SUBJECT LIST B. SC. FOOD TECHNOLOGY

		Subject 1	**Subject 2**	**Subject 3**	**Subject 4**	**Vocational**	**Co-curricular (Qualifying)**	**Industrial Training**	**Minimum credit**	**Cumulative minimum Credit Required for award of certificate/diploma/ degree**
		Major	**Major**	**Major**	**Minor elective**	**Minor**	**Minor**	**Major**		
		Credit 4/5/6	**Credit 4/5/6**	**Credit 4/5/6**	**Credit 4/5/6**	**Credit 3**		**Credit 4**		
YEAR	**SEM**					**Skill development**	Qualifying (MM-100) Pass-40			
1	1.	Food preservation and processing **(4+2)**	Fruit vegetable and plantation product **(4+2)**	Food Microbiology **(4+2)**	Food Packaging **(4+1)**	Entrepreneurship and agribusiness management **(3+0)**	Communication Skills	-	46	46 [Certificate in B.Sc. Food technology]
	2.	Food Biochemistry **(4+1)**	Fruit and vegetable processing technology **(4+2)**	Fermentation technology **(4+2)**		Food and bakery science **(2+1)**	Environment studies and Value Education	-		
2	3.	Milk and Milk PDT technology) **(4+2)**	Food Additive contaminants and toxicology **(4+2)**	Food beverages **(4+2)**	(Technology of spices) **(4+1)**	Technical communication skills **(3+0)**	Personality Development Through Applied Philosophy Of Ramanaya And Ramcharitra Manas		46	92 [Diploma in B.Sc. Food technology]
	4.	Egg Poultry meat and fish processing technology **(4+2)**	Cereals and legume Processing technology **(4+2)**	Industrial Microbiology **(4+1)**		Nutrition Therapeutics and Health **(3+0)**	Meditation			

SUBJECT LIST B. SC. FOOD TECHNOLOGY

3	5.	Oil and fat processing Technology **(4+2)**	Food Flavourings **(4+2)**				Vivekanand a Studies	Training **(0+4)**	40	132 [Degree in B.Sc. Food Technology]
		Food Engineering **(3+1)**	Design of Food Processing equipments **(3+1)**							
	6.	Food Quality **(4+2)**	Basic Food Nutrition **(4+2)**			-	Indian Traditional Knowledge System	Training **(0+4)**		
		39	40	23	10	12		8		132

B.Sc. FOOD TECHNOLOGY

Course Structure – at a Glance

CODE	COURSE TITLE	CREDITS
Major Courses		**Total 102**
	Food preservation and processing	4+2
	Fruit vegetable and plantation product	4+2
	Food Microbiology	4+2
	Food Biochemistry	4+1
	Fruit and vegetable processing technology	4+2
	fermentation technology	4+2
	milk and Milk PDT technology	4+2
	Food Additive contaminants and toxicology	4+2
	Food beverages	4+2
	Egg Poultry meat and fish	4+2
	Cereals and legume	4+2
	industrial Microbiology	4+1
	Oil and fat processing technology	4+2
	Food Flavour	4+2
	Food Engineering	3+1
	Design of Food	3+1
	Food Quality	4+2
	Basic Food Nutrition	4+2
Minor Courses*		**Total 2 2**
Minor Elective		
	Food Packaging	4+1
	technology of spices	4+1
MINOR (SKILL DEVELOPMENT COURSE)		
	Entrepreneurship and agribusiness management	3+0
	Food and bakery science	2+1
	Technical communication skills	3+0

SUBJECT LIST B. SC. FOOD TECHNOLOGY

	Nutrition, Therapeutics and Health	3+0
MINOR (CO-CURRICULAR) QUALIFYING		
	Communication skills	
	Environment studies and Value Education	
	Personality development through applied Philosophy of ramanaya and ramcharitra Manas	
	Meditation	
	Vivekananda studies	
	Indian traditional knowledge system	
MAJOR (INDUSTRIAL TRAINING)		**TOTAL 8**
	Industrial training I	0+4
	Industrial training II	0+4

SUBJECT LIST B. SC. FOOD TECHNOLOGY

COURSE CONTENT

BSFT 101-FOOD PRESERVATION AND PROCESSING PRINCIPLES

(CREDITS: THEORY – 4 PRACTICAL - 2)

THEORY

Objectives:

- To study the importance microorganisms in food preservation
- To introduce the basics of various food processing and preservation technologies

CONTENTS

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

Preservation of foods by high temperatures: Basic concepts in thermal destruction of microorganisms D,Z,F values. Heat resistance and thermophic microorganisms. Cooking, Blanching, Pasteurization and Sterilization of foods. Assessing adequacy of thermal processing of foods, General process of canning of foods, Spoilage in canned foods.

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.

