

# **Syllabus for B.Sc. (Food Technology)**

(CBCS)

Group II Elective Courses

**SEMESTER I**

**BFTFCE 137: FOOD FLAVOURS**

**24 hrs**

## **UNIT I**

**12 hrs**

### **INTRODUCTION**

Importance of food flavours and Classification of food flavours.

Chemical compound classes and their flavour responses.

Flavour development during biogenesis, flavour development during food processing.

Use of biotechnology to develop flavours.

## **UNIT II**

**12 hrs**

### **THE CHEMICAL SENSES**

Anatomy of the chemical senses

Neural development of the chemical senses.

Receptor mechanisms, neural coding, the control of eating.

Flavour Analysis- Subjective versus Objective methods of analysis, psychophysics and sensory evaluation.

Instrumental analysis, sample handling and artifacts.

## **REFERENCES**

- Ashurst, Philip R. "Food Flavorings". 3rd Edition. Aspen Publication, 1999.
- Charalambous, G. "Food Flavors: Generation, Analysis and Process Influence". Elsevier, 1995.
- Fisher, Carolyn "Food Flavours : Biology and Chemistry". Royal Society of Chemistry, 1997
- Heath, H.B. and G.Reineccius "Flavor Chemistry and Technology". CBS, 1996.
- Hofman, Thomas, Chi-Tang-Ho and Wilhelm Pickenhagen "Challenges in Taste Chemistry and Biology ". ACS Publications, 2003.
- Reineccius, Gary "Flavor Chemistry and Technology". 2nd Edition. Taylor & Francis, 2006.

## **BFTFCE 138: NUTRITION THROUGH LIFE CYCLE**

**24 hrs**

### **UNIT I**

**12 hrs**

Food groups, Balanced diet, Principles of meal planning, Factors effecting meal planning and RDA for Indian population. **Nutrition during Pregnancy-** Physiological changes, nutritional requirements, effect of malnutrition on outcome of pregnancy, complications of pregnancy. **Nutrition during Lactation-** Physiology of lactation, factors affecting lactation, nutritional requirements. **Nutrition during Infancy-** Growth and development, breast feeding, compositional differences between human milk and milk substitute. Weaning foods.

### **UNIT II**

**12 hrs**

**Nutrition for Preschool children-** Growth and development, nutritional requirements, nutritional problems specific to this age. **Nutrition for School age and adolescent children-** Growth spurt, nutritional requirements, factors affecting their eating habits, nutritional problems specific to this age. **Nutrition for adulthood-** Nutrient requirements for adult man and woman, nutritional status of Indian adult population. **Nutrition for old age-** Physiological changes in elderly, Nutritional requirements, nutritional problems health concerns in old age and their management.

### **REFERENCES**

- Chadha R., Mathur P. ( eds). 2015. Nutrition: A Lifecycle Approach, Orient, New Delhi.
- Dietary Guidelines for Indians, ICMR (2011), NIN, Hyderabad.
- Khanna K, Gupta S, Seth R, Passi SJ, Mahna R, Puri S. 2013. Textbook of Nutrition and Dietetics. Phoenix Publishing House Pvt. Ltd.
- Seth V and Singh K., 2006. Diet Planning through the Life Cycle: Part 1 Normal Nutrition, A Practical Manual. Elite Publishing House Pvt. Ltd. New Delhi.
- Srilakshmi.B, Dietetics, New age international publication.2013

## **BFTFCE 139: POST HARVEST MANAGEMENT**

**24 hrs**

### **UNIT I**

**12 hrs**

**Fruits and vegetables as living products:** Chemical composition, pre and post harvest changes, desirable characteristics of fruits and vegetables for processing.

**Plant growth regulators:** Role in relation with storage, physical and chemical treatment to increase shelf life conditions.

**Food additives:** Used in vegetable processing and preservation.

### **UNIT II**

**12 hrs**

**Fruits and vegetable juices:** preparation of juice, syrups, squashes. Concentration and drying of juices, packaging of dried fruits and vegetables.

**Vinegar:** methods of preparations, food standards and quality control.

**Spices:** spice production and processing of various spices, antioxidant activity of spices, storage of spices and spice extractives.

