

**UNIVERSITY OF KERALA**

**SYLLABUS**

**for**

**B. Voc. Degree Programme**

**In**

**FOOD PROCESSING AND MANAGEMENT**

***UNDER***

**Choice based Credit and Semester system**

**(w.e.f. 2019 admission)**

The University Grants Commission (UGC) has launched a scheme on skills development based higher education as part of college/university education, leading to Bachelor of Vocation (B.Voc.) Degree with multiple exits such as Diploma/Advanced Diploma under the NSQF. The B.Voc. program is focused on universities and colleges providing undergraduate studies which would also incorporate specific job roles along with broad based general education. This would enable the graduates completing B.Voc. to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge. The proposed vocational program in Food processing and Management will be a judicious mix of skills, professional education related to Food processing and Management and also appropriate content of general education. It is designed with the objective of equipping the students to cope with the emerging trends and challenges in the Food Processing and Management.

## **1. ELIGIBILITY FOR ADMISSION**

Eligibility for admissions and reservation of seats for B.Voc Food Processing and Management shall be according to the rules framed by the University from time to time. No student shall be eligible for admission to B.Voc. Food Processing and Management unless he/she has passed the Plus Two of the Higher Secondary Board of Kerala or that of any other university or Board of Examinations in any state recognized as equivalent to the Plus Two of the Higher Secondary Board in Kerala, with not less than 45 % marks in aggregate. However SC/ST, OBC, and other eligible communities shall be given relaxation as per University rules.

## **2. NATURE OF THE COURSE**

This course follows 2(b) pattern of the University under first degree CBCS program with appropriate modifications.

- No open course is envisaged
- No Electives are included
- Total credits enhanced to 180 instead of 120
- Working hours per week is increased to 30 hours
- All vocational subjects are treated as core course.
- Multiple exit points are permitted, that is, if willing, candidate can quit after the successful completion of first & second year. Candidate do so, can't be re-entered.

- There will not be provisions for improvement.
- A candidate who failed in a semester may get two supplementary chances. Only failed papers are to be written in the supplementary examination.

### 3. CURRICULUM

The curriculum in each of the years of the program would be a suitable mix of general education and skill development components.

### 4. DURATION

The duration of the B.Voc Food Processing and Management shall be three years consisting of six semesters. The duration of each semester shall be five months inclusive of the days of examinations. There shall be at least 90 working days in a semester

### PROGRAM STRUCTURE

The B.Voc Food Processing and Management shall include:

- Language courses (English)
- General Education Components
- Skill Components
- Project
- Industrial Training
- Soft Skills and Personality Development Programs
- Study tours

<b>Duration /NSQF Qualification Levels</b>	<b>Total Credit</b>	<b>Semester</b>	<b>Exit point Award</b>
1 <sup>st</sup> year / Level 5	60	Two semester	Diploma
2 <sup>nd</sup> year / Level 6	60	Four Semester	Advanced Diploma
3 <sup>rd</sup> year / Level 7	60	Six Semester	B VOC

## **Evaluation**

The evaluation of each course shall contain two parts- Sessional Assessment and Final Assessment. The Sessional and Final Assessment shall be made using a Mark- Based Grading System on a 7-point scale. Overall Sessional: Final ratio will be maintained as 20:80.

### **Theory Examinations**

#### **a. Sessional**

The sessional evaluation is to be done by continuous assessment of the following components. The components of the evaluation for theory and practical and their weights are as below.

#### **I. Distribution of Sessional marks:**

##### **a. Theory courses**

###### **Components Marks**

<b>Components</b>	<b>Marks</b>
<b>Attendance</b>	<b>5</b>
<b>Assignment/seminar</b>	<b>5</b>
<b>Viva</b>	
<b>Test Paper</b>	<b>10</b>
<b>Total</b>	<b>20</b>

##### **b. Practical courses**

###### **Components Marks**

<b>Components</b>	<b>Marks</b>
<b>Attendance</b>	<b>4</b>
<b>Lab involvement</b>	<b>6</b>
<b>Record</b>	<b>10</b>
<b>Total</b>	<b>20</b>

#### **II. Attendance Evaluation**

A student should have a minimum of 75% attendance. Those who do not have the minimum requirement for attendance will not be allowed to appear for the Final Examinations.

#### **Distribution of Marks for evaluation**

##### **Components Marks**

90% - 100% :5

85% - 89% : 4

80% - 84% : 3

75% - 79% : 2

### **III. Assignment/Seminar/Viva**

Each student has to take one assignment or one seminar presentation per course from first to fifth semester. The students should compulsory take one seminar presentation on sixth semester.

#### **Different components for the evaluation of Assignment**

##### **Components Marks Weights**

<b>Components</b>	<b>Marks</b>
Punctuality	<b>1</b>
Content	<b>2</b>
Conclusion	<b>1</b>
Reference	<b>1</b>
Total	<b>5</b>

#### **Different components for the evaluation of Seminar**

##### **Components Marks**

<b>Components</b>	<b>Marks</b>
Visual Aids used	<b>1</b>
Content	<b>2</b>
Presentation	<b>1</b>
Reference	<b>1</b>
Total	<b>5</b>

### **IV. Test Paper**

Model examination mark is considered.

#### **b. Final**

The final examination of all semesters shall be conducted by the University of Kerala on the close of each semester. For reappearance/ improvement, students may appear along with the next batch.

#### **Theory Examinations**

A question paper shall be a judicious mix of very short answer type, short answer type, short essay type / problem solving type and long essay type questions. Courses such as common courses, open course and elective course do not contain practical courses. The pattern of questions for these courses without practical are listed below.

1. Each question paper has four parts A, B, C & D.
2. **Part A** contains 10 questions of 1 mark each all of which the candidate has to answer.
3. **Part B** contains 12 short answer type questions spanning the entire syllabus and the candidate has to answer 8 questions. Each question carries 2 marks.
4. **Part C** contains 9 problem type questions / short essays spanning the entire syllabus and the candidate has to answer 6 questions. Each question carries 4 marks. But, for open courses, Part C contains short essay type questions only.
5. **Part D** contains 4 essay type questions spanning the entire syllabus and the candidate has to answer 2 questions. Each question carries 15 marks.
6. The total marks for courses are 80.

### **Practical Examinations**

The practical examinations for the core and complementary courses are to be conducted at the end of every semester by the institution. The external examiner shall be selected by the institution. The score sheet should be sent to the Controller of Examinations soon after the evaluation. A minimum of 16 experiments should be done in a practical course and a candidate submitting a certified record with a minimum of 8 experiments alone is eligible for appearing for the Practical Examination.

### **Practical Evaluation**

The scheme of evaluation of the practical examination will be decided by the Board of Examiners.

### **Student strength for practical examination**

There shall be at least one teacher to supervise a batch of not more than 15 students in each laboratory session.

### **Internship/Project Evaluation**

The evaluation of the internship at various Food Processing Industries will be assessed by the internal coordinator and faculty.

All students have to begin working on the project in the **sixth** semester and must submit at the end of the semester. The ratio of Sessional to Final component of the project is 2:3. The mark distribution for assessment of the various components is as follows.

**Sessional Evaluation of Project (Sem 4)**

Components	Marks
Attendance	5
Review I	5
Review II	5
Viva	15
Presentation	10
Total	40

**Sessional  
Evaluation of  
(sem6)****External  
Evaluation of****(sem6)****External Evaluation of Project (Sem 4)**

Components	Marks
Introduction and objectives	5
Review of Literature	5
Materials & Methods	5
Results & Discussion / Applications	10
Report	10
Viva- voce/presentation	25
Total	60

**Project****Project**

Components	Marks
Attendance	20
Review I	30
Review II	30
Report	30
Viva/Presentation	50
Total	160

Components	Marks
Introduction and objectives	20
Review of Literature	30
Materials & Methods	40
Results & Discussion / Applications	50
Report	40
Viva- voce/presentation	60
Total	240

### Semester I

Semester	Title of the course	Course code	No. of Hours/ Week		Total Credits	Total hours/	University exam	Total	
			Lec.	Lab.				CE	ECE
	English	EN111.1	4	-	4	72	3	20	80
<b>I</b>	Bakery and Confectionery Technology	VFP1S01	5	-	5	90	3	20	80
	Principles of Food Preservation	VFP1S02	4	-	4	72	3	20	80
	Fundamentals of food science	VFP1S03	4	-	4	72	3	20	80
	Bakery and Confectionery Technology (Practical)	VFP1S04	-	3	3	54	3	20	80
	Food Science and Nutrition I	VFP1G05	4	-	4	72	3	20	80
	Entrepreneurship Development and Project Management	VFP1G06	4	-	4	72	3	20	80
	Industrial visit /study tour /Internship	VFP1I01	-	2	2	36	-	-	-
	<b>Total</b>			<b>30</b>		<b>S</b>	<b>G</b>	<b>540</b>	<b>140</b>
					<b>18</b>	<b>12</b>			



## **Semester I**

### **VFP1S01 – BAKERY AND CONFECTIONERY TECHNOLOGY**

**(Skill Course)**

**Total Credits: 5**

**No. of instructional hours: 5 hrs/Week**

**Aim of the course:** To impart basic and applied technology of baking and confectionery and acquaint with the manufacturing technology of bakery and confectionery products.

#### **Course Overview and Context**

To highlight the processing methods used in baking and confectionery industries.

To know about the various types of food products made using baking technology.

To have a basic idea about baking and confectionery manufacture and quality control.

To know about the importance of each ingredient in the bakery and how it effects the overall product and its sensory and quality parameters.

To be able to start a small scale bakery and confectionery Module

#### **Syllabus Content**

##### **Module I: Manufacture of Sugar**

Sugarcane, jaggery, khandasari sugar, raw sugar, refined sugar, white sugar, beet sugar, manufacture of sugar from sugar cane, refining of sugar.

##### **Module II: Classification of confectionery**

Sugar boiled confectionery- crystalline and amorphous confectionery, rock candy, hard

candy, lemon drop, china balls, soft candy, lollypop, marshmallows, fudge, cream, caramel, toffee, lozenges, gumdrops, honeycomb candy.

### **Module III: Properties of wheat**

Wheat – Properties, Quality – Hardness, Gluten strength, protein content, soundness. Methodology and approaches to evaluate bread and bread – wheat quality – processing factors, product factors.

### **Module IV: Principles of baking and Bread manufacturing**

Major baking ingredients and their functions, role of baking ingredients in improving the quality of bread. Characteristics of good flour used for making bread, biscuits and cakes. Ingredients used for bread manufacture, methods of mixing the ingredients, dough development methods - straight dough, sponge dough, moulding, proofing, baking, packing, spoilage, bread staling, methods to reduce bread staling and spoilage.