FOOD PRESERVATION AND PROCESSING PRINCIPLES

PRACTICAL

1. Concept of shelf life of different foods
2. To study the concept of Asepsis and sterilization
3. Determination of pH of different foods using pH meter.
4. Study quality characteristics of foods preserved by drying/dehydration/ freezing.
5. To perform pasteurization of fluids using different methods.
6. To perform blanching of different plant foods..

Book References Author

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

BSFT 102-FRUITS, VEGETABLES AND PLANTATION PRODUCTS

(CREDITS: THEORY – 4 PRACTICAL - 2)

THEORY

Objectives:

- To impart knowledge of different methods of fruits and vegetable processing.
- To learn about processing of various spices, tea, coffee and cocoa.

CONTENTS

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. Preserves, candies and crystallized fruits. Tomato products: Puree, Paste, Ketchup, Sauce and soup. Chutneys, pickles and other products.

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, enrobed and other
confectionary products.

PRACTICAL

1. Estimation of total soluble solids (TSS).
2. Estimation of pH and acidity of products.
3. Estimation of brix: acidity ratio
4. Estimation of ascorbic acid and effect of heat treatment on it.
5. To study the steps of can making process.
6. Preparation and evaluation of pectin products.
7. Adulteration of spices.
8. Dehydration of fruits and vegetables.
9. Rehydration of fruits and vegetables

Book References:

Author Title

G. Lal, G.S. Siddappa and G.L. Tondan Preservation of fruits & vegetables.
& G.L. Tandon B.L. Amla Food Industry.
B. Shrilakshimi Food Science.
Bernard. W. Minifie Chocolate, Cocoa and Confectionary: Science and Technology.
R.H.H. Wills et.al. An introduction to the Post-harvest physiology and handling of fruits and vegetables.

BSFT 103-BASIC FOOD MICROBIOLOGY

(CREDITS: THEORY – 4 PRACTICAL - 2)

THEORY

Objectives:

1. To know the important genera of microorganisms associated with food and their characteristics.
2. To understand the role of microbes in fermentation, spoilage and food borne diseases

CONTENTS

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.

PRACTICAL

1. Introduction to the Basic Microbiology Laboratory Practises and Equipments
2. Functioning and use of compound microscope
3. Cleaning and sterilization of glassware
4. Preparation and sterilization of nutrient broth
5. Cultivation and sub-culturing of microbes
6. Preparation of slant, stab and plates using nutrient agar
7. Standard Plate Count Method

Book references:

Author Title
M.J.Pelczar Microbiology
James M. Jay Modern Food Microbiology
Adams & M.O..Moss Food Microbiology
W.C.Frazier Food Microbiology

BSFT 104-FOOD PACKAGING

(CREDITS: THEORY – 4 PRACTICAL - 1)

THEORY

Objectives:

- To impart comprehensive overview of the scientific and technical aspects of food packaging.
- To instill knowledge on packaging machinery, systems, testing and regulations of packaging

FOOD PACKAGING

Unit-I

Basic Concepts: Concept of packaging, Functions of a Food Package, Package development factors and Food package development. Aseptic Packaging. Newer trends.

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

Glass and Metal containers: Glass: Composition, Properties, Bottle making and Closures for glass containers. Metal: Bulk containers, Tin-plate containers, Tin free steel containers, Aluminium containers, Latest development in metal cans and protective lacquers.

Unit-IV

Food product characteristics and package requirement, Selection of materials, Forms, Machinery and methods for fresh produce (Fruits, Vegetables, Egg, Meat and Fish), Edible oils and Fats, Spice and spice products, Processed products (Fruit & Vegetable, Cereal & Pulse, Dairy, Confectionary & Snacks, Meat & Marine products).

Unit-V

Package printing, Packaging Laws and Regulations, Evaluation of food packaging materials and package performance.

PRACTICAL

1. Testing of physical/mechanical properties of food packaging material .
2. Testing of thermal shock resistance of glass .
3. Gas/Vacuum packaging of foods and shelf life studies.
4. Determination of Water Vapor Transmission rate of Packaging Material.
5. Edible packaging of Food Samples.
6. Study of Sorption Isotherm for Food Package Design.

7. Packaged food cut-out analysis.
8. To study the operation of FFS machine.

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

BSFT 105- Entrepreneurship and agribusiness managament
(CREDITS: THEORY – 3)

CONTENTS

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

Management of agribusiness projects and enterprise. Management of agribusiness trade in WTO environment. Agricultural and food policy. Rural environment and institution.

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 201- FOOD BIOCHEMISTRY AND BIOTECHNOLOGY
(CREDITS: THEORY – 4 PRACTICAL – 1)

THEORY

Objectives:

- To understand the chemistry of foods - composition of food, role of each component
- To understand the effect of processing on various food components

UNIT-I

Nutrition: Function's and energy of foods, basal energy metabolism, dietary allowances and standards for different age groups. Assessment of nutritional quality of foods, mineral and vitamins as functional constituents in human metabolism and deficiency diseases associated. Effect of processing on nutritive value of food.

