

COURSES OF STUDIES

For
2007-2008

MASTER OF SCIENCE MATHEMATICS



**RAVENSHAW UNIVERSITY
CUTTACK**

COURSES OF STUDIES

P.G – I

First Semester

Paper - I (MT-1.1.1)

Abstract Algebra

FM- 50

Time: 3 Hrs.

Unit - I

17 Marks

Group Isomorphism, Automorphism, Conjugacy and G sets. Normal and Subnormal Series, Composition series, Jordan- Holder theorem, Solvable groups, Nilpotent groups, permutation groups.

Unit - II

17 Marks

Direct products, finitely generated abelian group, sylow's theorem, groups of order p^2, pq , Unique factorisation domain, Euclidean domain, Finitely generated modules over a principal ideal domain and its application to finitely generated abelian groups.

Unit - III

16 Marks

Field Theory : Algebraic Extensions of fields, algebraically closed fields, Normal and separable extensions, multiple roots. perfect fields, finite fields, primitive elements, Galois Theory : Automorphism groups and fixed fields, fundamental theorem of Galois

theory, polynomials solvable by radicals, Ruler and compass construction, Insolvability of the general equation of degree 5 by radicals.

Book Prescribed

1. Basic Abstract Algebra. P.B. Bhattacharya, S.K. Jain, S.R. Nagpaul 2nd edition (Cambridge University Press).

Unit - I

Chapter 5 (5.2, 5.3, 5.4), 6 (6.1, 6.2, 6.3), 7 (7.1, 7.2, 7.3)

Unit- II

Chapter 8 (8.1, 8.2, 8.4 (8.4.1, 8.4.2, 8.4.3, 8.4.4, 8.4.7), 8.5), 11 (11.1 to 11.4), 21 (21.1, 21.3)

Unit - III

Chapter - 15 (15.1, 15.2, 15.3, 15.4 (excluding 15.4.2, 15.4.3, 15.4.4), 16 ((16.1, 16.1.2, 16.1.3), 16.2 to 16.5), 17 (17.1, 17.2), 18 (18.3, 18.5).

Books for reference

1. Algebra by M. Artin (PHI)
2. Modern Algebra by Surjeet singh and Quazzirmuddin
3. Topics in algebra by I.N. Herstein.
4. Basic Algebra Vol- I, Vol-II by M. Jacobson, W.H. Freeman.
5. First Course on Abstract Algebra, John B. Fraak. Sh
6. Fundamentals of Abstract Algebra. By D.S. Mallick et. al.

Paper - II (MT-1.1.2)

Real Analysis

FM- 50

Time: 3 Hrs.

Unit - I

17 Marks

The Riemann - stieltjes integral, Definition and Existence of the integral, properties of the integral, Integration and differentiation.

Sequence and series of Functions, uniform convergence, continuity, integration, differentiation.

Unit - II

17 Marks

Lebesgue Measure and Integral, Introduction, Outer measure, Measurable sets and lebesgue measure, A non- measurable set, measurable function. The Riemann integral,. The lebesgue integral of a bounded function over a set of finite measure. The integral of a non- negative function. The general lebesgue integral.

Unit -III

16 Marks

Differentiation and Integration, The classical Banach spaces

Differentiation of monotone function, Functions of bounded variation.

Differentiation of monotone function, Functions of bounded variation.

Differentiation of an integral, Absolute continuity. LP

spaces. The Holder and Minkowski inequalities and completeness, Bounded linear functionals on the LP spaces.

Books prescribed

1. Principles of Mathematical analysis - Walter Rutin
Chapter - 6 (6.1 to 6.22) , 7 (7.1 to 7.18)
2. Real Analysis - H.L. Royden (3rd edition)
Chapter 3(1 to 5) , 4 (1 to 4) 5 (1 to 4) 6 (except 4)

Paper - III (MT-1.1.3)**Complex Analysis****FM- 50****Time: 3 Hrs.****Unit -I****17 Marks**

Power series, analytic function, Analytic functions as mappings, Mobius transformations, power series representation of Analytic function

Unit - II**17 Marks**

Zeros of analytic function, The index of a closed curve, Cauchy's theorem and integral formula, Morera's theorem, Liouville's theorem, Fundamental theorem of Algebra, zeros, Goursat theorem

Unit - III**16 Marks**

Classification of singularities, poles, absolute convergence, Laurent series development, Casorati

Weierstrass theorem, Maximum modulus theorem, Schwartz's Lemma.

Book recommended

1. Functions of One complex variable - J.B. Conway
Chapter III (1-3) IV (2-5, 7, 8,) V (1,3) VI (1,2)

Paper -IV (MT-1.1.4)**Topology****FM- 50****Time: 3 Hrs.****Unit -I****17 Marks**

Topological spaces, Basis and order of topology, product and subspace topology, closed set, limit points, continuous function, Product topology.

Unit - II**17 Marks**

Connected spaces, connected sets in real line. Compact spaces. compact sets in the real line, limit point compactness.

Unit -III**16 Marks**

The countability axioms. The separation axioms. The Urysohn lemma. The Urysohn metrization theorem. Tychonoff theorem.

Book prescribed

1. Topology A First course - J.R. Munkers
Chapter 2 (2.1 - 2.8) , 3(3.1- 3.7) , 4(4.1 - 4.4), 5(5.1)

Paper - V (MT-1.1.5)**Practical****(Exp-30, Viva-10, Record -10)****FM- 50****Time: 3 Hrs.**

List of Experiments :

1. To evaluate a multiple choice test.
2. To sort strings in alphabetical order.
3. To count characters, Words and lines in a text.
4. To prepare a mathematics book shop inventory.
5. To process examination marks.
6. To handle integer data files.
7. To handle file with mixed data.
8. To plot a given function.

