### FIRST SEMESTER (Theory Papers)

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Max. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSFT 101</td>
<td>Food preservation and processing principles</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 102</td>
<td>Fruits, vegetables and plantation products</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 103</td>
<td>Basic food microbiology</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 104</td>
<td>Food packaging</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 105</td>
<td>Basic nutrition</td>
<td>60</td>
</tr>
</tbody>
</table>

### FIRST SEMESTER (Practical Papers)

<table>
<thead>
<tr>
<th>Practical</th>
<th>Max. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>75</td>
</tr>
<tr>
<td>II</td>
<td>75</td>
</tr>
<tr>
<td>Internal Assessment</td>
<td>250 (50 X 5 = 250)</td>
</tr>
</tbody>
</table>

Total marks of B.Sc. First Semester 700

### SECOND SEMESTER (Theory Papers)

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Max. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSFT 201</td>
<td>Food Biochemistry and Biotechnology</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 202</td>
<td>Fruit and vegetable processing technology</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 203</td>
<td>Fermentation technology</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 204</td>
<td>Milk and milk products technology</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 205</td>
<td>Food quality and safety management</td>
<td>60</td>
</tr>
</tbody>
</table>

### SECOND SEMESTER (Practical Papers)

<table>
<thead>
<tr>
<th>Practical</th>
<th>Max. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>75</td>
</tr>
<tr>
<td>II</td>
<td>75</td>
</tr>
<tr>
<td>Internal Assessment</td>
<td>250 (50 X 5 = 250)</td>
</tr>
</tbody>
</table>

Total marks of B.Sc. Second Semester 700

### THIRD SEMESTER (Theory Papers)

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Max. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSFT 301</td>
<td>Food additives, contaminants and toxicology</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 302</td>
<td>Food Beverages</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 303</td>
<td>Technology of Spices</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 304</td>
<td>Food Engineering</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 305</td>
<td>Cereals and legumes processing technology</td>
<td>60</td>
</tr>
</tbody>
</table>

### THIRD SEMESTER (Practical Papers)

<table>
<thead>
<tr>
<th>Practical</th>
<th>Max. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>75</td>
</tr>
<tr>
<td>II</td>
<td>75</td>
</tr>
<tr>
<td>Internal Assessment</td>
<td>250 (50 X 5 = 250)</td>
</tr>
</tbody>
</table>

Total marks of B.Sc. Third Semester 700
## FOURTH SEMESTER (Theory Papers)

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Max. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSFT 401</td>
<td>Egg, poultry, meat &amp; fish processing technology</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 402</td>
<td>Food additives and legislation</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 403</td>
<td>Food hygiene and plant sanitation</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 404</td>
<td>Enterpreneurship and agribusiness management</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 405</td>
<td>Industrial microbiology and enzyme technology</td>
<td>60</td>
</tr>
</tbody>
</table>

### FOURTH SEMESTER (Practical Papers)

<table>
<thead>
<tr>
<th>Practical-I</th>
<th>75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical-II</td>
<td>75</td>
</tr>
<tr>
<td>Internal Assessment</td>
<td>250 (50 X 5 = 250)</td>
</tr>
<tr>
<td>Total marks of B.Sc. Fourth Semester</td>
<td>700</td>
</tr>
</tbody>
</table>

## FIFTH SEMESTER (Theory Papers)

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Max. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSFT 501</td>
<td>Oils and fats processing technology</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 502</td>
<td>Food flavourings</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 503</td>
<td>Design of food processing equipments</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 504</td>
<td>Food quality and safety</td>
<td>60</td>
</tr>
<tr>
<td>BSFT 505</td>
<td>Food industry waste management</td>
<td>60</td>
</tr>
</tbody>
</table>

### FIFTH SEMESTER (Practical Papers)

<table>
<thead>
<tr>
<th>Practical-I</th>
<th>75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical-II</td>
<td>75</td>
</tr>
<tr>
<td>Internal Assessment</td>
<td>250 (50 X 5 = 250)</td>
</tr>
<tr>
<td>Total marks of B.Sc. Fourth Semester</td>
<td>700</td>
</tr>
</tbody>
</table>

## SIXTH SEMESTER (Theory Papers)

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Max. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSFT 601</td>
<td>Industrial training and presentation</td>
<td>450</td>
</tr>
</tbody>
</table>
SEMESTER I

BSFT 101 FOOD PRESERVATION AND PROCESSING PRINCIPLES

Unit-I
Basic considerations: Aims and objectives of preservation & processing of foods, Degree of perishability of unmodified foods, Causes of quality deterioration and spoilage of perishable foods, intermediate moisture foods, wastage of foods.

