

## M.Sc. FOOD TECHNOLOGY

### Course Structure-at a Glance

#### I<sup>st</sup> Semester

Paper Code	Course Title	Marks
MFT 101	Principles of Food Processing	100
MFT 102	Food Chemistry	100
MFT 103	Instrumentation & Analytical Techniques	100
MFT 104	Research Methodology, Statistics & Computer application	100
	PRACTICAL	100
<b>Total Marks</b>		500

#### II<sup>nd</sup> Semester

MFT 201	Post- Harvest Technology of Horticultural Crops	100
MFT 202	FOOD MICROBIOLOGY	100
MFT 203	PACKAGING OF FOOD MATERIALS	100
MFT 204	PRINCIPLES OF FOOD ENGINEERING	100
	PRACTICAL	100
<b>Total Marks</b>		500

#### III<sup>rd</sup> Semester

MFT 301	Processing of Cereals, Pulses & oilseeds	100
MFT 302	Processing of Milk & Milk Products	100
MFT 303	Processing of Milk & Milk Products	100
MFT 304	Enterpreunership in Food Processing	100
	PRACTICAL	100
<b>Total Marks</b>		500

#### IV<sup>th</sup> Semester

MFT 401	INDUSTRIAL FOOD FERMENTATION	100
MFT 402	TECHNOLOGY OF MEAT, FISH AND POULTRY	100
MFT 403	FOOD PLANT SAFETY AND WASTE MANAGEMENT	100
MFT 404	Dissertation and Project	200
MFT 405	MOOC Compulsory (any one out of available choices)	Grading System: Pass or Fail
<b>Total Marks</b>		500
<b>Grand Total Marks</b>		2000

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**IBSBT, CSJM University, Kanpur**

**Course content**

**SEMESTER I**

**MFT 101: Principles of Food Processing**

**UNIT I**

Introduction: Definition and scope of Food Science and Technology, historical development of food processing and preservation, general principles of food preservation.

**UNIT II**

Preservation by heating: Principles of the method, Types of microorganisms, bacterial load, sterilization and commercial sterility, thermal resistance of the microorganisms and enzymes..

Canning and bottling: General aspects of canning and bottling, processing operations exhausting and sealing, retorting, ultra-high temperature processes, determination of thermal process time, processing equipments, canning/ bottling of various food products.

Chemical preservation: Preservation of foods by use of sugar, salt, chemicals and antibiotics and by smoking. Effect of various food processing operations on the nutrients of foods.

**UNIT III**

Refrigeration and freezing preservation: Refrigeration and storage of fresh foods, major requirements of a refrigeration plant, controlled atmospheric storage, refrigerated storage of various foods, freezing point of selected foods, influence of freezing and freezing rate of the quality of food products, methods of freezing, storage and thawing of frozen foods.

**UNIT IV**

Drying and dehydrations: Sun drying of various foods, water activity and its effect on the keeping quality, sorption isotherms and their use. Characteristics of food substances related to their dehydration behaviour, drying phenomenon, factors affecting rate of drying, methods of drying of various food products, type of driers and their suitability for different foods; intermediate moisture foods. Concentration (Evaporation): Application in food industry processes and equipment for manufacture of various concentrated foods and their keeping quality, Properties of liquid, single and multiple effect evaporation.

**UNIT V**

Radiations: Sources of radiations, effect on microorganisms and different nutrients; Radiation units and doses for foods, dose requirements for radiation preservation of foods, safe limits, irradiation mechanism and survival curve, irradiation of packaging materials. Microwave Heating: Principles and application in food processing.

**Reference Books**

Food Processing Technology by P.J. Fellows, Woodhead publishing ltd. Food Science by N.N. Potter, CBS publishing.

Physical principles of Food Preservation. Vol. II by M. Karel, O.R. Fenema and D.B. urd, Maroel, Dekker Inc. New York.

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## **MFT 102: Food Chemistry**

### **UNIT I**

Energy Metabolism: Basal metabolic requirements and activity, Recommended Dietary allowances, Concept of balanced diet, Menu planning. Water: properties, bonding and chemistry.

### **UNIT II**

Carbohydrates: Classification, structure and properties of carbohydrates. Role of carbohydrates in food industry. Sugar, starch, cellulose, glucans, hemicelluloses, gums, pectic substances, polysaccharides. Browning reaction in foods: Enzymatic and non-enzymatic browning in foods of vegetable and animal origin during storage and processing of foods.

