

DEPARTMENT OF MATHEMATICS

Syllabus for Ph.D. Entrance Exam

Unit I

Ordered Set: Field, The Real Field, The extended Real number, system, Euclidean spaces, Finite, countable and uncountable sets, metric space, Sequence and series, Convergence.

Complex Analysis: The complex plane, Polynomials, Power series, transcendental functions such as exponential, trigonometric and hyperbolic function, analytic functions.

Unit II

Modern Algebra: Elementary basic concept, Group, subgroup, Normal subgroup, Kernel –Cyclic group, Centre of the Group.

Topology: Basis, dense sets, subspaces and product topology, separation Axioms, connectedness and compactness.

Unit III

Ordinary Differential Equations: Series solutions of first order equations, second order linear equations.

Partial Differential equations: Partial Differential equations of second order: Linear partial differential equations with constant coefficients, solution classification of second order partial differential equations, solutions.

Unit IV

Graph Theory: Introduction, degrees, isomorphism, sub graph, walk, path, circuit, connected graph, disconnected graph, components, properties of trees, pendent vertices in a tree, distance and centre in a tree, rooted and binary trees, counting tree, spanning trees, fundamental circuits.

Numerical analysis: Numerical solutions of algebraic equations and transcendental equations-method of iteration-Newton Raphson's Method.

Unit V

Statistics: sample space, discrete probability, independent events, bayes theorem, random variables and distribution functions (univariable, multivariable) expectation and moments, independent random variables, marginal and conditional distribution.

Linear programming problem: Simplex methods, duality, elementary queuing and inventory models.

References:

1. Walter rudin-principle of mathematical analysis 3rd edition(chapter1,chapter3)
2. Lars.V.Ahlfors-an introduction to the theory of analytic function of one variable 3rd edition Tata McGraw Hill.
3. I.N.Herstein,Topics in algebra,2nd edition John wiley and sons. (chapter:4,4.1 to 4.4, chapter 6:6.1 to 6.2)
4. James Munkers:Introduction to topology.
5. G.F.Simmons:Diffeential equation with Applications and historical Notes,McGraw Hill Book Company,1972.
6. Ian N.Sneddon: Elements of partial differential equation,McGraw Hill International ediion,1984.
7. Graph theory with applications of Engineering and Computer Science By Narasingh Deo (Prentice Hall of India)
8. Numerical Methods for Scientific and Engineering Computation – M.K.Jain, S.R.K.Iyengar, R.K. Jain, 4th edition
9. Mathematical Statistics: P.R. Vital, First Published 2002. Margham Publishing.
10. An Introduction to Operation Research – Hamdy A. Taha , 8th edition. Prentice Hall of India Pvt. Ltd, New Delhi, 1995