

Jiwaji University, Gwalior MP



Centre for Food Technology

Syllabus (NEP 2020)

M. Sc. Food Technology

Session -2025-2027

M.Sc. (FOOD TECHNOLOGY) 2025-2027

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Scheme for M.Sc. Food Technology NEP 2020

For 2 Year PG Programme

Scheme B-1 (For the course of science having major practicum components)

First Year

M.Sc. Food Technology I Semester

S. No.	Course Code	Course Name	Total Marks	Credits (s)	End Semester Exam Marks		Internal Marks	
					Max.	Min.	Max.	Min.
1.	CC-11	Principles of Food Science and Nutrition	100	6	60	24	40	16
2.	CC-12	Principles of Food Preservation and Microbiology	100	6	60	24	40	16
3.	PC-11	Practical -I	100	4	60	24	40	16
4.	PC-12	Practical -II	100	4	60	24	40	16
5.		Internship/Apprenticeship or Seminar	100	2	-	-	100	40
		Grant Total	500	22				

M.Sc. (FOOD TECHNOLOGY) 2025-2027

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Scheme for M.Sc. Food Technology NEP 2020

For 2 Year PG Programme

Scheme B-1 (For the course of science having major practicum components)

First Year

M.Sc. Food Technology II Semester

S. No.	Course Code	Course Name	Total Marks	Credits (s)	End Semester Exam Marks		Internal Marks	
					Max.	Min.	Max.	Min.
1.	CC-21	Food Engineering and Post-Harvest Technology	100	6	60	24	40	16
2.	CC-22	Food Quality Control and Packaging Technology	100	6	60	24	40	16
3.	PC-21	Practical - I	100	4	60	24	40	16
4.	PC-22	Practical - II	100	4	60	24	40	16
5.		VAC-II (CHM/EESC)	100	2	100	40	-	-
		Grant Total	500	22				

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Scheme for M.Sc. Food Technology NEP 2020

For 2 Year PG Programme

Scheme B-1 (For the course of science having major practicum components)

Second Year

Option-1 (Only CourseWork)

M.Sc. Food Technology III Semester

S. No.	Course Code	Course Name	Total Marks	Credits (s)	End Semester Exam Marks		Internal Marks	
					Max.	Min.	Max.	Min.
1.	CC-31	Food Crops, Spices and Flavor Technology	100	6	60	24	40	16
2.	CC-32	Animal Products: Processing and Preservation Technology	100	6	60	24	40	16
3.	PC-31	Practical - I	100	4	60	24	40	16
4.	PC-32	Practical - II	100	4	60	24	40	16
5.		Internship/Apprenticeship or Seminar	100	2	-	-	100	40
		Grant Total	500	22				

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Scheme for M.Sc. Food Technology NEP 2020

For 2 Year PG Programme

Scheme B-1 (For the course of science having major practicum components)

Second Year

M.Sc. Food Technology IV Semester

Option-1 (Only Course Work)

S. No.	Course Code	Course Name	Total Marks	Credits (s)	End Semester Exam Marks		Internal Marks	
					Max.	Min.	Max.	Min.
1.	CC-41	Advances in Food Technology	100	6	60	24	40	16
2.	CC-42	Nutraceuticals, Functional Foods and Food Toxicology	100	6	60	24	40	16
3.	PC-41	Practical - I	100	4	60	24	40	16
4.	PC-42	Practical - II	100	4	60	24	40	16
5.		VAC - I: (Food Regulations, Product Development and Intellectual Property Rights in Food Industries)	100	2	100	40	-	-
		Grant Total	500	22				

Or

Option - 2(Course Work & Research Work)/Option - 3 (Only Research Work)

S. No.	Course Name	Total Marks	Credit(s)
1.	Research Thesis/ Research Project/ Patent	500	22

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Scheme for M.Sc. Food Technology NEP 2020
For 2 Year PG Programme
Scheme B-1 (For the course of science having major practicum components)
Second Year

Option 2 (Course Work and Research Work)

