Post Harvest Technology of Fruits and Vegetables

Unit I

**Introduction:** Role and Status of Post Harvest Technology

**Fruits and Vegetables as Living Products:** Chemical Composition, Pre and Post Harvest Changes (chemical and Biochemical Changes during Post Harvest), Maturity Standards for Storage, Desirable Characteristics of Fruits and Vegetable of Processing

**Principle of Post Harvest Technology:** Physical and Chemical treatment to increase the shelf life, conditions for Transportation and Storage, Disease and Injuries during marketing. MAS CAS. Fresh cut vegetables, Minimally processed fruits and vegetables.

Unit II

**Pickles and Chutneys:** Preparation of various types of Pickles- Theory and Practice, Preparation of Sauces and Chutneys, Problems relating to 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 III

**Fruits and Vegetable Juices:** Preparation of Juice, Syrups, Squashes, Cordials and Nectars. Concentration and Drying of juice, Preparation of Jam, Jellies and Marmalades. Packaging and Storage of fruit concentrations and Powders, Fortification and Soft Drinks.

**Preservation by Freezing:** General Methods of freezing of Fruits and Vegetables, Problems relating to storage of frozen products.

Unit IV

**Dehydration of Fruits and Vegetables:** Methods, Packaging, Storage, Quality Control during and after drying.

**Packaging used in Fruits and Vegetables Preservation:** Canning and Bottling, Quality of Raw Material, preparation of raw material, Syrups and Brines, Effect of Canning and Bottling on Nutritive Value, Spoilage of Canned Foods, Detection and Control.

Unit V

**Food Additives:** Use in Fruit and Vegetable Preservation

**Vinegar:** General Methods of Preparation, Food Standards and Quality Control

**Utilization of Waste from fruit and Vegetables Processing Plants**

**Tea, Coffee and Cocoa** Production and Manufacturing
Food Microbiology

Unit I
General Characteristics of Microorganisms: Classification and Identification of Yeasts, molds and groups of Bacteria. Importance in Food Industry.
Intrinsic and Extrinsic Factors Influencing growth of Microorganisms in Foods.

Unit II
Pathogens in Foods: Microbial Infections and Intoxications, Growth and Survival of Pathogens in Food.
Food Borne Diseases: Investigation and Control of food borne microbial disease with special reference to typhoid, gastroenteritis and food poisoning.
Food Spoilage: Spoilage of Fresh and Processed Fruit and Vegetables, Spoilage of Meat, Fish, Eggs and Poultry Products. Microbial Toxins.

Unit III

Unit IV
Food Fermentation: Bacterial, Yeast and Mold Cultures, Single and Mixed Cultures, Propagation, maintenance and evaluation of Cultures, Factors effecting Activity of Cultures, Bacteriophages, Residual Antibiotics and Chemicals.

Unit V
Role of Biotechnology in Food Microbiology
Role of Oligosaccharides in Food Microbiology
Probiotics and Prebiotics
FT 203

Analytical Techniques and Quality Control

Unit I

General Techniques and Instrumentation: A brief general Introduction to techniques in Lyophilisation and evaporation; Dialysis and ultrafiltration, pH, Microbio assays, Radioisotope use - detection and measurement; saturation analysis (RIA, ELISA, Radioimmunodiffusion)

Unit II

Separation Techniques:
Centrifugation: General Principle – Instrument, preparatory and analytical centrifugation.
Chromatography: Theoretical Plate concept, Techniques of adsorption chromatography (Coloumn and TLC) Partition (Paper),GLC, HPLC, Ion Exchange basic instruments and application only.
Electrophoresis: General Principle, application of paper and Gel (Agrose and PAGE)

Unit III

Colorimetry and Spectrophotometry: An introduction and general study of
- Beer’s Lambert’s law
- Fluorimetry: Instrument and application
- Flame photometry and Atomic absorption: Instrument and application.

Unit IV

Qualitative and quantitative food analysis Methods:
Carbohydrates: Nelson- Somogyi method, Glucose/ Reducing sugars Oxidase method, Glycogen by hydrolysis (Liver glycogen)
Starch: Anthrone Sulphuric acid, DNSA method.
Crude Fibre: by digestion method
Lipids: Total Cholesterol by Liebermann Burchari method; Ferric Chloride-Sulphuric acid method.
PUFA: Triglyceraldehydes: free FA.

Unit V

Vitamins: Riboflavin, Niacin, Folic acid, Ascorbic acid (Microbial and or Chemical method of estimation)
Minerals: Iron by Wong’s method, Calcium by Colorimetric method, Phosphorus Fiske Subba Row method, Sodium and Potassium by any Suitable method.
Food Engineering

Unit I

**Introduction:** General concepts, Essential and Optional processing, Scenario and Scope
**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

Unit II

**Pasteurization:** Pasteurization of Packaged and Unpackaged Foods, Pasteurization Calculations and Equipments.

Unit III

**Heat Transfer Operations:** Principles, Modes of Transfer, Applications of HTO

Unit IV

**Food Dehydrations:** Mechanism of Drying, Moisture and Drying Rate Curves, Constant and Falling rate Periods, Spray, Drum, Cabinet, Tunnel, Fluidized Bed Dryers, Batch and Continuous Operation, Osmotic Dehydration and Freeze Drying
**Chilling, refrigeration and Freezing:** Shelf Life extension requirements for various products, Theories, Characteristics curve, Cooling Rate calculations. Chilling and Freezing Equipments, Cryogenics.

Unit V

**Separation Processes:** Filtration and Centrifugation, Theories and Mathematical Descriptions, Constant Rate and Constant Pressure Filtration, Equipment
**Irradiation:** Irradiation Mechanism and Survival Curve, Irradiation of Packaging Materials.
**Membrane Filtration Technology:** (RO, UF and Micro filtration and Nano Filtration),