



PREM CHAND MARKANDA SD COLLEGE FOR WOMEN, JALANDHAR CITY

Re-accredited 'A+' grade (2nd Cycle) by NAAC Bangalore

A unique prestigious Post Graduate Institution of Northern India

DEPARTMENT OF MATHEMATICS: TEACHING PLAN (Session 2025-26)

Program Specific Outcome: PO No.	Upon Completion of the Programme, the graduates will be able to:
PSO.1	Analyze a problem, identify and define the computing requirements, which may be appropriate to its solution.
PSO.2	Gain a relational understanding of mathematical concepts and related structures, and be able to follow the patterns involved in mathematical reasoning.
PSO.3	Pursue advanced studies and research in pure and applied mathematical science
PSO.4	Develop a positive attitude towards mathematics as an interesting and valuable subject of study.
PSO.5	equip them with mathematical modelling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.

Teaching Plan
Session 2025-26
Odd Semester

CLASS: B.Sc. (Eco, Non Med)/ B.A. Sem I

SUBJECT: Algebra

Faculty Name: Mrs. Shveta Mahajan.

TOPIC	DURATION	TEACHING TOOLS
Relations between the roots and coefficients of general polynomial equation in one variable. Transformation of equations. Transformation of equations Descarte's rule of signs with illustrations.	July-August	Group teaching, and learning through problem-solving. Expeditionary Learning, Learning through Problem solving, analytical learning, learning through practical examples.
Solution of cubic equations by Cardon method, Solution of biquadratic equations by Ferrari's Methods, Partitioning of Matrices, Matrices Partitioned conformably for Multiplication. Linear independence of row and column vectors. Row rank, Column rank of a matrix, Equivalence of column and row ranks, Nullity of matrix.	September	Learning through Problem solving, analytical learning, Participative learning using previous knowledge Group teaching, and learning through problem-solving. Expeditionary Learning
Applications of matrices to a system of linear (both homogeneous and non-homogeneous) equations. Theorems on consistency of a system of linear equations. Eigen values, Eigen vectors, minimal and the characteristic equation of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix, Quadratic Forms, quadratic form as a product of matrices. The set of quadratic forms over a field. Congruence of quadratic forms and matrices. Congruent transformations of matrices. Elementary congruent transformations. Congruent reduction of a symmetric matrix. Reduction in the real field. Classification of real quadratic forms in n variables.	October	Participative learning through quiz, Interactive learning through encouraging students to explain their reasoning

Definite, semi-definite and indefinite real quadratic forms.		
Characteristic properties of definite, semi-definite and indefinite forms.	November	Participative learning through power point presentation

Course Outcomes:

CO.1	At the end of the Semester, Students are able to solve system of linear equations and obtain Eigen values, Eigen vectors, minimal and characteristic equation of a matrix
CO.2	Students are able to classify real quadratic form in variables, definite, semi- definite and indefinite real quadratic form
CO.3	Students are able to understand the concept of matrix congruence of skew symmetric matrices and its reduction in real field.
CO.4	Students are able to find the relations between the roots and coefficients of general polynomial equation in one variable.
CO.5	Students are able to distinguish between solution of cubic equations and Bi-quadratic equations.

Teaching Plan
Session 2025-26
Odd Semester

CLASS: B.Sc. (Eco, Non Med)/ B.A. Sem I

SUBJECT: Algebra Laboratory

Faculty Name: Mrs. Shveta Mahajan.

