

AKS UNIVERSITY, SATNA
Scheme of Diploma course in Food Technology
Course Duration: 3 years
Diploma (Food Technology)

SEMESTER III

Sr. No.	Subject Code	Subject	L	P	Credit
1	28FT301	Technology of Milk and Dairy Products	2	0	2
2	28FT302	Applied Nutrition	3	0	3
3	28FT303	Technology of Cereal and Pulses	3	0	3
4	28FT304	Food Technology	2	0	2
5	28FT305	Biochemistry	3	0	3
6	28FT306	Bakery Technology	3	0	3
1	28FT351	Technology of Milk and Dairy Products (Lab)	0	1	1
2	28FT352	Applied Nutrition (Lab)	0	1	1
3	28FT353	Technology of Cereal and Pulses (Lab)	0	1	1
4	28FT354	Food Technology (Lab)	0	1	1
5	28FT355	Biochemistry (Lab)	0	1	1
6	28FT356	Bakery Technology (Lab)	0	1	1
7	28FT357	Skill Development (Bakery)	0	2	2
TOTAL			16	8	24

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IV Semester

Scheme & Syllabus

Sr.No.	Subject Code	Subject	L	P	Credit
Theory					
1	28FT401	Principles of Food Processing	4		4
2	28FT402	Technology of Fruits and Vegetables	4		4
3	28FT403	Food and Industrial Microbiology	2		2
4	28FT404	Food Packaging	2		2
5	28FT405	Sensory Evaluation Techniques	2		2
6	28MT406	Plant Organization and Management	3		3
Practical					
1	28FT451	Principles of Food Processing-Lab		2	1
2	28FT452	Technology of Fruits and Vegetables-Lab		2	1
3	28FT453	Food and Industrial Microbiology-Lab		2	1
4	28FT454	Food Packaging-Lab		2	1
5	28FT455	Sensory Evaluation Techniques-Lab		2	1
6	28FT456	Skill Development (Milk and Milk Products)-Lab		4	2
Total Credit			17	14	24

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SEMESTER V

Sr. No.	Subject Code	Subject	L (Hr)	P (Hr)	Credit
1	28FT501	Grain Storage Technology	3	0	3
2	28FT502	Technology of Oil Seeds	3	0	3
3	28FT503	Technology of Beverage Production	3	0	3
4	28FT504	Confectionary and Convenience Foods	2	0	2
5	28FT505	Food Quality Analysis	3	0	3
1	28FT551	Technology of Beverage Production (Lab)	0	2	1
2	28FT552	Technology of Oil Seeds (Lab)	0	2	1
3	28FT553	Food Quality Analysis (Lab)	0	2	1
4	28FT554	Skill Development (Confectionary)-Lab	0	4	2
5	28FT555	Industrial Training-(1 Month)	0	0	5
TOTAL			14	10	24

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VI Semester

Scheme & Syllabus

Sr.No.	Subject Code	Subject	L	P	Credit
Practical					
1	28FT651	Project Report			15
2	28FT652	Skill Development (Cereals, Pulses and Oilseeds)- Lab		20	10
Total Credit				20	25

Diploma (Food Technology)

SEMESTER III

1. TECHNOLOGY OF MILK AND DAIRY PRODUCTS 3(2+1)

RATIONALE

This subject is aimed at developing an understanding of various process technologies and handling of equipment used in the processing and value addition of milk and milk products in the students

DETAILED CONTENTS

UNIT 1.

Introduction – Status and scope of dairy industry in India; Fluid Milk - Definition of milk, composition, physical and chemical properties of milk constituents and nutritive value of milk, factors affecting composition of milk, types of milk, Physico-chemical properties of milk: Colour, flavour, taste, specific gravity, & density, boiling and freezing point, refractive index, acidity and pH, viscosity, surface tension, thermal conductivity. Basis for pricing of milk

UNIT 2

Quality control tests; Platform tests like-smell, appearance, temp, sediment, acidity, lactometer reading
Chemical/Laboratory test: Acidity, PH, alcohol, fat, SNF, etc. Microbiological: SPC, MBRT, Resazurin tests etc.; Fluid Milk Processing - Receiving, Filtration and clarification, straining, standardization

UNIT 3

Homogenization and its effects, Pasteurization: and various systems of Pasteurization; LTLT, HTST, UHT methods, Pasteurizers (Heating system, cooling system, flow controller, regenerator, flow division valve) sterilization, packaging of fluid milk; Coagulated Milk Products - Channa, paneer, classification and manufacturing process of cheese; Butter/Ghee – Manufacture and storage of butter and ghee

