



P.K. University
Shivpuri (M.P.)

Syllabus
For
**M.Sc. FOOD
TECHNOLOGY**
(I, II, III & IV SEMESTER COURSE)

W.E.F. - Session 2023 - 2024

P.K.UNIVERSITY SHIVPURI (M.P.)



M.Sc. Food Technology Examination Scheme (2023-24)

Semester	Course Code	Title of the Paper	Credit	L	T	P	T-CCE	T-UE	P-CCE	P-UE	Marks
First	MFOODFT101	Food Biochemistry & Nutrition	4	4	0	0	40	60	0	0	100
	MFOODFT102	Food Chemistry	4	4	0	0	40	60	0	0	100
	MFOODFT103	Food Microbiology	4	4	0	0	40	60	0	0	100
	MFOODFT104	Food Processing & Preservation	4	4	0	0	40	60	0	0	100
	MLABCFT105	Lab course I	2	0	0	4	0	0	20	30	50
	MLABCFT106	Lab course II	2	0	0	4	0	0	20	30	50
		TOTAL	20				160	240	40	60	500
Second	MFRUIFT107	Fruit and Vegetable Technology	4	4	0	0	40	60	0	0	100
	MFOODFT108	Food Engineering	4	4	0	0	40	60	0	0	100
	MFOODFT109	Food Packaging-I	4	4	0	0	40	60	0	0	100
	MFOODFT110	Food Quality Control, Laws & Management	4	4	0	0	40	60	0	0	100
	MLABCFT111	Lab course III	2	0	0	4	0	0	20	30	50
	MLABCFT112	Lab course IV	2	0	0	4	0	0	20	30	50
		TOTAL	20				160	240	40	60	500
Third	MPROCFT201	Processing of Cereals, Pulses, Oil Seed & Sugar crops	4	4	0	0	40	60	0	0	100
	MPROCFT202	Processing of milk and Milk Products	4	4	0	0	40	60	0	0	100
	MPROCFT203	Processing of Meat, Poultry & Egg Products	4	4	0	0	40	60	0	0	100
	MENTRFT204	Entrepreneurship in Food Processing, Food Standards & Food laws	4	4	0	0	40	60	0	0	100
	MLABCFT205	Lab course V	2	0	0	4	0	0	20	30	50
	MLABCFT206	Lab course VI	2	0	0	4	0	0	20	30	50
		TOTAL	20				160	240	40	60	500
Fourth	MADVAFT207	Advances in Food Technology	4	4	0	0	40	60	0	0	100
	MFOODFT208	Food Processing, Chemistry and Microbiology	4	4	0	0	40	60	0	0	100
	MLABCFT209	Lab course VII	2	0	0	4	0	0	20	30	50
	MDISSFT210	Dissertation	10	0	0	10	0	0	0	250	250
		TOTAL	20				80	120	20	280	500
		Total marks of all semester	80				560	960	140	460	2000

L – Lecture T- Theory P- Practical CCE- Continuous comprehensive Exam UE- University Exam



SYLLABUS-I SEMESTER

MFOODFT101: FOOD BIOCHEMISTRY AND NUTRITION

UNIT-I

Introduction to different food groups and its importance in nutrition.

Carbohydrate: Introduction, digestion, food sources. Metabolic pathways for breakdown of carbohydrates: glycolytic pathway, pentose phosphate pathway, citric acid cycle, electron transport chain, ATP balance, gluconeogenesis, deficiency, metabolic defects such as diabetes associated with carbohydrates.

UNIT-II

Protein: Introduction, Essential amino acids. food sources, metabolic defects, Metabolism of proteins – outlines (digestion and absorption); Nitrogen balance & nitrogen pool; Evaluation of quality of proteins, deficiency symptoms, prevention and cure.

Fat: Digestion: Introduction, digestion, metabolism outlines, essential fatty acids, food sources, metabolism of fat and fatty acid, nutritive functions, effects of excess and deficiency: obesity, cardiovascular diseases. Nutritional significance of lipo proteins.

UNIT-III

Fat soluble vitamins: Silent features, requirements, food sources, effects of excess and deficiency, principles.

Water soluble vitamins: silent features, requirements, food sources, effects of excess and deficiency.

Minerals: silent features, requirements, food sources, effects of excess (if any) and deficiency factors affecting utilization. Principles and outlines of estimation of micro and macro elements. Principles and outlines of estimation of fat soluble vitamins and water soluble vitamins.

Unit IV

Energy metabolism: Basal metabolic requirements and activity, SDA- specific dynamic action of food, respiratory quotient of food, caloric requirement of humans.

Recommendatory dietary allowance: concept of balance diet, menu planning in different ages and diseases.



P.K. University
Shivpuri (M.P.)

