

PATTERN AND SYLLABUS OF ENTRANCE TEST FOR NON GATE ADMISSION AT NIFTEM 2020

The seats remaining vacant after admission of GATE qualified candidates are offered to NON-GATE candidates. The admission is done through Entrance test organized by NIFTEM.

Due to the ongoing COVID-19 pandemic and prevailing conditions the exam for Non-GATE candidates will be conducted **Online. The detailed guidelines for online test such as test date, time and other requirements will be notified on website.*

Tentative date of online test: 16 Oct., 2020

The number of vacant seats are notified by institute on website and candidates must take decision based on available seats and eligibility.

The written test for non-GATE candidates shall consist of hundred (100) multiple choice questions of one mark each, there shall be negative marking and for each wrong answer 0.25 marks will be deducted. The duration of the test will be one hour and thirty minutes. The test shall consist of two parts.

Part-A shall contain Thirty (30) questions to test the Mental Ability, English and General Knowledge. Part-B shall contain Seventy (70) questions to test candidates' knowledge base in their chosen area.

Candidate have to chose any one of following five Part B papers at the time of filling application form..

Paper I	Food Science & Technology, Food Engineering, Dairy Technology, Foods and Nutrition
Paper II	Food Engineering, Agricultural Process Engineering, Bio Chemical Engineering, Chemical Engineering, Mechanical Engineering
Paper III	Food Business Management and Entrepreneurship
Paper IV	Food Science & Technology, Foods and Nutrition, Biotechnology, Microbiology, Biochemistry
Paper V	Agriculture, Environmental Science, Food Science & Technology

SYLLABUS OF DIFFERENT PAPERS (PART B) FOR NON GATE ENTRANCE TEST

Paper I for M.Tech. (FTM): Food Science & Technology, Food Engineering, Dairy Technology, Foods and Nutrition

Food Science: Carbohydrates, Proteins, Lipids, Pigments, Food flavours, Enzymatic and non-enzymatic browning; Nutrition: Balanced diet, Essential amino acids and fatty acids, PER, Water soluble and fat soluble vitamins, Role of minerals in nutrition, Antinutrients, Nutrition deficiency diseases, General Characteristics of microorganisms, Microbial growth in food: Intrinsic and extrinsic factors, Growth and death kinetics, serial dilution method for quantification; Microbial Food spoilage, Food borne illness Food Fermentation.

Food Products Processing Technologies: Processing principles: Canning, chilling, freezing, dehydration, control of water activity, CA and MA storage, fermentation, hurdle technology, addition of preservatives and food additives, Food packaging, cleaning in place and food laws.; Grain products processing: Milling of rice, wheat, and maize, parboiling of paddy, production of bread, biscuits, extruded products and breakfast cereals, Solvent extraction, refining and hydrogenation of oil; Fruits, vegetables and plantation products processing: Extraction, clarification concentration and packaging of fruit juice, Production of jam, jelly, marmalade, squash, candies, and pickles, pectin from fruit waste, tea, coffee, chocolate and essential oils from spices; Milk and milk products processing: Pasteurized and sterilized milk, cream, butter, ghee, ice-cream, cheese and milk powder; Animal products processing: Drying and canning of fish, post mortem changes, tenderization and freezing of meat, egg powder. Tea and coffee processing, Oil extraction and refining. Size reduction and mechanical separations, drying and dehydration.

Food Engineering - Heat transfer: Heat transfer by conduction, convection, radiation, boiling and condensation, Unsteady state heat transfer in simple geometry, NTU- effectiveness relationship of co-current and counter current double pipe heat exchanger; Thermal operations: Energy requirement and rate of operations involved in process time evaluation in batch and continuous sterilization, evaporation of liquid foods, hot air drying of solids, spray and freeze-drying, freezing and crystallization; Mass and momentum transfer operations: Properties of air-water vapour mixture; Humidification and dehumidification operations, Food rheology.