TOPIC	DURATION	TEACHING TOOLS
Introduction to the computer package in the practical, Matrix operations: addition, multiplication, inverse, transpose, determinant of matrix	July-August	Hands on practice using MATLAB software
Rank of matrix: Row Rank, Column Rank. Create the coefficient matrix A and vector b. Solve for x using the inverse, using the built-in function.	September	Hands on practice using MATLAB software
Solving a linear system, using Gauss elimination numerically. Finding eigenvalues and eigenvectors, numerically.	October	Hands on practice using MATLAB software
Practice of above topics.	November	Hands on practice using MATLAB software

Course Outcomes:

At the end of the Semester, Students are able to solve problems related to matrices using MATLAB software.
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Teaching Plan
Session 2025-26
Odd Semester

CLASS: - B.Sc. (Eco, Non Med, C.Sc.)/ B.A. B.Ed Sem III

SUBJECT: - Differential Equations

Faculty Name: Mrs. Shveta Mahajan

TOPIC	DURATION	TEACHING TOOLS
Differential equation of first order and first degree, Linear differential equation reducible to Linear Bernoulli's equation Ordinary differential equation of first order. Exact differential equations. Necessary and sufficient conditions for $Mdx + Ndy$ to be Exact, integrating factors by inspections, special rules to find integrating factors with proof. First order and higher degree equations, equations solvable for y, x, p, equations not containing x, equations not containing y, Clairaut's equation and equations reducible to Clairaut's form.	July-August	Learning through previous knowledge Group teaching, and learning through problem-solving. Expeditionary Learning Learning through flipped classroom.
Singular solution, p-discriminant, c-discriminant, illustrations of singular solutions, Geometrical meaning of a complete solution of the differential equations, General solution of homogeneous equation of second order, Orthogonal trajectories of cartesian and polar curve, Homogeneous differential equations, Linear differential equations with constant coefficients.	September	Learning through Problem solving, analytical learning
Variation of Parameters method, Reduction of order. Linear differential equations with variable coefficients, Define Cauchy's linear equations, Legendre's Linear equation. Power Series, convergence of power series, Radius of convergence, Power Series solution about an ordinary point, solutions about singular points, Frobenius method when roots of	October	Learning through handout notes and presentations.

indicial equations differ by non-integers, and when roots are equal.		
System of ordinary simultaneous equations,	November	Learning through flipped classroom

Course Outcomes:

CO.1	At the end of the Semester, the students will be able to identify the type of a given differential equation and select and apply the appropriate analytical technique for finding the solution.
CO.2	Students will be able to apply various techniques to solve first-order and higher-order linear ODEs
CO.3	Students will be able to use methods like variation of parameters and reduction of order.
CO.4	Students will be able to solve systems of linear DE's with constant coefficients and with variable coefficients.
CO.5	Students will be able to solve ordinary simultaneous equations.
CO.6	Students will be able to solve the differential equations using power series methods.

Teaching Plan
Session 2025-26
Odd Semester

CLASS: - B.Sc. (Eco, Non Med, C.Sc.)/ B.A. B.Ed Sem III

SUBJECT: - Differential Equations Laboratory

Faculty Name: Mrs. Shveta Mahajan

TOPIC	DURATION	TEACHING TOOLS
Plotting solution of first order differential equation. Solve the first-order differential equation $\frac{dy}{dx} = ay$, numerically using Runge-Kutta method.	July-August	Hands on practice using MATLAB software
Solve the second-order differential equation $\frac{d^2y}{dx^2} = ay$, numerically using Runge-Kutta method. Plotting of solution of family of second order differential equation.	September	Hands on practice using MATLAB software
Solution of system of ordinary differential equations, numerically using Runge-Kutta method.	October	Hands on practice using MATLAB software
Numerical solution of the nonlinear simple pendulum equation.	November	Hands on practice using MATLAB software

Course Outcomes:

At the end of the Semester, Students are able to solve and plot the graphs of problems related to differential equations using MATLAB software.

Teaching Plan
Session 2025-26
Odd Semester

CLASS: B.Sc. (Non Med,Eco, C.Sci)/ B.A. B.Ed. Sem V

SUBJECT: Dynamics

Faculty Name: Mrs. Shveta Mahajan.

