Bachelor of Vocational (B.Voc). (Food Processing and Preservation)

1st Year

<table>
<thead>
<tr>
<th>Subject code</th>
<th>Courses</th>
<th>Credits(T+P)</th>
<th>Marks</th>
<th>Subject code</th>
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<tbody>
<tr>
<td>BFP-101</td>
<td>Communication Skills-I</td>
<td>3+3</td>
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<td>BFP-103</td>
<td>Food Biochemistry</td>
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<td>BFP-102</td>
<td>Computer Fundamentals</td>
<td>3+3</td>
<td>75+75</td>
<td>BFP-104</td>
<td>Food Microbiology</td>
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<td>BFP-105</td>
<td>Food Analysis &amp; Instrumentation</td>
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Semester II

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<tr>
<td>BFP-201</td>
<td>Communication Skills-II</td>
<td>3+3</td>
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<td>BFP-203</td>
<td>Fruit and Vegetable Processing</td>
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<tr>
<td>BFP-202</td>
<td>Ethical Considerations</td>
<td>3+3</td>
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<td>BFP-204</td>
<td>Food and Nutrition</td>
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<td>BFP-205</td>
<td>Basic Principles of Food Processing and Preservation-I</td>
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### 2nd year

#### Semester III

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<tbody>
<tr>
<td>BFP-301</td>
<td>Industrial Safety and Hazards I</td>
<td>3+0</td>
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<td>BFP-303</td>
<td>Food Quality Assurance</td>
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<td>BFP-302</td>
<td>Industrial Management I</td>
<td>3+0</td>
<td>75</td>
<td>BFP-304</td>
<td>Food Fermentation &amp; Beverage Technology</td>
<td>3+3</td>
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<tr>
<td>BFP-306</td>
<td>Industrial visit and report making</td>
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<td>BFP-305</td>
<td>Milk &amp; Dairy Food Product Development</td>
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#### Semester IV

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<td>BFP-401</td>
<td>Industrial Safety and Hazards II</td>
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<td>BFP-403</td>
<td>Neutreacutal &amp; Probiotics</td>
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<td>BFP-402</td>
<td>Industrial Management II</td>
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<td>BFP-404</td>
<td>Meat, Poultry &amp; Fish Processing</td>
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### 3rd year

#### Semester V

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<td>BFP-501</td>
<td>Entrepreneurship Development I</td>
<td>3+0</td>
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<td>BFP-503</td>
<td>Food Biotechnology</td>
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<td>BFP-502</td>
<td>Research Methods And Statistics I</td>
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<td>BFP-504</td>
<td>Cereal and Pulse Technology</td>
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<td>Report making and viva of Industrial visit</td>
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<td>BFP-505</td>
<td>Bakery &amp; Confectionary Technology</td>
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#### Semester VI

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<td>Entrepreneurship Development &amp; Agribusiness Management</td>
<td>3+0</td>
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<td>BFP-604</td>
<td>Food Packaging</td>
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<td>BFP-602</td>
<td>Research Methods</td>
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<td>BFP-603</td>
<td>Case study related to agribusiness and retail management</td>
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<td>BFP-606</td>
<td>Food Plant Layout and Process Equipment Design</td>
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<td>BFP-607</td>
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Semester I

PAPER (BFP-101): COMMUNICATION SKILLS

Course Objectives:

- To introduce students the concepts of English language
- To enable the students meet the high professional expertise

Unit-I


Unit-II

The Process of Listening, Barriers to Listening, Types of Listening, Benefits of Effective Listening.

Unit-III

Spoken English in India, The Organs of Speech, Description and Articulation of English Speech Sounds, Syllables and Stress (Weak Forms, Intonation), Connected Speech, Spelling and Pronunciation, International Phonetic Alphabet Transcription of Received Pronunciation.

Unit-IV

Presentation Skills, Interviews, Public Speaking, Preparing the Speech, Organizing Speech, Special Occasion Speeches.

Text books

Practicals

Practicals: 60
Internal assessment: 15
Total Marks: 75
Time: 3 hours

1 Greeting and Introducing.
2 Practising Short Dialogues.
3 Listening News/Conversations/
4 Telephonic Conversation.

PAPER (BFP-102): COMPUTER FUNDAMENTALS

Theory: 120
Internal assessment: 30
Total Marks: 150
Time: 3 hours

Course Objectives:
• To enable the students understand the computer fundamentals

Unit – I
Computers: General introduction to computers, organization to computers, digital and analogue computers, Introduction to computers and its uses: Milestones in hardware and software-batch oriented/online/real time applications.

Unit-II
Compute as systems: Basic concepts, stored programs, functional units and their interrelation- communication with computer.

Unit – III
Data storage devices: Primary storage: Storage addressed and capacity, type of memory.
Secondary storage devices: Magnetic tape-data representation and R/W;
Magnetic disks, fixed and removable, data representation and R/W; Floppy and hard disks, optical disks CD-Rom, mass storage devices.