Unit-II
Preservation of foods by low temperatures:
Chilling temperatures: Consideration relating to storage of foods at chilling temperatures, Applications and procedures, Controlled and Modified atmosphere storage of foods, Post storage Handling of foods.
Freezing temperatures: Freezing process, Slow and fast freezing of foods and its consequence, other occurrences associated with freezing of foods. Technological aspects of pre-freezing, Actual freezing, Frozen storage and thawing of foods.

Unit-III

Unit-IV
Preservation by water removal:
Principles, Technological aspects and application of evaporative concentration process; Freeze concentration and membrane process for food concentrations.Principles, Technological aspects and application of drying and dehydration of foods. Cabinet, tunnel, belt, bin, drum, spray, vacuum, foam mat, fluidized-bed and freeze drying of foods.

Unit-V
Principles, Technological aspects and application of sugar and salt, Antimicrobial agents, Biological agents, non ionizing and ionizing radiations in preservation of foods. Hurdle technology.

Book References Author
O.R.Fennema Principles of Food science
V.Kyzlink Principle of Food Preservation
James M.Jay Modern Food Microbiology

BSFT102 FRUITS, VEGETABLES AND PLANTATION PRODUCTS

Unit-I
Structural, Compositional and Nutritional aspects of fruits and vegetables. Physiological development: Growth, Maturation, Ripening and Senescence. Post harvest handling including controlled and modified storage. Techniques of processing and preservation of fruits and vegetables by refrigeration and freezing, canning and bottling, drying and dehydration.

Unit-II
Technology of fruits and vegetable products: Juices and pulps, Concentrates and powders, Squashes and cordials. Beverage: Still and carbonated. James, Jellies and Marmalades.

Unit-III
Spices: Composition, Structure and characteristics. Preservation and processing of major and minor spices of India; whole spice, Spice powder, Paste and extracts, Spice oils and oleoresins. Composition, Structure, characteristics & processing of cashew nut and other dry fruits

Unit-IV
Composition, Production and processing of Tealeaves: Black tea, Green tea and Oolong tea. Instant tea. Production and processing of coffee cherries by wet and dry methods to obtain coffee beans, grinding, storage and preparation of brew, Soluble /Instant coffee, Use of chicory in coffee, decaffeinated coffee.

Unit-V
Production, processing and chemical composition of cocoa beans. Cocoa Processes: Cleaning, roasting, alkalization, cracking and fanning, Nib grinding for cocoa liquor, cocoa butter and cocoa powder. Manufacturing process for chocolate: Ingredients, Mixing, Refining, Conching, Tempering, Moulding etc. to obtain chocolate slabs, chocolate bars, enrobbed and other confectionary products.

Book References:
Author Title
& G.L. Tandon B.L. Amla Food Industry.
B. Shrilakshimi Food Science.
R.H.H. Wills et.al. An introduction to the Post-harvest physiology and handling of fruits and vegetables.

BSFT 103 BASIC FOOD MICROBIOLOGY
Unit-I
General characteristics of microorganism: Classification, morphology, physiology, growth, nutrition and reproduction; Pure culture techniques and maintenance of cultures, control of microorganism.

Unit-II
Incidence of microorganism in foods, source of contamination. Principle underlying spoilage and preservation of foods.

Unit-III L
Contamination, spoilage and preservation of cereal products, sugar products, fruit and vegetable products, meat products, fish and sea foods egg and poultry products milk and milk products and other foods, Microbiological standard of foods.