UNIT 4

Condensed Milk - Types and factors affecting the quality of condensed milk, storage of condensed milk; Dry Milk Products - Methods of drying milk (Drum and Spray drying), factors affecting the quality of dry milk. Introduction to instant non-fat dry milk packaging of dry milk products

UNIT 5

Frozen Products - Manufacturing of and ice cream; factors affecting the quality of frozen products; Cleaning and sanitation of dairy plant and equipment

LIST OF PRACTICALS

1. To conduct platform test of milk
2. Determination of SNF (Solids Not Fat), specific gravity, total solids of milk.
3. Testing efficacy of pasteurized milk
4. Determination of moisture & fat content of milk powder
5. Study of familiarization with various parts and working of cream separator
6. Preparation of Khoa
7. Detection of adulterants in milk like water, urea, neutralizers, preservatives, sucrose starch
8. Preparation of channa and paneer
9. Preparation of ice cream

10. Visits to different dairy plants
11. To perform sampling of milk
12. Determination of titrable acidity of milk
13. Determination of fat by garber method

INSTRUCTIONAL STRATEGY

This being one of the most important subject, teacher should lay emphasis on developing basic understanding of various concepts and principles and procedures involved herein. Suitable tutorial exercises may be designed by the teachers, which require students visit to various industries. Students may also be exposed to various National, BIS and international standards. Visits to the relevant industry for demonstrating various operations involved in the dairy technology, is a must. Experts from the industry may be invited to deliver lectures on the latest technology. Knowledge about pollution control and devices for the same may be provided to the students. Wherever relevant, students may be made aware about safety aspects.

RECOMMENDED BOOKS

1. Milk and Milk Products by Eckles and Eckles
2. Outlines of Dairy Technology by Sukmar De
3. Dairy Plant System and Layout by Tufail Ashmed
4. Principles of Dairy Technology by Woarner
5. Dairy Engineering by Forvall
6. Milk & Milk Products by CBSE
7. Chemistry & Testing of Dairy Products by Atherton Newlander

APPLIED NUTRITION [4(3+1)]

Unit I

Importance of nutrition to health and growth; Relation of food and diseases; Nutritional requirement of human body & RDA. Preparation of balanced diets.

Unit II

Carbohydrates – their functions in the diet. Sources of carbohydrates in the diet. Effects of excess carbohydrate and fat intake. Fats – their functions in the diet. Sources of fats and types of fats available.

Unit III

Proteins – their functions in the diet. Essential amino acids and protein quality. Sources of protein in the diet. Protein requirements. World food shortage and protein calorie malnutrition.

Unit IV

Vitamins – deficiency symptoms, sources, RDI Losses during cooking and storage. Mineral elements and water.

Unit V

Concept of RDA, ADI, ICMR recommendations for 8 calorine requirement for men, women & children. All other nutrient requirements, concept of nutraceuticals.

Practical

1. Assessment of nutritional status
2. Planning balanced diets for normal andtherapeutic nutrition
3. Formulation of nutrient rich foods
4. Assessment of nutritional quality of food.

Suggested Readings:

1. Bamji MS, Rao NP & Reddy V. 2003. Textbook of Human Nutrition. Oxford & IBH.
2. Joshi SA.1999. Nutrition and Dietetics. Tata McGraw Hill.
3. Khanna K, Gupta S,Passi SJ, Seth R & Mahna R. 1997. Nutrition and Dietetics. Phoenix Publ. Swaminathan M. 1974.
4. Essentials of Foods and Nutrition. Vol. II. Ganesh & Co.

TECHNOLOGY OF CEREALS AND PULSES 4(3+1)

Objective

To acquaint with production and consumption trends, structure, composition, quality evaluation, and processing technologies for product development and value addition of various cereals and pulses.

UNIT I

General introduction and production and utilization trends; Structure and composition of common cereals and pulses.

UNIT II

Wheat: Types and physicochemical characteristics; wheat milling - products and byproducts; factors affecting quality parameters; physical and chemical tests on wheat flour; manufacture of bakery products.

UNIT III

Rice: Classification, physicochemical characteristics; cooking quality; rice milling technology; Parboiling of rice- technology and effect on quality characteristics.

UNIT IV

Corn: Types and nutritive value; dry and wet milling, manufacture of value-added products; processing of millets; Legumes: composition, anti-nutritional factors, processing and storage; meal, flour.

UNIT V

Protein concentrates and isolates; extrusion cooking technology; snack foods; development of low cost protein foods. Pasta products and various processed cereal-based foods.