### **Module V: Cake and Biscuit manufacturing**

Processing of cakes and biscuits- ingredients, development of batter, baking and packing, Spoilage in cakes and biscuits.

### **Learning Resources**

#### **Reference books:**

1. Zhou. W, Hui Y,H; (2014), “Bakery Products Science and Technology”, 2nd Edition, Wiley Blackwell Publishers,
2. Pyler, E. J. and Gorton, L.A.(2009), “Baking Science & Technology” Vol.1 Fourth Edition, Sosland Publications.
3. Stanley P. Cauvain, Linda S. Young, (2008), “Baked Products: Science Technology and Practice”. John Wiley & Sons Publishers.

#### **Semester I**

### **VFP1S02 – PRINCIPLES OF FOOD PRESERVATION (Skill Course)**

**Total Credits: 4**

**No. of instructional Hours : 4 Hours/week**

**Aim of the course:** To make students understand about the mechanism of spoilage and deterioration in foods, the basic food preservation principles, and methods to preserve foods.

#### **Course Overview and Context**

To study the different ways in which food spoilage occurs and the techniques to prevent it.

To know the different spoilage agents and the ways in which they act on food.

To understand the principles behind the various methods of food preservation.  
To know how to use these principles to preserve different types of foods.  
To study the method of action of different preservatives.

## **Syllabus Content**

### **Module I: Food Spoilage**

Definition, types of spoilage - physical, enzymatic, chemical and biological spoilage.  
Mechanism of spoilage and its end products, shelf life determination.

### **Module II: Preservation by using Preservatives**

Food preservation: Definition, principles, importance of food preservation, traditional and modern methods of food preservation. Food additives – definition, types, Class I and Class II preservatives.

### **Module III: Preservation by use of high temperature**

Pasteurization: Definition, types, Sterilization, Canning - history and steps involved, spoilage encountered in canned foods, types of containers used for canning foods. Food irradiation – Principles, merits and demerits, effects of irradiation and photochemical methods.

### **Module IV: Preservation by use of Low Temperature**

Refrigeration - advantages and disadvantages, freezing: Types of freezing, common spoilages occurring during freezing, difference between refrigeration and freezing.

### **Module V: Preservation by Removal of Moisture**

Drying and dehydration - merits and demerits, factors affecting, different types of drying, Concentration: principles and types of concentrated foods.

## **Learning Resources**

### **Reference Books**

1. Gould, G. W. (2012), “New Methods of food preservation”, Springer Science & Business Media.
2. Manay, N.S. Shadaksharaswamy, M. (2004), “Foods- Facts and Principles”, New age international publishers, NewDelhi.
3. Srilakshmi, B.(2003), “Food Science”, New Age International Publishers, New Delhi.
4. Subalakshmi, G and Udipi, S.A.(2001), “Food processing and preservation”. New Age International Publishers, NewDelhi.

**Semester- 1**  
**VFP1SO3 - FUNDAMENTALS OF FOOD SCIENCE**  
**(Skill Course)**

**Credit : 4**

**No. of instructional hours: 4 hrs/week**

**Objectives :** To enable students to -

- 1) Understand the basic concept, functions, and classification of food.
- 2) Familiar with different methods of cooking.

**Course content :**

**Module I      Introduction to food science**

- Concept of food, food science
- Objectives of food science
- Functions of food

**Module – II    Classification of food**

- According to food science
- Basic five food groups
- Selection of food

**Module – III    Methods of cooking**

- Traditional cooking methods
- Modern cooking methods
- Objectives and importance of cooking

**Module – IV    Food Preparation and storage**

- Basic terms used in food preparation
- Pre-preparation for cooking

**PRACTICALS**

- Introduction to laboratory rules
- Equipments used in cooking
- Terms used in cooking.
- Weights and Measures of raw and cooked food

➤ **Methods of cooking**

1. Traditional preparation of the any two methods of the following
  - a) Boiling
  - b) Roasting
  - c) Frying
  - d) Steaming
2. Modern methods - Preparation of any two recipes from the following
  - a) Baking
  - b) Solar
  - c) Microwave
  - d) Combination

**References :**

- 1) B. Shreelakshmi : ``Food Science`` (second edition), New Age International, New Delhi.
- 2) Swaminathan : ``Text book of Food Science``, Vol-1, BAPPCO, Bangalore
- 3) Devendrakumar Bhatt & Priyanka Tomar : An Introduction to Food Science, Technology & Quality Management, Kalyani Publishers.
- 4) Sumati R. Mudambi : Fundamentals of Food & Nutrition wiley Eastern Ltd., New Delhi.

**Semester I**

**VFP1S04 – BAKERY AND CONFECTIONERY TECHNOLOGY (Practical)  
(Skill Course)**

**Total Credits: 3**

**No. of instructional hours: 3 hrs/week**

**Aim of the course:** To develop professional and practical knowledge in bakery and confectionary and make them competent as an entrepreneur.

**Course Overview and Context**

- To improve the culinary skills of the students
- To gain knowledge about the preparation of some basic food products
- To use the processes studied in food chemistry and food preservation papers to prepare different food products
- To understand how these can be utilized to start a small scale processing Module.
- It involves not only gaining knowledge on how to make a food product but also studies the principles behind them.
- It helps the students to gain not only theoretical but also practical knowledge

**Syllabus Content**

1. Preparation of ghee biscuits
2. Preparation of melting marvels
3. Preparation of sweet and salt biscuits
4. Preparation of bread
5. Preparation of pizza
6. Preparation of hot cross buns(sweet buns)
7. Preparation of jam nut cookies
8. Preparation of vanilla cake
9. Preparation of cake.
10. Visit to production Module of a bakery.

### **Semester I**

## **VFP1G05– FOOD SCIENCE AND NUTRITION I (General Course)**

**Total Credits: 4**

**No. of instructional hours: 4 hrs/week**

**Aim of the course:** To understand the nutrient composition of foods, their functions, sources and to impart knowledge of concept of good health and its importance.

### **Course Overview and Context**

- To know and understand the functions, importance of all nutrients present in foods.
- To know about the various types of nutrients and their functions in the body.
- To familiarize with the recent advances in field of nutrition
- To understand the different types of newly developed food products.

### **Syllabus Content**

#### **Module I: Introduction to Nutrition**

Definition of nutrition and health, inter-relationship between nutrition and health.

Malnutrition: Definition and types. Reference man and reference women.

#### **Module II: Food and water**

Definition of food, classification of foods based on origin, pH, nutritive value. Basic five food groups, food guide pyramid. Functions of foods. New concepts of food: health foods, ethnic foods, organic foods, functional foods, nutraceuticals, fabricated foods, extruded foods, convenience foods, junk foods, GM foods and proprietary foods. Water: functions, sources, requirement, water balance, toxicity and deficiency.

#### **Module III: Vitamins**

Classification, structure, function, sources, general causes for loss in foods, bioavailability, enrichment, fortification and restoration. Modules of measurement. Deficiency and toxicity disorders.

#### **Module IV: Minerals**

Classification of minerals. Functions, sources, bioavailability and deficiency of the following minerals- Calcium, Iron, Iodine, Fluorine, Sodium, Potassium.

#### **Module V: Energy**

Modules of energy, food as a source of energy, basal metabolic rate, factors effecting BMR, total energy Requirement.

### **Learning Resources**

#### **Reference Books**

1. James L Groff and Sareen S Gropper, (2009) “Advanced Nutrition and Human Metabolism”, Fourth Edition, Wadsworth Publishing Company.
2. Maurice B Shils, Moshe Shike A, Catherine Ross, Benjamin Cabellero, Robert J Cousins, (2006), “Modern Nutrition in Health and Disease”, Lippincott Williams alWilkins.
3. Michael J Gibney, Ian A Macdonald and Helen M Roche (2003) “Nutrition and Metabolism”, The Nutrition Society Textbook Series, Blackwell Publishing, First Edition.

### **Semester I**

## **VFP1G06– ENTREPRENEURSHIP DEVELOPMENT AND PROJECT MANAGEMENT (General Course)**

**Total Credits: 4**

**No. of instructional hours: 4 hrs/week**

**Aim of the course:** To develop Entrepreneurial culture and encourage the students to become entrepreneurs.

#### **Course Overview and Context**

- To know about the various procedures for starting a small scale Module of production.
- To have a basic idea about how to prepare a project to start a small scale industry.
- To know about various agencies that can provide assistance for starting a new project.

## **Syllabus Content**

### **Module I: Introduction to Entrepreneurship**

Meaning, definition and concepts, characteristics, functions, entrepreneurial traits and motivation, role of entrepreneur in economic development, factors affecting entrepreneurial growth. Types of entrepreneurs - Entrapreneurship, Women entrepreneurship, significance, problems, solutions to the problems

### **Module II: Entrepreneurship Development Program**

Objectives, Steps, Need for training- target group- Contents of the training program- Special Agencies for Entrepreneurial Development and Training-DIC.

### **Module III: Project**

Meaning, Features, Classification, Project identification, Stages in project identification, Project Life Cycle, Project formulation- Elements, Feasibility Analysis- Network Analysis-Project Planning.

### **Module IV: Setting up of micro small and medium enterprises**

Setting up of micro small and medium enterprises, location significance, Green channel, Bridge capital, Seed capital assistance, Margin money scheme, Sickness, Causes- Remedies.

### **Module V: Role of institutions/schemes in entrepreneurial development**

SIDCO, SIDBI, NIESBUD, EDII, SISI, NREG Scheme- SWARNA JAYANTHI, Rozgar Yojana Schemes

### **Learning Resources**

#### **Reference Books**

1. Drucker, Peter (2014), "Innovation and Entrepreneurship", Routledge Publishers.
2. Abraham M.M, (2010), "Entrepreneurship Development and Project Management", Prakash Publications and Printers.
3. Desai, Vasant (2001), "Dynamics of entrepreneurial development and management". Himalaya Publishing House.

