nutrition)" by B R Hamaker.

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B. Voc. Food Processing Technology

III Semester

Course Title: Lab Course -VIII **Course Code: U-LAC-423**

Marks: 50 **Credit: 02**

Learning objectives

- To provide Hands-on determination of physical properties of cereal grains.
- To provide Hands-on quantitative analysis of pulses and oilseeds.
- To Provide Hands-on removal of anti-nutritional compounds from pulses and oilseeds.
- To provide Hands-on preparation of malt.

Course Outcomes:

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

- gain knowledge on processing and milling of cereals and pulses.
- develop skills on the treatment and processing of the cereal and legume.
- develop skill of preparation of different byproducts of cereals and oilseeds.
- get hands on approach to check cooking quality of dhal.

Practicals:

1. Determination of physical properties of cereal grains
2. Determination of chemical properties of cereal grains
3. Studies on cooking quality of cereals
4. Preparation of malt
5. Value added products from cereals and millets
6. Production of modified starch
7. Visit to milling industry
8. Determination of physical properties of legumes and oil seeds
9. Determination of proximate composition of selected pulses and oilseeds
10. Determination of nutritional quality of selected pulses and oilseeds
11. Study of mini dhal mill; Study of mini oil mill.
12. Preconditioning of pulses before milling Preconditioning of oilseeds before milling.

13. Removal of anti-nutritional compounds from selected pulses and oilseeds
14. Laboratory milling of selected pulses and its quality evaluation
15. Laboratory milling of selected oilseeds and its quality evaluation
16. Laboratory refining of selected oils; Laboratory hydrogenation of selected Study of cooking quality of dhal.
17. Processing of composite legume mix and preparation of value-added products
18. Visit to commercial dhal mills and oil mills.

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B. Voc. Food Processing Technology

III Semester

Course Title: Fundamentals of food & nutrition **Course Code:** U-FFN-424

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

Learning Objectives:

- To provide the information on balanced diet and factors affecting, the balanced diet.
- To study and gain the information about physical and chemical properties of carbohydrates.
- To provide adequate knowledge about classification and sources of micro-nutrients.
- To understand the information about biological Functions of water.

Course Outcomes:

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

- get knowledge about the food groups and their functions.
- acquaint knowledge about classification of proteins.
- learn different macronutrients and macronutrients in food and their role in metabolic activities.
- gain knowledge about the role of water in food industry.

Unit I: **(13L)**

Introduction to Nutrition:

Definition, Functions, Classifications, Nutrients, Nutrition and Health, Balanced Diet and Factors Affecting, the Balanced Diet, nutrients, Food Groups and Functions, Meal Planning, RDA - Classification of nutrients (Macro, Micro)

Unit II: **(17L)**

Macro nutrients:

Classification, Sources - Functions, RDA - Deficiency, excess.

Carbohydrates: Physical and chemical properties, Function of carbohydrates, classification.

Proteins: Physical and chemical properties, Function of proteins, Classification of proteins.

Fats: Function and classification of fats.

Unit III: **(15L)**

Micro nutrients:

Classification, Sources - Functions, RDA Deficiency, excess, Vitamins: Fat Soluble (Vitamins A, D, E, and K), Water soluble vitamins (Vitamin B and C). Minerals: properties and function of mineral, Classification of minerals.

Unit – IV **(15L)**

Water:

Water - Composition, various Sources, Classification, biological Functions of water, RDA Deficiency, excess, role of water in food industry.

Recommended Textbooks and References:

1. Shubhangini Joshi, Textbook of food and nutrition, Tata Macgrohill Publishing Co., New Delhi.
2. B. Shrilakshmi, Nutrition Science, New Age International Publishers
3. Muddambi S.R. and Rajgopal M. V., Fundamentals of Food and Nutrition, Wiley Eastern Ltd., New Delhi.
4. Nutritive Value of Indian Foods, NIN, Hyderabad.
5. Food, Nutrition and Hygiene by R. Bansal, 2020.

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B. Voc. Food Processing Technology

III Semester

Course Title: Lab Course-IX **Course Code:** U-LAC-425

Marks: 50 **Credit: 02**

Learning Objectives:

- To provide Hands-on qualitative analysis of Carbohydrates.
- To prepare high fibre product with calculation of nutritive value.
- To Provide Hands-on preparation of high fat product with calculation of nutritive value.
- To understand the calculation of nutritive value of foods.