M.Sc. Food Technology III Semester

S. No.	Course Code	Course Name	Total Marks	Credits (s)	End Semester Exam Marks		Internal Marks	
					Max.	Min.	Max.	Min.
1.	CC-31	Food Crops, Spices and Flavor Technology	100	6	60	24	40	16
2.	CC-32	Animal Products: Processing and Preservation Technology	100	6	60	24	40	16
3.	PC-31	Practical - I	100	4	60	24	40	16
4.	PC-32	Practical - II	100	4	60	24	40	16
5.		Seminar	100	2	-	-	100	40
		Grant Total	500	22				

M.Sc. Food Technology IV Semester

S. No.	Course Name	Total Marks	Credit(s)
1.	Research Thesis/ Research Project/ Patent	500	22

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Scheme for M.Sc. Food Technology NEP 2020
For 2 Year PG Programme
Scheme B-1 (For the course of science having major practicum components)
Second Year

Option – 3 (Only Research Work)

M.Sc. Food Technology III Semester

S. No.	Course Name	Total Marks	Credit(s)
1.	Research Thesis/ Research Project/ Patent	500	22

M.Sc. Food Technology IV Semester

S. No.	Course Name	Total Marks	Credit(s)
1.	Research Thesis/ Research Project/ Patent	500	22

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CC-11- Principles of Food Science and Nutrition

Credits: 6

Objective: To provide students with an integrated understanding of food chemistry, biochemistry, and nutrition. This course aims to develop knowledge of the chemical and biochemical components of food and their role in human health, metabolism, and food industry applications.

UNIT I - Fundamentals of Food Chemistry & Nutrition

1. Definition, importance and scope of food chemistry and nutrition biochemistry
2. Introduction to food groups and role and prospects of food constituents in human health and industry

UNIT II - Carbohydrates

1. Classification, structure, properties and functions of carbohydrates, Food sources, digestion and absorption, Role in Food Industry.
2. Starch, Modified starch, Cellulose, Gums, Pectin
3. Metabolic pathways: glycolysis, TCA cycle, gluconeogenesis, glycogenesis, glycogenolysis, PPP, ETC, ATP balance
4. Metabolic defects: Diabetes, other diseases associated with carbohydrate.
5. Browning reactions in food: Enzymatic & Non-enzymatic browning during storage and processing of food.

UNIT III - Proteins

1. Classification, structure, functions, physical and chemical properties, food sources, Digestion, absorption, metabolic pathways (transamination, deamination, decarboxylation, urea cycle), Nitrogen balance and nitrogen pool.
2. Purification and Denaturation of Protein
3. Protein interactions from various sources (milk, cereal, egg, fish, meat, muscle, oilseed)
4. Essential amino acids, Modified proteins and single cell proteins
5. Deficiency symptoms and related metabolic disorders, prevention and cure

UNIT IV: Lipids

1. Classification, structure, functions and food sources (vegetable and animal fats- Margarine, Lard, Butter etc.), Frying and Shortenings.
2. Digestion, absorption, metabolism of fatty acids, Metabolic pathways: β -oxidation, biosynthesis of free fatty acids, cholesterol metabolism, phospholipids, Essential Fatty Acids.
3. Crude oil refining, hydrogenation, winterization
4. Flavour changes in fats/oils: rancidity, lipolysis, oxidation, Factors affecting lipid oxidation.
5. Health implications: Obesity, CVDs, Nutritional and industrial significance of lipoproteins

UNIT V - Vitamins & Minerals

1. Classification: Vitamins (Fat- and water-soluble vitamins), Minerals (Major and Minor)
2. Biochemical roles, requirements, physiological functions, food sources
3. Processing effects, Bioavailability, deficiency effects and excess intake implications
4. Factors affecting utilization of micronutrients

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UNIT VI -Energy & Metabolism

1. Energy metabolism: Basal metabolic rate, SDA, respiratory quotient
2. Caloric requirement calculations
3. Nutritive functions and deficiency effects of nutrients
4. Recommended Dietary Allowance (RDA): concept, balanced diet planning for various groups and diseases

UNIT VII -Food Enzymes & Bioactive Compounds

1. Enzymes: classification, nomenclature, structure, properties and functions
2. Enzyme activity in food systems, factors affecting rate of enzymatic action.
3. Industrial enzyme applications: flavor production, processing aids
4. Bioactive compounds: Tannins, Phytosterols, Glucosinolates, Alkaloids, Polyphenols
5. Introduction to plant pigments and their food roles: Carotenoids, Xanthophylls, Chlorophyll, etc.

