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ADIKAVI NANNAYA UNIVERISTY

FOOD PRODUCTION TRENDS AND HUMAN NUTRITION-1

Theory:

Semester - I

Unit-I: Status of food processing industry in India & Abroad, Indian Food Industry, Reasons for slow growth, Scope for Expansion, future priorities in food production need, magnitude and inter dependence of food production and processing agencies.

Unit-II: Dairy, Bakery, Confectionery, Beverage and Snack foods and their growth, popularity of Indian foods, National and International Projects and their food products.

Unit-III: Ministry of food processing industries (MOFPI), objectives and functions, APEDA - its objectives and functions, food characteristics, classification of foods, types of foods, convenience foods - Recent Trends for processing of foods, genetically modified foods.

Unit-IV: Functional foods and their advantages and disadvantages, Food Demand and Supply, Factors affecting Food Demand, Food Laws, Factors affecting food laws,

Unit-V: Global demand for food, World Food Day- its importance and action plan, classification of food crops, food losses, production and estimation of post harvest losses, Development programmes and strategies to eliminate food losses, Employment generation through post harvest operations.

Books for Reference:

1. N.N. Potter, Food Science, III edition,. AVI Publishing Co. Inc., West Port, USA, 1978.
2. K. Vijaya Raghavan, Agricultural Administration in India.
3. Chidida Singh, Modern Techniques of Raising Field Crops, Oxford & IBH Publishing Co, New Delhi.
4. Graft and Saguy, Food Product Development, CBS Publishers, New Delhi.
5. M. Swaminathan, Food and Nutrition, Vol I &II, The Bangalore Printing & Publishing Co. Ltd,
Bangalore.
6. Mahatab, S.Banji, N. Prashad Rao and Vinodini Reddy. Text Book of Human Nutrition, Oxford & IBH
Publishing Co.Ltd. New Delhi.

ADIKAVI NANNAYA UNIVERISTY

FUNDAMENTALS OF FOOD MICROBIOLOGY-1

Theory:

Semester -I

Unit-I: Cultivation of bacteria, nutritional requirement, Nutritional classification of bacteria, Physical conditions required for growth, growth of bacteria, normal growth curve, yeast, morphological characteristics. Algae - Protozoa- Destruction of micro organisms – control of micro organisms by chemical agents.

Unit-II: History of Food Microbiology - important micro-organisms associated with foods – mould, yeast and bacteria, micro-organisms in natural food products, Microbes used in food biotechnology,

Unit-III: Extrinsic and intrinsic parameters affecting growth and survival of microbes, chemical changes caused by microorganisms, Organic acids, other compounds, lipids, pectic substances.

Unit-IV: Food Spoilage – Contaminants of various foods stuffs – vegetables, cereals, pulses, oilseeds, milk, meat, egg and poultry during handling and processing.

Unit-V: Principles of food preservation, methods of food preservation, application in food preservation, preservation by use of low temperatures, growth of microorganisms at low temperatures, chilling or cold storage, frozen storage, sharp freezing and quick freezing, changes during freezing.

Practical:

Semester-I

1. Microscope demonstration.
2. Preparation of bacterial smears, staining – simple differential staining of spore, molds and yeasts.
3. Sterilization and inoculation techniques.
4. Preparation of different nutrient media for cultivation of bacteria, yeast and molds.
5. Isolation of micro organisms – Pour plate methods, spread plate and streak plate methods.
6. Morphological identification of important molds, yeasts in foods (Slides and Cultures).

Books for Reference:

1. P Tauro K. K. Japur and K.S. Yadav, *An Introduction to Microbiology*, Wiley Eastern Limited, New Delhi.
2. C.B. Power and H.F. Dagainawala, *General Microbiology*, Himalaya Publishing House, Bombay.
3. Frazier, W.C.and Westhoff , D.C. IV Edn., *Food Microbiology*, Mc Graw Hill Inc, New Delhi, 1988.
4. Adam, M.R and Moss M.O, *Food Microbiology*, New Age International Pvt. Ltd, New Delhi.
5. Frazer, Math and Deibel, *Laboratory Manual for Food Microbiology*, Burgers Publishers, Minnesota, USA.

ADIKAVI NANNAYA UNIVERISTY

FUNDAMENTALS OF FOOD CHEMISTRY-1

Theory:

Semester -I

Unit -I: Introduction to Food Chemistry, Approach to the study of Food Chemistry, biochemical changes in foods, moisture in foods, water activity and sorption isotherms, shelf life of foods, Hysteresis, colloidal state, colloidal solutions, classification of colloidal solutions, protective colloids and gold number.

Unit II: Emulsions, classification of emulsions, Properties of emulsions, Gels, Types of Gels, properties of gels, food gels, introduction to the proximate composition of foods, official methods for the analysis of foods – AOAC, AACC, AOCS.

Unit -III: Carbohydrates

Introduction, Classification of Carbohydrates, structure and food sources, chemical properties in foods, functional properties of carbohydrates. Changes of carbohydrates on cooking, crude fiber, browning reactions in foods, application of stabilizers and thickeners in foods.

Unit -IV: Lipids (Fats and Oils)

Classification, Sources and Chemistry of lipids – physical properties and chemical properties in foods. Steps in manufacture of food fats. Role of fat and applications in food preparation, Shortenings, shortening value and factors affecting it.

Unit-V:

Selection of fats and oils, fat substitutes, Deterioration of fats/ oils, Rancidity, Tests for Rancidity, Reversion and Polymerization. Anti-oxidants natural and synthetic, their mechanism, Application of Enzymes in food industry, Anti-nutritional factors in foods.

Practical:

Semester-I

1. Safety rules in the laboratory, first aid and introduction to the lab equipment and glassware.
2. Preparation of standard solutions, Buffers and determination of pH content in food samples.
3. Demonstrating the principles and applications of colorimeter and Spectrophotometer.
4. Verification of Beer's law by using Colorimeter.
5. Qualitative tests for the carbohydrates, Amino acids,
6. Determination of ash content of foods and preparation of mineral solution.
7. Determination of carbohydrate content in foods by Anthrone method.
8. Determination of reducing sugars by Nelson Somogyi's method.
9. Determination of saponification value of Fats/ oils.
10. Determination of FFA content in fats/ oils.

Books for Reference:

1. Dr. Ling, H D Belitz, Dr. Ing, W. Grosch, *Food Chemistry*, Springer, New York, 1987.
2. Braverman, *Introduction to the Bio-Chemistry of Foods*, Elsevier Scientific Publishing Company.
3. AOAC Methods for Food Analysis.
4. Meyer, *Food Chemistry*, AVI Publishing Company, USA 1983.
5. Sadasivam and Manickyam, *Biochemical Methods*, New Age International Publications, New Delhi, 1996.
6. John M. Deman, *Principles of Food Chemistry*, Springer International edition, Third edition, 2007.
7. Meenakshipaul, *Experimental Food Chemistry*, Published gene tech books New Delhi, 2012.
8. Fenema. R, *Food Chemistry*, Fourth edition, CRC Press Taylors and Francis group.
9. R.P.Srivastava and Sanjeev Kumar, *Fruits and vegetables preservation, principles and practices*, International Book Distribution Co. Third revised edition.