Unit V

Introduction to sensory evaluation, Selection of sensory panelists; Factors influencing sensory measurements; Sensory quality parameters -Size and shape, texture, aroma, taste, color and gloss; Detection, threshold and dilution tests Different tests for sensory evaluation – discrimination, descriptive, affective; Flavour profile and tests; Ranking tests; Methods of sensory evaluation of different food products. Selection and training of sensory panel; Detection and threshold tests; Ranking tests for taste, aroma colour and texture; Sensory evaluation of various food products using different scales, score cards and tests;

Text Books/References :

1. Lehninger, Nelson & Cox, Principle of Biochemistry, CBS Publication
2. Modern Experimental Biochemistry, Boyer, Pearson Education
3. Lubert stryer, Biochemistry, Freeman & Co, N.Y.
4. Voet & Voet, Fundamentals of Biochemistry, Jonh Willey & Sons
5. Hames, B.D.(Ed), Biochemistry, Viva Books
6. Essentials of Food and Nutrition, Swaminathan, Vol1 &2
7. Fundamentals of Food and Nutrition by Sumati. R. Muldambi
8. Nutrition and dietetics by Rose
9. Nutrition and dietetics by oshi



MFOODFT102: FOOD CHEMISTRY

UNIT-I

Carbohydrate : General introduction, classification, structure, properties and functions of carbohydrates, role of carbohydrate in food industries, sugars, starch, cellulose, glucans, hemicelluloses, gums, pectic substances, polysaccharides, Modified starch.

Browning reactions in food: Enzymatic and non-enzymatic browning in foods of vegetable and animal origin during storage and processing of foods.

Non-calorific sweeteners: Artificial and Natural
Methods of estimation of carbohydrates-principles and outlines

UNIT-II

Proteins: General introduction, classification, structure, properties, purification and denaturation of proteins, protein derived from milk, egg protein, meat protein, fish muscle protein, oil seed protein and cereal protein. Allergens associated with food proteins. Modified proteins and application in food industry. Single Cell Protein. Methods of estimation of protein- principles and outlines.

Food Adulteration- Outlines and detection methods.

UNIT-III

Lipids: General introduction, classification, properties, functions and requirements of food lipids, refining of crude oil, hydrogenation and winterization. Vegetable and animal fat, margarine, lard, butter. Frying and shortenings. Flavor changes in fats and oils, lipid oxidation & factors affecting lipid oxidation. Methods of estimation of lipids- Principles and outlines.

Unit IV

Vitamins: General introduction, Fat and Water soluble Vitamins, effect of various processing treatments and fortification of foods.

Minerals: General introduction, effect of various processing treatments

Water: Chemistry, role in food storage, water activity and growth of microorganisms, physical, chemical and microbiological characteristics of water.

Unit V

Enzymes: General introduction, Nature, function, nomenclature & structure, its Classification and properties of enzymes and its activity in different food systems, factors affecting rate of enzymatic action .Flavor production by enzymes.

Plant pigments and their role in Food Industry: Carotenes, Xanthophylls, Chlorophyll, Bitter Substances and Tannins.



P.K. University
Shivpuri (M.P.)

Textbooks and Reference materials

1. Beltz, H.D. 2005. *Food Chemistry*. Springer Verlag.
2. Fennema, O.R., 2006, *Food Chemistry*, Academic Press.
3. Meyer, L.H. 1987. *Food Chemistry*. CBS publishers and Distributors, New Delhi.
4. Potter, N.N. and Hotchkiss, J.H. (2006), *Food Sciences*, Fifth edition, CBS publishers and Distributors, New Delhi.
5. Fennema, O.R. 2006. *Food Chemistry*. Marcel D



MFOODFT103: FOOD MICROBIOLOGY

UNIT I

Definition, Historical Development, Classification and importance of Yeast, Mold and Bacteria. Importance and significance of microorganisms in Food science. Micro-organisms importance in food - Factors affecting the growth of micro organisms in food – Intrinsic and Extrinsic parameters that affect microbial growth.

UNIT II

Food Hygiene and Sanitation: Contamination during handling and processing and its control; indicator; indicator organisms; rapid methods in detection of microorganisms. Thermal inactivation of microbes-Concept, determination & importance of TDT, F, Z & D values, factors affecting heat resistance, pasteurization and sterilization.

UNIT III

Protection and preservation of Foods: Modified atmosphere, Radiation in Foods from the microbiological angle. Outlines of indicators of water and food safety and quality- Microbiological criteria of foods and their significance.

UNIT IV

Food spoilage: Characteristic features, dynamics and significance of spoilage of different groups of foods- Cereal and cereal products, vegetables and fruits, meat, poultry and sea foods, milk and milk products, packed and canned foods.

Microbes: *Bacterial food borne diseases* (Staphylococcal intoxication, Botulism, Salmonellosis, Shigellosis, Enteropathogenic Escherichia Coli Diarrhoea, Clostridium Perfringens gastroenteritis, Bacillus cereus Gastroenteritis), *Mycotoxins:* Aflatoxicosis, Deoxynivalenol Mycotoxicosis, Ergotism.

UNIT V

Colorimetry: Introduction, beers & lamberts law, extinction coefficient, general principles of colorimeter, application in food industry.

