

B.Ed.(Hons.) 4 Year Program (Elementary)

Discipline Five: Mathematics (Content Courses)

Department of Teacher Education

University of Karachi

B.Ed. Hons. (Elementary) Semester V

Mathematics I (Course code: DTE-531)

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.

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, Ferozesons.

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.

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Mathematics II (Course code: DTE-522)

B.Ed. Hons. (Elementary) Semester VI

Algebra and Calculus - II

SECTION A:

Differential Calculus: Bounds, limits and continuity, properties of continuous functions, derivatives, Leibnitz: and Rolle's theorems, Lagrange's and Cauchy's mean value theorems, generalized mean value theorems, indeterminate forms, Taylor's and Maclaurin's series.

SECTION B:

Integral Calculus: Anti-derivatives, techniques of integration, Riemann integral, properties of definite: integrals, mean value theorem, reduction formulae, improper integrals and Beta and gamma integrals.

SECTION C:

Differential Equations I: Differential equations, formation and solution, equations of first order, initial and boundary: value problems, various methods of solving first order differential equations: Separable,

Exact & Homogeneous equation, integration factor and orthogonal trajectories. Non-Linear First Order Equations, Envelopes and Singular solutions.

SECTION D:

Differential Equations II: Higher order Homogeneous Differential equations with constant coefficients, superposition: of solutions, Cauchy-Euler's equations, systems of two first order linear homogenous equations, nonlinear equations.

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.

Birkhoff, G. & Rota, G.C. (1989). Ordinary. Differential Equations, Fourth Edition, John Wiley and Sons, New York.

Boyce, W. E. & Prima, R.C. (1992). Elementary Differential Equations and Boundary Value Problems, John Wiley.

Calvert, J. & Voxman, W. (1994). Finite Mathematics, McGraw Hill, N.Y.

Flus, R. (1983). 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 Esastern 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.

O Neil, P.V. (2003). Advanced Engineering Mathematics, Fifth Edition.

Sharma, A.K. (2007). Linear Transformations, First Edition, Discovery Publishing House, New Delhi.

Sharma, J. N. (2007). Numerical Methods for Engineers and Scientists, Second Edition, Narosa Publishing House, New Delhi.

Steward (2002). 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, Ferozesons.

Thomas & Finney (2005). Calculus and Analytic Geometry, Addison Wesley.

Thorde, J. A. & Kumpel, P.G. (1984). Elementary Linear Algebra, Saunders College Publishers, New York.

Yousuf, S.M. (2003). Mathematical Methods, Fourth Edition, Ilmi Kitab Khana, Lahore.