## **Semester -I VFP1101- Industrial visit /study tour /Internship Report**

**Credit: 2**

**Total Hours: 36**

Assessment of Project / Industrial visit /study tour /Internship Report



- i) The Project/Industrial visit/study tour/Internship report must be submitted by the prescribed date.
- ii) It is desirable that the topics for Project/Industrial visit/study tour/Internship report shall be assigned by the end of the semester.
- iii) The Project/Industrial visit/study tour/Internship report and its presentation shall be evaluated by the internal coordinator of the course and concerned faculty

## Semester II

Semeste	Title of the course	Course code	No. of Hours/ Week		Total	Total hours/ semester	Universit y exam	Total Mar ks	
			Lec.	Lab.				CE	ECE
	English	EN1211	4	-	4	72	3	20	80
II	Dairy Technology	VFP2S01	4	-	4	72	3	20	80
	Packaging Technology	VFP2S02	4	-	4	72	3	20	80
	Dairy Technology (Practical)	VFP2S03	-	4	4	72	3	20	80
	Food Preservation (Practical)	VFP2S04	4	-	4	72	3	20	80
	Business Communication	VFP2G05	-	4	4	72	3	20	80
	Environmental Studies	VFP2GO6	4	-	4	72	3	20	80
	Industrial visit /study tour /Internship	VFP2I02	-	2	2	36	-	-	-
	<b>Total</b>			<b>30</b>		<b>S G</b>	<b>540</b>		<b>140</b>
					<b>1812</b>				

**Semester II**  
**VFP2S01 - Dairy Technology**  
**(Skill Course)**

**Total Credits: 4**

**No. of instructional hours: 4 hrs/week**

**Aim of the course:** To inculcate the knowledge regarding various dairy products and its processing techniques.

**Course Overview and Context**

To understand about the products that can be made from milk.

To understand the processing and storage of dairy products.

To know about the quality control measures applied in dairy industries.

To have a basic idea about their processing and products which can be made at a small scale

**Syllabus            Content**

**Module I: Introduction**

Milk - Definition, sources, and composition of milk, factors effecting composition of milk, physiochemical properties of milk, grading of milk-definition and types of grades, collection and transportation of milk.

**Module II: Processing of market milk**

Flowchart of milk processing, Reception, Different types of cooling systems. Clarification and filtration process, standardization- Pearson's square method, pasteurization-LTLT, HTST and UHT process- continuous pasteurizer, Sterilization and Homogenization, Cream separation- centrifugal cream separator ,bactofugation.

**Module III: Special milks**

Skim milk, evaporated milk, condensed milk, standardized milk, toned milk, double toned milk, flavored milk, reconstituted milk.

**Module IV: Indigenous and Fermented milk products**

Product description, methods for manufacture of butter, cheese, ice cream, khoa, channa, paneer, shrikhand, ghee. Spray drying system: dried milk- whole milk and skim milk powder. Instantization of milk.

Module V: In-Plant cleaning system 10 Hours Introduction to Cleaning in- place (CIP) system - cleaning procedure, Cleaning efficiency, Methods of cleaning in food industry, cleaning solutions – Detergents, Sanitizers. SIP system of dairy plant, Personal hygiene in dairy plant.

**Learning Resources References**

1. Joshi.V.K., (2015), "Indigenous Fermented Foods of South Asia", CRC Press.
2. Alan H. Varnam, (2012), "Milk and Milk Products: Technology, chemistry and microbiology", Springer Science & Business Media Publishers.
3. Robinson, R. K., (2012), "Modern Dairy Technology: Volume 2 Advances in Milk Products", Springer Science & Business Media Publishers.

**Semester II**  
**VFP2S02 - Packaging Technology**  
**(Skill Course)**

**Total Credits: 4**

**No. of instructional hours: 4 hrs/week**

**Aim of the course:** To provide knowledge about trends and development in food packaging technologies and materials.

**Course Overview and Context**

- To familiarize with the different materials and methods used for packaging.
- To understand the technology behind packaging and packaging materials
- To have a basic idea about the materials used for food packaging and their testing.
- To know about the different forms in which a food can be packed

**Syllabus Content**

**Module I: Introduction to packaging**

Definition, Functions of packaging – Containment, Protection, Preservation, Promotion, Convenience, Communication. Requirements of effective package, Types of food packaging- primary, secondary and tertiary packaging.

**Module II: Deteriorative Reactions and shelf life of foods**

Introduction, deteriorative Reactions in food- factors affecting deterioration of foods- physical changes, biological changes, chemical changes. Shelf life of foods – Definition, intrinsic and extrinsic factors controlling the rate of reactions. Shelf life determination tests.

**Module III: Packaging Materials and their properties**

Rigid containers- Glass, Wooden boxes, metal cans- Aluminium and tin plate containers, Semi rigid containers- paperboard cartons, Flexible packaging- paper, plastic pouches- Low density polyethylene, High density polyethylene and Polypropylene. Packaging materials for dairy products, bakery and confectionary, granular products, fruits and vegetables.

**Module IV :Special Packaging**

Aseptic packaging, Active packaging, Intelligent packaging, Modified atmospheric

packaging and controlled atmospheric packaging, Shrink packaging, stretch packaging, Biodegradable packaging, Edible packaging, Tetra packs.

### **Module V: Labeling and safety concerns in food pack**

Printing process, inks, adhesives, labeling, coding- bar codes, Food packaging closures of glass and plastic containers, Legislative and safety aspects of food packaging, Machineries used in Food Packaging, Package testing-Thickness – Paper density - Basis weight – Grammage - Tensile Strength - Gas Transmission Rate (GTR) - Water Vapour Transmission Rate(WVTR).

### **Learning Resources**

#### **References**

1. Gordon L. Robertson (2012), “Food Packaging: Principles and Practice”, Third Edition, CRC Press.
2. Takashi Kadoya (2012), “Food Packaging”, Academic press.
3. Richard Coles, Derek McDowell, Mark J. Kirwan (2003), “Food Packaging Technology”, CRC Press.

**Semester II**  
**VFP2S03 – Dairy Technology**  
**(Practical) (skill course)**

**Total Credits: 4**

**No. of instructional hours: 4 hrs/week**

**Aim of the course:** To develop the skills in dairy product preparation and to familiarize with the dairy plant equipments.

**Course Overview and Context**

- To gain knowledge about preparation of some dairy products
- To perform chemical analysis of milk sample
- To understand different processing equipment in dairy plant

**Syllabus Content**

1. Milk Testing – Platform Tests.
2. Determination of Activity (Titrable Acidity) of Milk.
3. Determination of fat and SNF content in milk.
4. Clot on boiling test for milk.
5. Determination of specific gravity of milk.
6. Detection of Addition of Starch in Milk.
7. Preparation of Lassi.

8. Preparation of khoa.
9. Preparation of Basundi.
10. Preparation of chakka and shrikand.
11. Preparation of kalakand.
12. Preparation of cooking butter.
13. Preparation of ghee.
14. Preparation of flavoured milk.
15. Visit to milk product development centre.

**Semester-II**  
**VFP2S04- FOOD PRESERVATION II**  
**Practical (Skill Course)**

**Total Credits : 4**

**No. of instructional Hours : 4 hrs/ per week**

**Objectives:**

To enable student –

- 1) To acquire knowledge of food preservation and preservation technique.
- 2) To know the application of food preservation methods.

**Course content:**

**Module I - Preservation by Low Temperature**

- Concept, History
- Types of preservation methods by low temperature
- Different equipments used for preservation by low temperature
- Treatments prior to freezing

**Module – II - Preservation by using Preservatives**

- Definition and Concept
- Types of preservatives-Natural and Artificial
- Mode of action of different preservatives



### **Module – III - Preservation by Irradiation Process**

- Meaning and Concept
- Irradiation methods
- Sources of radiation
- Level of dose and their effect on food

### **Module – IV - Modern Techniques in Food Preservation**

- Use of pulsed electric field
- High hydrostatic Pressure
- Hurdle technology

#### **Reference:**

- 1) Prakash Triveni : Food Preservation, Aadi Publication, Delhi.
- 2) Shafiur Rahman M: Hand Book of Food Preservation, Marcel Dekker Inc, New York.
- 3) McWillims and Paine : Modern Food Preservation, Surjeet Publication.
- 4) Fellows ,P. and Eills H. 1990 Food Processing Technology: Principles and Practicals, New York
- 5) NPCS Board, Modern Technology on Food Preservation
- 6) Sivasankar B.: Food Processing and Preservation

#### **PRACTICALS**

- 1) Introduction to freezing equipments
- 2) Preservation by using chemical preservatives
  - i) Tomato ketchup
  - ii) Fruit squash
- 3) Preparation of product by using salt as preservative
- 4) Preparation of product by using sugar as preservative
- 5) Preparation of product by using oil as preservative
- 6) Preparation of food product by Freeze drying  
to food preservation Module
- 7) Visit

**Semester- II**  
**VFP2G05- BUSINESS COMMUNICATION-I**  
**(General Course)**

**Credit: 4**

**No. of instructional hours: 4hrs/week**

**Module 1: Use of English in Business Environment**

**Topics:**

Business Vocabulary: Vocabulary for banking, marketing and for maintaining public relations

What is a sentence? Elements of sentence, Types of sentence: Simple, compound, complex

**Module 2: Writing a Letter of Application and CV/ Resume**

**Topics:**

Structure of a letter of application for various posts - CV/ Resume and its essentials

**Module 3: Presenting Information/Data**

**Topics:**

Presenting information/data using graphics like tables, pie charts, tree diagrams, bar diagrams, graphs, flow charts

**Module 4: Interview Technique**

**Topics:**

Dos and don'ts of an interview

Preparing for an interview

Presenting documents

Language used in an interview

**Practical: Based on the theory Modules**

**Reference Books:**

1) Sethi, Anjanee & Bhavana Adhikari. *Business Communication*. New Delhi: Tata McGraw Hill

Tickoo, Champa & Jaya Sasikumar. *Writing with a Purpose*. New York: OUP, 1979.

2) Sonie, Subhash C. *Mastering the Art of Effective Business Communication*. New Delhi: Student

Aid Publication, 2008.

3) Herekar, Praksh. *Business Communication*. Pune: Mehta Publications, 2007.

4) Herekar, Praksh. *Principals of Business Communication*. Pune: Mehta Publications, 2003.

5) Rai, Urmila & S. M. Rai. *Business Communication*. Himalaya Publishing House, 2007. Pradhan, N. S. *Business Communication*. Mumbai: Himalaya Publishing House, 2005.

6) Pardeshi, P. C. *Managerial Communication*. Pune: NiraliPrakashan, 2008.

## **Semester –II**

### **VFP2GO6 ENVIRONMENTAL STUDIES (General Course)**

**Total Credits :4**

**No. of instructional Hours : 4 hrs/ week**

#### **AIMS:**

To create better understanding about the deteriorating condition of our environment among students

#### **OBJECTIVES**

On completion this course, student should:

Have better awareness and concern about current environmental issues

Develop a healthy respect and sensitivity to environment

Develop pride in social and environmental activism.