ADIKAVI NANNAYA UNIVERSITY

RAJAHMUNDRY

CBCS/Semester System

(for 2016-17 Admitted Batch)

II Semester Syllabus

B.Sc. FOOD TECHNOLOGY

FUNDAMENTALS OF FOOD CHEMISTRY-2

Unit-I: Proteins, Introduction, Composition, Physicochemical properties of proteins, amphotericism of proteins, binding of ions, denaturation of proteins. Functional properties of proteins, hydration, solubility, viscosity, gelation, texturization, emulsification, binding, foaming. Pure proteins of some food- plant proteins, Milk proteins, Egg proteins, Determination of protein content in foods, Kjeldhal method, Dumas method.

Unit-II: Micro – Components in Foods-

Flavor introduction, Taste, Odour, Description of Food flavors, Astringency, flavor and off-flavor, Flavor related to Fruits, Vegetables, Spices and Fish, pigments in fruits, vegetables and meat, myoglobin chemistry and colour, cured meat pigments, stability of meat pigments,

Unit-III: Chlorophyll- physical characteristics, structure, colour loss during thermal processing, HTST processing, regreening during thermal processing, carotenoids, structure, physical properties, and chemical properties.

Unit-VI: Food colourants, use of certified dyes, colours exempt from certification. Vitamins – Toxicity of Vitamins, sources of vitamins, dietary recommendation,

Unit-V: Enzymes in food industry, carbohydrases, amylases, pectinolytic enzymes, cellulases and hemicellulases, proteases, endopeptidases, lipid hydrolyzing enzymes, lipases, phospholipases
Bioavailability of vitamins, optimization of vitamin retention – enrichment, restorations, fortification, functional properties of minerals.

Practical:

1. Determination of protein in foods by Micro kjeldhal method.
2. Determination of Lipids in foods by Soxhlet method.
3. Determination of titratable acid content in foods (Acetic acid and citric acid content in foods).
4. Determination of Amino acids in foods by Ninhydrin method.
5. Determination of Vit.A and total carotenes.
6. Determination of Vit.C in foods by dye method.
7. Estimation of Chlorophyll.
8. Detection of adulterants in foods.

Books for Reference:

1. Dr. Ling, H D Belitz, Dr. Ing, W. Grosch, *Food Chemistry*, Springer, New York, 1987.
2. Braverman, *Introduction to the Bio-Chemistry of Foods*, Elsevier Scientific Publishing Company.
3. AOAC Methods for Food Analysis.
4. Meyer, *Food Chemistry*, AVI Publishing Company, USA 1983.
5. Sadasivam and Manickyam, *Biochemical Methods*, New Age International Publications, New Delhi, 1996.
6. John M. Deman, *Principles of Food Chemistry*, Springer International edition, Third edition, 2007.
7. Meenakshipaul, *Experimental Food Chemistry*, Published gene tech books New Delhi, 2012.
8. Fenema. R, *Food Chemistry*, Fourth edition, CRC Press Taylors and Francis group.
9. R.P.Srivastava and Sanjeev Kumar, *Fruits and vegetables preservation, principles and practices*, International Book Distribution Co. Third revised edition.

ADIKAVI NANNAYA UNIVERSITY

RAJAHMUNDRY

CBCS/Semester System

(for 2016-17 Admitted Batch)

II Semester Syllabus

B.Sc. FOOD TECHNOLOGY

FUNDAMENTALS OF FOOD MICROBIOLOGY-2

Semester – II

Unit-I: Control of Micro-organisms in food at high and low temperature, dehydration, freezing, freeze drying, irradiation and use of preservatives.

Unit-II: Control of micro-organisms by antibiotics, characteristics of antibiotics, removal of microorganisms, maintenance of anaerobic conditions.

Unit-III: Food contamination and public health hazards: Food poisoning, food borne intoxications and infections, symptoms, mode and sources of transmission and methods of prevention, investigations and detection of food borne and outbreak.

Unit-IV: Importance of sanitation and hygiene, personnel hygiene, food hygiene, environmental hygiene, food plant hygiene, sanitizing methods, sanitizing agents, acid and alkali compounds.

Unit-V: Risk assessment and management during food preparation, HACCP, definitions and principles, flow diagram, limitations of HACCP, PFA and FPO, indices of food quality, Indian food laws and standards.

Practical:

1. Microbial examination of natural food products.
2. Microbiological analysis of water, milk – standard plate count and coil form count.
3. Identification of food pathogens in foods-cereals, pulses, meat.
4. Microbial production of alcohol.
5. Microbial production of acetic acid.
6. Thermal death time determination
7. Visit to food preservation units.

Books for Reference:

1. P Tauro K. K. Japur and K.S. Yadav, *An Introduction to Microbiology*, Wiley Eastern Limited, New Delhi.
2. C.B. Power and H.F. Dagainawala, *General Microbiology*, Himalaya Publishing House, Bombay.
3. Frazier, W.C. and Westhoff, D.C. IV Edn., *Food Microbiology*, Mc Graw Hill Inc, New Delhi, 1988.
4. Adam, M.R and Moss M.O, *Food Microbiology*, New Age International Pvt. Ltd, New Delhi.
5. Frazer, Math and Deibel, *Laboratory Manual for Food Microbiology*, Burgers Publishers, Minnesota, USA.

ADIKAVI NANNAYA UNIVERSITY

RAJAHMUNDRY

CBCS/Semester System

(for 2016-17 Admitted Batch)

II Semester Syllabus

B.Sc. FOOD TECHNOLOGY

FOOD PRODUCTION TRENDS AND HUMAN NUTRITION-2

Unit-I: Brown Revolution, Yellow Revolution, Blue Revolution, Food security, programs for food production, Green Revolution, White Revolution.

Unit-II: Nutrition, Concepts, Nutrients classification of Proteins, Carbohydrates, Fiber, Fat & Oils, Minerals, Vitamins and their metabolic functions.

Unit-III: BMR, Factors affecting BMR, Balanced Diet, RDA, Diet for different age groups.

Unit-IV: Nutrition through life cycle, Nutrition during pregnancy, lactation, adolescence, infant nutrition in diseases, geriatric nutrition, sports nutrition

Unit-V: Diet for Diabetics, Kidney diseases, Heart diseases, Hypertension, Liver diseases, AIDS, cancer nutrition during emergency, packed lunches, food allergy, nutritional policies

Books for Reference:

1. N.N. Potter, *Food Science*, III edition, AVI Publishing Co. Inc., West Port, USA, 1978.
2. K. Vijaya Raghavan, *Agricultural Administration in India*.
3. Chidida Singh, *Modern Techniques of Raising Field Crops*, Oxford & IBH Publishing Co, New Delhi.
4. Graft and Saguy, *Food Product Development*, CBS Publishers, New Delhi.
5. M. Swaminathan, *Food and Nutrition*, Vol I & II, The Bangalore Printing & Publishing Co. Ltd, Bangalore.
6. Mahatab, S. Banji, N. Prashad Rao and Vinodini Reddy. *Text Book of Human Nutrition*, Oxford & IBH Publishing Co. Ltd. New Delhi.

