

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: ANVI BANSAL

Subject: ABSTRACT ALGEBRA

Class: MSC Ist (1st sem)

Paper: 24MAT201DS01

1 st week	
2 nd week	Introduce Abstract Algebra
3 rd week	Sylow theorems for p -groups
4 th week	Sylow theorems for Sylow subgroups.
5 th week	Applications of Sylow theorems, description of groups of order p^2 and p^3
6 th week	Normal and subnormal series, solvable groups.
7 th week	Derived series, solvability of S_n , nilpotent groups.
8 th week	Modules, cyclic modules, simple and semi-simple modules.
	Schur's lemma, free modules, modules over principal ideal domains.

9 th week	Noetherian and Artinian modules, modules of finite length.
10 th week	Noetherian and Artinian rings, Hilbert Basis theorem.
11 th week	Composition series, Jordan-Holder theorem.
12 th week	Review of concepts and problem solving.
13 th week	Practice problems on groups and modules.
14 th week	Application of abstract algebra concepts.
15 th week	Revision Test of all sections.
16 th week	Presentation related to Noetherian and Artinian rings.
17 th week	Focus on weak areas and practice questions.
18 th week	Final revision of all syllabus.

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: ANVI BANSAL

Subject: MATHEMATICAL ANALYSIS

Class: M.Sc Ist (1st year)

Paper: 24MAT201DS02

1 st week	Introduction to Riemann-Stieltjes Integration, existence, properties.
2 nd week	Integration and differentiation, fundamental theorem of calculus
3 rd week	Integration of vector-valued functions, Rectifiable curves.
4 th week	Pointwise and uniform convergence, Cauchy criterion
5 th week	Test for uniform convergence (Weierstrass M-test, Abel, Dirichlet).
6 th week	Uniform convergence and continuity, Weierstrass approximation theorem.
7 th week	Power series, uniform convergence, uniqueness theorem.
8 th week	Abel theorem, Tauber theorem.

9 th week	function of a several variable, Linear Transformations, Derivatives in $\mathbb{R}^n$.
10 th week	chain Rule, Partial Derivative, continuously Differentiable Mapping, Young and Schwarz theorems.
11 th week	Taylor theorem, Higher order Differentials.
12 th week	Explicit and Implicit functions, Inverse function theorem.
13 th week	change of variables, extreme value of Implicit function.
14 th week	stationary values of implicit functions, Lagrange multipliers, Jacobians.
15 th week	Revision of all sections.
16 th week	Practice Problems
17 th week	Revision of Taylor theorem and weak Areas
18 th week	Revision of all section.

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: Anvi Bansal

Subject: Complex Analysis

Class: M.Sc Ist (1st year)

Paper: 24MAT201DS03

1 st week	Introduction to complex Analysis, function of a complex variable, continuity.
2 nd week	Differentiability, Analytic functions and their properties, Cauchy - Riemann equation.
3 rd week	Cartesian and polar coordinates, power series.
4 th week	Radius of convergence, Differentiability of sum function of a power series.
5 th week	Path in a Region, Contour, Complex Integration, Cauchy theorem.
6 th week	Cauchy Integral formula, extension of a Cauchy theorem formula for multiply connected domain.
7 th week	Poisson Integral formula, Higher order Derivatives.
8 th week	Complex Integral as a function of its upper limit, Morera theorem, Cauchy inequality, Liouville theorem.

9 th week	Zeros of an analytic function, Laurent series, Isolated singularities.
10 th week	Casorati-Weierstrass theorem, Limit point of zeros and poles.
11 th week	Maximum modulus principles, Schwarz lemma, meromorphic functions.
12 th week	Argument principle, Rouché theorem, fundamental theorem of Algebra.
13 th week	Calculus of Residues, Cauchy residues theorem
14 th week	Evaluation of Integrals of Types $\int_{[0 \text{ to } 2\pi]} f(\cos \theta, \sin \theta) d\theta$, $\int_{[-\infty \text{ to } +\infty]} f(x) dx$.
15 th week	Conformal mappings, space of Analytic functions and their completeness.
16 th week	Hurwitz theorem, Montel theorem, Riemann Mapping theorem.
17 th week	Revision of all types, practice problems.
18 th week	class tests, solving problems and doubts.

