



बिलासपुर विश्वविद्यालय, बिलासपुर (छत्तीसगढ़)
SEMESTER SYLLABUS
M.Sc. MATHEMATICS

SCHEME OF EXAMINATION & DISTRIBUTION OF MARKS

SEMESTER - I

Paper No.	Title of the Paper (s)	Internal Assessment	Term End Exam	Practical	Total Marks
1.	Advanced Abstract Algebra (I)	20	80		100
2.	Real Analysis (I)	20	80		100
3.	Topology (I)	20	80		100
4.	Complex Analysis (I)	20	80		100
5.	Advanced Discrete Mathematics (I)	20	80		100

SEMESTER - II

Paper No.	Title of the Paper (s)	Internal Assessment	Term End Exam	Practical	Total Marks
1.	Advanced Abstract Algebra (II)	20	80		100
2.	Real Analysis (II)	20	80		100
3.	Topology (II)	20	80		100
4.	Complex Analysis (II)	20	80		100
5.	Advanced Discrete Mathematics (II)	20	80		100

SEMESTER - III

Paper No.	Title of the Paper (s)	Internal Assessment	Term End Exam	Practical	Total Marks
1.	Integration Theory and Functional Analysis - I	20	80		100
2.	Partial Differential Equations. Mechanics and Gravitation - I	20	80		100
OPTIONAL PAPER (ANY THREE)					
3.	Program. in C with ANSI Features I	20	50	30	100
4.	Fuzzy Sets and their Applications-I	20	80		100
5.	Operations Research-I	20	80		100
6.	Fluid Mechanics-I	20	80		100
7.	Information Theory-I	20	80		100
8.	Fundamentals of Computer Science -I	20	80		100

SEMESTER - IV

Paper No.	Title of the Paper (s)	Internal Assessment	Term End Exam	Practical	Total Marks
1.	Integration Theory and Functional Analysis -II	20	80		100
2.	Partial Differential Equations. Mechanics and Gravitation - II	20	80		100
OPTIONAL PAPER (ANY THREE)					
3.	Programming in C with ANSI Features- II	20	50	30	100
4.	Fuzzy Sets and their Applications-II	20	80		100
5.	Operations Research-II	20	80		100
6.	Fluid Mechanics-II	20	80		100
7.	Information Theory-II	20	80		100
8.	Fundamentals of Computer Science II	20	80		100

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बिलासपुर विश्वविद्यालय, बिलासपुर (छत्तीसगढ़)
SEMESTER SYLLABUS
M.Sc. MATHEMATICS

SEMESTER-I
PAPER- I
ADVANCED ABSTRACT ALGEBRA

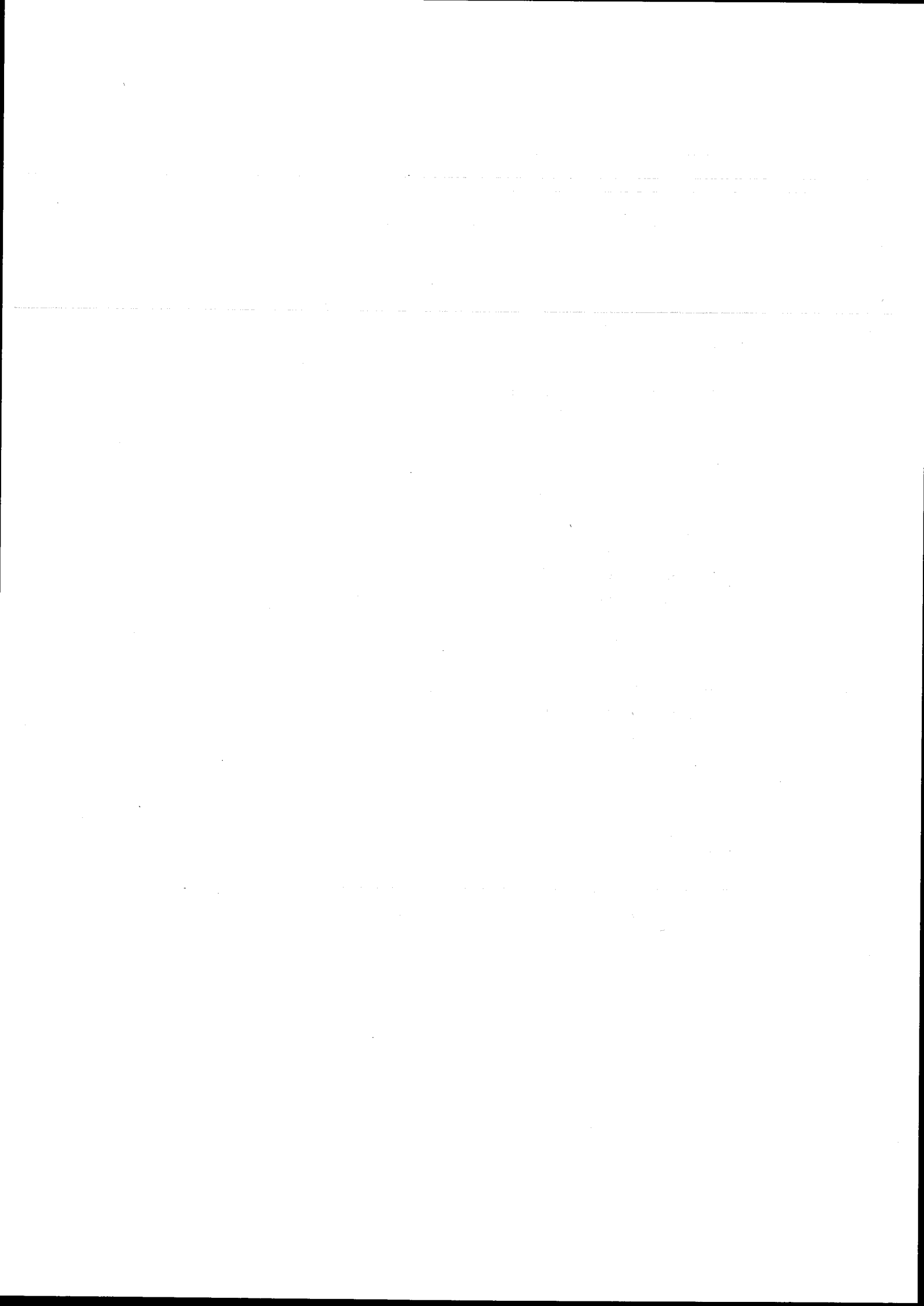
Group- Permutation group, Normal subgroup, Three Isomorphism Theorems, Correspondence Theorem, Maximum Normal subgroup, Automorphism and Inner Automorphism, Centre of groups.

Normal Series- Normal and Subnormal series, Composition Series, Jordan-Holder theorem, Solvable groups, Nilpotent groups.

Rings & Modules- Definitions, Maximal and prime ideals, Nilpotent and Nil Ideals, Zorn's Lemma (statements only), its application to obtain maximal ideals.

REFERENCES:

1. P.B. Bhattacharya, S.K. Jain and S.R. Nagpaul: Basic Abstract Algebra (2nd Ed.), Cambridge University Press, Indian Edition, 1997
2. I.S. Luther and I.B.S. Passi, Algebra: Vol. I - Groups, Narosa Publishing House, 1996.
3. Surjeet Singh and Quazi Zameeruddin: Modern Algebra, Vikas Publishing House Pvt. Ltd., 1990.
4. N. Jacobson: Basic Algebra: Vols. I & II, Hindustan Publishing Company, 1980.
5. S. Lang: Algebra, 3rd Edition, Addison-Wesley, 1993.





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SEMESTER SYLLABUS
M.Sc. MATHEMATICS

SEMESTER-I
PAPER-II
REAL ANALYSIS-I

The Riemann–Stieltjes Integral- Definition and existence of Riemann–Stieltjes integral, Properties of the Integral, Integration and differentiation, the Fundamental Theorem of Calculus, integration of vector-valued function Rectifiable curves.