PRACTICALS IN TECHNOLOGY OF CEREALS and PULSES

1. Determination of moisture content of grain
2. Determination of angle of repose of grain
3. Physical-tests on wheat and rice (Geometrical mean diameter, bulk density)
4. Manufacturing of daliya
5. Determination of gluten content in wheat flour
6. Study about air screen cleaner
7. Milling of wheat and rice by laboratory mill
8. Study of parboiling of rice
9. Determination of different grade rice in a milled rice grain sample
10. Malting of barley

Suggested Readings

1. Dendy DAV & Dobraszczyk BJ. 2001. Cereal and Cereal Products. Aspen.
2. Hosene RS. 1994. Principles of Cereal Science and Technology. 2nd Ed. AACC.
3. Kay DE. 1979. Food Legumes. Tropical Products Institute.
4. Kent NL. 1983. Technology of Cereals. 4th Ed. Pergamon Press.
5. Kulp K & Ponte GJ. 2000. Handbook of Cereal Science and Technology. 2nd Ed. Marcel Dekker.
6. Lorenz KL.1991. Handbook of Cereal Science and Technology. Marcel Dekker.
7. Marshall WE & Wadsworth JI. 1994. Rice Science and Technology. Marcel Dekker.
8. Mathews RH. 1989. Legumes Chemistry, Technology and Human Nutrition. Marcel Dekker.
9. Matz SA. 1969. Cereal Science. AVI Publ.
10. Pomeranz Y. 1987. Modern Cereal Science & Technology. VCH Publ.
11. Salunkhe DK.1992. World Oilseeds: Chemistry, Technology and Utilization. VNR. Watson SA & Ramstad PE.1987. Corn; Chemistry and Technology. AACC.

FOOD TECHNOLOGY 3(2+1)

Unit- 1: Introduction

Introduction, definition and importance of Agro Processing, Food Technology, Food Science, Food Process Engineering ,Post Harvest Engineering, and Food Engineering, Various classification of Food Industry, constituents of food, major food quality parameters, Deteriorative factors and their control.

Unit-II: Unit Operations

Introduction and definition of the Major Unit operations and Major Food Process Equipments used after harvesting the various crops, i.e. Cereal, Pulses, oilseeds ,Fruits, Vegetables and Spice crops. Basic Concept of Major Chemical and Biochemical engineering unit operations used in food processing industry, i.e. Separation, Distillation, Crystallization and Food Fermentation.

Unit-III: Heat Energy Calculations

Introduction to the Basic technical terms used in Food Processing calculations i.e. Heat, Calorific value, Enthalpy, Specific heat, Thermal conductivity, Relative Humidity, Latent Heat and Sensible heat. Basic conversion used in energy calculations i.e. Calories, Joule, Watt, Horse Power, Electricity consumption measurement in food processing equipment and machinery.

Unit-IV: Food Preservation

Definition of Food Preservation, Introduction to various unit operation used in Food Preservation by the addition of heat (Heat Treatment-Pasteurization and Sterilization), Unit operation used in Food Preservation by the removal of heat (Freezing, Cooling, Drying, Dehydration and Evaporation). Nutritional quality of various food materials.

Unit-V: Storage and Packaging Technology

Food grain storage principles. Major Variables which causes deterioration and changes in food grain during storage. Various classification of Different food grain storage structure. Technical aspect and importance of food Packaging and different packaging materials used in food packaging.

Text Book: Introduction to Food Engineering - R. Paul Singh, Dennis R.

Reference Books:

1. Fundamentals of Food Engineering by Stanley Charm.
2. Heid, J.L. and Joslyn, M.A., Fundamentals of Food Processing Operation, The AVI Publishing Co; Westport, 1967.
3. Heldman, D.R., Food Process Engineering, The AVI Publishing Co; Westport, 1975.
4. Hall, C.W; Farall, A.W. & Rippen, A.L; Encyclopedia of Food Engineering, Van Nostrand - Reinhold.
5. Food Preservation & Processing, Kalyani Publication,New Delhi,by Manoranjan Kalia and Sangita Sood.

List of Practicals:

1. To Visit the Bakery center and Prepare the Plant layout of Bakery production unit.
2. To Visit the Soya milk Unit and Prepare the Process Flow Chart for soymilk production.
3. To visit the Hammer Mill Unit and Prepare the Process Flow Chart.
4. To visit the Vacuum Packaging Unit and Prepare the Process Flow Chart.
5. Experiment on Laboratory model of Mini Rice Mill Unit and prepare the Process Flow Chart
6. Experiment on Pulse Milling Unit and Prepare the Process Flow Chart.
7. Experiment on Spice Milling Unit and Prepare the Process Flow Chart.
8. To Visit the Vegetable Dryer Unit and Prepare the Process Flow Chart.
9. Study on Psychometric chart to determine the Relative humidity, Dry bulb, Wet bulb temperature.
10. Experiment on Digital Moisture Meter to determine the Moisture content (% wb) of various food grain.