#### **COURSE OUTLINE**

**Module–I:** The Multi-disciplinary Nature of Environmental Studies: Definition, scope and importance, Need for Public Awareness, Ecology and Ecosystems: Definition of Ecology, Structure and function of an ecosystem, Producers, Consumers and Decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristics features and function of – forest ecosystem, grassland ecosystem, desert ecosystem, aquatic ecosystem(ponds, streams, lakes, rivers, oceans, estuaries)

**Module-II:** Biodiversity and its conservation: Introduction, genetic, species and ecosystem diversity definition, value of biodiversity, biodiversity at global, national and local levels, India as a mega diversity nation, hot spots of biodiversity, threats to biodiversity – habitat lose, poaching of wild life, man wild life conflicts, endangered and endemic species of India, conservation of biodiversity in in-situ EX-situ

**Module-III** Natural Resources: Air resources-features, composition, structure, air quality

management, forest resources-, water resources, mineral resources, food resources, energy resources, land resources, Environmental pollution: definition, air pollution, water pollution, marine pollution, thermal pollution, soil pollution, noise pollution, nuclear hazards, waste management, cleaner technologies, reuse and recycling, solid waste management, role of

individuals to prevent pollution, pollution case studies, disaster management – floods, earthquake, cyclone and landslides

**Module –IV:** Social issues and the environment: From unsustainable to sustainable development, urban problems related to energy, water conservation, rain water harvesting, water shed management, resettlement and rehabilitation of people- it's problems and concerns, case studies, environmental ethics- environmental value relation ships, environmental ethics and species preservation, climate change, global warming, acid rain, Ozone layer depletion, nuclear accidents and holocaust, case studies, waste land reclamation, consumerism and waste products, legislation to protect the environment, environmental protection act, dir(prevention and control of pollution) act, water(prevention and control of pollution) act, wild life protection act, forest conservation act, environmental management systems(EMS), environmental information systems(EIS), P.I.L public hearing and role of NGOS, ISO 9000 and 14000, issues involved in enforcement of environment legislation, public awareness, environmental economics-environment and standard of living

#### **COURSE MATERIAL**

- 1)Kiran B Chokkas and others : “Understanding Environment”, Sage 2004
- 2)P. VenugopalaRao, Environmental Science & Engineering, PHI
- 3) Benny Joseph: Environmental Studies, Tata McGraw Hill
- 4)Lester R Brown, Plan B: rescuing a Planet under stress and a civilization in trouble, 5)Orient Longman Kurien Joseph & R Nagendran, Essentials of Environmental Studies, Pearson 26

## **Semester- II**

### **VFP2I02- Industrial visit /study tour /Internship Report**

**Credit: 2**

**Total hours:36**

Assessment of Project / Industrial visit /study tour /Internship Report

- i) The Project/Industrial visit/study tour/Internship report must be submitted by the prescribed date.
- ii) It is desirable that the topics for Project/Industrial visit/study tour/Internship report shall be assigned by the end of previous semester.
- iii) The Project/Industrial visit/study tour/Internship report and its presentation shall be evaluated by the coordinator of the course and concerned faculty

The external evaluation of the Project / Industrial visit /study tour /Internship report will done along with practical.

### Semester III

Semest	Title of the course	Course code	No. of Hours/ Week		Total	Total hou	Universit y exam	Total	
			Lec	Lab				CE	E
	Applied microbiology	VFP3G01	3	-	3	54	3	20	80
III	Technology of Fish, Meat and Egg Processing.	VFP3S02	4	-	4	72	3	20	80
	Technology of Spices and plantation crop	VFP3S03	4	-	4	72	3	20	80
	Technology of Fermented Foods	VFP3S04	4	-	4	72	3	20	80
	Food Microbiology	VFP3G05	3	-	3	54	3	20	80
	Food Microbiology (Practical)	VFP3S06	-	3	3	54	3	20	80
	Food Quality Testing(Practical)	VFP3S07	-	4	4	72	3	20	80
	Internship	VFP3I03	-	2	2	36	-	-	-
	<b>Total</b>			<b>30</b>		<b>S</b>	<b>G</b>	<b>540</b>	<b>140</b>
					<b>18</b>	<b>12</b>			

**Semester- III**  
**VFP3G01- APPLIED MICROBIOLOGY**  
**(General Course)**

**Total Credits:3**

**No. of instructional Hours : 3 hrs/week**

**Objective:**

To enable students

- 1) To study the different microorganism.
- 2) To understand the different food born disease and spoilage of food.

Course Content:

**UNIT I** -Introduction to microbiology - Concept of general Microbiology -Morphological characteristics and reproduction of bacteria, yeasts, fungi. -Physical & Chemical factors affecting growth and destruction of micro- organisms.

**Unit II** -Food Contamination -Introduction of sources of contamination. -Classification of food according to ease which it spoils. (fresh, dry and preserved ) -Bacterial & viral food intoxications. -Naturally occurring toxicants in food, toxic metals & chemicals

**Unit III** -Spoilage of Food -Introduction of microbial spoilage -Cereals & cereal products spoilage - Milk & milk products spoilage - Fruit & Vegetable products spoilage - Meat, poultry egg & fish products spoilage

**Unit IV** Food Born Disease - Introduction of food born disease -Mode of transmission of disease - Food borne illness - Control of food borne illness

**References**

- 1) W.C. Frazier and D.C, 1978, 3rd edition, Food Microbiology.
- 2) James M. Jay 1927. 6th edition, Modern Food Microbiology
- 3) G.J. Banwart, Basic Food Microbiology
- 4) Singh B.D., Nallari P., Kavikishore P and Singh R.P Applied Microbiology



**Semester III**  
**VFP3S02 – TECHNOLOGY OF FISH, MEAT AND EGG**  
**PROCESSING**  
**(Skill Course)**

**Total Credits: 4**

**No. of instructional Hours : 4 hrs/week**

**Aim of the course:** To understand the technology for handling, processing, preservation of meat, poultry and fish products.

**Course Overview and Context**

- To understand need and importance of livestock, egg and poultry industry
- To study structure, composition and nutritional quality of animal products.
- To study processing and preservation of animal foods.
- To understand technology behind preparation of various animal food products and by product utilization

**Syllabus Content**

**Module I: Compositional and Nutritional aspect of Animal foods**

**Fish** - Classification of fish (fresh water and marine), composition, spoilage of fish - microbiological, physiological, biochemical. **Meat** - Definition of carcass, concept of red meat and white meat, composition of meat, marbling in meat, post mortem changes in meat - rigor mortis, tenderization of meat, ageing of meat. **Egg**- composition and nutritive value, egg proteins, characteristics of fresh egg, deterioration of egg quality.

**Module II: Fish Processing**

**Preservation of fish**-Chilling, Freezing, curing, drying, salting - salting methods: brining, pickling, curing and canning of fish. Smoking - smoke production, smoke components, quality, safety and nutritive value of smoked fish, pre - smoking processes, smoking process control.

**Module III: Meat processing**

Meat Quality - colour, flavour, texture, Water Holding Capacity (WHC), Emulsification capacity of meat. Tests for assessment of raw meat - TVN, FFA, PV, Nitrate and nitrite in cured meat. **Preservation of meat** -Refrigeration and freezing, thermal processing - canning of meat, dehydration, meat curing.

## **Module IV :Egg processing**

Egg-Composition and nutritive value. Factors affecting egg quality. Preservation of eggs - Refrigeration and freezing, thermal processing, dehydration, coating.

## **Module V: Products from fish, meat and egg**

**Fishery products:** Surimi - Process, traditional and modern production lines, quality of surimi products. Fish protein concentrates (FPC), fish protein extracts (FPE). **Meat products:** Sausages - processing, RTE meat products. **Egg products**– Egg powder, frozen egg pulp, designer eggs.

## **Learning Resources**

### **Reference**

1. George M. Hall (2012), “Fish Processing Technology”, Springer Science & Business Media Publication.
2. Fidel Toldra (2010), “Handbook of Meat Processing”, John Wiley & Sons Publication.
3. Rao D.G. (2010), “Fundamentals of food engineering”. PHI Learning Pvt .Ltd.
4. Isabel Guerrero-Legarreta (2010), “Handbook of Poultry Science and Technology, Secondary Processing”, John Wiley and Sons Publication.
5. Casey M. Owens. (2010), “Poultry Meat Processing”, Second Edition, CRC Press.
6. Leo M.L. Nollet and Fidel Toldra (2006), “Advanced Technologies For Meat Processing”, CRC Press.

## **Semester III**

### **VFP3S03 – Technology of Spices and Plantation Crops (Skill Course )**

**Total Credits: 4**

**No. of instructional Hours : 4hrs/week**

**Aim of the course:** To impart basic knowledge about the importance and production technology of spices and plantation crops.

### **Course Overview and Context**

- To know about the importance of various types of spices which are used in the food industry and their applications
- To understand the processing steps involved in spice processing
- To know about value added products from spices
- To know various processing steps involved in plantation crop processing

## **Syllabus Content**

### **Module I:Spiceprocessing**

Introduction, classification, composition and functions. Major international quality specifications of spices. Spice processing, spice reconditioning, spice grinding, post-processing treatments. Introduction to Gas chromatography, HPLC, AAS, Spectrophotometer.

### **Module II: Processing of Major Spices**

Major spices: Pepper, cardamom, ginger, clove, nutmeg, vanilla, cinnamon, chilli and turmeric – method of manufacture; chemistry of the volatiles; enzymatic synthesis of flavour identical.

### **Module III :Spice extractives**

Value added spice products: Spice volatile oils, spice oleoresins, Use of spice extractives, replacement of spices with oils and oleoresins, alternative products, Ground spices, processed spices, organic spices, curry powders.

### **Module IV: Plantation crops-cashew processing**

Composition, Structure and characteristics of cashew nut, uses, Traditional method of cashew processing, General processing, Cashew apple processing , cashew by product -CNSL.

### **Module V: Sugarcane and Cocoa processing**

Production and processing of sugarcane, Cocoa: varieties, Processing of cocoa– Fermentation and Drying, storage. Manufacture of chocolate- couching, enrobing, milk chocolate, white chocolate, dark chocolate, cocoa butter, wafer coated chocolate, cocoa powder.

## **Learning Resources**

### **References**

1. J.S.Purthi, (2003) (2001), “Minor Spices and Condiments: Crop Management and Post Harvest Technology”, ICAR publication, 1stEdition,
2. Handbook of Fruit Science and Technology: Production, Composition, Storage, and Processing. D. K. Salunkhe, S. S. Kadam, CRC Press, 1st Edition,1995.
3. N.K.Jain,(1989), “Global Advances in Tea Science”, Aravali Books International, 1st Edition.