### **REFERENCES**

- Haard, N.F. and Salunke, D.K . 1975, Post harvest biology and handling of fruits and vegetables, AVI, Westport.
- Jacob John P., 2012. A Handbook on Post Harvest Management of Fruits and Vegetables
- Saraswathy S; T L Preethi; S Balasubramanyan; J Suresh; N Revathy and S Natarajan, 2008. Post Harvest Management of Horticultural Crops, 10: [8177543229](#) / ISBN 13: [9788177543223](#),Published by Agrobios.
- Verma L.R and Joshi, 2000, Post harvest technology of fruits and vegetables, vol 1 and vol 2.

## Group II Elective Courses

### SEMESTER II

#### BFTFCE 187: TECHNOLOGY OF SPICES

**24 hrs**

#### UNIT I

**12 hrs**

**Spices:** Definition, Classification, Chemical Composition, Use of Spices.

**Spice oil and Oleoresins:** Definition, Technology of Manufacturing

**Pepper:** Refining and processing of pepper; Pepper products - White pepper, dehydrated green pepper, Pepper oil, Oleoresin.

**Chillies:** Drying of chillies, quality attributes of chillies and paprika

#### UNIT II

**12 hrs**

**Cardamom:** Composition, Drying of fruits, Bleaching, Grading, Cardamom Products, Essential oil and oleoresins

**Ginger:** Curing, Bleaching, Grading Ginger Products, Ginger oils, Ginger oleoresin, Dehydrated Ginger, Bleached Ginger

**Turmeric:** Curing, Grading, Turmeric powder, Essential oil, oleoresin

#### REFERENCES

- Pruthi J S 1993, Major Spices of India Indian Council of Agricultural Research.
- Pruthi, J. S 1999 "Quality Assurance in Spices and Spice Products, Modern Methods of Analysis," Allied Publishers Ltd, New Delhi.

## **BFTFCE 188: RESEARCH AND DEVELOPMENT OF NEW PRODUCT**

**24 hrs**

### **UNIT I**

**12 hrs**

#### **Product Development in Food Industry**

Introduction, Criteria for the product development, Principles of product development

#### **R&D Skills**

Technical Basics, Required Skills

Level-1, Level 2—Team Player, Level 3—Business Partner, Skill and Capability Assessment, Basic Product Development Process Flow, The Product Creation Process, Challenges in Today's Environment, Product Development and Refinement Stage, Commercialization and Launch,

#### **Company's Perspective on Innovation**

Introduction, Innovation Defined, Key Principles and Applications, Innovation Comfort Level, Innovation Investment, Maintaining Relevance with Your Consumer, Target the Possibilities

### **UNIT II**

**12 hrs**

#### **Brands**

Introduction, From Great Brands to Meaningful Brands, Good and great brands, Functions of brands The Relation between the Brand and the Product,

#### **Market Forces**

Introduction, Marketing and Product Development, Brands as Added Value, Brands Act as Multipliers, Implications for New Products

#### **Process application**

Introduction, Demand Economy, Speed, Accuracy, Money

### **REFERNCES**

- Wiley Blackwell 2007, Accelerating New Food Product Design and Development, Jacqueline H. Beckley, Editor, ISBN: 978-0-813-80809-3, Blackwell Publishing

## **BFTFCE 189: TOTAL QUALITY MANAGEMENT**

**24 hrs**

### **UNIT I**

**12 hrs**

#### **INTRODUCTION**

Introduction to food quality, Need for quality, Evaluation of quality, Definition of quality Dimensions of product and service quality, Basic concepts of TQM, TQM Framework, Contributions of Quality Gurus, Barriers to TQM, Cost of Quality.