Unit – IV
Input/output devices: Key-tape/diskette devices, light pin Mouse, joystick, source data automation. printed outputs: Serial, line, page, printers, plotters, voice response units.
Text Books


Practicals

<table>
<thead>
<tr>
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<th>Marks</th>
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<tbody>
<tr>
<td>Elements of Word Processing</td>
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<td>Text Creation and Manipulation</td>
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<tr>
<td>Using Emails</td>
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<tr>
<td>Document handling</td>
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<tr>
<td>Use of Internet</td>
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<tr>
<td>Making Small Presentations</td>
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Total Marks: 75
Time: 3 hours

PAPER (BFP-103): FOOD BIOCHEMISTRY

<table>
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</table>

Internal assessment: 15
Total Marks: 75
Time: 3 hours

Course Objectives:

• To enable the students understand the chemistry and importance of water, carbohydrates, lipids, proteins and vitamins

• To impart knowledge on the methods of manufacture of oils and the methods of determining the quality of oils and fats

• To understand the role of vitamins in human nutrition and the effect of various processing methods in maintaining the vitamin content in foods.

Unit I

Water And Ice: Importance of water in foods. Structure of water & ice. Bound & free water, water activity (aw) and their implications. sorption Phenomena and Sorption isotherms, examples – Dispersed systems – some basic considerations

Chemistry Of Carbohydrates: Nomenclature Classification & structure of carbohydrates, Chemical reactions of carbohydrates. Physical & chemical properties of sugars

Unit II

Unit III


Unit IV


Vitamins and minerals: Water soluble & fat soluble, micro- and macronutrients

Text Books

Reference Books
3. Dr. U Satyanarayana and Dr. U Chakrapani 2013. Biochemistry. Elsevier

Practicals:

Practical: 60
Internal assessment: 15
Total Marks: 75
Time: 3 hours

1. Estimation of Reducing sugars
2. Estimation of Free Fatty Acids in Fats and Oils
3. Saponification Value of Fats and Oils
4. Iodine Value of Fats and Oils
5. Qualitative Analysis of Sugars/amino acids
6. Identification of Sugars/amino acids by Paper Chromatography
Course Objectives:

• To understand the isolation methodology of microorganisms.

• To know the methods of preservation of foods.

• To identify the microorganisms of food commodities of plant and animal origin.

• To learn about Food borne diseases and microorganisms.

Unit I


Unit II


Unit III

Microbiology Of Water And Food Commodities: Microbiology of water and their importance of processing of foods in industries. MPN of coliforms Microbiology of milk – Hetero and homo fermentative Lactic acid bacteria – Yogurt and Cheese fermenting

Unit IV

Food Borne Pathogens: Food Poisoning and intoxication – food borne diseases –Symptoms of diseases caused by Bacillus spp., Clostridium botulinum, Escherichia coli, Salmonella, Staphylococcus aureus, Shigella spp., Hepatatis, Gastroenteritis viruses, Entamoeba histolytica and Entamoeba coli.
Text Book


Reference Books


Practicals:

<table>
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<tr>
<th>Practical</th>
<th>Internal assessment</th>
<th>Total Marks</th>
<th>Time</th>
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<tbody>
<tr>
<td>60</td>
<td>15</td>
<td>75</td>
<td>3 hours</td>
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</table>

1. Study of morphology of bacteria and fungi
2. Methods of sterilization and preparation of media
3. Gram staining, negative and lactophenol staining
4. Methods of pure culture techniques for bacteria
5. Hanging drop preparation to observe motility of bacteria
6. Enumeration and isolation of bacteria and fungi from water/milk and contaminated food
7. MPN and IMVIC Test
8. Methylene blue reduction test in milk

PAPER (BFP-105): FOOD ANALYSIS AND INSTRUMENTATION

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<th>Internal assessment</th>
<th>Total Marks</th>
<th>Time</th>
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<tbody>
<tr>
<td>60</td>
<td>15</td>
<td>75</td>
<td>3 hours</td>
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</table>

Course Objectives:

• To generate the skill of handling the different instruments of food process technology.
• To study the various techniques of food analysis.

Unit 1
Introduction to food analysis, type of samples and sampling techniques, storage and preservation of samples, expression of results.

Different preservation principles involved in food processing

**Unit II**

Instrumentation in food analysis: Principles, types and applications of colorimetry and electrophoresis and chromatography: paper, thin layer, ion exchange

**Unit III**

Instrumentation in food analysis: Color measurement in foods. X-ray analysis of foods and its applications, scanning electron microscopy (SEM) in food analysis and indentification.

**Unit IV**

Ultrasonics and other instruments for determination of physical and rheological properties of food. Texture analysis in foods.

Sensory versus instrumental analysis of texture, rapid methods of microbial analysis, immunoassays; Techniques for estimation and analysis of toxins and pesticides in food.

**Text books/References:**


**Practicals**

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<tr>
<th>Practical</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Use of spectrophotometer in food content estimations</td>
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<tr>
<td>2</td>
<td>Demonstration of electron microscopy</td>
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<tr>
<td>3</td>
<td>Determination of physical and rheological properties of foods by different techniques</td>
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<tr>
<td>4</td>
<td>Separation of food components by chromatography</td>
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</table>
Semester II
PAPER (BFP-201): COMMUNICATION SKILLS-II

Course Objectives:

• To make the students proficient in English writing and reading
• To enable students for job applying, making resumes and cover letters

Unit-I

Unit-II
Effective Writing Skills: Elements of Effective Writing, Main Forms of Written Communication: Agenda, Minutes, Notices, Writing of CV, Memo, Drafting an E-mail, Press Release. Correspondence: Personal, Official and Business, Report Writing.

Unit-III

Unit-IV
Remedial Grammar and Usage, Important Aspects of English Grammar and Usage, Phrases and Clauses.