Course Outcomes:

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

- learn the chemical composition of food and its nutrition.
- learn different Macronutrients and Macronutrients analysis in food.
- get hands on approach in qualitative and quantitative analysis of proteins and carbohydrates.
- prepare high fat product with calculation of nutritive value.

Practical:

1. Preparation of list of nutrient rich food sources (Carbohydrates, proteins, fats)
2. Calculation of nutritive value of foods
3. Preparation of high carbohydrate product from cereals with calculationof nutritive value
4. Preparation of high fibre product with calculation of nutritive value
5. Preparation of high protein product from plant source with calculationof nutritive value
6. Preparation of high protein product from animal source with calculation of nutritive value
7. Preparation of high fat product with calculation of nutritive value
8. Preparation of low-fat product with calculation of nutritive value

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B. Voc. Food Processing Technology
IV Semester

Course Title: Soft Skills II **Course Code-** U-SFS-515
Marks: 100 **Hours: 60** **Credit: 04**

Learning Objectives:

- To provide the information on skill of selection career.
- To develop comprehensive understanding regarding vocabulary building.
- To provide adequate knowledge about skills of leadership and team management.
- To understand the basic information about external factors affecting personality.

Course Outcomes:

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

- increased their confidence in written and interpersonal communication.
- understand the use of good qualities in their life.
- acquaint knowledge about concept of Importance of team.
- get knowledge about the use of meditation as a tool to achieve health and wealth.

Unit I: **(15L)**

Career Selection and Entrepreneurship:

Skill of selection career, Finding out inborn qualities and interest, Interest- attraction or love, Entrepreneurship: definition, definition of entrepreneur, qualities of entrepreneur, scope and limitations of entrepreneurship, Business: - definition of business, definition of businessman, qualities of businessman, scope and limitations of businessman. Service: definition of service, service sectors in India and Abroad, scope and limitation of service

Unit II: **(15L)**

Spoken English:

Vocabulary building -Listening, Reading, Writing, Speaking, Basic pattern of Sentence- Present tense, Past tense, Future tense, Art of asking questions - Question starting with helping verb.

Unit III: **(15L)**

Leadership and Team Management:

Leadership and Team Management: Definition of leader, Qualities of leader, Duties of leader, Definition of team, Importance of team, Formation of team, Management of team.

Unit IV: **(15L)**

Personality Development:

Definition of personality, External factors affecting personality, Internal factors affecting personality, Meditation, Use of meditation as a tool to achieve health and wealth.

Recommended Textbooks and References:

1. Seven habits of highly effective peoples – Stephen Covey, You can heal your life – Dr. Lueis Hey
2. How to win and influence people – Dell Karnogi
3. Granthawali- Swami Vivekananda
4. Rich Dad Poor Dad – Robert Kiwasoki
5. Marketing Management – Philip Kotler
6. You can win – Shiv khera
7. Body language – Dr. UjwalPatani
8. How I raised my self from failure to success – Frank Betgar
9. Agnipankh – Dr. A.P.J. Abdul Kalam.
10. Soft Skills- Ajay R. Tengse.

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B. Voc. Food Processing Technology

IV Semester

Course Title: Food Business Management **Course Code:** U-IIS-516

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

Learning Objective

- To know the technical knowhow about marketing management and human resource development
- To study the basics about HR and related policies.
- To provide adequate knowledge about international trade of food business management.
- To develop comprehensive understanding regarding ethnic food habits of different regions.

Course Outcomes:

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

- learn about marketing management and human resource development
- get knowledge about international trade and its use in foodindustry.
- acquaint the knowledge in the develop of marketing management skill.
- apply the knowledge of sectors in food industry and scale of operations in India.

Unit I: **(15L)**

Business Management:

Introduction, theories and functions, food industry management, marketing management and human resource development, personal management. Sectors in food industry and scale of operations in India.

Unit II: **(15L)**

Human Resource Management:

Study the basics about HR and related policies and capacity mapping approaches for better management. Consumer behavior towards food consumption, Consumer Surveys by various Institutes and Agencies, various journals on consumer behavior and market research, internet-based data search.