Unit-IV
Food poisoning and food borne infections, food plant sanitation, inspection and control, personnel hygiene, HACCP in food industry. Beneficial microorganisms and their utilization in food fermentation.

Book references:
Author Title
M.J.Pelczar Microbiology
James M. Jay Modern Food Microbiology
BSFT104 FOOD PACKAGING

Unit-I

Unit-II
Cellulosic and Polymeric packaging materials and forms: Food grade polymeric packaging materials, Rigid plastic packages. Films: Oriented, Co-extruded, Laminates and Metallised; Cellophane, Olefins, Polyamides, Polyesters, PVC, PVDC, PVA, Inomers, Copolymers, Polycarbonates, Phenoxy, Acrylic and Polyurethane. Their mechanical sealing and barrier properties.

Unit-III

Unit-IV

Unit-V

Book References:
Author Title
M. Mahadeviah and R.V. Gowramma Food Packaging Materials
S. Saclarow and R.C. Griffin Principles of Food Packaging
Trends in Food Science & Technology Proceedings of IFCON-1988

BSFT105 BASIC NUTRITION

Unit 1: Terms used in Nutrition and Health. Definitions-Health, Nutrition, Nutrients, Foods, Diet, R.D.A., Balanced diet, Malnutrition (Definition, causes, symptoms,), Under-nutrition, Over-nutrition, Optimum nutrition, PEM-Kwashiorkor, Marasmus

Unit 2: Five Food Groups and Food guide, relationship between food and nutrition, functions of food, classification of nutrients, factors affecting food consumption and food acceptance.

Unit 3: WATER- Functions, sources, requirements, water balance, dehydration (ORS) and toxicity, water as a cooking medium, effects of hard and soft water on cooking.
CARBOHYDRATE- Composition and classification, source, functions, requirements principles of cereal and sugar cookery (in brief)- effect of moist heat, effect of dry heat, identity of grains, gel formation, gluten formation, Pectic gels, crystallization, caramelization.
LIPIDS- composition, sources, functions, requirements, deficiency and excess; fatty acids-essential and non-essential, SFA, USFA, MUFA, PUFA, significance of fatty acids, Rancidity, Emulsion, changes on heating, smoking point, frying point, melting point, processes- hydrogenation and rendering; factors affecting fat absorption (in brief)
Unit 4:
PROTEIN composition, classification (complete, incomplete), sources, functions, requirements, deficiency, nutritional classification of amino acids (essential, Non-essential, semi-essential), mutual supplementation, Biological value, effect of heat on protein- denaturation, coagulation and Maillard reaction, foam formation, fermentation, Germination, Protein in Foods – Pulse, milk, egg, fish, meat.

Unit 5:
MINERALS- distribution in body, functions and sources, bioavailability and requirement, deficiency and excess of the following. Factors affecting (enhancing/inhibiting) absorption Calcium, Phosphorus, Iron, Iodine
VITAMINS- classification, sources, functions, requirements, deficiency and excess of the following, Factors affecting availability of vitamins from the diet.

References-
Age International Pvt. Ltd.
Kukude, S et al. Food Science, Sheth Publications.
Marion Benion & Hughes: Introductory Foods, Macmillan New York
Mudambi and Sheela Rao: Food science
Nutrient Requirements and Recommended Dietary Allowances for Indians- I.C.M.R.
Srilaxmi: Food Science, New Age International
Subbulaksmi G., and Udipi S.:Food Processing and Preservation

SEMESTER II

BSFT 201 FOOD BIOCHEMISTRY AND BIOTECHNOLOGY

UNIT-I

UNIT-II
Enzyme: Classification, nomenclature, activation energy, Michaelis-Menten equation, Lineweaver Burk Plot, factors affecting enzymes action, mechanism of enzyme action.
UNIT-III

UNIT-IV
Carbohydrates: Utilization of carbohydrates in body metabolism of carbohydrates and disorder in metabolism.

UNIT-V
Lipids: Utilization of fats, biosynthesis of fatty acids and fats, clinical disorders associated with fats.