### **UNIT III**

Proteins: Classification, structure, properties, purification and denaturation of proteins. Protein interaction and degradation, protein-protein interaction, protein-lipid complexes and protein-carbohydrate complex. Major protein systems and factors affecting them, the nature of interaction in proteins derived from milk. Egg proteins, meat proteins, fish muscle proteins, oil seed proteins and cereal proteins, Metabolic antagonists associated with food proteins, concepts of protein quality, dietary requirements, deficiency symptoms.

Enzymes: Nature, classification and properties of food enzyme, enzyme activity in different food systems, commercial availability. Food enzyme technology. Immobilization of enzymes, removal of toxicants through enzymes, flavour production by enzymes.

### **UNIT IV**

Lipids: Classification and physico-chemical properties of food lipids. Refining of crude oils, hydrogenation and winterization. Vegetable and animal fat, margarine, lard, butter. Frying and shortening. Flavor changes in fats and oils, lipid oxidation, factors affecting lipid oxidation, auto-oxidation, biological significance of auto-oxidation of lipids.

### **UNIT V**

Vitamins: Role of vitamins in food industry, effect of various processing treatments and fortification of foods. Minerals: Role of minerals in food industry, effects of various processing treatments.

Biological changes in foods: Plant pigments and their roles in food industry. Bitter substance and tannins.

Browning reactions in foods: enzymic and non enzymic browning in foods of vegetables and animal origins during storage and processing of foods.

### **Reference Books**

Belitz HD. 1999. Food Chemistry. Springer Verlag.

DeMan JM. 1976. Principles of Food Chemistry. AVI. Fennema OR. 1996. Food Chemistry. Marcel Dekker. Meyer LH. 1987. Food Chemistry. CBS

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## **MFT 103: Instrumentation and Analytical Techniques**

### **UNIT I**

Preparation of chemical solutions: Concept of molar, molal, and normal solutions. pH and Buffers: Importance and measurement .

### **UNIT II**

Chromatographic techniques: General principles. Partition and adsorption chromatography. Paper, thin layer, gas liquid, ion exchange and affinity chromatography. Gel filtration. Introduction to High Pressure Liquid Chromatography.

### **UNIT III**

Electrophoretic Techniques: General principles. Paper and gel electrophoresis. Polyacrylamide gel electrophoresis.

### **UNIT IV**

Spectroscopy: Beers and Lambert's Law. Extinction coefficient. General principles of colorimeters and spectrophotometers, Atomic spectroscopy, Emmission spectroscopy, IR spectroscopy.

### **UNIT V**

Flourimetry: Spectrofluorimeters. Flame photometry and atomic absorption spectrophotometry. Use of radioisotopes. Microbiological assays. Microscopy

### **Reference Books**

Hand Book of Food Analysis by Nollert & Toldra, CRC publishing ltd.

Hand Book of Analysis & Quality Control for Fruit & Vegetable Products by Rangana, Tata Mcgraw hill publishing.

Introduction to the chemical analysis of foods by Nielson, CBS publishing.

## **MFT 104: Research Methodology, Statistics and Computer Applications**

### **Section A**

#### **UNIT I**

Scientific Approach to Research: Meaning, significance, types of research studies.

Research Process: Formulating the problem, objectives, hypothesis, Experimental design, sample design, collecting data: observation, interview, questionnaire, case study, focus group discussion, analysis of data, interpretation, Report writing, Nutritional/Food Surveillance.

#### **UNIT II**

Sampling design: Census vs. sample survey. Steps, types.

Scaling techniques: Continuum, Reliability, Validity, Scale construction techniques.

Experimental designs: Randomized Block design

Processing of data: Development of code book.

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## **Section B**

### **UNIT III**

Measurements: Nature of measurements, types of measurement scale, Frequency distribution, graphical presentation of data.

Measures of Central Tendency: Computation of mean, median and mode, their uses.

Measures of variability: Computation of mean deviations, Quartile deviation and standard deviation, their uses.

Correlation: Regression, Meaning, Spearman and Pearson's techniques of correlation, linear regression. Chi Square.

Tests of significance of difference between means: t-test. Analysis of Variance (ANOVA): One way and two ways. Applications to food quality assessments

## **Section C**

### **UNIT IV**

Computer Applications: use of computers for preparing and presenting documents, spreadsheets, appropriate statistical and other relevant packages, internet.

Computer application in food technology, response surface methodology.

### **Reference Books**

Aggarwal BL. 2003. Basic Statistics. New Age.