Unit III: **(15L)**

International trade:

basics, classical theory, theory of absolute advantage, theory of comparative modern theory, free trade- protection, methods of protection, quotas, bounties, exchange control, devaluation, commercial treaties, terms of trade, balance of payments, foreign exchange, mechanics of foreign exchange, GATT, WTO, role of WTO. International trade in agriculture. World trade agreements related with food business, export trends and prospects of food products in India.

Unit IV: **(15L)**

World consumption of Food:

Patterns and types of food consumption across the globe. Ethnic food habits of different regions. Govt. Institutions related to international ad trade; APEDA, Tea board, spice board, wine board, MoFPI etc. management of export import organization, registration, documentation, export import logistics, case studies.

Recommended Textbooks and References:

1. Chhabra TN & Suria RK. 2001. Management Process and Perspectives. Kitab Mahal.
2. Jhingan ML. 2005. International Economics. 5th Ed. Virnda Publ. Kotler P. 2000. Marketing Management. Prentice Hall.
3. Reddy SS, Ram PR, Sastry TVN & Bhavani ID. 2004. Agricultural Economics. Oxford & IBH.

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B. Voc. Food Processing Technology

IV Semester

Course Title: Aptitude and Logical Reasoning **Course Code:** U-ALR-517

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

Learning Objective

- To provide the information on Different types of Numbers system.
- To know the technical knowhow about BODMAS Rule and age problems.
- To inculcate the new approaches to data interpretation.
- To understand conditions for calendars of two different years to be same.

Course Outcomes:

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

- acquaint the knowledge about test for prime number and prime factorization.
- apply the knowledge of important facts about arithmetic mean and geometric mean.
- understand how to draw a Venn Diagram and how to solve puzzle problems.
- Solve the problems on series formation and tricks and shortcuts for calculations.

Unit I: **(17L)**

Numerical Ability:

Theory, Different types of Numbers: Natural Numbers, Integers, Even Numbers, Odd Numbers, Prime Numbers: Test for Prime Number, Prime Factorization., Composite Number, Perfect Square., Test of Divisibility, GCD and LCD: Greatest Common Divisor (GCD or HCF), Method for finding the GCD & LCM of two or more numbers, Factorization Method., Least Common Multiple, Important Properties of GCD & LCM.

Unit II: **(15L)**

Daily Life Problems:

Theory, Preliminaries, BODMAS Rule, Modulus of Real Numbers, Quadratic Equation, Fractions, Law of Exponents, Last digit of a power. Algebraic methods of solving a pair of Linear Equations: Substation Method, Elimination Method. Age Problem, Average: Theory, Arithmetic Mean, Important facts about Arithmetic Mean, Geometric Mean. Median & Mode: Theory, Examples., Standard Deviation, Variance.

Unit III: **(10L)**

Logical Reasoning:

Data Interpretation: Theory, Table, Bar Chart, Line graph, Histograms, Pie Charts. Observational Ability: Theory, to draw a Venn Diagram, Logical Puzzles: Theory, Problems.

Unit IV: **(18L)**

Typical Calendar Problems:

Calendar Problem: The History, Theory: Odd Days, Leap Year, Ordinary Year, Counting of Odd Days, Tricks and Shortcuts for calculations, working rule for finding the day of a given date, Conditions for calendars of two different years to be same. Clock Problem: Theory, Important facts and shortcuts for quick calculation, some important types of clock problems. Series Formation: Theory, Number Sequence, Letter Sequence, Symbol Sequence.

Recommended Textbooks and References:

1. General Aptitude- A New Outlook by Christy Varghese.
2. Quantitative Aptitude for Competitive Examinations- RS Agarwal
3. A modern approach to Logical Reasoning - RS Agarwal.

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B. Voc. Food Processing Technology

IV Semester

Course Title: Food Spoilage & control **Course Code:** U-FSC-518

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

Learning Objectives:

- To understand the information about microbes involved in food spoilage.
- To provide the information on principles of quality control.
- To develop comprehensive understanding regarding food borne diseases.
- To know the technical knowhow about applications of food microbiology.

Course Outcomes:

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

- learn the principles and methods involved in the processing of perishable as well as Non-perishable foods and their effect.
- acquaint the knowledge in the microbiological quality standards of food.
- get knowledge about the various microbes which cause food spoilage.
- develop the skills in application of food microbiology.