UNIT VIII: Analytical Techniques in Food Chemistry

1. Spectroscopy: UV-Visible, Flame photometry, Atomic Absorption Spectroscopy – principles and instrumentation
2. Colorimetry: Beer-Lambert law, extinction coefficient
3. Applications in food quality and nutrition assessment

Textbooks / References:

1. Potter N. & Hotchkiss, J.H.(1996) ,Food Science 5th Edition , CBS Publishers
2. N. Shakuntala Many(2024), Foods Facts and Principles , 5th Edition, New Age International Publishers.
3. Boyer, R. (2000). Modern Experimental Biochemistry, 3rd Ed. Pearson
4. Lubert Strayer (2023). Biochemistry, 9th Ed. Freeman & Co.
5. Voet & Voet (2024). Fundamentals of Biochemistry, 6th Ed. John Wiley & Sons
6. Chakrapani, S. (2021). Biochemistry, 6th Ed. Elsevier
7. Jain, J.L. et al. (2020). Fundamentals of Biochemistry, 6th Ed. S. Chand
8. Joshi, S. (2021). Nutrition and Dietetics, 5th Ed. McGraw Hill
9. Belitz, H.D. (2009). Food Chemistry, 4th Ed. Springer
10. Damodaran, S. (2017). Food Chemistry, 5th Ed. Academic Press
11. Wildman, R.E.C. (2019). Handbook of Nutraceuticals and Functional Foods, 3rd Ed. CRC Press
12. Fennema, O.R. (2017) Food Chemistry , 4th Edition, Springer.
13. Meyer, L.H. (2006),Food Chemistry, CBS Publishers

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Sharma

Objectives

To provide knowledge of microorganisms in food, sources of contamination, and principles of preservation methods including heat, cold, chemicals, drying, irradiation, and fermentation, with emphasis on their effects on safety, quality, and shelf life.

Unit I: Introduction to Food Preservation and Microbiology

1. **Definition and Scope:** Overview of food microbiology and food science, their significance in food safety, quality, and technology.
2. **Historical Development:** Evolution of food microbiology and preservation techniques.
3. **Microorganisms in Food:** Classification, propagation, and importance of yeast, mold, and bacteria in food science.
4. **General Principles of Food Preservation:** Introduction to preservation methods and their impact on food quality and safety.

Unit II: Microbial Growth and Contamination

1. **Sources of Contamination:** Air, water, soil, sewage, and post-processing contamination.
2. **Microbial Growth:** Definition, growth curves (lag, log, stationary, death phases), and factors affecting growth (intrinsic and extrinsic parameters).

Unit III: Food Spoilage and Food-Borne Diseases

1. **Food Spoilage:** Characteristics and significance of spoilage in cereals, vegetables, fruits, meat, poultry, seafood, milk, and canned foods.
2. **Food-Borne Diseases:** Bacterial diseases (Staphylococcal intoxication, Botulism, Salmonellosis, Shigellosis, E. coli diarrhea, Clostridium perfringens, Bacillus cereus) and mycotoxins (Aflatoxicosis, Dioxin valenok, Ergotism).
3. **Rapid detection methods for microorganisms.**
4. **Indicator Organisms:** Role in assessing food and water safety and quality.

Unit IV: Food Preservation by Heat

1. **Heat-Based Preservation:** Blanching, pasteurization, sterilization, UHT processing, canning, and their effects on microbes.
2. **Thermal Inactivation:** Concepts of TDT, F, Z, and D values; pathogen survival in food.
3. **Ohmic Heating:** Principles and applications in food processing.

Harip Shrivastava
Principal
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Unit V: Low-Temperature Preservation and Freezing

1. **Refrigeration:** Requirements for refrigeration plants, storage of fresh foods, and impact on quality.
2. **Freezing:** Freezing points, methods (slow, quick, freeze-drying), effects on food quality, storage, and thawing processes.
3. **Microbial Survival:** Effects of low temperatures on microbial growth and pathogen survival.

