PGCET: 2025 – 26

Number of MCQ questions for PGCET is 100. Each question carry one mark.

Syllabus for PGCET in Chemical Engineering

(1) Engineering Mathematics

(i)Linear Algebra: Matrices and determinants, rank of matrix, systems of linear equations, Eigen values and Eigen vectors.

(ii) Calculus: Limit, Continuity and differentiability, Partial derivatives, test for convergence, Fourier series.

(iii) Vector Calculus: Gradient, divergent and curl, line, surface and volume integrals. Stokes theorem, problems related to Gauss's and Green's theorem.

(iv) Differential equations: Linear and nonlinear first order ODEs, higher order linear ODEs with constant coefficients, Cauchy's and Euler's equations.

(v) Partial Differential Equations: PDEs, formation of PDEs, solution of PDE by direct integration and separation of variables. Heat and wave equations.

(vi)Transforms: Laplace transforms, Fourier transform and Z – transform.

(vii) Probability and statistics: Mean, median, mode and standard deviation. Random variables, Poisson normal and binomial distributions, correlation and regression analysis.

(viii) Numerical Methods: Solutions of linear and nonlinear algebraic equations, integration of trapezoidal and Simpson's rule, Numerical solutions of ODEs.

(2) C Programming for problem solving

(i)Overview of C: Basic structure of C program, executing a C program, variable and data types, operators and expressions. Managing input and output operations, conditional branching and loops. Example programs. Finding rots of quadratic equation, computation of binomial coefficients, plotting of Pascal's triangle.

(ii)Arrays: Arrays (1D, 2D), character arrays and strings, basic algorithms, searching and sorting algorithms (linear search, bubble sort and selection sort).

(3) Technical English

(i) Introduction Listening Skills and Phonetics: Introduction to phonetics, sounds mispronounced, silent and non-silent letters, Homophones and homonyms, aspiration, pronunciation of "The" words ending with age. Use of articles – indefinite and definite articles.

(ii) Identifying Common Errors in writing and speaking English: Subject verb agreement (concord rules with exercises), common errors in subject verb agreement, noun-pronoun agreement. Adjective, adverb, verb, sequence of tenses, misplaced modifiers, Articles and prepositions, common errors in conjunctions. Gender, singular and plural.

(4)Process Calculations

Units and Dimensions, material and energy balances, humidity, combustion.

(5)Momentum Transfer

Basic equations of fluid flow, flow of incompressible fluids in conduits, transportation and metering of fluids, dimensional analysis.

(6) Mechanical Operations

Particulate technology, Size reduction, flow of fluids past immersed bodies, sedimentation, filtration, agitation and mixing.

(7)Heat Transfer:
Conduction, convection and radiation, heat transfer with phase change, design of double pipe and shell-and-tube heat exchangers, evaporators.

(8)Thermodynamics
First and second law of thermodynamics, PVT relations, Thermodynamic properties of pure fluids and solutions, phase and chemical reaction Equilibria.

(9) Material Science
Crystal geometry and structure determination, atomic structure and chemical bonding, crystal imperfections, phase diagram, deformation of materials and fracture, heat treatment, corrosion and its prevention, polymers and polymerization.

(10) Chemical Reaction Engineering
Kinetics of homogeneous reactions, design of ideal reactors, non-isothermal reactors, catalysis, gas liquid reactors.

(11) Process Control and Instrumentation
First order systems, closed loop system- controllers, P, I, D and on-off modes, stability, Control system design, pressure measurement, temperature measurement, thermocouples and pyrometers.

(12) Industrial pollution control
Sources, sampling and analysis of waste water, waste water treatment-preliminary, primary, secondary and tertiary treatment, air pollution control-sampling and estimation, control methods of gaseous pollutants and particulates, solid waste management-origin, classification and treatment, noise control-determination of noise levels, noise control characteristics, acoustic absorptive materials.

(13) Chemical Process Industries
Industrial gases and acids, chlor-alkali and cement industries, inorganic fertilizers, paints, pigments, varnishes, enamel, oils, fats, waxes, soaps, detergents, sugar, starch and allied industries, petroleum industries and petrochemicals. Coal, pulp and paper industries.

(14) Mass Transfer Operations
Diffusion- types, measurements, mass transfer coefficients, theories of mass transfer, concept of stages, cascades operation, NTU, HTU; humidification, drying, adsorption, crystallization, absorption, distillation, liquid-liquid extraction, leaching.

(15) Process modelling
Models and model building, principles of model formulations, precautions in model building, Fundamental laws: Review of shell balance approach, continuity equation, energy equation, equation of motion, transport equation of state equilibrium and Kinetics, classification of mathematical models. Mathematical Modelling and Solutions to the Following: Basic tank model — Level V/s time. Batch Distillation — Vapour composition with CSTRs in series time.