Books Recommended:
2. Food Science-B.Srilakshmi
3. Fundamentals of Nutrition-L Loyd McDonald
4. Principles of Biochemistry-Lehninger

BSFT 202:FRUIT AND VEGETABLE PROCESSING TECHNOLOGY

UNIT-I
Current status of production and processing of fruits and vegetables. Structural, compositional and nutritional aspects. Post-harvest physiology, handling, losses and conservation of fruits and vegetables.

UNIT-II
Techniques of extension of shelf life of unmodified produce: use of adjuncts, novel packaging, controlled and modified atmosphere storages. Processing for conversion into products and preservation by use of chemical preservatives, chilling & freezing, sterilization & canning, concentration and dehydration and other special techniques.

UNIT-III
Technology of Products: juices & pulps, concentrates & powders, squashes & cordials, nectars, fruit drinks & beverages carbonated and its quality control. Fermented products (Cider, wine, brandy).

UNIT-IV
Jam, Jelly and Marmalades; candied fruits, dried fruits and fruit products (eg. Aam papads, bars); soup mixes; sauces & ketchups; puree & pastes; chutneys & pickles.

UNIT-V
Spices & condiments, spice oils oleoresins, Processing of cashew nuts, coffee & cocoa beans, and tealeaves, Specialty fruit and vegetable products.

Books Recommended:
1. Food science by B.Srilakshami;New Age International.
4. Preservation of Fruits and Vegetable by Girdhari lal and Sidappa; CBS Publications
5. Food Science and Processing Technology,Vol., 2 by Mridula and Sreelata
6. Food Preservation by Sandeep Sareen
7. Fruit and Vegetable Preservation by Shrivastava and Kunal.
9. Literature from Spice Board of India, etc.

Additional references


BSFT 203 Fermentation technology

Unit-1
Introduction to fermentation: Rate of microbial growth and death. Fermentation kinetics, Types of fermentation sub-merged/solid state, Batch /continuous fermentation.

Unit-2
Fermenter design, operation, measurement and control in fermentation, Aeration and agitation in fermentation: Oxygen requirement, measurement of adsorption coefficients, sterilization of air and media; scale up in fermentation.

Unit-3
Production of beer, wine and vinegar, Traditional fermented foods like idli and dosa. Principles of down stream processing and Product recovery.

Unit-4

Suggested Readings

BSFT204: MILK AND MILK PRODUCTS TECHNOLOGY

UNIT-I

UNIT-II
Fluid Milks: Physicochemical characteristics and factors affecting them. Production, collection, testing quality, cooling, storage, and transportation of liquid milks. Receiving and quality assessing of liquid milk in dairy industry for detection of adulteration, decision for acceptance/rejection, and determination of price of the milk.

UNIT-III
Standardization and/or processing (pasteurization, sterilization and UHT processing), storage, packaging and distribution of liquid milks: whole, standardized, toned, double-toned, and skim milk. Recombined, reconstituted, and flavored milks. Cleaning and sanitization of dairy equipments and plant as a whole.

UNIT-IV:
Milk Products: Definition, composition, methods of preparation/production, quality and/or grading parameters, packaging, storage characteristics, uses and shelf-life of cream, butter and ghee; evaporated and condensed milks, skimmed, whole and instants milk powders.

UNIT-V
Ice-Creams, fermented milks (Curd, yogurt etc.) and milk-products (cheeses, butter milk, lassi etc.); other milk products (khoa, casein, whey proteins, lactose etc.); milk and milk product-based sweetmeats (burfi, rasogolla, milk-cake, kalakand, rubberi etc.)

Books Recommended:
1. Outlines of Dairy Technology by Sukumar De, Oxford University Press.
3. Milk and Milk Products by Eckles, Combs; and Macy, Tata McGraw Hill.
5. PFA Act 1954 & Rules 1955 as amended to date.

BSFT 205: Food quality and safety management
Unit-1
Objectives, importance and functions of quality control. Methods of quality, assessment of food materials-fruits, vegetables, cereals, dairy products, meat, poultry, egg and processed food products.

Unit-2
Sanitation and hygiene, GMP, GLP, Statistical quality control. Food laws and standard, PFA, AGMARK.

