

Gujarat PG CET 2025 Chemical Engineering (CH) 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.

CHEMICAL ENGINEERING

Fluid Flow Operations and Mechanical Operations: Fluid static and its application, Fluid Flow Phenomena, Basic equations of Fluid Flow, Flow of incompressible fluids in Conduits and Thin Layers, Flow of Compressible fluids, Flow past immersed bodies, Transportation and Metering of fluid, Dimensional Analysis. Solids and its flow properties, Size reduction, enlargement, Screening, Fluidization and conveying, Filtration and sedimentation, Mixing and agitation, Thickening and classification.

Chemical Process Industries: Water, Unit processes and applications, Coal, Industrial gases and carbon, Inorganic chemical industries and inorganic acid, cleaner production technology, its uses and applications and processing, Chlor-alkali and Heavy Inorganic industry, natural products industries, Paints, Pigments, Biotechnology and its application, Nitrogenous Fertilizer industry.

Process Calculations & Chemical Engineering Thermodynamics: Basic chemical calculations, Material balance with and without chemical reactions, Energy balance, Conservation of energy and first law of thermodynamics, Properties of pure substances, Heat effects, Second Law of thermodynamics, Thermodynamic properties of fluids, Thermodynamics of flow process, Phase equilibrium, Chemical equilibrium, Introduction to statistical thermodynamics and prediction method, fugacity.

Heat Transfer: Conduction convection and radiation. General laws of heat transfer, Natural convection, Heat transfer with phase change, Evaporation, Heat Exchange equipments, General constructions, Extended surface equipment, Industrial furnaces.

Mass Transfer: Molecular and Eddy Diffusion in fluids, Inter phase mass transfer, Gas Absorption, Liquid- Liquid extraction and leaching, Distillation, Humidification and dehumidification, Adsorption and ion exchange, Drying, Crystallization, Momentum, Heat and Mass transfer analogies, Membrane Separation Techniques

Instrumentation and Process Control: Laplace transforms, Response of First and second Order Systems, The control systems, Controllers and final control elements, Closed loop transfer functions, Stability, Control system design by frequency response, Controller Mechanism, Setting of different modes of controllers, P & I Process and Instrumentation Diagrams, Measurement of process variables, sensors and their dynamics transfer functions and dynamic.

Chemical Reaction Engineering: Kinetics of homogenous reactions, Interpretation of kinetic data single and multiple reactions in ideal reactors, Non ideal reactors, residence time distribution, single parameter model, non isothermal reactors, Mixing of Fluids, Kinetics and Design for non catalyzed, Heterogeneous system. Fluid Fluid Reactions, Fluid particle Reactions, Solid catalyzed reactions, Fixed bed Reactors, Slurry Reactors, Industrial application.

Plant Design and Economics: Process design aspects, Selection of process equipments, Process auxiliaries, Process utilities, Plant location and layout, Cost estimation, Estimation of total product, Depreciation, Profitability, cost indexes, Rate of return, Pay back period, discounted cash flow, optimization in design, Economic considerations in process and equipment design.

Environment and Safety: Various types of environmental pollution in general and in chemical and allied industry in particular, sources and causes of environmental pollution, effect of pollution on environment, methodologies for environmental pollution prevention (including process technology up gradation, development, etc.), Fire and explosion hazards rating- HAZOP and HAZAN.

Petroleum Refining and Petrochemicals: Types of crude, Evaluation of oil stocks and refinery product, Properties of crude and products, Processing of petroleum, crude and refinery products, Thermal and Catalytic cracking processes employed in refineries, Atmospheric and Vacuum distillation, Treating operations of petroleum products, Oil fields and refineries in India, Manufacturing process of: Chemicals from C1, C2, C3, C4 compounds, aromatics, polymers, etc. Engineering problems.

Polymer Technology: Monomers, functionality, degree of polymerizations, classification of polymers, glass transition, melting transition, criteria for rubberiness, polymerization methods: addition and condensation; their kinetics, metallocene polymers and other newer techniques of polymerization, copolymerization, monomer reactivity ratios and its significance, kinetics, different copolymers, random, alternating, azeotropic copolymerization, block and graft copolymers, techniques for copolymerization-bulk, solution, suspension, emulsion, Polymer compounding-need and significance, different compounding ingredients for rubber and plastics, crosslinking and vulcanization, vulcanization kinetics.

Polymer processing: Compression molding, transfer molding, injection molding, blow molding, reaction injection molding, extrusion, pultrusion, calendaring, rotational molding, thermoforming, rubber processing in two-roll mill, internal mixer.