### **UNIT II**

**12 hrs**

#### **TQM TOOLS AND TECHNIQUES**

The seven traditional tools of quality, New management tools, Six sigma: Concepts, Methodology, applications to manufacturing and service sector, Bench marking – Reason to bench mark, Bench marking process, Control Charts and Process Capability, Quality Function Development (QFD), Total productive maintenance (TPM)

#### **REFERENCES**

- Besterfield, Dale H. et al., “Total Quality Management”, 4th Edition, Pearson Education Asia, 2006.
- Dale H. Besterfield et al, Total Quality Management, Third edition, Pearson Education, First Indian Reprints 2004.
- Evans, James R. and William M. Lindsay, “The Management and Control of Quality”. 6th Edition South-Western (Thomson Learning), 2005.
- Janakiraman, B and Gopal, R.K, “Total Quality Management – Text and Cases”. PHI, 2006.
- Oakland, J.S. “TQM – Text with Cases”, 3rd Edition. Butterworth – Heinemann, 2003.
- Suganthi, L and Anand Samuel, “Total Quality Management”, PHI, 2006 .

## Group II Elective Courses

### SEMESTER III

#### **BFTFCE 237: ENTREPRENEURSHIP DEVELOPMENT**

**24 hrs**

#### **UNIT I**

**12 hrs**

##### **ENTREPRENEURIAL DEVELOPMENT**

Case studies of successful entrepreneurs  
Exercises on ways of sensing opportunities – sources of idea, creating efforts, SWOT Analysis  
Entrepreneurial skill assessment test  
Techniques of development of entrepreneurial skills, positive self image and locus of control.

#### **UNIT II**

**12 hrs**

##### **FOOD BUSINESS MANAGEMENT**

Case studies of Food Processing Business and its aspects  
Business opportunity Identification and Assessment techniques  
Business Idea Generation and evaluation exercise  
Market Assessment study Analysis of competitive situation  
SWOT Analysis for business and for competitors  
Preparation of business plan  
Preparation of project report  
Methods of Arrangement of inputs – finance and material

#### **REFERENCES**

- Acharya S S and Agarwal N L (1987) Agricultural Marketing in India, Oxford & ISH Publishing Co., New Delhi.
- Chandra, Prasanna (1996) Projects, Planning, Analysis, Selection, Implementation and Review, Tata McGraw-Hill Publishing Company Limited, New Delhi.
- David D. and S Erickson (1987) Principles of Agri Business Management , Mc Graw Hill Book Co., New Delhi.
- David H. Holt (2002) Entrepreneurship – Anew Venture Creation, Prentice Hall of India, New Delhi.
- Phill Kottler (1994) Marketing Management, Prentice Hall of India Private Limited, New Delhi.
- Vasant Desai (2011) The Dynamics of Entrepreneurial Development and Management, Himalya Publishing House Pvt. Ltd., Mumbai
- Vasant Desai (2012) Fundamentals of Entrepreneurship and Small Business Management, Himalya Publishing House Pvt. Ltd., Mumbai

## **BFTFCE 238: ROLE OF SENSORY PANEL MEMBERS IN FOOD INDUSTRIES**

**24 hrs**

### **UNIT I**

**12 hrs**

**Introduction:** Sensory evaluation and its importance in food industries. Sensory perception of a food sample. Different sensory methods.

**Types of Sensory Panelists-** Trained Panel, Semi-Trained Panel (D&C Panel), Consumer Panel. Screening, selection and training of sensory panelists- Qualification for Screening a Panelist, Screening, Selection and Training.

### **UNIT II**

**12 hrs**

**Role of sensory panel member-**Preparation for sensory analysis. Laboratory set up and equipments. Sample preparation for training. Preparation of score card. Importance of score card in acceptance of food. Factors Affecting Performance. Consumer evaluation, collecting data, applying statistics and interpretation of results. Management Input in sensory evaluation.

**Conduction of sensory evaluation in different food products-** Dairy products, meat products, bakery products, wine, confectionaries, convenience foods etc.,

### **REFERENCES**

- Amerine, M.A., Pangborn, R.M. and Roessler, E.B. (1965). Principles of Sensory Evaluation of Food, Academic Press, New York.
- Bodyfelt, F.W., Bobias, J. and Trout, G.M. (1988). The Sensory Evaluation of Dairy Products, AVI Publ. Co., New York.
- Eggert, J. and Zook, K. (1986). Physical requirement guidelines for sensory evaluation laboratories. ASTM STP 913. American Soc. Testing Materials, Philadelphia.
- Nelson, J.A. and Troat, G.M. (1964). Judging of Dairy Products, AVI Publ. Co., New York. Stone, H. and Sidel, J. (1993). Sensory Evaluation Practices, Academic Press, Inc. London.



