**THE GANDHIGRAM RURAL INSTITUTE-DEEMED TO BE UNIVERSITY**

**MINISTRY OF EDUCATION (SHIKSHA MANTRALAYA),GOI**

**ACCREDITED BY NAAC WITH 'A' GRADE 3rd CYCLE**

**GANDHIGRAM – 624 302, DINDIGUL DISTRICT, TAMIL NADU.**

# SYLLABUS

## (UGC-NSQF- NHEQF/NCrF/UCF & NEP 2020 VERSION)

## B.Voc / B.Voc (Honours)

## Food Processing

## (Effect from July 2024)

**DEEN DAYAL UPADHYAY – KAUSHAL KENDRA**

**THE GANDHIGRAM RURAL INSTITUTE**

**(DEEMED TO BE UNIVERSITY)**

**GANDHIGRAM**

GRI - B.Voc

**THE GANDHIGRAM RURAL INSTITUTE-DEEMED TO BE UNIVERSITY**
**DEEN DAYAL UPADHYAY – KAUSHAL KENDRA**
**B.VOC.FOOD PROCESSING**

| SEM | Category | | Course Code | Title of the Subject | Theory | Practical | No. of Credits/ Contact Hours | Mark Distribution | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Components | NEP-Nomenclature | | | | | | MID | ESE | Total |
| I | GEC (A) | Major-1 | 24FPVC1101 | Food Commodities | 4 | 0 | 4 | 40 | 60 | 100 |
| | | Major-2 | 24FPVC1102 | Food Chemistry | 3 | 0 | 3 | 40 | 60 | 100 |
| | | AEC-1 | | Essential English – I : Basic | 3 | 0 | 3 | 40 | 60 | 100 |
| | | VAC-1 | | Yoga and Fitness | 0 | 2 | 2 | 50 | - | 50 |
| | | **Total** | | | **10** | **2** | **12** | **170** | **180** | **350** |
| | SDC (B) | Major-3 | 24FPVC1103 | Bakery and Confectionery Products (T) | 5 | 0 | 5 | 40 | 60 | 100 |
| | | Major -4 | 24FPVC1104 | Bakery and Confectionery Products (P) | 0 | 5 | 5 | 60 | 40 | 100 |
| | | Major -5 | 24FPVC1105 | Unit Operations in Food Processing (P) | 0 | 5 | 5 | 60 | 40 | 100 |
| | | OJT-1 | 24FPVC1106 | Internship – I | 0 | 3 | 3 | 50 | - | 50 |
| | **Total** | | | | **5** | **13** | **18** | **210** | **140** | **350** |
| | **Grand Total (A+B)** | | | | **(12+18=30)** | | | **380** | **320** | **700** |
| | **NSQF Level** | | **4** | | | | | | | |
| | **UCF Level** | | **4.5** | | | | | | | |
| | **Job Role / Qualification Pack** | | **Multi Skill Technician (Food Processing) - FIC/Q9007** | | | | | | | |
| | **Award / Exit Option** | | **NA** | | | | | | | |

| SEM | Category | | Course Code | Title of the Subject | Theory | Practical | No. of Credits/ Contact Hours | Mark Distribution | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Components | NEP-Nomenclature | | | | | | MID | ESE | Total |
| II | GEC (A) | AEC-2 | | Essential English – II : Intermediate | 3 | 0 | 3 | 40 | 60 | 100 |
| | | VAC-2 | 24FPVV1201 | Environmental Science | 2 | 0 | 2 | 50 | - | 50 |
| | | MD-1 | | Digital Marketing | 0 | 3 | 3 | 60 | 40 | 100 |
| | | Major-6 | 24FPVC1202 | Technology for Convenience Foods (P) | 0 | 4 | 4 | 60 | 40 | 100 |
| | | **Total** | | | **5** | **7** | **12** | **210** | **140** | **350** |
| | SDC (B) | Major-7 | 24FPVC1203 | Cereals, Pulses and Oilseeds Processing (T) | 4 | 0 | 4 | 40 | 60 | 100 |
| | | Major-8 | 24FPVC1204 | Cereals, Pulses and Oilseeds Processing (P) | 0 | 4 | 4 | 60 | 40 | 100 |
| | | Major-9 | 24FPVC1205 | Fundamentals of Food Science (P) | 0 | 4 | 4 | 60 | 40 | 100 |
| | | Major-10 | 24FPVC1206 | Laboratory Practices | 4 | 0 | 4 | 40 | 60 | 100 |
| | | OJT-2 | 24FPVC1207 | Internship – II | 0 | 2 | 2 | 50 | - | 50 |
| | **Total** | | | | **8** | **10** | **18** | **250** | **200** | **450** |
| | **Grand Total (A+B)** | | | | **(12+18=30)** | | | **460** | **340** | **800** |
| | **NSQF Level** | | **4** | | | | | | | |
| | **UCF/NCrF Level** | | **4.5** | | | | | | | |
| | **Job Role / Qualification Pack** | | **Multi Skill Technician (Food Processing) - FIC/Q9007** | | | | | | | |
| | **Award / Exit Option** | | **Certificate in Food Processing** | | | | | | | |

| SEM | Category | | Course Code | Title of the Subject | Theory | Practical | No. of Credits/ Contact Hours | Mark Distribution | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Components | NEP-Nomenclature | | | | | | MID | ESE | Total |
| III | GEC (A) | Major-11 | 24FPVC2301 | Food Preservation Principle and Practices (T) | 4 | 0 | 4 | 40 | 60 | 100 |
| | | Major-12 | 24FPVC2302 | Dairy Processing Technology(T) | 4 | 0 | 4 | 40 | 60 | 100 |
| | | Major-13 | 24FPVC2303 | Food Microbiology (T) | 4 | 0 | 4 | 40 | 60 | 100 |
| | | **Total** | | | **12** | **0** | **12** | **120** | **180** | **300** |
| | SDC (B) | Major-14 | 24FPVC2304 | Food Microbiology (P) | 0 | 5 | 5 | 60 | 40 | 100 |
| | | Major-15 | 24FPVC2305 | Food Safety and Standards Regulation | 5 | 0 | 5 | 40 | 60 | 100 |
| | | Major-16 | 24FPVC2306 | Dairy Processing Technology (P) | 0 | 5 | 5 | 60 | 40 | 100 |
| | | OJT-3 | 24FPVC2307 | Internship - III | 0 | 3 | 3 | 50 | - | 50 |
| | | | | **Total** | **5** | **13** | **18** | **210** | **140** | **350** |
| | | | | **Grand Total (A+B)** | **(12+18=30)** | | | **330** | **320** | **650** |
| | **NSQF Level** | | | **5** | | | | | | |
| | **UCF/NCrF Level** | | | **5** | | | | | | |
| | **Job Role / Qualification Pack** | | | **Supervisor - Food Processing Industries – FIC/Q9009** | | | | | | |
| | **Award / Exit Option** | | | **NA** | | | | | | |

| SEM | Category | | Course Code | Title of the Subject | Theory | Practical | No. of Credits/ Contact Hours | Mark Distribution | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Components | NEP-NOMENCLATURE | | | | | | MID | ESE | Total |
| IV | GEC(A) | Major-17 | 24FPVC2401 | Personality Dynamics and Entrepreneurship | 5 | 0 | 5 | 40 | 60 | 100 |
| | | Major-18 | 24FPVC2402 | Food Quality Assurance | 5 | 0 | 5 | 40 | 60 | 100 |
| | | VAC-3 | | Let us Know Gandhi | 2 | 0 | 2 | 20 | 30 | 50 |
| | | **Total** | | | **12** | **0** | **12** | **100** | **150** | **250** |
| | SDC (B) | Major-19 | 24FPVC2403 | Food Analysis and Quality Testing (P) | 0 | 5 | 5 | 60 | 40 | 100 |
| | | Major-20 | 24FPVC2404 | Food Packaging | 5 | 0 | 5 | 40 | 60 | 100 |
| | | Major-21 | 24FPVC2405 | Traditional Indian Food – Case Studies | 0 | 2 | 2 | 50 | - | 50 |
| | | Major-22 | 24FPVC2406 | Training Course in Food Safety System | 0 | 3 | 3 | 50 | - | 50 |
| | | OJT-4 | 24FPVC2407 | Internship -IV | 0 | 3 | 3 | 50 | - | 50 |
| | | | | **Total** | **5** | **13** | **18** | **250** | **100** | **350** |
| | | | | **Grand Total (A+B)** | **(12+18=30)** | | | **350** | **250** | **600** |
| | **NSQF Level** | | | **5** | | | | | | |
| | **UCF/NCrF Level** | | | **5** | | | | | | |
| | **Job Role / Qualification Pack** | | | **Supervisor - Food Processing Industries – FIC/Q9009** | | | | | | |
| | **Award / Exit Option** | | | **Diploma in Food Processing** | | | | | | |

| SEM | Category | | Course Code | Title of the Subject | Theory | Practical | No. of Credits/ Contact Hours | Mark Distribution | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Components | NEP-Nomenclature | | | | | | MID | ESE | Total |
| V | GEC(A) | Major-23 | 24FPVC3501 | Food Additive and Flavouring Technology (P) | 0 | 4 | 4 | 60 | 40 | 100 |
| | | Major-24 | 24FPVC3502 | Online Swayam Course | 0 | 3 | 3 | - | - | - |
| | | Major-25 | 24FPVC3503 | Post Harvest Technology of Fruits and Vegetables (P) | 0 | 5 | 5 | 60 | 40 | 100 |
| | | | | **Total** | **0** | **12** | **12** | **220** | **80** | **200** |
| | SDC (B) | Major-26 | 24FPVC3504 | Fruits & Vegetables Processing (T) | 5 | 0 | 5 | 40 | 60 | 100 |
| | | Major-27 | 24FPVC3505 | Fruits & Vegetables Processing (P) | 0 | 4 | 4 | 60 | 40 | 100 |
| | | Major-28 | 24FPVC35E1/ E2 / E3 | Elective | 4 | 0 | 4 | 40 | 60 | 100 |
| | | Major-29 | 24FPVC3506 | Field Study / Study Tour | 0 | 2 | 2 | 50 | - | 50 |
| | | OJT-5 | 24FPVC3507 | Internship – V | 0 | 3 | 3 | 50 | - | 50 |
| | | | | **Total** | **09** | **09** | **18** | **240** | **160** | **400** |
| | | | | **Grand Total (A+B)** | **(12+18=30)** | | | **460** | **240** | **600** |
| | **NSQF Level** | | | **6** | | | | | | |
| | **UCF/NCrF Level** | | | **5.5** | | | | | | |
| | **Job Role / Qualification Pack** | | | **Internal Food Auditor –Food Processing FIC/Q7608** | | | | | | |
| | **Award / Exit Option** | | | **NA** | | | | | | |

| SEM | Category | | Course Code | Title of the Subject | Theory | Practical | No. of Credits/ Contact Hours | Mark Distribution | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Components | NEP-Nomenclature | | | | | | MID | ESE | Total |
| VI | GEC(A) | Major-30 | 24FPVC3601 | Novel Food Processing Technologies | 4 | 0 | 4 | 40 | 60 | 100 |
| | | Major-31 | 24FPVC3602 | Food Hygiene and Safety | 4 | 0 | 4 | 40 | 60 | 100 |
| | | Major-32 | 24FPVC3603 | Extrusion Technology | 4 | 0 | 4 | 40 | 60 | 100 |
| | | | | **Total** | **12** | **0** | **12** | **120** | **180** | **300** |
| | SDC (B) | Major-33 | 24FPVC3604 | Spice Processing Technology (P) | 0 | 4 | 4 | 60 | 40 | 100 |
| | | Major-34 | 24FPVC3605 | Food Bio-technology | 5 | 0 | 5 | 40 | 60 | 100 |
| | | Major-35 | 24FPVC3606 24FPVC3606 | Mini – Project Food Processing Unit – Case Study | 0 | 6 | 6 | 60 | 40 | 100 |
| | | OJT-6 | 24FPVC3607 | Internship / Experiential learning/- VI | 0 | 3 | 3 | 50 | - | 50 |
| | | | | **Total** | **5** | **13** | **18** | **210** | **140** | **350** |
| | | | | **Grand Total (A+B)** | **(12+18=30)** | | | **330** | **320** | **650** |
| | **NSQF Level** | | | **6** | | | | | | |
| | **UCF/NCrF Level** | | | **5.5** | | | | | | |
| | **Job Role / Qualification Pack** | | | **Internal Food Auditor –Food Processing FIC/Q7608** | | | | | | |
| | **Award / Exit Option** | | | **B.Voc. in Food Processing** | | | | | | |

## B.VOC. (Hons)

**Seventh Semester-**
**Research Methodology - 24FPVC4701**
**Product Brand and Marketing Management - 24FPVC4702**
**Internship – VII – 24FPVE4704 will be same for two specialization**

### SPECIALIZATION - I –INDUSTRIAL FOOD TECHNOLOGY

| SEM | Category | | Course Code | Title of the Subject | Theory | Practical | No. of Credits/ Contact Hours | Mark Distribution | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Components | NEP-Nomenclature | | | | | | MID | ESE | Total |
| VII | GEC(A) | Major-36 | 24FPVC4701 | Research Methodology | 6 | 0 | 6 | 40 | 60 | 100 |
| | | Major-37 | 24FPVC4702 | Product Brand and Marketing Management | 6 | 0 | 6 | 40 | 60 | 100 |
| | | | | **Total** | **12** | **0** | **12** | **80** | **120** | **200** |
| | SDC (B) | Major-38 | 24FPVC4703 | Cold Storage Technology (P) | 0 | 6 | 6 | 60 | 40 | 100 |
| | | Major-39 | 24FPVC4704 | Fermentation Technology (P) | 0 | 6 | 6 | 60 | 40 | 100 |
| | | OJT-7 | 24FPVC4707 | Internship – VII | 0 | 6 | 6 | 100 | - | 100 |
| | | | | **Total** | **0** | **18** | **18** | **220** | **80** | **300** |
| | | | | **Grand Total (A+B)** | **12+18=30** | | | **300** | **200** | **500** |

### SPECIALIZATION- 2 -INDUSTRIAL FOOD REGULATION SYSTEM

| SEM | Category | | Course Code | Title of the Subject | Theory | Practical | No. of Credits/ Contact Hours | Mark Distribution | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Components | NEP-Nomenclature | | | | | | MID | ESE | Total |
| VII | GEC (A) | Major-36 | 24FPVC4701 | Research Methodology | 6 | 0 | 6 | 40 | 60 | 100 |
| | | Major-37 | 24FPVC4702 | Product brand and Marketing Management | 6 | 0 | 6 | 40 | 60 | 100 |
| | | | | **Total** | **12** | **0** | **12** | **80** | **120** | **200** |
| | SDC (B) | Major-40 | 24FPVC4705 | Industrial Food Recall Regulation (P) | 0 | 6 | 6 | 60 | 40 | 100 |
| | | Major-41 | 24FPVC4706 | Computer Applications in Food Industry (P) | 0 | 6 | 6 | 60 | 40 | 100 |
| | | OJT-7 | 24FPVC4707 | Internship – VII | 0 | 6 | 6 | 100 | - | 100 |
| | | | | **Total** | **0** | **18** | **18** | **220** | **80** | **300** |
| | | | | **Grand Total (A+B)** | **12+18=30** | | | **300** | **200** | **500** |
| | **NSQF Level** | | **7** | | | | | | | |
| | **UCF/NCrF Level** | | **6** | | | | | | | |
| | **Job Role / Qualification Pack** | | **Production Manager- FIC/Q9003** | | | | | | | |
| | **Award / Exit Option** | | **NA** | | | | | | | |

| SEM | Category | | Course Code | Title of the Subject | Theory | Practical | No. of Credits/ Contact Hours | Mark Distribution | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Components | NEP-Nomenclature | | | | | | MID | ESE | Total |
| VIII | GEC(A) | Major-42 | 24FPVC4801 | Food Business Management | 6 | 0 | 6 | 40 | 60 | 100 |
| | | Major-43 | 24FPVC4802 | Project Preparation and Management | 6 | 0 | 6 | 40 | 60 | 100 |
| | | | | **Total** | **12** | **0** | **12** | **80** | **120** | **200** |
| | SDC (B) | Major-44 | 24FPVC4803 | Main Project | 0 | 12 | 12 | 100 | 100 | 200 |
| | | OJT-8 | 24FPVC4804 | Internship - VIII | 0 | 6 | 6 | 100 | - | 100 |
| | | | | **Total** | **0** | **18** | **18** | **200** | **100** | **300** |
| | | | | **Grand Total (A+B)** | **12+18=30** | | | **280** | **220** | **500** |
| | **NSQF Level** | | | **7** | | | | | | |
| | **UCF/NCrF Level** | | | **6** | | | | | | |
| | **Job Role / Qualification Pack** | | | **Production Manager- FIC/Q9003** | | | | | | |
| | **Award / Exit Option** | | | **B.Voc. (Hons) in Food Processing** | | | | | | |

**ELECTIVE PAPERS OFFERED**

| SEM | Category | Course Code | Title of the Subject | No. of Credits |
|---|---|---|---|---|
| V | Elective | 24FPVC35E1 | Principles of Food Engineering | 4 |
| | | 24FPVC35E2 | Functional Foods and Nutraceuticals | 4 |
| | | 24FPVC35E3 | Processing of Meat, Poultry and Sea foods | 4 |

**MULTI DISCIPLINARY COURSES FOR INTERDEPARTMENT LEVEL (UG) OFFERED BY B.Voc. FOOD PROCESSING PROGRAMME**

| SEM | Category | Course Code | Title of the Subject | No. of Credits/ Contact Hours | Mark Distribution | | |
|---|---|---|---|---|---|---|---|
| | | | | | MID | ESE | Total |
| I | MD – 1 | 24FPVM1101 | Production of Yeast Leavened Products | 3 | 60 | 40 | 100 |
| | | 24FPVM1102 | Preparation of Jam, Jelly, Marmalades and Sauces | 3 | 60 | 40 | 100 |
| | | 24FPVM1103 | Processing of Dehydrated Foods | 3 | 60 | 40 | 100 |
| II | MD – 2 | 24FPVM1201 | Preparation of Cakes and Icings | 3 | 60 | 40 | 100 |
| | | 24FPVM1202 | Storage and Warehouse Management Techniques | 3 | 40 | 60 | 100 |
| | | 24FPVM1203 | Basic Food Laws and Standards | 3 | 40 | 60 | 100 |
| III | MD -3 | 24FPVM2301 | Preparation of Cookies and Biscuits | 3 | 60 | 40 | 100 |
| | | 24FPVM2302 | Production of Convenience foods | 3 | 60 | 40 | 100 |
| | | 24FPVM2303 | Value Addition in Food Supply Chain Management | 3 | 40 | 60 | 100 |

**FIRST SEMESTER**

**FOOD COMMODITIES**

**Code:24FPVC1101 Credit: T4+P0 Contact Hours/Week:4 Marks:100**

**Course Objectives**

- To know about the commodities derived from plants and animals
- To provide knowledge on nutritive value of food commodities
- To illustrate the importance of processing the food commodities

**Specific Learning Outcome**

After completion of this course, the students will be able to

- Identify the foods from plant and animal sources
- Select foods rich in nutrients based on food groups
- Categorize the foods based on its shelf life

**UNIT I Science of Food**

**Introduction to Nutrition:-** BMI & Nutritional Status, Balanced diet, Food pyramid and Basic food groups suggested by ICMR.

