633. FOOD TECHNOLOGY

Food Chemistry, Biochemistry and Nutrition:

Foodchemistry:Carbohydrates-Structure,Metabolism (Glycogenesis, Glycolysis, Glycogenolysis, Gluconeogenesis) functional properties of mono, di & oligo-polysaccharides including starch, cellulose, pectic substances and dietary fibre; Protein and amino acids: structure, classifications, sources, Metabolism denaturation and functional properties of proteins, Vitamins and Minerals: Sources, Effect of processing on vitamins and minerals , Deficiency Diseases. Lipids-Classification and structure of lipids, Biosynthesis and Degradation Rancidity of fats, Polymerization and polymorphism; use of lipids in foods, physical and chemical properties, effects of processing on functional properties. Pigments- Carotenoids, chlorophylls, anthocyanins, Flavanoids tannins and myoglobin; Food flavours- Terpenes, esters, ketones and quinones;. Enzymes– classification, properties, characterization, kinetics and immobilization; fermentative production of enzymes (amylases, proteases, cellulases, pectinases, xylanases, lipases) used in food industry ; Enzymatic and non-enzymatic browning in different foods;. Water in food, water activity and shelf life of food, Neutraceuticals and Functional Foods.
Nutrition : Therapeutic Nutrition Balanced diet, Essential amino acids and fatty acids, Assessment of Nutritional Quality : PER,NPU,DC,BV Water soluble and fat soluble vitamins, Role of minerals in nutrition, Ant nutrients, Nutrition deficiency diseases.
Food additives- definitions, classification and functions, Preservatives, antioxidants, colours and flavours (synthetic and natural), emulsifiers, sequesterants, humectants, hydrocolloids, sweeteners, acidulants, buffering salts, anticaking agents, etc. - chemistry, food uses and functions in formulations; indirect food additives.

Food Microbiology:

Food microbiology: Types of micro-organism normally associated with food- Morphology, structure and detection of bacteria, yeast and mold in food, Spores and vegetative cells; Microbial growth in food- Intrinsic and extrinsic factors, Growth and death kinetics, serial dilution method for quantification; Micro-organisms in natural food products and their control. Biochemical changes caused by micro-organisms, deterioration and spoilage of various types of food products, microbial food fermentation; Foodborne disease- Toxins produced by Staphylococcus, Clostridium and Aspergillus; Bacterial pathogens- Salmonella, Bacillus, Listeria, Escherichia coli, Shigella, Campylobacter; Rapid Methods for Detection of Micro Organisms.

Food Technology and Preservation:

Wheat: Types and physicochemical characteristics; wheat milling – Equipment, products and byproducts; factors affecting quality parameters; physical, chemical and rheological tests on wheat flour; additives used in bakery products; flour improvers and bleaching agents; manufacture of bakery products, pasta products and various processed cereal-based foods; manufacture of whole wheat atta, blended flour and fortified flour, Rice: Classification, physicochemical characteristics; cooking quality; rice milling Equipment , technology; by-products of rice milling and their utilization; Parboiling of rice- technology and effect on quality characteristics; aging of rice - quality changes; processed products based on rice. Corn: Types

and nutritive value; dry and wet milling, manufacture of value-added products; processing of barley, oats, sorghum and millets.
Legumes and oilseeds: composition, anti-nutritional factors, processing and storage; processing for production of edible oil, meal, flour, protein concentrates and isolates.

Fruits, vegetables and plantation crops: primary processing: grading, sorting, cleaning, washing, peeling, slicing and blanching; minimal processing. Processing for pulp, puree and concentrates, aseptic packaging, canning, RTS fruit beverages, Individual Quick Freezing and frozen fruits and vegetables; Processing of fruits for candies, bars, toffees, jams and jellies, squashes and syrups using locally available fruits like papaya, mango, anola and other under-utilized fruits ; tea, coffee, chocolate and essential oils from spices.

Meat, fish, poultry & milk: Post mortem changes of meat, freezing, aging, pickling, smoking and tenderization of meat, Drying and canning of fish. Structure, composition, nutritive value and functional properties of eggs and its preservation by different methods. Milk and milk products processing: Milk processing flow sheet, filtration/clarification, storage of milk, standardization – simple problems in standardization, Homogenization, pasteurization – types of pasteurization process. Manufacture of Cream, Butter, Ghee, Milk powder, Cheese.

Confectionary and Snack Foods: Quality characteristics of confectionery ingredients; technology for manufacture of Hard Boiled Sweets, candies, chocolate, and special confectionary products; colour, flavour and texture of confectionary, Extrusion cooking technology; snack foods.

Types of beverages and their importance, Manufacturing technology for juice-based beverages; synthetic beverages; technology of still, carbonated; role of various ingredients of soft drinks, carbonation of soft drinks. Alcoholic beverages- types, manufacture and quality evaluation; the role of yeast in beer and other alcoholic beverages, ale type beer, lager type beer, technology of brewing process, equipments used for brewing and distillation, wine and related beverages, distilled spirits.

Processing and preservation by non-thermal methods, irradiation, high pressure, pulsed electric field, hurdle technology. Processing and preservation by low-temperature- refrigeration, freezing, Controlled Atmosphere(CA), Modified Atmosphere(MA), and dehydro-freezing.

Food Engineering:

Food chilling and freezing – Precooling and cold storage; CA and MA; Properties of frozen foods; freezing point depression; general introduction to enthalpy change during freezing; Plank's equation for predicting rates of product freezing; Cryogenic freezing and IQF; design of food freezing equipment such as air blast freezers, plate freezers and immersion freezers.
Fluid mechanics: Nature of fluids, flow properties of fluids, flow through pipes & fittings, flow measurement Meters, transportation of fluids – pumps, compressors and blowers;
Process Heat Transfer - Modes of heat transfer and overall heat transfer; thermal properties of foods such as specific heat and thermal conductivity; Fourier’s law, steady state and unsteady state conduction; heat exchange equipment; energy balances; rate of heat transfer; thermal boundary layer; heat transfer by forced convections; Unit operations: size reduction, homogenization, filtration, sedimentation, centrifugation, sieving, mixing, extraction, crystallization, evaporation, drying and extrusion. Types of equipment used in each unit

operation, their selection, applications in food industry; Spectroscopic techniques using UV/Vis, fluorescence, IR, FTIR, NIR, NMR; Temperature, Viscosity and Pressure Measuring Devices

Food Quality, Standards and Packaging Technology:

Food quality: Food Quality and Quality Attributes - Classification of Quality Attributes and their role in food Quality; Quality Assessment of Food materials – Fruits and Vegetables, Cereals and pulses, dairy Products, Meat, Poultry, Egg and Processed food Products Sensory Evaluation of Food Quality and its methods Food Adulteration and Food Safety.

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. 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.

Standards: FSSAI 2006- Scope; definitions & standards of quality. FPO and MPO- Rules, FSMS – 22000:2005- CODEX, Introduction to the family of ISO 22000 standards, ISO 9001:2008. HACCP- Terminology, Principles, Identification of CCPs, Application of HACCP System and the logic sequence involved.