**Semester III**  
**VFP3S04 – Technology of Fermented Foods**  
**(Skill Course)**

**Total Credits: 4**

**No. of instructional Hours : 4hrs/week**

**Aim of the course:** To impart thorough knowledge about various aspects of food fermentation process and technologies involved.

**Course Overview and Context**

To make students acquainted with principles of using of microorganisms in fermentation process.

Attain knowledge of production equipment in fermentation industry, substrate preparation and control of fermentative process and isolation of products

Substantial time is devoted to particular fermented products -- spirits industry, yeast industry, brewing industry, production of microbial biomass and selected organic acids.

**Syllabus Content**

**Module I: Introduction to fermentation processes**

Range of fermentation processes – Microbial biomass, Microbial enzymes, Microbial metabolites, Recombinant products. Classification of fermentation process– Lactic acid fermentation, alcoholic fermentation. Importance of fermentation in food industry - Flavour enhancement, Nutritional value, Preservation, Antibiotic properties.

**Module II: Microbial growth kinetics**

Batch culture, Continuous culture, Comparison of batch and continuous culture in industrial processes - Biomass productivity, Metabolite productivity, Continuous brewing, Fed-batch culture - variable volume fed- batch culture, Fixed volume fed- batch culture, Application of fed-batch culture, Examples of the use of fed-batch culture.

**Module III: Media and Inocula for fermentation**

Typical media, medium formulation, water, energy sources - carbon sources, nitrogen sources, minerals. Growth factors, nutrient recycle oxygen requirements, antifoams, medium optimization. Inoculum – Criteria for transfer of inoculum, development of inocula for yeast, bacterial and mycelia process, aseptic inoculation of plant fermenters.

**Module IV: Fermenter and sterilization process**

Instrumentation of fermenter, basic functioning of fermenter, recovery and purification

of fermented products. Sterilization – Introduction, Sterilization of fermenter, sterilization of feeds, sterilization of liquid wastes

### **Module V: Fermented food products**

**Fermented meat products** – Cured- raw meat, semidry fermented sausages, dry – fermented sausages, mold ripened sausages. Fermented soy products – Soy sauce, fermented whole soy beans, fermented tofu, Tempeh. **Fermented vegetables** – Chinese pickles, Kimchi, Sauerkraut. **Fermented cereal products** –Sourdough bread, croissants, rye bread, hamburger bun, Danish pastry, beer.

### **References**

1. Deirdre Rawlings, (2013), “Fermented Foods for Health”, Fair Winds Press.
2. Robert W. Hutkins, (2008), “Microbiology and Technology of Fermented Foods”, John Wiley & Sons.
3. Stanbury P.P. and Whitaker, A. (1984), “Principles of Fermentation Technology”. Pergamon Press, Oxford UK.
4. Steinkraus, K.H. (1983). “Handbook of Indigenous Fermented Foods”, Marcel Dekker, New York.

## **Semester III VFP3G05 – Food Microbiology (General Course)**

**Total Credits: 3**

**No. of instructional hours: 3hrs/week**

**Aim of the Course:** To make students understand the food and industrial microbiology and to make them aware about the importance of food quality control by avoiding pathogenic microbial attack.

### **Course Overview and Context**

Recognize and describe the characteristics of important pathogens and spoilage microorganisms in foods.

Understand the role and significance of intrinsic and extrinsic factors on growth and response of microorganisms in foods.

Identify ways to control microorganisms in foods.

Describe the beneficial role of microorganisms

### **Syllabus Content**

#### **Module I: Introduction to food microbiology**

Discovery, current status, role of food microbiology, sources of micro organisms in food, changes caused by microorganisms - food fermentation, putrefaction, lipolysis. Growth and survival of

microorganisms in foods, biological, chemical and physical changes caused by microorganisms, physical and chemical methods to control microorganisms.

### **Module II: Characteristics of microorganisms**

Classification of microorganisms, nomenclature, morphology – yeast and moulds, bacterial cells, viruses. Important microbes in food, microbial growth characteristics – Microbial reproduction, nature of growth in food. Food hygiene and sanitation: Contamination during handling and processing and its control; indicator organisms.

### **Module III: Food preservation**

Factors influencing microbial growth in food: Intrinsic and extrinsic factor - Hydrogen ion concentration, Moisture requirement, concept of water activity, temperature, oxidation reduction potential, inhibitory substances and biological structure. Principles of different food preservation methods.

### **Module IV: Spoilage in different food groups**

Food spoilage – Introduction, spoilage in cereals, vegetables and fruits, meat, eggs, poultry, fish, milk and milk products, canned foods, nuts and oil seeds, fats and oil seeds. Definition - food infection and food intoxication.

### **Module V: Beneficial uses of microorganisms**

Microorganisms used in food fermentation, mechanisms of nutrient transport, application in genetics, intestinal bacteria and probiotics, food bio preservatives of bacterial origin, food ingredients and enzymes of microbial origin. Economic importance of microorganisms.

### **References**

1. Ray , Bibek; Arun Bhunia,(2013), “Fundamental Food Microbiology”, CRC Press.
2. Adams ,Martin R, Maurice O Moss, Peter McClure (2015), “Food Microbiology”, Royal Society of Chemistry, Cambridge.
3. Jay, James M.(2012), “Modern Food Microbiology”, Springer Science & Business Media., Maryland.

## **SEMESTER III VFP3S06- FOOD MICROBIOLOGY Practical (Skill Course)**

**Credits :3**

**No. of instructional Hours : 3 Hours**

- 1) Study of instruments used for microbiology, cleaning and sterilization of glassware.
- 2) Preparation of media, techniques of incubation
- 3) Staining methods (monochrome staining, gram staining, flagella staining,)
- 4) Pure culture techniques (streak plate/pour plate).
- 5) Isolation of microorganism from foods, microbial examination of cereal and cereal products.

- 6) Microbial examination of fruits and vegetables.
- 7) Microbial examination of milk and milk products.
- 8) Microbial examination of meat and meat products.
- 9) Microbial examination of egg and poultry.

**SEMESTER III**  
**VFP3S07- FOOD QUALITY TESTING**  
**Practical (Skill Course)**

**Total Credits: 4**

**No. of instructional Hours: 4 Hours/week**

1. Determination of viscosity by Brookfield viscometer
2. Texture Profile Analysis by texture analyzer
3. Color analysis by Tint meter
4. Determination of oBrix by Refract meter
5. Sensory analysis of food products
6. Study of solid waste disposal methods
7. Study of liquid waste disposal methods
8. Visit to waste disposal section in food industry

**SEMESTER III**  
**VFP3I03- Industrial visit /study tour /Internship Report**

**Credit: 2**

**Total hours:36**

Assessment of Project / Industrial visit /study tour /Internship Report

- i) The Project/Industrial visit/study tour/Internship report must be submitted by the prescribed date usually two weeks before the end of academic session of the semester.
- ii) It is desirable that the topics for Project/Industrial visit/study tour/Internship report shall be assigned by the end of previous semester.
- iii) The Project/Industrial visit/study tour/Internship report and its presentation shall be evaluated by the coordinator of the course and concerned faculty

### Semester IV

Semest	Title of the course	Course code	No. of Hours/ Week		Total credits	Total hou	Universtit y exam	Total	
			Lec	Lab				CE	E C
<b>IV</b>	Technology of Cereal, Pulses and Oilseeds.	VFP4S01	4	-	4	72	3	20	80
	Technology of Beverages	VFP4S02	4	-	4	72	3	20	80
	By product utilization and Waste Management	VFP4G03	4	.-	4	72	3	20	80
	Marketing Management	VFP4G04	4	-	4	72	3	20	80
	Food and Beverages Processing(Practical )	VFP4S05	-	3	3	54	3	20	80
	Cereals, Pulses, and Oilseeds(Practical)	VFP4S06	-	3	3	54	3	20	80
	Business Management	VFP4G07	4	-	4	72	3	20	80
	Internship	VFPI04	-	4	4	72	-	40	60
	<b>Total</b>			<b>30</b>		<b>S</b>	<b>G</b>		<b>180</b>
					<b>18</b>	<b>12</b>			



**Semester IV**  
**VFP4S01 – Technology of Cereals, Pulses and Oilseeds**  
**(Skill Course)**

**Total Credits: 4**

**No. of instructional Hours : 4hrs/week**

**Aim of the course:** To acquaint with production and consumption trends, structure, composition, quality evaluation, and processing technologies for product development and value addition of various cereals, pulses and oilseeds.

**Course Overview and Context**

To create awareness about the processing of major cereals like paddy maize.

To study the storage and handling techniques of cereals, oilseed and pulses.

To gain knowledge on processing and milling of pulses and extraction of oil.

**Syllabus Content**

**Module I :Paddy Processing**

Composition and Quality characteristics. Curing of Paddy. Parboiling Processes-soaking, steaming, drying, CFTRI and pressure parboiling process, Paddy Dryer - LSU Dryer. Production of Flattened Rice and Puffed Rice from Paddy.

**Module II :Rice Milling**

Paddy Dehusking Processes. Rice Mill Flow Chart. Engelberg Huller Mills. Modern Rice Mills – Their Components - Pre Cleaners, rubber roll Shellers, Paddy Separators – Satake type, Polishers - Cone polishers, glazing, Extraction of rice bran oil and uses of rice bran in food industry.

**Module III :Wheat milling**

Wheat - composition and nutritional value, wheat milling process - cleaning-conditioning/hydrothermal treatment, milling-break roll and reduction rolls.

**Module IV: Milling of Pulses**

Varieties-chemical composition and structure-dry milling and wet milling process of pulses, processed products of pulses.

**Module V: Oil seed processing**

Introduction- methods- hydraulic press- screw press – principle and working, solvent extraction methods, Clarification, degumming, neutralization, bleaching, deodorization techniques/process, blending of oils. Hydrogenation, Fractionation, Winterization.

### **Learning Resources**

### **References**

1. Dendy DAV & Dobraszczyk BJ. (2001), “Cereal and Cereal Products”, Aspen Publications.
2. Chakraverty, A. (1995), “Post Harvest Technology of Cereals, Pulses and Oilseeds”. Oxford and IBH Publishing Co, Calcutta
3. N.L.Kent and A.D.Evans: (1994) “Technology of Cereals” (4th Edition), Elsevier Science (Pergamon), Oxford, UK,
4. Samuel Matz: (1992), “The Chemistry and Technology of Cereals as Food and Feed, Chapman & Hall

## **Semester IV VFP4S02 – TECHNOLOGY OF BEVERAGES (Skill Course)**

**Total Credits: 4**

**No. of instructional Hours : 4hrs/week**

**Aim of the course:** The aim of the course is to provide the students with general scientific knowledge about processing of alcoholic and non- alcoholic beverages.