**Food:** Definition and its Function, Classification of foods based on origin. New Concepts of food :- Ethnic foods, Organic foods, Functional foods, Junk foods, GM foods and Proprietary foods.

**UNIT II Major and Minor Cereals and Pulses**

**Major Cereals:-** Composition and Nutritive value of cereals, Structure of wheat and rice.

**Minor Cereals:** Composition and Nutritive value of Millets. Variety of Millets.

**Pulses & Legumes:** Composition and Nutritive value of pulses. Factors affecting cooking time of pulses.

**UNIT III Fruits and Vegetables**

**Fruits:** Classification, Composition, Climatric and Non- Climatric fruits, Ripening and changes occur during ripening.

**Vegetables:** Classification of vegetables-leaf, roots & tubers and others, Composition and nutritive value of vegetables.

**UNIT IV Milk, Egg and Flesh Foods**

Milk: source, type and nutritive value. Egg: Structure, Composition and nutritive value, Grading changes during storage.

**Meat and Fish:** Structure, Composition and nutritive value, quality changes during cooking.

CPT-B.Voc

**UNIT V Nuts and Spices**

Spices: Source, Composition and Nutritive value, Classification use of spices;

**Nuts and Oilseeds:** Sources, Structure, Composition and Nutritive value of Nuts.

**RELATED EXPERIENCES**

1. Plot a food pyramid using locally available food ingredients
2. Survey the availability of cereals, meat and fish in the nearby market
3. Collect and display pulses and legumes
4. Identify the greens cultivated in the local area
5. Collect fruits available in the local market and categorize
6. Survey on types of sugar and evaluate its quality
7. Survey on vegetable oil and/fat available in the market
8. Visit to grain market
9. Visit to fruits and vegetable market
10. Visit to spice processing unit and dairy industry
11. Visit to oil and sugar mill

**TEXTBOOK**


1. Srilakshmi, B.(2018), "Food Science", New Age International Publishers, New Delhi
2. Potter, N.M. and Birch, G.G. (1986). Food Science, AVI, West Port, Conn.
3. Swaminathan, M. Food Science and Experimental Foods. Madras: Ganesh and Company.
4. Harold McGee(2004), " On Food and Cooking", Scribner Publishers, Newyork.


**REFERENCE BOOK**


1. Francis FJ.Wiley Encyclopedia of Food Science & Technology. John Wiley & Sons.
2. Manay, N.S. Shadaksharaswamy, M. (2004), "Foods- Facts and Principles", New age international publishers, New Delhi.
3. Gopalan, C., Rama Sastri, B.V., Balasubramanian, S.C., Narasinga Rao, B.S., Deosthale, Y.G., & Pant, K.C. 2012. Nutritive value of Indian Foods, National Institute of Nutrition, ICMR, Hyderabad, India.


**WEBOGRAPHY**

1. https://egyankosh.ac.in/bitstream/123456789/11694/1/Unit-1.pdf
2. http://lib.rudn.ru/file/Food_Science_Nutrition_Catalogue_ebook.pdf
3. https://www.slideshare.net/RoshinaRabail/introduction-to-food-science-and-technology-101
4. https://www.slideshare.net/partharoychaudhry/cereals-pulses-36867856
5. https://slideplayer.com/slide/14016092/
6. http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=147675

CRI - B.Voc

## FOOD CHEMISTRY

**Code:24FPVC1102 Credit: T3+P0 Contact Hours/Week:3 Marks:100**

**Course Objectives**

- To provide knowledge on food constituents and its physical and chemical properties
- To understand the changes in food quality due to processing conditions

**Specific Learning Outcome**

After completing this course students will be able to

- Describe the chemical structure of major components of foods (water, carbohydrates, protein and lipids)
- Explain how changes in overall composition are likely to change the reactivity of food.

**UNIT I Food Composition**

Introduction to food chemistry, food composition – water, carbohydrate, protein, fat. Water: Structure, hydrogen bonding, effect of hydrogen bonding on the properties of water, moisture content of foods, types of water, water activity. Determination of moisture content of different foods. Estimation of aW of foods

**UNIT II Carbohydrates**

Nomenclature, composition, structure, classification - monosaccharide, disaccharides, oligosaccharides and polysaccharides, properties and food sources. Starch – composition, structure and properties, concept of gelatinisation, dextrinisation, retrogradation. Examination the starch structure by microscope. Determination of Gelatinization Temperature Range of different starches.

**UNIT III Amino Acids & Proteins**

Nomenclature, composition, structure, classification, properties of amino acids. Proteins: structure, classification, properties (physiochemical and functional) changes in proteins during processing. Stabilization of Protein Structure- Hydrogen bonding, Denaturation, Gel formation. Analysis the functional properties of proteins- Swelling, Dispersibility, Solubility, Viscosity and Emulsification.

**UNIT IV Fats and oils**

Nomenclature, composition, structure, classification, physical and chemical properties - hydrolysis, hydrogenation, rancidity and flavour reversion, emulsion and emulsifiers, saponification value, acid value and iodine value, smoke point. Estimation of smoke point of various oil. Determination of the percent of free fatty acids.

CBE-B.Voc

**UNIT V Enzymes, pigments, flavours in food**

Enzymes – meaning and importance, classification, factors influencing enzymatic activity, quality changes due to enzyme action, enzymatic browning and method of control, enzymes in food processing. Pigments meaning, classification, properties, effect of processing and storage, flavours-composition, properties, effect of processing on flavour components. Methods used to prevent enzymatic browning. Study the effect of heat, acid, alkali on fruit/vegetable pigments

**REFERENCE BOOKS**:


1. Sumathi.S (2016). "Food Chemistry and Nutrition", published by BSP Book Pvt. Ltd.
2. Swaminathan, M. Food Science and Experimental Foods. Madras: Ganesh and Company.
3. Macmillan. Janet D. Ward. & Larry Ward (2015). Principles of Food Science, 4$^{th}$edt. Goodheart Willcox Company Inc.
4. Srilakshmi, B. (2008). Nutrition Science. New Age International Publishers, New Delhi.
5. Potter,N.N. and Hotchkiss, J.H. Food Science, edition 5, CBS Publishers and Distributors, New Delhi.


**WEBOGRAPHY**

1. https://www.brainkart.com/article/Classification-of-Food_37944/
2. https://www.bngkolkata.com/pre-preparation-of-food/

GRI - B.Voc

## ESSENTIAL ENGLISH I

**Code:** **Credit: T3+P0** **Contact Hours/Week:3** **Marks:100**

GRI - B. Voc

**YOGA AND FITNESS**

**Code:** **Credit: T0+P2** **Contact Hours/Week:2** **Marks:50**

GRI - B. Voc

## BAKERY AND CONFECTIONERY PRODUCTS

**Code:24FPVC1103 Credit: T5+P0 Contact Hours/Week:5 Marks:100**

**Course Objectives**

- To highlight the principles and concepts of baking.
- To understand the importance of quality control process in baked goods
- To acquire the knowledge for manufacturing of Confectionery products

**Specific Learning Outcomes**

After completion of this course, the students will be able to

- Express the importance of raw material selection in production of quality products
- Evaluate and assess the quality of baked and Confectionery foods
- To be able to design a bakery layout
- Able to run a small bakery unit.

**UNIT I Equipment used in bakery and confectionery industry**

Bakery - Layout and design. Scope of bakery and confectionery in food industry, Construction and working of various equipment like mixers, proofing chambers, dough dividers, moulder and sheeter, baking ovens, cooling chamber, sealing and packaging machines, rolling and cutting machines.

**UNIT II Principle of baking**

Baking meaning, principle, commonly used ingredients for bakery products, Types and quality of flour, dough development and chemistry. Importance of weighing & measurement baking time, temperature mixing & gluten development.

**UNIT III Technology for production of bakery products**

Bread: Role of ingredients in preparing quality bread, factors influencing quality of bakery products, shelf life and storage practices. Methods used for dough development –Straight dough method, sponge and dough method, Salt delayed method. Staling of bread, methods to reduce bread staling and spoilage.

Biscuits and cookies: Role of ingredients in preparing quality biscuits and cookies, Characteristics of good flour used for making biscuits, cookies, crackers and rusk.

**UNIT IV Introduction to confectionery products**

**Sugar:** Types of sugar, stages of sugar cookery, refining of sugar, manufacture of sugar from sugar cane, jaggery.

**Types of Confectionery products** - Characteristics of Confectionery products - Ingredients used in Confectionery products: Sugar boiled confectionery- crystalline and amorphous confectionery. Equipments used in confectionery industry. Quality characteristics of Confectionery products.

CBCS - B.Voc

**UNIT V: Manufacturing of Confectionery Products**

Processing of raw material, technology of manufacturing of toffee, chocolate, hard boiled candies, bars. Other confectionery products- Marshmallows, Cream, Caramel, China Balls, Honey comb candy, Gum drops, Lemon drop, Lollypop.

**TEXTBOOK**


1. Pyler, E. J. and Gorton, L.A.(2009), "Baking Science & Technology" Vol.1 Fourth Edition,Sosland Publications.
2. Stanley P. Cauvain, Linda S. Young, (2008), "Baked Products: Science Technology and Practice". John Wiley & Sons Publishers.
3. Zhou. W, Hui Y,H; (2014), "Bakery Products Science and Technology", 2nd Edition, Wiley Blackwell Publishers
4. Yogambal Ashokkumar, (2018), "Textbook of Bakery & Confectionery" PHI learning.


**REFERENCES**


1. Dubey SC. 2002. Basic Baking.The Society of Indian Bakers, New Delhi.
2. Francis FJ. 2000. Wiley Encyclopedia of Food Science & Technology. John Wiley& Sons.
3. Manley D. 2000.Technology of Biscuits, Crackers & Cookies. 2nd Ed. CRC Press


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## BAKERY AND CONFECTIONERY PRODUCTS (P)

**Code:24FPVC1104 Credit:T0+P5 Contact Hours/Week:5 Marks:100**

### Course Objectives

- To highlight the processing methods used in baking and confectionery industries.
- To understand the importance of quality control process in baked foods
- To acquire the knowledge of manufacturing technology for Confectionery products

### Specific Learning Outcomes

After completion of this course, the students will be able to

- Familiar with process and production of bakery and confectionery goods
- Develop novel food products by applying concept of bakery and confectionery technology
- Evaluate and assess the quality of baked and Confectionery foods

### Practical

1. Introduction to Bakery and Confectionery Equipment.
2. Standard weights and measures commonly used in bakery industry.
3. Quality characteristics and evaluation of bakery ingredients.
4. Preparation of yeast leavened baked goods and evaluation of its quality
   a. Bread b. Buns c. Doughnut d. Pizza e.Rusk
5. Preparation of Cake and characteristics of cake of scoring of cake
   a. Basic Cup Cake Mixture b. Brownies c. Eggless Cake d. Muffins
6. Preparation of variety of baked products & evaluation of its quality
   a. Biscuits b. Cookies c. Melting Marvels
7. Preparation of Confectionery products and evaluation of its quality.
   a. Caramel Custard b. Candies c. Toffee d. Mousse
8. Preparation of different types of pastry and evaluation of its quality.
9. Visit to small scale bakery and confectionery unit.
10. Visit to large scale bakery & confectionery unit.
11. Visit to sugar manufacturing unit

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**TEXTBOOK**

1. Pyler, E. J. and Gorton, L.A.(2009), "Baking Science & Technology" Vol.1 Fourth Edition,Sosland Publications.

2. Stanley P. Cauvain, Linda S. Young, (2008), "Baked Products: Science Technology and Practice". John Wiley & Sons Publishers.

3. Zhou. W, Hui Y,H; (2014), "Bakery Products Science and Technology", 2nd Edition, Wiley Blackwell Publishers

4. Yogambal Ashokkumar, (2018), "Textbook of Bakery & Confectionery" PHI learning.

**REFERENCE BOOK**

1. Dubey SC. 2002. Basic Baking.The Society of Indian Bakers, New Delhi.

2. Francis FJ. 2000. Wiley Encyclopedia of Food Science & Technology. John Wiley & Sons.

3. Manley D. 2000.Technology of Biscuits, Crackers & Cookies. 2nd Ed. CRC Press

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## UNIT OPERATIONS IN FOOD PROCESSING (P)

**Code:24FPVC1105 Credit: T0+P5 Contact Hours/Week:5 Marks:100**

**Course Objectives**

- To provide the knowledge on processing concepts and principles
- To understand the mechanism, operation of equipment used in food processing

**Specific Learning outcomes**

After completion of this course, the students will be able to

- Identify the equipment used for various food processing units.
- Able to handle the equipment used in food industry.

**Practical**

1. Handling procedures of the machineries used for milling.
2. Cleaning, sorting and grading – aims, methods, applications and physical properties of food materials.
3. Microscopic structure of grain starches.
4. Physical, Thermal and Rheological properties of grains.
5. To determine the types of conveyor and crusher used in food industry.
6. Experiment on agitation, their purpose and the vessels used in agitators like impellors, Propeller, Turbine.
7. Exercise on mixing, their purpose and equipments like liquid mixer, blender, dough & paste mixer used for mixing.
8. Determination of average size of flour by sieving techniques.
9. Determination of bulk density, porosity and true density.
10. Exercise on physical and chemical properties of flour.
11. Estimation of gluten content of wheat, flour grade & treatment (bleaching, maturing).
12. Safe disposal methods of wastes in food separation.
13. Visit to rice mills.
14. Visit to oil extraction unit

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## TEXTBOOK


1. Singh, R.P. and Heldman, D.R. (2001), "Introduction to Food Engineering", 3rd ed., Academic Press.
2. Hui, Y.H. (2005), "Handbook of Food Science, Technology and Engineering" (vol.1-4), Marcel Dekker Publishers.
3. Rao, M.A., Rizvi, S.S.H. and Dutta, A.K. (2005), "Engineering properties of Foods", 3rd ed., Marcel Dekker Publishers.


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1. Pandey, H., Sharma, H.K., Chouhan, R.C., Sarkar, B.C. and Bera, M.C. (2004), "Experiments in Food Process Engineering", CBS Publishers and Distributors.
2. Sharma, S.K., Mulvaney, S.J. and Rizvi, S.S.H. (2000), "Food Process Engineering: Theory and Laboratory Experiments", Wiley and Sons Publishers.


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3. https://www.slideshare.net/mobile/urveshprajapati3990/grinding-50256980
4. https://www.slideshare.net/mobile/prem1790/grinding-162817256
5. https://www.slideshare.net/mobile/khadeejaikram56/centrifugation-49732927
6. https://www.slideserve.com/orlando-butler/cleaning-sorting-and-grading-of-tomato
7. https://www.slideshare.net/mobile/JunaidAbbas5/sorting-and-grading
8. https://www.slideshare.net/mobile/ubaidulhai/filtration-and-clarification
9. https://www.ficsi.in

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## INTERNSHIP – I

**Code:24FPVC1106 Credit:T0+P3 Contact Hours/Week:3 Marks:50**

Students have to undergo internship after completing their first semester at an established bakery unit based on their **NSQF level 4 "Plant Baker"/ "Multi Skill Technician (Food Processing)".** Students who underwent training should submit a report on their daily routine activities. After the successful completion of internship, a viva voce will be conducted with their presentation and evaluated.

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**SECOND SEMESTER**

**ESSENITAL ENGLISH - II**

**Code:** **Credit:T3+P0** **Contact Hours/Week:3** **Marks:100**

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## ENVIRONMENTAL SCIENCE

**Code: 24FPVV1201 Credits: T2+P0 Contact Hours/week: 2 Marks: 50**

**Course Objectives**

To enable the students to

- Understand the fundamental concepts of environmental science, including ecosystems, biodiversity, and sustainability
- Develop awareness and knowledge about environmental issues and their impacts on natural and human systems

**Specific Learning Outcomes**

On Successful Completion of this course, the students will be able to

- Critically analyze environmental issues and propose sustainable solutions
- Gain practical skills in environmental monitoring, assessment, and problem-solving

**UNIT I**

**Multidisciplinary Nature of Environmental Studies:** Introduction, Definition and Importance of Environmental Studies, Need for Public Awareness, Sensitization and Participation.

**Natural Resources:** (1) Types of Natural Resources – Land, Forest, Water, Minerals, Food and Energy, Natural Resource - Conservation, Role of an Individual in Conservation of Natural Resources, Equitable Use of Resources for Sustainable Lifestyles.

**UNIT II**

**Ecosystems:** Concept of an Ecosystem, Types of Ecosystem, Structure and Function of an Ecosystem, Producers, Consumers and Decomposers, Energy Flow in the Ecosystem, Food Chains, Food Webs and Ecological Pyramids, Ecological Succession, Types, Characteristic Features

**UNIT III**

**Environmental Pollution:** Definition, Causes, Effects and Control Measures of: (a) Air Pollution, (b) Water Pollution, (c) Soil Pollution, (d) Marine Pollution, (e) Noise Pollution, (f) Thermal Pollution, (g) Nuclear Hazards, Solid Waste Management and Disaster Management

**UNIT IV**

**Social Issues and the Environment:** Environment from Unsustainable to Sustainable Development, Urban Problems Related to d to Energy Water Conservation, Rainwater Harvesting, Watershed Management, Resettlement and Rehabilitation of People: Its Problems and Concerns, Case Studies, Environmental Ethics: Issues and Possible Solutions, Climate Change, Global Warming, Acid Rain, Ozone Layer Depletion, Nuclear Accidents and Holocaust, Case Studies, Wasteland Reclamation, Consumerism and Waste Products

**UNIT V**

**Biodiversity:** Introduction – Definition: Genetic, Species and Ecosystem Diversity, Bio-geographical Classification of India, Value of Biodiversity: Consumptive Use, Productive Use, Social Use, Ethical Use, Aesthetic Use and Option Values, Biodiversity at Global, National and Local Levels,

India as a Mega diversity Nation, Hotspots of Biodiversity, Threats to Biodiversity, Biological Diversity Act, 2002.

