



**SCHOOL OF DISTANCE & CONTINUING EDUCATION  
DRAVIDIAN UNIVERISTY: KUPPAM**

**Syllabus for First Year M. Sc. Mathematics  
Paper – I : ALGEBRA**

**I. GROUP THEORY:**

Homomorphisms, Automorphisms, Cayleys theorem, Permutation groups, Another counting principle. Sylow's theorem, Direct products, Finite abelian groups.  
(Chapter 2, Sections 2, 7 2. 14 of (1) (3 Questions to be set).

**II. RING THEORY:**

Rings, Some special classes of rings, Homomorphisms, Ideals and quotients of an integral domain, Euclidean rings. The field of quotients of an integral domain, Euclidean rings, a particular Euclidean ring, polynomial rings, polynomial over the rational field, polynomial rings over the commutative rings.  
(Chapter 3 sections 3.1 3.11 of (1) (2 Questions to be set).

**III. FIELDS:**

Extension fields, Roots of polynomials, Construction with straight edge and compass, More about roots, the elements of Galois theory, Solvability by radicals, Galois groups over the rationals.  
(Chapters 5 sections 5.1 5.8 of (1)). (3 Questions to be set).

**IV. LATTICES:**

Partially ordered sets, Lattices, Modular Lattices, Schreier's theorem. The Chain conditions decomposition theory for Lattices with ascending chain condition, Independence, complemented modular lattices, Boolean algebras.  
(Chapter 7 section 1 8 to (2)). (2 Questions to be set).

**Text Books:**

- 1 .Topics in Algebra by I.N. Horstein (2nd Edition), Vikas Publishing House Pvt.Ltd.
2. Lectures in Abstract Algebra by Nathan Jacobson, D. Van Nostrand Company, Inc.



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**Syllabus for First Year M. Sc. Mathematics  
Paper – II : Analysis**

- I. Finite, countable and uncountable sets - Metric spaces - Compact sets - Perfect sets Connected sets. ( 2 questions to be set)
- II. Sequences in metric spaces Subsequences - Cauchy sequences - Upper and lower limits - Some special sequences. Absolute convergence - Addition and multiplication of series Rearrangements. (1 question to be set).
- III. Continuity - Limits of functions Continuous functions Continuity and compactness Continuity and connectedness Discontinuities Monotonic functions Infinite and limits at infinity. (1 question to be set).
- IV. Riemann Stieltjes integral Definition and existences of integral - Properties of integral - Intergration and differentiation. (2 questions to be set).
- V. Sequences and series of functions Uniform convergence - Uniform convergence and continuity - Uniform convergence and integration - Uniform convergence and differentiation - Equicontinuous family of functions - Weierstrass approximation theorem. (2 questions to be set).
- The Lebeggue theory - Set functions A construction of the Lebesgue measure - measure spaces - Measurable functions - Simple function - Integration - Comparison with Riemann integral - Integration of complex function - Functions of class  $L^2$ . (2 questions to be set).

**Text Books:**

Walter Rudin: Principle of Mathematical Analysis (Third Edition) Mc. Graw Hill International Edition.



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Syllabus for First Year M. Sc. Mathematics

Paper – III : Differential Equations and Numerical Methods

**UNIT I**

**1. Differential Equation:** Differential equation -order of differential equation-degree of differential equation -Solution of differential equation-General Solution-Particular Solution-Differential equation of first order and first degree-Solution of differential equation of first order and first degree ,Variable - separable form, Equation reducible to variable – separable form , Linear differential equation, Bernoul's Equation, Homogeneous Differential Equations, Homogeneous Differential Equation can be Reduced in the homogeneous form, Exact differential equation- Formation of a differential equation-Finding equation of a curve whose geometrical properties are given -Orthogonal trajectory.

**UNIT II**

**2. Linear Differential equations (n<sup>th</sup> order with constant coefficients) :**Linear differential equation with constant coefficients-The Operator D- Complementary Functions (C.F)- Auxiliary equation (A.E)- Rules for finding complementary function, If all the roots of A.E are distinct and real , when the roots of auxiliary equation are equal , when roots of A.E are imaginary, When roots of A. E equation are repeated imaginary, When roots of A. E equation are repeated imaginary, When roots of A.E equations are irrational -The Inverse Operator  $\frac{1}{f(D)}$  -Rules for finding the particular integral (P.I) - When  $Q = e^{ax}$  or  $a^{x+b}$ , Case of failure, When  $Q = \sin(ax + b)$  or  $\cos(ax + b)$ , Case of failure, When  $Q = x^m$ , m being a positive integer, When  $Q = e^{ax} \cdot v$ , where v is the function of x only, When  $Q = x \cdot v$

**UNIT III**

Solution of Algebraic and Transcendental Equations : Introduction – The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method. Interpolation: Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences-Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton's formulae for interpolation – Central difference interpolation Formulae – Gauss' Central Difference Formulae –Interpolation with unevenly spaced points-Lagrange's Interpolation formula.