**Paper II for M.Tech. (FPEM): Food Engineering, Agricultural Process Engineering, Bio
Chemical Engineering, Chemical Engineering, Mechanical Engineering**

- Unit 1. Mass and energy balance, preservation processes, fluid flow, heat transfer, heat exchangers, refrigeration, freezing, evaporation, psychometrics, mass transfer, non-thermal food processing techniques, dehydration, extrusion processes for foods, modified atmosphere packaging, controlled atmosphere packaging, engineering properties, thermal properties & quality of biomaterials.
- Unit 2. Grading, cleaning, washing, sorting, shelling, dehusking, decortication, milling, polishing, pearling, pasteurization and sterilization of liquid foods, kinetics of microbial death, size reduction
- Unit 3. Process technology and machinery for cereals, pulses, oil seeds, fruits, vegetables, spices, condiments, plantation crops, animal products, sea-foods, fiber crops, animal feed, natural resins and gums.
- Unit 4. Agricultural by-products/residue utilization, Waste disposal of food processing plants, different methods and equipment.
- Unit 5. Conveying equipments viz. belt conveyors, screw/auger conveyors, bucket elevators and drag/chain conveyors. Storage environment and its interaction with stored product. Factors influencing the shelf life of the stored product
- Unit 6. Unit operations of food engineering- size reduction, separation, novel food processing i.e. high pressure processing, pulse electric field, infrared heating, ohmic heating, irradiation etc, membrane separation.
- Unit 7. 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.

Paper III for M.Tech. (FPOM): Food Business Management and Entrepreneurship

Food Analysis:

Texture analysis of foods, Microscopic techniques in food analysis (light microscopy, SEM, TEM, XRD, particle size analysis, image analysis etc.), Thermal method in food analysis (Differential scanning calorimetry and others), Chromatographic methods in food analysis and separation, Enzymatic method of food analysis, application of biosensors in food analysis.

Food Quality and Management:

Quality attributes- physical, chemical, nutritional, microbial and sensory; their measurement and evaluation; total Quality Management; GMP/GHP; GLP,GAP; Sanitary and hygienic practices; HACCP; Indian & International quality systems and standards like Food Safety and Standards Act,2006,ISO and food Codex.

Food Engineering:

Engineering properties of foods, steady state and unsteady state heat transfer, mass transfer, Death rate kinetics, thermal process calculations, heat and mass balance in single effect and multiple effect evaporator, methods to improve steam economy, drying Rates, theories of drying, Freezing curves, freezing time calculations, membrane separation techniques, centrifugation and fluidization, viscometry and food rheology.

Food Process Technology:

Mechanism and application of High Pressure processing, Ultrasonic processing, Microwave and radio frequency processing high intensity light, pulse electric field, ohmic heating, IR heating, inductive heating and hurdle technology in food processing and preservation.

Food Processing Equipment Design:

Basic Scientific and Engineering Principles of equipment design, Riveted and welded joints, corrosion mechanism and corrosion control, design of vessels and storage tanks.

Bioprocess Engineering:

Fundamentals of growth kinetics, Media sterilization, Air Sterilization, Bioreactor Fermenter, aeration and Agitation. Bioprocess instrumentation, Bioprocess modeling and simulation and its application in industrial fermentation, scale –up of fermentation processes.

Paper IV M.Tech. (FSQM): Food Science & Technology, Foods and Nutrition, Biotechnology, Microbiology, Biochemistry

Unit- 1

Carbohydrates, Proteins, Lipids, Pigments, Food flavours, Enzymatic and non-enzymatic browning; Nutrition: Balanced diet, Essential amino acids and fatty acids, PER, Water soluble and fat soluble vitamins, Role of minerals in nutrition, Antinutrients, Nutrition deficiency diseases.

Unit- 2

General Characteristics of microorganisms, microbial growth in food: Intrinsic and extrinsic factors, Growth and death kinetics, serial dilution method for quantification; Microbial Food spoilage, Food borne illness Food Fermentation.

Unit- 3

Use of analytical techniques for food analysis: General principles and components of instrumentation, Chromatography, Spectroscopy, Polarimetry, thermal methods, Rheology of food products, Moisture analysis.