**REFERENCES:**


1. Environmental Studies: From Crisis to Cure by R. Rajagopalan
2. Environmental Studies by Erach Bharucha
3. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha
4. Environmental Studies by Benny Joseph


**WEBOGRAPHY:**


1. https://deb.ugc.ac.in/Uploads/SelfLearning/HEI-Exempted-U-0497/HEI-Exempted-U-0497_SelfLearning_20220531171724.pdf
2. https://www.ugc.gov.in/oldpdf/modelcurriculum/env.pdf
3. https://www.hzu.edu.in/bed/E%20V%20S.pdf


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## DIGITAL MARKETING

**Code:** **Credit:T0+P3** **Contact Hours/Week:3** **Marks:100**

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## TECHNOLOGY FOR CONVENIENCE FOODS (P)

**Code:24FPVC1202 Credit:T0+P4 Contact Hours/Week: 4 Marks:100**

### Course Objectives

- To know the types of convenience foods available in the market
- To understand the science behind the production of convenience foods
- To provide knowledge on quality and safety of convenience foods

### Specific Learning Outcomes

After completion of this course, the students will be able to

- Identify and select the convenience food products based on consumer need
- Explain the method for preparation of convenience foods
- Evaluate and assess the quality of convenience foods

### Experiments

1. Identification of convenience foods available in the market.
2. Doing a market survey about convenience foods.
3. Preparation of RTE foods.
4. Preparation of RTC foods.
5. Preparation of RTS & RTD Beverage.
6. Preparation of dehydrated fruits and vegetables.
7. Evaluation of reconstituted fruits & vegetables.
8. Development of instant food premixes.
9. Preparation of canned vegetable & soup.
10. Preparation of frozen foods.
11. Evaluation of canned foods.
12. Examine the quality characteristics of snack food.
13. Visit to canning industry
14. Visit to pasta industry

### TEXTBOOK


1. Srivastava R. P. & Kumar Sanjeev, Sanjeev Kumar (2002). Fruit and Vegetable Preservation: Principles and Practices, International Book Distributing Company, Lucknow.
2. GirdhariLal, ***G.S. Siddappa***, ***G.L. Tandon***..***Preservation of Fruits and Vegetables***, ICAR Publication, New Delhi.
3. Riaz, M.N. (2000). Extruders in Food Applications, CRC Press, USA




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**REFERENCE BOOK**


1. Chavan U.D. and Patil J.V. (2013). Industrial Processing of Fruits and Vegetables. Daya Publishing House New Delhi.

2. Lusas, E.W. & Rooney, L.W.(2001). Snack Food Processing. CRC Press, USA.

3. Manay, N.S. Shadaksharaswamy, M. (2004), "Foods- Facts and Principles", New age international publishers, New Delhi.


**WEBOGRAPHY**

1. https://ecoursesonline.uasri.res.in
2. https://ccsuniversity.ac.in
3. https://www.egyangosh.ac.in
4. https://www.ficsi.in

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## CEREALS, PULSES AND OILSEEDS PROCESSING (T)

**Code:24FPVC1203 Credit:T4+P0 Contact Hours/Week:4 Marks:100**

### Course Objectives

- To know about the processing of cereals, pulses and oilseeds.
- To study the storage and handling practices of cereals, oilseed and pulses.
- To gain knowledge on processing and milling of cereal, pulses and oilseeds.

### Specific Learning Outcome

After completing this course students will be able to

- Know about the post harvest technologies for cereals, pulses and oilseeds
- Explain the loss of nutrients due to various processing methods adopted for cereals, pulses and oilseeds
- Familiar with the processed foods related to cereals, pulses and nuts.

### UNIT I – Introduction to Grain Processing

Current scenario of food grain production, post-harvest losses. National & International quality standards of grains.

Grain Handling Equipment – Design & working principle, Grain storage methods and quality changes of grains during storage & preventive measures.

### UNIT II- Major Cereals Processing

Pre-harvest Conditioning for major cereals, parboiling- principles, conventional & improved method of parboiling. Physiochemical changes in paddy during parboiling. Milling of major cereals,- rice and wheat; effect of processing on nutritive value.

### UNIT III Minor Cereals (Millet) Processing

Pre-harvest Conditioning for millets, Processing and value addition of millets, effect of processing on nutritive value of millets. Prevention & control of infestation during storage.

### UNIT IV Pulses Processing

Post harvest technologies for pulses; milling of pulses; antinutritional factors in pulses and the methods used for destruction/elimination; processed pulse based products; effect of processing on nutritive value of pulses.

### UNIT V Nuts and Oilseeds Processing

**Nuts Processing -** Post harvest technologies for nuts; processing of nuts, processed nuts based products; effect of processing on nutritive value of nuts.

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**Oilseeds Processing** -Structure, composition and nutritive value of oilseeds; oil extraction methods and refining process; effect of processing on nutritive value, oil quality changes during storage. Properties & uses – fibre spinning.

## TEXTBOOK


1. Chakraverty, A, "Post Harvest Technology of Cereals, Pulses and Oilseeds". Oxford and IBH Publishing Co, Calcutta.
2. Manay, N.S. Shadaksharaswamy, M. (2004), "Foods- Facts and Principles", New age international publishers, New Delhi.


## REFERENCE BOOK


1. N.L.Kent and A.D.Evans."Technology of Cereals" (4th Edition), Elsevier Science (Pergaman), Oxford, UK,
2. Samuel Matz.,"The Chemistry and Technology of Cereals as Food and Feed, Chapman & Hall.
3. Dendy DAV and Dobraszczyk BJ. (2001), "Cereal and Cereal Products", Aspen Publications.


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2. https://cftri.res.in/Millets/
3. https://www.slideshare.net/Senthil13k/wheat-42967958
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5. https://www.cooksinfo.com/flour-grades
6. http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=5913
7. https://www.slideshare.net/LinaDarokar/milling-process-rice-dal
8. https://www.slideshare.net/tusharbhar96/parboiling-of-rice
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11. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=805
12. https://www.cashews.org/en/cashew-processing

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## CEREALS, PULSES AND OILSEEDS PROCESSING (P)

**Code:24FPVC1204 Credit: T0+P4 Contact Hours/Week:4 Marks:100**

### Course Objectives

- To know about the processing of cereals, pulses and oilseeds.
- To study the handling practices of cereals, oilseed and pulses based on their characteristics.
- To gain knowledge on processing and milling of cereal, pulses and oilseeds.

### Specific Learning Outcome

After completing this course students will be able to

- Know about the post harvest technologies for cereals, pulses and oilseeds
- Explain the various processing methods adopted for cereals, pulses and oilseeds
- Familiar with the process and production of value- added products from cereals, pulses and oilseeds.

### Experiments

1. Exercise on physical characteristics of cereals.
2. Preparation of cereal based cookery.
3. Demonstrate the microscopic examination of starch and starch cookery.
4. Preparation of millet based food products.
5. Determine the physiochemical and functional properties of millet flours.
6. Preparation of pulse based food products
7. Exercise on egg and evaluation of its quality.
8. Determine functional properties of nuts.
9. Preparation of nuts incorporated food products.
10. Preparation of full fat soy flour.
11. Chemical tests for determination of rancidity.
12. Visit to rice processing industry
13. Visit to millet processing unit
14. Visit to pulse processing industry
15. Visit to nuts processing unit

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**TEXTBOOK**


1. Chakraverty.A.(2019), "Post Harvest Technology of Cereals, Pulses and Oilseeds", 3rd Edition, Oxford and IBH Publishers.
2. Manay, N.S. Shadaksharaswamy, M. (2004), "Foods- Facts and Principles", New age international publishers, New Delhi.


**REFERENCE BOOK**


1. N.L.Kent and A.D.Evans. "Technology of Cereals" (4th Edition), Elsevier Science (Pergaman), Oxford, UK,
2. Samuel Matz.,"The Chemistry and Technology of Cereals as Food and Feed, Chapman & Hall.
3. Dendy Dav & Dobraszczyk BJ. (2001), "Cereal and Cereal Products", Aspen Publications.


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2. https://youtu.be/kVqisXuiWsc
3. https://www.millets.res.in/technologies/Technologies_of_millet_value_added_products.pdf

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## FUNDAMENTALS OF FOOD SCIENCE (P)

**Code:24FPVC1205 Credit: T0+P4 Contact Hours/Week: 4 Marks:100**

### Course Objectives

- To know about the food types and its origin
- To understand the science behind food preparations
- To signify the role of food in health and well being

### Specific Learning Outcomes

After completion of this course, the students will be able to

- Familiar in qualitative analysis of nutrients
- Choose appropriate cooking method for food preparation
- Suggest method to reduce loss of nutrients during processing.

### Experiments

1. Survey on types of food products available in the market.
2. Exercise on blanching of vegetables and fruits.
3. Experiment on different types of cooking methods
4. Exercise on simple cooking – preparation, serving, calculation of cost & yield.
   a. Appetizers b. Starters c. Salad
5. Experiment on Qualitative analysis for carbohydrate.
6. Experiment on Qualitative analysis for protein and lipids.
7. Exercise on Qualitative test for minerals.
8. Group the food ingredients based on carbohydrate, protein and lipid content.
9. Group the foods based on vitamin and mineral content.
10. Collect data on latest kitchen appliances in the market.
11. Calculate the energy value of foods.
12. Compute energy requirement of an individual.

### TEXTBOOK


1. Srilakshmi, B. (2018). Food Science. New Delhi: Chennai: New Age International Private Limited. Publishers.
2. Mudambi, R.S. and Rajagopal, M.Y., Fundamentals of Food and Nutrition, NewDelhi: Wiley Eastern Limited.
3. Swaminathan, M., Food Science and Experimental Foods. Madras: Ganesh and Company.


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## REFERENCE


1. Janet D. Ward. & Larry Ward (2015). Principles of Food Science, 4thedt. Goodheart Willcox Company Inc.
2. Srilakshmi, B. (2008). Nutrition Science. New Age International Publishers, New Delhi.
3. Potter,N.N. and Hotchkiss, J.H., Food Science, 5th Edition, CBS Publishers and Distributors, New Delhi.


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2. https://www.bngkolkata.com/pre-preparation-of-food/
3. https://www.britannica.com/science/human-nutrition


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## LABORATORY PRACTICES

**Code: 24FPVC1206 Credits: T4 +P0 Credit hours/ week: 4 Marks: 100**

**Course Objectives**

- To understand the basic needs and requirements of a laboratory
- To provide knowledge about laboratory waste disposal and management
- To know about the hazards and safety measures to be followed in a laboratory

**Specific learning outcomes**

After completion of this course, the students will be able to,

- Plan for basic operations in the lab and maintain cleanliness in the laboratory
- Handle, operate/work safely in the laboratory
- Apply the knowledge to prevent accidental injuries/hazards in the laboratory

**Unit I Operations in laboratories**

Operations in Laboratory – Definition, types of laboratory, the essential requirements of a laboratory, space, design of laboratories - fixed and flexible design laboratories, main laboratories in other rooms, furniture and storage services, ventilation, flooring and fume cupboards, heating and cooling, Safe laboratory procedures.

**Unit II Handling of lab equipment**

Access to the laboratories, maintenance of equipment, handling of glasswares, apparatus and furniture, servicing of equipment, procedure for handling of chemicals, handling of animals and plants, prevention of equipment from rust, dust, vibration, correct usage of instruction manual, calibration of equipments. First aid and medical treatment- emergency showers, eyewash stations, treatment of localised injuries, burns & fractures.

**Unit III Cleaning of laboratories and Waste Disposal**

Colour coding of services, Basic benefits of colour coding, Laboratory safety signs & symbols. Emergencies with services, emergency procedures for flooding and gas leaks, proper cleaning of laboratories. Laboratory & personnel safety, Material Safety Data Sheet, personnel protective

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equipment. Disposal of waste materials – Unserviceable, Non- consumable items, Obsolete Instruments, Chemical wastes.

**Unit IV Laboratory hazards and safety measures**

Hazardous chemicals and hazardous apparatus, laboratory hazards (biological, chemical, physical, electrical and psychological),emergency response related to injuries, spills and use of spill kits, laboratory evacuation, isolation, elimination, minimisation of hazardous level of chemicals, accident and incident records, Personnel related requirements. Fire Hazards – Fire triangle, sources and types of extinguisher.

**Unit V Inventory Management and Documentation**

Inventory Management: Planning, control and costing. Stores & storekeeping, scope & importance, purchase procedure, types of purchase, location of stores & materials, procedure for the movement of stores, different methods of pricing materials, store records. Laboratory records- General principles, Sample collection records, inspection of laboratories. Filing system – classify, aims and source of information, filing system of chemicals, filing of printed and written material worksheet/instruction for experiments and demonstration.

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**TEXTBOOKS**


1. Pomeranz, Y. and Meloan, C.E., Food Analysis: Theory and Practice, CBS Publishers and Distributor, New Delhi
2. Susanne Nielson (2017). Food Analysis, Springer Technology and Engineering.


**REFERENCES**


1. National committee for clinical laboratory standards, (1996), Clinical laboratory manuals, 3rd edition, approved guideline 3P2-3 A, Villanova, Pa.
2. Rao. S. (2010), "Testing Commissioning Operation & Maintenance of Elecrical equipments; Khanna publishers.


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5. https://www.pharmaguideline.com/2011/07/sop-for-laboratory-cleaning.html?m=1
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8. https://www.slideshare.net/VarshaShahane/emergency-management-in-laboratories
9. https://chemlab.truman.edu/laboratory-safety/emergency-procedures/
10. https://www.safety.uwa.edu.au/incidents-injuries-emergency/procedures/lab#biological
11. https://www.slideshare.net/VarshaShahane/emergency-management-in-laboratories
12. https://www.slideshare.net/prdiphamal/laboratory-hazard


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## INTERNSHIP - II

**Code: 24FPVC1207 Credit: T0+P2 Contact Hours/week: 2 Marks: 50**

Students have to undergo internship after completing their Second semester at an established Oil Processing and milling industry based on their **NSQF level 4 "Multi Skill Technician (Food Processing)".** Students who underwent training should submit a report on their daily routine activities. After the successful completion of internship, a viva voce will be conducted with their presentation and evaluated.

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## THIRD SEMESTER

## FOOD PRESERVATION PRINCIPLE AND PRACTICES (T)

**Code: 24FPVC2301 Credit: T4 +P0 Contact Hours/week: 4 Marks: 100**

**Course Objectives**

- To acquire knowledge about food spoilage and their causes
- To understand the concept and science behind preservation of foods
- To know about commonly used method of food preservation

**Specific Learning Outcome**

After completion of this course, the students will be able to

- Know the basics of food preservation
- Suggest suitable techniques for preservation of foods
- Apply knowledge to improve the traditional method of preservation

**Unit I Basics of Food Preservation**

**Food spoilage** – Definition, difference between contamination and spoilage in food, signs of contamination and spoilage in food.

**Food preservation:** Definition, importance, principles, Classification of food on the basis of pH value, moisture content.

**Unit II Traditional and Modern Methods of Food Preservation**

Boiling, Burial, Confit drying, Pickling, Curing, Fermentation, Canning. Irradiation, Bio Preservation, MAP, CAP, Vacuum Packing, Non- thermal plasma, Hurdle technology, chemical. Safe storage methods to improve shelf life of food attributes. Preservatives, Pascalization, Freeze drying.

**Unit III Preservation by Application of Heat**

**Preservation by use of high temperature**: Blanching, Pasteurization, Sterilization, Canning advantages and limitations. Canning-history and steps involved, types of containers used for canning foods, spoilage encountered in canned foods.

**Drying and dehydration-** meaning, merits and demerits, effect on food quality, methods of drying, factors affecting drying process, Concentration: principles and types of concentrated foods.

**Unit IV Preservation by Low Temperature Storage**

Refrigeration meaning and principle, advantages and disadvantages, freezing: meaning, principle types of freezing, the effect on quality on frozen foods.

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**Unit V Preservation by use of preservatives**

Preservative- Definition, types- Class I and Class II preservatives, mechanism of action, merits and demerits. Permissible limits, FSSAI guidelines for usage of preservatives.

**TEXTBOOKS**


1. Subalakshmi, G and Udipi, S.A. (2001),"Food processing and preservation". New Age International Publishers, New Delhi.
2. Mc Willims and Paine: Modern Food Preservation, Surjeet Publication.
3. Girdharilal,G.S. and Siddappa (1986). "Preservation of Fruits and Vegetables". New Delhi: Publications and Information Division, ICAR.
4. Desoresier,W.N. and James,N. (1987). "The Technology of Food Preservation". New Delhi: CBS Publishers and Distributors.


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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, New Delhi.
3. Srilakshmi, B.(2003), "Food Science", New Age International Publishers, New Delhi.


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3. https://www.slideshare.net/Selvaprakashnavaneethan/modern-trends-in-food-preservation-81331889
4. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=5130
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9. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=111469
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## DAIRY PROCESSING TECHNOLOGY (T)

**Code: 24FPVC2302 Credit: T4+P0 Contact Hours/week: 4 Marks: 100**

**Course Objectives**

- To be familiar with steps involved in milk processing
- To know the types of machinery/equipment used for processing.
- To provide knowledge about value addition of milk.

**Specific Learning Outcomes**

After completion of this course, the students will be able to

- Describe the composition and properties of milk
- Apply the knowledge to improve the shelf life of milk
- Spell out the processing line and machinery used for dairy processing

**Unit I Milk composition and its properties**

Scope, importance and need of dairy processing, Dairy Development Program Implemented in India- Operation flood program, Rashtriya Gokul Mission and Dairy development scheme.

Source of milk, Major and minor constituents of milk (Water, protein, lactose, fat, vitamin, mineral content). Physiochemical properties of milk- Colour, taste, pH, viscosity, boiling point, freezing point, specific heat.

**Unit II Types of Milk and Inplant cleaning system**

Types of milk - Standardized milk, Pasteurized Milk, Toned Milk, Double Toned Milk, Flavoured and Recombined Milk. Colostrum- Significance, Composition, Difference between normal milk and colostrums, Factors affecting composition & yield of milk- Species, Breed, Individuality, Stages of Lactation, Age of animal, Interval between milking.

**Dairy plant cleaning solutions –** Dairy plant layout, Detergents, Sanitizers, cleaning procedure, Cleaning efficiency, CIP,SIP Personal hygiene in dairy plant,.

**Unit III Grading and Processing of Milk**

**Judging and Grading of milk**-Definition and types of grades, Fundamental rules for judging of milk, Milk scoring techniques, Undesirable flavours.

**Stages of processing :** Filtration, Clarification, Sterilization, Homogenization, Evaporation, Standardization by pearson square method, pasteurization - LTLT,HTST, UHT, Continuous pasteurisation. Cream Separation – Bactofugation, Centrifugal Separation.

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**Unit IV Quality Analysis of Milk**

Sensory analysis of milk – Determination of Specific gravity, fat, SNF, Acidity & pH in milk & their significance & interpretation. Determination & significance of MBRT – SPC- Phosphatase activity in milk.

**Unit V Value Added Products from Milk**

Value added products from milk- Paneer, Icecream, Cheese analogue, Infant foods, Ghee, Whipping cream, Probiotic foods, flavoured milk.

**Related experience**

1. Quality evaluation of locally available milk
2. Detection of adulterants in milk
3. Analyze the factors affecting stability of milk
4. Testing the quality of pasteurized milk
5. Visit to local milk processing unit
6. Visit to modern milk industry

**TEXTBOOKS**


1. Walstra P, Geurts TJ, Noomen A, Jellema A & Van Boekel MAJS., "Dairy Technology – Principles of Milk Properties and Processes". Marcel Dekker.

2. Aneja RP, Mathur BN, Chandhan RC & Banerjee AK. (2002). "Technology of Indian Milk Products". Dairy India Publ., Delhi.

3. Alan H. Varnam, (2012), "Milk and Milk Products: Technology, chemistry and microbiology", Springer Science & Business Media Publishers.