BIOCHEMISTRY 4(3+1)

UNIT 1

Introduction to Biochemistry. Proteins and protein structures; Essential amino acids. Metabolism of proteins (digestion and absorption); Nitrogen balance and nitrogen pool; Evaluation of quality of proteins

UNIT 2 Enzymes; Definition, function, classification, nomenclature & structure; Co-enzymes and its function; Mechanism of enzyme action, enzyme kinetics & environmental effects; Enzyme inhibition.

UNIT 3 Carbohydrates; Definition & classification; General chemistry of carbohydrates; Metabolic pathways for breakdown of carbohydrates: glycolytic pathway, pentose phosphate pathway, citric acid cycle, electron transport chain, ATP balance, gluconeogenesis; General chemistry of lipids; Essential fatty acids; Digestion & absorption of lipids.

UNIT 4 Vitamins & minerals: occurrence, physiological function of vitamins and minerals. Introduction to human nutrition; Nutritive values of foods;

UNIT-5

Basal metabolic rate; Techniques for assessment of human nutrition, Dietary requirements and deficiency diseases of different nutrients Revision.

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 Nutrition and dietetics by Rose

BIOCHEMISTRY LAB

1. Separation of amino acids/sugars by Ascending Paper Chromatography.
2. Separation of sugars/amino acids by Thin Layer Chromatography.
3. Separation and isolation of proteins/amino acids by Paper Electrophoresis.
4. Determination of BOD₅ and COD of a sample of waste water.
5. Preparation of cell-free extract: Bacterial cell by sonication, Chicken liver by homogenization.
6. Assay of enzyme activity – (a) Phosphatase assay [Chicken liver] (b) Protease assay
7. Study of an enzymatic reaction.

BAKERY TECHNOLOGY CREDITS: THEORY- 3, PRACTICAL- 1)

- Objectives: 1. To impart students basic knowledge relating to the principles of baking
2. To introduce them to the techniques of cake, bread, biscuits or cookies and pastry making.
 3. To familiarize them with various food packaging materials

Unit 1 (Baking Industry)

Baking industry and its scope in the Indian economy.● History of Bakery - present trends, prospects● Nutrition facts of bakery products.●

Unit 2 (Cake Technology)

Preparation of cakes - types of cakes; ingredients used; methods● of batter preparation; steps in cake making; balancing of cake formula; evaluation of the baked cake; operational faults in cake processing and the remedial measures. Labeling and Packaging. Costing Cake decoration- different methods of cake decoration.

Unit 3 (Pastry Technology)

Preparation of pastry - types of pastries (short crust, puff/flaky● and choux pastry); ingredients; processing and evaluation. faults and remedies.

Unit 4 (Bread Technology)

Preparation of bread - ingredients used; methods of● dough preparation; steps in bread processing; evaluation of the baked bread; staling of bread; diseases of bread.

Unit 5 (Biscuit and Cookies Technology)

Preparation of biscuits and cookies – types;● ingredients; processing and evaluation. Crackers

PRACTICAL

1. Determination of gluten content in refined wheat flour
- 2 Sensory evaluation (by Hedonic scale) for various processed food products.
3. To familiarize the students with quality tests of wheat flour and yeast with reference to bread processing.
4. To equip them with the necessary skills for bread, biscuits and cookies processing.
5. To equip them with the necessary skills for cake and pastry processing.
6. Preparation and sensory evaluation of: breads (white and brown bread) buns and dinner rolls pizza base.
7. Preparation and sensory evaluation of various biscuits and cookies (Dropped biscuits Rolled biscuits Moulded biscuits)

RECOMMENDED READINGS

Encyclopedia of Food Science and Technology, Academic Press, 1993.

Kent NL. Technology of Cereals. Pergamon Press, London 2004.

Potter, Norman N and Hotchkiss, Joseph H, Food Science, CBS Publishers, Delhi, 2007

Ketrapaul N, Grewal RB, Jood S. Bakery Science and Cereal Technology. Daya Publishing House, Delhi 2005

Khanna K, Gupta S, Seth R, Mahana R, Rekhi T. The Art and Science of Cooking Phoenix Publishing House Private Limited, Delhi 2004.

Confectionary and Convenience Foods (4+1)

Unit-I

Definition, importance of sugar confectionery- compositional effects.

