

Mathematics I (Semester 2)

Algebra and Calculus – I

Section A:

Theory: Binary relations, functions and their graphs, composition of functions.

Number System: Real and complex number systems, De Moivre's theorem with applications, exponential. Trigonometric, hyperbolic, logarithmic, inverse hyperbolic and inverse circular functions.

Infinite Series: Sequences, limits and bounds of sequences, infinite series, and basic comparison test, limits: comparison test, integral, ratio and root tests, alternating series, absolute and conditional convergence.

Section B:

Group theory: Groups and their properties, subgroups, order of a group, cyclic groups, cosets, Lagrange's theorem, permutation groups, rings, fields, vector spaces, subspaces, linear combinations and spanning set, linear dependence and basis, dimension, linear transformations.

Section C:

Matrices: Elementary row operations, echelon and reduced echelon forms, inverse, rank and normal: form of a matrix, matrix of linear transformation, partitioning of a matrix.

Determinants: Axiomatic definition of a determinant, determinant as sum of product of elements, Adjoint: and inverse of a matrix.

Systems of Linear Equations: Gaussian elimination and Gauss-Jordan methods, Cramer's rule, consistent and inconsistent: systems.

Section D:

Equations: Solutions of quadratic, cubic and biquadratic equations, numerical solution of equations, Newton:-Raphson, regula falsi and bisection methods.

Probability: Axioms of Probability, conditional probability, discrete and continuous random variables: probability distributions, binomial, Poisson and normal distributions.

Books Recommended:

- Adler, F. R. (2005). Modeling the Dynamics of Life Calculus and Probability for Life Science, Second Edition, Thomson Brooks / Cole.
- Anton, H. (1997). Elementary Linear Algebra, Eight Edition, John Wiley.
- Boyce, W. E. & Prima, R. C. (1983). Elementary Differential Equations and Boundary Value Problems, John Wiley.
- Calvert, J. & Voxman, W. (1994). Finite Mathematics, McGraw Hill, N.Y.
- Flus, R. Calculus and Analytic Geometry, Prindle, Weber and Schmidt, Boston, Mass.
- Jain, M. K., Iyengar, S.R.K. & Jain, R.K. (1991). Numerical Methods for Scientific and Engineering Computations, Six Edition, Wiley Eastern Ltd.
- Jain, R. K. & Iyengar, S.R.K. (2007). Advanced Engineering Mathematics, Third Edition, Narosa Publishing House, New Delhi.
- Kishan H. (2007). Differential Calculus, Atlantic Publishers and Distributors Pvt. Ltd.
- Kreyszig, E. (2005). Advanced Engineering Mathematics, Ninth Edition, John Wiley.
- Mathews, J. H. & Howell, R. W. (2002). Complex Analysis for Mathematics and Engineering, Fifth Edition, Jones and Bartlett Publishers, Boston.
- O Neil, P. V. (2003). Advanced Engineering Mathematics, Fifth Edition.
- Sharma, A.K. (2007). Power Series, First Edition, Discovery Publishing House, New Delhi.
- Sharma, S.C. Complex Variable, First Edition, Discovery Publishing House, New Delhi,
- Steward, Precalculus Mathematics for Calculus, Fourth Edition, with CD, Brooks Cole.
- Swokowski, E.W. (2000). Calculus and analytic geometry, Prindle, Weber and Schmidt Boston, Mass.
- Talpur, N.M. (1971). Calculus and Analytic Geometry, Ferozsons.
- Thomas & Finney (2005). Calculus and Analytic Geometry, Addison Wesley.
- Thorpe, J. A. & Kumpel, P.G. (1984). Elementary Linear Algebra, Saunders College Publishers, N.Y.
- Yousuf, S. M. (2003). Mathematical Methods, Fourth Edition, Ilmi Kitab Khana, Lahore.