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1. Robinson, R. K., (2012), "Modern Dairy Technology: Volume 2 Advances in Milk Products", Springer Science & Business Media Publishers.

2. Smit G. (2003). "Dairy Processing – Improving Quality". CRC-Woodhead Publ.


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## FOOD MICROBIOLOGY (T)

**Code: 24FPVC2303 Credit: T4 +P0 Contact Hours/week: 4 Marks:100**

### Course Objectives

- To understand the role of microorganism in food industry
- To know the factors influencing microorganism growth in food articles
- To recognize microorganisms responsible for food spoilage.

### Specific Learning Outcomes

After completion of this course, the students will be able to

- Describe the characteristics of beneficial and spoilage microorganisms
- Signify the contributions of microorganisms to food and health
- Identify the microorganisms responsible for spoilage of foods.

### Unit I Introduction to food microbiology

Introduction to food microbiology, Discovery, current status, Classification of microorganisms, nomenclature, morphology – yeast and moulds, bacterial cells, viruses, sources of microorganisms in food, changes caused by microorganisms, factors affecting microbial growth – Intrinsic, Extrinsic and Implicit factors.

### Unit II Microbial spoilage of food and Food borne illness

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

### Unit III Microbial Contamination

Food Infection, Food Intoxication- Sources, types and prevention. Enterotoxin, Mycotoxin and Isolation of food borne pathogen.

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**Unit IV Beneficial uses of microorganisms**

Microorganisms used in food fermentation, putrefaction and lipolysis, mechanisms of nutrient transport, intestinal bacteria and probiotics, food bio preservatives of bacterial origin, food ingredients and enzymes of microbial origin, Role of microbes in food industry.

**Unit V Microbial examination and investigation**

General Microbiological Methods of enumeration and isolation of bacteria and fungi: conventional (serial dilution/pour plate technique) and modern methods (RIA, ELISA, PCR).

**TEXTBOOKS**


1. Frazier. W.C and Westhoff D.C., "Food Microbiology", Tata McGraw Hill Publishing Co., Ltd., New Delhi.
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.


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1. Ray, Bibek; Arun Bhunia, (2013), "Fundamental Food Microbiology", CRC Press.
2. Bibek Ray " Fundamental food microbiology". CRC Press. 3rd Edition. 2005.


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## FOOD MICROBIOLOGY (P)

**Code: 24FPVC2304 Credit: T0+P5 Contact Hours/week: 5 Marks:100**

**Course Objectives**

- To analyze the chemical constituents in food and to understand the basic concepts of food microbiology.
- To know the isolation and identification of common pathogenic bacteria found in high – risk food
- Understand the microbial spoilage in different food groups

**Specific Learning Outcomes**

After completion of this course, the students will be able to

- Acquire practical knowledge in microbial testing of sampling and testing of different food groups Identify the microorganisms responsible for spoilage of foods.
- Familiar in Sterilization method, microbiological media, staining & culture techniques

**Experiments**

1. Microbiological laboratory standards and safety protocols.
2. Standard aseptic conditions of Microbiological laboratory.
3. Operation and working principles of Light/ Compound microscope.
4. Working principles and operations of basic equipments of microbiological laboratory (Autoclave, Incubator, Vortex, Magnetic stirrer).
5. Use and care of laminar air flow chamber.
6. Applications of basic microbiological tools (Pipettes, Micropipette, Bunsen burner, Inoculation loop, Spreader).
7. Use of microscope to identify and differentiate bacteria, yeast and mould.
8. Preparation of glassware and media for microbial testing.
9. Preparation of slant, stab and plates using nutrient agar.
10. Culture Media preparation for bacteria and fungi
11. Isolation of pure culture –Pour plate technique, Streak plate and Spread Plate techniques
12. Staining of microorganisms and their examination.
13. a. Simple Staining b. Gram's Staining c. Acid-fast staining c. Spore staining d. Fungal staining d. Structural staining
14. Enumeration of yeast and mould in food.
15. Standard Plate count method

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16. Bacterial count with the help of Haemocytometer
17. Microbiological examination of potable water: Total and coliform count.
18. To study the microflora of probiotics (curd).
19. Bacteriological analysis of foods: Both fresh and processed fruits & vegetables, cereals, spices, and canned foods using conventional method.
20. Visit to microbiology laboratory.

**TEXTBOOKS**


1. Frazier. W.C., and Westhoff D.C, "Food Microbiology", Tata McGraw Hill Publishing Co., Ltd., New Delhi.
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.


**REFERENCES**


1. Ray ,Bibek; ArunBhunia,(2013), "Fundamental Food Microbiology", CRC Press.
2. Bibek Ray. " Fundamental food microbiology". CRC Press. 3rd Edition. 2005.
3. Lina A.Omar Zahid (2020), " Atlas of Food Microbiology", 6th Edition, University of Baghdad – College of Science.


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## FOOD SAFETY AND STANDARDS REGULATION

**Code: 24FPVC2305 Credit: T5+P0 Contact Hours/Week: 5 Marks:100**

**Course Objectives**

- To understand the importance of food safety and their standards.
- To study the opportunity to learn FSMS and to learn international food law and quality standards.
- To gain knowledge on providing an opportunity to learn licensing and quality auditing program.

**Specific Learning Outcome**

After completing this course students will be able to

- Can be able to become advisor to the manufacturing industries, process industries, which are involved in food business
- To prepare HACCP based SOP
- Familiar with conducting quality auditing in the food industries.

**UNIT I – Introduction to food safety**

History of food regulations in India, Legislations – Solvent Extracted Oil, Deoiled Meal and Edible flour (Control) order 1967, Edible oils Packaging 1998, Vegetable Oil Products Order 1998. Definition, Scope and Importance of food safety, factors affecting food safety.

**Unit –II – Sampling plans & procedures**

Principle aspects of sampling of food: Importance of sample collection, sampling tools and containers, sample collection techniques, sampling for microbiological analysis of food, routine versus investigational sampling, quantity of sample to be collected, packaging and sealing of food, dispatch of sample, documentation and commodity specific sampling procedure.

**Unit III – Standard Operating Procedure**

SOP – Definition, Purpose, Format, developing & implementing, effective writing. SOP for purchasing raw materials, receiving raw materials, storage, cleaning, holding, cooling, freezing, thawing, and reheating. Systems in laboratory accreditation. Preparation of HACCP based SOP checklist.

**Unit – IV – Food Safety and Standard Training**

FSMS – Definition, Scope, Leadership,Objectives. FSMS Process Model, ISO 22000:2018 standard –requirements, certification process, PDCA cycle. Audit – Objectives, Purpose, Checklist, benefits of check list, Report writing, Compliance audit, Six Sigma.

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**Unit – V - Registration and Licensing:**

Framework of registration or licensing of food service establishment, registration procedure for petty food manufacturer, Procedure for licensing, Inspection for grant of registration/License, renewal of license, Penalties, Adjudication

**REFERNCES**


1. Andres Vasconcellos J. 2005. Quality Assurance for the food industry – A practical approach, CRC press.
2. Inteaz Alli.2004. Food Quality assurance- Principles & practices, CRC Press, Newyork.
3. Neal D.Fortin. 2009. Food regulation, Wiley Publishsers.
4. Narayanan, P., Copyrights and Industrial Designs, 3rd edition., (2002).
5. O' Rourke, 2005. European Food Law, 3rd Edition, Thommson, Sweet and Maxwell.


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## DAIRY PROCESSING TECHNOLOGY (P)

**Code: 24FPVC2306 Credit: T0+P5 Contact Hours/week: 5 Marks: 100**

**Course Objectives**

- To understand the basic operations in the manufacturing of milk products
- To provide knowledge about value addition of milk and utilization of its by products.

**Specific Learning Outcome**

After completion of this course, the students will be able to

- Know the process involved in the production of various milk based products
- familiar with machineries used for the manufacturing of milk products
- Select appropriate techniques for testing of milk products quality

**Experiment 1 – Analysis of Liquid Milk**

1. Check the sterility of milk by Turbidity test.
2. Determine the Casein content of the milk.
3. Detection of adulterants in milk.
4. Microbial analysis – SPC, MBRT, Alkaline Phosphatase test, Resazurin test, Coliform count.
5. Preparation of Flavoured milk

**Experiment 2 – Analysis of Cream and Cream Powder**

1. Determination of Milk protein in Milk solids nor Fat of Cream Powder by AOAC method.
2. Preparation of Khoa
3. Preparation of Paneer
4. Preparation of Ice-cream and Kulfi
5. Preparation of dahi, cream, buttermilk and paneer.

**Experiment 3 – Analysis of Milk Powder and butter/ghee/cheese preparation**

1. Preparation and quality evaluation of spray dried milk
2. Determination of solubility index and percent in milk powder.
3. Preparation of sample of ghee/butter/cheese
4. Determination of Butyro refractometer reading in ghee
5. Preparation of sample of whey powder and evaluation of pH, Lactose and moisture.

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## TEXTBOOKS


1. Aneja RP, Mathur BN, Chandhan RC & Banerjee AK. (2002). "Technology of Indian Milk Products". Dairy India Publ., Delhi.

2. Alan H. Varnam, (2012), "Milk and Milk Products: Technology, chemistry and microbiology", Springer Science & Business Media Publishers.


## REFERENCES


1. Walstra P, Geurts TJ, Noomen A, Jellema A & Van Boekel MAJS., "Dairy Technology – Principles of Milk Properties and Processes". Marcel Dekker.

2. Robinson, R. K., (2012), "Modern Dairy Technology: Volume 2 Advances in Milk Products", Springer Science & Business Media Publishers.

3. Smit G. (2003). "Dairy Processing – Improving Quality". CRC-Woodhead Publ.


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3. https://www.cooksinfo.com/flour-grades
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6. https://www.slideshare.net/tusharbhar96/parboiling-of-rice
7. http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=5933
8. https://www.slideshare.net/tusharbhar96/parboiling-of-rice
9. https://www.slideshare.net/mobile/mahmudulmithun/postharvest-technology-of-agricultural-product
10. http://www.fao.org/3/ac301e/ac301e03.htm


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## INTERNSHIP - III

**Code: 24FPVC2307 Credit: T0+P3 Contact Hours/week: 3 Marks:50**

Students have to undergo internship after completing their third semester at an established Dairy industry and food processing unit based on their **NSQF level 5 "Supervisor - Food Processing Industries".** Students who underwent training should submit a report on their daily routine activities. After the successful completion of internship, a viva voce will be conducted with their presentation and evaluated.

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## FOURTH SEMESTER

## PERSONALITY DYNAMICS AND ENTREPRENEURSHIP

**Code: 24FPVC2401 Credit: T5+P0 Contact Hours/week: 5 Marks : 100**

**Course Objectives**

- To understand the concept and principle of personality development.
- To know the importance of interpersonal relationship in team building and leadership
- To learn about conflict and stress management for effectiveness of working in industries.

**Specific learning outcome**

After completion of this course, the students will be able to,

- Develop a positive attitude in life
- Find solutions for every problems in life
- Develop interpersonal relationships and social skills in working atmosphere

**Unit I Introduction to personality development:**

Definition, self understanding and monitoring, five dimensions of personality, determinants-personality traits- theories of personality-importance of personality development- self awareness, Motivation, Relevance and types of Motivation, Motivating the subordinates, Analysis of Motivation

**Interpersonal Relations -** Introduction to Interpersonal Relations - Stages, Analysis of Transactions.

**Unit II Attitude and Motivation**

Attitude – Concept, Significance, Factors affecting attitudes, Positive attitude and Negative attitude. Difference between personalities having positive and negative attitude.

Leadership - Definition- leadership style-theories of leadership- qualities of an effective leader. Team building- meaning, types of teams, - importance of team building. Employability Quotient – Resume Building, Group Discussion, HR round, Mock Interview.

**Unit III Stress and Conflict Management**

Introduction to Stress, Causes of Stress, Impact Stress, Managing Stress. Conflict: Introduction to Conflict, Causes of Conflict. SWOT analysis. Time as a Resource, Identify Important Time Management Wasters, Individual Time Management Styles, Techniques for better Time Management.

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**Unit IV - Introduction to an Entrepreneur**

Concepts of entrepreneur, entrepreneurship and entrepreneur - Characteristics and competencies of a successful entrepreneur - Type of entrepreneurs - Role of entrepreneur in economic development - Distinction between an entrepreneur and a manager - Entrepreneur and Intrapreneur.

Concept of women entrepreneurship - Reasons for growth of woman entrepreneurship - Problems faced by them and remedial measures.

**Unit V - Entrepreneurial Development Programmes**

Entrepreneurship development programmes (EDPs) - Objectives of EDPs - Organizations for EDPs in India – NIESBUD & SISI- their roles and activities.

Schemes for assistance – State and Central level current schemes and programmes for individual and group support. SIDCO, DIC, SIDBI, TIIC NSIC, MSME- Objectives, Programmes and their activities.

**TEXTBOOKS**


1. NarayanaRajan *et al.,*"Personalikty Development", publication division, M.S.University., Tirunalveli.
2. Stephan. P.Robbins.,(2008)., " OrganisationalBehavoiur", tenth edition., prentice hall of India., private limited, New Delhi.
3. Jit. S.Chandan., (2008), "Organisationalbehaviour", third edition. Vikas publishing house private limited.


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1. Aswathappa, Organisational Behavior, Himalaya Publishing House, 12th edition, 2016.
2. P.Subba Rao, Management and Organisational behavior: Text, Cases and Games, Himalaya Publishing House, 1st edition, 2010.
3. Mullins, Organisational Behavior, Pearson Education Limited, 9th edition, 2010.
4. L.M.Prasad, Organisational Behaviour, 5th edition, Sultan Chand and Sons, New Delhi, 2014
5. Michael H Morris, Corporate Entrepreneurship and Innovation in Corporations, 7th Edition, CENGAGE Learning, Delhi, 2010
6. Jerry Katz, Entrepreneurship Small Business, 5th edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2007


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3. https://www.dynamictutorialsandservices.org/2018/10/entrepreneurship-development-notes.html
4. http://www.gplohaghat.org.in/download/file/oG6FoOTS2G.pdf
5. https://www.pasc.edu.in/wp-content/uploads/2021/04/ENTREPRENEURSHIP-DEVELOPMENT-III-BBA.pdf


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## FOOD QUALITY ASSURANCE

**Code: 24FPVC2402 Credit: T5+P0 Contact Hours/week: 5 Marks:100**

**Course Objectives**

- To understand food laws and regulations governing the quality of foods
- To know about Intellectual property rights
- To identify the factors affecting food quality assurance

**Specific Learning Outcomes**

After completion of this course, the students will be able to

- Describe the laws and standards related to food quality assurance.
- Signify the importance of intellectual property rights to avoid food frauds
- Apply the knowledge to maintain quality in food industries.

**Unit I Concepts of quality management**

Objectives, importance and functions of quality control, Quality management systems in India, Sampling procedures and plans, Domestic regulations, Global Food safety Initiative. Definition and concepts of quality – Factors affecting food quality; Quality attributes- physical, chemical, nutritional, microbial, and sensory; their measurement and evaluation

**Unit II National Standards**

National Standards - Organizations dealing with inspection, traceability and authentication, certification and quality assurance - PFA, FPO, MMPO, MPO, AGMARK, BIS; Edible Oil Packaging, Consumer Protection Act, Food Safety and Standards Act, 2006,

**Unit III International Standards**

International standards – WHO, FAO, Codex Alimentarius Commission, ISO, Food Codex, Export import policy, Hazard analysis Critical Control Point: Definition, principles, Guidelines for the application of HACCP system.

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**Unit IV Quality Assurance**

Concept of quality assurance, need and importance, Total Quality Management, GMP/GHP, GLP, GAP, Sanitary and hygienic practices, Quality manuals, documentation and audits, Quality improvement plans and quality control circle.

**Unit V Food quality control and Analytical techniques**

Concepts of quality control, Need and importance of quality control programmes such as quality plan, documentation of records, product standards Product and purchase specifications and process control; Duties and responsibilities of food quality controller.

**Analytical Techniques**- Chromatography- Thin layer, HPLC, GLC, GC-MS, LC-MS, Electrophoresis, Isolation and extraction techniques for sample preparation.

**TEXTBOOKS**


1. Kher, C.P. Quality control for the food industry. ITC Publishers, Geneva. 2000.
2. Philip,A.C. Reconceptualizing quality. New Age International Publishers, Bangalore.


**REFERENCES**


1. Yong-Jin Cho, SukwonKang.(2011), "Emerging Technologies for Food Quality and Food Safety Evaluation" ,CRC Press.
2. AlliInteaz, (2003), "Food Quality Assurance: Princ0iples and Practices", CRC Press.
3. Vasconcellos J. Andres, (2003), "Quality Assurance for the Food Industry: A Practical Approach",CRC Press.


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3. https://en.wikipedia.org/wiki/Global_Food_Safety_Initiative
4. https://www.invensislearning.com/blog/quality-control-inspector-roles-responsibilities/
5. https://www.fda.gov/food/hazard-analysis-critical-control-point-haccp/haccp-principles-application-guidelines

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## LET US KNOW GANDHI

**Code:** **Credit: T2 +P0** **Contact Hours/week: 2** **Marks: 50**

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## FOOD ANALYSIS AND QUALITY TESTING (P)

**Code: 24FPVC2403 Credit: T0+P5 Contact Hours/week: 5 Marks:100**

**Course Objectives**

- To understand the food quality analysis techniques
- To provide hands on training in food testing and quality analysis

**Specific Learning Outcomes**

After completion of this course, the students will be able to

- Familiar with the food testing methods
- Know about the equipment used in food analysis

**Experiments**

1. **Estimation of pH and Buffer:**
   I. Preparation of standard solutions for the chemicals solutions and buffers for analysis.
   II. Estimation of pH for food samples
   III. Find out Molarity, Normality and Dilution Factor
2. **Macronutrient Analysis:**
   I. Determination of moisture content of food.
   II. Determination of ash content present in food.
   III. Determination of Carbohydrate by anthrone method.
   IV. Estimation of Protein.
   V. Estimation of Fat content present in food.
   VI. Estimation of crude fibre.
3. **Micronutrient Analysis**
   I. Estimation of Calcium in Milk.
   II. Estimation of Iron by wong's method.
   III. Determination of β – Carotene.
   IV. Estimation of Vitamin – C
4. Phytochemical (Qualitative) analysis of different food sample.
5. Determine the permissible level of food additives
6. Detection of adulterants present in food
7. Test for detection of pesticide residues in food
8. Visit to food testing laboratory.