## **BFTFCE 239: PEST MANAGEMENT OF STORED FOOD**

**24 hrs**

### **UNIT I**

**12 hrs**

Production of food grain and post harvest losses in India, General problems of storage of food grains, Factors responsible for the storage losses at commercial and farm level. Food Safety & Standard Act & its importance. Uniform Specification, Procedure for inspection of food grains, terminology, Necessity and utility. Role of Moisture in spoilage of stored grain, moisture migration, measurement of moistures content in food grain and milled products. Chemical and nutrition value changes during storage period in food grains. Quality of food grains, its maintenance during storage food grains i.e., Categorization, classification, grade designation, etc. Principles of construction of scientific metallic & non-metallic storage structures & their specifications.

### **UNIT II**

**12 hrs**

Mode of Action of insecticides, rodenticides & fungicides. Tolerance limit of pesticide residues, antidotes and precautions and safe handling of pesticides. Insect pest of stored grain and milled products, Integrated Insect Pest Management, Sources and detection of infestation in stored food grains. Identification of rats and Management. Termite and their control, Control of house hold pests. Toxic contaminants in food grains, their ill effect and prevention. General Principles of fumigation, different type of fumigations with MBr, Alp and Precautions in their use. Insecticide Act, Consumer protection Act & Stress Management. Role and function of Warehousing Development and Regulatory Authority and negotiability of Warehouse Receipt. Role of regulation agencies & responsibilities of fumigation operators. Stack/Container/Ship fumigation. Maintenance of Fumigation records.

### **REFERENCES**

- Chattopadhyay SB. 1985. Principles and Procedures of Plant Protection. Oxford & IBH, New Delhi.
- Dhaliwal GS & Arora R. 2001. Integrated Pest Management: Concepts and Approaches. Kalyani Publ., New Delhi.
- Duntson PA. 2004. The Insects: Structure, Function and Biodiversity. Kalyani Publ., New Delhi.
- Evans JW. 2004. Outlines of Agricultural Entomology. Asiatic Publ., New Delhi.
- Jerry Heeps (2006) Insect Management for Food Storage and Processing, Second Edition, Elsevier, eBook ISBN: 9780128104293.
- Patnaik BD. 2002. Physiology of Insects. Dominant, New Delhi.
- Saxena AB. 2003. Biological Control of Insect Pests. Anmol Publ., New Delhi.
- Uma Shankar (2012) Integrated Pest management in stored Grains In book: Integrated Pest management: principles and Practice, Edition 2012 Publisher: CABI, pp 386- 407.

## Group II Elective Courses

### SEMESTER IV

#### BFTFOE 257: DAIRY TECHNOLOGY

24 hrs

##### UNIT I

12 hrs

**Composition:** Composition of milk from sources, factors affecting Composition of milk.

**Properties:** Physical and Chemical properties-Flavour, Colour, acidity, viscosity, Specific gravity, Freezing point, Boiling point, Effect of- heat, enzymes, acids and alkali.

**Types of Milk:** Toned, Double toned milk, Standardized milk, Homogenized milk, and Recombined milk.

**Processing of Milk:** Processing, distribution and storage of liquid milk.

##### UNIT II

12 hrs

##### Dairy Products:

**Cream and Butter-** Composition, Processing and Technology

**Ice Cream:** Technology of Ice cream- Ingredients, formulation, Freezing, Hardening, Storage, Distribution and defects. Frozen dessert.

