SYLLABUS M.SC MATHEMATICS – IInd SEMESTER

Advanced Abstract Algebra —II
MAT201

Unit- I
Introduction to Modules. Examples, submodules quotient modules. Module homomorphism,isomorshism. Finitely generated modules, cyclic modules.

Unit – II
Simple modules, Sernisimple modules, Free modules, Schur's lemma.

Unit – III
Noetherian & Artinian modules and rings, Hilbert basis theorem. Wedderburn-Artin theorem.

Unit – IV
Uniform modules, Primary modules, Noether-Laskar theorem. Fundamental structure theorem of modules over a principal ideal domain and its applications to finitely generated : abelian groups.

Unit – V
Similarity of linear transformation, Invariant spaces, Reduction to triangular forms. Nilpotent transformations. Index of Nilpotency, Invariants of a nidpotent transformation. The primary decomposition theorm.

Reference Books:
P.B. Bhattacharya, S.K.Jain, S.R. Nagpaul, Basic Abstract Algebra, Cambridge University Press, (Indeian Edition)

SYLLABUS M.SC MATHEMATICS – IInd SEMESTER

Lebesgue Measure & Integration
MAT202

Unit — I
Lebesgue outer measure. Measurable sets. Regularity. Measurable functions. Borel and Lebesgue measurability. Non-measurable sets.

Unit – II
Integration of Non-negative functions. The General integral. Integration of Series, Reimann and Lebesgue Integrals.

Unit – III
The Four derivatives. Functions of Bounded variation. Lebesgue Differentiation Theorem, Differentiation and Integration.

Unit - IV
The LP-spaces, Convex functions, Jensen's inequality. Holder and Minkowski inequalities. Completeness of LP.

Unit – V
Dual of space when 1 < p < convergence in Measure,Uniform. Convergence and almost uniform convergence.

Reference Books:
G. de Barra. Measure Theory and Integration, Wiley Eastern (Indian Edition)
Walter Rudin, Principles of Mathematical Analysis,McGraw-Hill, International student edition, H.L. Royden, Real Analysis, Macmillan, Indian Edition.

SYLLABUS M.SC MATHEMATICS – IInd SEMESTER

Topology- I I
MAT203

Unit — I
Separation axioms TO,T1,T2,T3,T4 : their Characterizations and basic properties. Urysohn's lemma. Tietze extension theorem.

Unit – II
Compactness. Continuous functions and compact sets. Basic properties of compactness. Compactness and finite intersection property. Sequentially and countably compact compact sets. Local compactness and one point compactification. Stone-vech compactification. Compactness in metric spaces. Equivalence of compactness, countable compactness and one point compactification. Stone-vech compactification. Compactness in metric spaces. Equivalence of compactness, countable compactness and sequential compactness in metric spaces. Connected spaces. Connectedness on the line. Components. Locally connected spaces.

Unit – III
Tychonoff product topology in terms of standard sub-base and its characterizations. Projection maps. Separation axioms and product spaces. Connectedness and product spaces. Compactness and product spaces (Tychonoff s theorem) Countability and product spaces.

Unit - IV
Embedding and metrization. Embedding lemma and Tychonoff embedding. The Urysohn metrization theorem. Net and filters. Topology and convergence of nets Hausdorffness and nets. Compactness and nets. Filters and their convergence. Canonical way of converting nets to filters and vice-versa.Ultra-filters and Compactness.

Unit – V
The fundamental group and covering spaces-Homotopy of paths. The fundamental group. Covering spaces. The fundamental group of the circle and the fundamental theorem of algebra.

Reference Books:
1. H.K Pathak, Topology Book

SYLLABUS M.SC MATHEMATICS – IInd SEMESTER

Complex Analysis –II
MAT204

Unit — I
Weierstrass factorization theorem. Gamma and its properties.Riemann Zeta function. Riemann's functional equation

Unit – II
Runge's Theorem. Mittag-Leffler's theorem. Analytic continuation. Uniqueness of direct analytic continuation. Uniqueness of analytic continuation along a curve. Power series method of analytic continuation.

Unit – III
Schwartz reflection principle. Monodromy theorem and its consequences. Harmonic function on a disc.

Unit - IV
Harnax inequality and theorem. Dirichlet problem. Green's function. Cannonical products. Jenson's formula. Hadamard's three circles theorem. Order of an entire function. Exponent of convergence. Borels theorem. Hadamard's factorization theorem.

Unit – V
The range of an analytic function. Bloch's theorem. The little Picard theorem.Schottky's theorem. Montel Caratheodary and great Picard theorem. Univalent function. Bieberbach conjecture and the V, - theorem.

Reference Books:
J.B.Convey ,Functions of one complex variable, Springer-Verlag
S Ponnuswamy, Fundamentals of complex analysis, Narosa Publishing House.
L.V.Ahlfors, Complex Analysis, McGraw Hill

SYLLABUS M.SC MATHEMATICS – IInd SEMESTER

Advanced Discrete Mathematics-II
MAT205

Unit — I
Directed graphs, lndegree and outdegree of a ventex, weighted undirected graphs dijkrtra's algorithm, strong connectivity and washell's algorithm directed trees, search trees, tree traversals.

Unit – II
Introductory coumputability theory-Finite State Machines and their Transition Table Diagrams. Equivlence of Finite State Machines. Reduced Machines, Homomorphism. Finite Automata. Acceptors.

Unit – III
Non-deterministic Finite Automata and equivalence of its power to that of Deterministic Finite Automata. Moore and Mealy Machines.

Unit - IV
Turing Machine and Partial Recursive Functions. Grammars and Languages-Phrase-Structure Grammars. Rewriting Rules. Derivations.

Unit – V
Sentential Forms,. Language generated by grammer , Regular, Context-Free, and Context Sensitive Grammars and Languages. Regular sets. Regular Expressions and the Pumphaj Lemma. Kleene's Theorem. Notions of Syntax Analysis. Polish Notations. Conversion of Infix Expressions to Polisn Notaaon

Reference Books:
J.R Trerp.blay & R. Manohar, Discrete Mathomcs eal Sir uiJurus with, Applications to Computer Science, MeGxov- A