Unit-3
Sampling and specification of raw materials and finished products, Concept of Codex Almentarious/USFDA/ISO 9000 series, rules and regulations for waste disposals.

Unit-4
Food adulteration and food safety. HACCP, Sensory evaluation-introduction, panel screening, Sensory and instrumental analysis in quality control, IPR and patents.
Suggested Readings

SEMESTER III
BSFT 301: Food additives, contaminants and toxicology
Unit-1
Unit-2
Various additives such as preservatives, antioxidants, emulsifiers, sequesterants, humectants, stabilizers with respect to chemistry, food uses and functions in formulations.
Unit-3
Colours, flavours, sweeteners, acidulants with respect to chemistry, food uses and functions in formulations, indirect food additives
Unit-4
Food contaminants, physical, chemical, microbial and other contaminants; food toxicants.
Suggested Readings

BSFT302: Food Beverages
Unit 1 Fruit Juices Squashes & Cordials:
Unit 2. Fruit Beverages:
Squases & Cordials, juices syrups, carbonated beverages. Fruit juice concentrate. Fruit juice powder
Unit 3. Fermented Beverages:
Beer – Brewing, raw material & manufacture, storage finishing & packaging
Grape wine – composition of grapes, wine type & their composition mold & yeast of grape & wine.
Chemistry of Fermentation; composition of wine. Production of red and white table wine, production of sherry sparkling wine, desert wine, vermouth wine, flavoured wine, fruit wine etc.
Spoilage of wine – Non-bacterial & bacterial.
Unit 4: Brandy & whisky production – Definition, compounds and methods of manufacture; winery by-products.
Unit 5: Coffee – Production practice, processing of coffee beans into powder, instant coffee, decaffeination.
Tea – Leaf processing, various classes of tea, changes during processing of tea leaves, instant tea.

References Books:
1. Preservation of fruits & vegetable. Girdharilal & Siddappa
2. Commercial fruits & Vegetable Product. W.V.Cruces
3. Technology of wine making food science. W.V.Cruces.S
4. Technology, chemistry and microbiology of food beverages: Varman & Sakesland

BSFT 303: Technology of Spices.
UNIT 1- Spices, Spice oils & Oleoresin
Definition, Classification, Chemical composition, Use of Spices. Spice oil and Oleoresins—Definition, Technology of Manufacturing
UNIT II—Major Spices
Pepper Refining and processing of pepper
Pepper products:- White pepper, dehydrated green pepper, Pepper oil, Oleoresin.
UNIT III
Chillies:- Drying of chillies, quality attributes of chillies and paprika
Cardamom:- Composition, Drying of fruits, Bleaching, Grading, Cardamom products, Essential oil and oleoresins
UNIT IV
Ginger:- Curing, Bleaching, Grading Ginger Products, Ginger oils, Ginger oleoresin, Dehydrated Ginger, Bleached Ginger
Turmeric:- Curing, Grading, Turmeric powder, Essential oil, oleoresin.
Packaging of spices

REFERENCES
Major spices of India J S Pruthi
Quality assurance in spices and spice products J S Pruthi

BSFT304: Food Engineering
UNIT I Unit operations & Heat transfer
Pasteurization: HTST, UHT, Pasteurizing equipments

UNIT II Refrigeration & Freezing
Refrigeration Principle of refrigeration. Vapour compression refrigeration cycle
Freezing Principle of freezing & freezing rate

UNIT III Evaporation
Principle, single effect evaporation, multiple effect evaporation, Types of evaporators - Horizontal tube, Vertical tube, Falling film evaporator, Raising film evaporator.