UNIT-II

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

UNIT-III

Proteins: Utilization of protein in body proteins products of protein metabolism. Disorders in metabolism, clinical proteins associated with excess and deficiency of proteins.

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.

PRACTICAL

1. Preparation of primary and secondary solutions
2. Estimation of moisture content
3. Determination of gelatinization temperature range (GTR) of different starches and effect ofadditives on GTR
4. Determination of percent free fatty acids
5. Estimation of Peroxide Value
6. Estimation of Total Ash
7. Estimation of Protein Content

Books Recommended :

1. Food :Facts and Principles-N. Shakuntala Manay, N.Shadksharawamis.
2. Food Science-B.Srilakshmi
3. Fundamentals of Nutrition-L Loyd McDonald
4. Principles of Biochemistry-Lehninger

BSFT- 202 Fruits and vegetable Processing technology
(CREDITS: THEORY – 4 PRACTICAL – 2)

THEORY

Objectives :

This course will enable the student to:

- Understand the technology of fruit and vegetable products
- To know about processing of spices
- To understand the post-harvest losses.

CONTENTS

UNIT-I

Current status of production and processing of fruits and vegetables in India. **Current status of production and processing of fruits and vegetables specific to Uttarakhand**. 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. **Wild Fruits of Uttarakhand and their value addition.**

PRACTICAL

CONTENTS

1. Preparation of squash from seasonal fruits
2. Preparation of chutney and pickles
3. Preparation of concentrates and fruit powders
4. Preparation of Tomato products
5. Preparation of jam from seasonal fruits
6. Preparation of Jelly
7. Preparation of Marmalade
8. Preparation of cider and wine
9. Preparation of value-added product from wild fruits of Uttarakhand

Books Recommended

1. Food science by B.Srilakshami;New Age International.
2. Fundamentals of Foods and Nutrition by R. Madambi & M.V. Rajgopal.
3. Foods :Facts and Principles by N Shakuntala manay;New Age International (P) Ltd.
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.
8. Post-Harvest Physiology & Handling of Fruits & Vegetables by Wills, Lee, Graham, McGlasson & Hall (AVI)
9. Literature from Spice Board of India,etc.

Additional references

1. Bose, T.K. Ed. 1985. Fruits of India: Tropical and Sub-tropical. Naya Prokash, Calcutta.
2. Dauthy, M.E. 1997. Fruit and Vegetable Processing. International Book Distributing Co.
   Lucknow, India.
3. Hamson, L.P. 1975. Commercial Processing of Vegetables. Noyes Data Corporation, New Jersey.
4. Jagtiani J., Chan, H.T. and Sakal, W.S. Ed. 1988. Tropical Fruit Processing Academic Press, London.
5. Kadar, A. A. 1992. Postharvest Technology of Horticultural Crops. 2nd Ed. University of
   California.
6. Lai, G., Siddappa, G. and Tondon G.L. 1986. Preservation of Fruits and Vegetables, indian Council of Agril. Research, New Delhi.
7. Salunkhe, D.K. and Kadam, S.S. Ed. 1995. Handbook of Fruit Science and Technology:

8. Production, Composition and Processing. Marcel Dekker, New York.
9. Salunkhe, D.K. and Kadam, S.S. Ed. 1995. Handbook of Vegetable Science and Technology. Production, Composition, Storage and processing Marcel Dekker, New York.
10. Seymour, G.B., Taylor, J.E. and Tucker, G.A. Ed. 1993. Biochemistry of Fruit Ripening.
Chapman and Hall, London.
11. Srivastava, R.P. and Kumar, S. 1998. Fruit and Vegetable Preservation: Principles and Practices. 2nd Ed. International Book Distributing Co. Lucknow.
12. Ting, S.V. and Rousett, R.L. 1986. Citrus Fruits and Their Products. Marcel Dekker, New York.
Thurme S. Ed. 1991. Food Irradiation. Elsevier Applied Science, London.
13. Wills, R.B.H., McGlasson, W.B., Graham, W.B., Lee, T.H. and Hall, E.G. 1981.
14. Postharvest: An Introduction tothe Physiology and Handling of Fruits and Vegetables. Granada, U.K.

BSFT 203- FERMENTATION TECHNOLOGY
(CREDITS: THEORY – 4 PRACTICAL – 2)

THEORY

Objectives

1. To impart knowledge of fermentation processes in food industry
2. To learn about design of food fermentor
3. To understand processing of fermented products

CONTENTS

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

Production of alcohols, organic acids, single cell proteins, enzymes and immobilization of enzymes. Biological waste treatment.

PRACTICAL

CONTENTS

1. To study about Design of Stirred tank reactor
2. To study about production of beer
3. To understand the production of beer
4. To Prepare wine using fruit substrates
5. To prepare traditional fermented food of uttarakhand

Suggested Readings

Stanburry P.P. and Whitaker, A. 1984. Principles of Fermentation Technology. Pergamon Press, Oxford UK.
Steinkraus, K.H. 1983. Handbook of Indigenous Fermented Foods. Marcel Dekker, NewYork.