Flourimetry: Introduction, principle, instrumentation & application., Flamephotometry: Instrumentation & application.

Spectroscopy: General principle, instrumentation, types-atomic absorption spectrophotometer, UV-Visible, principle, instrumentation & applications.

TextBooks/References:

1. Essentials of Microbiology; K.S. Bilgrami; CBS Publishers, Delhi
2. Food Microbiology; WC Frazier; Tata McGraw Hill, Delhi
3. Modern Food Microbiology; James M Jay; CBS Publishers, Delhi
4. Microbiology; Pelczar, Chan and Krieg; Tata McGraw Hill, Delhi
5. Basic Food Microbiology; Bannett, Chapman and Hall
6. Food Microbiology; M.R. Adams
7. Handbook of Microbiology; Bisen



MFOODFT104: FOOD PROCESSING & PRESERVATION

UNIT-I

Introduction: Definition and scope of Food science and technology, historical development of food processing and preservation, general principles of food preservation

Processing and preservation by heat: Blanching, pasteurization, sterilization and UHT processing, canning, extrusion cooking, dielectric heating, microwave heating, baking, roasting and frying. Retort processing of ready to eat (RTE) products.

Baking: Milling, Principle of baking various of baked products.

UNIT-II

Radiation: Source of radiations, mode of action effect on microorganisms and different nutrients dose requirements for radiation preservation of food.

Microwave heating: Principles and application in Food processing.

UNIT-III

Refrigeration and Freezing Preservation: Refrigeration and storage of fresh food major requirement of refrigeration plant atmospheric storage, refrigerated storage of various food freezing point of selected food influence of freezing and freezing rate of quality of the food product. Method of freezing storage, and thawing of frozen food.

Unit IV

Chemical Preservation: Preservation of food by use of sugar, salt, chemicals, antibiotics & by smoking

Concentration: Application in food industry processes and equipment for manufacture of various concentrated foods and their keeping quality

Fermentation: Application in preservation of food pickling. curing etc

Unit V

Drying: Processing and preservation by drying, concentration and evaporation, various methods employed in production of dehydrated food products, selection of methods based on characteristics of foods to be produced, advantages and disadvantages of different methods, sun-drying, tray or tunnel drying, spray drying, drum drying, freeze drying, fluidized bed drying. Physical and chemical changes during drying control of chemical changes, desirable and undesirable changes. Packaging and storage of dehydrated food products. Outlines of moisture analysis.

Textbooks and Reference materials

1. Desrosier NW & James N. (2007). Technology of food preservation. AVI Publishers
2. Fellows, P.J. (2005). Food processing technology: Principle and Practice. 2nd Ed. CRC Publishers
3. Jelen, P. (2005). Introduction to Food Processing. Prentice Hall
4. N.M. Potter, Food Science and Technology.



LAB COURSE I

1. Qualitative analysis of carbohydrates
2. Qualitative analysis of Proteins
3. Analysis of lipids: acid value, iodine value, saponification value etc
4. Estimation of carbohydrates in food materials
5. Estimation of proteins in food materials
6. Estimation of crude fibre in food materials
7. Estimation of ascorbic acid in food materials
8. Estimation of calcium in food materials
9. Estimation of cholesterol in food materials
10. Estimation of calorific value of foods.

Lab course-II

A) Processing of Food and Food Microbiology

1. Determination of moisture in different food samples.
2. Determination of TSS in different food samples.
3. Quality assessment by Blanching and browning control
4. Quality assessment by different drying methods.
5. Determination of acidity and pH different food samples.
6. Determination of ash in food samples.
7. Instruments used for food processing.
8. Determination of gelatinization
9. Stages of sugar cookery
10. Estimation of gluten content

B) Food Microbiology Lab

1. Preparation of common laboratory media and study of a compound microscope.
2. Staining: Gram's staining,
3. Sub culturing of a bacterial strain in liquid and solid medium.
4. Study of growth of E. coli by a spectrophotometer.
5. Study of microbiological quality of milk by MBRT test.
6. Preparation of synthetic medium for yeast and mould and inoculation with standard strains of yeasts and moulds.
7. Microbiological analysis of typical processed food and unprocessed food.
8. Dilution and Plating by spread –plate and pour–plate techniques.
9. Isolation of pure culture.
10. Test for adulteration in different food samples.



SYLLABUS-II SEMESTER

MFRUIFT107: FRUITS AND VEGETABLE TECHNOLOGY

UNIT-I

Introduction, definition, role, importance and status of post harvest technology.

Fruits and vegetables: Morphology of fruits and vegetables, maturity indices and methods of maturity determinations. Post-harvest physiological and biochemical changes in fruits and vegetables, ripening of climacteric and non climacteric fruits; regulations, methods.

UNIT-II

Post harvest disorders- Factors affecting post harvest changes, handling and packaging of fruits and vegetables, chilling injury & disease, storage practices: CA and MA, hypobaric storage, pre-cooling and cold storage, Zero energy cool chamber, commodity pretreatments - chemicals, wax coating, VHT and irradiation.