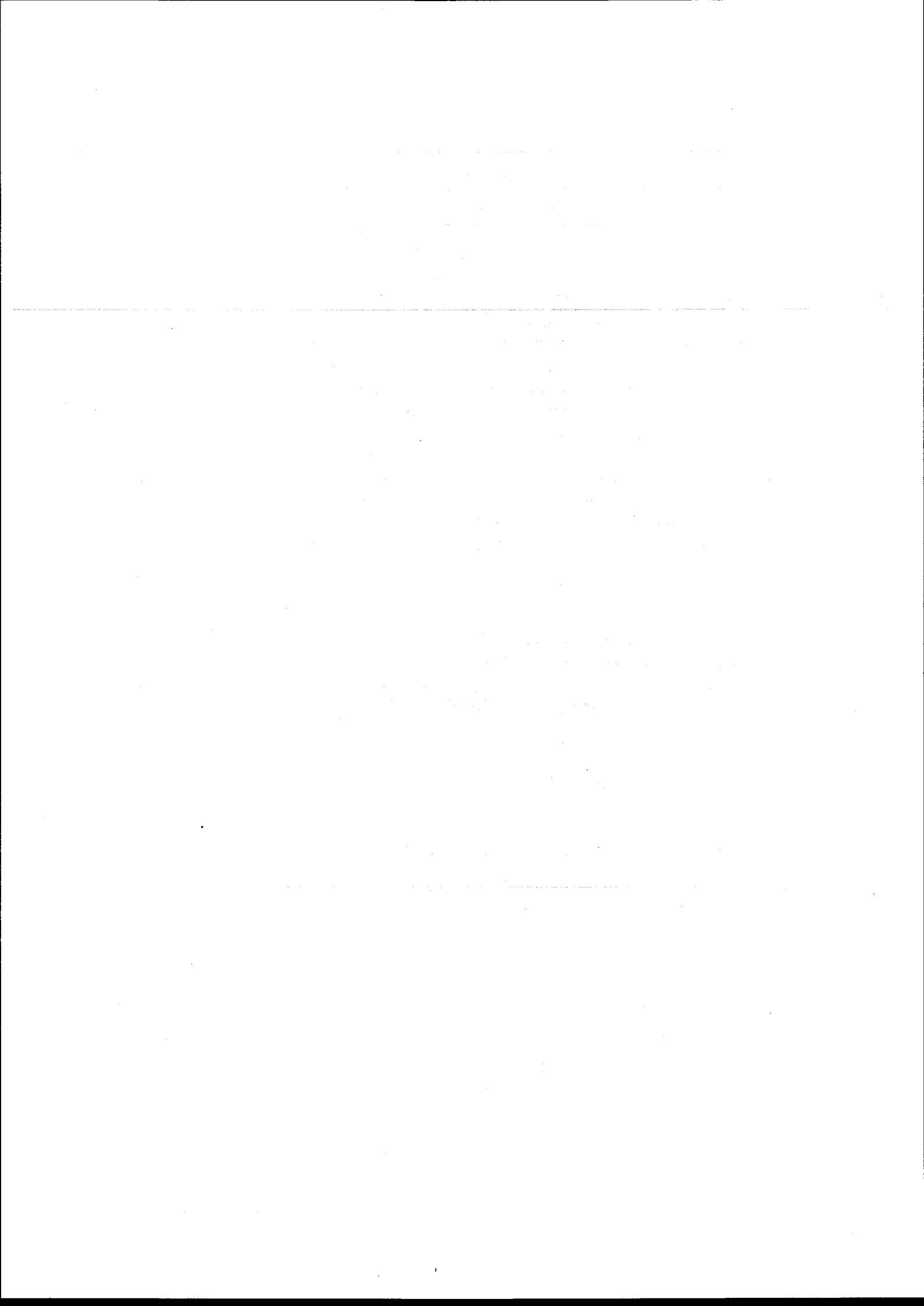
Functions of Several Variables- Linear transformation, derivatives in an open subset of \mathbb{R}^n , Contraction principle, Inverse function theorem, Implicit function theorem, Derivatives of higher orders, Differentiation of integrals.

Sequences and series of Functions- Point wise and uniform convergence, Cauchy criterion for uniform convergence, Weierstrass M-test, Abel's and Dirichlet's tests for uniform convergence, Uniform convergence and continuity uniform convergence and Riemann-Stieltjes integration, uniform convergence and differentiation, Weierstrass approximation theorem.

Power Series- Uniqueness theorem for power series, Abel's and Tauber's theorem.

REFERENCES:

- [1] Walter Rudin: Principles of Mathematical Analysis' (3rd edition) McGraw Hill, Kogakusha, 1976, International student edition.
- [2] P.K. Jain and V.P. Gupta: Lebesgue Measure and Integration, New age International (P) Limited published, New Delhi 1986 (Reprint 2000).





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SEMESTER SYLLABUS
M.Sc. MATHEMATICS

SEMESTER-I
PAPER-III
TOPOLOGY – I

Definition and examples of topological spaces, closed sets, Closure, Dense subsets
Neighborhoods, Interiors, exteriors and boundary points.

Accumulation point and derived set, Bases and sub-base, subspaces and relative
topology, Alternate methods of defining a topology in terms of Kuratowski Closure
Operator and Neighborhoods systems.

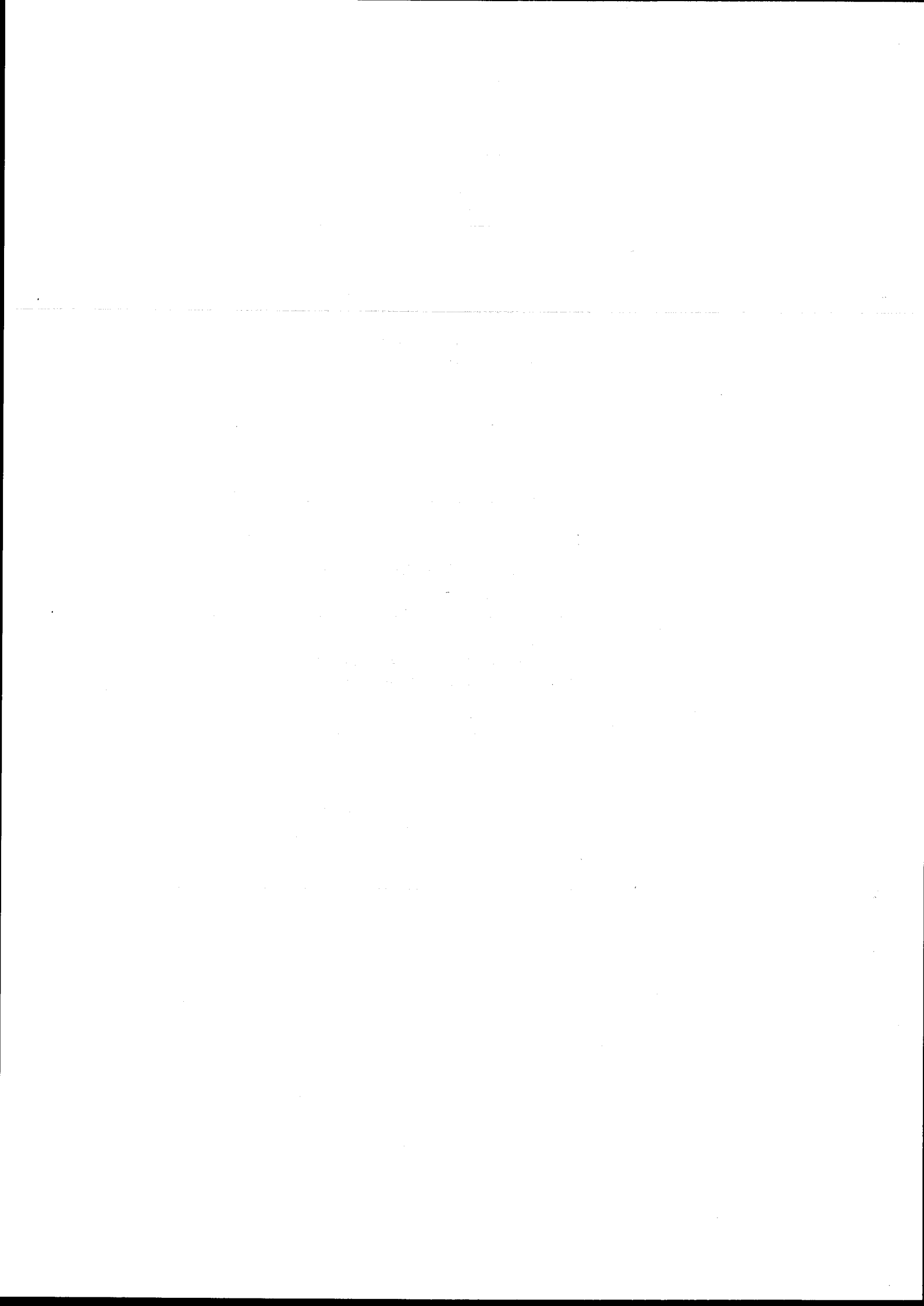
Continuous functions and Homeomorphism.

Separation axioms, T_0 , T_1 , T_2 , T_3 , $T_{3\frac{1}{2}}$, T_4 spaces, their characterization and basic
properties.

First and second countable countable spaces, Lindelof's theorems, Separable Spaces,
Second Countability and Separability, Uryshohn's lemma and Tietz Extension Theorem.

REFERENCES:

1. G.F. Simmons: Introduction to Topology and Modern Analysis, McGraw -Hill
2. J.N. Sharma: Topology, Krishna PrakashanMandir, Meerut
3. M.J.Mansfield: Introduction to Topology. **Van Nostrand. Princeton, New Jersey, 1963**
4. Jame R. Munkres. Topology, A First Course. **Prentice Hall, Incorporated, 1974**
5. K.D.Joshi: Introduction to General Topology , New Age International(P) Ltd. New Delhi.
6. JDugundji. Topology. Boston: Allyn and Bacon, 1966. [OP]
7. B.Mendelson: Introduction to Topology, **Dover Publications, 1990.**





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SEMESTER SYLLABUS
M.Sc. MATHEMATICS

SEMESTER-I
PAPER- IV
COMPLEX ANALYSIS- I

Complex Integration, Cauchy-Goursat Theorem, Cauchy's integral Formula, Higher order derivatives.

Morera's theorem, Cauchy inequality and Liouville theorem, the fundamental theorem of Algebra, Taylor's theorem, Maximum modulus principle.

Laurent's series isolated singularities.