Text Books/ References

Practicals

Practicals : 60  
Internal assessment: 15  
Total Marks : 75  
Time : 3 hours

1. Verbal communications.  
2. Group Discussions  
4. How to face an interview panel

PAPER (BFP-202): ETHICAL CONSIDERATIONS

Theory : 120  
Internal assessment: 30  
Total Marks : 150  
Time : 3 hours

Course Objectives:

- To make the students aware of intellectual property rights  
- To inculcate the business ethics among the students

Unit-I

The importance and the needs of ethics; Laws and ethics; Environmental protection; Creating awareness and safeguarding health of consumers; Fair trade practices.

Unit-II
Concept of property, rights, duties and their correlation; History and evaluation of IPR; Copyrights and related rights. Distinction among various forms of IPR.

**Unit-III**

Patent rights/protection and procedure; Infringement or violation; Remedies against infringement; Indian Patent Act 1970 and TRIPS; Geographical indication and Industrial design.

**Unit-IV**

International Registration systems; WIPO treaties; Unfair competition; Protection of new plant varieties; Legal implications and public concerns in genetic modification of foods; National policies on food security.

**Text Books/ References;**

4. A. N. Tripathi, 2009, Human Values, New Age International

**Practicals**

- **Practicals**: 60
- **Internal assessment**: 15
- **Total Marks**: 75
- **Time**: 3 hours

1. Ethical case study related to food industry and report writing
2. How to file a patent
Course Objectives:

• To enable the students to understand the thermal processing of fruits and vegetables

• To impart technical know-how on the preparation of fruit juices

• To understand the methods of dehydration

Unit I

Introduction: Production of Fruits and vegetables in India. Cause for heavy losses - Spoilage factors, Post harvest field operations, preservation treatments for freshly harvested fruits and vegetables.

Packaging of whole fruits and vegetables for internal and export markets. Processing and packaging of cut fruits and vegetables.

Unit II


Unit III


Unit IV

Aseptic And Other Methods Of Processing: Aseptic processing and Bulk packing of Fruit juice concentrates, Pulps and Puree Brief information on Asepticity and how it is strictly
maintained in the plant. Aseptic heat exchangers for sterilizing and concentrating the product. Aseptic fillers.

Different system of filling practices. Tetra pack for small quantities, Dole system and Scholle system for bulk storage in Bag and Boxes and Bag & Drums. Storage of Aseptically packed products. Minimal processing – Basic concepts, Reverse osmosis.

Text Book


Practicals

   Practical : 60
   Internal assessment: 15
   Total Marks : 75
   Time : 3 hours

1. Preservation and processing of certain vegetables by drying.

2. Preparation of tomato ketchup/tomato puree and its preservation.

3. Preparation of pickles and marmalades and its preservation.

4. Preparation of Jams and jellies

5. Preparation of frit wine

7. Preparation of amla preserve and dried fruit product (Aam papad, bars)
PAPER (BFP-204): FOOD AND NUTRITION

Course Objectives:

• To understand about Biochemical cycles
• To impart basic knowledge about Biosynthesis of macromolecules
• To understand about Nutrition, its importance and anti-nutritional factors
• To know about specialized nutrition

Unit I


UNIT II

Metabolism Of Carbohydrates Proteins And Fatty Acids: Glycolysis, Pentose phosphate shunt, TCA cycle, gluconeogenesis, Regulation of metabolic pathways, urea cycle. Biosynthesis and degradation of fatty acids (saturated and unsaturated) and cholesterol. Aminoacids (tyrosine, cysteine). Peptides and proteins.

Unit III


Unit IV

Nutritional Disorders: Inborn errors of carbohydrate, protein and fat metabolisms -Nutrition and disorders associated with organs such as liver and kidney - Naturally occurring anti-nutritional factors – Cyanogens, lectins, enzyme inhibitors, phytoallexins, and phytates.

Text Books

2. Satyanarayana U. and Chakrapani U, 2007 “Biochemistry”, Uppala publishers,

Reference books


Practicals

1. Estimation of sugars by DNS method
2. Estimation of crude fibre
3. Estimation of total proteins
4. Estimation of different phytochemicals
5. Estimation of fats in food

PAPER (BFP-205): BASIC PRINCIPLES OF FOOD PROCESSING AND PRESERVATION

Course Objectives:

• To understand the basic principles of food processing.
• To know the different methods of preservation of foods.

Unit I

Introduction and historical developments in food processing and preservation. Food spoilage: Microbial, physical, chemical & miscellaneous. General methods of preservation of whole fruits/Vegetables and processed fruits and vegetables

Heat preservation and processing: Heat resistance of microorganisms, types of heat treatments and effects on foods, canning of foods, cans and container types, spoilage of canned foods

Unit II

Dehydration: Drying, dehydration Drying methods, methods of concentration of fruit juices, liquid food concentrates, changes in food during dehydration and concentration.
Refrigeration storage: Requirements of refrigeration storage, changes of foods during refrigeration storage

Freezing and frozen storage: slow and quick freezing, factors determining freezing rate, freezing methods, changes in food during freezing, frozen food storage, freeze during in food processing.

Unit III

Food frying: general principles, Types and process, frying oils, potato chips and potato crisp production.

Emulsification in food processing: principles, examples of emulsification in food; milk, ice-cream mix, coffee/tea whiteners, salad dressings, meat sausages, margarine and spreads.