Unit-II

Manufacture methods of high boiled sweets:,

Unit-III

Machineries used in confectionary industry

Unit-IV

Types of confectionery products- Chocolate, Caramel, Toffee and Fudge and other confections- ingredients

Processing method- Quality control.

Unit-V

Spoilage of confectionery products, Quality characteristics of confectionary ingredients.

Practicals – 10 Practicals on Nutritional,Chemical,Toxin and Microbiological analysis of food material.

Food Quality Analysis (3+1)

Unit-I

Introduction, need and importance of food quality analysis, Distinguish features of HACCP, GMP, GAP, Codex, FSSAI, FDA, WHO, FAO and Audit of production unit.

Unit-II

Nutritional Analysis-Analytical techniques of Minerals, Vitamins, Fat, Salt, Sugar and

Unit-III

Chemical Analysis-Heavy Metal, Toxin, Additives and preservative presence in food.

Unit-IV

Microbiological Analysis-Analytical methods to detect and isolate the bacteria in food materials.

Unit-V

Instrumental techniques in food analysis, Atomic spectroscopy, HPLC, Texture analyzer and other advance equipment to assess the quality of food material.

Grain Storage Technology (3+0)

Objective Expose the students to the large scale handling and storage mechanism of grains, engineering operations and the control of physical, chemical and biological spoilage during storage of grains.

Theory

UNIT I –

Physico-chemical and thermal properties of grains - grain dimensions, bulk density, true density, porosity, coefficient of friction, angle of repose, thermal conductivity and aerodynamic properties. Psychrometry: humidity, % relative humidity, humid heat, deterioration index, wet bulb temperature, use of psychrometric charts.

UNIT II –

Grain drying - moisture content, equilibrium moisture content; free and bound water, rate of drying, constant and falling rate of drying rate; factors affecting rate of drying process, types of dryers used for drying of grains.

UNIT III –

Grain storage – principles, moisture movement during bulk storage of grains, pressure distribution in storage bins, methods of aeration, various theories, Physical, chemical, microbiological and sensory changes occurring during storage,

UNIT IV -

Grain storage structures - location and material selection for storage building, Types - traditional, modern; temporary and permanent storage structures; design considerations. Insects and pests – types, extent of losses during storage, causes and control measures,

UNIT V –

Air tight, controlled atmosphere and modified atmospheric storage; differences, principles, optimization of storage gas composition, rate of supply, control systems for oxygen and carbon dioxide- their effect on microbes and limitations.

Reference Books -AACC. 2004. Storage of Cereal Grains and their Products. Chakraverty & De Post Harvest Technology of Cereals, Pulse and Oilseeds. IBH Publ. Mahajan & Goswami. 2005. Food and Process Engineering. Ojha TP & Michael AM. 2006. Principles of Agricultural Engineering. Jain Brothers.

Technology of Beverages Production (4+1)

Objective

To provide a technical view of beverages and a full discussion of manufacturing processes in the context of technology and its related chemistry as well as a more fundamental appraisal of the underlying science.

UNIT I

Introduction and global extent of beverages industry. Types of beverages and their importance; status of beverage industry in India; Manufacturing technology for juice-based beverages; synthetic beverages;

Unit-II

Technology of still, carbonated, low-calorie and dry beverages; isotonic and sports drinks; role of various ingredients of soft drinks, carbonation of soft drinks.

UNIT III

Specialty beverages based on tea, coffee, cocoa, spices, plant extracts, herbs, nuts, dairy and imitation dairy-based beverages.

UNIT IV

Alcoholic beverages- types, manufacture and quality evaluation; the role of yeast in beer and other alcoholic beverages, brewing process, equipments used for brewing and distillation, wine and related beverages, distilled spirits.

UNIT V

Packaged drinking water- definition, types, manufacturing processes, quality evaluation and raw and processed water, methods of water treatment, BIS quality standards of bottled water; mineral water, natural spring water, flavoured water, carbonated water.

Technology of Beverages Production -Lab

1. Chemical and microbiological analysis of raw water quality
2. Preparation of regional fruit juices
3. Preparation of whey-based beverages
4. preparation of iced and flavoured tea beverage
5. Preparation of carbonated and non-carbonated soft drinks; Preparation of wine and beer
6. Preparation of soy milk, fruit milkshakes, herbal beverages
7. Visit to relevant processing units.