Gupta SP. 2004. Statistical Methods. S. Chand & Sons.

Elhance, D.L. (2008). Fundamentals of Statistics. Kitab Mahal, Patna.

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## MFT 105: Practical

Preparation of standard solutions for the chemical analysis i.e. HCl, H<sub>2</sub>SO<sub>4</sub>, KmnO<sub>4</sub>, Sodium Thiosulphate and Iodine.

Determination of pH and acidity of foods

Determination of proximate composition of Foods: Moisture, Protein, Fat, Total ash, Crude fibre, Carbohydrate, Calorific Value

Determination of minerals in food products: Calcium by Titration, Phosphorus by Spectrophotometer, Iron by Spectrophotometer

Estimation of reducing, non-reducing, total sugars in cereals and fruits & vegetable products. Determination of starch content in food products

Estimation of fats & Oils: Free fatty acid, Peroxide value, Saponification value, RM Number, TBA test, Iodine value, Fat adulteration test

Determination of NaCl content in food products. Determination of trypsin inhibitors. Qualitative analysis of compounds by chromatography techniques: Thin layer Chromatography, Paper Chromatography: Descending, Ascending and Circular Paper chromatography.

Use of electrophoresis in the determination of proteins.

Determination of Rheological properties by using texture analyzer

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## SEMESTER II

### MFT 201: Post Harvest Technology of Horticultural Crops

#### UNIT I

Fruits and vegetables as living products: Chemical composition; pre and post harvest changes, maturity standards for storage, desirable characteristics of fruits and vegetables of processing.

Post harvest handling of fresh fruits and vegetables: Role of plants growth regulators in relation to storage; physical and chemical treatment to increase the shelf-life, conditions for transportation and storage, disease and injuries during marketing.

#### UNIT II

Storage of fresh fruits and vegetables. Containers: Tin, glass and other packaging materials used in fruits and vegetables preservations. Canning and bottling: quality of raw materials, preparation of materials, preparation of syrups and brines, canning and bottling, effect of canning and bottling on nutritive value, spoilage of canned foods, detection and control.

Fruit and vegetable juices: Preparation of juice, syrups, squashes, cordials, and nectars; concentrations and drying of juice, packaging and storage and concentrations and powders; fortified and soft drinks. Preparation of preserve and candied fruits

#### UNIT III

Preservation by freezing, general methods for freezing of fruits and vegetables; problem relating to storage of frozen products; standards for frozen food products.

Dehydration of fruits and vegetables: Methods; packaging, storage, quality control during and after dehydration.

#### UNIT IV

Pickles and chutneys: Preparation of various types of pickles- theory and practice; preparation of sauces and chutneys; problems relating to the shelf life of pickles and chutneys; quality control. Tomato products: preparation of various tomato products, food standards and quality control.

Pectin: Raw materials; processes and uses of pectin; products based on pectin manufacture and quality control.

#### UNIT V

Food additives: Use in fruit and vegetable preservation.

Vinegar: General methods of preparation, food standards and quality control. Uses

Utilization of waste from fruit and vegetables processing plant.

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## Reference Books

Lal G, Siddapa GS & Tandon GL. 1986. Preservation of Fruits and Vegetables. ICAR.

Salunkhe DK, Bolia HR & Reddy NR. 1991. Storage, Processing and Nutritional Quality of Fruits and Vegetables. Vol. I. Fruits and Vegetables. CRC.

Thompson AK. 1995. Post Harvest Technology of Fruits and Vegetables. Blackwell Sci.

## MFT 202: Food Microbiology

### UNIT I

General characteristics of microorganisms: Classification and identification of yeasts, molds and groups of bacteria important in food industry. Source of contamination: Air, water, soil, sewage, post processing contamination. Intrinsic and extrinsic factors influencing growth of microorganisms in foods.

### UNIT II

Classification of foods and general principles involved in their preservation. Effects on microbes of: Low temperature preservation, lethal effects of chilling, freezing and thawing; high temperature preservation. Heat resistance of microorganism, heat penetration and thermal processing. Pasteurization, sterilization, canning and dehydration; chemical preservation and its toxic effects; irradiations.

### UNIT III

Food fermentations: Bacterial, yeast and mold cultures; single and mixed cultures, propagation, maintenance and evaluation of cultures; factors affecting activity of cultures, bacteriophages, residual antibiotics and chemicals.