House hold preservation methods: Pickling, salt curing, oil and smoking.

Unit IV

Types of Industrial wastes: Biodegradable and non degradable

Food industrial waste from fruit and vegetable processing industry, meat industry.

Utilization of waste: method of utilizing waste to make value added products: Biogas plant

Text Book


Practicals:

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<th>Practical</th>
<th>Description</th>
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<tr>
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<td>Dehydration and freezing and different foods</td>
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<td>Estimation of water activity</td>
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<td>3</td>
<td>Use of food enzymes</td>
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<td>Frozen storage of foods</td>
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<tr>
<td>5</td>
<td>Pasteurization and sterilization of food</td>
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Practical : 60
Internal assessment: 15
Total Marks : 75
Time : 3 hours
Course Objectives:

- To create awareness about health hazards of industrial substances.
- To evaluate the threshold value of industrial hygiene and safety.

UNIT-I


UNIT-II

Toxicology: Toxics materials and their properties, effect of dose and exposure time, relationship and predictive models for response, Threshold value and its definitions, material safety data sheets, industrial hygiene evaluation.

UNIT-III

Fire & explosion: Fire and explosion hazards, causes of fire and preventive methods. Flammability characteristics of chemical, fire and explosion hazard, ration of process plant.

UNIT-IV

Propagation of fire and effect of environmental factors, ventilation, dispersion, purifying and sprinkling, safety and relief valves.

Books Recommended:

PAPER (BFP-302): INDUSTRIAL MANAGEMENT I

Course Objectives:

- To understand the different forms of business organizations and their management.

UNIT-I


UNIT-II

Forms of Business Organisations:

Forms of Business Organisations, Advantages and Disadvantages of Private Ownership and Public Ownership; Distinction between Sole Proprietary Firm and Partnership Firm;

Distinction between Partnership Firm and Joint Stock Company; Distinction between Private and Public Company; Types of Organisations – Concepts, merits and demerits of Line, Line and Staff, Functional Organisations.

UNIT-III

Elementary Economics: Concepts of Basic terms in Economics – Goods, Utility, Value, Price, Wealth, Money, Wants; Demand and Demand Analysis – Factors influencing demand,

Law of Demand, Demand Curve, Variations in Demand, Change in Demand, Elasticity of Demand; Equilibrium and Price Determination

UNIT-IV

The Manufacturing (Production) Function: Objectives of Production Management, Operation Concept

Meaning of Product Development, Factors Influencing Choice of Manufacturing Systems, Classification of Manufacturing Systems; Factors Governing Plant Location, Basic Procedure of Method Study (Work Study) and Time Study; Concepts, Objectives and functions of Production Planning and Control (PPC).

Text Books/References:

Course Objectives:

• To understand the different principles of food quality control.

• To assess the food quality assurance of different food.

Unit I

Objectives, importance and functions of quality control. Principles of food quality control and quality assurance, quality control and assessment in food materials-fruits, vegetables, cereals, dairy products, meat, poultry, egg and processed food products.

Unit II

Total quality management (TQM) - good manufacturing practices, good hygienic practices, good lab practices.

Microbial quality control: determination of microorganisms in foods by cultural, microscopic, physical, chemical, immunological and bioassay methods.

Unit III

Food regulations, grade and standards, concepts of Codex Almentarious, HACCP, USFDA, ISO 9000 series etc. Food laws and standards, IPR and patents. Food standards and safety Act: salient provisions and prospects, role of various national and international agencies.

Unit IV

Food adulteration, nature of adulteration, methods of evaluation of food adulterants and toxic constituents of dairy, meat, spices and other products.

Sensory quality evaluation: Introduction, methods, panel screening, selection methods, Sensory and instrumental analysis in quality control.

Practicals

1. Techniques of quality assessment of different natural and processed foods.

2. Identification and ranking of food product attributes.

Text Books/References:


PAPER (BFP-304): FOOD FERMENTATION & BEVERAGE TECHNOLOGY

Theory : 60
Internal assessment: 15
Total Marks : 75
Time : 3 hours

Course Objectives:

• To understand the different types of fermentation technologies used in making fermented.

Unit I

Introduction to fermentation: Rate of microbial growth and death.

Fermentation kinetics, Fermentor design, operation measurement and control and types of fermenters, Batch/continuous fermentation, scale up in fermentation, Principle and use of biosensors.

Unit II

Food fermentations; Lactic acid fermentation of milk, vegetable, cereals and meat: Alcoholic fermentation of fruit juices, sugar and starch substrates; Leavening and baking process; Vinegar fermentation, milk; fermented soya and other legume based foods; Role of fermentation in processing of tea, coffee and cocoa;

Microbial polysaccharides production in foods; Indigenous fermented foods like Dahi, Raabri, Idli, Dosa, Jalebi, etc.

Unit III

Brewing technology of alcoholic beverages- wine, cider, brandy, mead, perry, toddy, sake; Fermentation, distillation and blending.

Beverages : Definition, types, importance of beverages in our diets, soft drinks and hard drinks, treatment of water for food industry.

Unit IV

Technology of soft drinks: Carbonated and non-carbonated beverages.
Whey beverages and utilization of whey in development of fortified drinks, use of low calorie sweeteners in beverages.