TOPIC	DURATION	TEACHING TOOLS
Rectilinear motion in a straight line with uniform acceleration, Newton's laws of motion, Motion of two particles connected by a string, Motion along a smooth inclined plane, Variable acceleration, Simple Harmonic Motion.	July-August	Participative learning using practical examples from real life
Curvilinear motion of particle in a plane, Definition of velocity and acceleration, projectiles, Oscillations: Free Vibrations, Simple Pendulum, Conical Pendulum	September	Group teaching, and learning through problem-solving. Expeditionary Learning
Work, Power and Energy: Kinetic and Potential energy, Conservative forces. Theorem of conservation of energy.	October	Participative learning using practical examples from real life
Work done against gravity	November	Participative learning through quiz and assignments

Course Outcomes:

CO.1	At the end of the Semester, Students are able to explain the relationship between forces and motion. Understand Newton's Laws of Motion and Apply the laws to solve many problems.
CO.2	Students are able to discuss the motion of particles connected by a string, motion along a smooth inclined plane.
CO.3	Students are able to solve different types of problems with Variable Acceleration.
CO.4	Students are able to discuss Simple Harmonic Motion and Illustrate it with a variety of examples.
CO.5	Students are able to solve Pendulum, Damped and forced Oscillations oscillating system problems.
CO.6	Students are able to define Work, Power and Energy and Explain their relationship. Use measurement tools to apply the concepts of Work and power to solve real life problems.

Teaching Plan
Session 2025-26
Odd Semester

CLASS: B.Sc. (Non Med,Eco, C.Sci)/ B.A. B.Ed. Sem V

SUBJECT: Number Theory

Faculty Name: Mrs. Sonia Sharma.

TOPIC	DURATION	TEACHING TOOLS
Preliminaries: Proof by induction, Binomial Theorem. Divisibility in Integers: Basic Definitions and Properties, The division Algorithm, GCD, The Euclidean Algorithm, LCM, Existence and determination of solution to the linear Diophantine equation $ax + by = c$, primes-definition & Properties, the fundamental theorem of Arithmetic..	July-August	Group teaching, and learning using previous knowledge, Participative learning using quiz and assignments
Number-theoretic functions: the greatest integer function, Euler's Phi-function, Sum & number of divisors functions, function & the Inversion formula. Congruences-definition and properties, linear congruences, existence & solution of the linear congruence, , Complete and reduces residue systems, Chinese remainder theorem.	September	Group teaching, and learning using previous knowledge, Expeditionary Learning Group teaching, and learning using previous knowledge,
Fermat's theorem, Euler's theorem, Pseudoprimes Wilson's theorem. Application to Cryptography-Factorization methods due to Fermat	October	Expeditionary Learning and participative learning through quiz
RSA.	November	Participative learning usings examples from real life

Course Outcomes:

CO.1	At the end of the Semester, Students are able to prove results involving divisibility and greatest common divisors.
CO.2	Students are able to solve system of linear congruences and find solutions of specified linear Diophantine equation.
CO.3	Students are able to apply Fermat's ,Euler's and Wilson's theorem to prove relation involving prime numbers.
CO.4	Students are able to understand and apply properties of phi functions in real world problems.
CO.5	Students are able to understand application of important arithmetic functions

Teaching Plan
Session 2025-26
Odd Semester
CLASS: BCA Sem I
SUBJECT: Applied and Discrete Mathematics
Faculty Name: Mrs. Sonia Sharma

TOPIC	DURATION	TEACHING TOOLS
Set Theory: Definition of sets, subsets, complement of a set, universal set, intersection and union of sets. De-Morgan's laws, Cartesian products, Equivalent sets, Countable and uncountable sets, minset, Partitions of sets,	July-August	Lecture Method, white board.
Relations: Basic definitions, graphs of relations, properties of relations. Logic and Propositional Calculus: Proposition and Compound Propositions, basic Logical Operations, Propositions and Truth Tables, Tautologies and Contradictions, Logical Equivalence, Duality law, Algebra of propositions, Conditional and Bi conditional Statements, Arguments, Logical Implication, Propositional Functions, Predicates and Quantifiers, Negation of Quantified Statements, Inference theory of the predicates calculus. Boolean Algebra: Boolean algebra and its duality, Duality, Boolean Algebra as Lattices, Boolean identities, sub-algebra, Representation Theorem	September	Lecture Method, Conceptual understanding, analytical learning, problem solving , learning by doing
Boolean Algebra: Sum-of-Products Form for Sets, Sum of-Products Form for Boolean Algebra, Minimal Boolean Expressions, Prime Implicants, Boolean Functions, Karnaugh Maps. Matrices: Introduction of a Matrix, its different kinds, matrix addition and scalar multiplication, multiplication of matrices, transpose etc. Square matrices,	October	Analytical Method Group teaching, and learning through problem-solving. Expeditionary Learning
Matrices: Square matrices, inverse and rank of a square matrix, Matrix Inversion method,	November	Drill Method ,Group learning