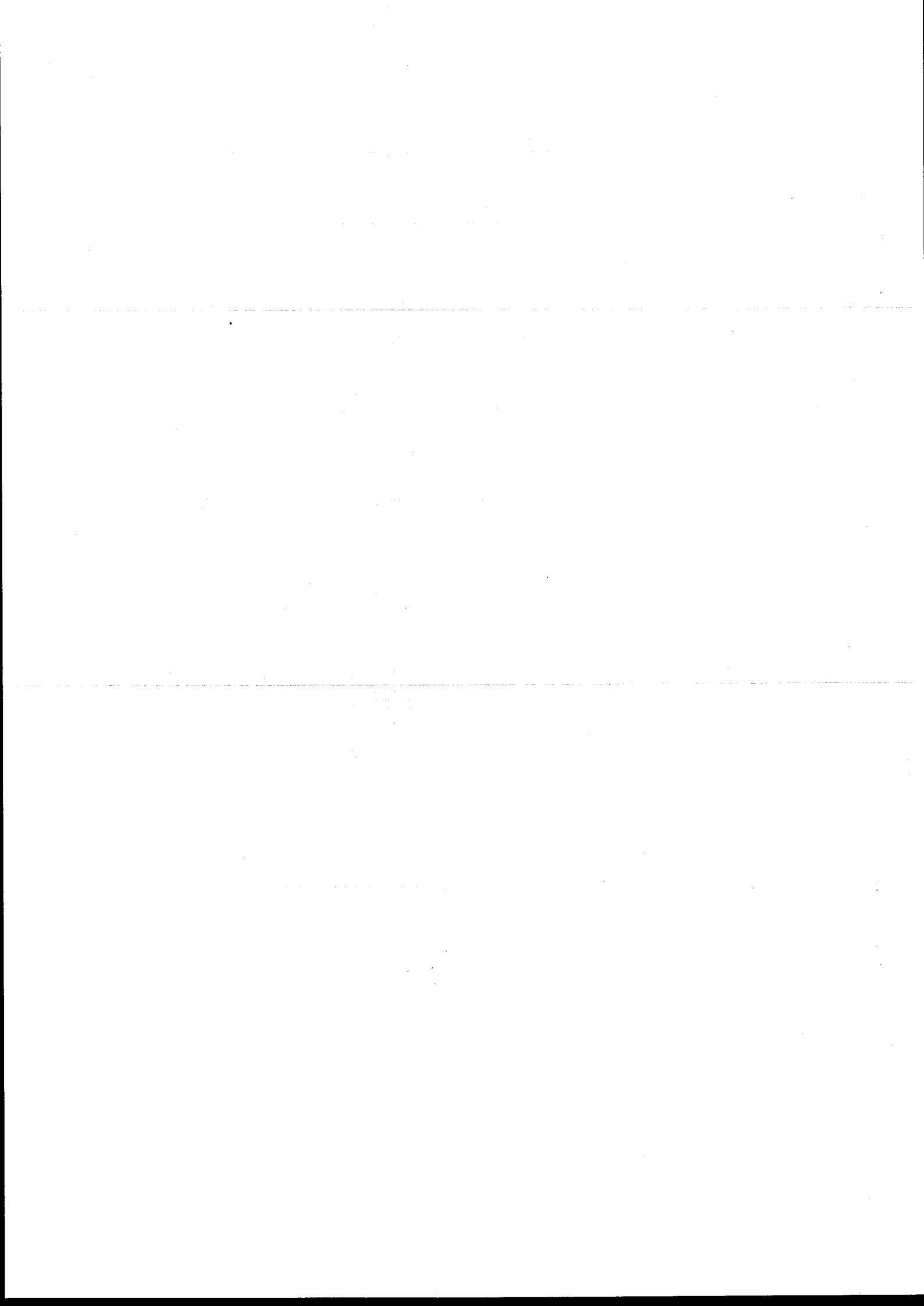
Meromorphic functions, Schwarz lemma, the Argument principle, Rouché's theorem Inverse function theorem.

Residues, Cauchy's residue theorem, Evaluation of integrals, Branches of many values functions with special references to $\arg z$, $\log z$. And z^8 .

Bilinear transformations, their properties and classification, Definitions and examples of conformal mappings.

REFERENCES:-

1. J.B. Conway : Functions of one complex variable. Springer-Verlag international student Edition. Narosa publishing House. 1980.
2. D. Sarason : Complex Function theory. Hindustan Book Agency. Delhi 1994.
3. S. Ponnusamy : Foundation of complex Analysis. Narosa publishing house 1997.
4. J.N. Sharma : Functions of a complex variable , Krishna Prakashan Mandir, Meerut
5. B.S. Tyagi: Functions of a Complex Variable, Kedar Nath Ram Nath Prakashan, Meerut, 1981.





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SEMESTER SYLLABUS
M.Sc. MATHEMATICS

SEMESTER-I
PAPER-V
ADVANCED DISCRETE MATHEMATICS- I

Formal logic- Statement and Notation, Connectives-- Negation, Conjunction, Disjunction, Truth Table, Conditional and Biconditional statement, well-formed formula, Tautology, Equivalent formula, Duality and functionally complete set of connectives, two state devices and statement logic, Normal form, Principle conjunctive and Principle Disjunctive Normal forms, The theory of interface for the statement calculus, Rules of Interface, Automatic Theorem proving, the predicate calculus, Quantifiers, Rules of Interface, Free and Bound variables, Interface theory of predicate calculus, valid formulas over finite universe, valid formulas involving quantifiers, formulas involving more than one quantifiers.

Algebraic Structure - Algebraic system, Semigroups and Monoids (including those pertaining to concatenation operation), Homomorphism of semigroup and SubMonoids. Direct products, Basic Homomorphism theorem.

Lattices - Lattices as partially ordered sets and their properties. Lattices as Algebraic systems, Sub lattices, directproducts and homomorphism, Complete, Complemented and Distributive Lattice

Boolean Algebra- Boolean Algebras as lattices, Various Boolean Identities, The switching Algebra, example, Subalgebras, Direct products and Homomorphism, Join-irreducible elements, Atoms and min-terms, Boolean forms and their Equivalence, Minterm Boolean forms, Sum of products, canonical forms, Minimization of Boolean functions Application of Boolean Algebra to Switching theory (Using AND, OR, NOT gates) The Karnaugh Map Method.

REFERENCES:

1. J.P. Tremblay & R. Manohar: Discrete Mathematical structure with application to computer sciences. McGraw Hill Book Co. 1997.
2. Seymour Lipschutz.: Finite Mathematics (International edition 1993) McGraw Hill Book Co. New York.
3. N. Deo: Graph Theory with applications to Engineering and Computer Sciences. Prentice Hall of India.
4. S. Wiitala: Discrete Mathematics - A unified approach McGraw Hill Book Co. New York.
5. C.L. Liu: Elements of Discrete mathematics. McGraw Hill Book Col.
6. M.K.Gupta: Discrete Mathematics, Krishna Prakashan Mandir (P) Ltd., Meerut.





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SEMESTER SYLLABUS
M.Sc. MATHEMATICS

SEMESTER-II
PAPER-I
ADVANCED ABSTRACT ALGEBRA-II

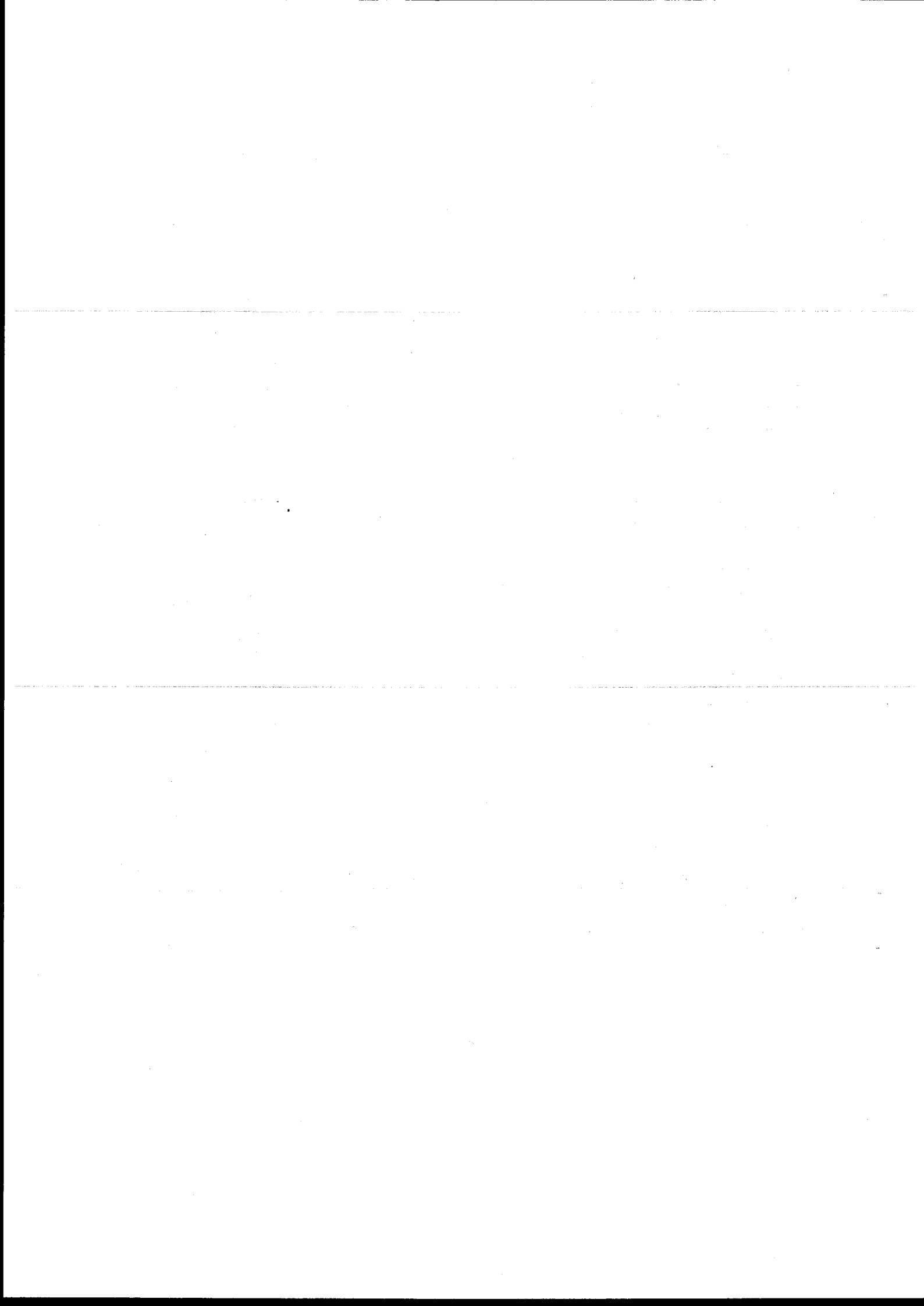
Modules and Vector Space - Definition and examples of sub-modules, Quotient modules, Direct sum, Modules generated by a set R , Homomorphism of modules, Isomorphism Theorem, exact sequence of modules, short exact sequence Cyclic Modules, Semi Simple Modules, Simple Modules, Schure's Lemma, Free Modules, Representation of Linear mapping, Rank of Linear mapping, Rank Nullity Theorem.