Text Books/References:

Practicals

- Lactic acid fermentation of milk
- Alcoholic fermentation of fruit juices
- Preparation of acetic acid production
- Preparation of whey beverages,
- Chemical analysis of water for mineral content, hardness and turbidity
- Microbiological analysis of water: plate count and coliform counts
Course Objectives

To enable the students to understand the various dairy products and their preparation.

Unit 1

Dairy industry in India & its future prospects.

Composition and properties of milk, liquid milk handling operations: Collection and Testing; Filtration and Clarification, Skimming,

Standardization; Homogenization, Pasteurization (LTHT, HTST, UHT)

Sterilization, Packaging, Storage and distribution of fluid milk;

Unit II

New Concept in milk processing- UHT, Membrane processing, Microwave and irradiation treatments; aseptic packaging.

Microbiology of milk, sources of milk contamination.

Unit III

Technology of indigenous dairy products: Dahi, butter, ghee, channa, paneer etc.

Technology of cream, butter, margarine and ghee manufacture.

Technology of condensed and evaporated milk: Composition, nutritive value, process of manufacture, defects (their causes and prevention).

Technology of yoghurt, Acidophilus milk, Bufgaricus milk, Kumiss, Kefir; Manufacturing of Cheddar, Mozzarella, cottage and processed cheese.

Unit IV

Milk and milk product standards and legislations in India: Grading of milk and criterion of grading, reconstituted milk, synthetic milk.

Milk adulteration and quality control in dairy industry. By products of dairy industry and their utilization.
Milk based infant foods; Manufacturing of casein, Caseinate, Co-precipitates, WPC, Lactose; National and International Organizations in dairy Industry.

Text Books/References:

Practicals

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<tr>
<td>Platform tests</td>
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<td>Determination of fat, SNF, TS Protein</td>
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<td>Lactose and ash contents of milk</td>
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<td>Layout plan for setting up of milk plant</td>
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<td>Preparation and Evaluation of different types of milk and milk products</td>
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<td>Preparation and evaluation of butter, ice cream, cheese, yoghurt</td>
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Semester IV

PAPER (BFP-401): INDUSTRIAL SAFETY & HAZARDS II

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Course Objectives

- To enable the students to assess the risk of various energy hazards.
- To enable the students to calculate the risk analysis in various hazards.

UNIT-I
Other Energy Hazards: Electrical hazards, noise hazard, radiation hazard in process operations, hazards communication to employees, plant management and maintenance to reduce energy hazards.

UNIT-II

Risk analysis: Component and plant reliability, even probability and failure, plant reliability, risk analysis, HAZOP AND HAZAN, event and consequence analysis (vapor cloud modeling) Designing for safety, measurement and calculation of risk analysis.

UNIT-III

Hazard Assessment: Failure distribution, failure data analysis, modeling for safety, safety training, emergency planning and disaster management, case studies.

UNIT-IV

Emergency relief systems: Introduction, Description of in-vessel phenomena, two phase level calculations, sizing relief devices.

Text Books/References:

Sanjoy Banerjee. 2002. Industrial Hazards and Plant Safety by Amazon Publisher.

PAPER (BFP-402): INDUSTRIAL MANAGEMENT II

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Instructions for the examiner: The Question Paper will have four sections. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

Course Objectives

- To enable the students to understand the quality material and personal management.
- To enable the students to understand the financial and marketing management concepts.

Unit I

Quality Management: Definitions of Quality, Historical Development of Quality Management, Quality Standards, Quality Control, Concept of Zero Defect, Quality Circles – Meaning, Benefits and Operation of Quality Circles, Quality Audit – Meaning, Terminology, Stages of an Audit;

Unit II

Unit III

Unit IV
Marketing Concepts – Need, Want, Demand, 4 P-s, Production Concept, Product Concept, Selling Concept, Marketing Concept, Societal Marketing Concept, Difference between Selling and Marketing; Market Segmentation – STP Concept, Need for Segmentation, Bases of Segmentation, Types of Segmentation. Marketing Research – Need for and Steps of Marketing Research, Questionnaires; Promotion Mix.

Text Books/References:
2 Everett E. Adam, Ronald J. Ebert 1992, Production & Operations Management, Pearson Education / PHI
Course Objectives

To enable the students to understand the concepts of nutraceuticals and probiotics.

To enable the students to understand the importance of food for good health.

Unit I

Concept on nutraceutical: nutraceutical and functional foods, nutraceutical as new dietary ingredients, biological significance of Nutraceuticals, Nutraceuticals and dietary supplement, world market for Nutraceuticals.

Unit II

Nutraceuticals in food and beverage industry: non caretonid terpenoids, flavonoids and other polyphenolic compound, natural pigments (chlorophyll, chlorophyllin, xanthophylls, beta caretonoides).

Unit III


Unit IV

Concept and opportunities on probiotics, prebiotic and synbiotic, biological significance and use of probiotics for human, for cattle, poultry and for aquaculture. World market for probiotics current technologies.

Commercial production, current technology in probiotics production.

Probiotic foods, resistant starch, fructo-oligosacchariuides as Probiotic food components, Efficacy of probiotic foods, standards and regulation for probiotic foods.

Practicals

1. Quantification in Nutraceuticals in fruits and vegetables.
2. Isolation of flavonoids from apple pomace,
Calorimetric quantitation of Nutraceuticals,
Separation of pigments by TLC.
Separation and quantifications of pigments by column chromatography.