Suggested Readings

1. Hardwick WA. 1995. Handbook of Brewing. Marcel Dekker.
2. Hui YH. et al 2004. Handbook of Food and Beverage Fermentation Technology. Marcel Dekker.
3. Priest FG & Stewart GG. 2006. Handbook of Brewing. 2nd Ed. CRC.
4. Richard P Vine. 1981. Commercial Wine Making - Processing and Controls. AVI Publ.
5. Varnam AH & Sutherland JP. 1994. Beverages: Technology, Chemistry and Microbiology. Chapman & Hall.

Woodroof JG & Phillips GF. 1974. Beverages: Carbonated and Non Carbonated. AVI Publ.

Technology of Oil Seeds(4+1)

Unit-I

Introduction, Present and future prospects of oil seeds, chemical composition and characters of oil seed and Oils, Anti-nutritional factors, elimination Methods.

Unit-II

Post Harvest Technology of Oil seeds, Handling Drying, Storage, Grading, Pretreatments, cleaning, Dehulling, Size reduction and flaking.

Unit-III

Oil extraction: Traditional Methods, Ghani, Power Ghanis, Expellers - Principle of Expeller, structure design of expeller. Solvent extraction process: Principle, Pretreatment - Breaking, Cracking, flaking. Extraction principles, factors affecting the extraction process.

Unit-IV

Desolventization. Refining of Oils - Degumming, neutralization, bleaching, filtration, deodorization, their Principles and process controls.

Unit-V

New Technologies in oil seed processing, utilization of oil seed meals of different food uses. High protein Product, like protein concentrate and isolates.

Practical : Physical properties of Oil seeds. Estimation of protein. Estimation of Fat Methods Dal Milling Process. Antinutritional factors, Methods of Elimination, Extraction of oil by expeller press. Production of protein rich product.Solvent Extraction of Soybean oilStudy on various quality parameter for cooking oil.

Principles of Food Processing 5 (4+1)

Unit-I

Introduction and Goals, Food Spoilage and Foodborne Diseases, Prevention and Retardation of Food Spoilage,

Unit-II –

Definition ,concept,expression,and theory of Materials Handling operation, Cleaning, Grading Sorting,Drying, Milling, Mixing, Blanching and Evaporation,

Unit-III

Protein denaturation, Gelatinization of starch, Role of enzymes in food processing, Method to transform the raw food(Cooking, roasting, frying and baking).

Unit-IV-

Theory and principles of fermentation,application in food industry, Food additives, Food safety standards.

Unit V-

Food Preservation methods, refrigeration and cold storage, warehousing, silo and food packaging technology

Practicals-

- 1) Study and demonstration of food spoilage in different food materials.
- 2) Demonstration of Fermentor
- 3) Study on protein denaturation
- 4) To perform the blanching of different raw materials.
- 5) Determination of gluten content in refined wheat flour
- 6) Drying of food using Tray dryer
- 7) Demonstration of cooking and roasting of different food materials to inspect the physical and chemical changes.
- 8) Demonstration of gelatinization of starch.
- 9) Demonstration of frying and baking of different food materials.

Reference Books:

- ✓ Stavros Yanniotis.2008.Solving Problems in Food Engineering. Springer Science + Business Media, NY, USA.
- ✓ Gaurav Tewari and Vijay K. Juneja. 2007. Advances in Thermal and Non-Thermal Food Preservation. Blackwell Publishing, Ames, Iowa, USA.
- ✓ M. Shafiur Rahman. 2007. Handbook of Food Preservation, 2nd Ed. CRC Press, Boca Raton, FL, USA.
- ✓ James G. Brennan. 2006. Food Processing Handbook. Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany.
- ✓ Marcus Karel and Darvl B. Lund.2003. Physical Principles of Food Preservation, 2nd Ed. Marcel Dekker, Inc., NY, USA.
- ✓ Peter Zeuthen and Leif Bùgh-Sùrensen. 2003. Food Preservation Techniques. CRC Press

Plant Organization and Management (3+0)

Unit-I

Introduction, definition, element and concept of management. Importance of management. Management concepts and principles, process of management, Decision making, Functions of management. Definition and registration procedure of company, company registration documents and other operational documents related to taxation, payment, order, purchase and transport of materials.

Unit-II

Human resource management: concepts, theories, policies and organizational behaviour.

Unit-III

Financial Management- Meaning, Definition, financial management of Food bussiness management. Importance of financial statement, balance sheet, profit/Loss Statement, Ratio-Profitability Ratio ,Liquidity ratio.

Unit-IV

Marketing management, definition, theory and principles, international trade of food products, Import and export procedure of food products, related documents, Role of Director general of Foreign Trade (DGFT). Role of APEDA, Factory laws.

Unit-V

WTO and GATT, provisions for trade in agricultural and food commodities, International trade development strategy in food and agri – commodities.