UNIT IV Driers & Boilers
Driers Principle, constant rate & falling rate of period of drying, Types of driers - Drum drier, Cabinet drier, Tunnel drier, Spray drier, Fluidized bed drier
Boiler Principle, working of water tube & fire tube boiler

UNIT V Rheology
Definition, Rheological characteristics of foods, viscosity, apparent viscosity-Newtonian and Non Newtonian

References
Unit operations of Agricultural processing K.M Sahay & K.K Singh
Refrigeration & Air conditioning P Kurmy & Gupta
Introduction to Food Engineering R. Paul singh, Dennis R Heldman
Introduction to Food Process Engineering Ramco.T. Toledero
Unit Operations of Chemical Engineering Warren L Macabe, Julian C Smith, Peter Hariat

BSFT 305: CEREALS AND LEGUMES PROCESSING TECHNOLOGY
UNIT-I
Importance of cereals and legumes, Post-harvest quality and quantity losses. Recommended pre-processing practices for handling of cereals and pulses for their safe storage, including control of infestation, National and International quality and grading standards.

UNIT-II
Byproduct utilization.

UNIT-III
UNIT-IV

UNIT-V
Structure, composition and properties of legumes. Cleaning, grading, pretreatments for difficult-to-mill (urad, arhar, moong, moth) and easy-to-mill (chana, masoor and pea) legumes, milling practices and actual milling of different legumes. Sweet and savory products from legumes in India.

Books Recommended
2. Technology of Cereals by N.L.Kent.
3. Food Facts and Principles by Mannay; New age International (P) Ltd.
4. Food Science by Norman N.Potter; CBS Publications.
5. Chemistry and Technology of Food and Food Products by M.B. Jacobs
6. Manuals on Rice and its Processing by CFDRI.
8. Development in Milling & Baking Technology by AFST (I), CFDRI, Mysore, India.
10. Articles on Pulse Milling in India Food Industry & JFST, both Publications of AFST (I).

Syllabus (B. Tech. Food Technology)
Rajasthan Technical University, Kota

Semester IV
BSFT 401: EGG, POULTRY, MEAT & FISH PROCESSING TECHNOLOGY

UNIT-I
Current levels of production, consumption and export of category products. Nutritional, safety/health and hygienic considerations.

UNIT-II
Egg: Structure, composition, nutritional and functional characteristics of eggs. Grading, spoilage, storage and transportation of whole eggs. Processing of eggs for liquid products (white, yolk and whole egg) and solid products (albumen, whole egg powder) for preservation through freezing & drying.

UNIT-III
Poultry: Pre-slaughter care and consideration; Operations in preparation of dressed poultry, its storage and marketing; Quality and safety considerations; utilization of by-products. Poultry cuts.

UNIT-IV
Meat: Ante-mortem examination of meat animals, scientific techniques of slaughtering, dressing, post-mortem inspection, storage, tenderization, cuts, packaging; beef, mutton, pork as human foods, cured meat products, sausages, by-products, frozen and canned meat products.

UNIT-V
Fish: Types, catch, examination; care in handling & transportation; processing of shell-fish,
crabs, oysters, lobsters, frog legs etc. for domestic and export markets. Filleting and freezing, canning salting & drying of fish. Fish sauce and protein concentrates.

Books Recommended:

BSFT 402: FOOD ADDITIVES AND LEGISLATION

UNIT-I
Definitions, uses and functions of Acid, Base, Buffer systems, Salts and chelating/sequestering agents, Masticatory substances. Low calorie and non nutritive sweeteners, Polyols.

UNIT-II
Antioxidants, Emulsifying and stabilizing agents, Anti-caking agents, thickeners, Firming agents. Flour bleaching agents and Bread improvers.

UNIT-III
Anti microbial agents / Class I and Class II preservatives as per PFA Act.

UNIT-IV

UNIT-V

Books Recommended:
1. Food Chemistry O.R. Fennema
2. Food Chemistry Belitz, Grosch
3. Various acts, orders, standards & specification

BSFT 403: FOOD HYGIENE AND PLANT SANITATION

UNIT-I
General principle of food hygiene, Hygiene in rural and urban areas in relation to food preparation, personal hygiene and food handling habits. Place of sanitation in food plants. Sanitary aspects of building and equipment: Plant layout and design, Comparative studies on sanitary fabrication of different types of processing equipments.

