

Dr. B.R. Ambedkar Govt. College Dabwali (Sirsa)

Lesson Planning for the Session 2024-25 under Outcome Based Education framework

Name of AP: Pradeep Bishnoi

Class and Semester: B.Sc.-III/B.A.-III (EVEN SEM)

Subject: Mathematics - Linear Algebra

Clear learning objectives – Student will learn about vector spaces, linear transformations and inner product spaces, will be able to find basis and dimension of vector spaces, find rank and nullity of linear transformation, find orthonormal basis of inner product spaces.

Teaching Strategies - Conceptual understanding and problem solving

Assessment Methods – Summative

Month: January

Chapter 1: Vector Spaces and Subspaces - Introduction, Vector space, Vectors in \mathbb{R}^n , Examples on Vector Space, Properties of Vector space, Subspace, Theorems on Subspace, Examples, Linear Sum of Subspaces and Subspace Generated by a Set, Theorems on Linear Sum, Sum and Direct sum of subspaces, Vector Spaces and Subspaces - Disjoint Subspaces, Theorems on Sum and Direct Sum of subspaces, Examples on Direct Sum of Sub Spaces

Chapter 2: Basis and Dimension of Vector Spaces - Linear Combination of Vectors, Linear Dependence and Independence of Vectors, Theorems on Linear Dependence and Independence of Vectors.

Month: February

Chapter 2: Basis and Dimension of Vector Spaces - Examples on Linear Dependence and Independence of Vectors, Spanning Sets, Linear Span, Finitely Generated Vector Space, Theorems on Linear Span, Examples on Linear Span, Basis of a Vector Space, Ordered Basis, Coordinates, Theorems on Basis and Dimensions of a Vector Space, Examples on Basis and Dimensions of a Vector Space, Identical Spaces, Theorems, Examples

Chapter 3: Quotient space - Introduction, Theorems on Quotient Space, Examples on Quotient

Chapter 4: Linear Transformations - Introduction, Definition, Theorems and Properties of L.T., Examples, Vector Space Isomorphism- Theorems and Examples

Chapter 5: Rank and Nullity - Introduction, Null Space and Kernel, Range, Theorems on Range, Null Space and Kernel, Examples on Range, Null Space and Kernel, Assignment

Month: March

Chapter 6: Algebra of Linear Transformations - Introduction, Sum of Linear Transformations, Theorems, Product of Linear Transformations, Theorems, Examples, Singular and Non-Singular Linear Transformations, Theorems, Invertible Linear Transformations, Theorems and Examples on Invertible Linear Transformations, Class test

Chapter 7: Matrix of Linear Transformation - Introduction, Coordinate Vector, Matrix of Linear Transformation with Ordered Basis, Theorems, Matrix of Linear Transformation with Standard Basis, Examples, Matrix of Linear Transformation - Theorems, Change of Basis, Change of Basis- Theorems, Examples, Vector Space of Linear Transformations, Assignment

Chapter 8: Dual Space - Dual Space, Theorems and Examples on Dual Space, Bidual of Vector Space, Theorems, Annihilator, Theorems and Examples on Annihilator,

Month: April

Chapter 9: Eigen Values and Eigen Vectors - Definition, Eigen Space, Characteristic Polynomial, Theorems and Examples on Eigen Values and Eigen Vectors, Similar Matrices, Theorems on Similar Matrices, Diagonalisation, Theorems and Examples on Diagonalisation

Chapter 10: Inner Product Spaces - Introduction - Inner, Norm of a Vector, Cauchy Schwarz Inequality, Triangle Inequality and Examples, Normed Linear Space and Examples, Orthogonal Vectors, Orthonormal Set and Orthonormal basis, Bessel's Inequality and Examples, Gram- Schmidt Orthogonalization Process and Examples, Theorems and Examples on Orthonormal Basis

Chapter 11: Linear Operators on Inner Product Spaces - Introduction, Adjoint Operators, Self Adjoint Operators, Unitary operators, Normal operators, Theorems and Examples on Operators

Dr. B.R. Ambedkar Govt. College Dabwali (Sirsa)

Lesson Planning for the Session 2024-25 under Outcome Based Education framework

Name of AP: Pradeep Bishnoi

Class and Semester: B.Sc.-II/B.A.-II (EVEN SEM)

Subject: Mathematics - Special Functions and Integral Transforms

Clear learning objectives – Student will be able to find power series solutions to some special kind of second degree differential equations, find Laplace transform and Fourier transform of some functions

Teaching Strategies - Conceptual understanding and problem solving

Assessment Methods – Summative

Month: January

Chapter 1: Power Series – Definition of Power Series, Convergence, Operations, Analytic Function and Examples, Ordinary and Singular points, Existence of power series solution, Examples- Solution in Series about an Ordinary point $x = 0$, Examples- Solution in Series about an Ordinary point $x \neq 0$, Frobenius Method (When $x=0$ is a Regular Singular Point), Examples- Solution in Series by Frobenius Method
Chapter 2: Bessel's Equation and Bessel's Function - Beta and Gamma Function, Bessel's Equation and its Solution, Bessel's Function and Neumann Function, Theorems on Bessel's Function, Recurrence Relation for Bessel's Function, Examples, Generating Function for Bessel's Function, Representation of Bessel's Function in Integral- Jacobi's Series, Examples- Jacobi's Series,