Text Books/References:

PAPER (BFP-404): MEAT, POULTRY & FISH PROCESSING

Course Objectives:
- To create awareness about the processing of meat, fish and poultry.
- To study the storage and handling techniques of fish and poultry.
- To gain knowledge on processing of meat.
- To study about the by products obtained during processing along with their uses.

Unit 1

Status and scope of meat industry in India.
Structure and physico-chemical properties of muscle.
Source of meat animals and fishes, importance in national economy;
Meat : Composition and nutritive and value, Slaughtering and dressing of meat animal; Quality evaluation of eviscerated carcasses; conversion of muscle into meat, environmental and animal production factors that affect meat quality, post mortem changes in meat, rigor mortis, cold shortening, prerigor processing.
Unit II

Processing and preservation methods of meat, Aging of meat, meat tenderization-natural and artificial methods.

Storage and preservation of meat: Chilling, Freezing, Curing, Smoking, Dehydration, Freeze-drying, Irradiation, Canning and Glazing of fish.

Unit III

Cooking, palatability and eating quality of meat, microbial spoilage of meat, Restructured meat products, meat analogs, Meat industry of Fish: Factors affecting quality of fresh fish, fish dressing, chilling, freezing, salting and canning of fish.

Unit IV

Egg: Structure, composition, nutritive and functional properties.

Quality of egg: Internal quality evaluation, microbial spoilage of eggs, preservation and storage methods for eggs.

Egg products: Egg powder, boiled egg, scrambled eggs. Packaging and transportation of eggs.

Poultry products: Types, chemical and nutritive value of poultry meat, grading and packaging of poultry meat.

Text Books/References:

2. G.J. Mountney, 1995. Poultry Products Technology by Taylor & Francis,
Course Objectives:

- To create awareness about the food processing.
- To study the various methods of preservation of food.

Unit I

Extrusion technology: General principles, extrusion process, advantages of extrusion, extrusion equipment, single screw extruders and twin screw extruders, effect of extrusion on food properties.

Hydrostatic Pressure Technology principles and application of hydrostatic pressure technology in food industry.

Unit II

Hurdle Technology: Principles, types and application of hurdle technology in dairy products, intermediate moisture foods, fermented products, heated foods and chilled foods.

Membrane Technology: Introduction of membrane, their classification and function, principles of reverse osmosis and ultrafiltration, nanofiltration and microfiltration, applications of membranes in food processing industry, modules for using membrane filters.

Unit III

High intensity electric field pulses (HIEFP): Principles, generation of electric field pulses, application in foods, effect on bread making and wheat dough and bread making properties, effect of HIEFP on microorganisms.

Food Irradiation Technology: General aspects of irradiation, ionizing radiation, irradiation process, units, mechanism, advantages and disadvantages of irradiation process.

Unit IV

Ultrasound in food processing and preservation: Introduction, ultrasound instrumentation, ultrasound processing for enhancement of mass transfer, heat transfer and homogenization and emulsification.

Immobilized enzyme technology: concept, methods of immobilization and use of immobilized enzymes in food processing industry.

Text Books/References

Semester V

PAPER (BFP-501): ENTERPRENEURSHIP DEVELOPMENT I

Course Objectives:

• To create the awareness about the trade license and registration marks among students.
• To develop the skill of preparation of project report among the students.

Unit I

Entrepreneur & entrepreneurial flair; Classification of small, medium and large scale manufacturing industries; Opportunities of food processing industries.

Unit II

Trade license and registration marks; Sources of finance; Selection of land and factory sheds.

Unit III

Agencies for promotion of different types of industries; Source of machine and equipment.

Unit IV

Preparation of project report; Market feasibility reports; Techno-economic feasibility report on fruits and vegetable processing, bakery and confectionary, mushroom manufacture and soybean processing.

Text books/ References:

2. S. S. Khanka 2006 Entrepreneurial development S. Chand Limited
Course Objectives:

- To make the students aware of sampling techniques and research designs.
- To develop the skill of scientific writing among the students.

Unit I

Introduction to Statistics: Mean, Mode, Median

Sampling techniques in quantitative research: Sampling methods in current use/examples from current research; Issues with regard to sampling techniques

Research designs in quantitative research.

Unit II

Longitudinal versus cross-sectional; Experimental versus quasi-experimental versus Correlational; Exploratory versus descriptive versus explanatory

Theory of probability

Unit III

Qualitative research methods; Ideology/worldview of the qualitative researcher; Research designs in qualitative research;

Sampling techniques in qualitative research; Data collection methods in qualitative research; Data analytic strategies in qualitative research; Reporting of results in qualitative research

Unit IV

Scientific writing: Distinguishing scientific writing from popular and literary writing styles; Characteristics/principles of scientific writing; Examples of good scientific writing; Writing a research proposal; Reporting statistical findings in text

Ethics: In academia; In research in general; In research with human subjects; In research with animal subjects.

Text books/ References:


Practicals

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1 Calculation of mean, standard deviation, mean deviation and variance
2 Calculation of coefficient of variation and Hypothesis testing
3 Presentation of data by frequency tables, diagrams and graphs.
4 Calculation of measures of skewness and Kurtosis.
5 Calculation of dispersion.

PAPER (BFP-503): FOOD BIOTECHNOLOGY

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Course Objectives:

• To create awareness about the various GM foods.
• To study the various prospects of biotechnology in the development of food products.

Unit 1

Introduction to Food biotechnology, basic principles of genetic engineering, Application of genetic to food production improvement of the processing of various crops by genetic engineering, food safety and biotechnology.