UNIT-II

UNIT-III
Sanitary aspects of water supply: Source of water, quality of water, water supply and its uses in food industries. Purification and disinfection of water preventing contamination of potable
water supply.
UNIT-IV
Effective detergency and cleaning practices: Importance of cleaning technology, physical and chemical factors in cleaning, classification and formulation of detergents and sanitizers, cleaning practices.
UNIT-V
Sanitary aspects of waste disposal. Establishing and maintaining sanitary practices in food plants, role of sanitation, general sanitary consideration and sanitary evaluation of food plants.
Books Recommended:
1. Guide to Improve Food Hygiene - Gaston and Tiffney
2. Practical Food Microbiology & Technology - Harry H. Weiser, Mountney, J. and Gord, W.W.
3. Food Poisoning and Food Hygiene - Betty C. Hobbs
4. Principles of Food Sanitation - Marriott and Norman, G.
5. Hygiene and Sanitation in Food Industry - S. Roday

BSFT 404: ENTERPRENERSHIP AND AGRIBUSINESS MANAGEMENT
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.
UNIT-V
Commodity trading and forecasting for agribusiness. Retail and supply chain management. Management of cooperation.
Books Recommended:
1. Marketing Management - Philip Kotler
2. Marketing Management - Dr. P. K. Srivastava
3. Marketing Management - Dr. S. C. Jain

BSFT 405: INDUSTRIAL MICROBIOLOGY & ENZYME TECHNOLOGY
UNIT-I
Introduction, Classification of Microbial products. Microbial Processes for Production of organic acids, solvents, antibiotics, enzymes, polysaccharides, lipids, pigments and aroma.
UNIT-II
Equipments and Accessories for industrial processes.
UNIT-III
UNIT-IV
Reaction Environment rebuilding, Chemical modification, intra-molecular cross linking, immobilization.

UNIT-V
Application of enzymes in industry, analytical purpose and medical therapy

Books Recommended:
1. Industrial microbiology:-Casida Newage Publication 2001
2. Industrial microbiology:-Prescott and Dunn CBS Publications 4th Ed. 1999
4. Journals and Reviews

SEMESTER V
BSFT 501: OILS AND FATS PROCESSING TECHNOLOGY

UNIT-I
Sources; chemical composition; physical and chemical characteristics; functional and nutritional importance of dietary oils and fats. Post-harvest handling storage and processing of oilseeds for directs use and consumption.

UNIT-II
Extraction of oil by mechanical expelling and solvent extraction and obtaining deoiled cakes suitable for edible purposes. Processing of other plant sources of edible oils and fats like coconut, cottonseed, rice bran, maze germ, etc.

UNIT-III

UNIT-IV
Processing of refined oils: Hydrogenation, fractionation, winterzation, inter-esterification etc. for obtaining tailor-made fats and oils.

UNIT-V
Production of butter oil, lard, tallow, Margarine, Cocoa butter equivalents, shortenings, low fat spreads, peanut butter etc. Speciality fats and designer lipids for nutrition and dietetics, especially by biotechnology.

Books Recommended
2. The Industrial Chemistry of Facts & Waxes 3rd. by Balliere,Tindall & Cox.
3. Handling & Storage of Oiseeds,Oils,Fats & Meal by Paterson, HBW.

BSFT 502: Food flavourings

Unit 1
Food flavor and its importance to consumers and food processors. Flavor and nutrition. Sources, extraction, delivery systems, and analyses (chemical, instrumental, and sensory) of flavours and flavorings in foods. Sensory perception of flavor: Senses of taste and smell, tasting versus sniffing, astringency, pungency, interaction of senses in flavor perception; taste, odour, and acceptance of flavor stimuli.

UNIT-II
Chemistry of substances responsible for taste and flavor-taste sensations, flavour enhancers, flavour potentiators or modifiers. Methodology of sensory evaluation and determination of threshold levels as specified by BIS.

UNIT-III
Flavoring constituents of various foods like meat, fish, milk, vegetables, fruits, fats & oils, spices & herbs, cereals and pulses. Flavor changes during processing, preservation, packaging, and storage of foods. Roles as sulfur compounds, fatty acids, amino acids, terpenoids, lactic acid-ethanol in food flavours. Process and reaction flavours/volatiles in foods.