Field Theory - Extension field, Algebraic and transcendental extensions, Separable and inseparable extensions, Normal extension, Perfect fields, Finite fields, Primitive element, algebraically closed fields, Automorphisms of extensions, Galois extensions, fundamental theorem of Galois Theory.

Noetherian and Artinian modules and rings, Hilbert basis theorem, Wedderburn – Artin theorem.

REFERENCES:

1. P. B. Bhattacharya, S. K. Jain and S. R. Nagpaul: Basic Abstract Algebra (2nd Ed.), Cambridge University Press, Indian Edition, 1997
2. I. S. Luther and I. B. S. Passi, Algebra: Vol. I - Groups, Narosa Publishing House, 1996.
3. Surjeet Singh and Quazi Zameeruddin: Modern Algebra, Vikas Publishing House Pvt. Ltd., 1990.
4. N. Jacobson: Basic Algebra: Vols. I & II, Hindustan Publishing Company, 1980.
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SEMESTER SYLLABUS
M.Sc. MATHEMATICS

SEMESTER-II
PAPER-II
REAL ANALYSIS-II

Measurable sets- Lebesgue outer measure, Lebesgue measure, Properties of measurable sets, Borel sets and their measurability characterization of measurable sets, Non measurable set

Measurable functions- Definition and properties, Simple, Step and characteristic function, Continuous function, sets of measure Zero, Sequence of functions, Egoroff's Convergence in measure, Riesz theorem.

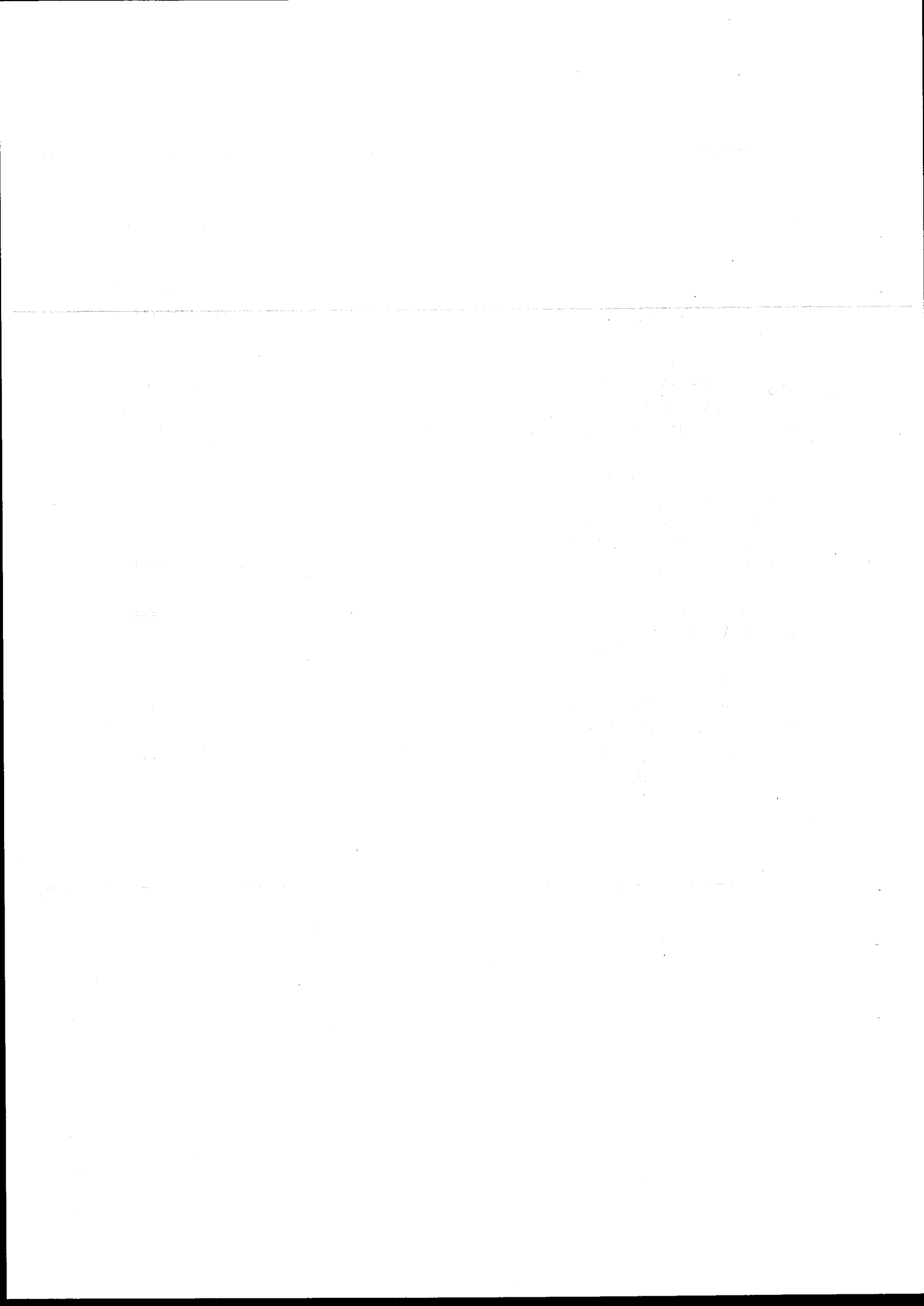
Lebesgue Integral- Lebesgue integral of a bounded function, Comparison of Riemann integral and Lebesgue integral, Bounded Convergence Theorem, Integral of non-negative measurable function, Fatou's Lemma, Monotone convergence theorem, General Lebesgue integral, Lebesgue dominated convergence theorem.

Differentiation and integration- Dini derivatives, Differentiation of monotone functions, Lebesgue theorem, Function of bounded variation, Differentiation of an integral, Lebesgue integral, Lebesgue sets, Absolutely Continuous Functions, Integral of the derivatives.

Lebesgue L^p spaces- The classes L^p , Holder and Minikowski inequalities, L^p Banach Spaces, Convergences in the mean.

REFERENCES:

- [1] Walter Rudin: 'Principles of Mathematical Analysis' (3rd edition) McGraw Hill, Kogakusha, 1976, International student edition.
- [2] P.K. Jain and V.P. Gupta: 'Lebesgue Measure and Integration', New age International (P) Limited published, New Delhi 1986 (Reprint 2000).





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SEMESTER SYLLABUS
M.Sc. MATHEMATICS

SEMESTER-II
PAPER-III
TOPOLOGY-II

Compactness - Basic properties of compactness.

Continuous functions and compact sets, compactness and Finite Intersection Property, Sequentially and Countably compact sets, Local compactness in Metric space
Equivalence of compactness, countable compactness and sequential compactness in metric space.

Connected spaces, connectedness on the real line, Components, Locally connected spaces, totally disconnected spaces.

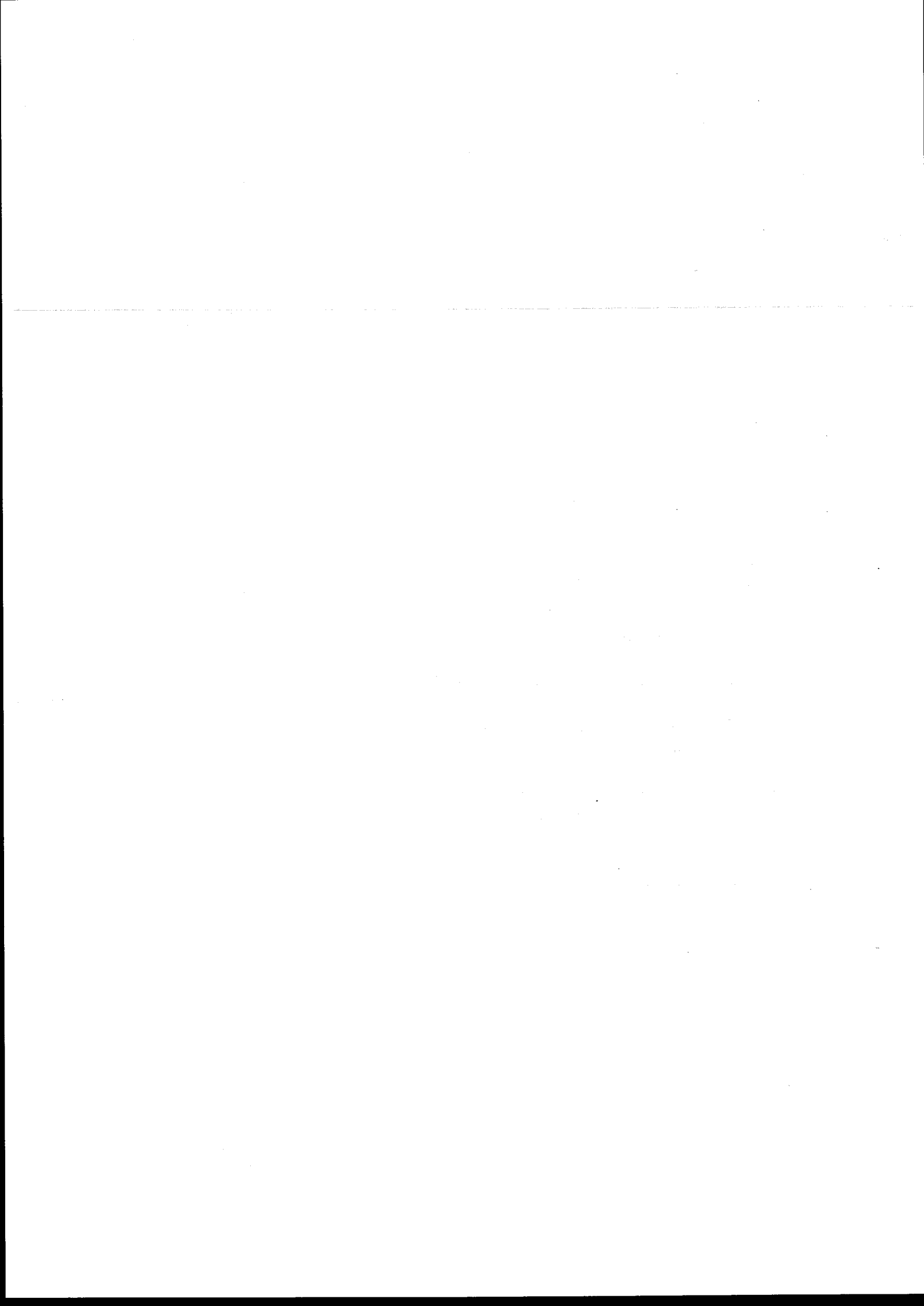
Nets – Topology and convergence of Nets, Hausdorffness and nets, Filters and their convergence, ultra filters.