BSFT 204- FOOD AND BAKERY SCIENCE
CREDITS: THEORY – 2 PRACTICAL – 1)

THEORY

Objectives

• To understand the fundamentals of baking
• To learn the technologies behind bakery products.
• To understand industry trends

CONTENTS

UNIT-I BAKERY INDUSTRY

Current status, growth rate, and economic importance of Bakery Industry in India. Product types, nutritional quality and safety of products, pertinent standards & regulations.

UNIT II BREAD, BUNS AND PIZZA BASE

Ingredients & processes for breads, buns, pizza base, Equipments used, product quality characteristics, faults and corrective measures

UNIT III CAKES

Ingredients & processes for cakes, Equipments used, product quality characteristics, faults and corrective measures. Different types of icings.

UNIT IV BISCUITS, COOKIES & CRACKERS

Ingredients & processes, Equipments used, product quality characteristics, faults and corrective measures.

UNIT VI MODIFIED BAKERY PRODUCTS

Modification of bakery products for people with special nutritional requirements e.g. high fibre, low sugar, low fat, gluten free bakery products.

UNIT-VII BREAKFAST CEREALS, MACARONI PRODUCTS AND MALT

Production and quality of breakfast cereals, macaroni products and malt.

Recommended Readings:

1. Dubey, S.C. (2007). Basic Baking 5th Ed. Chanakya Mudrak Pvt. Ltd.
2. Raina et.al. (2003). Basic Food Preparation-A complete Manual. 3rd Ed. Orient Longman Pvt. Ltd.
3. Manay, S. & Shadaksharaswami, M. (2004). Foods: Facts and Principles, New Age Publishers.
4. Barndt R. L. (1993). Fat & Calorie – Modified Bakery Products, Springer US.
5. Samuel A. Matz (1999). Bakery Technology and Engineering, PAN-TECH International Incorporated.
6. Faridi Faubion (1997). Dough Rheology and Baked Product Texture, CBS Publications.
8. Samuel A. Matz (1992). Cookies & Cracker Technology, Van Nostrand Reinhold

PRACTICAL

CONTENTS

1. Preparation of pizza base and assessment of its quality
2. Preparation of bread and assessment of its quality
3. Preparation of buns and assessment of quality
4. Preparation of butter cake and assessment of its quality.
5. Preparation of sponge cake with icing and assessment of its quality.
6. Preparation of cookies and assessment of quality.
7. Preparation of biscuits and assessment of quality.

Recommended Readings:

1. Dubey, S.C. (2007). Basic Baking 5th Ed. Chanakya Mudrak Pvt. Ltd.
2. Raina et.al. (2003). Basic Food Preparation-A complete Manual. 3rd Ed. Orient Longman Pvt. Ltd.
3. Manay, S. & Shadaksharaswami, M. (2004). Foods: Facts and Principles, New Age Publishers.
4. Barndt R. L. (1993). Fat & Calorie – Modified Bakery Products, Springer US.
5. Samuel A. Matz (1999). Bakery Technology and Engineering, PAN-TECH International Incorporated.
1. Faridi Faubion (1997). Dough Rheology and Baked Product Texture, CBS Publication
2. Samuel A. Matz (1992). Cookies & Cracker Technology, Van Nostrand Reinhold

BSFT 301-MILK AND MILK PRODUCTS TECHNOLOGY
(CREDITS: THEORY – 4 PRACTICAL - 2)

THEORY

Objectives

- To know the need and importance of dairy
- To know the compositional and technological aspects of milk
- To study processed milk-products.

CONTENTS

UNIT-I

Introduction: Status of Dairy Industry in India. Cooperative Dairying. Operation Floods. Chemical composition, microbiological quality, and nutritional importance of milk and milk product in PFA Act, Rules, 1955 as amended to date. **Milk Production and utilization in Uttarakhand.**

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, reconstitued, and flavored milks. Cleaning and santitization 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 productbased sweetmeats (burfi, rasogolla, milk-cake, kalakand, ruberii etc.). **Traditional milk-based sweets of Uttarakhand.**

PRACTICAL

1 To perform platform tests in milk. (Acidity,COB,MBRT,specific gravity,SNF)
2 To estimate milk protein by Folin method.
3 To estimate milk fat by Gerber method.
4 Preparation of flavoured milk/. Pasteurization of milk
5 To determine acidity of milk
6 To prepare paneer using different coagulating agents
7 To determine salt content in butter
8 To prepare traditional dairy products like shrikhand, dahi, chhenna etc.

