

**IIFPT Post Graduate Entrance Examination 2018**  
**M.Tech (Food Process Engineering) syllabus**

**Unit 1: Heat and Mass Transfer**

Basic laws of thermodynamics, thermodynamic properties and processes, energy equations, heat, work, heat engine, heat pump, refrigeration and steam tables. EMC, sorption and desorption isotherms, water activity and psychrometry. Modes of heat transfer, heat exchanger. Mass transfer and mass-heat-momentum transfer analogies. Fluid statics, fluid dynamics, continuity equation and Bernoulli's theorem. Dimensional analysis - applications in food processing.

**Unit 2: Engineering Properties**

Importance of engineering properties of biological materials; physical characteristics *viz.* shape, size, volume, density, porosity, surface areas, Frictional characteristics *viz.*, rolling resistance, angle of repose. Properties of bulk particulate solids *viz.* specific surface area, mean diameter, flow rate. Aerodynamics characteristics *viz.* drag coefficient and terminal velocity. Thermal properties *viz.* specific heat, thermal conductivity, thermal diffusivity. Dielectric properties *viz.* dielectric and microwave radiation, dielectric constant and energy absorption. Optical properties; transmittance and reflectance. Rheological properties and stress-strain-time relationship, rheological models, visco-elasticity.

**Unit 3: Post Harvest Unit Operations**

Technology & equipments for grading, cleaning, washing, sorting, shelling, cyclone separation, centrifugal separation, dehusking, decortication, milling, polishing, pearling, drying, heating, cooling, freezing, pasteurization and sterilization of foods, size reduction, cryogenic grinding, granulation, crystallization, membrane separation processes; Evaporation, Distillation, Mixing, coagulation, mechanical separation processes, *viz.* sedimentation, clarification, filtration, pressing, expelling, leaching, extraction, extrusion.

**Unit 4: Process Technology and Machinery**

Pre-milling, conditioning, process technology and machinery for cereals, pulses, oil seeds, fruits, vegetables, spices, condiments, plantation crops, meat, fish and poultry products. Emerging techniques- high pressure processing, ohmic heating, ultraviolet light, pulsed electric field, pulsed light field, encapsulation of food ingredients and Hurdle technology. Agricultural by-products/residue utilization and Waste disposal of food processing plants.

**Unit 5: Dairy Engineering and Technology**

Physical and chemical properties of milk - Chilling, pasteurization, sterilization, homogenization, cream separation - theory & machineries - Butter and cheese processing - Ice cream and milk powder production - membrane separation of milk - ultra filtration - reverse osmosis - membrane material and structures - packaging and filling of milk and milk products - production and Processing of Special Milks, condensed and evaporated milk, Fat Rich Dairy products and indigenous milk products, Fermented Milk Products and Milk by-products.

### **Unit 6: Food Packaging Technology**

Packaging terminologies. Functions of food packaging. Packaging requirements for different environments. Basis for selection of packaging material. Metal and Glass - Manufacturing, properties and its applications. Paper and polymers films as food packaging material-types, properties, manufacturing and its applications. Filling systems. Labels and bar coding - printing on packaging materials. Aseptic packaging, vacuum packaging, biodegradable packaging materials. Nano composite as packaging materials. Testing of packaging materials and instruments.

### **Unit 7: Material Handling and Storage**

Bulk conveying equipments, *viz.* belt conveyors, screw/ auger conveyors, bucket elevators, drag/chain Conveyors and Pneumatic conveyors. Estimation of energy requirement and capacity, Operation and maintenance of conveying equipment. Food grain storage practices and structures - Traditional, improved and modern. Controlled and modified atmospheric storage. Cold storage design & operations and cooling load calculations.

### **Unit 8: Plant layout, Design, Instrumentation and process control**

Computer aided design and analysis of machines and machine components. Materials, manufacturing processes, design of elements and selection of standard parts *viz.* pulley, chains, sprockets, bearings, belts, fasteners, hydraulic components, pipes, hoses. Plant design concepts and general design considerations, plant location, product and process design, process flow charts, equipment selection, plant layout. Design and selection of machinery for handling utilities like water, steam, fuel etc. and disposal of effluents and residues. Static and dynamic characteristics of instruments, Transducers elements, intermediate elements, indicating and recording elements. Measurement of motion, force, torque, power, temperature, humidity, pressure and flow. Physical and chemical sensors, biosensor.

### **Unit 9 Food chemistry & microbiology**

Importance of microorganisms in food - primary sources of microorganisms in food - intrinsic and extrinsic parameters of food affecting microbial growth - Microbial spoilage of foods - Assessing microbial load in foods - microscopic, cultural, physical, chemical - Fermented and microbial foods - Food borne diseases and safety. Thermal death time and process time calculations.

Classification, structure and functional properties of Carbohydrates, Proteins and lipids. water soluble and fat soluble vitamins, role of minerals in nutrition. Proximate analysis of food constituents. Chemical and biochemical changes during processing and storage of foods. Classification and applications of enzymes, food additives, pigments and flavours in food processing.

### **Unit 10 Food Quality & Standards**

Principle and methods for subjective and objective quality evaluation of foods. Measurement techniques and instruments for food quality determination, destructive and non-destructive quality evaluation. International, National Food laws and standards - FSSAI, PFA, FPO, BIS, AGMARK, APEDA, FDA, ISO, GRAS, EU, CAC, TQM, GMP, GAP, HACCP. International standards for export and quarantine requirements for export of Agricultural and Horticultural produce.