Text and Reference books:

- 1- Mondy R. Waghe and Premeaux Shahe, R. 1995. Management Concepts, Practices and Skills. Prentice Hall, Inc. Englewood Cliffs, New Jersey.
- 2- Shukla, M.C. 2001. Business Organization and Management. S. Chand and Co., New Delhi.

Food and Industrial Microbiology 3 (2+1)

Unit-I

Evolution and scope of microbiology; History of microbiology; Microbial classification, nomenclature and identification; Taxonomic groups;

Unit-II

General methods of classifying bacteria; Microscopy and microscopes: Smears and staining; Morphology and fine structure of bacteria; Cultivation of bacteria, nutritional requirements; Nutritional classification of bacteria; Phototrophs, chemotrophs, autotrophs and heterotrophs; Obligate parasites; Bacteriological media, Growth of bacteria, Reproduction of bacteria;

Unit-III

Introduction to fungi, algae and protozoa and virus : Nutrient transport phenomenon: Passive diffusion, facilitated diffusion; Group translocation, active transport. Microbial genetics; Bacterial recombination; Bacterial conjugation, transduction; Bacterial transformation;

Unit-IV

Mutations: Types of mutations, mutagenesis; Mutation rate, repair of mutations; Phenotypes of bacterial mutants; Designation of bacterial mutants; Destruction of microorganisms: Physical agents and chemical agents; Chemotherapeutic agents and chemotherapy; Characteristics of antibiotics; Mode of action of antibiotics;

Unit-V

Pure culture: Methods of isolation of pure cultures; Maintenance and preservation of pure cultures; Culture collections.

Practical: Microscopy; Micrometry; Cleaning and sterilization of glassware and acquainting with equipment used in microbiology; Preparation of nutrient agar media and techniques of inoculation; Staining methods (monochrome staining, gram staining, negative staining, capsule-staining, flagella staining and endospore staining); Pure culture techniques (streak plate/pour plate/spread plate); Identification procedures (morphology and cultural characteristics); Growth characteristics of fungi: Determination of microbial numbers, direct plate count, generation time; Factors influencing growth: pH, temperature, growth curves for bacteria.

Suggested Reading

Gerard J. Tortora, Berdell R. Funke, Christine L. Case. 2014. Microbiology: An Introduction, 12th Ed. Prentice-Hall, NY, USA.

Johanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2013. Prescott's Microbiology, 9th Ed. McGraw-Hill Higher Education, NY, USA.

Michael J. Pelczar Jr., E.C.S. Chan and Noel R. Krieg. 1998. Microbiology, 5th Ed. Tata McGraw-Hill Education, New Delhi.

Diploma (Food Technology)
Technology of Fruits and Vegetables (4+1)

Unit-I

Introduction

Production and processing scenario of Fruits and vegetables in India and World. Causes of Post harvest Losses and their control parameter. Scope of fruit and vegetable processing industry in India- present status, constraints and prospective.

Unit-II

Introduction to Preservation Technology of Fruits and Vegetable Products, Classification of Preservation techniques -different types of chemicals used in processing of Fruits and vegetables. Irradiation- process,principle and application in fruit and vegetable Industry-safedoses of usage.

Unit-III

Processing Technology of Fruits and Vegetable Products-

Jam, Jelly, Marmalades, Pickles, Preserved Sauces, Ketchups, Production flowcharts, Unit operation involved, Ingredient, Quality parameters and Problems during production process.

Unit-IV

Processing technology of Fruit Beverage-

Unit operations and Equipment used in the preparation of beverages.Types of Beverages- Processing technology of Beverages-Flow charts of Juice-examples-RTS –Nectar, Cordial,Squash.

Unit-V

Processing technology of Fruit and vegetable based other products- Vegetable wafers and Papads, Soups,Vinegar and different types of Wines.

Text Book:

Handbook of Analysis of Fruits and Vegetable Products by S. Rangana, Tata McGraw Hill, New Delhi, 1986.

Reference Books:

- 1- Commercial Vegetable Processing – Tressler DK and Woodruff JG, AVI Publishing Co.,West port, CT 2004.
- 2- Commercial Fruit Processing – Woodroof J.G. , Luh B.S. AVI Publishing Co, West Port,CT 2004.