Unit VI: Chemical and Alternative Preservation Methods

1. **Chemical Preservation:** Use of sugar, salt, chemicals, antibiotics
2. **Smoking:** process and method.
3. **Concentration:** Processes and equipment for producing concentrated foods and their keeping quality.

Unit VII: Food Fermentation

1. **Food Fermentation:** Microbial cultures, their maintenance, evaluation, and use in single and mixed cultures; therapeutic value of fermented foods.
2. **Fermentation in Preservation:** Applications in pickling, curing, and other preservation techniques.

Unit VIII: Drying

1. **Drying:** Methods (sun-drying, tray/tunnel drying, spray drying, drum drying, fluidized bed drying), physical and chemical changes, and control measures.
2. **Packaging and Storage:** Techniques for dehydrated foods, ensuring quality and safety.
3. **Radiation:** Sources, mode of action, effects on microorganisms and nutrients, dose requirements, and irradiation of packaging materials.
4. **Microwave:** principles and applications.

Textbooks and Reference Materials

1. Bilgrami, S. (2019). Essentials of Microbiology. 1st Edition, CBS Publishers, Delhi.
2. Frazier, W.C. (2013). Food Microbiology. 5th Edition, Tata McGraw Hill, Delhi.
3. Jay, J.M. (2005). Modern Food Microbiology. 4th Edition, CBS Publishers, Delhi.
4. Peleazar, Chan, and Krieg (2024). Microbiology. 6th Edition, Tata McGraw Hill, Delhi.
5. Ray, B. and Bhunia, A. (2025). Fundamental Food Microbiology. 5th Edition, CRC Press.
6. Prescott, L.M., Harley, J.P., and Klein, D.A. (2023). Microbiology. 7th Edition, McGraw Hill, New York.
7. Desrosier, N.W. & James, N. (2007). Technology of Food Preservation. AVI Publishers.
8. Fellows, P.J. (2005). Food Processing Technology: Principles and Practice. 2nd Edition, CRC Publishers.
9. Jelen, P. (2005). Introduction to Food Processing. Prentice Hall.
10. Potter, N.N. (1995). Food Science and Technology. 5th Edition, Springer Publishers.

Monif Shams
Principal
Alkhan

Objective: To understand the chemistry of food and to develop skills related to quality evaluation of foods using various qualitative techniques.

Outcome: The students shall acquire the practical skills for the sampling of foods and shall be able to carry out quality evaluation foods. They will learn biochemical techniques for estimation of nutritional content in different type of food products. Qualitative analysis of carbohydrates, and Proteins.

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 fiber 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
11. Balance diet: food exchange list and steps in diet planning.
12. Diet planning for pre-school, school children, lactating women

Textbooks/References:

1. Weaver CM and Doniel JR (2003). The Food chemistry Laboratory: A manual for Experiment Foods, Dietetics and Food scientist. 2nd Edition. CRC Press.
2. Sehgal S. 2016. A laboratory Manual of Food Analysis I K International Publishing Hors Pvt. Ltd.
3. Yeshajahu Pomeranz, Clifton E. Mcloan, (2018) Food Analysis- Theory and Practice. 4th Edition. by Medtech

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PC-12-Processing and Microbial Quality

Credits -4

Objective: To understand the microbial techniques and to develop skills related to microbial quality evaluation and processing of foods using various techniques.

Outcome: The students shall acquire the practical skills for the processing and sampling of foods and shall be able to carry out microbial analysis. Introduction to microbiological techniques: Requirements of a microbiology lab, Safety rules to be, analyse food products for possible microbial contamination

A) Processing of Food

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 in different food samples.
6. Determination of ash in food samples.
7. Instruments used for food processing.
8. Gelatinization
9. Stages of sugar cookery
10. Estimation of gluten content

B) Food Microbiology Lab

1. Preparation of common laboratory media and study of Simple and Compound Microscope.
2. Staining: Gram's staining.
3. Sub culturing of a bacterial strain in liquid and solid medium. Isolation of pure culture.
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 mold and inoculation with standard strains of yeasts and molds. Microbiological analysis of typical processed food and un-processed food.
7. Dilution and Plating by spread -plate, pour -plate techniques and Microbial counting.
8. Evaluation of Microbiological quality of Water and MPN test of coliforms.
9. Determination of Thermal resistance of Enzymes and Microorganisms.
10. Determination of activity of starter cultures used in Dairy Industry.

