

Lesson Plan for Even Semester (2023-2024)

Class- BSc + BA I (Even Semester)

Subejct : Vector Calculus (21123, 21183)

Week 1	Scalar and Vector product of three vectors
Week 2	Product of three vectors, Reciprocal vectors, Vector differentiation
Week 3	Scalar and vector valued point functions Derivative along a curve, Directional Derivatives and Test
Week 4	Gradient of a scalar point function, Geometrical Interpretation of grad
Week 5	Character of gradient as a point function
Week 6	Divergence and curl of vector function, characters of Div and curl of f as point function, examples and test.
Week 7	Gradient, divergence and curl of sums and product and their related vector identities. Laplacian Operator
Week 8	Orthogonal curvilinear coordinates, Conditions for orthogonality triad of mutually orthogonal triad
Week 9	Gradient Divergence, curl and Laplacian operators in terms of orthogonal curvilinear coordinates Cylindrical and spherical coordinates.
Week 10	Vector Integration: Line and Surface integral
Week 11	Volume integral, Theorem of Gauss and problems based on Gauss theorem
Week 12	Green's and Stokes' theorem and problems based on these.
Week 13	Revision
Week 14	Revision
Week 15	Test and Revision

Name- Arun Kumar

Class- BSc+ BA I (Even Semester)

Paper- Number Theory and Trigonometry (21121, 21181)

Week 1	Divisibility, G.C.D.(greatest common divisors), , L.C.M.(least common multiple)
Week 2	Primes, Fundamental Theorem of Arithmetic. Linear Congruences, Examples
Week 3	Linear Diophantine equations in two variables, Fermat's theorem. Wilson's theorem and its converse. Class Test
Week 4	Chinese Remainder Theorem, Complete residue system and reduced residue system modulo m . Euler's ϕ function Euler's generalization of Fermat's theorem.
Week 5	Quadratic residues. Legendre symbols. Lemma of Gauss; Gauss reciprocity law. Greatest integer function $[x]$. The number of divisors of n . Mobius μ function and the sum of divisors of a natural number n (The functions $d(n)$ and $\sigma(n)$ function and Assignment 1 .
Week 6	Mobius inversion formula. De Moivre's Theorem and its Applications
Week 7	De Moivre's Theorem Applications, Circular Functions of a Complex variables.
Week 8	Expansion of trigonometrical functions. Direct circular and hyperbolic functions and their properties. Class Test
Week 9	Logarithm of a complex quantity. Inverse circular and hyperbolic functions and their properties.
Week 10	Gregory's series. Summation of Trigonometry series.
Week 11	Summation of Trigonometry series. Assignment.
Week 12	Class Test & Revision
Week 13	Revision
Week 14	Revision
Week 15	Full Syllabus Test

Name : Arun Kumar

Class :BSc + BA II (Even Semester)

Paper : Sequence and Series (41121, 41181)

Week 1	Boundedness of the set of real numbers, LUB and GLB of a set, Neighbourhood, Interior points.
Week 2	Isolated points, limit points open set, closed set, interior of a set
Week 3	Closure of a set and their properties, BWT, Open covers, Compact sets and Heine-Borel theorem.
Week 4	Sequence of real numbers and their convergence, Theorem on limits of sequence
Week 5	Bounded and monotonic sequences Cauchy Sequence, Subsequences
Week 6	Infinite Series and its convergence and divergence, comparison tests, Geometric series, Hyper-Harmonic series.
Week 7	Infinite series: D' Alembert's Ratio Test and n^{th} root test, Raabe's Test,
Week 8	Logarithmic, De Morgan and Bertrand's test, Gauss test, Integral test and Condensation test.
Week 9	Alternating Series, Absolute and conditional convergence
Week 10	Arbitrary series: Abel's test and Dirichlet's test, Re-arrangement terms in series.
Week 11	Dirichlet's theorem, Riemann's rearrangement, Pringsheim's theorem, Multiplication series
Week 12	Product of series. Convergence and divergence of infinite products.
Week 13	Revision
Week 14	Revision
Week 15	Full Syllabus Test.

Name : Arun Kumar

Class :BSc + BA II (Even Semester)

Paper : Special Functions and Integral Transforms (41122, 41182)

Week 1	Series solution of differential equations – Power series method
Week 2	Power series method, Examples, Definitions of Beta and Gamma functions.
Week 3	Examples Related to Beta and Gamma functions, Bessel functions and their properties-Convergence, recurrence, Relations and generating functions, Orthogonality of Bessel functions.
Week 4	Legendre differential equations and their solutions: Legendre functions and their properties-Recurrence Relations and generating functions. Orthogonality of Legendre polynomials. Rodrigues' Formula for Legendre Polynomials, Laplace Integral Representation of Legendre polynomial. Class Test
Week 5	Hermite differential equations and their solutions, Hermite functions and their properties-Recurrence Relations and generating functions. Orthogonality of Hermite polynomials. Rodrigues' Formula for Hermite Polynomials, Examples. Assignment1.
Week 6	Laplace Transforms – Existence theorem for Laplace transforms, Linearity of the Laplace transforms, Shifting theorems, Laplace transforms of derivatives and integrals.
Week 7	Differentiation and integration of Laplace transforms, Convolution theorem, Inverse Laplace transforms, convolution theorem, Inverse Laplace transforms of derivatives and integrals, solution of ordinary differential equations using Laplace transform. Class Test.
Week 8	Fourier transforms: Linearity property, Shifting, Modulation, Convolution Theorem, Related Examples, Assignment.
Week 9	Fourier Transform of Derivatives, Relations between Fourier transform and Laplace transform, Parseval's identity for Fourier transforms, Examples
Week 10	Solution of differential Equations using Fourier Transforms, Examples.
Week 11	Test & Revision
Week 12	Revision
Week 13	Revision
Week 14	Revision

Name : Arun Kumar

Class : BSc + BA III (Even Semester)

Paper : Linear Algebra (61122, 61182)

Week 1	Vector Spaces : Definition, examples and theorems, Subspaces and Direct sums
Week2	Linear span, L.I. and L.D. vectors, Finitely Generated VS
Week 3	FDVS, Invariance of the number of elements of bases sets, Dimension of a VS and Quotient Space.
Week 4	Linear transformations and linear forms on VS, Vector space of all the linear transformations, Kernel and Range of a vector space.
Week 5	Rank and Nullity of a LT, Rank-Nullity theorem and related examples.
Week 6	Algebra of LT, Singular and Non-singular LT, Matrix of a LT, Change of basis
Week 7	Dual Spaces, Engenvalues and Eigen vectors, Diagonalizility, Minimal polynomial
Week 8	Inner Product spaces: Definitions and examples, Cauchy-Schwarz inequality, Orthogonal complements
Week 9	Orthogonal sets and basis, Bessel's inequality for FDVS, GS Orthogonalisation process.
Week 10	Adjoint of a LT and its properties , Unitary Linear transformation.
Week 11	Some Previous year questions of competitive exams.
Week 12	Some Previous year questions of competitive exams.
Week 13	Revision and Test.
Week 14	Revision and Test
Week 15	Revision and Test.