

Gujarat PG CET 2025 Food Engineering (FE) Syllabus PDF

ENGINEERING MATHEMATICS

Linear Algebra: Matrix algebra, Systems of linear equations, Eigen values and eigenvectors.

Calculus: Functions of single variable, Limit, continuity and differentiability, Mean value theorems, Evaluation of definite and improper integrals, Partial derivatives, Total derivative, Maxima and minima, Gradient, Divergence and Curl, Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems.

Differential equations: First order equations (linear and nonlinear), Higher order linear differential equations with constant coefficients, Cauchy's and Euler's equations, Initial and boundary value problems, Laplace transforms, Solutions of one dimensional heat and wave equations and Laplace equation.

Complex variables: Analytic functions, Cauchy's integral theorem, Taylor and Laurent series.

Probability and Statistics: Definitions of probability and sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random variables, Poisson, Normal and Binomial distributions.

Numerical Methods: Numerical solutions of linear and non-linear algebraic equations
Integration by trapezoidal and Simpson's rule, single and multi-step methods for differential equations.

FOOD ENGINEERING

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.

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.

Food Products Technology

Processing principles: thermal processing, chilling, freezing, dehydration, addition of preservatives and food additives, irradiation, fermentation, hurdle technology, intermediate moisture foods.

Food pack aging 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.

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

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: psychrometric, humidification and dehumidification operations.
