Section A
Multiple Choice Questions

1) Research Methodology: (40 Marks)
Writing Skills: Tenses, Parts of speech, Clauses, Subject-verb agreement, Idioms and Phrases, Reading comprehension, Word-meaning. Synonyms-antonyms, Hyponyms;
Logical and Analytical reasoning:
Programming Skills: Data Types, Assignments, Conditional Statements, Branching and looping, input/output statements.

2) Subject Area: (10 Marks)

Section B
Subjective Questions (30 Marks)

Real Analysis: Sequence and series of functions, Pointwise and uniform convergence, Reimann Stieltjes integrals with properties, Power series, Abel’s theorem and Taylor theorems, Functions of several variables, Partial derivatives, Jacobian, Multiple integrals.

Special Functions and Vector Calculus: Gradient, Divergence, Curl, Vector identities, Directional derivatives, Line, surface and volume integrals, Stokes’, Gauss and Green’s theorems, Bessel functions, Legendre polynomials, Gauss Hypergeometric functions, Hermite and Laguerre polynomials.

Complex Analysis: Continuity and differentiability, Analytic functions, Cauchy’s theorem, Cauchy’s integral formula, Taylor and Maclaurin expansions, Laurent’s series, Singularities, Theory of residues and contour integration, Conformal mappings.


Topology: Continuous maps, Compactness, Separation properties.

Abstract and Linear Algebra: Groups, Subgroups, Lagrange’s theorem, Normal subgroups, Quotient group, Homomorphism, Permutation group, Cayley’s theorems, Sylow theorem, Rings, Ideals, Fields. Vector space, Basis, Linear transformations, Matrices, Rank and Nullity, Eigen values and Eigen vectors, Characteristic and Minimal Polynomials, Diagonalizability, Jordan canonical form.


Partial Differential Equations: Lagrange’s and Charpit’s general method for solving PDE’s, Cauchy problem for first order PDE’s, Classification of second order PDE’s, general solution of higher order PDE’s with constant coefficients, Method of separation of variables for Laplace, heat and wave equations.