UNIT-III

Drying and dehydration of fruits and vegetables, problems related to storage of dehydrated products, Canning of fruits and vegetables, its process, spoilage in canned foods. Changes during freezing of fruits of vegetables and problems related to storage of frozen products.

UNIT-IV

Vinegar: Method of preparation and quality control

Tea, Coffee and Cocoa: Production and manufacturing.

Pectin: Raw material processes and uses of pectin, products based on pectin, manufacturing and quality control.

UNIT-V

Fruits and Vegetables: Preparation of juice, syrup, squashes, jam, jellies, marmalades, cordials and nectars, fortification and soft drinks.

Tomato products: Preparation of various tomato products and quality control.

Pickles and chutney: Preparation of various pickles, sauces and chutneys, problems related to shelf life of pickles and chutneys, quality control.

References:

1. Bose, T.K. Ed. 1985. Fruits of India: Tropical and Sub-tropical. Naya Prokash, Calcutta.
Dauthy, M.E. 1997. Fruit and Vegetable Processing. International Book Distributing Co. Lucknow, India.
2. Hamson, L.P.1975. Commercial Processing of Vegetables. Noyes Data Corporation, New Jersey.



P.K. University
Shivpuri (M.P.)

3. Lai,G.,Siddappa,G.andTondonG.L.1986.Preservationof Fruits and Vegetables, Indian Council of Agril. Research, New Delhi.
4. Salunkhe, D.K. and Kadam, S.S.Ed. 1995. Handbook of Fruit Science and Technology: Production, Composition and Processing. Marcel Dekker, NewYork.
5. Salunkhe, D.K. and Kadam, S.S. Ed. 1995. Handbook of Vegetable Science and Technology. Production, Composition, Storage and processing Marcel Dekker, NewYork.
6. Srivastava,R.P. and Kumar,S.1998.Fruit and Vegetable Preservation: Principles and Practices.2nd Ed. International Book Distributing Co. Lucknow.



MFOODFT108: FOOD ENGINEERING

UNIT-I

Introduction: General concept, essential scope & scenario

Size Reduction process: Principles, theories & laws, energy consideration, equipments & size reduction of various food products

Mixing & forming: Theory & applications, mixing indices, equipments for solid and liquid foods products.

UNIT-II

Process Heat Transfer: Modes of heat transfer and overall heat transfer; thermal properties of foods such as specific heat and thermal conductivity, Fourier's law, steady state and unsteady state conduction, heat exchange equipment; energy balances; rate of heat transfer; thermal boundary layer, heat transfer by forced convections, heat transfer to flat plate and in non Newtonian fluids, heat transfer in turbulent flow; heating and cooling of fluids in forced convection outside tubes, natural convection

UNIT-III

Food dehydration: Mechanism of drying, moisture & drying rate curves, constant and falling rate periods, spray, drum cabinet, tunnel, fluidized bed dryer, batch & continuous operation, osmotic dehydration & freeze drying.

Evaporation: Properties of liquid, heat & mass balance, single & multiple effect evaporation, steam economy, heat recovery, efficiency, equipments & systems.

UNIT-IV

Chilling, refrigeration & freezing : Introduction, types of freezers, pre-cooling & cold storage, Shelf life extension requirements, theories, characteristic curve, cooling rate calculations, chilling & freezing equipments, cryogenics, freeze drying, properties of frozen foods.

UNIT-V

Separation processes:

Centrifugation: General principles, instrument t& types of centrifuges, preparatory & analytical centrifugation & applications.

Chromatographic

Techniques:

General

introduction to principles, partition & adsorption chromatography-paper, thin layer, gas & liquid, ion exchange & affinity chromatography, gel filtration, HPLC and application in food industry

Membrane filtration technology: Principles of other food processing such as-RO, UF, Dialysis, osmosis, micro filtration, and nano filtration-outlines



MFOODFT109: FOOD PACKAGING-I

UNIT I

Introduction to Food Packaging: Packaging terminology-definition, types of packaging. Functions of food packaging, characteristics of food stuff that influences packaging selection.

UNIT II

Packaging material and their properties: Glass, paper and paper board, corrugated fiber board (CFB), Metal containers-Tin Plate and Aluminum, composite containers, collapsible tubes, plastic films, laminations, metalized films, Co-extruded films, testing of packaging material.

UNIT III

Packaging systems and methods: vacuum packaging, controlled atmospheric packaging, modified atmospheric packaging, aseptic packaging, retort processing, microwave packaging, active packaging, intelligent packaging, edible packaging, shrink and stretch packaging.

UNIT IV

Packaging of fresh and processed foods: Packaging of fruits and vegetables, fats and Oils, spices, meat, Poultry and sea foods, dairy Products, bakery, beverages, dehydrated and frozen foods. Liquid and powder filling machines – like aseptic system, form and fill (volumetric and gravimetric), bottling machines. Form Fill Seal (FFS) and multilayer aseptic packaging machines.