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: Anur Bausal

Subject: Mathematical statistics

Class: M.Sc (1st sem)

Paper: 24MAT201DS04

1 st week	Introduction to Mathematical statistics, Course outcomes and probability basics.
2 nd week	Various approaches of probability, Addition theorem
3 rd week	Boole inequality, Conditional probability and multiplication theorem
4 th week	Independent events, mutual and pairwise independence of events and Bayes theorem.
5 th week	Definition and properties of Random variables, Discrete and continuous Random variables.
6 th week	Probability mass and density functions, Distribution functions, concepts of Bivariate Random Variable.
7 th week	Joint marginal and conditional Distribution.
8 th week	Covariance, Variance - covariance, Moment generating functions, Definition of and properties.

9 th week	Uniform, Bernoulli, Binomial Distributions with properties.
10 th week	Poisson and Geometric Distributions with properties.
11 th week	Uniform, Exponential and Normal Distribution with properties.
12 th week	Parameter and statistics, sampling distribution, standard error of estimate.
13 th week	Null and alternative hypothesis, Critical Region, level of significance, one tailed and two tailed tests.
14 th week	Types of errors.
15 th week	Large sample tests for single mean, single proportion
16 th week	Difference between two means and two proportions.
17 th week	Revision of all topics, practice problem.
18 th week	Class test, Doubt clearing and exam preparation.

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: ANVI BANSAL

Subject: Analytical Number Theory

Class: M.Sc Ist (Ist sem)

Paper: 24MAT201DS05

1 st week	
2 nd week	Overview of distribution of primes numbers.
3 rd week	Fermat and Mersenne numbers, Farey series, approx. of irrational by rationals.
4 th week	Hurwitz theorem, irrationality of e and π .
5 th week	Practice problems and discussions on all topics.
6 th week	Arithmetic in $\mathbb{Z}_m$ and group U_m , primitive roots.
7 th week	Algebraic structure of U_m , quadratic residues, Prime module.
8 th week	Arbitrary module solutions.
	Assessment on section. I and II.

9 th week	
10 th week	Riemann Zeta functions, convergence, application to primes.
11 th week	$(\zeta(s))$ as Euler Product, evaluation of $\zeta(2)$ and $\zeta(2k)$.
12 th week	Diophantine equation $ax+by=c$; $x^2+y^2=z^2$
13 th week	Representation by two or four square.
14 th week	Waring Problem.
15 th week	Arithmetic function $\phi(n)$, $\tau(n)$, $\sigma(n)$
16 th week	Mobius Inversion formula, mobius function $\mu(n)$
17 th week	Perfect numbers, order and average order of function.
18 th week	Practice problems on different functions.
	Assessment and doubts.

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: ANVI BANSAL

Subject: Advanced Discrete Mathematics.

Class: Msc Ist (1st sem)

Paper: 24MAT201 SED1

1 st week	Introduction to recurrence relations, some number sequences.
2 nd week	Linear homogenous recurrence relation.
3 rd week	Non homogenous Recurrence Relations, Generating functions.
4 th week	Recurrences and Generating functions, exponential Generating functions.
5 th week	statements and symbolic Representation, tautologies, propositional logic.
6 th week	Quantifiers, Predicates and Validity.
7 th week	lattices as partially ordered sets, properties.
8 th week	lattices as algebraic systems, sublattices, Direct Products.

9 th week	Boolean algebras as lattices, Boolean Identities.
10 th week	switching algebra, subalgebras, Direct products.
11 th week	Joint- irreducible elements, atoms, minterms, Boolean forms.
12 th week	sum of products, canonical forms, minimization, application to switching theorem.
13 th week	Finite state machines, Transition Diagrams.
14 th week	Equivalence of finite state machines, Reduced machines.
15 th week	Finite automata, acceptors, non-deterministics automata.
16 th week	Grammars and languages, phrases- structure Grammars. Regular sets.
17 th week	Regular, context-free, Context-sensitive Grammars.
18 th week	Reviews, assessments, Regulars expression, pumping lemma.