Unit I: **(15L)**

Introduction to Food Spoilage:

History and development of food microbiology. Common food borne microorganisms, role and significance of Microorganisms in Foods. Methods for detection of microbes in fresh meat and processed meat.

Unit II: **(15L)**

Food Preservation:

Food Preservation & Principles of Quality Control: Chemicals, Radiation, Low and high temperature, aseptic Packaging, microbiological quality standards of food, FDA, HACCP, ISI.

Unit III: **(15L)**

Food Born diseases:

Microbial food spoilage and food borne diseases: Staphylococcal, Ecoli, Salmonellosis, Shigellosis, Listerial infections. Mycotoxins, Aflatoxins, Alternaria Toxins, Toxigenic Phyto planktons and Viruses.

Unit IV: **(15L)**

Food Microbiology:

Applications of Food Microbiology: Beneficial Uses of Microorganisms in Food Intestinal Beneficial Bacteria-Concept of Prebiotics and Probiotics, genetically modified foods. Biosensors in food

Recommended Textbooks and References:

1. Food Microbiology. 2nd Edition By Adams
2. Modern Microbiology, James M.Jay
3. Fundamental Food Microbiology, Bibek Ray. CRC press

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B. Voc. Food Processing Technology

IV Semester

Course Title: Lab Course - X **Course Code:** U-LAC-521

Marks: 50 **Credit: 02**

Learning Objectives: -

- To provide Hands-on basic microbiology laboratory practices and equipments.
- To provide Hands-on preparation and sterilization of nutrient media.
- To provide Hands-on morphological study of bacteria and fungi.
- To provide Hands-on staining methods.

Course Outcomes:

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

- understand the standard plate count method.
- understand bacteriological analysis of water
- perform and analyze the determination of microbes in food material.
- understand the scheme for the detection of food borne pathogens.

Practicals:

1. Introduction to the Basic Microbiology Laboratory Practices andEquipments
2. Preparation and sterilization of nutrient broth and media
3. Morphological study of bacteria and fungi using permanent slides
4. Simple staining and Gram's staining
5. Standard Plate Count Method
6. Bacteriological Analysis of Water
7. Assessment of surface sanitation by swab/rinse method
8. Assessment of personal hygiene
9. Scheme for the detection of food borne pathogens

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B. Voc. Food Processing Technology

IV Semester

Course Title: Quality Control and Regulations **Course Code:** U-QCR-519

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

Learning Objectives:

- To provide conceptual knowledge of sampling and quality of the foods to students.
- To provide adequate knowledge about standard tests for quality assessment.
- To impart detailed understanding about mandatory food laws.
- To understand the information about principles and steps of HACCP Plan.

Course Outcomes:

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

- basic understanding about quality control of food and different regulatory bodies.
- develop skill of analysis of food for checking the quality of product.
- acquaint the knowledge about food safety and standards Act 2006.
- learn about HACCP and their implementation in food industry

Unit I: **(17L)**

Introduction to quality Control:

Introduction to Quality Control in the food industry - General concepts of quality and quality control - Major quality control functions

Sampling of Food - Sample Selection and Sampling Plans - Preparation and storage of Laboratory Samples - Sampling Methods

Unit II: **(15L)**

Standard tests and of food:

Standard tests for quality assessment – Physical Tests, Chemical tests, Microbiological tests. Instrumental analysis of food - Viscosity analysis - Consistency analysis - Texture analysis - Color analysis

Unit III: **(18L)**

Food Laws:

Mandatory food laws; The food safety and standards Act 2006, Establishment of the authority, composition of authoring functions of chief executive officer, scientific part, General principles to be followed in Revised August 2016 37 administration of act, General provisions as to articles of food, special responsibility as to safety of food, analysis of food offences ofpenalties.

Unit – IV **(10L)**

HAPPC and Hazard analysis:

Principles and steps of HACCP Plan, Hazard Identification, Risk assessment Risk communication with communication agencies and Hazard analysis, CCP Decision Tree, HACCP Plan.

Recommended Textbooks and References:

1. Bhatia,R. and Ichhpujan, R.L. Quality assurance in Microbiology. CBS. Publishers and Distributors, New Delhi. 2004.
2. Kher, C.P. Quality control for the food industry. ITC Publishers, Geneva. 2000.
3. Early R. Guide to Quality Management Systems for Food Industries. Blackie Academic. 1995.
4. Krammer A & Twigg BA. Quality Control in Food Industry. Vol. I, II. AVI Publications. 1973.

