

## **SYLLABUS FOR ENTRANCE TEST FOR M.TECH. (FOOD TECHNOLOGY)**

The question paper will contain 100 multiple choice type questions on the following topics carrying equal marks.

Subjects Covered: Food Chemistry and Nutrition/ Food Microbiology/ Food Products Technology/ Food Quality Management/ Food Engineering

Max. Marks: 100

Time: 1h and 30 min

### **Unit 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 occur in foods during different processing.

### **Unit 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 Aspergillums genera. Fermented foods and beverages: curd, yoghurt, cheese, pickles, soya-sauce, sauerkraut, idly, dosa, vinegar, alcoholic beverages and sausage.

### **Unit 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

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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, food plant sanitation and cleaning in place (CIP).

#### **Unit 4: Food Quality Management**

Objectives, importance and functions of quality control, Quality systems and tools used for quality assurance including control charts, acceptance and auditing inspections, critical control points, reliability, safety, recall and liability. The principles and practices of food plant sanitation. Food and hygiene regulations. Environment and waste management. Total quality management, good management practices, HACCP and codex in food. International and national food laws. US-FDA/ISO-9000 and FSSAI. Food Adulteration, food safety. Sensory evaluation, panel screening, selection methods. Sensory and instrumental analysis quality control. Quality control of food at all stages and for packaging materials. Non-destructive food quality evaluation methods.

#### **Unit 5: 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: psychometric, humidification and dehumidification operations.

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