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: ANVI BANSA L

Subject: Functional Analysis

Class: Msc Ind (3rd sem)

Paper: 25MAT203 DS01

1 st week	Overview of functional Analysis, Normed linear Spaces.
2 nd week	Metric on normed spaces, Banach spaces, Hölder's and Minkowski Inequality.
3 rd week	Subspace of a Banach space, Quotient space of Normed linear spaces.
4 th week	Completeness of L_∞ , L^p , $C[a, b]$, Incomplete normed space.
5 th week	Finite Dimensional normed linear spaces and subspaces
6 th week	Bounded linear transformation, Equivalent formulation of continuity
7 th week	Spaces of Bounded linear transformations, Continuous linear functional.
8 th week	Conjugate spaces, Hahn-Banach extension theorem (Real and complex form).

9 th week	Reiez Representation theorem for bounded linear function on L^p and $C[a,b]$
10 th week	second conjugate spaces, Reflexive space, uniform, boundedness Principle.
11 th week	Open mapping theorem and its application.
12 th week	Projections, closed Graph theorem.
13 th week	Equivalent norms, weak and strong convergence
14 th week	Their equivalence in finite Dimensional spaces.
15 th week	weak sequential compactness.
16 th week	solvability of linear equation in Banach spaces.
17 th week	Compact operators and its relation with continuous operator, compactness of linear Transformation on a finite Dimensional space.
18 th week	Properties of limit of compact operators, compactness of limit of sequence of compact operators. Revision and Problem Solving.

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: ANVI BANSAL

Subject: Elementary Topology

Class: M.sc Ind (3rd sem)

Paper: 25MAT 203 DS02

1 st week	
2 nd week	Introduction to topological spaces, definition, examples.
3 rd week	comparison of topologies, intersection & union of topologies.
4 th week	Neighbourhood, Interior point, Interior of set.
5 th week	Adherent point, limit point, closure of set.
6 th week	closed sets, derived sets, closure operator properties.
7 th week	Boundary, dense subsets, Interior, exterior operators.
8 th week	Relative topology, Base & sub base, continuous function.
	Open / closed functions, Homomorphism, connectedness.

9 th week	connected subsets, continuity and connectedness components, Locally connected spaces,
10 th week	
11 th week	compact spaces / subsets, finite Intersection property, continuity & compact sets, compactness in Hausdorff space.
12 th week	
13 th week	sequentially and countably compact sets. Local compactness, one-point compactification.
14 th week	
15 th week	first & second countable, separable spaces. Hereditary properties, countability in separable space.
16 th week	
17 th week	Lindelof Theorem, T_0 , T_1 , T_2 axioms. Characterization & properties of separation axioms, Revisions.
18 th week	

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Name of the Teacher: ANVI BANSAL

Subject: FLUID DYNAMICS

Class: M.C. IInd (3rd sem)

Paper: 25MAT203 DSO3

1 st week	
2 nd week	Overview of fluid dynamics, Kinematics - Velocity at point of fluid.
3 rd week	Eulerian and Lagrangian method and descriptions.
4 th week	Kinematics - streamlines, Pathlines, streaklines.
5 th week	Velocity potential, Irrotational and rotational motions, Vorticity.
6 th week	Equation of continuity, boundary surfaces, acceleration components.
7 th week	Pressure at point, Euler equation of motion.
8 th week	Equation of motion in cylindrical and spherical co-ordinates.
9 th week	Bernoulli equation, Impulsive motion, Kelvin circulation theorem.

9 th week	
10 th week	Vorticity equation, energy equation for incompressible flow.
11 th week	Axially symmetric flows, liquid streaming past a sphere.
12 th week	Motion of sphere through liquid, K.E generated by Impulsive motion.
13 th week	3D sources, sinks, doublets and their image in impermeable surface.
14 th week	Motion of two concentric spheres.
15 th week	2D motion using cylindrical polar co-ordinates, stream function.
16 th week	Axis symmetric flow, Stoke stream function of basic flow.
7 th week	complex velocity potential, Irrotational motion in 2-D.
8 th week	Milne-Thomson circle Th ^m ; 2D source, sinks, doublets & Image.
	Revision + practice problem.