Transgenic plants and their contribution to food production enhancement.
Unit II

Methods of molecular cloning, immobilization of microbial cultured plant cells. Bacterial starter culture,

Methods of inoculum and medium preparation, slurry processing and product isolation.

Unit III

Natural antimicrobials for food preservation: Phytoalexins, essential oils and their components, bacteriocins, nisin, pediocins etc, applications of bacetriocins in food systems. Aflatoxins-production, control and reduction using molecular strategy.

Protein engineering in Food technology - methods, applications of protein engineering (e.g. glucose isomerase, Lactobacillus Beta-galactosidase and peptide antibiotic nisin) single cell protein

Unit IV

Fermented food: origin, scope and development, saukraut, younhurt, cheese, misotempeh, Regulatory and social aspects of biotechnology of foods, production of food flavour and colours.

Biomanagement of food industry wastes. Organic foods: Concept, scope, certification and regulation.

Nanotechnology in food processing. Golden rice: Concept, characteristics and importance of golden rice.

Text books/ References:


Practicals

Practical : 60
Internal assessment: 15
Total Marks : 75
Time : 3 hours

1 Method of plant cell culture
2 Preparation of starter culture
3 Production of amylase
4 Immobilization of enzymes.
5 Indirect DNA transfer

**PAPER (BFP-504): CEREAL AND PULSE TECHNOLOGY**

Theory : 60  
Internal assessment: 15  
Total Marks : 75  
Time : 3 hours

**Course Objectives:**

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

**Unit I**


Methods of grain drying- LSU Dryer, By Products of Paddy Processing - Paddy husk and its uses as husk ash, activated carbon, furfural and other by products. Production of Flattened and Puffed Rice from Paddy.

**Unit II**


Paddy Separators – Satake and Schule Designs, Polishers -Cone polishers and other types, Bran and Brokens separators. Rice Mill yields and loss due to brokens at different stages of milling. Use of Rice Bran in Edible oil Industry.

**Unit III**


Unit IV

Milling And Processing Of Maize: Dry milling of maize, Storage and drying, Pre-cleaning, cleaning equipment, degemination and dehusking, Roller milling, Sifting, Purifying, Aspiration, Pneumatics in a maize mill.

Products of milling - Flour, Semolina, Brewers’ grits etc and their applications. Wet milling of Maize and corn: Modern methods of processing, Cleaning, Steeping, Degermination, Bran and Fibre separation, Gluten and Starch Separation.

Equipment needed for Degermination, Debraning and starch separation. Starch conversion into other value added products – Acid Hydrolysis, Enzyme Hydrolysis, Isomerization processes. Processing for Dextrose, Malto Dextrin and other products. Extraction and refining of Corn oil in brief. Grain storage and handling

Text Books


Reference Books


Practicals

Practical : 60
Internal assessment: 15
Total Marks : 75
Time : 3 hours

1. Determination of physical properties of different cereal grains
2. Determination of water absorption capacity, sedimentation value and alcoholic acidity of the Maida.
3. Determination of adulterant (NaHCO3) in wheat flour/ Maida.
4. Estimation of Protein content of different Cereals and Legumes.
5. Determination of Gluten content in wheat flour samples.

PAPER (BFP-505): BAKERY AND CONFECTIONERY TECHNOLOGY

Theory : 60  
Internal assessment: 15  
Total Marks : 75  
Time : 3 hours

Course Objectives:

• To provide knowhow on the machinery and process involved in the baking process

• To understand the various types of sugar and its grades

• To know the confectionery product manufacture

Unit I

Bakery Equipments And Testing Of Flour For Bakery Goods: Laboratory testing of Wheat grain Quality, Moisture tests, Grain hardness testing. Testing, Visco graph, Amylograph, Ferinograph. Dough mixers, Dividers, rounders, Proofing, moulding, Ovens, Slicers, Packaging materials and equipment, Sanitation and safety.

Unit II


Unit III

Sugar Production Process Details: Energy and material balance of cane sugar process. Extraction of juice, extraction yields, drying and uses of Bagasse, Purification of juices-juice filtration and chemical purification, Clarification stages, Lime addition, pH control, Treatment of clarified juice, evaporation –multiple effect evaporators

Unit IV

Technology Of Beverages Manufacture (Alcoholic And Non Alcoholic): Manufacture of beer, wine and champagne - Quality characteristics

Manufacture of distilled beverages including whisky, brandy, rum and gin – Quality aspects

Manufacture of carbonated beverages – quality aspects – Manufacture of sugar-free, sugarless, carbonated beverages.
Confectionery Technology: Types of Confectionery, raw materials and processing of chocolates, hard boiled candies. Additives for Confectioneries. Equipments used in Confectionery manufacture.

**Books**


**Reference Books**


**Practicals**

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1. Prepare the Bread rolls/cakes/ and assessment of its quality
2. Perform the quality test on fat/butter for bakery applications on different parameters
3. Carry out the assessment of market Candy and Chewing gum.
4. Perform the quality assessment test on yeast and skimmed milk powder for bakery application.
5. Prepare Chocolate cookies and assessment of its quality.
Course Objectives:

• To make the students aware of basic elements in enterprise management
• to create the awareness about the agricultural marketing and commodity trading for agribusiness

Unit I
Element in Enterprise Management: Basic management concepts, personnel, production, materials, financing and marketing managements, problem solving and innovation, industrial and business law. Entrepreneurial motivation.