UNIT-IV
Spices and herbs as food flavorings: Processing of basil, mint, saffron, cloves, tamarind, ginger, cardamom, chilies, pepper etc. for essential oils, extracts and oleoresins as the case may be.

UNIT-V

Books Recommended:
1. Food Chemistry by Fennema
2. Spices & Flavor Technology by Pruthi, J.S.

BSFT 503: DESIGN OF FOOD PROCESSING EQUIPMENTS

UNIT-I
Introduction to design of post harvest equipments. Design considerations and their interaction with material selection, equipment size and structural design. Code and material selection.

UNIT-II
Design of material handling equipment: Belt conveyor, bucket elevator, screw conveyor, cyclone conveyor, chain conveyor, pneumatic conveyor.

UNIT-III
Design of heat exchangers: Shell and tube, plate and scraped surface heat exchanger (Design will include functional & structural design).

UNIT-IV
Design of seed processing equipments: Air screen cleaner, rotary cleaner, graders based on size shape and surface produce handled, seed treater.

UNIT-V
Storage and pressure vessels: Design of shell conveyor and other components including nozzles, flanges, reinforcement.

Books Recommended:
1. Process Plant Design - Beckhurst, J. K. and Harber, J. H.
2. Process Equipment Design - Brownell, L. E. and Young, E. H.
3. Process Equipment Design - Joshi, M. V.

BSFT 504: FOOD QUALITY AND SAFETY
UNIT-I
Ways of describing food quality: Composition, appearance, kinesthetic and flavour attributes.
Nutritional quality of foods and its assessment (content and quality of nutrients).
Microbiological quality of foods.
UNIT-II
Sensory quality and its evaluation, instrumental measurement of sensory attributes such as color,
viscosity, texture etc.
UNIT-III
Quality control, quality assurance and total quality management in food industry.
UNIT-IV
Defects in food quality, its sources, classification, prevention and control. Statistical quality
control. Quality costs.
UNIT-V
Antinutritional factors in food. Undesirable constituents developing in Process and storage of
food. Microbial contamination, pesticide residues, concept of HACCP, physical, chemical and
microbiological safety of food.
Books Recommended:
1. Quality control in the food industry -S. M. Herschfoerfer
2. Quality control for the food industry -A. Kramer and B.A.Twigg
3. Principles of sensory evaluation of Foods -M. A. Amerine
4. Rheology and Texture in Food Quality -J. M. deMan, P. W. Vowsy
5. Food Chemistry - Fenemma
6. Analysis of Fruits and vegetables -Ranganna

BSFT 505: FOOD INDUSTRY WASTE MANAGEMENT

UNIT-I
Characterization and utilization of by-products from cereals, pulses, oilseeds, fruits, vegetables,
plantation, dairy, eggs, meat, fish and poultry processing industries.
Elements of importance in efficient management of wastes from aforesaid food industries.
UNIT-II
Standards for emission or discharge of environmental pollutants from food processing
Characterization of food industries effluents, in terms of parameters of importance
UNIT-III
Unit concept of treatment of food industry effluents: Screening, sedimentation, floatation as per
and primary treatments, biological oxidations:– objectives, organisms, reactions, oxygen
requirements, aeration devices.
UNIT-IV
Effect on characteristic parameters of effluents in treatments using lagoons, trickling filters,
activated sludge process, oxidation ditches, rotating biological contracters and theirs variations
and advanced modifications.
UNIT-V
Advanced wastewater treatment systems: physical, physicochemical and chemical treatments.
Coagulation and floculation, disinfection, handling and disposal of sludge and treated effluents
conforming to EPA provisions.
Books Recommended:
1. Water technology by N.F.Gray.
2. Environmental pollution by K.C.Agrawal.
3. Industrial microbiology by L.E.Casida Jr
5. Food processing waste management by green and Kramer (AVI)
6. By-products from food industries: utilization and disposal by AFSI(I)

SEMESTER VI
BSFT 601 Industrial training
To acquaint the students with practical aspects related to the operations of food processing equipments and processing of food products.