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## TEXTBOOKS


1. Suzanne Nielsen (2017), "Food Analysis Laboratory Manual", Springer Publication
2. Pomeranz, Y. and Meloan, CE., Food Analysis: Theory and Practice, CBS Publishers and Distributor, New Delhi
3. Ranganna, S., Handbook of Analysis and Quality Control for Fruit and Vegetable Products, 2nd Edition, Tata Mc Graw hill Publishing Co Ltd., New Delhi


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1. Kher, C.P. (2000). Quality control for the food industry. ITC Publishers, Geneva.
2. Early, R., Guide to Quality Management Systems for the Food Industry, Blackie, Academic and Professional, London

3. Gould, W.A. and Gould, R.W.,"Total Quality Assurance for the Food Industries",CTI Publications Inc, Baltimore


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4. https://discoverfoodtech.com/soxhlet-extraction-method/
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7. http://egyankosh.ac.in/bitstream/123456789/33675/1/Practical%208.pdf

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## FOOD PACKAGING

**Code: 24FPVC2404 Credit: T5+P0 Contact Hours/week: 5 Marks: 100**

**Course Objectives**

- To understand the technology behind food packaging and packaging materials
- To provide knowledge about development in food packaging technologies and materials.

**Specific Learning Outcome**

After completion of this course, the students will be able to

- Know the properties of different packaging materials
- Familiar with various methods of packaging to improve the shelf life
- Select appropriate packing material and packaging technology for any food products

**Unit 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. Intrinsic and Extrinsic factors controlling the rate of reaction. Shelf life determination test.

**Unit II 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. Relative advantages and disadvantages of different packaging materials, effect of these materials on packed commodities. Measurement of water absorption of paper and paperboard.

**Unit III Packaging of different foods**

Factors determining the packaging requirements of various foods. Packaging materials for dairy products, bakery and Confectionery, granular products, fruits and vegetables, perishable and processed foods. To determine the water vapour permeability and gas transmission rate of packaging material and films.

**Unit IV Packaging Technologies**

Ordinary packaging, vacuum packaging, Aseptic packaging, Active packaging, Intelligent packaging, modified atmospheric packaging and controlled atmospheric packaging, shrink packaging, stretch packaging, Biodegradable packaging, Edible packaging, tetrapacks.

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**Unit V Printing and Labelling safety concerns in food packaging**

Printing process, inks, adhesives, coding- bar codes, Food packaging closures of glass and plastic containers, Legislative and safety regulations aspects of food packaging as per FSSAI norms. Nutritional Labelling.

Packaging equipment & machinery – Vacuum packaging machine, Bottling machines, carton making machines, gas packaging machine, seal & shrink packaging machine, form and fill sealing machine, nano particles in food packaging.

**TEXTBOOKS**


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.
4. Harsh Sharma, "Food Packaging Technology", Agrimoon Publisher.


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1. Mathlouthi, M., "Food packaging and Preservation". Aspen Publications.
2. Ahvenainen, Raija. (2003) "Novel Food Packaging Techniques".Wood Head Publishing.


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## TRADITIONAL INDIAN FOOD – CASE STUDIES

**Code: 24FPVC2405 Credit: T0+ P2 Contact Hours/week: 2 Marks: 50**

Traditional food connects people and helps others understand cultures through food, which is people identity. Traditional food and dishes that are passed on through generations or which have been continued for many generations. They are traditional in nature, and may have a historic prevalent in a national dish, regional or level cuisine.

As student of food processing, they have to do a case study based on Traditional Indian Food and submit report based their evaluation will be done

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## TRAINING COURSE IN FOOD SAFETY SYSTEM

**Code: 24FPVC2406 Credit: T0+P3 Contact Hours/week: 3 Marks: 50**

Training in food safety is a large scale training program to demonstrate their ability to control food safety hazards and contribute to ensure that food is safe at the time of human consumption are expected to meet specific requirements. Training Courses like Fostac training, FSMS training course, Food Safety, HACCP, FSMS course.

From, this students from B.Voc. food processing, they have to undergo anyone of the training course and submit a report based on the course they learned.

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## INTERNSHIP - IV

**Code: 24FPVC2407 Credit: T0+P3 Contact Hours/week: 3 Marks: 50**

Students have to undergo internship after completing their fourth semester at an established Food analysis laboratory based on their **NSQF level 5 "Supervisor- Food Processing Industries".** Students who underwent training should submit a report on their daily routine activities. After the successful completion of internship, a viva voce will be conducted with their presentation and evaluated.

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## FIFTH SEMESTER

## FOOD ADDITIVES AND FLAVOURING TECHNOLOGY (P)

**Code:24FPVC3501 Credit:T0+P4 Contact Hours/Week:4 Marks:100**

### Course Objectives

- To explore the food additives and their functions on food
- Can be able to predict the permissible additives and limits in processed foods
- To gain knowledge on understanding of chemical agents added to enhance the quality of processed foods.

### Specific Learning Outcome

After completing this course students will be able to

- To familiar students with the additives relevant to the processed food industry.
- To familiarize students with microbial, chemical and natural toxicants, allergens present and developed during food processing.
- To build knowledge on food additives among regulatory laws and limitations for usage of food additives.

### Experiment 1 – Introduction to food Additives

1. Definition, classification and functions of food additives
2. Indirect food additives- intentional and unintentional. E & INS numbers for food additives
3. Evaluation of GRAS aspects of food additives

### Experiment 2 – Introduction to flavour technology

1. Definition, types of flavors
2. Extraction techniques of flavors
3. Flavour analysis – Subjective Vs Objective methods of analysis, psycophysics and sensory evaluation

### Experiment 3 – Estimation of preservations in foods

1. Estimation of preservatives in foods
2. Identification of colors in food by TLC
3. Olfactory analysis of food products, receptor mechanism.

### Experiment 4 – Determination of residues in food

1. Protocol for detection and quantification of toxins in foods.
2. Detection of pesticide residues in food
3. Detection of antibiotic residues/hormones/veterinary drugs and heavy metals in food

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**Experiment 5 – Safety and Standards for food additives**

1. Food additives and labeling in EU, FDA, FPO
2. FSSAI Specifications for food additives
3. Laws and regulations for food additives and ingredients in processed foods

**REFERENCE**


1. Branen Al, Davidson Pm and Saminen S.(2001).Food Additives. Second Edition, Marcel Dekker.
2. Jim Smith and Hong Shum (2011).Food Additives data book, Second Edition, Wiley-Blackwell publishers.
3. Dushpande S.S., (2002), Handbook of Food Toxicology, first Edition, Marcel Dekker Publishers.


**WEBOGRAPHY**

1. https://www.slideshare.net/foodadditives/ppt
2. https://www.scribd.com/foodadditives/ppt
3. https://www.fao.org
4. https://www.fssai.gov.in

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## ONLINE SWAYAM COURSE

**Code: 24FPVC3502 Credit: T0+P3 Contact Hours/ week: 3 Marks:**

Swayam is a platform initiated by Government of India and designed to achieve the three cardinal principles of Education policy like access, equity and quality. Once, they have completed the course with certification, they can add the credits to their academic record.

Students from B.Voc. Food Processing, they have to do any one of the course via swayam portal relevant to their subject and also submit their passing certificate.

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## POST HARVEST TECHNOLOGY OF FRUITS AND VEGETABLES (P)

**Code: 24FPVC3503 Credit: T0+P5 Contact Hours/week: 5 Marks: 100**

**Course Objectives**

- To understand the changes in of fruits and vegetables during maturity, ripening and storage
- To know about the post harvest management systems for fruits and vegetables
- To be familiar with quality indices for fruits and vegetable selection and harvest

**Specific learning outcome**

After the completion of this course, the students will be able to,

- Describe the quality changes in fruits and vegetables after harvest
- Select appropriate methods to control the loss of quality in fruits and vegetables during handling, transport and storage
- Apply the knowledge to extend the shelf life of fruits and vegetables

**Experiments**

1. Demonstrate harvesting method and the tools used for harvesting.
2. Determine maturing indices of various fruits and vegetables.
3. Exercise on identification of processing equipments used in food industry.
4. Post- harvest treatments for shelf life extension of horticultural crops.
5. Physiochemical composition analysis of fruits and vegetables.
6. Effect of pre-cooling on shelf life of fruits and vegetables.
7. Exercise on conservation of zero energy cool chambers for on farm storage.
8. Test the quality of fruits subjected to effect of ethylene on ripening process.
9. Experiment on principles of preservation by heat, low temperature, chemicals and fermentation.
10. Value addition and processing of fruits.
11. Value addition and processing of vegetables.
12. Pre-packaging of fruits and evaluation of its quality
13. Pre-packaging of vegetables and evaluation of its quality
14. Determination of TSS and acidity in fruit juices.
15. Visit to commercial packaging unit
16. Visit to commercial storage unit

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## TEXTBOOKS


1. Thompson AK., Post Harvest Technology of Fruits and Vegetables.Blackwell Sci.
2. Kadar AA.1992. Post-harvest Technology of Horticultural Crops. 2nd Ed. Universiity of California.
3. Lloyd, A. & Penizer.R (1998). Handling, transportation and storage of fruits and vegetables, AVI Publication
4. Verma LR. & Joshi VK. 2000. Post Harvest Technology of Fruits and Vegetables. Indus Publication


## REFERENCES


1. Pantastico B.,"Post Harvest Physiology, Handling and Utilization of Tropical and Subtropical Fruits and Vegetables "AVI Publication.
2. Salunkhe DK, Bolia HR & Reddy NR., "Storage, Processing and Nutritional Quality of Fruits and Vegetables"Vol. I. Fruits and Vegetables. CRC.
3. Wills, R.B. (2002). Post harvest: An Introduction to the physiology and handling of fruits and vegetables, CBS Publishers & Distributors, New Delhi.
4. Verma, L.R., & Joshi, V.K. (2004). Post harvest technology of fruits and vegetables handling, processing, fermentation and waste management, Indus Publishing Co. New Delhi.


## WEBOGRAPHY

1. http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=5816
2. https://www.slideshare.net/KarlLouisseObispo/lecture-1-importance-of-postharvest-technology
3. http://www.fao.org/3/au186e/au186e.pdf
4. https://www.wnc.edu/files/departments/ce/sci/postharvesthandling.pdf
5. https://www.destechpub.com/wp-content/uploads/2015/01/Post-harvest-Technologies-of-Fruits-Vegetables-preview.pdf
6. http://www.fao.org/3/y4358e/y4358e05.htm

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## FRUITS AND VEGETABLES PROCESSING (T)

**Code: 24FPVC3504 Credit: T5+P0 Contact Hours/ Week: 5 Marks: 100**

**Course Objectives**

- To highlight the importance of fruit and vegetable processing
- To understand the changes in quality of fruits and vegetables during processing and storage
- To provide knowledge on technology of preservation and value addition of fruits and vegetables

**Specific Learning Outcomes**

After completion of this course, the students will be able to

- Know the proper handling technologies of fruits and vegetables to reduce post harvest losses.
- Familiar with various methods of preservation to improve the shelf life of fruits and vegetables
- Process and produce value added products from fruits and vegetables

**Unit I Scenario of fruit and vegetable processing**

Fruits and Vegetables – Introduction, food supply and consumption data. An over view of production and processing scenario of fruits and vegetables in India and World. Post harvest management of fruits and vegetables-control of losses in harvesting, and handling operations. Scope of fruit and vegetable preservation industry in India.

**Unit II Primary processing of fruits and vegetables**

Selection, Grading, Sorting, cleaning, washing, peeling, cutting/slicing, grading, packaging of fruits and vegetables, processing methods, machinery used for the process, advantages and limitations of the processes. Commodity pre-treatments- Pre-cooling, chemicals, pre- packaging, cleaning and grading. Storage Practices – Control atmospheric, hypotactic storage, cool store, zero energy cool chamber.

**Unit III Beverages from fruits and vegetables**

Fruit beverages: Definition, Classifications, health benefits, processing technology for manufacturing of fruit juices, fermented/non-fermented, pulp, RTS beverage, nectars, squash, syrups, cordials ,Carbonated and Non- Carbonated Beverages, Stimulating and Non- Stimulating beverages.

Fermented fruits and vegetables products like sauerkraut, pickles, wines etc. Syrups and brines used in processing, containers used for primary packaging of fresh fruits and vegetables and their processed products.

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**Unit IV Value added fruits and vegetable products**

Commercial processing of major fruits and vegetables (canning, jam, jellies, marmalade, purees, concentrates, preserve, candy, toffee/bar etc.). Drying and dehydration technology of fruits and vegetables: preparation of raisins, anardana, dried fig, dried leafy vegetables, juice powders, flakes, wafers, chips etc. Tomato paste, ketchup, sauce, puree, soup, chutney etc.

**Unit V By-products utilization and waste management**

Utilization of By-products: pectin extraction, vinegar production from fruit and vegetable waste, Waste disposal: Physical, Chemical & Biological methods; Economical aspects of waste treatment and disposal.

**TEXTBOOKS**


1. Srivastava, R.P. and Kumar, S.: Fruit and Vegetable Preservation: Principles and Practices. International Book Distributing Co. Lucknow.
2. Girdharilal and Siddappa, Preservation of Fruits and Vegetables, Kalyani Publishers, 2001.
3. Subalakshmi, G and Udipi, SA: Food processing and preservation, 1st Edition. New Age International (P) Ltd. 2006


**REFERENCES**


1. Cruees, W.V. Commercial fruits and Vegetable products, Agrobios Publishers, 2009
2. Desrosier NW and Desrosier JN: The Technology of Food Preservation, 4th Ed. CBS Publishers and Distributors, New Delhi. 2006


**WEBOGRAPHY**

1. https://www.foodtown.com/articles/select-fresh-fruits-vegetables
2. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=111423
3. http://wiki.zero-emissions.at/index.php/Peeling_in_food_industry
4. http://www.agritech.tnau.ac.in/postharvest/fpo_spec.html
5. http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=5858
6. https://www3.epa.gov/ttn/chief/ap42/ch09/final/c9s08-2.pdf
7. :http://www.madehow.com/Volume-4/Raisins.html#ixzz6d7LmmHcC
8. http://www.phdmsme.in/uploaded_files/project_report/1536148322_327.pdf
9. https://medium.com/@luolaner521/several-methods-of-making-dried-figs-cea083e2d01
10. http://www.ticomachine.com/faq/fruit-juice-powder-production.html
11. https://www.dimasharif.com/fruit-wafers/

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## FRUITS AND VEGETABLES PROCESSING (P)

**Code: 24FPVC3505 Credit: T0+P4 Contact Hours: 4 Marks:100**

### Course Objectives

- To understand the technology for preservation of fruits and vegetables
- To Provide knowledge about quality testing of fruits and vegetables.

### Specific Learning Outcomes

After completion of this course, the students will be able to

- Know the different types of processed fruits & vegetables products.
- Make different processed fruit & vegetable based products with quality assurance and safety.

### Experiments

1. Study on common food processing equipment's such as: pulper, sealers, juice extracting machines, autoclaves, corking machines.
2. Peeling and cutting of fruits and vegetables.
3. Exercise on Grading and Sorting of fruits and vegetables their functionality.
4. Extraction and preservation of Fruit Juices.
5. Testing Pectin in fruit juices and pulp.
6. Preparation of fruit RTS beverage and evaluation of its quality
7. Preparation of fruit squash and cordial.
8. Preparation of fruit jam and evaluation of its quality
9. Preparation of fruit jelly/marmalade
10. Preparation of fruit preserve and candy
11. Preparation of fruit bar/toffee
12. Preparation of dehydrated fruits and vegetables
13. Preparation of pickle/ mixed pickle
14. Preparation of tomato ketch-up, sauce & chutney
15. Visit to fruit and vegetable processing industry
16. Visit to commercial storage and canning unit.

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## TEXTBOOKS


1. Girdharilal and Siddappa, Preservation of Fruits and Vegetables, Kalyani Publishers, 2001.
2. Subalakshmi, G and Udipi, SA: Food processing and preservation, 1st Ed. New Age International (P) Ltd. 2006


## REFERENCES


1. Cruees, W.V. Commercial fruits and Vegetable products, Agrobios Publishers, 2009
2. Desrosier NW and Desrosier JN: The Technology of Food Preservation, 4th Ed. CBS Publishers and Distributors, New Delhi, 2006


## WEBOGRAPHY

1. https://www.foodtown.com/articles/select-fresh-fruits-vegetables
2. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=111423
3. http://wiki.zero-emissions.at/index.php/Peeling_in_food_industry
4. http://www.agritech.tnau.ac.in/postharvest/fpo_spec.html
5. http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=5858

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## ELECTIVE

**Code: 24FPVC35E1/E2/E3 Credit: T4+P0 Contact Hours/week: 4 Marks: 100**

(The Elective course should be opted by the students offered by the department)

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## FIELD STUDY/ STUDY TOUR

**Code: 24FPVC3506 Credit: T0+P2 Contact Hours/week: 2 Marks: 50**

Field study/study tour is an educational procedure by which each student gain or learns information by observing the objects, places, natural events and other real life information. Students have to undergo at an established food processing industry organized visit by teachers. They should submit report on the activities carried out with details of date and timing.

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## INTERNSHIP- V

**Code: 24FPVC3507** **Credit: T0+P3** **Contact Hours/week: 3** **Marks: 50**

Students have to undergo internship after completing their fifth semester at an established Fruits and beverage processing sector and based on their **NSQF level 6 "Internal Food Auditor – Food Processing".** Students who underwent training should submit a report on their daily routine activities. After the successful completion of internship, a viva voce will be conducted with their presentation and evaluated.

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**SIXTH SEMESTER**

## NOVEL FOOD PROCESSING TECHNOLOGIES

**Code: 24FPVC3601 Credit: T4+P0 Contact Hours/week: 4 Marks: 100**

### Course Objectives

- To know about new developments in food processing
- To provide knowledge about concept and principles of novel techniques
- To highlight the applications in food processing

### Specific Learning Outcomes

After completion of this course, the students will be able to

- Know the application and use of the technology in food processing
- The concepts and process involved in novel food processing
- Apply the knowledge to develop/modify food products using novel techniques

### Unit I Food Irradiation & Microwave Heating

Irradiation: meaning, source, principle- types of irradiation, process, terminologies involved in food irradiation, advantages, limitations, Food applications.

Microwave Heating - Dielectric properties of food, heat & mass transfer in microwave processing, application of microwave processing of foods.

### Unit II Membrane separation process

Membrane Technology-process, types: principles & penetration level of membrane, Micro-filtration, Ultra-filtration, Nano-filtration and Reverse Osmosis, Types of flow in membrane filtration, membrane modules -advantages and limitations, Food applications

### Module II High pressure processing

High Pressure processing: Concept, principle, Equipment for HPP Treatment-generation of high premises, Mechanism of microbial inactivation and its application in food – Food suitability.

### Unit IV Hurdle technology

Basics of hurdle technology Mechanism, Aspects, Newer Physical, Chemical and Biochemical hurdles- organic acids – Natural & Bio-based antimicrobials .

Antimicrobial agents - Bacteriocins , Nisin– chitin / chitosan, Advantages and limitation.

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**Unit V Pulse Electric Field and Ohmic Heating**

Pulse Electric Field – Principle, System components, Application, Factors affecting outcome of PEF.

Ohmic Heating & Inductive Heating – Principle, Product suitability, formulation of pre-treatment.