TEACHING PLAN

(July, 2025 to November, 2025)

Name of the Teacher: ANVI BANSAAL

Subject: Ordinary differential Equation

Class: M.Sc Ind (3rd Sem)

Paper: 25 MAT 203 DSO 4

1 st week	Overview of ODEs, Preliminaries
2 nd week	approximation solution, Cauchy - Euler construction.
3 rd week	Equicontinuous family of functions, Ascoli - Arzela lemma
4 th week	Cauchy - Peano existence theorem, Picard - Lindel of theorem
5 th week	solution of initial-value problem by Picard's method.
6 th week	Dependence of solution on Initial conditions.
7 th week	Matrix methods for homogeneous first order system.
8 th week	fundamental set of solutions, fundamental matrix, Wronskian.

9 th week	Basic theory of homogenous linear system, Abel-Liouville formula
10 th week	Non-homogenous linear systems, self-adjoint equations.
11 th week	Sturm theory, Sturm separation theorem, fundamental comparison theorem.
12 th week	Phase plane, Paths, Critical points, Autonomous systems.
13 th week	Types of critical points (centre, saddle, spiral, Node), stability.
14 th week	Asymptotically stable points, unstable points, Critical points and Path of linear system.
15 th week	Nonlinear conservative dynamical system, Dependence on a Parameter.
16 th week	Liapunov direct method, limit cycle, Periodic solution.
17 th week	Bendixson non existence criterion, Poincare-Bendixson theorem, Index of critical point.
18 th week	Sturm-Liouville problems, Orthogonality of characteristics, functions Revision and Exam Prep.

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Name of the Teacher: ANVI BANSA L

Subject: GRAPH THEORY

Class: M.Sc Ind (3rd sem)

Paper: 25MAT203 DSO 5

1 st week	
2 nd week	overview of graph theory, definitions and types of graphs.
3 rd week	walks, Paths, circuits, connected and disconnected graphs.
4 th week	Application of graphs, operations on graphs.
5 th week	Graph representation, Isomorphism of graphs.
6 th week	Eulerian and Hamiltonian paths.
7 th week	shortest path in weighted graph.
8 th week	Planar graphs, detection of planarity, Kuratowski's theorem.
	Graph coloring.

9 th week	
10 th week	Directed graphs, trees, tree terminology
11 th week	Rooted Labeled trees, prefix code, binary search tree.
12 th week	Tree traversal.
13 th week	Review and practice problems on trees and graphs.
14 th week	Spanning trees and cut sets, minimum spanning trees.
15 th week	Kruskal algorithm, Prim algorithm.
16 th week	Decision trees, Sorting methods.
17 th week	Solve problem, involving vertex, edge, planarity.
18 th week	Apply tree & graph algorithms to solve problem.
	Revision and practice problem.

TEACHING PLAN

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Name of the Teacher: ANVI BANSAL

Subject: DIFFERENCE EQUATIONS

Class: M.sc Ind (3rd sem)

Paper: 25MAT263 SED3

1 st week	Introduction to difference equation, difference operator basics.
2 nd week	Summation, generating functions, approximate summation.
3 rd week	first order linear Difference Equations.
4 th week	General Results for linear Equations.
5 th week	solving linear Equations, applications.
6 th week	Equation with variable coefficients, non linear equation with that can be linearized, z-transform.
7 th week	Initial value Problems for linear system
8 th week	stability of linear systems.

1 st week	Phase plane Analysis, fundamental matrices, floquet theory.
2 nd week	Stability of non-linear systems, chaotic behaviour.
3 rd week	Introduction to Asymptotic methods.
4 th week	Asymptotic Analysis of sums.
5 th week	Asymptotic methods for linear Equations.
6 th week	Asymptotic methods for non-linear Equations.
7 th week	Apply difference equations in Modelling Phenomena
8 th week	Revision, focus on applications and problem solving.
9 th week	Comprehensive Revision of all topics
10 th week	Class Test, Exam preparation, Addressing Doubts.