XL - U	Food Technology

Section 1: Food Chemistry and Nutrition

Carbohydrates: structure and functional properties of mono-, oligo-, & poly-saccharides including starch, cellulose, pectic substances and dietary fibre, gelatinization and retrogradation of starch. **Proteins:** classification and structure of proteins in food, biochemical changes in post mortem and tenderization of muscles. **Lipids:** classification and structure of lipids, rancidity, polymerization and polymorphism. **Pigments:** carotenoids, chlorophylls, anthocyanins, tannins and myoglobin. **Food flavours:** terpenes, esters, aldehydes, ketones and quinines. **Enzymes:** specificity, simple and inhibition kinetics, coenzymes, enzymatic and non-enzymatic browning. **Nutrition:** balanced diet, essential amino acids and essential fatty acids, protein efficiency ratio, water soluble and fat soluble vitamins, role of minerals in nutrition, co-factors, anti-nutrients, nutraceuticals, nutrient deficiency diseases. **Chemical and biochemical c hanges:** changes occur in foods during different processing.

Section 2: Food Microbiology

Characteristics of microorganisms: morphology of bacteria, yeast, mold and actinomycetes, spores and vegetative cells, gram-staining. **Microbial growt h:** growth and death kinetics, serial dilution technique. **Food spoilage:** spoilage microorganisms in different food products including milk, fish, meat, egg, cereals and their products. **Toxins from microbes:** pathogens and non-pathogens including Staphylococcus, Salmonella, Shigella, Escherichia, Bacillus, Clostridium, and Aspergillus genera. **Fermented foods and beverages:** curd, yoghurt, cheese, pickles, soya-sauce, sauerkraut, idli, dosa, vinegar, alcoholic beverages and sausage.

Section 3: Food Products Technology

Processing principles: thermal processing, chilling, freezing, dehydration, addition of preservatives and food additives, irradiation, fermentation, hurdle technology, intermediate moisture foods. **Food pack aging and storage:** packaging materials, aseptic packaging, controlled and modified atmosphere storage. **Cereal processing and products:** milling of rice, wheat, and maize, parboiling of paddy, bread, biscuits, extruded products and ready to eat breakfast cereals. **Oil processing:** expelling, solvent extraction, refining and hydrogenation. **Fruits a nd vegetables p rocessing:** extraction, clarification, concentration and packaging of fruit juice, jam, jelly, marmalade, squash, candies, tomato sauce, ketchup, and puree, potato chips, pickles. **Plantation crops processing and products:** tea, coffee, cocoa, spice, extraction of essential oils and oleoresins from spices. **Milk and milk products processing:** pasteurization and sterilization, cream, butter, ghee, ice-cream, cheese and milk powder. **Processing of animal products:** drying, canning, and freezing of fish and meat; production of egg powder. **Waste utilization:** pectin from fruit wastes, uses of by-products from rice milling. **Food standards and qu ality maintenance:** FPO, PFA, Agmark, ISI, HACCP, food plant sanitation and cleaning in place (CIP).

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Section 4: Food Engineering

Mass and energy balance; Momentum transfer: Flow rate and pressure drop relationships for Newtonian fluids flowing through pipe, Reynolds number. **Heat transfer:** heat transfer by conduction, convection, radiation, heat exchangers. **Mass transfer:** molecular diffusion and Fick's law, conduction and convective mass transfer, permeability through single and multilayer films. **Mechanical operations:** size reduction of solids, high pressure homogenization, filtration, centrifugation, settling, sieving, mixing & agitation of liquid. **Thermal operations:** thermal sterilization, evaporation of liquid foods, hot air drying of solids, spray and freeze-drying, freezing and crystallization. **Mass transfer oper ations:** psychrometry, humidification and dehumidification operations.

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