

Karnataka Examinations Authority, Bengaluru - 560012**PGCET: 2024 – 25****Number of MCQ questions for PGCET is 100. Each question carry one mark.****Syllabus for PGCET in Polymer Science and Technology****(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 roots 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) Fluid Mechanics and Statics

Types of fluids — shear stress and velocity gradient relation Newtonian and non-Newtonian fluids, laminar and turbulent flow. Flow in boundary layers, Reynolds number, Bernoulli equations, variation of pressure with height — hydrostatic equilibrium, Barometric equation, Measurement of fluid pressure — manometers.

(5) Chemical Process Calculations

Concept of mole, mole fraction, compositions of mixtures of solids, liquids and gases. Ideal gas law calculations, general material balance equation for steady state.

(6) Chemical Engineering Thermodynamics

Basic concepts - system, surrounding and processes, closed and open systems, state and properties, intensive and extensive properties, state and path functions, general statement of first law of thermodynamics, first law of thermodynamics, first law for cyclic process, P-V-T behaviour of pure fluids, equations of state and ideal gas law, processes involving ideal gas law, constant volume, constant pressure, constant temperature, Van-Der Waals equation.

(7) Heat and Mass Transfer

Modes of heat transfer, unilayer and multiplayer condition, forced and natural convection, introduction to molecular diffusion in gases and liquids, theories of mass transfer, principles and types of distillations.

(8) Polymer Science

Classification of polymers, definition of polymerization, chain polymerization (free radical, ionic and co-ordination polymerizations), step (condensation) polymerization, copolymerization methods of polymerization (bulk, solution, suspension, emulsion).

(9) Polymerization Kinetics

Definition of reaction rate, order, molecularity, different theories of reaction rate, activation energy, kinetic expressions for simple first order and second order chemical reactions, kinetics of linear step reaction polymerization, kinetics of addition polymerization initiated by free radical initiator: steady state assumption.

(10) Processing Technology

Extrusion, injection moulding, blow moulding compression moulding, rotational moulding, thermoforming, calendaring.

(11) Polymer Manufacturing

Industrial production methods of HDPE, LDPE, PP, PS, PVC, PMMA, Nylon 6 and Nylon 66.

