

LESSION PLAN : B.Sc 1st SEMESTER 2nd 2024-25  
Algebra and Number Theory

Week	Topics
Week 1	Symmetric, Skew symmetric, Hermitian and skew Hermitian matrices, Elementary operations on matrices.
Week 2	Rank of a matrix, Inverse of a matrix, Linear dependence and independence of rows and columns of matrix, Row rank and column rank of a matrix, Eigen values, Eigen vectors and characteristic equation of a matrix.
Week 3	Minimal polynomial of a matrix, Cayley-Hamilton theorem and its use in finding the inverse of a matrix, Unitary and orthogonal matrices.
Week 4	Relations between the roots and coefficients of general polynomial equation in one variable.
Week 5	Solutions of polynomial equations having conditions on roots, Common roots and multiple roots,
Week 6	Transformation of equations, Nature of the roots of an equation, Descarte's rule of signs.
Week 7	Solutions of cubic equations (Cardon's method), Biquadratic equations and their solutions.
Week 8	Divisibility, Greatest common divisor (gcd), Least common multiple (lcm), Prime numbers, Fundamental theorem of arithmetic.
Week 9	Linear congruences, Fermat's theorem.
Week 10	Euler's theorem, Wilson's theorem and its converse, Chinese Remainder theorem.
Week 11	Linear Diophantine equations in two variables.
Week 12	Revision of Unit I and II
Week 13	Revision of Unit III and IV

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LESSION PLAN : B.Sc 2<sup>nd</sup> SEMESTER IVth 2024-25  
Sequences and Series

Week	Topics	Activities
Week 1	Boundedness of the set of real numbers; least upper bound, greatest lower bound of a set, neighborhoods, interior points, isolated points	
Week 2	Limit points, open sets, closed set, interior of a set, closure of a set in real numbers and their properties.	Classroom discussion on limit points.
Week 3	Bolzano-Weiestrass theorem, Open covers, Compact sets and Heine-Borel Theorem and Some problems.	
Week 4	Sequence: Real Sequences and their convergence, Theorem on limits of sequence, Bounded and monotonic sequences,	Classroom discussion on Bounded and monotonic func.
Week 5	Cauchy's sequence, Cauchy general principle of convergence, Subsequences, Subsequential limits.	
Week 6	Infinite series: Convergence and divergence of Infinite Series, Comparison Tests of positive terms Infinite series,	
Week 7	Cauchy's general principle of Convergence of series, Convergence and divergence of geometric series, Hyper Harmonic series or p-series.	Activities based on Convergence and divergence.
Week 8	Infinite series: D-Alembert's ratio test, Raabe's test, Logarithmic test, de Morgan and Bertrand's test,	Classroom discussion on Infinite series.
Week 9	Cauchy's Nth root test, Gauss Test, Cauchy's integral test, Cauchy's condensation test.	Class Test -1 based on Unit I & II.

Week 10	Alternating series, Leibnitz's test, absolute and conditional convergence, Arbitrary series: Abel's lemma, Abel's test,	Activities based on Alternating series.
Week 11	Dirichlet's test, Insertion and removal of parenthesis, re-arrangement of terms in a series, Dirichlet's theorem,	Group Discussion
Week 12	Riemann's Re-arrangement theorem, Pringsheim's theorem (statement only), Multiplication of series, Cauchy product of series, (definitions and examples only) Convergence and absolute convergence of infinite products.	Classroom discussion of Convergence and absolute convergence of infinite products.
Week 13	Revision of Unit I and II	Class Test -2 based on Unit III & IV
Week 14	Revision of Unit III and IV	

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LESSION PLAN : B.Sc IIIrd SEMESTER 6<sup>th</sup> 2024-25  
Linear Algebra

Week	Topics	Activities
Week 1	Vector spaces, subspaces, Sum and Direct sum of subspaces, Linear span, Linearly Independent and dependent subsets of a vector space.	
Week 2	Linearly Independent and dependent subsets of a vector space. Finitely generated vector space, Existence theorem for basis of a finitely generated vector space, Finite dimensional vector spaces, Invariance of the number of elements of bases sets, Dimensions. Quotient space and its dimension.	Classroom discussion on Vector spaces
Week 3	Quotient space and its dimension, Homomorphism and isomorphism of vector spaces.	
Week 4	Linear transformations and linear forms on vector spaces, Vector space of all the linear transformations Dual Spaces, Bidual spaces, annihilator of subspaces of finite dimensional vector spaces.	Classroom discussion on Linear transformations
Week 5	Problems and examples related to above topic.	
Week 6	Null Space, Range space of a linear transformation, Rank and Nullity Theorem, Algebra of Linear Transformation, Minimal Polynomial of a linear transformation.	
Week 7	Singular and non-singular linear transformations, Matrix of a linear Transformation, Change of basis,	Activities based on Rank and Nullity

	Eigen values and Eigen vectors of linear transformations.	
Week 8	Problems and examples related to above topic.	Classroom discussion on , Eigen values and Eigen vectors
Week 9	Inner product spaces, Cauchy-Schwarz inequality, Orthogonal vectors, Orthogonal complements, Orthogonal sets and Basis	Class Test -1 based on Unit I &II
Week 10	Bessel's inequality for finite dimensional vector spaces, Gram-Schmidt, Orthogonalization process, Adjoint of a linear transformation and its properties, Unitary linear transformations.	Activities based on Orthogonal sets and Basis
Week 11	Problems and examples related to above topic.	Group Disussion
Week 12	Revision of Unit I and II	Class Test -2 based on Unit III &IV
Week 13	Revision of Unit III and IV	Classroom discussion on problems.
Week 15	Problems and examples related to above topic.	

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