### **Course Overview and Context**

- To study about the various beverages.
- To study about the products made out of them.
- To provide a technical view of beverages.
- To understand the manufacturing processes in the context of technology.

### **Syllabus content**

#### **Module I: Introduction to beverages**

Types of beverages and their importance, status of beverage industry in India, Manufacturing technology for juice-based beverages, synthetic beverages; technology of still, carbonated, low-calorie and dry beverages, isotonic and sports drinks; role of various ingredients of soft drinks, carbonation of soft drinks.

#### **Module II: Manufacturing process of beverages**

Beverages based on tea, coffee, cocoa, spices, plant extracts, herbs, nuts, Dairy-based beverages.

#### **Module III: Types of coffee and tea**

Chemical composition and processing of tea and coffee and their quality assessment. Types of tea: black tea, green tea, oolong tea. Types of coffee: Vacuum coffee, drip coffee, iced coffee. Espresso coffee, instant coffee. Decaffeination of Coffee types of decaffeination: Roselius method, Swiss water process, direct and indirect method, triglyceride method, carbon dioxide method.

#### **Module IV :Alcoholic beverages**

Types, manufacture and quality evaluation; the role of yeast in beer and other alcoholic beverages, ale type beer, lager type beer, technology of brewing process, equipments used for brewing and distillation, wine and related beverages, distilled spirits.

#### **Module V: Packaged drinking water**

Definition, types, manufacturing processes, quality evaluation and raw and processed water, methods of water treatment, BIS quality standards of bottled water; mineral water, natural spring water, flavoured water, carbonated water.

#### **Learning Resources**

#### **Reference Books**

1. Manay, N.S, Shandaksharaswamy, M., (2004), “Foods- Facts and Principles”, New Age International Publishers, NewDelhi,
2. Potter, N.N, Hotchkiss, J.H.( 2000), “Food Science”. CBS Publishers, NewDelhi.
3. Srilakshmi, B. Food Science (3<sup>rd</sup> Edition) (2003), New Age International (p) Limited Publishers, NewDelhi,
4. Nicholas Dege. (2011), “Technology of Bottled water”. Blackwell publishing Ltd, UK.

### **Semester IV**

#### **VFP4G03 – By product utilization and Waste management (General Course )**

**Total Credits: 4**

**No. of instructional Hours : 4hrs/week**

**Aim of the course:** To understand about the ways for effective utilization of the byproducts obtained after food processing and also to gain knowledge about characterization of waste products and effluent treatment methods.

#### **Course Overview and Context**

To identify types of wastes in food industry

To gain knowledge in different effluent treatment methods

To utilize the byproduct in the food industry

## **Syllabus Content**

### **Module I: Introduction**

Types of waste and magnitude of waste generation in different food processing industries, concept, scope and importance of waste management and effluent treatment.

### **Module II :Waste characterization**

Temperature, pH, Oxygen demands (BOD, COD, TOD), fat, oil and grease content, metal content, forms of phosphorous and sulphur in waste waters, microbiology of waste, other ingredients like insecticide, pesticides and fungicide residues'

### **Module III :Effluent Treatment**

Pretreatment of waste: sedimentation, coagulation, flocculation and floatation  
Secondary treatments: Biological oxidation (trickling filters, activated sludge process),  
industrial wastewater treatment: characteristics of industrial wastewater, treatment levels

### **Module IV: Waste utilization of agro industries**

Characterization and utilization of by products from cereals (breweries), pulses, oilseeds, fruits & vegetables (wineries) and plantation crops (sugar industries).

### **Module V: Waste utilization of animal and marine product industries**

Characterization and utilization of byproducts from dairy, eggs, meat, fish and poultry

### **Learning Resources**

#### **Reference**

1. Abbas Kazmi, Peter Shuttleworth, (2013), "The Economic Utilization of Food Co- Products", Royal Society of Chemistry Publishing.
2. A.M.Martin,(2012),"BioconversionofWasteMaterialstoIndustrialProducts", Springer Science & Business Media Publishing.
3. Marcos von Sperling,(2007), "Basic Principles of Wastewater Treatment", IWA Publishing.

**Semester IV**  
**VFP4G04 – Marketing Management**  
**(General Course)**

**Total Credits: 4**

**No. of instructional Hours : 4hrs/week**

**Course Overview and Context**

To know about the various types marketing strategy involved in generating sales for a new product food products?

To have a basic idea about different marketing skills,

To know the different ways in which a food can be marketed to give optimum visibility,

To understand the importance of packaging in improving sales and the latest marketing trends

**Syllabus Content**

**Module I: Marketing management**

Introduction- Definition of marketing and marketing management- Marketing concepts and functions-Marketing research – marketing mix.

**Module II :Market segmentation**

Concept-Need- Basis-Market targeting-Market Positioning -Understanding consumer behaviour- Buying motives- Factors influencing consumer buying decisions

**Module III: Marketing of products**

Product- Meaning- Product development- Product mix- PLC- Branding- brand equity- Brand loyalty-Trade mark. Packaging and labelling - Pricing of products-Factors influencing pricing- Pricing policies and Strategies-Types of pricing.

**Module IV: Logistic and supply chain management**

Its elements-Channel of distribution types- Factors affecting the choice of a channel of distribution.

**Module V: Emerging trends in marketing**

Modern marketing- Direct marketing- E Marketing- Tele marketing-Viral marketing - Relationship marketing-Social marketing- Demarketing - Remarketing- Synchro marketing-Service marketing.

#### **Semester- IV**

### **VFP4S05 - FOOD AND BEVERAGES PROCESSING**

#### **Practical- Skill Course**

**Credits :3**

**No. of instructional Hours : 3 hrs/week**

#### **PRACTICALS:**

- 1) Examination of physical impurities of water
- 2) Determination of brix: acid ratio of the beverage.
- 3) Determination of SO<sub>2</sub> content of soft drink.
- 4) Preparation of grape wine
- 5) Determination of saccharin
- 6) Determination of total CO<sub>2</sub> of water
- 7) Determination of free CO<sub>2</sub> of water
- 8) Determination of total sulphates in water
- 9) Determination of total alkalinity of water
- 10) Preparation of carbonated beverages 1
- 11) Visit to beverage processing unit

#### **Semester IV**

### **VFP4S06– Cereals, Pulses and Oilseeds (Practical)**

#### **Practical- Skill Course**

**Total Credits: 3**

**No. of instructional Hours : 3hrs/week**

#### **Course Overview and Context:**

- To understand the physical properties of cereal flours.
- To impart knowledge on working of a rice milling station.
- To impart knowledge on working of a oil expelling unit station.

#### **Syllabus Content**

1. Physical characteristics of Wheat.

2. Estimation of Gluten Content of flour.
3. Estimation of Polanski Value of flour.
4. Estimation of Potassium Bromate in flour.
5. Fermenting power of yeast.
6. Physical Characteristics of Rice and paddy.
7. Cooking characteristics of rice.
8. Determination of sedimentation power of flour.
9. Visit to rice mill station.
10. Visit to oil expelling unit.

**Semester IV**  
**VFP4G07 - Business Management**  
**(General Course )**

**Total Credits: 64**

**No. of instructional Hours : 4hrs/week**

**Course Overview and Context**

- To familiarize the students with concepts and principles of Management

**Syllabus            Content**

**Module I : Management**

Introduction, Meaning, nature and characteristics of Management - Scope and functional areas of management - Management as a science art or profession - Management & Administration – Principles of management - Social responsibility of management.- Contributions of F. W. Taylor and Henry Fayol - Emergence of Japan as an industrial giant.

**Module II: Planning**

Nature, importance and purpose of planning - Planning process, objectives - Types of plans MBO-Features-steps.

**Module III: Organizing and Staffing**

Nature and purpose of organization, Principles of organization - Types of organization, Organization Chart- Organization manual-Departmentation, Committees Authority-Delegation of Authority- Responsibility and accountability-Centralization Vs decentralization of authority - Nature and importance of staffing - Process of selection & recruitment.

**Module IV :Directing**

Meaning and nature of directing - Motivation- meaning - importance-Theories of Motivation (Maslow s, Herzberg, McGregor s, X & Y theory) Leadership-Meaning-Styles Managerial Grid by Blake and Moun-ton - Likert s Four level model-Coordination-Meaning and importance.

### **Module V:Controlling**

Meaning and steps in controlling - Essentials of a sound control system - Methods of establishing control-Control by Exception.

### **Learning Resources**

#### **References**

1. Koontz & O Donnell ,Management.
2. Appaniah & Reddy, Essentials of Management.
3. L M Prasad, Principles of management.
4. Rustum & Davan, Principles and practice of Management.

### **Semester- IV**

#### **VFPI04 - PROJECT / INDUSTRIAL VISIT /STUDY TOUR /INTERNSHIP REPORT**

**Total Credits : 4**

**Total Hours : 72**

Project/Industrial visit/Institutional visit study tour based on the any one subject related to the syllabus

- i. Presentation of study tour report
- ii) Submission of study tour report
- iii) Submission of Project report/ Viva – Voce

The evaluation of Project/Industrial visit/ study tour will be conducted along with the practicals.



### Semester V

Semest	Title of the course	Course code	No. of Hours/ Week		Total credits	Total hou	Universit y exam	Total	
			Lec	Lab				CE	E
<b>V</b>	Fruit and Vegetable Processing	VFP5S01	5	-	5	90	3	20	80
	Food Chemistry	VFP5S02	5	-	5	90	3	20	80
	Food Quality Assurance	VFP5S03	4	-	4	72	3	20	80
	Computer Applications	VFP5G04	4	-	4	72	3	20	80
	Personality Development	VFP5G05	4	-	4	72	3	20	80
	Food Chemistry(Practical)	VFP5S06	-	4	4	72	3	20	80
	Food Processing Equipment	VFP5G07	4	-	4	72	3	20	80
	<b>Total</b>			<b>30</b>		<b>S</b>	<b>G</b>	<b>540</b>	<b>140</b>
					<b>18</b>	<b>12</b>			

**Semester V**  
**VFP5S01 – Fruit and Vegetable Processing**  
**(Skill Course)**

**Total Credits: 5**

**No. of instructional Hours : 5hrs/week**

**Aim of the course:** To understand about the proper post harvest handling technologies of fruits and vegetables and to know the process of development of fruit and vegetable processing products.

