

**Syllabus
for
Food Engineering and Technology
(MTQP06)**

Note:

- i. *The Question Paper will have 75 questions.*
- ii. *All questions will be based on Subject-Specific Knowledge.*
- iii. *All questions are compulsory.*
- iv. *The Question paper will be in English.*

Food Engineering and Technology (MTQP06)

Section 1: Food Chemistry and Nutrition

Carbohydrates: Structure and functional properties of mono-, oligo-, & poly- saccharides including starch, cellulose, pectic substances and dietary fiber, gelatinization and retrogradation of starch.

Proteins: Classification and structure of proteins in food, biochemical changes in postmortem and tenderization of muscles.

Lipids: Classification and structure of lipids, rancidity, polymerization and polymorphism.

Pigments: Carotenoids, chlorophylls, anthocyanins, tannins and myoglobin.

Food flavors: 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 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 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 packaging 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.

Food Engineering and Technology (MTQP06)

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, Agmark, 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: Psychrometry, humidification and dehumidification operations.