Tychonoff product topology in terms of standard sub-base and its characterization, Projection Maps.

Connectedness and product space, Compactness and product space (Tychonoff's theorem)

REFERENCES:

1. G.F. Simmons :Introduction to Topology and Modern Analysis, McGraw -Hill
2. J.N .Sharma: Topology, Krishna PrakashanMandir, Meerut
3. M.J.Mansfield: Introduction to Topology. **Van Nostrand. Princeton, New Jersey, 1963**
4. Jame R. Munkres: Topology, A First Course. **Prentice Hall, Incorporated, 1974**
5. K.D.Joshi: Introduction to General Topology , New Age International(P) Ltd. New Delhi.
6. JDugundji. Topology. Boston: Allyn and Bacon, 1966. [OP]
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SEMESTER SYLLABUS
M.Sc. MATHEMATICS

SEMESTER-II
PAPER-IV
COMPLEX ANALYSIS-II

Entire Functions- Weierstress factorization theorem Gamma function and its properties, Riemann Zeta function, Riemann's functional equation, Runge's theorem, MittagLeffler's theorem.

Analytic continuation, uniqueness of direct analytic continuation, Uniqueness of analytic continuation along curve, Power series method of analytic continuation, Schwartz's Reflection Principle.

Monodromy theorem and its consequences.

Canonical product, Jensen's formula, Poisson– Jensen Formula, Hadamard's three circles theorem, Order of an entire function.

Exponent of convergence, Borel's theorem, Hadamard's factorization theorem.

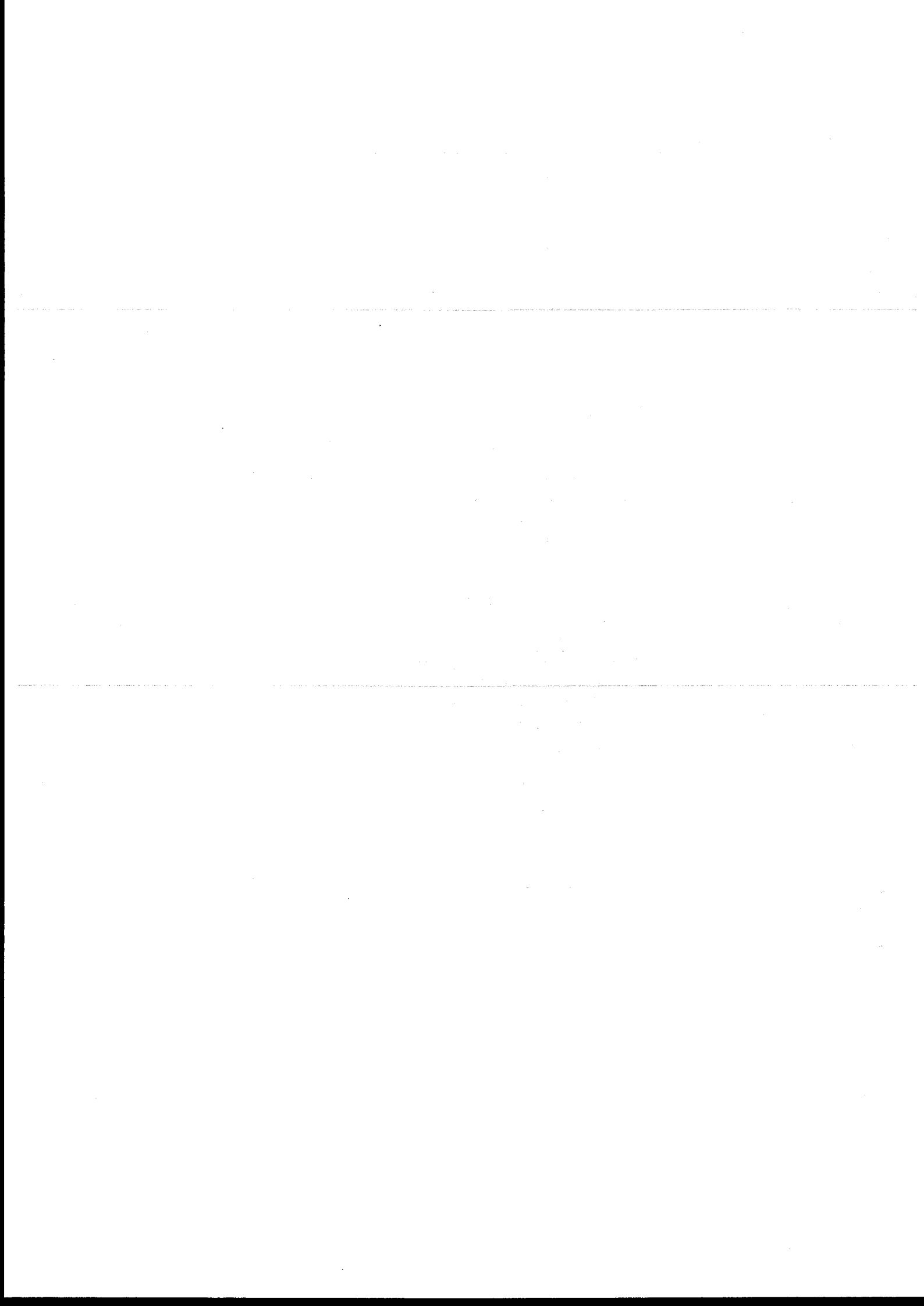
The range of an analytic function, Bloch's theorem, The little Picard theorem.

Schottky's theorem, Montel Caratheodory and the Great Picard theorem.

Univalent functions, Bieberbach's conjecture (statement only) and the "1/4 – theorem".

REFERENCES:-

1. J.B. Conway : Functions of one complex variable. Springer-Verlag international student Edition. Narosa publishing House. 1980.
2. D. Sarason : Complex Function theory. Hindustan Book Agency. Delhi 1994.
3. S. Ponnusamy : Foundation of complex Analysis. Narosa publishing house 1997.
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M.Sc. MATHEMATICS

SEMESTER-II
PAPER-V
ADVANCE DISCRETE MATHEMATICS-II

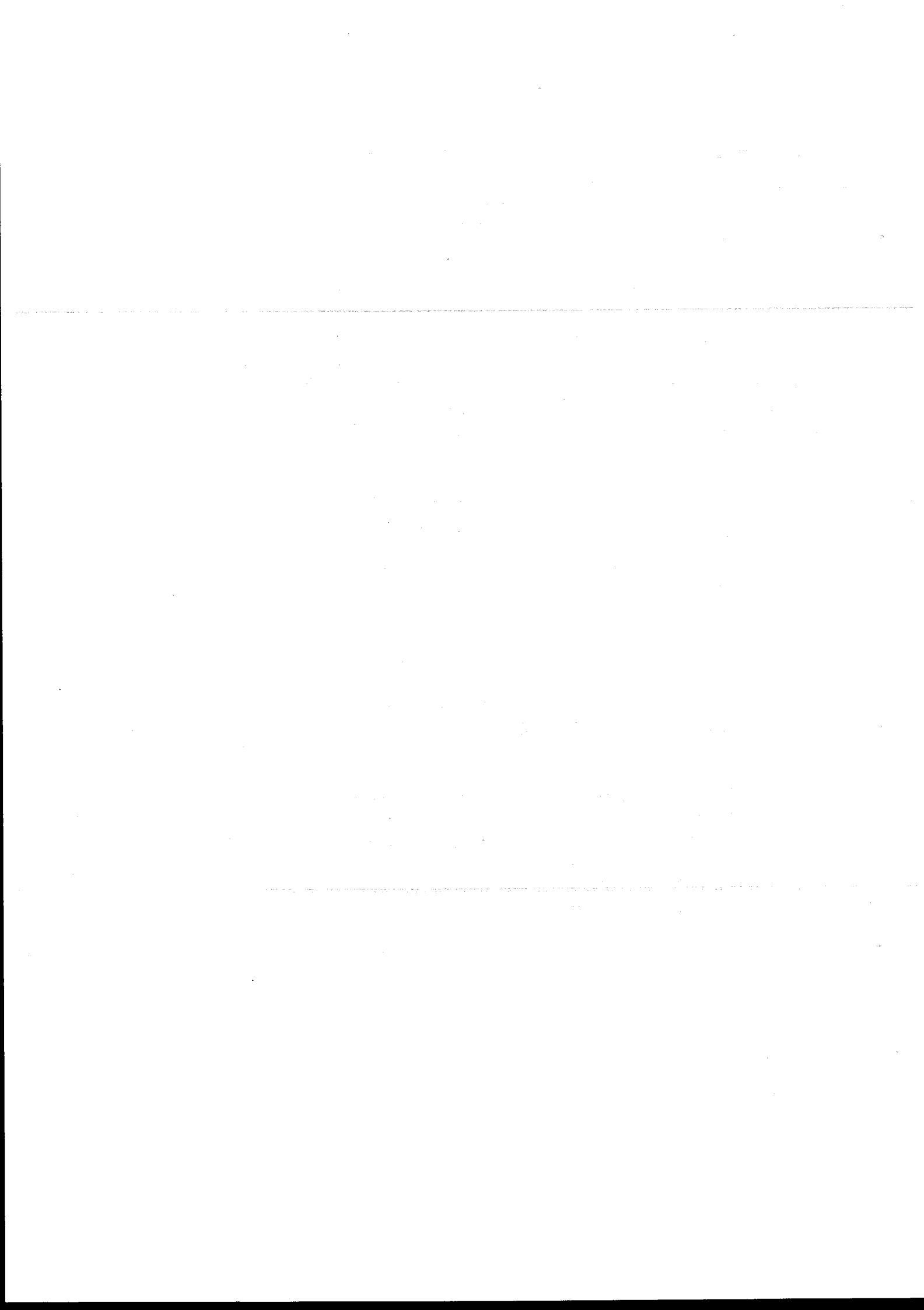
Grammar and Language- Phase structure grammar, Rewriting Rules, Derivation, sentential forms, context-sensitive context, Free and Regular grammars and language, Notion of syntax, Analysis, Polish Notation, Conversion of Infix expression to Polish Notation, The Rename Polish Notation.