List of Practicals-

1. Study on the Infrastructure required for Fruits and Vegetable Products Manufacturing Industry.
2. Study on commercial production of Amchur and dry fruits powder.
3. Study and Preparation of fruit juices, squash, R-T-S, fruit juice concentrate and powder.
4. Preparation of fruit Jelly: Wood apple, Sweet orange/mandarin/Guava,/Tamarind.
5. Preparation of Fruit Jam: Apple/Mango/Guava,/Papaya/Aonla/Strawberry.
6. Preparation of pickles.
7. Preparation of dried Tomato ,Onion, Potato slices.
8. Preparation of dried Apple slices and Banana flakes.
9. Preparation of dehydrated leafy vegetable.
10. Study on Freezing of fruits and vegetables.

Sensory Evaluation Techniques 3(2+1)

Unit-I

Introduction to food quality and sensory evaluation. Need and importance of sensory evaluation techniques, Organoleptic properties, Senses and their classification, role of sensory evaluation on consumer acceptance assessment of food products. Sensory nervous system of human.

Unit-II

Sensory Characteristics of Food: Appearance, Colour, Flavor, Odour, Taste. Taste interaction, Mouth feel, Temperature, Texture, Astringency, Consistency, Psychological factors.

Unit-III

Requirements for conducting Sensory Evaluation and serving procedures-Sensory taste, Trained panel members, Selection of panel of judges, requirements for an ideal panel member, Different types of panels.

Unit-IV

Testing laboratory units of sensory evaluation, Preparation of samples, Techniques of smelling and tasting, Testing time. Methods of Sensory Evaluation and Evaluation cards – Difference/discrimination procedures. Methods of Sensory Evaluation and Evaluation cards- Ranking and Rating procedures.

Unit-V

Different methods of Quantitative descriptive analysis. Determination of Sensory thresholds and taste Interactions

Practicals-

Sensory evaluation of different food products and their assessment in laboratory.

1. Introduction to sensory evaluation.
2. Training of sensory panel.
3. Determination of threshold value for sweet taste attribute of an individual and comparison of market samples for sweetness level.
4. Determination of threshold value for salt taste attribute of an individual and comparison of market samples for saltiness level.
5. Determination of threshold value for sour taste attribute of an individual and comparison of market samples for sourness level.
6. Sensory evaluation of given sample by difference test method.
7. Sensory evaluation of given sample by hedonic rating method.
8. Development of sensory score card.
9. Sensory evaluation of given samples by descriptive analysis (flavor attributes).
10. Sensory evaluation of given samples by acceptance/ preference tests.

Food Packaging 3(2+1)

UNIT I

Definitions, objectives and functions of packaging and packaging materials; Packaging requirements and selection of packaging materials; Types of packaging materials: **Paper:** pulping, fibrillation and beating, types of papers and their testing methods; **Glass:** composition, properties, types of closures, methods of bottle making;

Unit-II

Metals: Tinplate containers, tinning process, components of tinplate, tin free steel (TFS), types of cans, aluminum containers, lacquers; **Plastics:** types of plastic films, laminated plastic materials, co-extrusion, edible films, biodegradable plastics.

UNIT III

Properties of materials such as 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 vapour transmission rate (WVTR) and its measurement, prediction of shelf life of foods, selection and design of packaging material for different foods.

UNIT IV

Food packaging systems: Different forms of packaging such as rigid semi- rigid, flexible forms and different packaging system for (a) dehydrated foods (b) frozen foods (c) dairy products (d) fresh fruits and vegetables (e) meat, poultry and sea foods.

UNIT V

Packaging equipment and machinery: Vacuum, CA and MA packaging machine; gas packaging machine; seal and shrink packaging machine; form and fill sealing machine; aseptic packaging systems; bottling machines; carton making machines.

Food Packaging Technology (Lab)

1. Study on different packaging material
2. Identification and testing of packaging materials
3. Determination of wax from wax paper
4. Determination of equilibrium moisture content
5. Determination of water vapour transmission rate of packaging material
6. To perform vacuum packaging of food sample and carry out its storage study
7. Testing the compression strength of the boxes
8. Packaging the food material in seal and shrink packaging machine and study its shelf life
9. Testing the strength of glass containers by thermal shock test;
10. Testing the strength of filled pouches by drop tester.

Text Book:

1. Mahadeviah M & Gowramma RV. 1996. Food Packaging Materials. Tata McGraw Hill.

Reference Books:

1. Kadoya T. (Ed). 1990. Food Packaging. Academic Press.
2. Painy FA. 1992. A Handbook of Food Packaging. Blackie Academic.
3. Sacharow S & Griffin RC. 1980. Principles of Food Packaging. AVI Publ.

Skill Development (Milk and Milk Products)-Lab (0+2)

Student will manufacture the different milk products at incubation centre ,AKS University

Semester-VI

Project Report

Skill Development (Cereals,Pulses and Oil Seed)-Lab