UNIT V

Packaging Laws, Regulations, Evaluation and Quality control- Toxicity, shelf life testing, corrosion, tensile strength, bursting strength, tearing resistance, puncture resistance, impact strength, tear strength, their methods of testing and evaluation, barrier properties of packaging materials-Theory of permeability, factors affecting permeability, permeability coefficient, gas Transmission rate(GTR) and its measurement, water vapor transmission rate(WVTR)and its measurement, prediction of shelf life of foods, selection and design of packaging material for different foods.

TextBooks and Reference materials

1. Robertson, G.L. 2006 Food Packaging: Principles and Practice (2nd ed.), Taylor & Francis
2. NIIR. (2003). Food Packaging Technology Handbook, National Institute of Industrial Research Board, Asia Pacific Business Press Inc.
3. Ahvenainen, R. (Ed.) 2003 Novel Food Packaging Techniques, CRC Press,
4. Han, J.H. (Ed.) 2005 Innovations in Food Packaging, Elsevier Academic Press,
5. Coles, R., McDowell, D. and Kirwan, M.J. (Eds.) 2003 Food Packaging Technology,



MFOODFT110: FOOD QUALITY CONTROL, LAWS AND MANAGEMENT

UNIT-I

Food safety and hygiene

Food safety concept- Importance of food safety in food processing. Food hygiene and its practices (GMP/GHP, GAP, GLP). Hygiene verification on food industry, cleaning and sanitation (CIP, ETP, WTP, Pest control) prevention and control.

UNIT-II

Concept of quality: Quality attributes- physical, chemical, nutritional, microbial and sensory, their measurement and evaluation. Quality measurement techniques, process design and control and product design and control, TQM, IPR and Patent.

UNIT-III

Food laws and regulations: Food safety 2006, 2011 act and regulation, FSSAI. Various organizations dealing with inspection and traceability and authentication, Certifications (BIS, AGMARK, ISO, FPO, MFPO, PFA, MPO, etc.)

UNIT-IV

International food laws and regulations: US Federal laws, USDA, FDA, FAO, WHO, CODEX, HACCP.

Differential financial institutions: NABARD, WTO, World Bank.

UNIT-V

Entrepreneurship in food processing: Concept of entrepreneur and entrepreneurship, quality, functions of an entrepreneur. Current status of entrepreneurship in Indian food industries. Introduction to marketing (demand, supply, sample survey techniques, marketing information, consumer trends and behavior), and HRM (concept, planning and appraisal).

References:

1. Early R. 1995. *Guideto QualityManagement Systems forFood Industries*. Blackie Academic.
2. Krammer A & Twigg BA. 1973. *Quality Control in Food Industry*. Vol. I, II. AVI Publ.
3. Chhabra TN & Suria RK. 2001. *Management Process and Perspectives*. Kitab Mahal.
4. Jhingan ML. 2005. *International Economics*. 5th Ed. Virnda Publ.
5. Kotler P. 2000. *Marketing Management*. Prentice Hall.
6. Reddy SS, Ram PR, Sastry TVN & Bhavani ID. 2004. *Agricultural Economics*. Oxford & IBH.



LAB COURSE I

1. Canning of fruits and vegetables.
2. Dehydration of fruits and vegetables.
3. Preparation of tomato juice.
4. Preparation of tomato puree.
5. Preparation of tomato paste.
6. Preparation of various types of pickles.
7. Preparation of tomato ketchup.
8. Preparation of tomato mock tail.
9. Preparation of tomato soup.
10. Preparation of tomato chutney.
11. Preparation of jackfruit pickles.
12. Preparation of jams
13. Preparation of lime squashes.
14. Preparation of jellies.
15. Preparation of jam marmalades.
16. Pectin determination
17. Determination of chemical preservatives in fruits and vegetables.
18. Blanching of fruits and vegetables for quality estimation.

LAB COURSE II

1. Testing of different types of packaging materials.
2. Determine moisture content in given package samples.
3. Test for modified starch in different package materials.
4. Test for water absorbency in corrugated fibre board box.
5. Test for types of adhesive used in CFB.
6. Development of new food products and formulations.
7. To perform flap bend test in CFB.
8. Test for formal shock resistance in glass bottles.
9. Graphical representation of moisture contents in different food products.
10. Determination of shelf lives.



SYLLABUS-III SEMESTER

MPROCFT201: Processing of Cereals, Pulses, Oil Seed & Sugar Crops

UNIT I (8 lectures)

Wheat Technology: Composition of grain and environmental effects on its processing quality, enzymes of wheat and their role in the manufacture of wheat products; principles of wheat milling and its effect on composition of flour, aging of flour, byproducts, chemical improvers-bleaching and maturing agents, property of dough and its rheology, manufacture of wheat products bread, biscuits etc.; formulation of premixes for bakery products; pasta goods and processed cereal foods for infants.