ADIKAVI NANNAYA UNIVERSITY

RAJAMAHENDRAVARAM

CBCS / Semester System

(From 2015-16 Admitted Batch)

B.Sc. Food Technology

III Semester Syllabus

FOOD SAFETY AND MICROBIAL STANDARDS – 1

Unit-I:

History of Food spoilage, Food poisoning, Food legislation and Food preservation. Dietary Toxins: Naturally occurring in food – Endogenous toxin, Exogenous toxin: Toxic phenolic substances, Flavonoids, Tannins, Coumarin - Toxicity and symptoms - Chemical properties(structure and stability) - Type of foods involved – Prevention.

Unit-II:

Microbial toxins: i) Bacterial: *Clostridium botulinum*, *Clostridium perfringens*, *Staphylococcus*, *Salmonella*, *Vibrio*, *Escherichia coli*, five groups of *E.coli*, *Bacillus cereus*- Types of food involved - toxicity and symptoms - Chemical properties ii) Mold. Types of mycotoxins - Aflatoxins, Patulin, Penicillic acid, Ochratoxin, citrinin, Alternaria toxin -Types of food involved - toxicity and symptoms - Chemical properties, Mushroom toxins, Intrinsic toxin produced during processing and storage.

Unit-III:

Food Borne infections: Protozoans - Giardiasis, Amebiasis, Flat worms, Taeniasis, Round worms Food borne viruses - Polio, Hepatitis A & E, Noroviruses, rota viruses Types of food involved - toxicity and symptoms - Chemical properties. Metals as toxin –Heavy metals - Occurrence - detection in foods – Toxicological effects – limits, contamination, and Elimination

Unit-IV:

Lead,Tin, Zinc, Aluminium, Chromium, Cobalt, Antimony - Occurrence - detection in foods - Toxicological effects – limits. Pesticidal residues as toxin; i) Chlorinated ii) Non-chlorinated. Mechanisms of Toxicity-Residues in Food, Acceptable daily intakes, Maximum residue limits.

Unit-V:

Anti microbial agents - common anti microbial food agents - Benzoic acid - Benzoates - Sorbic acid - Sorbates - Short chain organic acids - acetic acid - lactic acid - propionic acid- citric acid - parabens - sulfite – nitrite
Anti microbial agents - Natural antimicrobial substances present in foods (Indirect antimicrobials) - Antioxidants, Flavoring agents, spices and essential Oils, phosphates, Medium chain fatty acids and esters, acetic and lactic acid
Anti microbial agents - Antibiotics(Monensin, natamycin, tetracyclins, Subtilin, Tylosin, Nisin, Endolysins), Antifungal agents for fruits, Ethylene and propylene Oxides

Practicals:

- 1-4. Estimation of bacterial toxins from food samples. (Different types of foods).
- 5-8. Estimation of fungal toxins from food samples. (Different types of foods).
- 9-10. Heavy metal detection (lead).

Books for Reference:

1. M.P.Doyale, L.R.L Benchat, T.J.Montville, *Food Microbiology*, ASN Press, Washington USA.
2. Carlvan Derzant and Splittoessev, *Methods for Microbial Examination of Foods*, APHA Publishers, Washington DC, USA.
3. Frazer, Math and Deibel, *Laboratory Manual for Food Microbiology*, Burgers Publishers –Minnesota, USA
4. J.M.Jay, *Modern Food Microbiology*, CBS Publishers and Distributors, New Delhi, 1987.
5. N.G.Marriott, *Principles of Food Sanitation*, AVI Pub.Co.USA, 1985.

ADIKAVI NANNAYA UNIVERSITY

RAJAMAHENDRAVARAM

CBCS / Semester System

(From 2015-16 Admitted Batch)

B.Sc. Food Technology

III Semester Syllabus

PROCESSING AND PRESERVATION OF FOODS - 1

Unit-I:

Classification of different foods of plant origin: Cereals, Millets, Pulses, Oilseeds, Fruits, Vegetables, Spices and Plantation Crops. Composition & constituents- Post harvest handling, Storage, methods of infestation.

Unit-II:

Study of different process methods: products of cereals and millets with special reference to rice and wheat. Processing and product development with maize, sorghum and ragi. Processing of Pulses along with different pre-treatments. Oil expelling methods with emphasis on Sesame, Sunflower, Mustard, Palm, Coconut, groundnut and Rice bran oils. Refining, Hydrogenation and Shortenings.

Unit III:

Fruits and Vegetables- Different processing operations – Fruit Juices, Squashes, Cordial, Jam, Jelly, Marmalade, Chutneys, Sauces, Pickle Processing along with Principles and methods of preparation and their usage in different communities.

Unit-IV:

Classification and composition of Spices and Plantation crops. Study of special attributes of main spices like Pepper, Cardamom, Ginger, Garlic, Turmeric, Nutmeg, Coriander and Cinnamon. Chillies, Cocoa, Coffee, Tea and Gum and their processing and preservation methods.

Unit-V:

Classification of animal foods. Meat and Meat products selection, Meat and Meat Products, Egg & Avian Products, Milk & milk products, Fish & Fishery products, and their composition. Characters of animal foods and selection of different animal foods for processing.

Practicals:

1. Determination of quality parameters of rice and wheat.
2. Processing of flaked, parboiled and puffed rice.
3. Experiments on flour quality.
4. Processing of different wheat products.
5. Planning and preparation of malted products.
6. Processing of different fruit and vegetable based products which includes jams, jelly, marmalade, pickles, squashes, juices and cordials.
7. Visit to rice and wheat processing industry and study of different equipment.
8. Visit of fruits, vegetables & spice processing industry and study of processing.

Books for Reference:

1. J.L. Multon, A.M. Riemert, D. Marsb & A.J. Eydt 1st edition, *Preservation & Storage of Grain, Seeds and their Products*, CBS Publications and Distributors, Delhi.
2. Kent, *Cereal Technology*, Oxford Perman Press, London.
3. Giridharlal, Sidappa and G.L. Tandon, *Preservation of Fruits and Vegetables*, ICAR, New Delhi.
4. Dey.S, *Outlines of Dairy Technology*, Oxford University Press, New Delhi, 1994.
5. Lawrie R.A, *Meat Science*, Paragon Press Oxford, New York.
6. Borgstorm G. *Fish as Food*, Vol-4, New York Academic Press.

ADIKAVI NANNAYA UNIVERSITY

RAJAMAHENDRAVARAM

CBCS / Semester System

(From 2015-16 Admitted Batch)

B.Sc. Food Technology

III Semester Syllabus

UNIT OPERATIONS IN FOOD PROCESSING - 1

Unit -I:

Unit Operations- classifications – conservation of mass and energy. SI, FPS and MKS system of Units- Evaporation- single effect evaporation and multiple effect evaporation, vacuum evaporation – short tube and long tube evaporators, its applications in food industry.