Books Recommended:

1. Outlines of Dairy Technology by Sukumar De,Oxford University Press.
2. Principles of Dairy Processing by James N.Warner, Wiley Eastern Ltd.
3. Milk and Milk Products by Eckles,Combs; and Macy,Tata McGraw Hill.
4. Technology of Indian Milk Products by Aneja et al. A Dairy India Publication.
5. PFA Act 1954 & Rules 1955 as amended to date.

BSFT 302-FOOD ADDITIVES, CONTAMINANTS AND TOXICOLOGY
(CREDITS: THEORY – 4 PRACTICAL - 2)

THEORY

Objectives

- To teach characteristics and classification of food additives
- To impart technical knowhow of contaminants of food industry
- To study about toxicological evaluations in food.

CONTENTS

Unit-1

Additives in food processing and preservation. Their functions and safety. Safety and quality evaluation of additives. Acute and chronic studies. LD50. Analytical methods:chemical and instrumental.

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.

PRACTICAL

CONTENTS

1. To analyse preservative in packed food
2. To estimate anti-oxidant activity of product using DPPH assay.
3. To detect synthetic color on food
4. To estimate microbial contamination in food using TPC.
5. To study about toxicants in food.

Suggested Readings

Fennema, O.R. Ed. 1976. Principles of Food Science: Part-I Food Chemistry. Marcel Dekker, New York.

Potter, N.N. 1978. Food Science. 3rd Ed. AVI, Westport.

Branen A.L. and Davidson, P.M. 1983. Antimicrobials in Foods. Marcel Dekker, New York.

Furia, T.E. 1980, Handbook of food additives, Vol I and Vol II.

BSFT 303-FOOD BEVERAGES

(CREDITS: THEORY – 4 PRACTICAL - 2)

THEORY

Objectives

- To know the processing of different types of beverages
- To understand chemistry of distilled and undistilled beverages
- To study about processing of TEA.

CONTENTS

Unit 1 Fruit Juices Squashes & Cordials:

Equipment for fruit juices, double operations prosses. Pulping equipment, dearator & flash pasteurization, fruit beverage-preparation & preservation. Straining, filtration & clarification. Preservation of fruit juices preservation by addition of sugar, freezing ,by carbonation & by filtration.

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.

PRACTICAL

CONTENTS

1. To determine ascorbic acid content in fruit juices
2. To determine acidity of raw and processed juices
3. To Prepare RTS
4. To Prepare Cordial
5. To Prepare grape wine
6. To determine carotene in a given sample of fruit juice
7.

References Books:

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

BSFT 304-TECHNOLOGY OF SPICES

(CREDITS: THEORY – 4 PRACTICAL - 1)

THEORY

Objectives:

1 Spice, spice oil and oleoresins, definition and manufacturing process
2 To understand about processimg of paprika and ginger and cardamom

CONTENTS

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

PRACTICALS

1) Estimation of moisture content Given spices
2) To check adulteration in given spices
3) To extract essential oil using steam distillation or solvent extraction
4) To Prepare dehydrated spices like dried ginger powder
5) To estimate fiber content in fiber rich spices

REFERENCES

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

SUBJECT LIST B. SC. FOOD TECHNOLOGY

BSFT 305- TECHNICAL COMMUNICATION SKILLS

CREDIT 3+0

COURSE OBJECTIVES:

1. To produce technical documents that use tools commonly employed by professionals
2. To communicate effectively in a professional context, using appropriate rhetorical approaches for technical documents, adhering to required templates, and complying with constraints on document format.
3. To clarify the nuances of phonetics, intonation and pronunciation skills.
4. To get familiarized with English vocabulary and language proficiency

Content

Unit -1 Fundamentals of Technical Communication: Technical Communication: Introduction, Features; Distinction between General and Technical Communication; The flow of Communication: Downward; upward, Lateral or Horizontal; Barriers to Communication, Importance of communication

Unit - II Forms of Technical Communication: Technical Report: Definition & importance; Thesis/Project writing: structure & importance; synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar & Conference paper writing; 7 Cs of effective business writing: concreteness, completeness, clarity, conciseness, courtesy, correctness, consideration.

Unit - III Technical Presentation: Strategies & Techniques

Presentation: Forms; interpersonal Communication; Class Room presentation; style;method, Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear: Confident speaking; Audience Analysis & retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience Participation: Quizzes & Interjections

Unit - IV Technical Communication Skills

Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis; Critical thinking; Nuances, exposition, narration and description

Unit - V Kinesics & Voice Dynamics:

Kinesics: Definitions; importance; Features of Body Language; Voice Modulation: Quality, Pitch; Rhythm; intonation, pronunciation, articulation, vowel and consonants sounds

Reference Books

1. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi.
2. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
3. Practical Communication: Process and Practice by L.U.B. Pandey; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2014, Delhi.
4. Modern Technical Writing by Sherman, Theodore A (et.al); Apprentice Hall; New Jersey; U.S.