Textbooks/References:

1. Garg N, Garg KL and Mukerji KG. (2010). Laboratory Manul of food Microbiology. I.K international Publishing House
2. Manual of Methods of Analysis – Microbiological Examination of Food and Water (2024) eighth Edition, FSSAI.
3. Manual of Methods of Analysis of Cereal and Cereal Products (2023) second Edition, FSSAI.

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Anup Kumar
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Anup Kumar

- Every student shall deliver at least one seminar on topic of the curriculum/ advances in food technology, which will individually be assessed by every available teacher on the basis criteria laid down by the Staff council. Students in audience will also be encouraged to assess the seminar on the given criteria and their evaluation will also be given due consideration. The average marking will be taken into consideration.
- The internship provides students with practical exposure to real-world industrial environments, bridging the gap between classroom learning and professional practice. It enables hands-on experience, skill development, and industry-oriented learning for career readiness.

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Objective: To develop comprehensive knowledge about engineering principles in food processing, instrumentation, and control, alongside the biochemistry, physiology, and post-harvest technology of fruits and vegetables. This includes their role in quality, pre- and post-harvest changes, and the technologies involved in processing, preservation, and value addition.

UNIT-I

1. Introduction to food processing and post-harvest technology: Scope, applications, role, importance, and status.
2. Morphology of fruits and vegetables, maturity indices, and methods of maturity determination.
3. Post-harvest physiological and biochemical changes in fruits and vegetables, ripening of climacteric and non-climacteric fruits, regulations, and methods.

UNIT-II

1. 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, cold storage, Zero energy cool chamber), commodity pre-treatments (chemicals, waxing, VHT, and irradiation).
2. Minimal processing of fruits and vegetables: Quality factors for processing.

UNIT-III

1. Pectin: Raw material processes, uses, products based on pectin, manufacturing, and quality control.
2. Fermentation: Definition, fermented products, methods of preparation, and quality control (Vinegar, Wine, Beer, Sauerkraut, Kimchi, Pickle).
3. Tea, Coffee, and Cocoa: Production and manufacturing

UNIT-IV

1. Mechanical operations in food processing: Principles, theories, laws, energy considerations, equipment, and size reduction of solid and liquid food products.
2. Reduction processes: Theory and applications, mixing indices, equipment for solid and liquid foods.
3. Mixing & forming: Theory and applications.

UNIT-V

1. Process Heat Transfer: Thermal properties of foods (specific heat and thermal conductivity), modes of heat transfer, Fourier's law, steady and unsteady state heat transfer, heat exchange transfer, and overall heat transfer.
2. Rheology of foods: Newtonian fluids and non-Newtonian fluids, measurement of viscosity.
3. Fluid-Flow: Properties of liquids, flow measurement.

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UNIT-VI

1. Operations in Food Engineering: Mechanisms of drying, moisture vs. drying rate curves, constant and falling rate periods.
2. Food dehydration: Mechanism, freeze drying.
3. Chilling, refrigeration & freezing: Introduction, characteristics curve, cooling rate calculations, chilling & freezing, shelf-life extension requirements, properties of frozen foods.

UNIT-VII

1. Evaporation: Properties of liquid, heat & mass balance, single & multiple effect evaporation, steam economy, heat recovery, efficiency, equipment & systems.
2. Food Storage: Introduction, storage requirements, types of freezers, precooling & cold storage, food machinery, packaging, instrumentation, and control.