Unit-II:

Mechanical separation - Filtration, filtration equipment, sedimentation, centrifugal and liquid-liquid separation centrifuge its applications. Size Reduction and Separation: Introduction, methods of separation, Grinding and cutting, Energy used in grinding, Characteristics, particle size distribution, energy & power requirement. Crushing efficiency, Kick's law, Rittinger's law, Bond's law.

Unit-III:

Contact equilibrium - separation processes- concentrations- gas – liquid equilibria. Solid – solid equilibria – equilibrium concentration – extraction – rate of extraction, stage equilibrium extraction. McCabe Thiele plot.

Unit-IV:

Introduction and importance of Physical properties-Shape and size of grains, Shape and size of Fruits, Bulk density of the grains, True density of the grains, Porosity, Angle of repose, Test weight, Cleaning, Sorting and Grading. Peeling, Dehulling, Dehusking,

Unit-V:

Mixing Definition, Measurement of Mixing, Mixing index, Mixing Equipment- Double cone mixer, Ribbon mixer, Kneader, Propeller mixer. Forming-Bread molders, Pie and biscuit formers, Confectionery molders.

Practicals:

1. Determination of separation efficiency of centrifugal separator.
2. Determination of energy requirement in size reduction using ball mill.
3. Determination of collection efficiency of cyclone separator.
4. Problems on evaporators.
5. Determination of particle size distribution using sieve shaker.
6. Performance evaluation of sieve.
7. Visit to solvent extraction unit.
8. Visit to sugar industry.
9. Performance evaluation of hammer mill.
10. Determination of Moisture content by hot air oven method.

Books for Reference:

1. Chakravarthy A, *Post Harvest Technology of Cereals, Pulses and Oilseeds*, Oxford and IBH Publications Company Limited, Calcutta, 1988.
2. Charm S.E, *Fundamentals of Food Engineering*, The AVI Publishing Company, USA, 1971.
3. Dennis R.H, *Food Process Engineering*, The AVI Publishing Company, 1971.
4. Earle R.L, *Unit Operations in Food Processing*, Pergamaon press, New Delhi, 1983.
5. Mc Cabe and Smith J.C, *Unit Operations of Chemical Engineering*, Tata Mc Graw Hill Publishing Book Company, New Delhi, 1993.
6. Geankoplis CJ, Allyn & Bacon Inc. Newton, Massachusetts, *Transport Process & Unit Operations*, 1978.
7. Sahay K.M. & Singh K.K, *Unit Operations of Agricultural Processing*, Vikas Publication House, New Delhi.

ADIKAVI NANNAYA UNIVERSITY
CBCS/SEMESTER SYSTEM
IV SEMESTER : B.Sc FOOD TECHNOLOGY
(w.e.from 2015-16 admitted batch)
PROCESSING AND PRESERVATION OF FOODS – 2

Unit-I:

Methods of slaughter – humane & religious methods. Different cuts of meat structure & composition of meat. Different methods of processing & preservation of meat & meat products. Egg & Avian Products. Structure & Composition of eggs from different sources.

Unit-II:

Grading, packaging and preservation of eggs. Processing of different products such as frozen & dried products. Chemical composition of Avian meat. Different methods of preservation.

Unit-III:

Milk & Milk products. Composition of milk from different species. Physicochemical properties. Milk & milk products. Processing & preservation of milk & milk products. Fermented milk products and indigenous milk products processing & preservation.

Unit-IV:

Fish and marine products: Types and their Classification and Nutritive value of fish, prawn and other marine products. Selection, grading, processing of different fish & fishery products.

Unit-V:

Special emphasis on salting & other novel methods of preservation of fish and fishery products, Shelf life and quality of processed products. Usage of these products in different areas and communities.

Practicals:

1. Study of different slaughtering methods.
2. Study of different dressing methods.
3. Preservation techniques of meat products.
4. Preservation techniques of egg products.
5. Preservation of various chicken products.
6. Sampling, analysis and processing of milk.
7. Processing of various milk products.
8. Selection & grading of fishery products.
9. Preservation of different fish & fishery products.

Books for Reference:

1. J.L. Multon, A.M. Riemert, D. Marsb & A.J. Eydt 1st edition, *Preservation & Storage of Grain, Seeds and their Products*, CBS Publications and Distributors, Delhi.
2. Kent, *Cereal Technology*, Oxford Perman Press, London.
3. Giridharlal, Sidappa and G.L. Tandon, *Preservation of Fruits and Vegetables*, ICAR, New Delhi.
4. Dey.S, *Outlines of Dairy Technology*, Oxford University Press, New Delhi, 1994.
5. Lawrie R.A, *Meat Science*, Paragon Press Oxford, New York.
6. Borgstorm G. *Fish as Food*, Vol-4, New York Academic Press.

ADIKAVI NANNAYA UNIVERSITY
CBCS/SEMESTER SYSTEM
IV SEMESTER : B.Sc FOOD TECHNOLOGY
(w.e.from 2015-16 admitted batch)
UNIT OPERATIONS IN FOOD PROCESSING - 2

Unit -I:

Distillation – stage distillation, steam, vacuum and batch distillation. Mixing – mixing of solids, liquids, pastes. Blending, emulsification, mixing index, Physical, thermal, electrical and rheological properties.

Unit-II:

Drying and Dehydration – Moisture content, free moisture, bound moisture- Thin layer drying, batch drying, Equilibrium moisture content, Hysteresis, Drying curves, Constant - rate period, Falling - rate period– water activity - Psychrometry - terms, chart and application.

Unit -III:

Types of dryers: tray dryer, tunnel dryer, LSU dryer, freeze dryer, osmotic dehydration, foam mat drying, their working principles and applications in food industry, extrusion cooking.

Unit-IV:

Introduction to heat processing - Blanching, Pasteurization, Sterilization, Interaction of Heat Energy and Food Components - Introduction to Reaction Kinetics, Temperature Dependence of Kinetics, Thermal Destruction of microorganisms, Thermal Destruction of Enzymes,

Unit-V:

Concentration – freeze concentration – freezing and storage of frozen products – low temperature preservation, irradiation of food products – microwave heating, dielectric heating of foods, principles and applications in industry.

Practicals:

Semester-II

1. Determination mixing index of a feed mixer.
2. Determination of thermal death time.
3. Experiments on sterilization in retorts.
4. Experiments on tray dryer.
5. Experiments on osmotic drying.
6. Experiments on extrusion cooking.
7. Experiments on freezing of food materials.
8. Experiments on freeze dryer.
9. Determination of bulk density and porosity of grains.
10. Determination of size and angle of repose of grains.
11. Determination of specific heat of grains.
12. Visit to an industry (extruder).