**TEXTBOOKS**

1. Da-Wen Sun,"Emerging Technologies for Food Processing", Academic press/ Elsiever, London, UK,2005.

**REFERENCES**

1. Leistner L. and Gould G. Hurdle Technologies – Combination treatments for food stability safety and quality, Kluwer Academics / Plenum Publishers, New York ,2002
2. P Richardson, "Thermal Technologies in Food Processing", Campden and Chorleywood Food Research Association, UK, Woodhead Publishing Limited, 2001
3. Gustavo V.Barbosa-Canovas, Maria S.Tapia and M.Pilar Cano, " Novel Food Processing Technologies". CRC Press, 2004.

**WEBOGRAPHY**

1. https://apps.who.int/iris/bitstream/handle/10665/38544/9241542403_eng.pdf
2. https://www.sathyabama.ac.in/sites/default/files/course-material/2020-10/UNIT-V_8.pdf
3. http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000015FT/P000068/M000148/ET/14616619928et.pdf
4. https://www.ijcmas.com/vol-4-7/Aditya%20Pundhir%20and%20Nida%20Murtaza.pdf

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## FOOD HYGIENE AND SAFETY

**Code: 24FPVC3602 Credit: T4+P0 Contact Hours/week: 4 Marks: 100**

**Course Objectives**

- To understand the hygienic practices in food industry.
- To maintain personal hygiene and to check food safety aspects.

**Specific Learning Outcomes**

On Successful Completion of this course, the students will be able to

1. Know the principles and applications of sanitation in food industry.
2. Know about the various types of Sanitation techniques applicable in the food industry
3. Gain an understanding of food hygiene and safety during food processing unit operations

**Unit I Food Safety and Hygiene**

**Food Safety-** Definition, principles of food safety, importance & guidelines of food safety in food industries, National legislative related to food safety. Factors affecting food safety, source of contamination.

**Hygiene –** Definition, Personal, community, WASH (Water, Sanitation and Hygiene) Programme.

**Unit II Hygiene Practices and sanitation in food industry**

**Hygiene Practices -** Necessity, personnel hygiene, sanitary requirement of food processing premises, safety at work place. Importance of sanitation, application of sanitation to food industry. **Pre-** requisite programs followed in food industry.

**Unit III Food borne disease and prevention**

Food Borne Disease – Types, Food borne pathogens, Food borne infection,

Food Poisoning – sources, Causes, signs of food spoilage and prevention of contamination of food poisoning.

**Unit IV Environmental Sanitation**

Purchasing and receiving safe food, food storage, sanitary procedures in food preparation, serving and displaying of food, special food operations.

Location and layout of premises, constructional details, sanitary requirements for equipments, guidelines for cleaning equipments, cleaning procedures, pest control, water supply, storage and waste disposal, environmental pollution.

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**Unit V Sanitation regulations and Standards**

Introduction, regulatory agencies, control of food quality, local health authority. Food sanitation check lists given by FSSAI. High Risk Foods & Storage of food, Low risk food & their storage. FSMS process, HACCP plan and role of supervisor in food industry.

**TEXTBOOKS:**


1. Roday S, (2011), "Food Hygiene and Sanitation", McGraw Hill Publishing Company Limited.
2. H. L. M. Lelieveld, John Holah, David Napper, (2014), "Hygiene in Food Processing: Principles and Practice", Elsevier Publications.


**REFERENCES:**


1. Marriott, Norman (2013), "Principles of Food Sanitation", Springer Science & Business Media Publishing.
2. Hygiene Rating Schemes for food establishment (2021), Quality Council of India.


**WEBOGRAPHY**

1. https://www.sciencedirect.com/topics/food-science/food-hygiene#:~:text=Food%20hygiene%20constitutes%20the%20cornerstone,greatest%20risk%20for%20human%20health.&text=Guidelines%20on%20the%20Application%20of,%2Dto%2DEat%20Foods%3B%20and
2. https://www.unimed.edu.ng/oer.unimed.edu.ng/LECTURE%20NOTES/1/1/SUNDAY-OLANREWAJU-Basics-of-food-safety-and-HygieneOER1037206.pdf
3. https://www.slideshare.net/AbiodunOladipo/food-hygiene-and-safety-lecture
4. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/env_health_science_students/foodhygieneptii.pdf
5. https://www.intracen.org/uploadedFiles/intracenorg/Content/Exporters/Exporting_Better/Quality_Management/AssetPDF/FINAL%20Food%20safety%20and%20GHP%20-%20Gambia(2).pdf
6. https://www.scribd.com/presentation/479849314/Food-Hygiene-Lecture-ppt

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## EXTRUSION TECHNOLOGY

**Code: 24FPVC3603 Credit: T4+P0 Contact Hours/Week: 4 Marks:100**

**Course Objectives:**

- To understand the importance of understanding fundamentals, design considerations, processing of different extruded products and selection of food extrusion equipments.
- To study the opportunity to knowing recent trends and future aspects of food extrusion.
- To gain the knowledge on appropriate extruder for the specific food product.

**Specific Learning Outcome**

After completing this course students will be

- Ability to solve the process related problem during extrusion.
- Familiar with developing new food products with various ingredients.

**UNIT I – Introduction to Food Extrusion**

**Extruders –** Definition, principles, classification of extruders. Extruder selection, Designing and Working principle of extruders in food industry, pre-conditioning of raw materials used in extrusion process. Advantages and disadvantages of different types of extrusion.

**UNIT – II – Equipment used in food extrusion**

**Screw extruder – Single screw extruder** – Design and working principle, Operation, manufacturing of Macaroni, Vermicelli, Sphagetti and Vermicelli

**Twin Screw extruder -** Design and working principle, Operation, manufacturing of pappad, processed foods, animal foods.

**UNIT – III- Extrusion Process**

Selection criteria of extrusion process, Types of extrusion process- Dry and Wet, Melting process, Startup and shutdown of extruder, post extrusion techniques, Trouble shooting of manufacturing process, Different food application.

**UNIT – IV – Extrusion Cooking**

**Extrusion Cooking -** Basic principles of proper extrusion cooking, Hot and cold extrusion technology, characteristics of extruded products, Factors affecting extrusion cooking. Physiochemical changes occur during extrusion. Quality parameters of measuring methods for extruder product property.

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**UNIT- V- Development of Novel Foods using Extrusion Technology**

**Extruded products-** Production of snack foods, Breakfast cereals, Baby foods, Fortified ready to eat foods, extruded biscuits with high quality, Meat extender, Stabilization of rice bran, Oil expelling, recycling of food waste from food industry. Quality changes in minimally processed foods, microbial risk and health hazards.

**REFERENCE:**


1. Robin Guy, (2001), "Extrusion Cooking :Technologies and Applications", Woodhead Publishing (Elseiver)
2. Leszek Mosicki, Extrusion (2011)– Cooking Techniques : Applications, Theory and Sustainability, Wiley Publications.
3. Frame.N.D., "The technology of extrusion cooking", Springer Publication.


**WEBOGRAPHY:**

1. http://www.extrusion technology in food processing/slideshare.com
2. www.ijedr.org

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## SPICES PROCESSING TECHNOLOGY (P)

**Code: 24FPVC3604 Credit: T0+P4 Contact Hours/Week: 4 Marks:100**

**Course Objectives**

- To impart knowledge related to harvesting techniques of spices
- To expose the students to analyze the spice processing

**Specific Learning Outcome**

- Students will able to prepare the value added products from different spices
- Familiar in medicinal usage of some therapeutic spices.

1. Spices – Morphology, Post harvesting techniques of pepper and cardamom.
2. Classification of Spices, Condiments, seasonings and culinary herbs.
3. Identify common parts used in spices & herbs.
4. Identify medicinal usage of some therapeutic spices along with their active components.
5. Discuss the importance of various process charts, product flow chart of spices, herbs & condiments processing.
6. Demonstrate how to analyze the process chart, product flow chart, formulation chart of spices.
7. Value Added Products from Different Spices
    1. Black Pepper – Oleoresin, Green pepper in brine, Dehydrated green pepper
    2. Paprika – Colour, Paprika flavour.
    3. Ginger – Powder, Dry ginger starch, Spent ginger preserves.
    4. Turmeric – Natural pigment, Curcuminoids.
    5. Fenugreek – Powder, Dried Fenugreek leaves.
8. Preparation of Essential oil from different extracts of spices.
9. Visit to Spice Processing Industry
10. Visit to Condiment Processing Unit

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## REFERENCES


1.Acharya N.G. Ranga Agricultural University, B.Tech (Food Technology) "Material Processing of Spices and Plantation Crops prepared by Ms.Aruna Kumari Y College of Food Science and Technology.

2. Peter.K.V., "Handbook of Herbs and Spices, Woodhead publishing.

3.Dr.Prakash.V and Sundarrajan.K.V.S.S., " Spices : Processing technology and Product Development", Allied Publishers


## WEBOGRAPHY


1. http://www.krishi.icar.gov.in
2. http://www.slideshare.net/processing of spices and plantation
3. http://www.scibd.com/practical manual - processing of spices and plantation crops


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## FOOD BIOTECHNOLOGY

**Code: 24FPVC3605 Credit: T5+P0 Contact Hours/week: 5 Marks:100**

**Course Objective**

- The students will be able to understand the scope and application of biotechnology
- The students will be able to know the technological aspects of industrial production.

**Specific learning outcome**

- To familiarize the students with waste generated from food industries and methods of by-product utilization.
- To acquaint students with the fundamentals of biotechnology and its application in food processing, fermentation and waste utilization.

**UNIT I Food Biotechnology and Bioinformatics**

**Food Biotechnology –** Definition, Scope and Application of Biotechnology- Application of Food Industries, Pharmaceuticals, Agriculture and Waste Utilisation.

**Bioinformatics –** Scope and importance, Application in Food Technology, Regulatory and Social aspects of Biotechnology of foods

**UNIT II Fermentation Technology**

**Fermentation, Downstream Processing -** Fermentation Process – Batch Culture, Continuous Culture, Fed Batch Culture. Bacterial starter culture, methods of inoculums and medium preparation, slurry processing.

**UNIT III Fermented Foods**

Technological aspects of industrial production – Wine, enzyme- amylase, Pectinase, Protease, Organic Acids, Vitamins, Antibiotics, Baker's yeast, SCP.

Traditional Fermented Foods – Idly, Dosa, Fermented milk Products – Cheese, Yoghurt, Butter, Fermented food based on cereals and legumes – Bread, Soy sauce.

**UNIT IV Plant and Animal Biotechnology**

Plant Biotechnology – Plant tissue culture – Cultivation, Genetically Modified Foods – Definition, Principle, Classification of GM foods and Application, Benefits and risk of GM foods.

Animal Biotechnology – Animal Cell Culture, Animal nutrition and Health, Biotechnology in animal feed industry.

**UNIT V Enzyme Technology**

Enzyme Technology- Basic Concepts, Principles, Application and future trends. Production of industrial enzymes – Protease, Lipase and Lactase.

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Immobilisation of enzymes – Definition, methods of immobilisation, application of immobilised enzymes in food industry, merits and demerits.

Food Nanotechnology – Basic Concepts, Principles, applications and future trends

**REFERENCE BOOKS:**

1. Earle R.L.,(2000 )"Unit operations in Food Processing", Pergamon Press.

2. R.Paul singh,(2001). Introduction to Food Engineering. Academic press, California, USA

**TEXTBOOKS:**

1. Satyanarayana, U, " Biotechnology", Books and Allied (P), Ltd., Kolatta, 2006.

2. Dubey, R.C., " A Textbook of Biotechnology", S.Chand & Company Pvt. Ltd., New Delhi, 2014.

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## MINI PROJECT

**(Students those who are exit in sixth semester)**

**Code: 24FPVC3606 Credit: T0+P6 Contact Hours/ week:6 Marks: 100**

The Objective of this mini project is to let the students apply their knowledge and having great exposure in research field. Students are formed in group under guidance and finally they need to submit the report along with presentation.

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## FOOD PROCESSING UNIT – CASE STUDY

**Code: 24FPVC3606 Credit: T0+P6 Hours/ week: 6 Marks: 100**

The objective of this case study is to understand the ways and means of establishment of food processing sector. Students will get clear idea on how processing plant works. The Students shall be placed in food processing unit. Each student is expected to do an individual case study. The students have to submit the case study along with presentation.

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## INTERNSHIP/ EXPERIENTIAL LEARNING - VI

**Code: 24FPVC3607 Credit: T0+P3 Contact Hours/ week:3 Marks: 50**

Experiential Learning helps the student to develop competence, capability, capacity building, acquiring skills, expertise, and confidence to start their own enterprise and turn job creators instead of job seekers. This is a step forward for "Earn While Learn" concept. Experiential learning is an important module for high quality professional competence and practical work experience in real life situation to Graduates. The main objective of EL are:

1. To promote professional skills and knowledge through meaningful hands on experience.
2. To build confidence and to work in project mode
3. To acquire enterprise management capabilities

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## SEVENTH SEMESTER

## RESEARCH METHODOLOGY

**Code: 24FPVC4701 Credit: T6+P0 Contact Hours/week:6 Marks:100**

**Course Objectives**

- To make the students understand about Research Processing.
- To enable the students to gain knowledge on to conduct research , article writing , presentation and concluding of research

**Specific Learning Outcome**

After learning this paper the students will gain knowledge in , Research Process, Conducting Literature Review, Information's Sources, Data collection, Sampling, Citation and listing system of documents**.**

**UNIT – I**

**Meaning of Research:** Objectives of research, Types of Research, Research Process, Problem Statement, Research Design,

**UNIT – II**

**Problem Formulations**: Conducting Literature Review, Information's Sources (Books, monographs, reviews, blogs, etc) Information Retrieval, Role of libraries in Information Retrieval, Research Gap,

**UNIT - III**

**Research Design:** Experimental / Theoretical/Empirical Research, Cause effect Relationship, Field Experiment, Data/variable types and classifications, Data collection- Methods and Tools

**UNIT – IV**

**Data Analysis and Interpretations:** Sampling, Sampling Error, Statistical Methods/Tools – Measures of Central Tendency ,Test of Hypothesis - Correlations and regression analysis, Co-efficient of Variation.

**UNIT – V**

**Writing Research Articles and Thesis:** Guidelines for writing the abstracts, introductions, methodology, results and discussion, Conclusion, section of manuscript, Plagiarism and Ethical Considerations in Research.

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**TEXT BOOKS:**

1. Research and Methodology by C.R Kothari, Gaurav Garg.
2. Research and Methodology by Ranjitkumar
3. Research Design by R. Pannerselvam

**REFERENCES:**

1. Case Study Research Design and Methods by Robert K. Yin
2. The Action Research Dissertation( A Guide FOR Students and Faculty) by Kthryn Herr, Gary L.Anderson
3. Research Design by Jhon W.Creswell

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## PRODUCT BRAND AND MARKETING MANAGEMENT

**Code: 24FPVC4702 Credit: T6+P0 Contact Hours/Week:6 Marks:100**

### Course Objectives

•. To explore the process of creation of brand
•. To understand the importance of product management including product portfolio, development process and life cycle analysis
• To gain knowledge on understanding and differentiate product vs brand.

### Specific Learning Outcome

After completing this course students will be able to

- Managing a brand with concepts of brand building and management to keep brands strong and relevant for years to achieve.
- To develop strategies to be adopted for the product, pricing and distribution aspects of the brand.
- familiar to develop branding as marketing strategy, brand equity, its importance and measurement.

### UNIT I – Product Management

**Product -**Introduction and importance – role of product manager. PLC theory – product vs brand, concept, stages and criticism of PLC. Product portfolio – Concept, factors influencing product portfolio, Mapping- understanding company brands vs competitive brand market position, product strategy and planning.

### UNIT II – Branding and Marketing Management

Introduction of marketing, marketing management- marketing concept and functions, Marketing research, marketing information system, market forecasting, targeting and positioning, marketing planning process.

Branding Management – Concept of brand equity, creating brands in a competitive market, brand positioning, strategic issues in brand management- concepts, principles – brand extension, brand equity and its component.

### UNIT III – New Product Development

**NPD-** New Product Development process, stages of NPD, strategy, Reasons for failure of a new product. Commercialization- Test marketing – concept and benefits, managing growth, customer relationship management.

**Packaging -**Meaning, importance, types, factors influencing packaging decision.

Packaging Strategies: Meaning Legal and ethical aspects of packaging: Green packaging, concept and importance. Product labelling – Meaning, types and importance.

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**UNIT IV – Brand Positioning and Repositioning**

Sustainability to brand a long term, Branding at different stages of market, Scope for branding, role of branding and branding strategies needed at different stages in the evolution of the market, Designing and implementing branding strategies.

**Repositioning** – Meaning, Positioning vs Repositioning, Successful challenging strategies of repositioned product, global brand, benefits of global branding, Types of brand name, brand identity, Local brand, Attitude branding and iconic brands.

**UNIT V- Brand Communication**

Concept, need and importance of brand communication. Communication model, Role for communication, Brand awareness, Elements and types of brand, advantages of manufacturers brand, Digital Brand Management model.

Brand loyalty and equity- factors affecting brand loyalty. Benefits of brand loyalty, Types of brand loyalty, Building brand loyalty – Brand Positioning and associations.

**REFERENCE:**


1. Subroto Sengupta, Brand Positioning: Strategies for competitive advantage, McGraw Hill Education.
2. Keller K.L., Rameswaram.M.G., & Isaac Jacob, Strategic Brand Management, Pearson Education, Second Edition.
3. Keller, K.L., & Swaminathan, V. (2019), Strategic Brand Management: building, Measuring and Managing Brand Equity (5th Ed.). Prentice Hall
4. Trott.P (2008). Innovation Management and Product Development (4th Ed.). Prentice Hall.


**WEBOGRAPHY**

1. www.slideshare.net/brandcommunication/ppt
2. www.notesmagic:brand positioning.blogspot.com
3. www.longodom.org
4. www.slideshare.net/product brand management/ppt

GRI - B.Voc

## SPECIALIZATION – I – FOOD TECHNOLOGY

## COLD STORAGE TECHNOLOGY (P)

**Code:24FPVC4703 Credit:T0+P6 Contact Hours/Week:6 Marks:100**

### Course Objectives

- To know about the handling techniques of cold storage system
- To provide knowledge on design refrigeration and cold storage
- To illustrate the importance of general warehouse an cold chain warehouse

### Specific Learning Outcome

After completion of this course, the students will be able to

- Identify and demonstrate the different types of refrigeration
- Design the refrigeration cold storage system
- Select best methods for storing foods without loss of nutrients.

