

**National institute of Food Technology,
Entrepreneurship and Management, Thanjavur (NIFTEM-T)**



Syllabus for
PhD Entrance Examination- 2025
**PhD (Food Technology) in Food Process Engineering; Food Process Technology; and
Food Safety and Quality Assurance syllabus**

Unit 1: Basics of Food Technology

Methods of Food Preservation: Drying, Dehydration, Pasteurization, Sterilization, Freezing, Freeze drying, Aseptic Preservation, Hurdle Technology, Microfiltration, Bacteriofugation, High voltage electric fields, Pulse electric fields, High pressure processing, Irradiation, Ohmic heating, Dielectric heating, Microwave, RF, Infrared technologies, and Chemical Preservation. Intermediate moisture food products, low & high acid foods and shelf stable foods.

Food Chemistry and Microbiology: Carbohydrates, Proteins, Fat, Vitamins and Minerals and micro molecules. Characteristics of microorganisms: morphology of bacteria, yeast, mold and actinomycetes, spores and vegetative cells, gram-staining. Sources of microorganisms, Intrinsic and Extrinsic parameters of food affecting microbial growth. Microbial growth: growth and death kinetics, Thermal death time and process time calculations.

Heat transfer by conduction, convection involving laminar and turbulent flow, radiation, heat exchangers. Mass Transfer: Molecular diffusion and Fick's law, and convective mass transfer, permeability: Momentum Transfer: Flow rate and pressure drop relationships

Processing of Foods

Processing cereals, grains and oilseeds: Dehusking, Decortication, Milling, Parboiling, Hydrogenation, Refining. Spices and Plantation Crops Processing: Tea, Coffee, Coconut, Cashew, Cocoa-Processing and Oil palm; Extraction of essential oils.

Processing fruits and vegetables: Maturity, Harvesting, Post-harvest Handling of Fruits and Vegetables; Processing of fruit juice, jam, jelly, marmalade; IQF products; By-products utilization of fruits and vegetable processing.

Dairy Technology: Physical and Chemical Properties of Milk; Milk Processing: Clarification, Ultrafiltration, Pasteurization, Standardization, Homogenization, Sterilization; Milk products: Standardized, toned, double toned, UHT. Dairy Plant Sanitation, and CIP.

Processing of Meat, Fish and Poultry Products: Methods of Slaughtering of various Animals and Poultry; Postmortem examination and Rigor mortis; Meat tenderization, Curing, Smoking. Poultry processing: Scaling, Evisceration; Structure and Composition of Egg and Egg products. Fish processing: Stunning, Filleting, Brining, Canning, Smoking, Pickling, Cold chain management.

Processing of Bakery, Confectionery and Extruded Products: Bread, Biscuits, Cookies, Cakes, Candies, Chocolates making. Extrusion: Types, principle; Extruded products: Pasta, Breakfast Cereals, Snacks.

Food Packaging and Storage: Functions of food packaging. Packaging requirements for different environments. Basis for selection of packaging material. Storage: Modified and Controlled Atmospheric Storage. Active and Intelligent packaging. Food grain storage practices and structures – Traditional, improved and modern. Cold storage design & operations and cooling load calculations.

Unit 2: Food Quality Analysis, Laws and Regulations

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. Principles of chromatography (liquid and gas), Spectrophotometric techniques, HPLC, GC, GC-MS, LCMS, AAS, SEM, XRD, DSC, Rheometer, Texture Analyzer.

Food Safety Systems: Quality systems standards including Food laws and standards: FSSAI, PFA, FPO, BIS, AGMARK, APEDA. International standards and organizations – FAO, WHO, WTO, Food Codex Alimentarius, FDA, ISO, GRAS, EU, TQM, GMP, GAP, HACCP.

Unit 3: Research Methodology

Types of Research Design and Stages, Selection and Formulation of Research Problem, Objective(s) and Hypothesis Developing Research Plan, Determining Experimental and

Sample Design. Sources of Data – Primary and Secondary Types of Data – Categorical (nominal and ordinal), Numerical (discrete, continuous, ratio and interval). Methods of Data Observation, Records or Experimental Observations. Statistical analysis: Mean, median, T-test, F-test, P value and ANOVA. Statistical Graphics – Histograms, Bar Graphs, Pie Charts. Intellectual Property Rights and Trademarks: Protection of investment and efforts in research and development by patenting.