Introductory Computability Theory- Finite state Machines and their Transition, Table diagrams, Equivalence of Finite state Machines, reduced machines, Homomorphism Finite automata, and equivalence of its power to that of Deterministic finite automata, Moore and Mealy Machines, Turing machines and partial recursive functions.

Graph Theory- Definition of (undirected) graph, paths, Circuits Cycles & Sub graphs, Induced Sub graphs, Degree of a vertex, Connectivity, Planar Graphs and their properties, Trees, Euler's Formula for connected planar Graphs. Complete and complete Bipartite graphs, Kuratowski's Theorem(statement only), and its use, Spanning trees. Cut sets. Fundamental cut sets and cycles, Minimal spanning trees. Matrix representation of graphs, Euler's theorem on the Existence of Eulerian Paths, and circuit, Directed Graphs, In degree and out degree of a vertex, Weighted undirected Graphs.

REFERENCES:

1. J.P. Tremblay & R. Manohar: Discrete Mathematical structure with application to computer sciences. McGraw Hill Book Co. 1997.
2. Seymour Lipschutz.: Finite Mathematics (International edition 1993) McGraw Hill Book Co. New York.
3. N. Deo: Graph Theory with applications to Engineering and Computer Sciences. Prentice Hall of India.
4. S. Wiitala: Discrete Mathematics - A unified approach McGraw Hill Book Co. New York.
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6. M.K.Gupta: Discrete Mathematics , Krishna PrakashanMandir(P) Ltd., Meerut.





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SEMESTER SYLLABUS
M.Sc. MATHEMATICS

SEMESTER-III
PAPER-I (COMPULSORY)
INTEGRATION THEORY AND FUNCTIONAL ANALYSIS-I

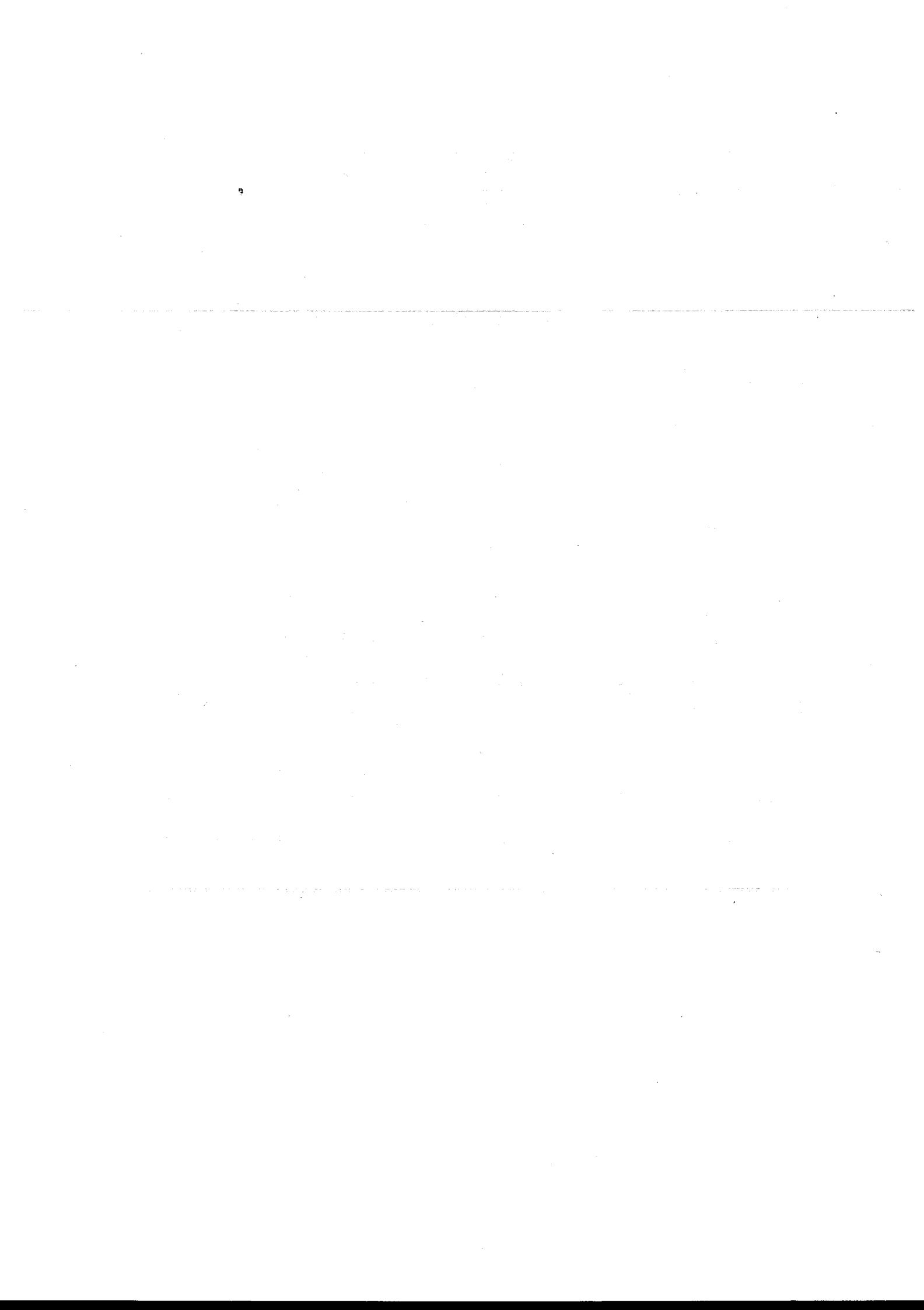
Signed measure, Hahn decomposition theorem, mutually singular measures, Radon-Nikodym theorem, Lebesgue decomposition, Riesz representation theorem, Extension theorem (Caratheodory)

Lebesgue-Stieltjes integral, product measures, Fubini's theorem, Tonelli's theorem, Integral operator, Inner measure, Extension by set of measure zero, Caratheodory outer measure. Hausdorff measure, Differentiation and Integration, Decomposition into absolutely continuous and singular parts.

Baire sets, Baire measure, continuous functions with compact support, Regularity of measures on locally compact spaces.

REFERENCES:

1. H.L. Royden: Real Analysis, Macmillan Publishing Co. Inc., New York, 4th Edition, 1993.
2. B.Choudhary and Sudarsan Nanda: Functional Analysis with Applications Wiley Eastern Ltd., 1989
3. J.H. Williamson: Lebesgue Integration, Holt Rinehart and Winston, Inc. New York. 1962
4. P.R. Halmos: Measure Theory, Van Nostrand, Princeton, 1950.
5. T.G. Hawkins: Lebesgue's Theory of Integration: Its Origins and Development, Chelsea, New York, 1979.
6. B.V. Limaye: Functional Analysis, Wiley Eastern Ltd.
7. G.de. Barra: Measure Theory & Integration, Wiley Eastern Ltd, 1981.
8. Walter Rudin: Real & Complex Analysis, Tata McGraw Hill Publishing. Company, New Delhi.
9. P.K.Jain, O.P.Ahuja & Khalid Ahmad: Functional Analysis, New Age International (P)Ltd., New Delhi.
10. A.Siddiqui: Functional Analysis with Applications: Tata McGraw Hill Publishing Company, New Delhi.





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SEMESTER SYLLABUS
M.Sc. MATHEMATICS

SEMESTER-III
PAPER- II (Compulsory)
Partial Differential Equations, Mechanics & Gravitation-I

Partial Differential Equations

Laplace's Equation—Fundamental solution, Mean value formulae, Properties of Harmonic function, Green function, Energy method.

Heat Equation - Fundamental solution, Mean value formulae, Properties of solution, Energy method.

Wave Equation - Solutions by spherical means, Homogeneous equations, Energy method.

Non-linear first order PDE, complete integrals, Envelopes characteristics, Hamilton Jacobi equations (calculus of variations, Hamilton's ODE), Conservation Laws, Representation of solutions, Separation of variables.