### Experiments

1. Material handling procedures and equipments needed for a cold storage unit.
2. Cooling system design and equipment solution cooling system configuration.

a) Type of refrigerant - ammonia /freon/others

b) Compressor – Reciprocating/screw/scroll/others

c) Condensor – Atmospheric /evaporator/shell and tube/plate heat exchanger/other

d) Cooling towers

e) Total refrigerator load

3. Initial stage condition and grouping of products.
4. Condition for perishable food article stage

a) Fruits and vegetables

b) Fleshy food

c) Milk products

5. Layout of multi-Commodity cold store facilitation
6. Study on Parallel flow and Counter flow heat exchangers
7. Exercise on components and processes of Vapour Compression and Vapour Absorption type refrigeration system.
8. Determination of Heat Transfer Co-efficient inside a cold storage and Refrigerator
9. Calculation of Cooling Loads

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10. Estimation of refrigeration requirements in dairy & food plant

11. Specification for general guidelines of conventional construction of a cold chamber.

12. Temperature recording devices used during transport, documentation and traceability

13. REFID technology in cold chain management.

14. Innovative refrigeration technologies like magnetic refrigeration, cryogenic cooling

15. Explain basics of cold chain warehousing. Identify difference between a general warehouse and cold chain warehouse.

**REFERENCE**


1. The complete book on cold storage, cold chain and warehouse (with controlled atmosphere and rural godowns)5th edition .Jan 2022.Ajay kumargupta .15BN-10:8195577520
2. Practical cold storage. Medoson cooper,Nabu press later edition, 2010.
3. e-book, cold storage basics.(ISH001CASB)
4. FSSAI manual for cold storage


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## FERMENTATION TECHNOLOGY (P)

**Code:24FPVC4704 Credit:T0+P6 Contact Hours/Week:6 Marks:100**

### Course Objectives

- To make the students familiar with the principles of using microbes in fermentation process
- To be familiar with the fermented products in brewing industry, production of biomass and organic acids.
- To be acquainted with the machineries needed for fermentative processes.

### Specific Learning Outcome

After completion of this course, the students will be able to

- Identify and demonstrate the different types of fermentor
- To be familiar in aseptic techniques followed in fermentation industry
- Provide knowledge on design and operation on different types of fermentor

**Experiments:**

1. Introduction to fermentation process.
2. Instrumentation and their control in fermentation industry – physical and chemical parameter.
3. Design and operations of fermentation, Basic concepts for selections for fermentation process. Anatomy of fermentor, cleaning of fermentor, assembling and pre-sterilization of fermentor.
4. Media formulation and optimization, Inoculums development, strain improvement.
5. Study of metabolic parameters and biosensors in food industry
6. Comparative Study of laboratory and commercial fermentor.
7. Microbial growth kinetics, fed bath and continuous cultures.
8. Aseptic techniques in inoculation of fermentation.
9. Development of Yeast.
10. Measurement of microbial growth after fermentation.
11. Preparation of Yogurt fermentation.
12. Preparation of Cheese
13. Fermentation method for the production of enzymes by microbes.
14. Preparation of sauerkraut, kimchi.
15. Study of alcohol production from high-sugar food material

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**REFERENCE**

1. Industrial microbiology (2000) AH Patel, Macmillan publisher, India.

2. Biology of industrial microorganisms by Arnold.L. Domain.Benjamin/ Cumming Publishers.Co.

3. Deider Rawlings, (2013),"Fermented Foods for health", Fair winds Press.

4. Robert W.Hutkins, (2008), "Microbiology and Technology of Fermented Foods", John Wiley & Sons.

**WEBOGRAPHY**

1. https:// www.tanfonline.com/doi/full/10.1080/13102818.2818.1440974.

GRI - B.Voc

## SPECIALIZATION – 2- INDUSTRIAL FOOD REGULATION SYSTEM

## INDUSTRIAL FOOD RECALL REGULATION (P)

**Code: 24FPVC4705 Credit: T0+P6 Contact Hours/week: 6 Marks: 100**

**Course Objectives:**

- To impart knowledge related to the purpose and implementation of food recall
- To gain knowledge in guidelines and withdrawal procedure of food recall

**Learning Outcome:**

- Students will learn about food recall, FSSRegulation, state and local government responsibilities.
- To be familiar with the food recall checklist given by the government.

1. Exercise on Purpose of Industry food recall.
2. Classification of industry recall and implementation
3. Recall program framework – role of industry and government.
4. Exercise on checklist recording government effectiveness of food recall
5. Recall management team their roles and responsibilities
6. Traceability & handling of emergencies & incidents
7. Food recall procedure based on FSSRegulation, 2017.
8. Distributor & retailer responsibilities related to food recall.
9. State and Local government responsibilities related to food recall.
10. International recall Co-ordinator responsibilities of food recall
11. Determine the recall or withdrawal decision matrix.
12. Guidelines for food recall advertisements.
13. Case Studies and discuss about the importance of food traceability & recall.

**REFERENCE:**

**1.** GOI (Government of India) FSSAI published the Food Safety and Standards (Food Recall Procedure) Regulations, 2017.

**WEBOGRAPHY:**

1. http://www.slideshare.net/slideshow/guidelines -on-food-recall/10468658
2. http://www.slideshare.net/conducting a food recall_ppt
3. http://www.fssai.gov.in

## COMPUTER APPLICATION IN FOOD INDUSTRY (P)

**Code: 24FPVC4706 Credit: T0+P6 Contact Hours/Week: 6 Marks:100**

**Course Objectives**

- To impart knowledge related to the applications of computation in food industries
- To expose the students with fundamental knowledge on the computer software

**Specific learning outcome**

- Students will gain knowledge regarding the computer applications and how to use the applications in food industry.

**Unit – I- Introduction to Computer and software used in food Industry**

1. Importance of computerization in the food industry
2. Introduction to computer-related hardware used in the food industry (Touch Screens, Hand Held Devices, Palm Tops, Barcode Printers and Scanners, RFID tags)
3. Introduction to various software for their application in food technology (like SAP, justFood ERP, SERVE) with relevant case studies.

**UNIT – II- MS Office Package Tools**

1. MS Office word
2. MS Excel
3. MS Power point
4. MS Access
5. MS Visual Basic

**Unit – III**

1. Web hosting and page design
2. Domain registration, web hosting, webpage design using web publishing software
3. Introduction to File Transfer Protocol (FTP); Online food process control from centralized server system in processing plant

**Unit – IV – Software used in Food Industry**

1. Basic Introduction to the application of computers in instrumentation and process control of the food industry (PLC, SCADA, LIMS etc.,)
2. Inventory control and management in food industry using Computers and automation techniques.
3. Sensory analysis using software like Compusense, SIIMs

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**Unit – V – ICT and Food Industry**

1. ICT – Definition, relationship between ICT and Food industry i.e. production, processing, storage, distribution and marketing.
2. Significance and current role of ICT in food industry
3. Challenges and Opportunities of ICT in food industry

**REFERENCE**


1. Chary SN (2004), Production and Operations Management, Tata Mc Graw Hill III Edition.
2. Anil Kumar, S and Suresh, N (2009), Operations Management, New Age International (P) Ltd., Publishers, New Delhi
3. Slack, N, Chambers, S and Jhonston, R (2007) Operations Management, Pearson Education Ltd., Essex, UK
4. Joseph G. Monks, Operations Management Theory and Problems, Mc. Graw Hill III Edition


**WEBOGRAPHY**

1. **https://electricalfundablog.com/scada-system-components-architecture/**
2. **https://www.automationit.com/blog/73-5-ways-scada-can-improve-food-and-beverage-manufacturing**
3. **https://www.slideshare.net/PraveenKumar3664/introduction-to-scada-123955975**
4. **https://www.slideshare.net/malditangpinay/basic-lecture-on-domains-and-webhosting**
5. **https://www.slideshare.net/respected/web-hosting-32614653**
6. **https://www.slideshare.net/ZeeshanInamdar2/computational-fluid-dynamics-92032469**

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## INTERNSHIP - VII

**Code: 24FPVC4707 Credit: T0+P6 Contact Hours/week: 3 Marks: 100**

Students have to undergo internship after completing their seventh semester at an established Food industry based on their **NSQF level 7 "Production Manager".** Students who underwent training should submit a report on their daily routine activities. After the successful completion of internship, a viva voce will be conducted with their presentation and evaluated.

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## EIGHTH SEMESTER

## FOOD BUSINESS MANAGEMENT

**Code: 24FPVC4801 Credit: T6+0 Contact Hours/week: 6 Marks: 100**

**Course Objectives**

- To understand concept and principle of management
- To know the scopes and importance in food business management
- To provide knowledge about trade and marketing.

**Specific Learning Outcome**

After learning this course, the students will be able to,

- Explain the scope and importance of management in food business
- Describe the line of management and the rules for effective management
- Outline the agencies related to food trade and marketing

**UNIT I Introduction to Management**

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.

**UNIT II Principles of management I**

Planning: Nature, importance and purpose, Planning process, objectives - Types of plans, Organisation: Principles of organisation, Types of organization, Organisation Chart- Organisation manual, Nature and importance of staffing - Process of selection & recruitment.

**UNIT III Principles of management II**

Directing: Meaning and nature of directing, Motivation: meaning & importance, Theories of Motivation, Leadership: Meaning Styles, Coordination: Meaning and importance.

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

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**UNIT IV Food business opportunities and challenges**

Patterns and types of food consumption across the globe, ethnic food habits of different regions, consumer behaviour, export trends and prospects of food products in India, food industry management, marketing management, sectors in food industry and scale of operations in India, MSME

**UNIT V Food Trade and marketing**

Foreign exchange, mechanics of foreign exchange, role of WTO, GATT, international trade in agriculture, world trade agreements, APEDA, Tea board, spice board, MoFPI,etc., management of export and import organisation, registration , documentation, export import logistics.

**TEXTBOOKS**


1. Chhhabre TN &SuriaRK(2001), " Management process and Perspectives", KitabMahal.
2. Prasad L.M. (2011). "Principles and Practice of Mangement",Published by Sultan Chand & Sons.
3. Kotler. P,(2000), "Marketing Management", Prentice hall.


**REFERENCES**


1. Harmon, P. (2007), Business Process Change : A Guide for Business Managers and BPM and Six Sigma Professionals, Elsevier/Morgan Kaufmann Publishers.
2. R. Anupindi et al. (2006), Managing Business Process Flows: Principles of Operations Management, Pearson Education Inc.


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## PROJECT PREPARATION AND MANAGEMENT

**Code: 24FPVC4802 Credit: T6+P0 Contact Hours/week: 6 Marks: 100**

**Course Objectives**

- To understand the basic concepts of project management.
- To provide knowledge on business preparation.
- To highlight the importance of planning and evaluation of project.

**Specific Learning Outcomes**

After completion of this course, the students will be able to

- Familiar with the steps in project management.
- Know the basics in the preparation of effective proposals.
- Evaluate the technical feasibility, financial viability, market acceptability and social desirability of projects.

**Unit I Introduction to Project Management**

Projects - Project ideas and preliminary screening. Developments - Project planning to Project completion - Pre-investment phase, Investment phase, Operational phase, Monitoring phase, Governmental Regulatory framework, Capital Budgeting.

**Unit II Risk and Profitability Analysis**

Risk analysis- Measures of risk, Sensitivity analysis, and Decision tree analysis. Means of financing, Term Loans, Financial Institutions. Cost of capital. Profitability - Cost of Production, Break-even analysis. Assessing the tax burden and financial projections.

**Unit III Stages of Project Management**

Opportunity studies - prefeasibility studies, functional studies or support studies, feasibility study expansion projects, data for feasibility study. Market and Demand analysis, Market Survey, Demand forecasting. Technical analysis- Materials and inputs, Choice of Technology, Product mix, Plant location, capacity, Machinery and equipment.

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**Unit IV Appraisal Process**

Concepts, Time value of money - Present and future value. Payback period, Rate of return, service coverage ratio, Net present value, Benefit cost ratio, Internal rate of return, ARR, Annual capital charge, Investment appraisal in practice.

**Unit V Project Planning, Implementation, And Control**

Forms of Project Organization, Project Planning, Implementation, and Control – Network construction, CPM, PERT, Development of Project schedule, Crashing of Project Network. Introduction to Foreign collaboration projects - Governmental policy framework, GST, IPR, DPR, Accounting software.

**TEXTBOOKS**


1. M.R. Gopalan, (2015). Project Management Core Textbook,(Paper Back) 2nd edition, Wiley India.
2. Gary Heerkens (2013). Project Management, Second Edition, Mc. Graw Hill Education, 2013.


**REFERENCES**


1. Prasanna Chandra, (2014). Projects: Planning, Analysis, Selection, Financing, Implementation, 8th Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi.
2. P.Gopalakrishnan and V.E.RamaMoorthy (2014). Text Book of Project Management,1stEdition, Macmillan India Ltd., New Delhi.
3. John M. Nicholas, Herman Steyn, (2016). Project Management for Engineering, Business and Technology, 5th Edition, Routledge.


**WEBOGRAPHY**

1. https://hahuzone.com/project-life-cycle#:~:text=According%20to%20the%20UNIDO%20manual,alternatives%20and%20preliminary%20project%20selection&text=Project%20appraisal%20and%20investment%20decision%20(appraisal%20report)
2. https://kissflow.com/project/five-phases-of-project-management/
3. https://www.lucidchart.com/blog/the-4-phases-of-the-project-management-life-cycle
4. https://blog.arkieva.com/demand-forecasting/
5. https://twproject.com/blog/project-organizational-structures-project-management/
6. https://bbamantra.com/market-and-demand-analysis/

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## MAIN PROJECT

**Code: 24FPVC4803 Credit: T0+P12 Contact Hours/Week: 12 Marks:200**

In Eighth semester, the students have to do the main project under specialization which are taken from seventh semester. The student project are performed under their respective guides. Improved quality of learning in research field increased collaborative among student and faculty. They need to submit the final report along with presentation.

| | |
|---|---|
| **I** | **The Cover Page – It should have**<br>• Title of the Project<br>• Name and address of the student<br>• Name and address of the Project Guide |
| **II** | **Abstract- 500 words** |
| **III** | **Contents** |
| **IV** | **Introduction – Description on background of the study** |
| **V** | **Objectives** |
| **VI** | **Review of literature** |
| **VII** | **Methodology** |
| **VIII** | **Results and Discussion** |
| **IX** | **Summary and Conclusion** |
| **X** | **Bibliography** |
| **XI** | **Appendix** |

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## INTERNSHIP - VIII

**Code: 24FPVC4804 Credit: T0+P6 Contact Hours/Week: 6 Marks:100**

Students have to undergo internship after completing their seventh semester at an established Food industry based on their **NSQF level 7 "Production Manager".** Students who underwent training should submit a report on their daily routine activities. After the successful completion of internship, a viva voce will be conducted with their presentation and evaluated.

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## ELECTIVE PAPERS

## ELECTIVE -1

## PRINCIPLES OF FOOD ENGINEERING

**Code: 24FPVC35E1 Credits: T4+P0 Contact Hours/week: 4 Marks: 100**

**Course Objective**

- . To understand the principles of unit operation.
- To acquaint with fundamentals of food engineering and its process.
- To understand the basics of designing of food plant and systems

**Specific Learning Outcome:**

- Students will able to prepare the food plant layout
- Familiar in phases of liquid mechanism

**Unit-I Introduction**

Introduction, Units and Dimensions, Heat Transfer- Conduction, Convection and Radiation, Mass transfer – Diffusion, membrane separation processes, steam generation and boilers, evaporation, drying and dehydration, refrigeration, freezing.

**Unit-II Design of Food Plant**

Important considerations for designing of food plants, types of layout principles and equipments, used in food industry.

**Unit-III Phases of Liquid Mechanism**

Liquid transport systems, properties of liquids, Newton's law of viscosity. Concepts and selection of refrigerant, description of a refrigeration cycle, frozen food storage. Heat and mass transfer, systems for heating and cooling food products, thermal properties of food, mode of heat transfer.

**Unit-IV Steam and Dehydration**

Steam Properties - Properties of wet, saturated and superheated steam and use of steam tables and Mollier diagram.

Drying – Water activity, Principle of drying and dehydration, concentration of food, rate of drying and drying equipment, freeze drying, spray drying, prediction of drying time from drying data.

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**Unit-V Psychrometric**

Properties of dry air, water vapour, Air vapour, mixture, psychrometric charts, humidification and dehumidification operation, application of psychometry, related numerical problems; cooling tower.

**REFERENCE**


1. Rao,DG,2010,Fundamentals of Engineering,P41kerning private,Ltd.
2. Singh RP and Heldman DR,1991,2003,2009,Introduction to food engineering, Academic press, 2nd,3rd and 4th edition.
3. Rao,CG,2006, Essentials of food processing engineering B.S publications.
4. Fellow P., Food Processing Technology.


**WEBOGRAPHY**

1. https://www.slideshare.net/mobile/mahmudulmithun/unit-operations-99244122
2. https://www.slideshare.net/UsamaKhan106/the-psychrometric-chart-theory-and-application
3. http://ecoursesonline.iasri.res.in/course/view.php?id=529
4. https://www.slideshare.net/bhavik22/properties-of-fluids-47900406
5. https://www.slideshare.net/MamtaSahurkar/evaporation-128676372
6. https://www.slideshare.net/HimanshuYadav18/steam-application

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## FUNCTIONAL FOODS AND NUTRACEUTICALS

**Code: 24FPVC35E2 Credits: T4+P0 Contact Hours/week: 4 Marks:100**

**Course Objectives**

To enable the students

- To Understand the basics of functional foods and Nutraceuticals
- To study the significance of Nutraceuticals
- To identify new strategies for marketing of traditionally known nutraceuticals

**Specific Learning Outcome:**

- Students will able to prepare the fortified foods
- Familiar in regulatory standards of nutraceuticals

**UNIT – 1**

**Nutraceuticals -** Historical Perspective, Definition, Classification of Nutraceuticals based on the food source, mechanism of action and chemical nature. Regulatory issues for Nutraceuticals including FSSAI, Codex and USFDA.

**Functional Foods –** Definition, Classification of functional foods, food technology and its impact on functional food development, key issues in Indian functional food industry.

**UNIT – II**

**Probiotics, Prebiotics and Synbiotics:** Definition, Sources and Health benefits- Natural Pigments like Chlorophyll, Chlorophyllin, Carotenoids, Lycopene, Anthocyanin, Glucosinolates, Isoflavanoids, Phytosterols, Omega – 3 – fatty acids, antioxidants.

**UNIT – III**

**Functional Ingredients –** Extraction / Purification of lycopene, Iso flavonoids, Prebiotics, Probiotics, Glucosamine and Phytosterols. Manufacturing of dietary supplements in the form of liquid, rehydration powder and mix.

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**UNIT – IV**

**Enrichment and Fortification in different foods –** Dairy Products, Beverages, Protein mixes, Infant Formulas, Value addition in different processed food products.

**Nutraceuticals Supplement from plant sources –** Spirulina, Aloevera, Oats, Flax Seed, Tomatoes and other cruciferous vegetables and Citrus fruits.

**Nutraceuticals Supplement from animal source –** Sea food and Dairy products.

**UNIT – V**

**Functional Foods and Nutraceuticals for disease management:** Management of CVD, Diabetes, Cancer, Hypertension and Obesity by Nutraceuticals compounds and their mechanism of action. The role of Nutraceuticals and functional foods in disease prevention. Contra- indication and toxicity of Nutraceuticals.