5. A Text Book of Scientific and Technical Writing by S.D. Sharma; Vikas Publication, Delhi.
6. Skills for Effective Business Communication by Michael Murphy, Harward University, U.S.
7. Business Communication for Managers by Payal Mehra, Pearson Publication, Delhi.

BSFT 401- EGG, POULTRY, MEAT & FISH PROCESSING TECHNOLOGY (CREDITS: THEORY – 4 PRACTICAL 2)

THEORY

Objectives

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

CONTENTS

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-portem 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.

PRACTICAL

CONTENTS

1. To check suitability of egg for processing using different tests
2. To study about candling technique
3. To study about structure of egg
4. To study shelf-life of eggs by different methods of preservation
5. Estimation of moisture content of meat
6. To perform freezing of yolk/albumen
7. Slaughtering and dressing of meat animals
8. Study of post mortem changes in meat animals

Books Recommended:

1. Meat Science by R.A. Lawrie,Pergamon Press.
2. Poultry Products Technology by G.J. Mountney.
3. Meat, Poultry & Sea Food Technology by R.L.Henricksons.
4. Poultry Meat and Egg Production by Parkhurst & Mountney.
5. Forsythe,S.J.The Microbiology of Safe Food , second edition, Willey-Blackwell,U.K.,2010
6. Mortimore S.and Wallace C.HACCP,A practical approach,Chapman andHill,London,1995
7. Blackburn CDW and Mc Clure P.J.Food borne pathogens.
8. Hazards,risk analysis &control.CRC Press,Washington,U.S.A, 200

BSFT 402- CEREAL AND LEGUME PROCESSING TECHNOLOGY
(CREDITS: THEORY – 4 PRACTICAL 2)

THEORY

Objectives:

1) To teach technology of milling of various cereals
2) To impart technical knowhow of legumes and their processed products.

CONTENTS

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. **Production and consumption of cereal and legumes in India and Uttarakhand.**

UNIT-II

Structure, types, composition, quality characteristics and physicochemical properties of wheat. Cleaning, tempering and conditioning, and milling processes for different wheat's. Turbogriding & Air Classification. Blending of flours. Milling equipments and milling products (Dalia, Atta, Semolina and flour). Flour grades and their suitability for baked goods. Quality characteristics and rheological properties of wheat milling products and its assessment. Byproduct utilization.

UNIT-III

Structure, types, composition, quality characteristics and physicochemical properties of rice. Milling and parboiling of paddy, Curing and ageing of paddy and rice. Criteria in and assessment of milling, cooking, nutritional and storage qualities of raw & parboiled rice. Processed rice products (flaked, expanded and puffed rice). By-product (husk and rice bran) utilization.

UNIT-IV

Structure, types and composition of corn. Dry and wet milling of corn. Starch and its conversion products. Processed corn products (popped corn, corn flakes etc.) Structure and composition of barley, bajra, jowar and other cereal grains and millet. Malting of barley. Pearling of millets. Parched and snack products. **Processed products of major and minor millets.**

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.

PRACTICAL

CONTENTS

1. Physical characteristics of Wheat.
2. Estimation of moisture, ash and Gluten Content of cereals.
3. Estimation of 1000 grain weight and 1000 grain volume and bulk density of cereal grains
4. To estimate raising capacity of flour.
5. Fermenting power of yeast.
6. Physical Characteristics of Rice and paddy.
7. To perform malting of barley
8. Determination of popping of grains

Books Recommended

1. Cereals Technology by Samuel A.Matz. CBS Publications.
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.
7. Cereals & Cereals Products-Chemistry & Technology by DAV Dendy &
B.J.Dobraszezk, Aspen Publication.
8. Development in Milling & Baking Technology by AFST (I), CFDRI, Mysore, India.
9. Food Industries of CEEDC, IIT, Madras.
10. Articles on Pulse Milling in India Food Industry & JFST,both Publications of AFST (I).
Syllabus (B. Tech. Food Technology) Rajasthan Technical Universtiy, Kota

BSFT 403 INDUSTRIAL MICROBIOLOGY
(CREDITS: THEORY – 4 PRACTICAL 1)

THEORY

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

Stability of Enzymes. Enzymes stabilization by selection and genetic Engineering, protein engineering.

UNIT-IV

Reaction Environment rebuilding, Chemical modification, intra-molecular cross linking, immobilization.

UNIT-V

Application of enzymes in industry, analytical purpose and medical therapy

PRACTICAL

1. Isolation of industrially important micro-organisms
2. Study and operation of laboratory fermenter
3. BOD and COD measurements in industrial effluents
4. Laboratory scale production of microbial metabolites such as organic acids, lipids etc.
5. Visit to related industries.