UNIT II (10 lectures)

Rice Technology: Composition, type of proteins, starch content, amylose and amylopectin fractions; presence and effect of lipases; distribution of vitamins; minerals, and proteins in rice grain and its relation to milling; rice milling operations and its effect on nutritive value; cooking quality; byproducts of rice milling and their utilization; processed and prepared mixes based on rice.

UNIT III (8 lectures)

Legumes: Composition, anti-nutritional factors, processing methods, methods of cooking.

UNIT IV (10lectures)

Corn Technology: Composition, processing of corn for manufacture of corn grits, meal and flour; manufacture of corn flakes, corn syrup, cornstarch, corn steep liquor, corn oil and canned corn. Composition and Processing of millets like barley, sorghum, oats etc.

UNIT V (9lectures)

Oilseeds: Composition, processing of oilseeds as protein concentrations, properties and uses of oilseeds meals, technology vegetable protein isolates; Barrier compounds in the utilization of oil seed proteins. Low cost protein foods from oilseeds.

Unit VI

Processing of Sugar Crops : sugarcane, Sugar beet crops and their differences, sugar production and manufacturing , Types of Sugar, Products of sugar (alcohol, Beer, Wine, Sugar, Syrups)

Practical

- Physico-chemicalandrheologicalexaminationofwheatanditsproductstestweight,kernel hardness, gluten content, milling tests.
- Evaluationofriceamyloseandamylopectindetermination, gelatinization temperature, water absorption tests.
- Experimental par boiling and assessment of degree of polishing.



P.K. University
Shivpuri (M.P.)

- Experimental baking of selected cereals products bread, biscuits.
- Preparation of protein concentrates and isolates and their evaluation for protein content and solubility.
- Determination of Yeast activity used in fermented cereal products.
- Quality test for wheat flour used in the baked products.
 - Maltose Number
 - Water Absorption
 - Sedimentation value
 - Alcohol Acidity
- Texture profile analysis of baked cereal food products by texture analyzer.

Learning Outcome: The students will have learnt about composition and processing of various cereals, pulses and oilseeds.

Reference Books

- ChakrabartyMM.2003.Chemistryand TechnologyofOilsand Fats.PrenticeHall.
- DendyDAV&DobraszczykBJ.2001.CerealandCerealProducts.Aspen.
- HamiltonRJ&BhatiA. 1980.Fats and Oils- Chemistryand Technology.App. Sci. Publ.
- HosneyRS. 1994. Principles of Cereal Scienceand Technology. 2nd Ed.AACC.



MPROCFT202: Processing of milk and Milk Products

UNIT I (12 lectures)

Introduction: Physicochemical properties of milk, Platform tests, Chemical composition and nutritive value of milk, Factors affecting composition of milk. Importance of milk industry in India: Collection, chilling, transportation, cream separation, standardization, pasteurization, sterilization, homogenization, packaging, storage and distribution of fluid milk, Ultrahigh temperature processed milk.

Preparation of various types of milks: Toned, homogenized, fortified, reconstituted and flavored milk.

UNIT II (12 lectures)

Technology of fermented milk products: Principles and practices of manufacture, packaging, storage and marketing of Dahi, cultured butter milk, acidophilus milk etc. Preparation of soft curd milk, vitaminized milk, standardized milk, filled milk and imitation milk.

Cheese: Manufacture of hard, semi hard, soft and processed cheeses. Storage, grading and marketing of cheese, cheese defects and their control. Butter: Manufacture, packaging, storage and marketing of butter; butter defects and their control, margarine.

UNIT III (8 lectures)

Technology of frozen milk products: Classification, manufacture, packaging, storage and marketing of ice cream, ices, sherbets etc. defects of frozen products and their control. Technology of evaporated and dried milk: Manufacture of evaporated milks and milk powders. Packaging storage defects and their control.

Technology of condensed milk: Manufacture of condensed milks, Packaging storage defects and their control.

UNIT IV (8 lectures)

Technology of dairy by products: Utilization of skim milk, buttermilk and whey for the manufacture of casein, lactose etc. Technology of indigenous milk products: Principles and practices of manufacture, packaging, storage and marketing of ghee, Khoa, Chhena, shrikhand, paneer, rasogulla, gulabjamun and Milk based foods.

UNIT V (5 lectures)

Sanitary aspects of dairy plant building, equipment and their maintenance. Disposal of dairy plant waste. Application of membrane technology in dairy industry.

Practical

- Platform test for raw milk
- Determination of moisture content in milk
- Determination of fat content in Milk powders and ice-cream products.
- Determination of Milk adulterants: Starch, Urea, Formaldehyde and Sugar,



P.K. University
Shivpuri (M.P.)