Books for Reference:

1. Chakravarthy A, *Post Harvest Technology of Cereals, Pulses and Oilseeds*, Oxford and IBH Publications Company Limited, Calcutta, 1988.
2. Charm S.E, *Fundamentals of Food Engineering*, The AVI Publishing Company, USA, 1971.
3. Dennis R.H, *Food Process Engineering*, The AVI Publishing Company, 1971.
4. Earle R.L, *Unit Operations in Food Processing*, Pergamaon press, New Delhi, 1983.
5. Mc Cabe and Smith J.C, *Unit Operations of Chemical Engineering*, Tata Mc Graw Hill Publishing Book Company, New Delhi, 1993.
6. Geankoplis CJ, Allyn & Bacon Inc. Newton, Massachusetts, *Transport Process & Unit Operations*, 1978.
7. Sahay K.M. & Singh K.K, *Unit Operations of Agricultural Processing*, Vikas Publication House, New Delhi.

ADIKAVI NANNAYA UNIVERSITY
CBCS/SEMESTER SYSTEM
IV SEMESTER : B.Sc FOOD TECHNOLOGY
(w.e.from 2015-16 admitted batch)
FOOD SAFETY AND MICROBIAL STANDARDS – 2

Unit-I:

Microbial standards of processed and preserved foods. Microbiological criteria for various food products- Sea foods, Milk products, Spices, Fruits and vegetables. Food safety-Indicators of food microbial Quality and safety - *Coliforms*, *Enterococci* etc. Food laws & Standards.

Unit-II:

Non permitted food additives - Allura red AC, Aspartame, amaranth, Benzoic acid, brilliant black, Butylated Hydroxy - anisole, Calcium benzoate, Calcium sulphite
Non permitted food additives- Monosodium glutamate (MSG) Ponceau 4R, Conchineal Red A, Potassium benzoate, Potassium nitrate, Propyl p-hydroxybenzoate, propylparaben, and paraben
Non permitted food additives - Saccharin & its Na, K and Ca salts, Sodium metabisulphite, Sodium sulphite, Stannous chloride (tin), Sulphur dioxide, Sunset Yellow FCF, OrangeYellow S, tartrazine

Unit-III:

Sanitation: GMPs - Personal hygiene - Sanitizers - Sanitation principles – Sanitizing methods - Sanitation agents. Risk assessment and management during food preparation:

Unit-IV:

Food safety, Objectives (FSO), Microbiological criteria, definitions, sampling plans. HACCP – prerequisite programs, definitions, HACCP principles, Flow diagrams, Application of HACCP principles, Limitations of HACCP.

Unit-V:

Food laws & Standards - FAO, Codex Alimentations, ISO, Indian food laws and standards, Prevention of Food Adulteration (PFA) act, Fruit Products Order(FPO), Meat Product Order(MPO), Cold Storage Order (CSO), BIS, Agmark

Practicals:

- 1-2. Risk assessment and management determination.
- 3-4. Study of national and international microbial quality standards.
- 5-6. Visit to export oriented food processing industry.
7. Practical Examination.

Books for Reference:

1. M.P.Doyale, L.R.L Benchat, T.J.Montville, *Food Microbiology*, ASN Press, Washington USA.
2. Carlvan Derzant and Splittsoessev, *Methods for Microbial Examination of Foods*, APHA Publishers, Washington DC, USA.
3. Frazer, Math and Deibel, *Laboratory Manual for Food Microbiology*, Burgers Publishers –Minnesota, USA
4. J.M.Jay, *Modern Food Microbiology*, CBS Publishers and Distributors, New Delhi, 1987.
5. N.G.Marriott, *Principles of Food Sanitation*, AVI Pub.Co.USA, 1985.

ADIKAVI NANNAYA UNIVERISTY

CBCS SEMESTER SYSTEM

SEMESTER V

INTRODUCTION TO COMPUTERS AND STATISTICS – 1

Theory:

Unit I:

Introduction to computers – Anatomy of computers – Input and output devices – Memory – Hardware – Software - Personal computers - Types of processors – Booting – Operating systems – DOS commands – Anatomy of Window - Title bar - Menu bar - Scroll bar - Tool bar.

Unit II:

MS Word – Creating, Formatting and Saving documents in MS Word -Understanding Word Processing - Word Processing Basics; Opening and Closing of documents; Text creation and Manipulation; Formatting of text; Table handling; Spell check, language setting and thesaurus; Printing of word document.

Unit III:

MS Excel – Using Spread Sheet - Basics of Spreadsheet - Manipulation of cells; Formulas and Functions; Editing of Spread Sheet, printing of Spread Sheet, creating, editing, saving spread sheet - Use of inbuilt statistic functions, data analysis, Correlation, Regression, T test – Creating graphs.

Unit IV:

MS Power point – Creating slides, adding text, adding pictures, adding tables – Adding sounds - Animation affect – Presentation buttons - MS Access - Concept of data base - Unit of data base - Creating data base – Internet concepts.

Unit V:

Introduction to Internet - WWW and Web Browsers - Basic of Computer networks; LAN, WAN; Concept of Internet; Applications of Internet; connecting to internet; What is ISP; Knowing the Internet; Basics of internet connectivity related troubles hooting, World Wide Web; Web Browsing softwares, Search Engines; Understanding URL; Domain name; IP Address; Using e-governance website.

Practicals:

Semester – I

1. Introduction – Activating Windows 98 – Features – Start menu and shutting down windows – Desktop – Features – Working with windows.
2. Creation of files/folders copying files/folders – recycle bin – Features.
3. Windows explorer – Searching files and folders moving, copying and renaming of files and folders.
4. MS Word 2000-Creating a document, formatting a document and saving the document.
5. Editing the document, inserting tables – importing the formatting, saving and printing
6. Practice on MS Word 2000.
7. MS Excel 2000 – Creation of spreadsheet – Entering data – formatting and editing.
8. Alignment of workbook – Adding boarders – Patterns and columns.

9. Creating simple and mathematical formulas and computation.
10. Use of statistical functions – Use of function wizard – Computation of analysis of variance, correlation and regression.
11. Charting data – Use of different types of charts for representation of data, creation, modification and printing of charts.
12. Creating a database in MS Access – Use of preliminary functions.
13. Sorting – Saving and retrieval of database.
14. Practicing MS Access.
15. PowerPoint – Features, usage and advantages.
16. Creation of slides and transparencies – Inserting picture
17. Presentation of slides using slide show.
18. Internet access and browsing, Understanding URL, domain name and IP address

Books for Reference:

1. R. Rangaswamy, *A Text Book of Agriculture Statistics*.
2. Nageswara Rao, *Statistics for Agricultural Sciences*.
3. V.Rajaraman and N Adabala, *Fundamentals of Computers*.
4. MS DOS Published by Microsoft Corporation.
5. MS Office Published by Microsoft Corporation.
6. S.C.Gupta, *Fundamentals of Statistics*.
7. S.J. Amdekar, *Statistical Methods: For Agricultural and Biological Sciences*.