UNIT-VIII

1. Separation processes: Centrifugation (general principles, instrument & types, centrifuges, preparatory & analytical centrifugation), chromatographic techniques (general introduction, partition & adsorption chromatography, paper, thin layer, gas & liquid, ion exchange & affinity chromatography, gel filtration, HPLC, and application in food industry).
2. Membrane filtration technology: Principles of other food processing such as RO, UF, dialysis, osmosis, microfiltration, and nanofiltration- outlines.

Textbooks and Reference Materials

1. Bose, T.K. Ed. (2022). Fruits of India: Tropical and Sub-tropical. Naya Prokash, 4th Edition, Calcutta. Authy, M.E.
2. Hulme, A.C. (1970). The Biochemistry of Fruits and their Products. Vol I & II. Academic Press, London.
3. Ranganna, S. (2015). Manual of Analysis of Fruit and Vegetable Products. Tata McGraw Hill, New Delhi.
4. Hamson, L.P. (2015). Commercial Processing of Vegetables. 2nd Edition. Noyes Data Corporation, New Jersey.
5. Lai, G., Siddappa, G., and Tandon G.L. (2022). Preservation of Fruits and Vegetables. 10th Edition. Indian Council of Agril Research, New Delhi.
6. Salunkhe, D.K and Kadam, S.S. Ed. (1998). Handbook of Fruit Science and Technology, Production, Composition and Vegetable and Processing. Marcel Dekker, New York. Salunkhe,
7. D.K. and Kadam, S.S. Ed. (2019). Handbook of Vegetable Science and Technology, Production, Composition and Processing. Marcel Dekker, New York.
8. R.P. Shrivastva. Sanjeev Kumar. (2023). Fruit and Vegetable Preservation Principles and Practices. Publication CB.
9. D.Q. Kern. (2019). Heat Transfer. 2nd Edition, MGH.
10. R.K. Rajput. (2020). Engineering Thermodynamics. 6th Edition. Tata-McGraw-Hill.
11. Bangalore. P.K. Nag. (2017). Engineering Thermodynamics. 4th Edition Springer.
12. Romeo Toledo. (2014). Basics of Food Engineering. 2nd Edition. Pergamon Press.
13. Earle R.L. 1985. Unit Operations in Food Processing. 5th Edition, Elsevier India.
14. Fellows, P.J. (2022). Food Processing Technology. 5th Edition. Elsevier.
15. R Paul Singh, Denni R Heldman (2024). -Introduction to Food Engineering. 6th Edition Publication Elsevier.

CC-22 Food quality control and Packaging technology

Credits: 6

Objective: This course equips students with knowledge of food safety, quality management, and sustainable packaging, along with relevant laws and standards. Graduates will be able to ensure food safety, design innovative products, and choose appropriate packaging to maintain quality and shelf life.

UNIT I -Food Safety & Hygiene

1. Introduction to food safety and hygiene.
2. Importance of food safety in food processing.
3. Food hygiene practices: GMP, GHP, GAP, GLP.
4. Hygiene verification, sanitation assurance, and Clean-in-Place (CIP) systems Food Industry.
5. Sanitizers and detergents used in the food industry.

UNIT II - Quality Concepts & Management

1. Concepts of quality management, quality assurance, and quality control in food processing.
2. Food Quality attributes: physical, chemical, nutritional, microbial and sensory.
3. Quality measurement techniques and process design and control.
4. Quality improvement in food processing industries.

UNIT-III-Principles and tools of quality management:

1. Total Quality Management (TQM) and its application in the food industry
2. ISO, HACCP, and FSSAI regulations.
3. PDCA cycle, 5S, KAIZEN, quality audits, and documentation.
4. Role of training and human resource development in maintaining quality standards.

UNIT IV -Fundamentals of Food Packaging

1. Definition, terminology, and types of packaging.
2. Functions of food packaging.
3. Selection and design of packaging materials for different foods.
4. Food characteristics influencing packaging choices.

UNIT V -Packaging Materials & Properties

1. Paper, paperboard, corrugated fibre board (CFB).
2. Glass packaging.
3. Metals: tin, aluminium.
4. Plastics: films, laminations, metallized films, co-extruded films.
5. Composite containers, collapsible tubes, edible and biodegradable packaging.