- Hydrogenperoxide, salt and detergent
- Operation, cleaning and sterilization of dairy plant machinery involved in fluid milk processing
- Preparation of toned, homogenized, fortified, reconstituted and flavored milks
- Manufacture of fermented milks.
- To study the kinetics of enzymes and manufacture of cheeses.
- Manufacture of butter
- Manufacture of ice-cream, ices, sherbets.
- Manufacture of casein, ghee, khoa, chhena.
- Sensory analysis of food products: Paired comparison test, Duo-trio test, Hedonic test, Triangle test, Ranking test, Single sample test, Composite scoring test,
- Analysis of water used in food industries i.e. Alkalinity, Acidity, Hardness, pH, TPC and Coliform count

Learning Outcomes: After completion of course students are expected to have an understanding of processing methods of milk in a dairy industry and manufacturing of dairy products.

Reference Books

- Aneja RP, Mathur BN, Chandan RC & Banerjee AK. 2002. Technology of Indian Milk Products. Dairy India Publ.
- DeS. 1980. Outlines of Dairy Technology. Oxford Univ. Press.
- Rathore NS et al. 2008. Fundamentals of Dairy Technology - Theory & Practices. Himanshu Publ.



MPROCFT 203: Processing of Meat, Poultry & Egg Products

CourseContent

- UNIT I** (8lectures)
Scope of meat & meat products industry in India. Structure of meat tissue. Chemical composition and nutritive value of meat Mechanism of muscle contraction and relaxation.
Postmortem changes-factor affecting post-mortem changes, thaw rigor and cold shortening
Properties of fresh meat. Meat carcass grading and cuts. Restructured meat products, Pre rigor processing of meat. Meat tenderization -and its techniques.
- UNIT II** (6lectures)
Preservation of meat & poultry- chilling, freezing, curing, smoking, canning, dehydration, irradiation, freeze drying, antibiotics, microwave, chemicals
- UNIT III** (2 lectures)
Utilization of meat industry by-products.
- UNIT IV** (8lectures)
Eggs - structure, composition, nutritive value and functional properties of eggs. Internal quality of eggs-evaluation, quality troubleshooters in eggs, egg grading. Preservation and maintenance of internal quality of eggs, Egg products-Egg powders, frozen eggs, egg foams, factors influencing foaming.
- UNIT V** (6lectures)
Poultry -types, factors affecting quality, chemical composition and nutritive value of poultry meat
Poultry dressing-ante and post mortem examination, methods of stunning, slaughter, scalding & dressing. Tenderness of poultry, problem factors in poultry meat. Utilization of poultry industry by-products.

Learning Outcome: Students will have learnt about chemistry of meat and various processing methods used for meat, fish, poultry and eggs.

Reference Books

- Govindan TK. 1985. Fish Processing Technology. Oxford & IBH.
- Hui YH. 2001. Meat Science and Applications. Marcel Dekker. 32
- Kerry J. et al. 2002. Meat Processing. Woodhead Publ. CRC Press.
- Pearson AM & Gillett TA. 1996. Processed Meat. 3rd Ed. Chapman & Hall.



MENTRFT204: Entrepreneurship in Food Processing, Food Standards & Food laws

UNIT I

(6 lectures)

Aggregate Planning:- General design considerations, Financial Analysis, plant location and plant layout, Flowcharts and their design, equipment selection

UNIT II

(4 lectures)

Design of service facilities

UNIT III

(4 lectures)

Human resource planning: Planning and design of marketing system, worker's safety and plant hygiene

UNIT IV

(6 lectures)

Introduction to Marketing and economics: Demand, Supply, Sample survey techniques, marketing information, consumer trends, consumer behavior.

UNIT V

(10 lectures)

Introduction to Operations Research: Definition, applications. Inventory control, Linear Programming. Queuing Theory, Transportation and Assignment. Forecasting

UNIT VI

(10 lectures)

Food standards and laws: International – Concept of Codex alimentarius, HACCP, GMP, GHP, USFDA, ISO 9000, ISO 22000, ISO 14000. National – Introduction of BIS/IS, Food Safety and standards – 2006, Food Safety and standard regulation 2010, FPO, MPO, MMPO, Agmark. Prevention of food adulteration Act: Food Adulteration: definition, common adulterants in different foods, contamination, methods of detection. Food additives and legislation; coloring matter, preservatives, poisonous metals, antioxidants and emulsifying and stabilizing agents, insecticides and pesticides. PFA specification for food products, Nutritional labeling



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Learning Outcome: The students would have been acquainted with designing and planning of food plant layout and operations research.

Reference Books

- ChandraP.2005.Project Management.TataMcGraw Hill.
- GopalKrishanP &Nagarajan K.2005.Project Management.New Age.
- HisrichRD &Peters MP.2002. Entrepreneurship.Tata McGrawHill.
- Kaplan JM. 2003. PatternsofEntrepreneurship. John Wiley& Sons.
- NandanH.2007.FundamentalsofEntrepreneurshipManagement.PrenticeHall.
- Early R.1995.Guide to Quality Management Systems for Food Industries. Blackie Academic.
- KrammerA&TwiggBA.1973. QualityControlinFoodIndustry. Vol.I,II.AVIPubl



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SYLLABUS- IV SEMESTER

MADVAFT 207: Advanced in Food Technology

UNIT I

Food technologists, quality assurance analysts, and packaging supervisors execute important roles in food companies. Extrusion cooking in the food company; the effect of process factors on the physicochemical and nutritional properties of processed foods' Cooking and preparation of meat analogues using thermoplastic extrusion, as well as the advantages of meat analogues over natural meat..

