

<b>XE-G</b>	<b>Food Technology</b>
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**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 Changes:** Changes occurring 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 Growth:** 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 and Vegetables Processing:** 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 Quality Maintenance:** FPO, PFA, A-Mark, ISI, HACCP, food plant sanitation and cleaning in place (CIP).

#### **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 Operations:** Psychrometric, humidification and dehumidification operations.