

# SYLLABUS FOR TAMILNADU COMMON ENTRANCE TEST (TANCET)

## PART – III

### 17. MATHEMATICS

**Algebra:** Group, subgroups, Normal subgroups, Quotient Groups, Homomorphisms, Cyclic Groups, permutation Groups, Cayley's Theorem, Rings, Ideals, Integral Domains, Fields, Polynomial Rings.

**Linear Algebra:** Finite dimensional vector spaces, Linear transformations – Finite dimensional inner product spaces, self-adjoint and Normal linear operations, spectral theorem, Quadratic forms.

**Real Analysis:** Sequences and series of functions, uniform convergence, power series, Fourier series, functions of several variables, maxima, minima, multiple integrals, line, surface and volume integrals, theorems of Green, Stokes and Gauss; metric spaces, completeness, Weierstrass approximation theorem, compactness.

**Complex Analysis:** Analytic functions, conformal mappings, bilinear transformations, complex integration: Cauchy's integral theorem and formula, Taylor and Laurent's series, residue theorem and applications for evaluating real integrals.

**Topology:** Basic concepts of topology, product topology, connectedness, compactness, countability and separation axioms, Urysohn's Lemma, Tietze extension theorem, metrization theorems, Tychonoff theorem on compactness of product spaces.

**Functional Analysis:** Banach spaces, Hahn-Banach theorems, open mapping and closed graph theorems, principle of uniform boundedness; Hilbert spaces, orthonormal sets, Riesz representation theorem, self-adjoint, unitary and normal linear operators on Hilbert Spaces.

**Ordinary Differential Equations:** First order ordinary differential equations, existence and uniqueness theorems, systems of linear first order ordinary differential equations, linear ordinary differential equations of higher order with constant coefficients; linear second order ordinary differential equations with variable coefficients, method of Laplace transforms for solving ordinary differential equations.

**Partial Differential Equations:** Linear and quasilinear first order partial differential equations, method of characteristics; second order linear equations in two variables and their classification; Cauchy, Dirichlet and Neumann problems, Green's functions; solutions of Laplace, wave and diffusion equations using Fourier series and transform methods.

**Calculus of Variations and Integral Equations:** Variational problems with fixed boundaries; sufficient conditions for extremum, Linear integral equations of Fredholm and Volterra type, their iterative solutions, Fredholm alternative.

**Statistics:** Testing of hypotheses: standard parametric tests based on normal, chisquare, t and F-distributions.

**Linear Programming:** Linear programming problem and its formulation, graphical method, basic feasible solution, simplex method, big-M and two phase methods. Dual problem and duality theorems, dual simplex method. Balanced and unbalanced transportation problems, unimodular property and u-v method for solving transportation problems. Hungarian method for solving assignment problems.