Books Recommended:

1. Industrial microbiology:-Casida Newage Publication 2001
1. Industrial microbiology:-Prescott and Dunn CBS Publications 4th Ed. 1999
2. Enzymes:-Trevor. Horwood 2001
3. Journals and Reviews

BSFT 404 Nutrition, Therapeutics and Health
(CREDIT -3+0)

COURSE CONTENT

UNIT I-Introduction to food and nutrition

Relationship between Food, Nutrition and Health
Relationship between Food, Nutrition and Health
Digestion, absorption and utilization of nutrients
Digestion, absorption and utilization of nutrients
Nutrient requirements
Recommended dietary allowances

UNIT II-

Nutrients

Carbohydrates ,– classification, functions and food sources
Dietary fibre, recommended allowances, problems of excess and deficiency
Types of proteins, functions and food sources, recommended allowances
Health significance, protein quality, factors affecting protein quality, methods of improving protein quality
Fats – types, functions and food sources
Recommended allowances and health significances
Energy – role of macronutrients in providing energy, units of heat and energy, energy requirements and its components
Measurement of energy expenditure, energy balance, health concerns related to energy balance
Fat soluble vitamins – functions, food sources, recommended dietary allowances and problems of excess and deficiency of Vitamin A and Vitamin E
Functions, food sources, recommended dietary allowances and problems of excess and deficiency of Vitamin D and Vitamin K
Water soluble vitamins functions, food sources, recommended dietary allowances and problems of excess and deficiency
Water soluble vitamins functions, food sources, recommended dietary allowances and problems of excess and deficiency

UNIT III

Major minerals – functions, food sources and problems of excess and deficiency of minerals
Major minerals – functions, food sources and problems of excess and deficiency of minerals

Trace minerals functions, food sources and problems of excess and deficiency of minerals
Water – need, factors affecting water balance and its maintenance, dehydration and water intoxication
Nutritional disorders– PEM, Vitamin A deficiency Iron deficiency,Vitamin B complex deficiency and iodine deficiency

UNIT IV

Meal planning

Food guide for selecting adequate diet, practical aspects of food selection
Use of the food guide for meal planning, planning budget, nutrition education, fallacies and misconceptions about foods, and selection of foods.
Meal planning – objectives, nutritional adequacy, food costs and factors affecting food selection. Other aspects affecting food selection – availability, family size, schedules, time, for family and various age groups. Food sanitation and Hygiene – water, food, equipment, control of insects, food sanitation. Water purification

UNIT V

Therapeutic Nutrition

Therapeutic adaptation of normal diet
Principles of therapeutic nutrition
Diet during fevers
Diet during lung disease
Diet in gastrointestinal disorders constipation
Diarrhoea
Diet in disorders of liver
Diseases of gall bladder and pancreas
Diet in Diabetes mellitus – types, symptoms, classification
Nutritional care and control of diabetes
Heart and blood vessels diseases, diet therapy
Myocardial infarction, congestive heart failure, diet therapy
Diet in kidney disorders functions of kidney, kidney ailments– causes
Acute and chronic renal failure, dialysis,kidney transplant, kidney stones – prevention
Diet in cancer
Diet in stress, burns and surgery
Diet in metabolic disorders
Nutrition in immune system disorder

SUBJECT LIST B. SC. FOOD TECHNOLOGY

BSFT 501- **OIL AND FAT PROCESSING TECHNOLOGY**

(CREDITS: THEORY – 4 PRACTICAL 2)

THEORY

Objectives:

To understand the major oilseeds in food industry

To know about the processing conditions of edible oil industry.

To understand the concept of

CONTENTS

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

Refining: Clarification, degumming, neutralization (alkali refining), bleaching, deodorization techniques / processes. Blending of oils.

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.

PRACTICAL

CONTENTS

1. Estimation of peroxide value of oil
2. To estimate free fatty acid content in oil
3. To study about adulteration in given oilseeds
4. To study about processing of peanut butter
5. To study about solvent extraction of oil.

Books Recommended

1. Bailey's Industrial Oil & Fat Products, 4th ed.John Wiley & Sons.
2. The Industrial Chemistry of Facts & Waxes 3rd. by Balliere,Tindall & Cox.
3. Handling & Storage of Oiseeds,Oils,Fats & Meal by Paterson, HBW.
4. Modern Technology in the Oils & Fats industry by S.C. Singhal,OTA (I).

SUBJECT LIST B. SC. FOOD TECHNOLOGY

BSFT 502-FOOD FALVOURINGS
(CREDITS: THEORY – 4 PRACTICAL 2)

THEORY

Objectives:

- To study about natural and synthetic flavors
- To study about extraction of flavour

Unit 1

Food flavour and its importance to consumers and food processors. Flavor and nutrition. Sources, extraction, delivery systems, and analyses (chemical, instrumental, and sensory) of flavours and flavourings 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

Determination of hygroscopic nature and shelf life/acceptance of foods. Natural, Nature identical and Synthetic flavors: Definitions, chemical composition/constituents, extraction and preparation of flavors, Stability and utility of flavor preparations. Methods used in flavor evaluation. BIS Specifications/PFA restrictions for use of certain constituents in flavoring materials.