Month: February

Chapter 2: Bessel's Equation and Bessel's Function - Equation Reducible to Bessel's Equation, Orthogonality relation of Bessel's Function, Examples
Chapter 3: Legendre's Equation - Introduction and solution- Legendre's Equation, Legendre's Polynomial, Rodrigue's Formula, Derivation of Legendre's Polynomial from Rodrigue's Formula, Generating function for $P_n(x)$, Recurrence Relations for $P_n(x)$, Examples, Orthogonality of Legendre's Polynomial, Laplace Integral Representation of Legendre's Polynomial, Examples, Class test
Chapter 4: Hermite's Equation - Introduction- Hermite's Equation, Hermite's Polynomial, Generating function for Hermite's Polynomial $H_n(x)$ and Examples, Assignment

Month: March

Chapter 4: Hermite's Equation - Rodrigue's Formula for Hermite's Polynomial $H_n(x)$, Recurrence Relations for $H_n(x)$, Examples on Recurrence, Orthogonality of Hermite's Polynomial $H_n(x)$, Examples
Chapter 5: Laplace Transforms - Definition and Laplace Transform of some Elementary Functions, Linear Property of Laplace Transform, First Shifting Property of Laplace Transform and Change of Scale Property, Examples, Function of Exponential Order and Second Shifting Theorem, Examples - Piece-Wise Continuous Functions, Laplace Transform of Derivatives, Effect of Multiplication of $f(t)$ by t^n in finding Laplace Transforms, Effect of Division of $f(t)$ by t in finding Laplace Transforms and Examples, Laplace Transform of Periodic Functions and Examples, Laplace Transform of Integrals, Examples based on Laplace Transform of Integrals, Laplace Transforms of Some Important Functions, Assignment
Chapter 6: Inverse Laplace Transforms - Introduction, Inverse Laplace Transform of some Elementary Functions, Theorems, Properties and Examples of inverse Laplace Transforms, Methods to find Inverse Laplace Transforms, Examples, Convolution Theorem, Examples

Month: April

Chapter 8: Solution of Differential Equations by Laplace Transforms - Introduction, Method to Solve Differential Equations by Laplace Transforms, Example, Method to Solve Differential Equations with Variable Coefficient by Laplace Transforms, Examples, Solution of Simultaneous Linear Equations with Constant Coefficient by Laplace Transforms, Examples
Chapter 9: Fourier Transforms - Definition- Fourier Transforms, Linear Property, Change of Scale Property, Shifting Property, Modulation Property, Examples-Fourier Sine and Cosine Transforms, Examples - Inverse Transforms, Convolution Theorem, Convolution Theorem for Fourier Transform,
Chapter 10: Solution of Differential Equations by Fourier Transforms - Introduction, Method to Solve Heat, Wave and Laplace equations by Fourier Transforms, Examples to solve One Dimensional Heat Equation, Two Dimensional Heat Equation and One Dimensional Wave Equation

Dr. B.R. Ambedkar Govt. College Dabwali (Sirsa)

Lesson Planning for the Session 2024-25 under Outcome Based Education framework

Name of AP: Pradeep Bishnoi

Class and Semester: B.Sc.-I/B.A.-I (EVEN SEM)

Subject: Mathematics - Algebra & Number Theory

Clear learning objectives – Student will learn about matrices, will be able find rank, eigen values and eigen vectors of matrices, solve polynomial equations, learn about the relation between roots of equations and transform an equation having required roots.

Teaching Strategies - Conceptual understanding and problem solving

Assessment Methods – Summative

Month: January Chapter 1: Matrices- Introduction, Definition and Types of Matrices, Transpose, Conjugate and Adjoint of Matrix, Theorems on transpose, conjugate and transposed conjugate of Matrices, Inverse of a matrix, Singular and Non-singular matrices, Theorems on Singular and Non-singular matrices, Solution of equations $AX = B$ using matrices, Examples, Symmetric Matrix, Skew-Symmetric Matrix, Hermitian Matrix, Skew- Hermitian Matrix, Theorems, Examples
Month: February Chapter 2: Rank of a Matrix- Sub-Matrix and Minors, Examples, Definition- Rank of a Matrix, Examples, Elementary Operations on Matrices, Equivalent Matrices, Echelon form of a Matrix, Theorems, Examples, Normal Form of a Matrix- Definition, Elementary matrices, Inverse of elementary matrices, Theorems and results on normal form of matrices, Theorem on rank of product of matrices, Examples, Inverse of a Matrix, Examples, Linear dependence and Linear independence, Theorems, Examples
Month: March Chapter 3: Characteristic Equation of a Matrix- Characteristic Matrix, Characteristic Polynomial, Characteristic Equation and Characteristic roots of a Matrix, Examples, Characteristic vectors of a Matrix, Examples, Theorems on Characteristic roots and Characteristic vectors of a matrix, Minimal Polynomial –Theorems and Examples. Chapter 4: Orthogonal and Unitary Matrices- Definition, Theorems, Examples. Chapter 5: Relation between the Roots & Coefficients of an Equation- Definition of Polynomial, Equation, Degree and Roots, Division Algorithm, Remainder and Factor Theorem, S.D., Examples, Fundamental Theorem, Roots in pairs, Examples.
Month : April Chapter 5: Relation between the Roots & Coefficients of an Equation- Theorems and examples related to Relation between Roots & Coefficients of an equation, Common and Multiple roots of an equation, Examples. Chapter 6: Transformation of Equations- Equation with roots satisfying given condition, Roots with sign changed, Roots multiplied by a given number, Reciprocal roots, Examples, Roots diminished by a given number, Examples, Transformation of a Cubic and Bi-quadratic, Examples, Transformation in General, Equation of Squared differences of a Cubic, Examples Chapter 7: Descarte's Rule of Signs- Definitions, Theorem related to Descarte's Rule of Signs, Complex Roots, Examples