Characteristic polynomial, Eigen values, eigen vectors, Cayley -Hamilton theorem.		
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Course outcome

CO.1	At the end of the Semester, Students are able to identify Set, understand the types of a Set, to find the Union, intersection, difference of sets, to apply set theory to solve problems.
CO.2	Students are able to find cross products, to find total number of relations, to find domain and range of a relation , to understand relations of different types, to present the relation in diagrams, matrix form etc.
CO.3	Students are able to understand the concept of countable set and uncountable Sets, to do the partition of a set.
CO.4	Students are able to find whether the statement is a proposition or not, to draw truth tables, to convert a statement in mathematical form and to test it's validity, to express a statement in mathematical form using quantifiers.
CO.5	Students are able to laws of Boolean algebra, to minimize an equation using laws or using k-map.
CO.6	Students are able to add, subtract, multiply two matrices, to express a matrix as a sum of symmetric and skew Symmetric Matrices, to solve linear equations using inversion method
CO.7	Students are able to write Characteristic equation, eigen values of a square matrix ,their corresponding eigen vectors as well. And know the Cayley- Hamilton theorem.

Teaching Plan
Session 2025-26
Odd Semester
CLASS: M.Sc. Computer Science Sem I
SUBJECT: Discrete Structures
Faculty Name: Mrs. Sonia Sharma

TOPIC	DURATION	TEACHING TOOLS
Sets and Functions: Sets, Relations, Functions, Pigeonhole principle, Inclusion - Exclusion Principle,	July-August	Deductive method and learning through problem-solving. Expeditionary Learning
Sets and Functions: Equivalence and Partial orderings, Elementary counting techniques, relation of partial order partitions, binary relations Graph Theory: Definition, Walks, Paths, Directed and Undirected graphs, connected graphs, regular and bipartite graphs, Eulerian chains and cycles. Hamiltonian chains and cycles, planar graphs,	September	Diagrams, ppt and problem solving technique, Books,LMS
Graph Theory: Trees and rooted tree, Spanning trees, Chromatic number Connectivity and other graphical parameter application Combinatorial Mathematics: Basic counting principles Permutations and combinations, Recurrence relations, generating Function, Application.	September	Group teaching, Practice method and Diagrams, Notes
Rings: Rings Subrings morphism of rings ideals and quotient rings. Euclidean domains Integral domains and fields	October	Lecture method, analytical approach and Expeditionary Learning
Boolean algebra: Boolean Algebra direct product morphisms Application of Boolean algebra in logic circuits and switching functions.	October	Participative learning through quiz ,

Course outcome

CO.1	At the end of the Semester, Students are able to solve problems of set theory theoretically and practically .
CO2.	Students are able to understand a function and difference between relation and function. Students are able to explain all types of function, to check whether the function is a bijection or not.
CO.3	Students are able to find different types of circuits, paths, to find the shortest path and minimum Spanning tree and understand the applications of Graphs.
CO.4	Students are able to find all the possible combination while selecting a particular combination , to calculate total combinations and arrangements in various problems.
CO.5	Students are able to general solution and particular solutions of different recurrence relation equations and to find their generating functions too.
CO.6	Students are able to understand rings, subrings, quotient rings, ideals to differentiate between integral domain and fields.
CO.7	Students are able to apply Boolean algebra to solve real life problems, to apply to solve the problems of computer science.