Unit II
Environmental analysis, project selection, project appraisal, modification/ finalization of project, collaborations, preparations for launching, trial run and test marketing.

Unit III

Unit IV
Marketing of Agricultural input and Marketing of Agricultural product. Market research for agribusiness.
Commodity trading and forecasting for agribusiness. Retail and supply chain management. Management of cooperation.

Books Recommended:
Course Objectives:

To study statistics that allows students to understand contrast phenomena

To study statistics that allows students to examine relationships between variables

**Unit I**

Types of distribution: Frequency distribution; Normal distribution; Probability distribution; Sampling distribution

Type I and type II errors; Central limit theorem; Point estimation vs. interval estimation; Standard error (and confidence intervals)

Parametric and nonparametric methods

**Unit II**

Using an advanced statistical method (steps in using an advanced statistical method)

**Unit III**

To study statistics that allows us to contrast phenomena: Univariate chi-square test; Bivariate chi-square test; t- or z- test for contrasting two independent groups; Paired t-test; ANOVA

**Unit IV**

To study statistics that allows us to examine relationships between variables: Bivariate chi-square test; Product-moment correlation coefficient.

Ethics in the use of statistics (e.g., the importance of test assumptions, the number of statistical tests in a research and levels of significance)

**References**


Practicals

Practical : 60
Internal assessment: 15
Total Marks : 75
Time : 3 hours

1. Fitting of binomial distribution.
2. Fitting of Poisson distribution.
3. Probability.
4. Bivariate frequency table.
5. T-test and anova

PAPER (BFP-604): FOOD PACKAGING TECHNOLOGY

Theory : 120
Internal assessment: 30
Total Marks : 150
Time : 3 hours

Course Objective:

• To enable the students to understand about packaging and packaging materials, interaction of food items with packaging materials

Unit I

Introduction To Food Packaging: Functions of packaging, Effect of environmental factors on quality of food.


Unit II

Metal Cans As Packaging: Metallic can types - Tin cans and Aluminum cans. Specialty of Open top sanitary cans, Lacquers and their use, Three piece cans and Two piece cans, Aerosol Cans.

Unit III
Flexible Films Packaging: Formation of Films and pouches, Plastics used and their Specific applications.


Board packaging and their applications.

Unit IV
Filling And Sealing Operations For Various Types Of Packages: Closing and sealing of Rigid plastic containers. Filling and sealing of Flexible plastic containers, Seal types, Hot wire sealing, hot bar sealing and impulse sealing.

Form fill Seal equipment: Printing on packages, Bar codes, Nutrition labeling and legislative requirements. Filling and Sealing of pouches, pouch from fill seal machines.


Text Book

Reference Books


PAPER (BFP-605): PLANTATION PRODUCTS AND TECHNOLOGY OF SPICES

Theory : 120
Internal assessment: 30
Total Marks : 150
Time : 3 hours

Course Objective:
To enable the students to understand

1. Basics of plantation and spice products
2. Techniques in processing these products
3. Developing new Technology.

**Unit I**

Chemistry and Technology of Coffee


**Unit II**

Tea – Chemistry and Technology


**Unit III**

Chemistry and Technology of Cocoa and Cocoa Products

Occurrence – Chemistry of the cocoa bean – changes taking place during fermentation of cocoa bean – Processing of cocoa bean – cocoa powder – cocoa liquor manufacture Chocolates – Types – Chemistry and technology of chocolate manufacture – Quality control of chocolates

**Unit IV**

Chemistry and Technology of Major Spices: Pepper, Cardamom, ginger and turmeric – Oleoresins and essential oils – Method of manufacture – Chemistry of the volatiles – Enzymatic synthesis of flavour identicals - Quality control

Chemistry and Technology of Minor Spices: Cumin, Coriander, Cinnamon, fenugreek, Garlic, Clove and Vanilla - Oleoresins and essential oils – Method of manufacture – Chemistry of the volatiles – Quality control

Present trends in synthesis of volatiles – micro-organisms, plant suspension cultures

**Text Books / Reference books**

PAPER (BFP-606): FOOD PLANT LAYOUT & PROCESS EQUIPMENT DESIGN

Theory : 120
Internal assessment: 30
Total Marks : 150
Time : 3 hours

Unit I

Basic concepts of plant layout and design with special reference to food process industries. Application of HACCP concept, ISO, FPO & MPO requirements in food plant layout and design.

Unit II

Design consideration for location of food plants. Basic understanding of equipment layout and ventilation in food process plants. Preparation of flow sheets for material movement and utility consumption in food plants.

Unit III

Plant layout and design of bakery and biscuit industries. Plant layout and design of fruits and vegetables processing industries including beverages.

Plant layout and design of milk and milk products. Miscellaneous aspects of plant layout and design like provision for waste disposal, safety arrangements etc.

Unit IV

Design of autoclave, Pasteurizer, Continuous Sterilizer, Steam Jacketed Pan and Vacuum Concentrator.

Design of Basket Press, Screw type Juice Extractor, Solid Mixer, Kneader; Oil Expeller, filters and extruder.

Design of Tray Drier, Drum Drier, Spray Drier, Fluidized Bed Drier and Rotary Roaster.

Design of Homogenizer, Pulping Machine, Plate Type Freezer and Freeze Drier.

Text Books/ References.

