

Lesson Plan

Name of the Assistant Professor : Dr. Savita Malik
Class and Section : B.Sc / B.A Ist Semester
Session : 2023-2024
Subject : Algebra

Month	Topic
August	Symmetric, Skew-symmetric, Hermitian and Skew-Hermitian matrices, Elementary operations on matrices, Rank of a matrix, Linear dependence and independence of rows and columns of a matrix. Row rank and column rank of a matrix. Eigen values, Eigen vectors and the characteristics equation of a matrix. Minimal polynomial of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix. Revision and Tests
September	Application of a matrices to a system of linear equations. Theorems on consistency of a system of linear equations. Unitary and Orthogonal Matrices, Bilinear and Quadratic forms. Revision and Tests
October	Relation between the roots and coefficients of general polynomial equation in one variable. Solutions of polynomial equations having conditions on roots. Common roots and multiple roots. Transformation of equations. Revision and Tests
November	Nature of roots of an equation. Descarte's rule of signs. Solution of cubic equations. Biquadratic equations and their solutions. Revision and Tests
December	University Exam

Signature of the Teacher

Lesson Plan

Name of the Assistant Professor : Dr. Savita Malik
Class and Section : B.Sc/B.A 3rd Semester
Session : 2023-2024
Subject : Partial Differential Equation

Month	Topic
August	Partial differential equations: Formation, order and degree, Linear and Non-Linear Partial differential equations of the first order: Complete solution, singular solution, General solution, Solution of Lagrange's linear equations, Charpit's general method of solution. Compatible systems of first order equations, Jacobi's method. Revision and Tests
September	Linear partial differential equations of second and higher orders, Linear and non-linear homogenous and non-homogenous equations with constant coefficients, Partial differential equation with variable co-efficients reducible to equations with constant coefficients, their complimentary functions and particular Integrals, Equations reducible to linear equations with constant coefficients. Revision and Tests
October	Classification of linear partial differential equations of second order, Hyperbolic, parabolic and elliptic types, Reduction of second order linear partial differential equations to Canonical (Normal) forms and their solutions, Solution of linear hyperbolic equations, Monge's method for partial differential equations of second order, Cauchy's problem for second order partial differential equations, Characteristic equations and characteristic curves of second order partial differential equation Revision and Tests
November	Method of separation of variables: Solution of Laplace's equation, Wave equation (one and two dimensions), Diffusion (Heat) equation (one and two dimension) in Cartesian Co-ordinate system Revision and Tests
December	University Exam

Signature of the Teacher

Lesson Plan

Name of the Assistant Professor : Dr. Savita Malik
Class and Section : B.Sc 5th Semester
Session : 2023-2024
Subject : Groups and Ring

Month	Topic
August	Definition of a group with example and simple properties of groups, Subgroups and Subgroup criteria. Generation of groups, cyclic groups, Cosets, Left and right cosets, Index of a sub-group Coset decomposition, Lagrange's theorem and its consequences, Normal subgroups, Quotient groups, Revision and Tests
September	Homomorphisms, isomorphisms, automorphisms and inner automorphisms of a group. Automorphisms of cyclic groups, Permutations groups. Even and odd permutations. Alternating groups, Cayley's theorem, Center of a group and derived group of a group. Revision and Tests
October	Introduction to rings, subrings, integral domains and fields, Characteristics of a ring. Ring homomorphisms, ideals (prime, maximal) and Quotient rings, Field of quotients of an integral domain, Euclidean rings, Polynomial rings, Polynomials over the rational field, The Eisenstein's criterion, Polynomial rings over commutative rings. Revision and Tests
November	Unique factorization domain, R unique factorization domain implies so is $R[X_1, X_2, \dots, X_n]$. Revision and Tests
December	University Exam

Signature of the Teacher

Lesson Plan

Name of the Assistant Professor : Dr. Savita Malik
Class and Section : B.Sc/B.A 2nd Semester
Session : 2023-2024
Subject : Ordinary Differential Equations

Month	Topic
January	Geometrical meaning of a differential equation, Exact differential equations. Integrating factors. First order higher degree equations solvable for x,y,p. Lagrange's equations, Clairaut's equations. Equation reducible to Clairaut's form. Singular solutions. Orthogonal trajectories: in Cartesian coordinates and polar coordinates. Self orthogonal family of curves.. Linear differential equations with constant coefficients. Revision and Tests
February	Homogeneous linear ordinary differential equations. Equations reducible to homogeneous linear ordinary differential equations. Linear differential equations of second order: Reduction to normal form. Transformation of the equation by changing the dependent variable/ the independent variable. Solution by operators of non-homogeneous linear differential equations. Reduction of order of a differential equation. Revision and Tests
March	Method of variations of parameters. Method of undetermined coefficients. Ordinary simultaneous differential equations. Solution of simultaneous differential equations involving operators (d/dx) or (d/dt) etc. Revision and Tests
April	Simultaneous equation of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$. Total differential equations. Condition for $Pdx + Qdy + Rdz = 0$ to be exact. General method of solving $Pdx + Qdy + Rdz = 0$ by taking one variable constant. Method of auxiliary equations. Revision and Tests
May	University Exam

Signature of the Teacher

Lesson Plan

Name of the Assistant Professor : Dr. Savita Malik
Class and Section : B.Sc/B.A 4th Semester
Session : 2023-2024
Subject : Special Functions and Integral Transforms

Month	Topic
January	Series solution of differential equations “ Power series method, Definitions of Beta and Gamma functions. Bessel equation and its solution: Bessel functions and their properties-Convergence, recurrence, Relations and generating functions, Orthogonality of Bessel functions. Revision and Tests
February	Legendre and Hermite differentials equations and their solutions: Legendre and Hermite functions and their properties-Recurrence Relations and generating functions. Orthogonality of Legendre and Hermite polynomials. Rodrigues’ Formula for Legendre & Hermite Polynomials, Laplace Integral Representation of Legendre polynomial. Revision and Tests
March	Laplace Transforms – Existence theorem for Laplace transforms, Linearity of the Laplace transforms, Shifting theorems, Laplace transforms of derivatives and integrals, 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. Revision and Tests
April	Fourier transforms: Linearity property, Shifting, Modulation. Convolution Theorem, Fourier Transform of Derivatives, Relations between Fourier transform and Laplace transform, Parseval’s identity for Fourier transforms, solution of differential Equations using Fourier Transforms. Revision and Tests
May	University Exam

Signature of the Teacher

Lesson Plan

Name of the Assistant Professor : Dr. Savita Malik
Class and Section : B.Sc 6th Semester
Session : 2023-2024
Subject : Linear Algebra

Month	Topic
January	Vector spaces- Definition and Examples. Subspaces, Sum and Direct sum of subspaces, Linear span, 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. Revision and Tests
February	Homomorphism and isomorphism of vector spaces, 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, Null Space, Range space of a linear transformation, Rank and Nullity Theorem. Revision and Tests
March	Algebra of Liner Transformation, Minimal Polynomial of a linear transformation, Singular and non-singular linear transformations. Matrix of a linear Transformation, Change of basis, Eigen values and Eigen vectors of linear transformations. Inner product spaces, Cauchy-Schwarz inequality, Orthogonal vectors, Orthogonal complements, Orthogonal sets and Basis. Revision and Tests
April	Bessel's inequality for finite dimensional vector spaces, Gram-Schmidt, Orthogonalization process, Adjoint of a linear transformation and its properties, Unitary linear transformations. Revision and Tests
May	University Exam

Signature of the Teacher