### UNIT IV

Microbiology of fermentation: Fermented milks. Cereal foods, vinegar, oriental foods, alcoholic beverages. Therapeutic value of fermented foods. Food Biotechnology: Use of biotechnologically improved enzymes in food processing industry

### UNIT V

Food spoilage: Spoilage of fresh and processed fruit and vegetables, spoilage of meat, fish, eggs and poultry products. Microbial toxins.

Pathogens in foods: Microbial infections and intoxications. Growth and survival of pathogens in food. Food borne diseases. Investigation and control

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## Reference Books

Food microbiology by V. Ramesh, MJP publishing.

Food microbiology by W.C. Frazier, 1st Edition by Mcgraw Hill Pub. Co. New York.  
Modern Food Microbiology, J.M. Jay. CBS publisher.

## MFT 203: Packaging of Food materials

### UNIT I

Definitions 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 paper and their testing methods; Glass: composition, properties, methods of making bottles and jars; Metals: Tin plate containers, tinning process, components of tin plate, tin free steel (TFS), types of cans, aluminum containers, lacquers; Plastics: types of plastic films, laminated plastic materials, coextrusion, edible films and biodegradable plastics.

### UNIT II

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.

Different packaging systems for dehydrated foods, frozen foods, dairy foods, fresh fruits and vegetables, meat, poultry and sea foods.

### UNIT III

Process of Packaging: Material handling, filling, air removal, sealing, retorting, Modified atmosphere packaging, vacuum and gas packaging. Package sterilization techniques, cushioning, unitizing, palletizing, stacking and containerization.

### UNIT IV

Quality Control: Evaluation of Packaging materials, toxicity, corrosion prevention, shelf life testing, minimization of transport losses, Hazards in handling and storage and packaging and their minimization.

### UNIT V

Packaging Laws and Regulations, Standards of Weights and Measures Act, Advancement in packaging

Technology: Smart packaging, Active packaging, Anti-microbial packaging

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## Reference Books

Coles R, McDowell D and Kirwan MJ, Food Packaging Technology, CRC Press, 2003

Robertson GL, Food Packaging – Principles and Practice, CRC Press Taylor and Francis Group, 2012

Paine FA and Paine HY, A Handbook of Food Packaging, Blackie Academic and Professional, 1992

## MFT 204: Food Engineering

### UNIT I

Size reduction process: Principles, theories and laws, energy considerations, equipments. Mixing and forming, theory and applications, mixing indices, equipments for solid and liquid. Fluid flow, laminar, turbulent and transitional ranges, velocity distribution profiles, basic equations, thermal velocity calculations.

Mass, Energy balance and Heat transfer: Steam injection, steam infusion, plate heat exchangers, tubular heat exchangers and scraped surface heat exchangers

### UNIT II

Pasteurization: Theory and application, pasteurization of packaged and unpacked foods, pasteurization calculations, equipments. Thermal processing: Death kinetics, thermal death curve, decimal reduction time. Z-factor, heat penetration curve, process time calculations, mathematical curve, process time calculations. Mathematical and graphical solutions. Chilling, refrigeration and freezing: theories, characteristics curve, cooling rate calculations.

### UNIT III

Evaporation: heat and mass balance, steam economy, heat recovery, efficiency, process calculations, Food dehydration: constant and falling rate periods, drying rate calculations.

### UNIT IV

Separation processes: Filtration and centrifugation, theories and mathematical descriptions, constant rate and constant pressure filtration, equipment. Membrane Technology- Reverse osmosis and Ultra filtration, Micro filtration

### UNIT V

Advanced Technologies: Extrusion: Theory and applications, extrusion cookers and cold extrusion, single and twin screw extruders, design considerations., Supercritical gas extraction, Advances in fortification: Synthetic nutrients. Techniques of food fortification. Stability of nutrients in relation to processing. Encapsulations: design and structure of microcapsules, release rate and mechanism. Techniques of micro encapsulation, advantages and application of encapsulation. Non thermal Processing: High pressure processing, Pulsed electric processing, Ohmic heating.

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## Reference Books

S. K. Sharma, S.J.Mulvaney, and S.S.H.Rizvi, Food Process Engineering: Theory and Laboratory Experiments, Wiley and Sons, 2000

H. Pandey, H.K. Sharma, R.C.Chouhan, B.C. Sarkar and M.C. Bera, Experiments in Food Process Engineering, CBS Publishers and Distributors, 2004

M.A. Rao, S.S. H.Rizvi and A.K.Dutta, Engineering properties of Foods, 3rd ed., Marcel Dekker, 2005

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## MFT 205: Practical

Analysis of canned food products for chemical and microbiological spoilage.