**Course Overview and Context**

- To know about the status of fruit and vegetable production in India with importance to losses.
- To study about the processing of fruits and vegetables.
- To impart knowledge about the various products from them.
- To study the various methods of drying of fruits and vegetables

**Syllabus Content**

**Module I: Introduction**

Composition and nutritive value of fruits and vegetable. Factors effecting composition and quality of fruits and vegetables. Quality requirements of raw materials for processing; sourcing and receiving at processing plants, primary processing: grading, sorting, cleaning, washing, peeling, slicing and blanching

**Module II: Spoilage of fruits and vegetables**

Different types of spoilages in fruits and vegetables. Spoilage during storage of fruits and vegetables and their prevention. General methods of preservation of whole fruits/vegetables and processed fruits and vegetables. Spoilage of pickles. Methods of preparation, curing techniques, defects and remedies. Types of preservatives commonly used in Fruits and vegetables processing industry, limits of usage of preservatives.

**Module III: Processing of fruits and vegetables**

Dehydration of fruits and vegetables using various drying technologies like sun drying, solar drying (natural and forced convection), osmotic, tunnel drying, fluidized bed drying, freeze drying, convectional and adiabatic drying; applications to raisins, dried figs, vegetables, intermediate moisture fruits and vegetables. Fruit powders using spray drying. Technology of extraction of juices from different types of fruits.

**Module IV: Manufacture of Fruit products**

Manufacturing process of juice, soup, puree, and paste .Jams, Jellies and marmalades: selection, preparation, production. Difference between jam and jelly. Theory of jell formation, failure and remedies in jam and jelly making. General principles and manufacturing processes of preserves, candied fruits, glazed fruits, crystallized fruits

### **Module V: Manufacture of vegetable products**

Manufacturing process of sauce, ketchup, vegetable juices and concentrated products

### **Learning Resources**

#### **Reference Books**

1. Nirmal Sinha, Y. H. Hui, et al; (2010), “Handbook of Vegetables and Vegetable Processing”, John Wiley & Sons.
2. Olga Martin-Belloso, Robert Soliva Fortuny, (2010), “Advances in Fresh-Cut Fruits and Vegetables Processing”. CRC Press.
3. W Jongen (2002), “Fruit and Vegetable Processing: Improving Quality”, Elsevier Publications.

### **Semester V**

### **VFP5S02 – Food Chemistry**

### **(Skill Course)**

**Total Credits: 5**

**No. of instructional Hours : 5hrs/week**

**Aim of the course:** To explain the chemical composition and functional properties of food.

#### **Course Overview and Context**

- To study about the major and minor components of food and their properties
- To know about the changes that occurs in foods during processing.
- To study the classification, structure and chemistry of the various food components.
- To understand the changes that occurs in the different constituents during storage and ways and means to prevent it.

#### **Syllabus Content**

##### **Module I: Water**

Introduction to food chemistry, structure of water molecule, hydrogen bonding, effect of hydrogen bonding on the properties of water, moisture in foods, free water, bound water, water activity, estimation of moisture in foods, determination of moisture and water

activity.

### **Module II: Carbohydrates**

Nomenclature, composition, sources, structure, reactions, functions, classification - monosaccharide, disaccharides, oligosaccharides and polysaccharides. Properties of Starch – gelatinization, gel formation, syneresis, starch degradation, dextrinisation, retrogradation, Qualitative and quantitative tests of carbohydrates.

### **Module III: Proteins**

Nomenclature, sources, structure, functions, classification - essential and non-essential amino acids, Physical and chemical properties of proteins and amino acids, functional properties - denaturation, hydrolysis, changes in proteins during processing. Enzymes - Specificity, mechanism of enzyme action, factors influencing enzymatic activity, controlling enzyme action, enzymes added to food during processing, enzymatic browning.

### **Module IV: Fats and oils**

Nomenclature, composition, sources, structure, functions, classification, essential fatty acids. Physical and chemical properties - hydrolysis, hydrogenation, rancidity and flavour reversion, emulsion and emulsifiers, saponification value, acid value and iodine value, smoke point.

### **Module V: Pigments, colours and flavours in food**

Micro nutrients: Vitamins and minerals, Pigments indigenous to food, structure, chemical and physical properties, effect of processing and storage, colours added to foods, flavours - vegetable, fruit and spice flavours, flavours of milk and meat products, effect of processing on flavour components.

### **Reference Books:**

2. Yildiz, Fatih (2009), “Advances in Food Biochemistry”, CRC Press, New York.
3. Damodaran, S., Parkin, K L., Fennema, O R., (2008), “Fennema’s Food Chemistry” - 4<sup>th</sup> edition, CRC press, New York
4. Campbell, M K and Farrell, S O (2006), “Biochemistry”, 5<sup>th</sup> edition, Cengage Learning Publishers, USA.
5. Manay, N.S. Shadaksharaswamy, M. (2004), “Foods- Facts and Principles”, New age international publishers, New Delhi.
6. Meyer, L.H. (2002), “Food Chemistry”. CBS publishers and Distributors, New Delhi.

**Semester V**  
**VFP5S03- Food Quality Assurance**  
**(Skill Course)**

**Total Credits: 4**

**No. of instructional Hours : 4hrs/week**

**Aim of the course:** To acquaint with food quality parameters and control systems, food standards, regulations, specifications.

**Course Overview and Context**

- To understand the principles and framework of food safety.
- To understand food laws and regulations governing the quality of foods.
- To apply preventive measures and control methods to minimize microbiological hazards and maintain quality of foods.
- To identify the wide variety of parameters affecting food quality.
- To understand about Intellectual property rights.

**Syllabus Content**

**Module I: Concept of quality**

Quality attributes- physical, chemical, nutritional, microbial, and sensory; their measurement and evaluation; Sensory *vis-à-vis* instrumental methods for testing quality.

**Module II: Concepts of quality management**

Objectives, importance and functions of quality control, Quality management systems in India, Sampling procedures and plans, Food Safety and Standards Act, 2006, Domestic regulations, Global Food safety Initiative, Various organizations dealing with inspection, traceability and authentication, certification and quality assurance - PFA, FPO, MMPO, MPO, AGMARK, BIS; Labeling issues, International food standards.

**Module III :HACC system**

Hazard analysis Critical Control Point: Definition, principles, Guidelines for the application of HACCP system.

**Module IV: Food Quality Laws and Regulations**

Quality assurance, Total Quality Management, GMP/GHP, GLP, GAP, Sanitary and hygienic practices, HACCP, Quality manuals, documentation and audits; Indian & International quality systems and standards like ISO and Food Codex, Export import policy, export documentation, Laboratory quality procedures and assessment of laboratory performance, Applications in different food industries, Food adulteration and food safety.

**Module V: Intellectual Property Rights**

IPR – Introduction, History in India, Laws related to IPR, Copyright, patent, trademark, designs, geographical indications of food, World Intellectual Property Organization (WIPO), Commercialization of Intellectual Property Rights (IPR), important websites.

### **Reference Books**

1. Yong-Jin Cho, Sukwon Kang.(2011), “Emerging Technologies for Food Quality and Food Safety Evaluation” ,CRC Press.
2. Alli Inteaz, (2003), “Food Quality Assurance: Principles and Practices”, CRC Press.
3. Vasconcellos J. Andres, (2003), “Quality Assurance for the Food Industry: A Practical Approach”,CRC Press.

## **Semester V VFP5G04 – Computer Applications (General Course)**

**Total credits: 4**

**No. of instructional Hours : 4hrs/week**

### **Course Overview and Context**

To understand the operations of windows operating system, desktop, text editing and printouts in word pad

To understand the operations of MS WORD-(Editing , Formatting, inserting)

To understand the various operations in MS-Excel

### **Syllabus Content**

#### **Module I:OfficeAutomation**

Introduction-Tools, Windows 7, desktop, files and folders, printers, Microsoft Office button, Quick access tool bar

#### **Module II: MSWord 7**

Introduction- Typing text, Saving, opening, Closing, common edit functions (cut copy paste, change case). Text Editing - Inserting text, spell check, correcting mistakes, common formatting functions. Formatting paragraph, tables, bullets & numbering, inserting clipart & word art, picture & Drawing tool bar, Header & footer.

#### **Module III: MSExcel7**

Introduction- Parts of MS Excel windows, opening, saving and closing, workbook, entering data and numbers, Texts, date & time, formatting data, tool bar, drawing in MS Excel, Drawing tool bar, formatting & editing worksheet. Format cells, row , column, work sheet ( Inserting, deleting, renaming) Formulas, functions, charts.

#### **Module IV: MS PowerPoint 7**

Introduction- Parts of power point windows. Features, background design, word art, clipart, 3D settings. Animations, sound views, types of views, inserting, deleting , arranging slides, slideshows

#### **Module V: DBMS, Internet &Email**

DBMS Intro & basic concepts, Internet introduction, Creating Email- Inbox, compose, draft, attachments.

#### **Learning Resource**

#### **References**

1. Study material for Diploma in Computer Application, Centre for continuing Education, Kerala.
2. Tom Bunzel, MS Office Research Guide; InformationIT.com.

### **Semester V**

#### **VFP5G05– Personality Development (General Course)**

**Total Credits: 4**

**No. of instructional Hours : 4 hrs/week**

**Aim of the course:** To understand the strategies for the personality development and to improve the personality of the employees upon organizational effectiveness.

#### **Course Overview and Context**

To bring about personality development with regard to the different behavioral dimensions.

#### **Syllabus Content**

##### **Module I:Leadership**

Introduction to Leadership, Leadership Power, Leadership Styles, Leadership in administration

##### **Module II :Interpersonal Relations**

Introduction to Interpersonal Relations, Analysis of different ego states, Analysis of Transactions, Analysis of Strokes, Analysis of Life position

### **Module III: Stress and Conflict Management**

Introduction to Stress, Causes of Stress, Impact Stress, Managing Stress. Conflict: Introduction to Conflict, Causes of Conflict

### **Module IV :Time Management**

Time as a Resource, Identify Important Time Management Wasters, Individual Time Management Styles, Techniques for better Time Management.

### **Module V:Motivation**

Introduction to Motivation, Relevance and types of Motivation, Motivating the subordinates, Analysis of Motivation

### **Semester - V**

#### **VFP5S06-FOOD CHEMISTR)**

#### **Practical- Skill Course**

**Total Credits :4**

**No. of instructional Hours : 4hrs/week**

- 1) Identification of Unknown Carbohydrate in sample
- 2) Identification of Unknown Protein in sample
- 3) Estimation of iodine value of fat/oil
- 4) Estimation of Saponification number of fat/oil
- 5) Estimation of Acid value of fat/oil
- 6) Estimation of Vitamin C content of sample
- 7) Estimation of hardness of water

### **Semester V**

#### **VFP5G07 – FOOD PROCESSING EQUIPMENTS (General Course)**

**Total Credits: 4**

**No. of instructional Hours : 4hrs/week**

**Aim of the course:** To introduce basic equipment design and various control mechanisms.

#### **Course Overview and Context**

To enable the student to design and develop equipments used in Food Processing operations.