**Cheese:** Introduction, Classification of cheese, Processing of cheese- Cottage and Cheddar.

**Fermented milk Products:** Curd, yoghurt, Acidophilus milk, Kefir, koumiss, Probiotic.

**Milk Powder:** Whole and skim milk powders, Instant milk powder.

**Technology of Dairy by-products:** Whey protein products.

**Dairy plant sanitation:** Objectives, CIP, Sanitizers.

##### REFERENCES

- Ananthkrishnan C P, Khan A Q, Padmanabhan P N. 1991 Technology of Milk Processing. Srilakshmi Publishers.
- Atherton, Henry V. 2003, Chemistry and Testing of Dairy Products CBS Publishers and Distributors Pvt., Ltd.,
- Eckles Clarence Henry 1977 Milk and Milk Products, Tata MC Graw Hill publishers
- Edgar Spreer. 1998 Milk and dairy products technology. Marcel Dekker.
- Johnson, Webb . 2005, Fundamentals of Dairy Chemistry. CBS Publishers and Distributors
- Kurmann, Joseph A. 1992, Encyclopedia of Fermented Fresh Milk Products, CBS Publishers and Distributors.
- Sukumar D E. 1980, Outlines of Dairy Technology, Oxford University Press, ISBN: 0195611942, 9780195611946.
- Walstra P, Geurts T. 1999. Dairy Technology. Marcel Dekker New York, ISBN 9780824702281 - 727

## **BFTFOE 258: TECHNOLOGY OF FRUITS & VEGETABLES**

**24 hrs**

### **UNIT I**

**12 hrs**

#### **Pectin, Jam, Jelly and Marmalade**

Pectin: Definition of pectin, classification, Pectic enzymes, Properties, jelly grade of pectin, Testing of pectin.

Jam, Jelly and Marmalade: Definition, jam making, jelly making, Defects.

#### **Fruits juices & Fruit preparations**

Fruit Juices: Ready to serve beverages, Squashes Cordials, Nectars, Concentrates Fruit juice powder-Freeze drying, Foam mat drying.

Fruit preparations: Preserves, Candies Crystallized fruits & Glazed fruits

Tomato products: Tomato juice, puree, paste & Ketchup, specification of the above products.

### **UNIT II**

**12 hrs**

#### **Canning**

Classification of canning of fruits – Pineapple, Oranges, Canning of vegetables – Peas, Carrots, Syrups & brines for canning.

#### **Drying & Dehydration**

Enzyme Inactivation, Sulphuring Sun drying – grapes and dates. Dehydration of vegetables and Fruits. Tunnel & cabinet drier.

#### **Browning**

Enzyme activity, enzymatic browning, Non enzymatic browning, its prevention.

### **REFERENCES**

- Cruess WV., 1997. Commercial fruit and vegetables Products. Anees offset press, New Delhi.
- Lal, G Siddappa S and Tandon GL. 2015, Preservation of fruit and vegetables. ICAR
- Pandey PH, 2007 Principle of Practices of post harvest Technology Kalyani publication.
- Potter NN, Hotchkiss JH. 2007 Food Science. CBS Publishers
- Thompson AK 1995 Post harvest Technology of Fruits and Vegetables Black well Sci
- Verma LR & Joshi V.K., 2000 Post Harvest Technology of Fruits & Vegetables. Indus Publishers.

## **BFTFOE 259: FOOD SAFETY, QUALITY AND REGULATION**

**24 hrs**

### **UNIT I**

**12 hrs**

#### **INTRODUCTION**

Definition of food safety and concept of safe food;  
characterization of food hazards physical, chemical and biological;  
adulteration, filth, plastics, pesticides, heavy metals;  
Changes due to food processing, trans fatty acids, pyrolytic and thermal decomposition products, urethane, mycotoxins, scrombotoxin, migration, cross - contamination, nitrates and related products, colour additives, fat substitutes, chemical preservatives, veterinary drugs and antibiotics.

### **UNIT II**

**12 hrs**

#### **MICROBIAL AND NATURAL SOURCE HAZARDS AND REGULATIONS**

Allergens, goitrogens, lathyrogens, alkaloids, lectins, aflatoxins.  
Implementation of FSIS program for pathogen reduction.  
Prevention of food-borne illness.  
Prevention of microbial hazards; Sanitation; antimicrobial plastics; intelligent packaging.  
Food Safety and Standards Act India 2006; Prevention of Food Adulteration Act, India, 1954; Responsibilities of the food service operator, consumer protection.

#### **REFERENCES**

- Fortin, N.D. "Food Regulation : Law, Science, Policy, and Practice". John Wiley, 2009.
- Lightbourne, Muriel "Food Security, Biological Diversity and Intellectual Property Rights" Ashgate, 2009.
- Mehta, Rajesh and J. George "Food Safety Regulation Concerns and Trade : The Developing Country Perspective". Macmillan, 2005.