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B. Voc. Food Processing Technology

IV Semester

Course Title: Lab Course- XI **Course Code:** U-LAC-522

Marks: 50 **Credit: 02**

Learning Objectives: -

- To provide conceptual knowledge about sampling and quality of the foods to students.
- To provide Hands-on determination of Moisture content of food.
- To provide Hands-on determination of total plate count.
- To provide Hands-on determination of protein content of food.

Course Outcomes:

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

- gain Hands-on experience and training on determination of fat content of food.
- understand the detection of adulteration in food samples
- To provide Hands-on qualitative and qualitative evaluation of food samples.

Practicals:

1. Determination of Moisture content of food
2. Determination of Fat content of food
3. Determination of protein content of food
4. Determination of crude fiber content of food
5. Determination of ash content of food
6. Determination of Total Plate Count
7. Determination of Yeast and Mould Count
8. To conduct Hazard Analysis & Risk Assessment of identified hazards
9. Determination of CCP through CCP Decision Tree
10. Visit to quality control laboratory

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B. Voc. Food Processing Technology

IV Semester

Course Title: Fruits and Vegetable Processing **Course Code:** U-FVP-520

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

Learning Objectives:

- The course involves a basic understanding of introduction to fruits and vegetables.
- To provide adequate knowledge about fruit-based beverages.
- To understand the techniques in Fruits and Vegetable processing.
- To study the procedures for preparation of fruit and vegetable products.

Course Outcomes:

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

- acquaint the knowledge in the production and processing status of Fruits and Vegetables in India.
- get knowledge about the cordial and blended beverages.
- apply the knowledge of dehydration types of fruits.
- understand the canning process of fruits and vegetables.

Unit I: **(15L)**

Introduction to Fruits and Vegetables:

Scope, importance, production and processing status of Fruits and Vegetables in India - Morphology and Composition of Fruits and vegetables - Storage of fruits and vegetables- principles and types of storage systems

Unit II: **(15L)**

Fruit based Beverages:

Definition and types - Methods of preparation- Juice, RTS, squash, nectar, syrup, crush, cordial and blended beverages. Jam, Jelly & Marmalade - Definition - Selection of fruits - Ingredients used and their role - Method of preparation

Unit III: **(15L)**

Dehydration types of fruits:

Dehydration of fruits & vegetables - Mechanical dehydration - Osmotic dehydration - Dehydrated products- Vegetable granule, Powder and Flakes.

Unit IV: **(15L)**

Pickling:

Introduction - Ingredients and their role - Pickling process, Canning of fruits and vegetables - Definition, History - Process of canning- fruits, vegetables - spoilage of canned fruits and vegetables

Recommended Textbooks and References:

1. Lal G., Siddhappa G., Tondon G. L., 1986, Preservation of fruits and vegetables, ICAR, New Delhi.
2. Shrivastava, R. P. and Kumar. S., 1998, Fruit and Vegetable Preservation: Principles and Practices, 2nd Edition, International Book Distribution Co., Lakhanow.
3. Salunkhe, D. K., and Kadam S. S., Ed 1995, Handbook of Fruit Science and Technology: Production, Composition and Processing, Marcel Dekker, New York.

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B. Voc. Food Processing Technology

IV Semester

Course Title: Lab Course - XII **Course Code:** U LAC-523

Marks: 50 **Credit:** 02

Learning Objectives:

- To provide the information on equipments used in Fruit and vegetables processing.
- To provide adequate knowledge about fruit processing industry.
- To provide Hands-on preparation of juices and pulps of different fruits.
- To provide Hands-on Qualitative and quantitative analysis of fruit jam and jelly.

Course Outcomes:

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

- explain the application of processing for fruits and vegetables processing.
- prepare fruit juices with juice extracting machines with safety precautions.
- preserve fruit juices with addition of preservatives and determine the acidity and TSS content
- perform and analyze the Preparation of pickles from fruits and vegetables.