To identify and discuss critical design of typical processing equipment.

To Understand the relationship between process design and Safety

### **Syllabus Content**



### **Module I: Introduction to equipments used in food industry**

Equipments: Types, planning, factors affecting selection and purchase

### **Module II: Mechanical Equipments**

Transport equipments: Fluid food transport equipment, mechanical conveyors. Storage equipments: Solid and liquid food storage equipments. Processing equipments: Size reduction, homogenization, mixing and foaming equipments. Separation equipments: Grading and sorting equipments.

### **Module III: Heat exchangers, dryers and evaporators**

Heat transfer equipments: Heat exchangers. Food evaporation equipments: food evaporators, evaporator components. Food dehydration equipments – Food dehydration principle, food dryers, hygiene and safety considerations.

### **Module IV: Refrigeration and thermal processing equipments**

Refrigeration and freezing equipments: Refrigerants, freezers, chillers. Thermal processing equipments: sterilizers, pasteurizers, blanchers.

### **Module V: Food packaging Equipments**

Introduction, preparation of food containers, filling equipments, closing equipments, group packaging.

### **Learning Resources**

#### **Reference Books**

1. Saravacos, George, (2015), “Handbook of Food Processing Equipment”, Springer Publishing.
2. H. L. M. Lelieveld, John Holah, David Napper, (2014), “Hygiene in Food Processing: Principles and Practice”, Elsevier Publications.
3. Sue Azam-Ali, (2003), “Small-scale Food Processing: A Directory of Equipment and Methods”, ITDG Publishing.

### Semester VI

Semest	Title of the course	Course code	No. of Hours/ Week		Total credits	Total hou	Universit	Total	
			Lec.	Lab.				CE	E
VI	Unit Operations in Food Industry	VFP6G01	4	-	4	72	3	20	80
	Emerging Technologies in food industry	VFP6G02	4	-	4	72	3	20	80
	Food Packaging(Practical)	VFP6S03	-	3	3	54	3	20	80
	Snack Food Processing(Practical)	VFP6S04	-	3	3	54	3	20	80
	Food Service Management	VFP6G05	4	-	4	72	3	20	80
	Project and Viva voce	VFP6I06	-	12	12	216	-	160	240
	<b>Total</b>			<b>30</b>		<b>S</b> <b>18</b>	<b>G</b> <b>12</b>	<b>540</b>	<b>260</b>

**Semester VI**  
**VFP6G01 - Unit Operations in Food Industry**  
**(Skill Course)**

**Total credit: 4**

**No. of instructional Hours : 4hrs/week**

**Aim of the course:** To provide in-depth knowledge in basic concepts of various unit operations in a food industry.

**Course Overview and Context**

- To understand the different operations performed in food industry
- To know details of working of different equipments

**Course Outline**

**Module I: Heat Transfer in Food Processing**

Modes of heat transfer-conduction, convection and radiation- heat exchangers- plate heat exchanger-tubular heat-scraped surface heat exchanger.

**Module II: Evaporation**

Basic principle, need for evaporation, single effect, multiple effect, heat economy, type of evaporator-long tube, short tube, agitated film evaporator.

**Module III: Distillation and crystallization**

Simple distillation, flash distillation, steam distillation, fractional distillation  
Crystallization -theory, tank crystallizer and scraped surface crystallizer.

**Module IV: Extraction and extrusion**

Solid Liquid extraction-leaching, Liquid-Liquid extraction, Super critical fluid extraction, single screw extruder, twin screw extruder

**Module V: Mechanical separation and material handling**

Sedimentation, Centrifugal separation, filtration, Mixing, Material handling-Belt conveyor, Screw Conveyor, bucket elevator and pneumatic conveyor.

## Learning Resources

### References

2. Y.H.Hui, (2005), "Handbook of Food Science, Technology and Engineering" (vol.1-4), Marcel Dekker Publishers.
3. M.A.Rao, S.S.H.Rizvi and A.K.Dutta, (2005), "Engineering properties of Foods", 3rd ed., Marcel Dekker Publishers.
4. H.Pandey, H.K. Sharma, R.C.Chouhan, B.C. Sarkar and M.C. Bera, (2004), "Experiments in Food Process Engineering", CBS Publishers and Distributors.
5. R.P.Singh and D.R.Heldman, (2001), "Introduction to Food Engineering", 3rd ed., Academic Press.
6. S.K.Sharma, S.J.Mulvaney and S.S.H.Rizvi, (2000), "Food Process Engineering: Theory and Laboratory Experiments", Wiley and Sons Publishers.

## Semester VI

### VFP6G02- Emerging Technologies in Food Industry (General Course)

**Total Credits: 4**

**No. of instructional Hours : 4hrs/week**

**Aim of the course:** To understand about new developments in food industry and to impart knowledge about the importance and applications of the technology.

#### Course Overview and Context

To enable the student to understand: Emerging / alternative technologies applied to food processing.

Relative advantages / disadvantages over existing technologies.

Economics and commercialization of newer technologies.

#### Syllabus Content

##### **Module I: Membrane separation process**

Membrane Technology-process- Micro-filtration, Ultra-filtration, Nano-filtration and Reverse Osmosis-advantages-equipment

##### **Module II: High pressure processing and microwave heating**

Microwave heating of foods- Mechanism of Heat Generation-Working of microwave

oven, High Pressure processing: Concept-Equipment for HPP Treatment-Mechanism of Microbial Inactivation and its Application in Food , dielectric heating of foods

**Module III: Irradiation and PEF and ohmic heating** Pulsed electric field – equipment –mechanism of PEF-advantages, Ohmic heating of foods-mechanism- principle-advantages, applications. Irradiation- principle- types of irradiation-advantages-applications

**Module IV: Osmotic dehydration of foods and minimal processing** Principle – Mechanism of osmotic dehydration – Effect of process parameters on mass transfer – Methods to increase the rate of mass transfer – Applications – Limitations of osmotic dehydration – Management of osmotic solutions. Minimal processing-principle-methods-advantages

**Module V: Nanotechnology and antimicrobial technology**

Role of Antimicrobial agents in food –Plant and animal derived antimicrobials – Antimicrobial enzymes, antimicrobial food packaging, nanotechnology-application of nanotechnology in food industry

### **Learning Resources**

### **Reference Books**

1. Leistner L. and Gould G. Hurdle Technologies – Combination treatments for food stability safety and quality, Kluwer Academics / Plenum Publishers, New York (2002)
2. Novel Food Processing Technologies(Food Science and Technology Series) by Gustavo V. Barbosa-Canovas, Maria S. Tapia, M. Soledad Tapia, M. Pilar Cano, Publisher: CRC Press, November 2004, ISBN-13:9780824753337,
3. P Richardson (2001), “Thermal Technologies in Food Processing”, Campden and Chorleywood Food Research Association, UK, Woodhead Publishing Limited.

**Semester -VI**  
**VFP6S03-FOOD PACKAGING**

**Practical-Skill Course**

**No. of Credits :3**

**No. of instructional Hours : 3hrs/week**

1. Identification of parts of food Package
2. Study of information on food Package
3. Determination of Thickness of paper
4. Physical test for plastics films.
5. Determination of GSM of Packaging material
6. Examination of different types of packages and containers
7. Study of edible packaging material
8. Cut out examination of can
9. Preparation of album of food packaging materials
10. Designing of sample labels.

**Semester -VI**  
**VFP6S04- SNACK FOODS PROCESSING**

**Practical-Skill Course**

**No. of Credits:3**

**No. of instructional Hours : 3hrs/week**

- 1) Preparation of Papad and its quality evaluation
- 2) Preparation of Chips and its quality evaluation
- 3) Preparation of Wafers and its quality evaluation
- 4) Preparation of Flaked cereals (Poha) and its quality evaluation
- 5) Preparation of Puffed cereals (Churmura) and its quality evaluation
- 6) Preparation of Expanded snack and its quality evaluation
- 7) Preparation of Roasted grains or nuts and its quality evaluation
- 8) Preparation of Coated grains or nuts and its quality evaluation
- 9) Preparation of instant food premixes and its quality evaluation
10. Visits to snack foods manufacturing industries

**Semester VI**  
**VFP6G05 – FOOD SERVICE MANAGEMENT**  
**(General Course)**

**Total Credits: 4**

**No. of instructional Hours : 4hrs/week**

**Aim of the course:** To understand the functioning of food service establishments. And to acquire knowledge about the services that should be given by a food service establishment.

**Course Overview and Context**

- To understand the organisation of food service establishments
- To understand the management of human, material and financial resources.
- To be familiar with various concepts involved in quantity and quality food production and service.
- To understand the need for efficient personnel management in the food industry.

**Syllabus Content**

**Module I: Introduction to Food Service Establishments 8 Hours**

Types of food service establishments. Planning for a food service unit- Planning, investment, Project report, Registration (License and Inspection).

**Module II: Menu Planning and table setting 14 Hours**

Menu Planning- importance, types, steps in planning. Requisites in designing a menu card, Methods of purchase, delivery, receiving, storage types. Table Setting and Arrangement - Indian and Western Styles of Table Setting, Table Appointments, Napkin folding styles, Flower arrangement, Table Etiquettes.

**Module III: Food Service and Delivery system 15 Hours**

Centralized and decentralized delivery systems, types of food service systems conventional, commissary, ready prepared, assembly, service styles - table, counter, tray, silver, plate, cafeteria, buffet. Specialized forms of food service - hospitals, airline, rail, homedelivery, catering and banquet, room and lounge service.

**Module IV: Food Service Management 15 Hours**

Managing an organization, Process involved, Principles of management, Functions of management- planning, organizing, directing, co-ordinating, evaluating, and controlling. Total quality management, Management by objectives. Work design, job design, work study and simplification.

**Module V: Accounting 8 Hours**

Book keeping, books of accounts, Journal, Ledger, trial balance, balance sheet. profit analysis, food cost control.

**Learning Resources**

**Reference Books**

1. Arora, (2007), “Food Service And Catering Management” APH Publishing.

2. Wentz Bill, (2007), “Food Service Management”, Atlantic Publishing Company.
3. Malhotra, R. K.(2002), “Food Service and catering Management” ,Anmol Publication Pvt Ltd.

## **SEMESTER VI**

### **VFP6I06- MAJOR PROJECT**

**No. of Credits: 12**

**Total Hrs: 216**

Project based on the any one subject related to the syllabus/ Scheme

- i) Submission of Project Report
- ii) Presentation of project report
- iii) Viva – Voice