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UNIT VI -Packaging Systems & Applications

1. Packaging methods: vacuum, retort, microwave, active, intelligent.
2. Shrink and stretch packaging.
3. Controlled and modified atmosphere packaging.
4. Aseptic packaging and sterilization.
5. Packaging of fresh and processed foods: fruits, vegetables, dairy, bakery, beverages, dehydrated products, meats, fats, oils, spices.
6. Liquid and powder filling machines: volumetric, gravimetric, bottling, Form Fill Seal (FFS), multilayer aseptic systems.

UNIT VII -Packaging Quality Control

1. Quality control tests: shelf-life evaluation, tensile strength, tearing resistance, puncture resistance, permeability tests (GTR, WVTR).
2. Factors affecting packaging material performance.
3. Prediction of shelf life for packaged foods.

UNIT-VIII - Sensory evaluation of Food

1. Sensory evaluation: factors affecting sensory evaluation.
2. Sensory quality parameters: size, shape, texture, aroma, taste, colour and gloss.
3. Different tests, methods, scales and scorecards for sensory evaluation of various food products.
4. Sensory Panel: Selection and Training of Sensory Panelists.

Recommended Textbooks & References

1. Early, R. (2012). Guide to Quality Management Systems for Food Industries. Blackie Academic.
2. Kramer, A.E., & Twigg, B.A. (2017). Quality Control in Food Industry, Vol. I & II. AVI Publ.
3. Chhabra, T.N., & Surya, R.K. (2019). Management Process and Perspectives, Latest Edition. Kitab Mahal.
4. NIIR. (2023). Food Packaging Technology Handbook (3rd Ed.). National Institute of Industrial Research Board.
5. Han, J.H. (2013). Innovations in Food Packaging (2nd Ed.). Elsevier Academic Press.
6. Coles, R., McDowell, D., & Kirwan, M.J. (Eds.). (2011). Food Packaging Technology (2nd Ed.). CRC Press.

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Surya
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Objective: To understand the effect of various preservation techniques on the quality and safety of food products. To evaluate a processing procedure used to preserve a food product.

Outcome: The students will be able to understand and utilize different food preservation techniques. Sampling techniques and preparation of test samples, Estimation of Water activity of food sample. Physical and Chemical evaluation of thermally processed food (Canned or Bottled), Pickling and curing of foods. Dehydration of foods and preparation of fruit juice concentrates and powder, physicochemical analysis of dehydrated food sample.

1. Canning of fruits and vegetables.
2. Dehydration of fruits and vegetables.
3. Preparation of tomato juice.
4. Preparation of tomato purée.
5. Preparation of tomato paste.
6. Preparation of tomato ketchup.
7. Preparation of tomato mock tail.
8. Preparation of tomato soup.
9. Preparation of tomato chutney.
10. Preparation of jams.
11. Preparation of jellies.
12. Preparation of marmalades
13. Preparation of squashes.
14. Preparation of Various type of Pickles.
15. Pectin determination
16. Determination of chemical preservatives in fruits and vegetables.
17. Blanching of fruits and vegetables for quality estimation.

Textbooks/References:

1. Lal G, Siddappa G S & Tandon GL. (2022). Preservation of fruits and Vegetables 10th Edition. ICAR.
2. R.P. Srivastava & Sanjeev Kapoor (2017) Fruit & Vegetables preservation: 3rd Edition. principle And Practices Revised And enlarged.
3. S Rangana. (2005) Handbook of Analysis and Quality Control for Fruit and Vegetable Product, Second Edition, Tata McGraw Hill.

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Objective: To understand the effect of various type of packaging materials, impact of packaging materials in different types of food.

Outcome: The students will be able to understand and utilize different type of packaging materials. Moisture content in different type of packaging materials. To perform Test for formal shock resistance in glass bottles etc.

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

Textbooks/References:

1. NIIR (2020) Food packaging Technology Handbook 3rd Edition, National Institute of Industrial Research Board, Asia Pacific Business Press Inc.
2. Coles, R. Mc Dowell, D. and Kirwan M. J. (EDS) (2009) Food Packaging Technology. Publisher CBS.
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