UNIT II

Advances in non thermal processing of foods: bio-preservation, ultra-sonification, high hydrostatic pressure processing, pulsed electric processing.

UNIT III

Advances in fortification (complementation and supplementation); techniques of food fortification; advances in the use of radiation and microwaves in the preparation of foods GM foods:

UNIT IV

Encapsulation: design and structure of microcapsules; techniques of microencapsulation; advantages and applications of encapsulation.

UNIT V

Health benefits of nutraceuticals, antioxidants, phytosterols; dosage for effective control of disease or health benefit with adequate safety Prebiotics and probiotics: usefulness of probiotics and prebiotics , Fractionation of fat, Super-critical carbon dioxide extraction, Introduction to food biotechnology, application and food processing



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Textbooks and reference materials

- Lopez, G.F.G., and Caaovas, G.V.B., Food Science and Food Biotechnology, CRC Press, Florida, USA.2003.
2. Bains, W. Biotechnology from A to Z. Oxford University Press, 2009.
 3. Cupp J. & Tracy TS. Dietary Supplements. Humana Press, 2003.



MFOODFT208: Food Processing Chemistry and Microbiology

Unit I

Extrusion technology: general principles, extrusion process, advantages of extrusion, extrusion equipment, single screw extruders and twin screw extruders, effect of extrusion on food properties, extrusion of starch based foods. Hydrostatic pressure technology: general principles, effect of hydrostatic pressure on microorganisms-possible mode of action, application of hydrostatic pressure technology in food industry.

Unit II

Hurdle technology: principles and basic aspects of hurdle technology, different hurdles, hurdle effect, application of hurdle technology in dairy products, intermediate moisture foods, fermented products, heated foods and chilled foods. Membrane technology: introduction of membrane, their classification and function, principles of reverse osmosis and ultrafiltration, nanofiltration and microfiltration, applications of membranes in food processing industry, modules for using membrane filters.

Unit III

High intensity electric field pulses (HIEFP), Ultrasound in food processing and preservation: Introduction, ultrasound instrumentation, Principles and uses of ohmic heating, dielectric heating and infra red heating, Microwaves processing, properties of microwaves,

Unit IV

Food chemistry- definition, scope and importance; water in food, water activity and shelf life of food; chemistry and stability of water and fat soluble vitamins; chemical properties of minerals and their bioavailability, enrichment and fortification. Protein, carbohydrate, fat and oil classification, properties, and use in food industries.

Unit V

Foods microbiology and public health: food poisoning, types of food poisonings, important features etc.; bacterial agents of food borne illness, food poisoning by clostridium, salmonella, E. coli, bacillus, staphylococcus etc.; non-bacterial agents of food borne illness: poisonous algae, and fungi - a brief account.

Unit VI

Food spoilage and microbes of milk, meats, fish and various plant products, spoilage of canned foods; methods of isolation and detection of microorganisms or their products in food; conventional methods; rapid methods (newer techniques) - immunological methods; fluorescent, antibody, radio immunoassay, principles of ELISA, PCR (Polymerized chain reactions).

Unit VII

Indicators microorganisms; microbiological criteria of foods and their significance; the HACCP system and food safety used in controlling microbiological hazards, applications of hurdle technology for controlling microbial growth.



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Recommended Books:

1. Gloud, G. W. (1995). New Methods of Food Preservation, Springer Publication
2. Holdsworth, S. D. (1993). Aseptic Processing and Packaging of Food Products, Elsevier, London.
3. Church, P. N. (1993). Principles and Applications of Modified Atmosphere Packaging of Food, Blackie Academic & Professional, U.K.
4. Leistner L & Gould G.W. (2002). Hurdle Technologies: Combination Treatments for Food Stability, Safety and Quality. Springer Publications
5. Gustavo V. Barbosa-Cánovas, María S. Tapia, M. Pilar Cano (2005). Novel Food Processing Technologies , CRC press
6. Tewari, G, Juneja, V.K. (2007). Advances in thermal and non-thermal preservation, Wiley Blackwell Press
7. Da Wen Sun (2005). Emerging Technologies for Food Processing, Academic Press. James M. Jay (2000).
8. Modern Food Microbiology, 5th Edition, CBS Publishers.
9. Banwart, G.J. (1997). Basic Food Microbiology, CBS Publishers.
10. Adam M.R. & Moss, M.O. (1995). Food Microbiology, New Age International Pvt. Ltd. Publishers.

MSEMIFT209: Lab Course VII

MDISSFT210: Dissertation