Tin coating weight measurement (Clarke's Test) Determination of the continuity of tin coating Sulphide stain test and corrosion resistance test

Determination of Ascorbic acid content in food products.

Determination of lycopene content

Determination of tannins in food products.

Dehydration of fruits and vegetables

Preparation of tomato products like ketchup, puree & past

Preparation of Jam, Jelly, marmalade, preserve and fruit candy Pectin determination in fruits and vegetable products.

Determination of chemical preservatives in fruits and vegetables products.

Preparation and analysis of fruits beverages i.e. Squash and cordial.

Use of flame photometry in the estimation of trace metals like Sodium and Potassium

Determination of microbial counts: Total viable, thermophilic, proteolytic, lipolytic and aerobic spore farmers, coliform counts, yeast and mold count.

Determination of activity of starter cultures used and dairy industry

Dye reduction test.

Determination of thermal resistance of enzymes and microorganisms

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## SEMESTER III

### MFT 301: Processing of Cereals, Pulses and Oilseeds

#### UNIT I

Wheat Technology: Structure and composition of grain, 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, by-products, 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

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; by-products of rice milling and their utilization; processed and prepared mixes based on rice.

#### UNIT III

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

#### UNIT IV

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

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.

#### Reference Books

Chakrabarty MM. 2003. Chemistry and Technology of Oils and Fats. Prentice Hall.

Dendy DAV & Dobraszczyk BJ. 2001. Cereal and Cereal Products. Aspen.

Hamilton RJ & Bhati A. 1980. Fats and Oils - Chemistry and Technology. App. Sci. Publ.

Hoseney RS. 1994. Principles of Cereal Science and Technology. 2nd Ed. AACC.

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## **MFT 302: Processing of Milk and Milk Products**

### **UNIT I**

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 flavoured milk.

### **UNIT II**

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**

Technology of frozen milk products: Classification, manufacture, packaging, storage and marketing of ice cream, ices, sherbets etc defect 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**

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.

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## UNIT V

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

### Reference Books

Aneja RP, Mathur BN, Chandan RC & Banerjee AK. 2002. Technology of Indian Milk Products. Dairy India Publ.

De S. 1980. Outlines of Dairy Technology. Oxford Univ. Press.

Rathore NS et al. 2008. Fundamentals of Dairy Technology - Theory & Practices. Himanshu Publ.

## MFT 303: Quality Control Food Standards and Food Laws

### UNIT I

Quality Assurance: Introduction, Importance and Difference. Food Quality and Food Safety: Scope and difference.

### UNIT II

Raw materials: Quality parameters and evaluation procedures. Finished product quality: Appearance, colour, texture, viscosity, consistency, flavour.

Sensory evaluation: Selection of panel of judges, sensory characteristics of foods, types of tests.

### UNIT III

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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#### **UNIT IV**

Quality Certification & Accrediation: Introduction and procedure.

#### **UNIT V**

Water Quality: Water standards and Analysis physical, chemical and microbiological characteristics of water analysis. Waste treatment: Fundamentals of Physical, Biological & Chemical waste treatments

#### **Reference Books**

Early R.1995.Guide to Quality Management Systems for Food Industries.  
Blackie Academic.

Krammer A & Twigg BA.1973. Quality Control in Food Industry. Vol. I, II. AVI  
Publ

#### **MFT 304: Entrepreneurship in Food Processing**

#### **UNIT I**

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

Planning and Design of service facilities, economic plant size

#### **UNIT II**

Analysis of plant costs and profitability: Network analysis of planning, scheduling and management activities. Requirement in respect of building and building materials.

#### **UNIT III**

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

#### **UNIT IV**

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

#### **UNIT V**

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

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### Reference Books

Chandra P. 2005. Project Management. Tata McGraw Hill.

Gopal Krishan P & Nagarajan K. 2005. Project Management. New Age.

Hisrich RD & Peters MP. 2002. Entrepreneurship. Tata McGraw Hill.

Kaplan JM. 2003. Patterns of Entrepreneurship. John Wiley & Sons.

Nandan H. 2007. Fundamentals of Entrepreneurship Management. Prentice Hall.