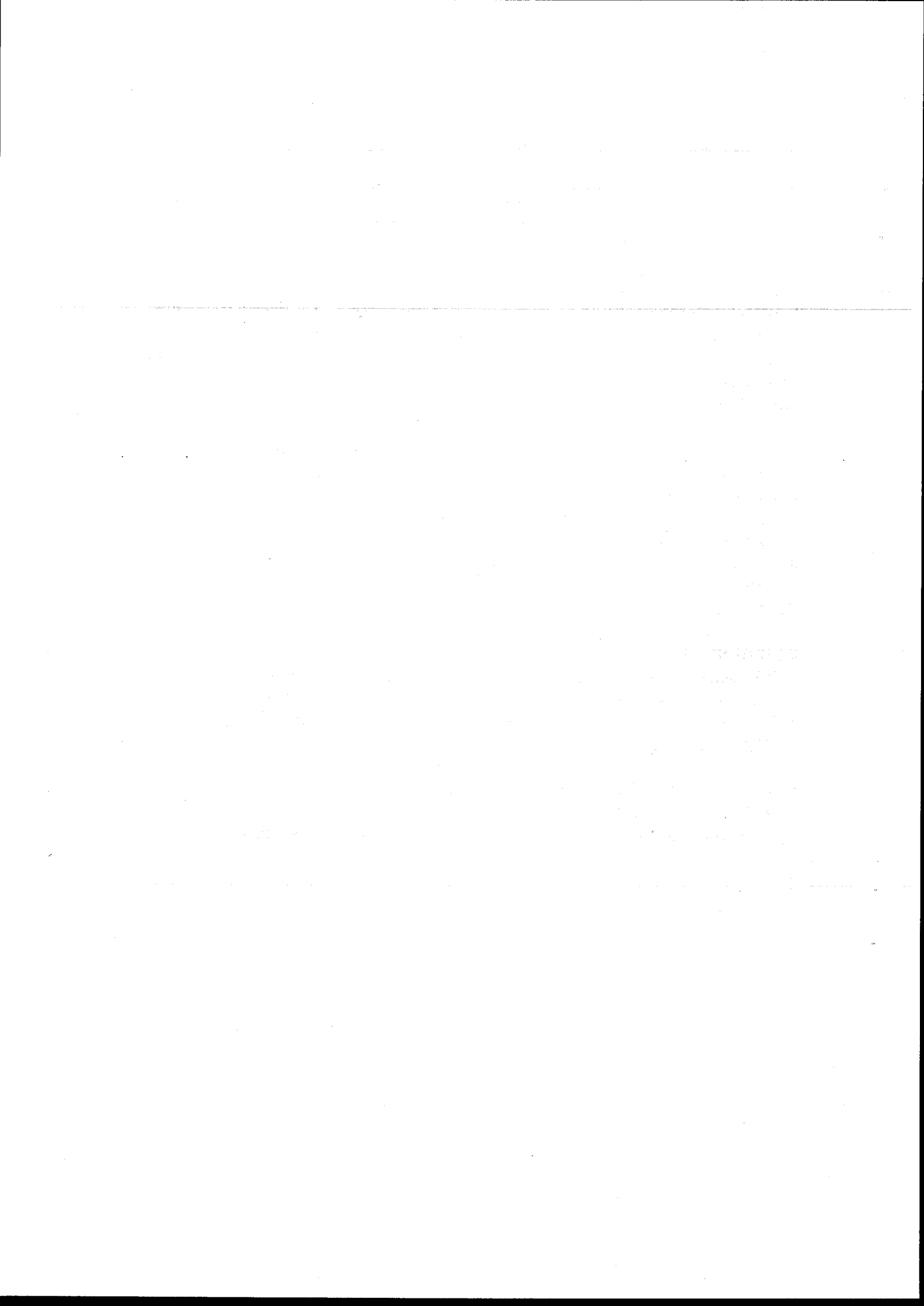
Laplace and Fourier Transforms and their applications, Legendre Transform.

Attraction - Attraction of rod, disc, spherical shell and sphere, spherical shell of finite thickness.

Surface integral of normal attraction (Application & Gauss's theorem) Laplace and Poisson equations, work done by self-attracting system.

REFERENCES:

1. D.Raisinghania: Ordinary and Partial Differential Equation, S.Chand , New Delhi.
2. Gupta, Kumar & Sharma: Classical - Mechanics, Pragati Prakashan,
3. S.L. Loney :An Elementary Treatise On Statics,University Press.
4. I.N. Sneddon: Partial Differential Equation , McGraw Hill Book Co.Ltd.
5. H.Goldstem: Classical Mechanics, Addition Wesley.
6. Narayan Chandra Rana&PramodSharad, Chandra Joag: Classical Mechanics. Tata McGraw-Hill Publishing Company, 1991.
7. B.D. Gupta &SatyaPrakash: Mechanics Relativity .PragatiPrakshan, Meerut.





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M.Sc. MATHEMATICS

SEMESTER-III
PAPER-III (OPTIONAL)
PROGRAMMING IN C (WITH ANSI FEATURES)-I

An overview of programming, Programming language, Classification- C Essentials Program Development Functions, Anatomy of a C Function, Variables and Constants, Expressions, Assignment Statements, Formatting Source Files, Continuation Character, The Pre-processor.

Scalar Data Types– Declarations, Different Types of Integers, Different kinds of Integer Constants, Floating- Point Types, Initialization, Mixing Types, Explicit Conversions- Casts, Enumeration Types, The Void Data Type, Typedefs, Finding the Address of an object Pointers.

Control Flow– Conditional Branching, The Switch Statement, Looping, Nested Loops, The break and continue Statements, The go to statement. Infinite Loops.

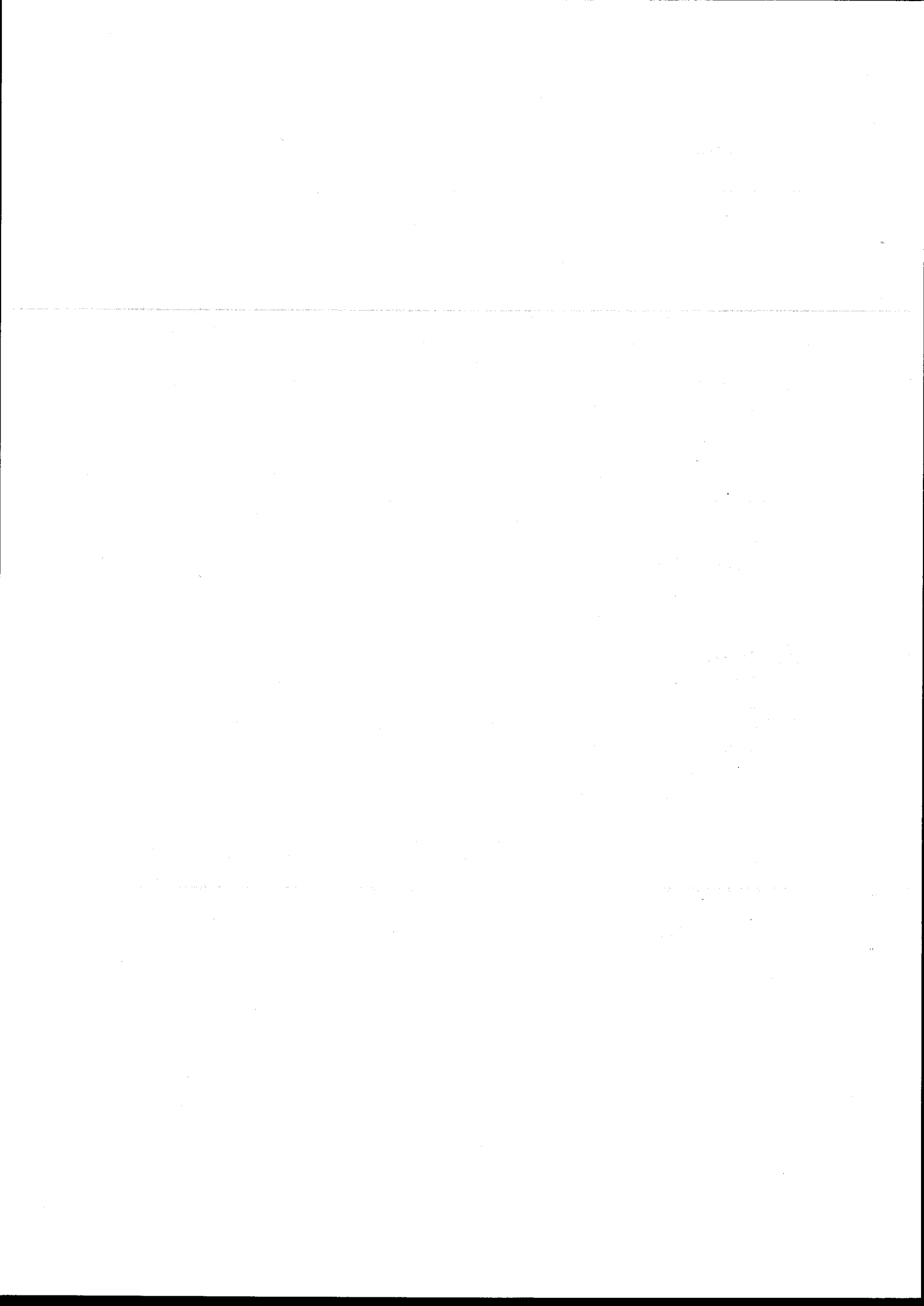
Operators and Expressions–Precedence and Associativity, Unary Plus and Minus operators, Binary arithmetic operators, Arithmetic assignment operators, Increment and Decrement Operators, Comma Operator, Relational Operators, Logical Operators, Bit-Manipulation Operators, Bitwise Assignment Operators, Cast Operator, Size of Operators, Conditional Operator, Memory Operators.

REFERENCES:

1. Peter A. Darnell and Philip E. Margolis, C: A Software Engineering Approach, Narosa Publishing House (Springer International Student Edition) 1993.
2. Brian W. Kernighan & Dennis M. Ritchie: The C Programme Language, 2nd Edition (ANSI Features), Prentice Hall 1989.
3. Yashwant Kanetkar: Let Us C, 8th Edition, B P B Publications 2007.
4. E. Balagurusamy: Programming in C (ANSI), 4th Edition, Tata Mac Graw Hill.