Book for reference :

1. Programming in Ansi-C (Second Edition) by E. Balguru Swamy, (Tata Mc. Graw Hill)
2. C- Language and Numerical Methods. by C- Xavier. (New Age International)

Paper - VI (MT-1.2.6)**Linear Algebra****FM- 50****Time: 3 Hrs.****Unit -I****17 Marks**

Linear Transformation, characteristic roots, canonical

forms, similarity of linear transforms, invariant subspace, Reduction to triangular forms. Nilpotent transformation, index of nilpotency, invariant of a linear transformation

Unit - II**17 Marks**

The primary decomposition theorem, Jordan blocks and Jordan forms, Rational cononical forms, cyclic modules, semisimple modules, schuler's lemma, Free module

Unit - III

Noetherian and Artinian modules, Ring, Hilbert space theorem. Wedderburn Artin theorem. Uniform modules, Primary modules, Noether - Lasker theorem, Smith normal form over a principal ideal domain and rank.

Books Recommended

1. Topics in Algebra - I.N. Herstein (wiley Eastern)
Chapter - 6 (6.1, 6.2, 6.4.6.5, 6.6,6.7)
2. Basic Abstract Algebra, B.Bhattacharya, S.J. Jain and S.R. Nagpaul,
Chapter 14, (1, 2 (excluding 2.4), 3 (3.1, 3.2, 3.3), 4 (4.1, 4.2,), 5 (up to 5.5))
Chapter 19 (1,2 (upto 2.14), 3.1, 3.2, 3.3, 4(upto 4.6))
Chapter 20(1,2,3)

Paper -VII (MT-1.2.7)**Functional Analysis****FM- 50****Time: 3 Hrs.****Unit - I****17 Marks**

Metric spaces and continuous functions, Normed Space, Continuity of linear maps, Hahn Banach theorem, Banach space.

Unit- II**17 Marks**

Uniform boundedness Principles, closed graph and open mapping theorem, Bounded inverse theorem, duals and transposes, Dual of $C(a,b)$, Weak convergence, Reflexivity.

Unit - III**16 Marks**

Inner product spaces, orthonormal sets, Projection and Riesz representation theorem.

Book Recommended.

Functional Analysis : B.V Limaye (Second Edition) (New Age International)

Chapter - I 3 (only statements of lemma 3.1, 3.2) 3.3-3.9.

Chapter - II 5, 6, 7 (excluding Banch limits), 8

Chapter - III 9 (Excluding 9.5, 9.6, 9.7), 10,11

Chapter - IV 13 (Upto 13.5 only), 14.4, 14.5 (Excluding moments Sequence), 15 (Excluding 15.5, 15.6, 15.7), 16.1

Chapter - VI 21, 22, 24 (Excluding weak convergence and week bound)

Books for reference.

1. Functional Analysis (A First course) M. Thambar Nair.
2. First Course in Functional analysis Casper Goffman and George pedric

Paper -VIII (MT-1.2.8)**Discrete Mathematics****FM- 50****Time: 3 Hrs.****Unit - I****17 Marks**

Mathematical Logic, Normal Forms, Theory of Inference for the statements calculus, the predicate calculus, inference theory of predicate calculus.

Unit - II**17 Marks**

Lattices and Boolean Algebra- partical ordering and poset, Lattices and partially ordered sets, Boolean Algebra, Boolean Functions, representation and Minimization of Boolean Functions.

Unit - III**16 Marks**

Algebraic structure and computability theory, Recursion, semi groups and Monoids, Grammars and Languages, application of Residue arithmetic to computer. Finite state acceptors and Regular

Grammars, Turing Machine and partial Recursive functions (Restricted)

Book prescribed

Discrete Mathematical structures with Applications to Computer Science - J. P. Tremblay and R. Monohar
Chapter 1 (1.3, 1.4, 1.5, 1.6) , 2 (2.3. 8, 2.3.9), 4(4.1 - 4.4), 2(2.6), 3(3.2,3.3, 3.6), 6(6.1,6.2).

Paper -IX (MT-1.2.9)**Optimization Technique****FM- 50****Time: 3 Hrs.****Unit - I****17 Marks**

The Simpler method and duality in linear programming

Unit - II**17 Marks**

The Transportation problem

Unit - III**16 Marks**

The Assignment and Routing problems, Network scheduling.

Book prescribed

1. Operation Research - Kanti swarup, P.K. Gupta, Man Mohan (S.C.)
Chapters 4.,5,10 (10.1, 10.2, 10.8-10.13), 11 (11.1 - 11.6), 21 (21.1-21.7)

Practical X (MT-1.2.10)**(Exp - 30 viva 10 Record- 10)****FM- 50 (30+10+10)****Time: 3 Hrs.****List of experiments**

1. To calculate mean and standard deviation
2. To calculate pearsson's coefficient of corelation
3. To find area under a curve
4. Lagrange's interpolation
5. Gauss elimination
6. Inverse of a matrix
7. To find eigen value and eigen vectors
8. Runge kutta method
9. Finding minimax approximation to e by chebyshev's polynomials
10. Approximating definite integral by Newton cotes, Gauss quatration rule.

Paper -XI (MT-1.2.11)**FM- 100****SEMINAR**

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