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## MFT 305: PRACTICAL

1. Physiochemical and rheological examination of wheat and its products test weight, kernel hardness, gluten content, milling tests.
2. Evaluation of rice amylase and amylopectin determination, gelatinization temperature, water absorption tests.
3. Experimental parboiling and assessment of degree of polishing.
4. Experimental baking of selected cereals products bread, biscuits.
5. Preparation of protein concentration and isolates and their evaluation for protein content and solubility.
6. Determination of yeast activity used in fermented cereal products.
7. Quality test for wheat flour used in the baked products:
  - A) Maltose Number
  - B) Water Absorption
  - C) Sedimentation value
  - D) Alcoholic acidity
8. Texture profile analysis of baked cereals food products by texture analyzer
9. Plat form test for raw milk.
10. Determination of fat content in milk powders and ice-cream products.
11. Determination of milk adulterants: Starch, Urea, Formaldehyde and sugar.
12. Operation, cleaning and sterilization of dairy plant machinery involved in fluid milk processing.
13. Preparation of toned, homogenized, fortified, reconstituted and flavoured milk.
14. Manufacture of fermented milk.
15. To study the kinetics of enzymes and manufacture of cheeses.
16. Manufacture of butter.
17. Manufacture of ice-cream, ices, sherbets.
18. Manufacture of casein, ghee, khoa, chhena.
19. Sensory analysis of food products:
  - a) Paired comparison test.
  - b) Duo-trio test
  - c) Hedonic test
  - d) Triangle test
  - e) Ranking test
  - f) Single sample test
  - g) Composite scoring test

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20. Analysis of used in food industries: Alkalinity, Acidity, Hardness,  $p^H$ , TPC and coliform count.

## SEMESTER IV

### MFT 401: Industrial Food Fermentation

#### UNIT I

Characteristics, Nutritional requirement and maintenance of microorganism used for fermentation. Basic needs of a fermentation process: Sterilization, inoculum development, aeration, agitation, temperature  $p^H$  control and aseptic operation.

#### UNIT II

Conventional fermented food, production of baker's yeast. Alcoholic beverages: Beer, Wine and distilled beverages.

#### UNIT III

Microbial production of organic acids (acetic, citric, propionic etc.) amino acids (L-lysine, L-glutamic acid etc.) vitamins (Riboflavin, cyanocobalamin etc) and Enzymes (lipase, protease, amylase etc.)

#### UNIT IV

Solid state and submerged fermentation process. Single cell protein and hydrocarbon fermentation.

#### Reference Books

Industrial Microbiology, RH Patel, Laxmi House Publication

Industrial Microbiology, LE Casida, JR, New Age International Publishers

Industrial Microbiology (An introduction), Michael J Waites, Neil L Morgan, John S Rockey and Gary Higton

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## **MFT 402: Technology of Meat, Fish and Poultry Products**

### **UNIT I**

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. Utilization of meat industry by-products

### **UNIT II**

Preservation of meat & poultry- chilling, freezing, curing, smoking, canning, dehydration, irradiation, freeze drying, antibiotics, microwave, chemicals

### **UNIT III**

Catch, handling and transportation of fish, spoilages, processing and preservation of fish, shell fish and other sea products.

### **UNIT IV**

Eggs - structure, composition, nutritive value and functional properties of eggs. Internal quality of eggs- evaluation, egg grading. Preservation and maintenance of internal quality of eggs, Egg products-Egg powders, frozen eggs, egg foams, factors influencing foaming.

### **UNIT V**

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 in poultry meat. Utilization of poultry industry by-products.

### **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.

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## **MFT 403: Food Plant Safety and Waste Management**

### **UNIT I**

Industrial hygiene and safety aspects related to toxicity, noise, pressure, temperature, vibration, radiation etc.

### **UNIT II**

Safety elements: site of layout, process stages. Risk analysis and assessment. Prevention of losses, pressure relief, provision for fire fighting release of hazardous material from tanks and pipes.

### **UNIT III**

Relief system: Types and Location. Disaster planning and management regulation, legislation and government role related to safety of food plant.

### **UNIT IV**

Characterization of waste water generated from food processing industries and its treatment by physical and chemical methods.

### **UNIT V**

Biological oxidation: Activated sludge process, tricking filter, rotating biological contractor, lagoons, oxidation ditches. Anaerobic digestion and composting Advance water treatment system: use of membrane, ion exchange, electro dialysis, magnetic separation. Handling and disposal of sludge.

### **Reference Books**

Plant sanitation for food processing and food service, Y H Hui, CRC publication

Principles of food sanitation, Norman G Marriott and Robert B Gravani

Food safety management Programms, Debby Newslow

## **MFT 404: Industry Training/ Project/ Dissertation**

*For Hand*  
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