**UNIT IV**

Fitting a straight line –Nonlinear curve fitting –Curve fitting by a sum of exponentials-Weighted least squares approximation-Linear weighted least squares approximation-Nonlinear weighted least squares. Numerical Differentiation and Integration: The Cubic Spline Method – Trapezoidal rule – Simpson's 1/3 Rule –Simpson's 3/8 Rule-Boole's and Weddle's Rules .

**UNIT V**

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods –Predictor-Corrector Methods- Adams-Moulton Method –Milne's M

**SCHOOL OF DISTANCE & CONTINUING EDUCATION  
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**Syllabus for First Year M.Sc (Mathematics )  
Paper IV - Operation Research**

**Unit I**

**Linear Programming problem** Mathematical formulation, assumptions in linear programming, graphical method of solution, simplex method, Big-M method and Two phase method, Dual simplex method.

**Unit II**

**Integer Programming** Introduction, Gomory's cutting plane method, Fractional cut method-Mixed integer and branch and bound techniques.

**Transportation Problem**-General transportation problem, Finding an initial basic feasible solution, Loops in transportation tables, Degeneracy, Optimality method-MODI method.

**Assignment Problem**- Hungarian Method, Traveling salesman problem.

**Unit III**

**Game theory** Introduction, two-person zero-sum games, some basic terms, the max-mini-max principle, games without saddle points-Mixed Strategies, graphic solution of  $2 \times n$  and  $m \times 2$  games, dominance property.

**Simulation** Introduction, Definition of Monte-Carlo Simulation.

**Unit IV**

**Dynamic Programming** Introduction, The Recursive equation approach, Algorithm, Solution of a L.P.P by Dynamic Programming.

**Sequencing Models**-Processing  $n$  jobs through 2 machines,  $n$  jobs through 3 machines, two jobs through  $m$  machines.

**Networking Analysis** CPM & PERT – Network minimization, shortest route problem, maximal-flow problem, Project scheduling, critical path calculations, PERT calculation.

**Unit V**

**Queuing Theory** Introduction, Queuing system, Elements of Queuing system, Characteristics of Queuing system, Classification of Queuing Models, Poisson Queuing systems-Model I (M/M/1):  $(\infty)$ :FIFO)-Characteristics of Model I and waiting time characteristics. Characteristics of (M/M/1):(N/FIFO), (M/M/C): $(\infty)$  /FIFO), (M/M/C):(N/FIFO)-all without derivation

**Text Books**

1. Operation Research by Kanti Swarup, P.KGuptha , Man Mohan 11<sup>th</sup> edition Sultan Chand & Sons Publication.
2. Operation Research , Jaico Publishing House
3. Operation Research-An introduction by Hamdy A Taha. Prentice Hall.
4. Introduction To Management Science, Anderson, Thomson Learning, 11Edn.
5. Operation Research Applications and Algorithms, Winston, Thomson Learning, 4Edn.
6. Introduction to Operation Research by Hiller/Lieberman. McGraw Hill.

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**Syllabus for First Year M.Sc (Mathematics )  
Paper V - Mathematical Methods**

**UNIT – I**

**Special functions:** Gamma and Beta Functions – Their properties – evaluation of improper integrals. Bessel functions – properties – Recurrence relations – Orthogonality. Legendre polynomials – Properties – Rodrigue’s formula – Recurrence relations – Orthogonality.

**UNIT-II**

**Functions of a complex variable** – Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thompson method.

**Elementary functions:** Exponential, trigonometric, hyperbolic functions and their properties – General power  $Z^c$  (c is complex), principal value.

**UNIT-III**

**Complex integration:** Line integral – evaluation along a path and by indefinite integration – Cauchy’s integral theorem – Cauchy’s integral formula – Generalized integral formula.

**Complex power series:** Radius of convergence – Expansion in Taylor’s series, Maclaurin’s series and Laurent series. Singular point – Isolated singular point – pole of order m – essential singularity.

**UNIT-IV**

**Residue** – Evaluation of residue by formula and by Laurent series - Residue theorem.

Evaluation of integrals of the type

- (a) Improper real integrals  $\int_{-\infty}^{\infty} f(x)dx$       (b)  $\int_c^{c+2\pi} f(\cos \theta, \sin \theta)d\theta$   
(c)  $\int_{-\infty}^{\infty} e^{imx} f(x)dx$       (d) Integrals by indentation.

**Argument principle** – Rouche’s theorem – determination of number of zeros of complex polynomials - Maximum Modulus principle - Fundamental theorem of Algebra, Liouville’s Theorem.

**UNIT-V**

**Conformal mapping:** Transformation by  $e^z$ ,  $\ln z, z^2, z^n$  (n positive integer),  $\text{Sin}z, \text{cos}z, z + a/z$ . Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio – properties – invariance of circles and cross ratio–determination of bilinear transformation mapping 3 given points .

**Text Books**

1. A text Book of Mathematical Methods, S M Naidu, StudentsHelpline Books
2. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley India Pvt. Ltd.
3. A text Book of Engineering Mathematics, Thamson Book Collection.
4. A text Book of Engineering Mathematics, Shahnaz Bathul, Prentice Hall of India.