Practicals:

1) Introduction to equipments used in Fruit and vegetables processing
2) Preparation and comparative sensory analysis of Juices and Pulps ofdifferent Fruits
3) Preparation and comparative sensory analysis of Fruit Jam and Jelly
4) Preparation and comparative sensory analysis of Fruit Syrup
5) Preparation of Dehydrated Vegetables
6) Preparation of Raisins from Grapes
7) Preparation of Amachur
8) Preparation of Pickles from Fruits and Vegetables
9) Preparation of Sauce from Fruits and Vegetables
10) Visit to fruit processing industry.

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.	Food Additives	U-FDA-419	Professional Ethics	Students can get jobs in different food industries and toxicology testing jobs.
2.	Principles of food Preservation	U-PFP-420	Professional Ethics	Students can get jobs in different food industries for preserving the foods
3.	Introduction to Cereal and Legume Processing	U-ICL-422	Professional Ethics	Students will get jobs in the cereal processing industry.
4.	Fundamentals of Food and Nutrition	U-FFN-424	Professional Ethics	Students will get jobs in different food industries.
5.	Food Business Management	U-IIS-516	Professional Ethics	Students will get jobs in different food industries as a manager.
6.	Food Spoilage and Control	U-FSC-518	Professional Ethics	Students will get jobs in different food industries in different

				spoilage and controlling sectors.
7.	Quality Control and regulations'	U-QCR-519	Professional Ethics	Students will get job in Quality Control unit of different food industries.
8.	Fruits and vegetable Processing	U-FVP-520	Professional Ethics	Students will get jobs in the vegetable and fruit processing industry.

Sr. No	Course Name	Code	Relevant to	Description
1.	Food Spoilage and Control	U-FSC-518	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.	Food Additives	U-FDA-419	Skill in food additives
2.	Principles of food Preservation	U-PFP-420	Skill in food preservation.
3.	Introduction to Cereal and Legume Processing	U-ICL-422	Research in food processing
4.	Fundamentals of Food and Nutrition	U-FFN-424	Research in food processing
5.	Food Business Management	U-IIS-516	Skills in food business
6.	Food Spoilage and Control	U-FSC-518	QC and QA
7.	Quality Control and regulations'	U-QCR-519	QC and QA
8.	Fruits and vegetable Processing	U-FVP-520	Technical skills in food sector.

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.	Soft Skills I	U-SFS-417			Students will be aware of listening and speaking skills and the	2019-20

					related sub-skills. ii. They can focus a lot on listening style to be the better speaker of English language.	
2.	Food Additives	U-FDA-419	Students can get jobs in different food industries and toxicology testing jobs.	Students can start their own business of food additives.	Students will learn about different types of food additives and their role in food processing.	2019-20
3.	Principles of food Preservation	U-PFP-420	Students can get jobs in different food industries for preserving the foods.	Students can give training related to awareness of food preservation and can open the preservation unit.	Different skills are developed for preserving the food naturally and artificially.	2019-20
4.	Introduction to Cereal and Legume Processing	U-ICL-422	Students will get jobs in the cereal processing industry.	Students can start their own milling industry and cereal and legume processing industries.	Students will learn about different processes involved in cereal and legume processing.	2019-20
5.	Fundamentals of Food and Nutrition	U-FFN-424	Students will get jobs in different food industries.		Students will learn the chemical composition of food and its nutrition. they will also learn different micronutrients and macronutrients and their role in metabolic activities.	2019-20
6.	Food Business Management	U-IIS-516	Students will get jobs in different food industries as a manager.		Students will learn about marketing management and human resource	2019-20

					development. Students will learn about international trade and its use in the food industry. Students will develop marketing management.	
7.	Aptitude and Logical Reasoning-I	U-ALR-517			Understand the basic concepts of Logical Reasoning. Solve campus placements aptitude papers	2019-20
8.	Food Spoilage and Control	U-FSC-518	Students will get jobs in different food industries in different spoilage and controlling sectors.		Students will learn the principles and methods involved in the processing of perishable as well as Non-perishable foods and their effect. Students will learn about principles of quality control.	2019-20
9.	Quality Control and regulations	U-QCR-519	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 and maintainin g quality.	Practical Knowledge will help to develop different skills for checking the quality of product.	2019-20
10.	Fruits and vegetable Processing	U-FVP-520	Students will get jobs in the vegetable and fruit		Students will learn about different techniques used in food and vegetable processing. Students will develop the skill of preparation of fruits and vegetables products.	2019-20