ADIKAVI NANNAYA UNIVERISTY

CBCS SEMESTER SYSTEM

SEMESTER V

FOOD PROCESSING EQUIPMENT - 1

Theory:

Unit I:

Material handling: Material handling machines and conveyors. Pretreatment unit operations: Cleaning, De-hulling and De-husking, Sorting & Grading, Peeling, Mixing and Forming, Size reduction and separation.

Unit II:

Physical properties of foods, Shape and size of grains and fruits, Bulk density and true density of grain, Porosity, Angle of repose, Test weight. Properties of Food materials and their significance in equipment design, processing and handling of food products.

Unit III:

Agitation and Mixing- Blending, pulverization equipment, Bread moulds, Pie and biscuit formers, confectionary mould. Hygienic design of Food Processing equipment, hygienic design principles and priorities. Sanitary requirement, sanitary pipes and fittings.

Unit IV:

Evaporation: Principles of evaporation, types and selection of evaporators, mass and energy balance. Design of single and multiple effect evaporators, material and energy balances, evaporator efficiency, recompression, heat and mass recovery and vacuum creating devises. Fouling of evaporators and heat exchangers.

Unit V:

Drying: Principles of drying, thin layer drying, moisture content, equilibrium moisture content, Hysteresis, drying curves, drying rate kinetics, Classification, mass and energy balance. Different types of dryers and components - roller, spray, tray, compartment, fluidized bed etc.

Practicals:

Semester - I

1. Determination of engineering properties of food materials.
2. Study of Plate type heat exchangers used in Dairy & Food Industry.
3. Studies on heat transfer through extended surfaces.
4. Studies on temperature distribution and heat transfer in HTST pasteurizer.
- 5-7. Design problems on heat exchangers.
8. Determination of viscosity of different food materials.
9. Study of evaporators and their material and enthalpy balances.
10. Demonstration of equilibrium sorption isotherms.

Books for Reference:

1. C.P. Arora, *Refrigeration and Air Conditioning*, Tata McGraw Hill Company, New Delhi, 2000.
2. P. Fellows, *Food Processing Technology, Principles and Practice*, CRC Press, 2000.
3. Nuri N. Mohsenin, *Physical Properties of Plant and Animal Materials*, Ed.2009
4. Earle R.L, *Unit Operations in Food Processing*. Pergamon Press, 1983.
5. K.M. Sahay and K.K Singh, *Unit Operations of Agricultural Processing*, Vikash Publication House, New Delhi.

ADIKAVI NANNAYA UNIVERISTY

CBCS SEMESTER SYSTEM

SEMESTER V

FOOD PACKAGING - 1

Theory:

Semester - I

Unit-I:

Packaging Science, Definition, History, Functions, Types of Materials - Uses, Application, Advantages and Disadvantages of each - Status of Packaging industry in India, Economics, Environmental hazards, Waste management and Consumer awareness.

Unit - II:

Need of Packaging food - Logistics - Merchandising Outlets - Handling - Transportation - Packaging machinery - Technology upgradation - Public distribution - Cost effective packaging - Packaging requirements - Levels of Packaging - Packaging functions - Attractiveness - Protection - Convenience - Printability – Differentiability.

Unit-III:

Labeling Laws - Packaging laws and Regulations - SWMA Rules - PFA Rules - FPO Rule MFPO Rules - Agmark Rules - Class 'A' commodities - Class 'B' commodities - Misbranded Labeling rules for infant foods.

Unit-IV:

Classification of Packages, Primary, Secondary and Tertiary – Special Box / Carton, Shrink, Aerosol, Vacuum, Boil-in-bag, Tetra pack, Squeeze tubes, etc. Significance and functions - Construction of Packages, Process Chart - Shelf life testing.

Unit-V:

Machinability - Environmental Impact - Low cost containment - Communication – Resealing features - Non toxicity - Aroma retention Hazards acting on Package during transportation - Moisture impact - Light impact – Common insect pests - Changes in food quality - Biological changes in food quality

Practicals:

Semester - I

1. Measurement of thickness of paper and paper boards.
2. Measurement of basic weight of paper and paper boards.
3. Measurement of bursting strength of paper and paper boards.
4. Measurement of resistance.
5. Visit to an Industry.
6. Visit to Dairy Industry.

Books for Reference:

1. Gorden I Robertson, *Food Packaging Principles and Practice*, CRC Press, London.
2. Ranganna S, *Handbook of Analysis and Quality Control, Fruits and Vegetables Products*, Tata Mc Graw Hill, New Delhi, 1986.

ADIKAVI NANNAYA UNIVERISTY

CBCS SEMESTER SYSTEM

SEMESTER V

FOOD QUALITY AND CERTIFICATION - 1

Theory:

Semester – I

Unit-I:

Food quality and its need in food industry - Definition of food quality - Role of food quality in Food Industry - Quality attributes - Classification of quality attributes.

Unit-II:

Food quality objectives, importance and functions of quality control - Methods of quality control - concepts of Rheology - Quality assessment of food materials i.e, fruits, vegetables, cereals and dairy products/milk and milk products

Unit-III:

Quality assessment of Food materials i.e, meat, poultry, egg and processed food products - Sensory evaluation – introduction, panel screening, selection methods. Interaction and thresholds, Statistical quality control.

Unit-IV:

Sensory and instrumental analysis in quality control. Consumer measurements: Factors influencing acceptance and preference, objectives of consumer preference studies, information obtained from consumer study.

Unit-V:

Factors influencing results from consumer surveys, Methods of approach, development of the questionnaire, types of questionnaires, serving procedures and other methods of data collection.

Practicals:

Semester - I

1-4. Techniques of quality assessment of fruits, vegetables, cereals, dairy products, meat, poultry, milk and other processed products.

5. Selection and training of sensory panel.

6. Hedonic rating of food.

7. Identification and ranking of food products attributes.

8. Sensory and Instrumental methods for measuring food attributes.

Books for Reference:

1. Imteaz Ali, *Food Quality Assurance, Principles and Practices*, CHIPS, Texas.
2. J.L.Multon, *Quality Control for Food and Agricultural Products*, CHIPS, Texas.
3. Amerine, M.A.Pangborn, R.M and Rosseler, *Principles of Sensory Evaluation of Food*, Academic Press, New York, 1965.
4. Birk, G.G.Berman, J.G and Parker, K.J, *Sensory Properties of Foods*, Applied Science, London, 1977.

5. Pattee, H.E, *Evaluation of Quality of Fruits and Vegetables*, AVI, Westport. 1985.
6. Ranganna S, *Handbook of Analysis and Quality Control-Fruits and Vegetables Products*, Tata Mc Graw Hill, New Delhi, 1986.
7. BIS Standards on Sensory Evaluation.

FOOD ADDITIVES - 1

Theory:

Unit-I:

Introduction to Food Additives – Types of additives with examples - benefits of additives - risks of additives, balancing risks & benefits - Functions and classification of food additives.

Unit-II:

Nutritional additives(fortificants/supplements), requirements (RDA and ADI), occurrence & commercial forms of various vitamins & minerals available. Antimicrobial agents – Application of benzoic acid & benzoates, Sorbic acid & sorbates, short chain acids & salts. Antibrowning agents – food applications.