Unit- 4

Introduction to human nutrition; Nutritive values of foods; Basal metabolic rate; Techniques for assessment of human nutrition, Dietary requirements and deficiency diseases of different nutrients

Unit-5

DNA, RNA; Replication, transcription, transformation, transduction, conjugation; Application in GM foods. Application of biotechnology in food, Immobilization of enzymes: Arresting of cell in insoluble matrix, immobilized cell systems

Paper V FOR M.Tech. (FSCM): Agriculture, Environmental Science, Food Science & Technology

Unit-1: Basic principles of crop production; cultivation of rice, wheat, sugarcane, groundnut, rapeseed mustard and potato; Agronomy-meaning, scope, principles, Crop ecology and geography, National & International agricultural research institutes in India, Agro climatic zones of India, Organic farming, precision farming, integrated farming systems, principles of field experimentation. Climate shift and its ecological implications, Agro- ecological regions in India, Climatic factors and their effect on crop productivity, weather & climate, Atmospheric temperature and global warming. weather forecasting; ;Importance & scope of horticulture. Climatic zones of horticulture crops. Orchard establishment including high density planting, Propagation methods & root stocks, Training & pruning methods, Production technology of fruit crops (Mango, Banana, Papaya, Pomegranate, Pineapple, Apple, Guava, Citrus), Importance & scope of vegetables. Classification of vegetables, Package of practices of vegetables (Tomato, Brinjal, Chilli, Okra, Cucumber, Bottle gourd, Cabbage, Cauliflower, Onion, Garlic, Potato, Carrot, Radish)

Unit 2: Importance & Scope of Post Harvest Technology of Horticulture crops; Maturity indices and standards for different fruits and vegetables; Destructive and non-destructive methods of maturity determinations; physiology and biochemistry of maturity and ripening, enzymatic and textural changes, ethylene biology, ethylene evolution and ethylene management, respiration, transpiration, regulation methods; Harvesting tools, harvesting practices for specific market requirements, primary processing of fruits & vegetables, Unit operations in packaging, storage and ripening protocols for important fruits and vegetables; Cold chain management of fruits and vegetables.

Unit 3: Importance & Scope of Fruit & Vegetable Preservation; Principles of preservation by heat, low temperature, chemicals & fermentation; Preservation methods by caning, bottling, freezing, drying & dehydration; Novel processing technologies of fruits and vegetables; Non-thermal processing; safety and quality issues in fruit and vegetable processing; Physiology, technology, quality and safety of fresh-cut fruits and vegetables; Enzymatic and non-enzymatic browning of minimally processed and processed products; Preparation of jams, jellies, candies, chutney, pickle, ketchup and squashes. High pressure juice processing; Preservatives and colours permitted and prohibited in India; Regulations for processed fruit and vegetable products in India; FSSAI, Codex and BIS standards for fruit and vegetable processed products.

Unit 4: Dairy development in India. Engineering, thermal and chemical properties of milk and milk products, unit operation of various dairy and food processing systems, process flow charts for product manufacture, working principles of equipment for receiving, pasteurisation sterilization, homogenisation, filling & packaging, butter manufacture, dairy plant design and layout, composition and proximate analysis of food products. Deterioration in products and their controls; Physical, chemical and biological methods of food preservation, changes undergone by the food components during processing, evaporation, drying, freezing juice extraction, filtration, membrane separation, thermal processing, plant utilities requirement.

Unit-5: Ecosystem concept; Structure and functions of biotic and abiotic components; Energy in ecosystems and environment; Food chains and food webs-ecological pyramids, nutrient cycles; Composition of air; Air pollution: sources, Effects of air pollutants on crops, vegetation, animals and human health; mitigation measures for combating air pollution; Global warming and greenhouse effect, major GHGs, sources and sinks of green house gases; Stratospheric ozone layer depletion-effect of UV radiation on plants and human health; Soil and water pollution: sources and types of soil and water pollutants; Effects of pollutants on soil health and productivity; Point and non-point sources of water pollution, major types of water pollutants, their impacts on environment and agro-ecosystems; Resource, product recovery, recycling and value addition to wastes; crop residue management