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## REFERENCE


1. Robert E.C Wildman. Handbook of Nutraceuticals and Functional Foods, CRC Press
2. Bagchi. D, Preuss. H. G and Swaroop. A (2016). Nutraceuticals and Functional Foods in human health and disease Prevention. Taylor and Francis Group.
3. Lockwood B (2007), Nutraceuticals – A Guide for healthcare professionals, second edition, Pharmaceutical Press.
4. Johnson I and Williamson G (2003), Phytochemical functional foods, CRC Press, Boca Raton, Boston, New York, Washington, DC.
5. Nutraceutical and Functional Food Components, CharisGalanakis, Academic Press
6. Functional Foods and Nutraceuticals (Food Science Text Series), Rotimi E. Aluko, Springer; 2012 edition


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2. https://pubmed.ncbi.nlm.nih.gov/17323283/
3. https://www.researchgate.net/publication/343846825_Nutraceuticals_History_Classification_and_Market_Demand
4. https://pubmed.ncbi.nlm.nih.gov/12738185/#:~:text=The%20term%20functional%20ingredient%20is,drugs%2C%20nutrients%20and%20food%20additives.
5. https://www.fda.gov/regulatory-information/search-fda-guidance-documents/guidance-industry-distinguishing-liquid-dietary-supplements-beverages


GRIP Voc

## ELECTIVE – 3

## PROCESSING OF MEAT, POULTRY AND SEA FOODS

**Code: 24FPVC35E3 Credits: T4+P0 Contact Hours/week: 4 Marks: 100**

**Course Objectives**

- To know the importance of fishery industry.
- To know the compositional technological aspects of fish.
- To study processed fish product.

**Specific Learning Outcome:**

- Students will able to know the processing of fleshy foods.
- Familiar in preparing byproducts of sea foods.

**Unit-I Introduction to Sea food processing**

Chilling and Freezing of fish, Status of fishery industry in India, Relationship between chilling and storage life, MAP, general aspects of freezing, freezing systems, (air, blest freezing, plate or contact freezing spray or immunization freezing) freezing on board, onshore processing changes in quality in chill and frozen storage and thawing.

**Unit-II Fish Curing and Smoking**

Drying and salting of fish, water activity and shelf- life. Salting processes, salting methods (brining, picking, kench curing, gasp curing). Types of salts, dried and salted fish products. Pindang, fish wood, dried shrimp.

Smoking- smoke production, smoke components quality, safety and nutritive value of smoked fish. Processing and equipment, pre-smoking process, smoking process control, traditional chimney kiln, modern mechanical fish smoking klin. Examples of smoked and dried products.

**Unit-III- Canning of Fish**

Principles of canning, classification of PH groupings, effect of heat processing on fish, storage of canned fish. pre-processes operations, cannery operations for specific canned products (Tuna, Sackerel, Sardines)

Fish protein concentrates (FPC), Fish protein entrets (FPE), Fish protein Hydrolysis (FPH), Fermented fish sauce and paste. Crabs, prawns, Lobsters, shrimps, shell fish products.

**Unit-IV Meat and Poultry processing**

**Meat -** Muscle structure, meat composition, slaughtering and post – mortem chemistry, colours and flavours of livestock – buffaloes, sheep and goat, storage and preservation of meat, microbiology and safety of livestock.

Poultry – Muscle Structure, composition, ante- mortem handling of poultry spices, storage and preservation techniques, microbiology and safety of poultry spices.

**Unit-V By-products of Meat and Poultry**

CBCS - B.Voc

**Meat and Processed Meat products –** Pickling, Canning, Drying Curing, Smoking, Kebabs, Mince, Salami, Sausages, Intermediate Moisture and Dried Meat products.

**Poultry Food Products –** Mince, Salami, Sausages, Egg Powder.

**Related experiences**

1. Visit to sea food processing units.

**REFERENCE**


1. Hall GM, Fish processing technology, VCH publishers INC.NY.1992.
2. Sen DP, Advances in fish processing technology, allied publishers pvt ltd.2005.
3. Shahidi F, Botta. JR, sea foods, chemistry, processing technology and quality, blackie academic & professional London,1994.


**WEBOGRAPHY**

1. https://www.researchgate.net/publication/339788847_An_Introduction_to_Seafood_and_Recent_Advances_in_the_Processing_of_Seafood_Products#:~:text=Seafood%20is%20one%20of%20the,rich%20fish%2C%20molluscs%20and%20crustaceans.
2. http://www.fao.org/3/Y5013E/y5013e04.htm
3. https://www.britannica.com/topic/fish-processing/Curing#:~:text=The%20smoking%20process%20consists%20of,then%20partially%20dried%20on%20racks.
4. https://www.sciencedirect.com/topics/food-science/canned-fish#:~:text=Canning%20is%20one%20of%20the,temperature%20for%20a%20determined%20time.
5. https://agritech.tnau.ac.in/fishery/fish_byproducts.html#:~:text=The%20traditional%20fishery%20byproducts%20are,of%20fish%20and%20fish%20waste.

GRD B.Voc

**MULTIDISCIPLINARY OFFERED IN B.Voc. FOOD PROCESSING**

**MULTIDISCIPLINARY – 1**

**PRODUCTION OF YEAST LEAVENED PRODUCTS**

**Code: 24FPVM1101 Credits: T0+P3 Contact Hours/week: 3 Marks: 100**

**Students will be able to**

- Acquire knowledge of the process of bread making and the preparation of bread varieties.

1. Principle involved in yeast product preparation.
2. Importance of measuring the ingredients.
3. Ingredients and their functions- Flour, Yeast, Salt, Milk improvers.
4. Methods of making yeast made products-straight dough method, salt delayed method, no time dough method, ferment and dough method.
5. Processing- flying fermentation, mixing bulk fermentation, knock back, dividing and rounding, intermediate proofing, moulding and panning, final proofing, Baking.
6. Processing - Depanning, cooking, slicing, packing. Bread faults and their causes-External and internal faults.
7. Preparation of bread, bun.
8. Preparation of doughnuts, pizza base.
9. Characteristics of good bread-volume, crust colour, texture.

**TEXT BOOK:**


1. Yogambal ashokkumar (2012), "Textbook of bakery and confectionery", PHI Learning Pvt .Ltd., Newdelhi, India, Second edition.
2. John J.Kingslee(2019) "A Professional text to bakery and confectionery", New age publishers.
3. Amit kumargupta(2021) "Textbook of bakery and confectionery", Generic.


GRI - B.Voc

## PREPARATION OF JAM, JELLY, MARMALADES AND SAUCES

**Code: 24FPVM1102 Credits: T0+P3 Contact Hours/week: 3 Marks: 100**

**Students will be able to**

- Acquire knowledge of the process of making jam, jelly, marmalades and sauces.

1. Selection of raw materials like fruits and vegetables, coloring, spices and flavoring agents.
2. Washing of fruits before they go for processing. Technology of extraction of juice from different types of fruits and vegetables - Peeling and slicing.
3. Prepare and maintain work area and process machineries for jam, jelly and ketchup.
4. Technique/preparation of jam and process of preparation of mixed fruit jam.
5. Preparation of jelly, marmalade and process of preparation of mixed fruit jelly.
6. Technique/preparation of sauce. Plan and demonstration of different types of sauces.
7. Preparation of ketchup and process of preparation of different types of ketchups.
8. Packing and bottling techniques of jam and jelly-glass, tin, bottle, cartons, plastic pouches.
9. Demonstrate Knowledge of food safety, Hygiene and sanitations for packaged food.
10. Cleaning of equipment and tools used with recommended cleansing agents and sanitizers.

**TEXT BOOK:**


1. Yogambal ashokkumar (2012), "Textbook of bakery and confectionery", PHI Learning Pvt .Ltd., Newdelhi, India, Second edition.
2. John J.Kingslee(2019) "A Professional text to bakery and confectionery", New age publishers.
3. Amit kumargupta(2021) "Textbook of bakery and confectionery",Generic.


GRI - B.VOC

## PROCESSING OF DEHYDRATED FOODS

**Code: 24FPVM1103 Credits: T0+P3 Contact Hours/week: 3 Marks: 100**

**Students will be able to**

- Acquire knowledge of the process of preparation of cakes and icings.

1. Introduction to dehydration techniques.
2. Exercise on different types of dehydration.
3. Demonstration of vegetables by using sun dried method.
4. Demonstration of vegetables by using solar dried method.
5. Preparation of desiccated coconut.
6. Preparation of okra flakes.
7. Preparation of dehydrated herbs.
8. Preparation of dehydrated soup mix using onion, carrot, garlic.
9. Preparation of dehydrated powdered lemon or orange peel used in tea.
10. Exercise on storage and shelf life techniques of dehydrated foods.

**TEXTBOOKS**


1. Subalakshmi, G and Udipi, S.A. (2001), "Food processing and preservation". New Age International Publishers, New Delhi. Girdharilal,G.S. and Siddappa (1986).
2. "Preservation of Fruits and Vegetables". New Delhi: Publications and Information Division, ICAR.


**REFERENCES**


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, New Delhi.
3. Srilakshmi, B., (2003), "Food Science", New Age International Publishers, New Delhi.


**WEBOGRAPHY**

1. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=17055
2. https://www.speakingtree.in/allslides/10-traditional-ways-to-preserve-food-before-it-gets-expired/1-canning
3. https://www.slideshare.net/Selvaprakashnavaneethan/modern-trends-in-food-preservation-81331889
4. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=5130
5. http://www.tiselab.com/pdf/Thermal-Processing-of-Food.

CPI - B.Voc

## MULTIDISCIPLINARY – 2

## PREPARATION OF CAKES AND ICINGS

**Code: 24FPVM1201 Credits: T0+P3 Contact Hours/week: 3 Marks: 100**

**Students will be able to**

- Acquire knowledge of the process of preparation of cakes and icings.

1. Introduction to Cakes – Cake making ingredients and its function.
2. Principles involved in preparation of cakes.
3. Methods - sugar batter method, flour batter method, blending method, all in process method.
4. Characteristics of cake-Volume, colour of crust, symmetry of form, crust character, bloom, grain, crumb colour, aroma, taste, texture, shelf life.
5. Cake faults and their remedies.
6. Preparation of Sponge cake -Fatless, Genoese, Plain sponge cake-Marble, Ribbon, Queen, Fruit, plum, cup
7. Icings-basic icings-Butter cream, Royal icing, fondant, American, gum paste.
8. Types of pastries- Short crust, puff, flaky, philo, choux, Danish. Possible faults.
9. Preparation of making chocolate.
10. Preparation of making Fondants.

**TEXT BOOK:**


1. Yogambal ashokkumar (2012), "Textbook of bakery and confectionery", PHI Learning Pvt .Ltd., Newdelhi, India, Second edition.
2. John J.Kingslee (2019) "A Professional text to bakery and confectionery", New age publishers.
3. Amit kumargupta (2021) "Textbook of bakery and confectionery",Generic.


GRI - B.Voc

## STORAGE AND WAREHOUSE MANAGEMENT TECHNIQUES

**Code: 24FPVM1202 Credits: T3+P0 Contact Hours/week: 4 Marks: 100**

**To enable the students**

To know the variety of techniques that allow food to be kept for extended periods without losing nutritional quality and avoiding the growth of unwanted microorganisms

**After completion of this course, the students will be able to:**

- The methods to prevent contamination of food from damaging agents.
- Delay or prevention of the growth of microorganisms in the food.
- Delay of enzyme spoilage, i.e. self-decomposition of the food by naturally occurring enzymes within it.
- To know the traditional and modern methods of food storage techniques.

**UNIT 1:**

Food spoilage – definition, food deterioration, types of factors responsible for food spoilage, microbial spoilage, spoilage due to characteristics and storage conditions of food (composition, acidity, moisture, temperature, oxygen, light, duration), classification of foods according to ease of spoilage.

**UNIT 2:**

Storage structures- the international goal of storage systems- low cost and high technology, storage considerations, traditional and modern storage structures- farm silos, horizontal silos, tower silos, pit silos, trench silos, importance of scientific storage systems.

**UNIT 3:**

Storage of dry grains- factors affecting storage of grains- duration, size or scale of storage, insect and mould control, and environmental conditions. Traditional storage, modern storage- silos- shallow/ deep bins, sheds or warehouses, design of cold storage, evaporative cooling system.

**UNIT 4:**

Storage of pulses - pre-storage steps- check for godowns, leakages, electrical, to check at receiving points, fumigations, regular inspections. Choice of storage methods, Storage in bags, Outdoor storage, Storage in pyramids, Storage in flexible silos, Warehouses and Storehouses silos, Bulk storage, Low capacity silos for farm storage, High capacity silos.

GRI - B.Voc

**UNIT 5**

Storage of perishables- fruits and vegetables- post-harvest changes, leaving the produce in the ground, burying it in the ground in pits, Traditional methods (Low cost storage structures) not requiring refrigeration include: In situ, sand, coir, pits, clamps, windbreaks, cellars, barns, evaporative cooling, and night ventilation. Modern storage-Cellar storage temperature (about 15◦) b) Refrigerated or chilling temperature (0◦ to 5◦c) Freezing temperature (cold storage) (18◦ to –40◦) fleshy foods storage techniques.

**REFERENCE BOOKS:**


1. Subbulakshmi.G.Udipi.SA. Food Processing and Preservation, New Age International Pub., Delhi, 2007
2. Siddhappa.,GS.Lal.G and Tendon, Preservation of fruits and vegetables, ICAR.
3. Chakrabarty,A, Post Harvest Technology of cereals, pulses and oilseeds, Oxford and IBH Pub. Company.


GRI - B.Voc

## BASIC FOOD LAWS AND STANDARDS

**Code: 24FPVM1203 Credits: T3+P0 Contact Hours/week: 3 Marks: 100**

**Students will be able to**

- Acquire knowledge about the basic food laws and standards.

**UNIT – I – Quality Attributes**

Quality attributes- physical, chemical, nutritional, microbial, and sensory; their measurement and evaluation

**UNIT –II – Sampling Plans & Procedure**

Principle aspects of sampling of food: Importance of sample collection, sampling tools and containers, sample collection techniques, sampling for microbiological analysis of food.

**UNIT – III- Food Hygiene**

Principles, Sanitary practices followed by food service establishments, food business operators, Pre requisition program – GMP, GHP.

HACCP – Objectives, Principles and guidelines.

**UNIT – IV- National and International standards**

**National Standards** – BIS, AGMARK, FPO and Consumer Protection Act 1986.

**International Standards**- WHO, FAO, Codex Alimentarius Commission, ISO, WTO.

**UNIT – V- FSSAI and FSSA**

**FSSAI –** Role, Functions, Objectives, Licensing and penalties for unsafe food of FSSAI, Food Safety and Standard Act 2006.

**REFERNCES:**


1. Alli.2004. Food Quality assurance- Principles & practices, CRC Press, Newyork.
2. Neal D.Fortin. 2009. Food regulation, Wiley Publishsers.
3. Narayanan, P., Copyrights and Industrial Designs, 3rd ed., (2002).
4. O' Rourke, 2005. European Food Law, 3rd Edition, Thommson, Sweet and Maxwell.


**WEBOGRAPHY:**

1. htttp://www..slideshare..net/ssllideshow/food-safety-management-systems-fsms/105549683
2. htttp://www..slideshare..net/ssllideshow/food-safety-management-systems-fsms/105549683

GRI-B.Voc

## MULTIDISCIPLINARY – 3

## PREPARATION OF COOKIES AND BISCUITS

**Code: 24FPVM2301 Credits: T0+P3 Contact Hours/week: 3 Marks: 100**

**Students will be able to**

- Acquire knowledge of the process of preparation of Cookies and Biscuits.

1. Introduction and difference between biscuits and cookies.
2. Principles involved in cookies preparation.
3. Methods for mixing cookies-Single or one stage method, creaming or sugar batter method.
4. Types of cookies – sheeted, piped, bar, dropped, rolled.
5. Preparation of soft dough biscuits.
6. Preparation of hard dough biscuits & crackers
7. Cookies and Biscuits - Faults and their causes.
8. Visit to Biscuit manufacturing unit.
9. Visit to bakery unit.

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**TEXT BOOK:**


1. Yogambal ashokkumar (2012), "Textbook of bakery and confectionery", PHI Learning Pvt .Ltd., Newdelhi, India, Second edition.
2. John J.Kingslee (2019) "A Professional text to bakery and confectionery", New age publishers.
3. Amit kumargupta (2021) "Textbook of bakery and confectionery",Generic.


GRI - B.Voc

## PRODUCTION OF CONVENIENCE FOODS

**Code: 24FPVM2302 Credits: T0+P3 Contact Hours/week: 3 Marks: 100**

**Students will be able to**

- Acquire knowledge to know about the preparation of convenience foods.

1. Introduction and types of convenience food.
2. Identification of different types of convenience foods available in market.
3. Selection of nutritional concerns and health benefits oriented convenience food.
4. Preparation of Noodles.
5. Preparation of Sphagetti.
6. Preparation of Frozen foods.
7. Preparation of Canned foods.
8. Preparation of Soup powder.
9. Preparation of Extruded snacks.
10. Advantages and Disadvantages of convenience food.

**TEXTBOOK**


1. Srivastava R. P. & Kumar Sanjeev, Sanjeev Kumar (2002). Fruit and Vegetable Preservation: Principles and Practices, International Book Distributing Company, Lucknow.
2. Girdharilal, ***G.S. Siddappa*** and ***G.L. Tandon***, ***Preservation of Fruits and Vegetables***, ICAR Publication, New Delhi.
3. Riaz, M.N. (2000). Extruders in Food Applications, CRC Press, USA


GRI - B. Voc

## VALUE ADDITION IN FOOD SUPPLY CHAIN MANAGEMENT

**Code: 24FPVM2303 Credits: T3+P0 Contact Hours/week: 3 Marks: 100**

**Students will be able to**

Understand the recent trends in supply chain management. The methods to reduce the wastage in the food supply chain.

**Unit 1:**

Introduction to food supply chain management- supply chain- process view- competitive and supply chain strategies- framework- facilities- inventory- transportation- information- sourcing- pricing. Food from farm to fork- including manufacturing- administration- utilization and discarding.

Value addition – strategic approach- post-harvest management- enhancing quality- market value- economic potential of agricultural products.

**Unit 2:**

Food supply chain- key stages in the food supply chain- production – handling and storage- processing and packaging- distribution- retailing and consumption. Reduce loss- food loss and strengthen resilience- food security.

Six supply chain models- continuous flow- fast chain- efficient- agile- flexible- custom configured.

**Unit 3:**

Supply chain risk management analysis- supplier scoring and analysis- pricing and revenue management for multiple customers- perishable products- seasonal demand, bulk and spot contracts.

Risk points- incoming quality of materials- processing methodology- storage conditions- outgoing quality.

**Unit 4:**

Value addition and bio-economy- waste generation into value addition- post-harvest- postproduction- manufacturing- handling- storage- wholesale- retail consumption.

**Unit 5**

Deployment of IT solutions in business processes, outsourcing- different variants in size, flavour etc. supply chain v/s demand chain- sales forecasting /pipeline systems- marketing analytics systems- customer service systems- order management systems.

CRI - B.Voc

**REFERENCE BOOKS**


1. Stevenson. G.W. and Pirog (2013) Value- based food articles for agri-food enterprises – of - the -middle.
2. Dev.S.M, (2008) Challenges for the revival of Indian agriculture.
3. FICCI (2014), Feeding a billion people- the role of food processing Industry.


GRI - B. Voc