PRACTICAL

1. To extract essential oil and oleoresin
2. To study about adulteration in spices like black pepper, clove etc.
3. To study about extraction of flavour using GC
4. To study about different sensory tests used for flavour analysis.

Books Recommended:

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

SUBJECT LIST B. SC. FOOD TECHNOLOGY

BSFT 503 FOOD ENGINEERING
(CREDITS: THEORY – 3 PRACTICAL 1)

THEORY

Objectives:

1. To understand the principle of Unit operation
2. To acquaint with fundamentals of food engineering and its process
3. To understand the basics of designing of food plant and systems

CONTENTS

UNIT I Unit operations & Heat transfer

Unit operations and Heat transfer: Mode of heat transfer – Conduction, Convection, Radiation. Heat exchanger:Classification, contact type heat exchange - Immersion, Non-contact type heat-exchanger, Plate Heat exchanger, Scraped surface Heat exchanger, Tubular Heat exchanger, Double & Triple tube Heat exchanger, Shell and Tube Heat exchanger. 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

PRACTICAL

CONTENTS

1. Plant layout design
2. Determination of drying characteristics
3. Determination of viscosity of Newtonian and non Newtonian fluids
4. Study of effect of temperature on viscosity
5. Screen analysis of food sample
6. Study of evaporation process
7. Freezing time calculation
8. Psychrometrics- use and application.

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 Hariot FOOD ENGINEERING

BSFT 504 DESIGN OF FOOD PROCESSING EQUIPMENT
(CREDITS: THEORY – 3 PRACTICAL 1)

THEORY
Objectives:

To know the design of different food 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.

PRACTICAL

1. To study about belt conveyor
2. To study about storage vessels
3. To Study about heat exchangers
4. To study about seed processing equipments

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.
4. Chemical Engineering Handbook - Perry, R. H. and Chitton, C. H.

SUBJECT LIST B. SC. FOOD TECHNOLOGY

BSFT 601 Food quality and safety
(CREDITS: THEORY – 4 PRACTICAL 2)

THEORY

Objectives:

1. To learn about quality management in food production chain.
2. To learn about physical, chemical contaminants in foods
3. To learn about latest trends and techniques in food scienceTo understand the significance of safe processing of foods.

CONTENTS

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.

PRACTICALS

1. Testing and evaluation of quality attributers of raw and processed food
2. Detection and estimation of food additives and adulterants
3. Application of HACCP to products
4. To check the nutritional quality of food
5. To check sensory quality of food
6. To check microbial quality 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

Recommended Readings

Ranganna S.1986. Handbook of analysis and quality control for fruits and vegetable products, Tata McGraw-Hill publishing company limited, Second edition

BSFT 602 BASIC NUTRITION
(CREDITS: THEORY – 4 PRACTICAL 2)

THEORY

Objectives:

To impart basic knowledge of:

- To study about food and its functions
- To study about nutritional deficiencies
- To Understand concept of RDA

CONTENTS:

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 acidsessential 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.

PRACTICAL

1. Proximate analysis of foods
2. ‘Estimation of Calorific value of food
3. Determination of Vit C
4. Estimation of β Carotene
5. Determination of TSS, Acidity
6. To study of anti-nutritional factors in food
7. Estimation of Protein
8. Estimation of calcium
9. Estimation Browning intensity of food
10. Estimation of Sugars
11. Estimation of Carbohydrate using anthore method

References-

Guthrie Helen (1986) Introductory Nutrition. Times Mirror/ Mosby College Publishing.
Age International Pvt. Ltd.
Bhatia Arti: Nutrition & Dietetics- Anmol Publication Pvt. Ltd.- New Delhi.
Blank F.C. (1999): Handbook of Food & Nutrition, Ago Botanical Publishers, Bikaner.
C.Gopalan, B.V. Ramasastri and S.C. Balasubramanian (1989)- Nutritive Value of Company, Minneapolis.
Elenaor N., Whitney S., Rady R. (1993): Understanding Nutrition, West Publishing Indian Foods. NINICMR Hyderabad 500 007
Kukude, S *et al*. Food Science, Sheth Publications.
Marion Benion & Hughes: Introductory Foods, Macmillan New York
Mudambi and Sheela Rao: Food science
Mudambi, S.R., Rajgopal, M.V.(1990) Fundamentals of Foods and Nutrition, New
Nutrient Requirements and Recommended Dietary Allowances for Indians- I.C.M.R.
Potter: Food Science,CBS publishers Pub.Co.Publication 1999.
Robinsson, and Lawler. (1986) Normal and Therapeutic Nutrition. Mac Millan
Shakuntala Manay: Foods Facts and Principles, Wiley Eastern
Srilaxmi: Food Science, New Age International
Subbulaksmi G., and Udipi S.:Food Processing and Preservation
Wardlaw (1993): Perspectives in Nutrition, Paul Insel Mosby.