PRACTICAL

The break-up of marks for third Semester's Practical will be as under:			
Sr. No.	Argument	Maximum Marks	Minimum Passing Marks
1.	Lab Record (Internal Assessment)	6	
2.	Viva-voce (External Assessment)	9	
3.	Program Development and Execution (External Assessment)	15	
Total Marks		30	11





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SEMESTER SYLLABUS
M.Sc. MATHEMATICS

SEMESTER-III
PAPER-IV (OPTIONAL)
FUZZY SETS AND THEIR APPLICATIONS-I

Fuzzy sets- Basic definitions α – cuts, Convex fuzzy sets, Basic operations on fuzzy sets, Types of fuzzy sets, properties of α – cuts, representation of fuzzy sets, First and Second decomposition theorem, Extension Principle for fuzzy sets, fuzzy complements, the two characterization theorems on fuzzy complementst-norms and t-conorms, Algebraic product and sum, bounded difference and sum, statements of characterization for t-norms and t-conorms, combination of operators.

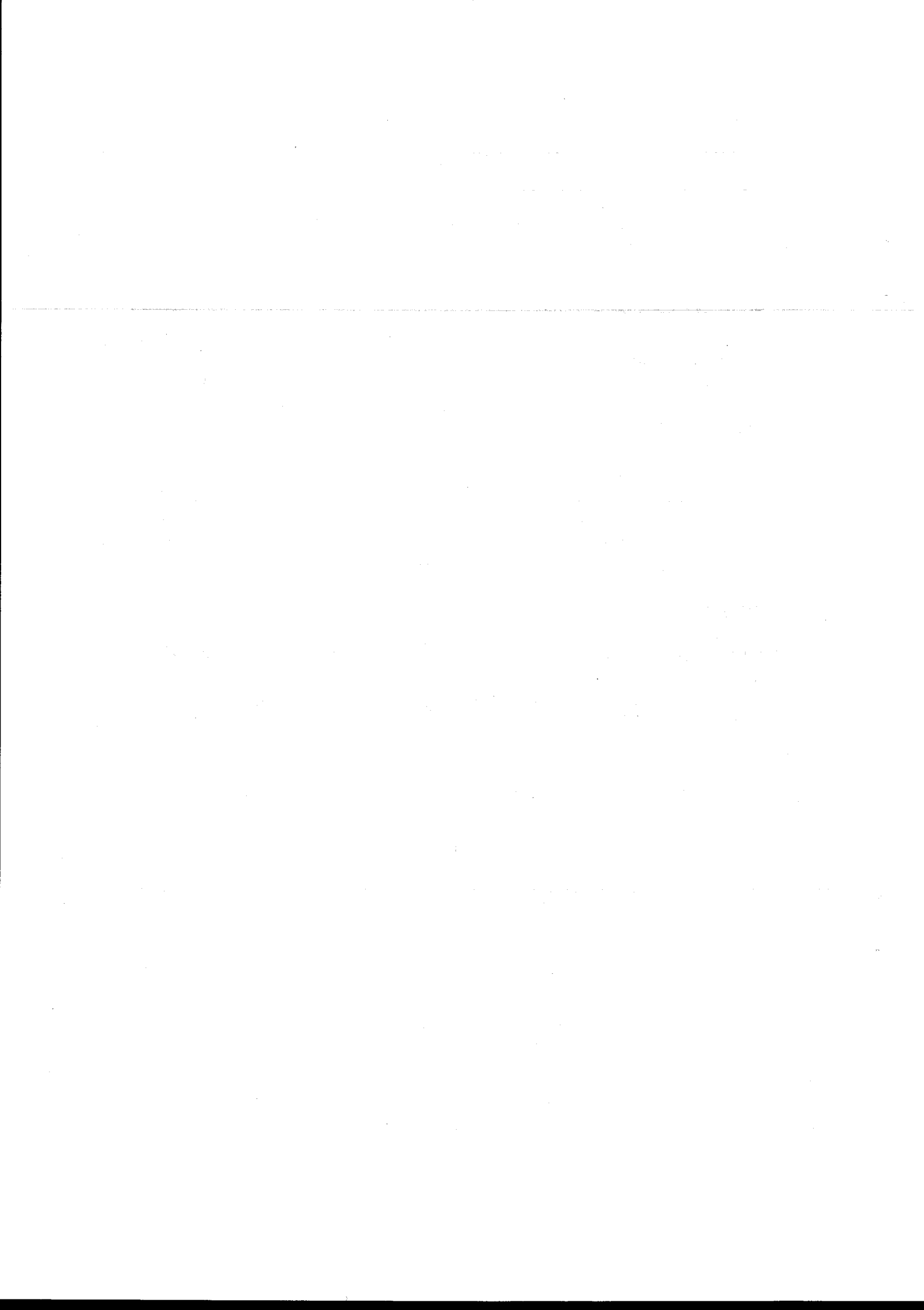
Fuzzy Arithmetic- Fuzzy numbers, Arithmetic operations on fuzzy numbers, Lattices of fuzzy numbers, fuzzy equations.

Fuzzy Relations- Fuzzy relations on fuzzy sets, fuzzy binary relations and fuzzy equivalence relations, Fuzzy morphism, standard composition, sup i composition, inf-wi composition of fuzzy relations.

Fuzzy Relations Equations- Problem partitioning, solution methods, fuzzy relation equations based upon sup i composition and inf-wi composition, approximate solution.

REFERENCES:

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2. H.J. Zimmermann: Fuzzy Sets and Fuzzy logic, Prentice Hall of India New Delhi





बिलासपुर विश्वविद्यालय, बिलासपुर (छत्तीसगढ़)
SEMESTER SYLLABUS
M.Sc. MATHEMATICS

SEMESTER-III
PAPER-V (OPTIONAL)
OPERATIONS RESEARCH-I

Operations Research and its Scope, Necessity of Operations Research in Industry, Linear Programming-graphical method of solutions, Simplex Method, Theory of the Simplex Method, Two phase method, Big M method of solution to LPP, Duality in linear programming, Duality theorems, Dual Simplex method, Other Algorithms for Linear Programming-Dual Simplex Method.

Parametric Linear Programming, Upper Bound Technique, Interior Point Algorithm, Linear Goal Programming, Assignment Problems, Its mathematical formulation, Solution of assignment problems, Optimality test. Transportation Problems, Formulation of transportation problems, Solutions of Transportation problems, North-West corner method, least cost method, Vogel's approximation method, Test for optimality U-V method.

Network Analysis—shortest Path Problem, Minimum Spanning Tree Problem, Maximum Flow Problem, Minimum Cost Flow Problem, Network simplex Method. Project Planning and Control I with PERT CPM.

REFERENCES:

1. F.S. Hillier and G.J. Ueberman: Introduction to Operations Research (Sixth Edition), McGraw Hill International Edition, Industrial Engineering Series, 1995 Affiliated East-West Press Pvt. Ltd., New Delhi, Madras.
2. G. Hadley: Linear Programming, Narosa Publishing House, 1995.
3. G. Hadley, Nonlinear and Dynamic Programming, Addison-Wesley, Reading Mass.
4. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali: Linear Programming and Network flows, John Wiley & Sons, New York, 1990.
5. H.A. Taha: Operations Research—An introduction, Macmillan Publishing Co., Inc., New York.
6. K. Swarup, P.K. Gupta and M. Mohan: Operations Research, Sultan Chand & Sons, N.Delhi.
7. S.S. Rao: Optimization Theory and Applications, Wiley Eastern Ltd., New Delhi.
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9. N.S. Kambo, Mathematical Programming Techniques, Affiliated East-West Press Pvt. Ltd., New Delhi, Madras.
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1. The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that this is crucial for the company's financial health and for providing reliable information to stakeholders. The text also mentions the need for regular audits to ensure the integrity of the data.

2. The second part of the document outlines the various methods used to collect and analyze data. It describes the use of surveys, interviews, and focus groups to gather qualitative information. Additionally, it details the application of statistical techniques to quantitative data, including regression analysis and hypothesis testing. The text also touches upon the importance of data visualization in making complex information more accessible.

3. The third part of the document focuses on the ethical considerations surrounding data collection and analysis. It discusses the need for transparency in the research process and the importance of obtaining informed consent from participants. The text also addresses the potential for bias in data collection and the steps that can be taken to minimize it. Finally, it highlights the responsibility of researchers to protect the privacy and confidentiality of their subjects.

4. The fourth and final part of the document provides a summary of the key findings and conclusions. It reiterates the importance of rigorous data collection and analysis practices and the need for ethical conduct in all research activities. The text also offers some practical recommendations for how these principles can be applied in a business context. The document concludes with a statement of appreciation for the support and assistance provided by the relevant departments and individuals.



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SEMESTER SYLLABUS
M.Sc. MATHEMATICS

SEMESTER-III
PAPER-VI (OPTIONAL)
FLUID MECHANICS-I

Kinematics- Lagrangian and Eulerian Methods, Equation of continuity, Stream lines, path lines, streak lines, velocity potential, Irrotational and rotational motions, Boundary surfaces, Vortex lines.

Equations of motion-Euler's dynamical Equations, Bernoulli's Equation of motion by flux method, Equations of motion under Impulsive forces, Principle of Energy for Incompressible fluids, Lagrange's Equations.

Motion in Two dimensions-Lagrange's stream function, Irrotational motion in two dimensions, Complex velocity Potential, sources, sinks, doublets and their Images, Use of conformal Transformation. The Milne-Thomson Circle Theorem of Blasius.

Motion of Cylinders- Motion of a general, circular and coaxial cylinders, Circulation about a moving cylinder, Streaming and circulation about a fixed circular cylinder.

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1. A.S.Ramsey: A treatise on Hydrodynamics Part II, CBS Publication, Delhi
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