Unit III:

Naturally occurring food additives, classification, role in food processing and health implications. Anti-oxidants and chelating agents, types and examples of anti-oxidants, their role in foods, natural and synthetic anti-oxidants - their mode of action in foods.

Unit IV:

Toxicology and Safety evaluation of food additives, beneficial/toxic effects, Generally Recognized As Safe (GRAS), tolerance levels and toxic levels in food. Preservatives - Natural and chemical preservatives and their chemical action on foods and human system.

Unit-V:

Food flavors – natural, nature identical, synthetic. Flavor enhancers, potentiators & applications. Flavoring materials made by processing. Applications of flavors in food industry.

Practicals:

Semester - I

1. Estimation of Chlorophyll content.
2. Estimation of Carotenoids.
3. Estimation of Colors from native source.
4. Estimation of total soluble solids using refractometer.
5. Estimation of NaCl in butter.
6. Estimation of NaCl in Pickles.

Books for Reference:

1. AL Branen, Davidson and S. Salminen, *Food Additives*. Marcel Dekker Inc NY 1990.
2. Swaminathan, *Food Science, Chemistry & Experimental Foods*. Bappco Publishers, Bangalore.

3. Mahindra S.N., *Food additives – Characteristics detection and estimation*. Tata Mc Graw Hill Publication Company, New Delhi.
4. Srivastav, R.P. and Sanjeev Kumar, *Fruit and Vegetable Preservation, Principles and Practice*. International Book Distribution Company, New Delhi.

FOOD TRADE AND BUSINESS MANAGEMENT - 1

Theory:

Unit-I:

Business Principles, Practices and Policies of Food trade. Mechanism of foreign exchange, WTO, GATT, International Trade in Agriculture, world consumption of food.

Unit-II:

Pattern and types of food consumption, APEDA, MOFPI, Spices Board, BIS etc, Food Marketing classification, Consumer behavior, demand and forecasting demand and marketing pigmentation.

Unit-III:

Product planning and linear programming, Sales promotion, break even analysis, Programme Evaluation and Review Technique. Social aspects of food marketing, Advertisings, features, objectives, effectiveness and components of advertisement.

Unit-IV:

Food plant layout & Process planning for the product, establishing the food product unit. Creativity and innovation problem solving. personnel management, salaries, wages and incentives, performance appraisal, quality control.

Unit-V:

Laws governing of food products, Role of consumers and role of food business people, formulation and selling of products. Food Marketing and Sales management.

Books for Reference:

1. D. David and S. Ericson, *Principles of Agri. Business Management*. Tata Mc Graw Hill Book Co., New Delhi.
2. P.K. Srivastava, *Marketing Management*. Himalaya Publishing House, New Delhi.
3. G.S. Batra and Narinder Kumar, *GATT implications of Denkel proposal*. Azmol Publications, New Delhi.

ADIKAVI NANNAYA UNIVERSITY

CBCS CLUSTER SYSTEM

B.Sc FOOD TECHNOLOGY

VI SEMESTER: W.E.FROM 2015-16 ADMITED BATCH

INTRODUCTION TO COMPUTERS AND STATISTICS - 2

Theory:

Unit I:

Introduction to statistics – Meaning and various definitions of statistics – Importance of statistics in science – Classification and summarization of data – Frequency distribution – Graphical methods.

Unit II:

Methods of central tendency – Measures of dispersion – Coefficient of variation(C.V) – Standard error(S.E) – Simple correlation and Simple regression.

Unit III:

Normal curve and its properties – Chi-Square distribution – Testing of Hypothesis – SMD test – T-test – F-test – Chi-Square test.

Unit IV:

Analysis of variance – Experimental design and planning – RBD-Randomized Block Design –CRD-Complete Randomized Design – LSD-Latin Square Design.

Unit V:

Introduction to sampling – Limitations and uses of sampling – Types of sampling – Applications of sampling in different fields.

Practicals:

1. Computation of mean for grouped data and SD for ungrouped data.
2. SD for grouped data and CV, SND test for single sample.
3. SND test for single and two samples.
4. t-test for single and two sample.
5. Paired t-test and Chi-square test.
6. Correlation coefficient and its testing.
7. Fitting of linear regression equation.
8. Analysis of CRD with equal and unequal number of observations.
9. Analysis of RBD.
10. Analysis of LSD.
11. Missing plot technique in RBD and LSD.
12. 2^3 Factorial experiments.
13. Simple random sample.

14. Stratified random sample with random allocation.

Books for Reference:

1. R. Rangaswamy, *A Text Book of Agriculture Statistics*.
2. Nageswara Rao, *Statistics for Agricultural Sciences*.
3. V.Rajaraman and N Adabala, *Fundamentals of Computers*.
4. MS DOS Published by Microsoft Corporation.
5. MS Office Published by Microsoft Corporation.
6. S.C.Gupta, *Fundamentals of Statistics*.
7. S.J. Amdekar, *Statistical Methods: For Agricultural and Biological Sciences*.

FOOD PROCESSING EQUIPMENT - 2

Theory:

Unit I:

Heat Processing - Blanching, Pasteurization and Sterilization – principles, different methods and equipments. Processing in containers, process time, T-evaluation, Design of batch and continuous sterilization.

Unit II:

Mechanical Separations: Screening and Screening equipment, Centrifugation-principle, equipment involved in centrifugation, liquid-liquid centrifugation, liquid-solid centrifugation, clarifiers, desludging and decanting machines. Filtration: Principles involved in filtration, membrane separation, Pressure and vacuum filtration. Expression: batch and continuous type.

Unit III:

Baking, principles of baking, different types of ovens Roasting and Frying equipment-principles, different types of equipments involved in roasting, different types of fryers. Extraction and Leaching, extraction equipment, supercritical fluid extraction, Leaching equipment. Crystallization and Distillation: Basic principles involved.

Unit IV:

Freezing of Foods: Types of freezers including ice cream freezers, Freeze concentration and freeze drying. Freezing curves, phase diagrams, methods of freeze concentration, design problems.

Unit V:

Food processing equipment and it's applications in food industry. Permeability-theoretical considerations, permeability of gasses and vapors, permeability of multilayer materials, permeability in relation to packaging requirement of food.

Practicals:

Semester - II

1. Determination of gas transmission rate.
2. Shelf life calculations for food products.
3. Material balances over screen and screen effectiveness.
4. Study of freezers.
5. Study of CIP treatment in dairy plant.
6. Study of CIP treatment in Fruits & Vegetables processing plant.

Books for Reference:

1. C.P. Arora, *Refrigeration and Air Conditioning*, Tata McGraw Hill Company, New Delhi, 2000.
2. P. Fellows, *Food Processing Technology, Principles and Practice*, CRC Press. 2000.
3. Nuri N. Mohsenin, *Physical Properties of Plant and Animal Materials*, Ed.2009
4. Earle R.L, *Unit Operations in Food Processing*. Pergamon Press, 1983.

5. K.M. Sahay and K.K Singh, *Unit Operations of Agricultural Processing*, Vikash Publication House, New Delhi.

FOOD PACKAGING - 2

Theory:

Unit-I:

Packaging applications in Food Industry – Product-package compatibility - Food hazards in packaging - Shelf-life testing - Risk management.

Unit-II:

Controlled Atmospheric Packaging Technology (CAP) - Modified Atmospheric Packaging, Technology (MAP) - Advantages of CAP and MAP - Effect of gases on MAP foods using N₂, O₂ and CO₂

Unit-III:

Paper as packaging material – Paper manufacture - Pulp - Mechanical pulp - Chemical pulping – Alkaline processes – Soda process - Sulfate process - Sulfite process - Semi chemical pulping – Digestion - Bleaching - Beating and Refining - Paper making - Converting - Calendaring – Strength - additives - Sizing agents.

Unit-IV:

Glass as Package material - Composition of Glass - Basic parts of Glass container – Closures - Parts of Closures - Types of Closures - Properties of glass - Internal pressure resistance - Vertical load strength.

Unit-V:

Aseptic Packaging - Need for Aseptic Packaging - Materials used in Aseptic Packaging Process - Comparison of Conventional and Aseptic Packaging - Aseptic Packaging System – Advantages, applications in food industry.

Practicals:

Semester - II

1. Determination of coating on Package material.
2. Identification of plastic films.
3. Finding chemical resistance of films.
4. Visit to Marine Industry.
5. Visit to Fruit Industry

Books for Reference:

1. Gordon I Robertson, *Food Packaging Principles and Practice*, CRC Press, London.
2. Ranganna S, *Handbook of Analysis and Quality Control, Fruits and Vegetables Products*, Tata Mc Graw Hill, New Delhi, 1986.

FOOD QUALITY AND CERTIFICATION - 2

Theory:

Unit-I:

Comparison of laboratory panels with consumer panels. Limitations of consumer survey. Fundamentals of food regulations – Additives, Contaminants, Food regulations pertaining to aspects of hygiene, Novel foods and aspects of labeling,

Unit-II:

Different existing food legislations - norms in implementation. Food grade and standards - International food regulations and certifications - Indian food regulations and certifications. Major differences between Indian and International standards.

Unit-III:

Food laws and standards (BIS) - IPR patents - HACCP- Principles of HACCP and its role in Food Industry - The Concept and process of implementation of HACCP in food industry

Unit-IV:

Concept of Codex Alimentarius - USFDA - the cause of its existence - its role in safeguarding food quality - ISO 9000 series - significance.

Unit-V:

Food adulteration and safety - Fundamentals of Food regulations pertaining to Additives and Contaminants - Different existing Food legislations-norms in implementation.

Practicals:

Semester - II

1. Testing of different foods for adulterants.
- 2-4. Determination of threshold value for basic tastes and odours.
- 5-7. Judging and grading of canned food products.
8. Visit to a certification agency.
9. Visit to fruits and vegetables market for quality assessment.

Books for Reference:

1. Imteaz Ali, *Food Quality Assurance, Principles and Practices*, CHIPS, Texas.
2. J.L.Multon, *Quality Control for Food and Agricultural Products*, CHIPS, Texas.
3. Amerine, M.A.Pangborn, R.M and Rosseler, *Principles of Sensory Evaluation of Food*, Academic Press, New York, 1965.
4. Birk, G.G.Berman, J.G and Parker, K.J, *Sensory Properties of Foods*, Applied Science, London, 1977.
5. Pattee, H.E, *Evaluation of Quality of Fruits and Vegetables*, AVI, Westport. 1985.
6. Ranganna S, *Handbook of Analysis and Quality Control-Fruits and Vegetables Products*, Tata Mc Graw Hill, New Delhi, 1986.
7. BIS Standards on Sensory Evaluation.

FOOD ADDITIVES - 2

Theory:

Unit-I:

Food Colors – sources, types with reference to natural & synthetic. Properties, reactions with reference to processing, food applications. Non-permitted colors – risks, health hazards.

Unit-II:

Emulsifiers (natural & synthetic), stabilizers – examples, functions & mechanism, HLB scale. Sweeteners – Natural, artificial – risks & benefits of Sweeteners.

Unit-III:

Starch modifiers – Chemical nature, their role in food processing. Buffers – acids and alkalies, types and examples, importance in food processing. Applications of antioxidants in food industry.

Unit-IV:

Clarifying agents – definition and their role in food processing, anti caking agents and their role in food processing, Humectants - definition and their role in food processing, stabilizers and thickeners - examples and their role in food processing.

Unit-V:

Surface active agents, examples and their mode of action in foods, Bleaching and maturing agents - examples and their role in food processing, Methods of estimating dietary intake of food additives. Food additives and hygiene sensitivity.

Practicals:

Semester - II

1. Estimation of NaCl in processed foods.
2. Estimation of sulfated ash.
3. Estimation of SO₂.
4. Estimation of Benzoate.
5. Estimation of Gums from Fruits and Vegetables.
6. Determination of Lycopene content in foods.

Books for Reference:

1. AL Branen, Davidson and S. Salminen, *Food Additives*. Marcel Dekker Inc NY 1990.
2. Swaminathan, *Food Science, Chemistry & Experimental Foods*. Bappco Publishers, Bangalore.
3. Mahindra S.N., *Food additives – Characteristics detection and estimation*. Tata Mc Graw Hill Publication Company, New Delhi.
4. Srivastav, R.P. and Sanjeev Kumar, *Fruit and Vegetable Preservation, Principles and Practice*. International Book Distribution Company, New Delhi.

FOOD TRADE AND BUSINESS MANAGEMENT - 2

Theory:

Unit-I:

Marketing strategy, Packaging, Advertising, label intervention, pricing after sales services. Legislations, Licensing, Registration, Municipal laws, business ethics and income law, labour law application. Consumer complaint redressal.

Unit-II:

Management of export – import organization, Registration, Documentation, Case studies, Export – Import policies related to Horticultural sector. Functions of management, planning, kinds of enterprise plans, forecasting, steps in forecasting.

Unit-III:

Staffing and directing, principles of direction, communication, motivation. Controlling, requirements of good control system, co-ordination - features and techniques of Co-ordination.

Unit-IV:

Different process of marketing - market segmentation, methods of market segmentation, market positioning, market penetration, target marketing. Product life cycle, personnel marketing, scope and importance of personnel marketing.

Unit-V:

Scale of operations of food industry in India. Training methods and techniques, learning process, fixed capital- factors determining fixed capital requirements, sources of fixed capital, working capital. Distinction between home trade and International trade.

Books for Reference:

1. D. David and S. Ericson, *Principles of Agri. Business Management*. Tata Mc Graw Hill Book Co., New Delhi.
2. P.K. Srivastava, *Marketing Management*. Himalaya Publishing House, New Delhi.
3. G.S. Batra and Narinder Kumar, *GATT implications of Denkel proposal*. Azmol Publications, New Delhi.