



**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
Even Semester
CLASS: B.Sc. (Eco, Non Med)/ B.A. Sem II
SUBJECT: Advanced Calculus
Faculty Name: Mrs. Shveta Mahajan.

TOPIC	DURATION	TEACHING TOOLS
Derivatives of Hyperbolic and Inverse Hyperbolic functions, Integration of hyperbolic functions, Concavity and Convexity of function, Point of inflexion, Asymptotes, Horizontal Asymptotes, Vertical Asymptotes, Oblique Asymptotes, Asymptotes of general Rational Algebraic Curve with illustrations, Intersection of curve and its Asymptotes,	January	Participative learning through checking students' previous knowledge
nth order derivatives, Leibnitz theorem on nth derivative and its applications, Indeterminate forms and L'Hospital rule, Application of Taylor's theorem in error estimation; Taylor's series expansions of $\sin x$, $\cos x$, e^x , $\log x$ etc. de Moivre's theorem (for integer and Rational index) and its applications, primitive nth roots of unity	February	- Learning through Problem solving - analytical learning
Properties of definite integral, Reduction formulae of type $\int \tan^n x dx$, $\int \cot^n x dx$, $\int \sec^n x dx$, $\int \operatorname{cosec}^n x dx$, $\int x \cos^n x dx$, $\int \cos^m x \sin nx dx$ Reduction formulae using Rule of Smaller index +1 of type $\int_0^{\pi/2} \cos^n x dx$, $\int_0^{\pi/2} \cos^n x dx$, $\int_0^{\pi/2} \cos^m x \sin^n x dx$. Reduction in the real field. Classification of real quadratic forms in n variables. Definite, semi-definite and indefinite real quadratic forms.	March	Participative learning through quiz
Real number system and its order properties: lub, glb of sets of real numbers, Completeness property, Archimedean property, Dense property of Rational numbers, Limit of a function of real variable, Properties of Limits, Squeeze Theorem, Continuous function and classification of discontinuities, Differentiability of a function of real variable	April	Interactive learning through encouraging students to explain their reasoning

Course Outcomes:

CO.1	At the end of the Semester, Students are able to demonstrate Asymptotes, points of inflexion, multiple points on a curve & also to differentiate between concavity and convexity & hence tracing of curve.
CO.2	Students are able to apply reduction formula on different functions & to develop the concept of variation of parameter.
CO.3	At the end of the Semester, Students are able to understand real number system, lub& glb of set of real numbers, limit of a function, basic properties of limit
CO.4	Students are able to analyse continuous and discontinuous function, Apply concept of continuity in uniform continuity.
CO.5	Students are able to solve problems related to successive differentiation, Leibnitz theorem, Taylor's & Maclaurin's theorem with various forms of remainders and to use these expansion to compute values of Sine, Cosine, tangent or log function.
CO.6	Students are able to understand the concept of De Moivre's theorem & its applications. Identify circular, hyperbolic function and their inverses.

Teaching Plan
Session 2025-26
Even Semester
CLASS: B.Sc. (Eco, Non-Med)/ B.A. Sem II
SUBJECT: Calculus Laboratory
Faculty Name: Mrs. Shveta Mahajan.

TOPIC	DURATION	TEACHING TOOLS
Plotting graphs of elementary functions $ax+b$, $\sin(bx+c)$, $\log(ax+b)$, $1/(ax+b)$, $\sin(ax+b)$, $\cos(ax+b)$, $ ax+b $ and to illustrate the effect of a and b on the graphs.	January	Hands on practice using MATLAB software
Plotting the graphs of the polynomial of degree 4 and 5, the derivative graph, the second derivative graph, Tracing of conics in Cartesian coordinates and using the general equation of second degree in x and y.	February	Hands on practice using MATLAB software
Tracing of conicoids: Ellipsoid, Hyperbolic paraboloid, Elliptic paraboloid, Hyperboloid of one and two sheets etc., Graphs of hyperbolic functions.	March	Hands on practice using MATLAB software
Approximation of limit. Approximations of derivatives.	April	Hands on practice using MATLAB software

Course Outcomes:

At the end of the Semester, Students are able to plot the given graphs using MATLAB software
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Teaching Plan
Session 2025-26
Even Semester
CLASS: - B.Sc. (Eco, Non Med, C.Sc.)/ B.A. B.Ed Sem IV

SUBJECT: - Analysis

Faculty Name: Mrs. Shveta Mahajan

TOPIC	DURATION	TEACHING TOOLS
Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequences. Cauchy's convergence criterion.	January	• Learning through Problem solving, analytical learning • Learning through Flipped Classroom.
Series of non-negative terms. Comparison tests. Cauchy's integral test. Ratio test. Cauchy's root test. Logarithmic test. Cauchy condensation test, Gauss test, Alternating series. Leibnitz's test. Absolute and conditional convergence.	February	• Group teaching • learning through problem-solving • Expeditionary Learning
Partitions, Upper and lower sums. Upper and lower integrals, Riemann integrability. Conditions of existence of Riemann integrability of continuous functions and of monotone functions. Algebra of integrable functions.	March	• Learning through Problem solving • analytical learning
Improper integrals and statements of their conditions of existence. Test of the convergence of improper integral,	April	• Interactive learning through encouraging students to explain their reasoning

Course Outcomes:

CO.1	At the end of the Semester, Students are able to demonstrate an understanding of limits and how they are used in sequences and series.
CO.2	Students are able to distinguish between the absolute convergence and conditional convergence.
CO.3	Students are able to know and describe the converging behavior of improper integrals.
CO.4	Students are able to find the convergence of series using different tests..

Teaching Plan
Session 2025-26
Even Semester
CLASS: B.Sc. (Eco, Non Med)/ B.A. Sem IV
SUBJECT: ANALYSIS LABORATORY
Faculty Name: Mrs. Shveta Mahajan.

TOPIC	DURATION	TEACHING TOOLS
Generate bounded sequences. Visualize bounded sequences using plots.	January	Hands on practice using MATLAB software
Study the convergence of sequences through plotting. Visualize monotonic sequences using plots.	February	Hands on practice using MATLAB software
Investigate convergence of series. Visualization of convergence tests: Cauchy Root test and D' Alembert Ratio test.	March	Hands on practice using MATLAB software
Approximating radius of convergence of a power series.	April	Hands on practice using MATLAB software

Course Outcomes:

At the end of the Semester, Students are able to plot the given graphs using MATLAB software
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Teaching Plan
Session 2025-26
Even Semester
CLASS: B.Sc. (Non Med,Eco, C.Sci)/ B.A. B.Ed. Sem VI
SUBJECT: Linear Algebra
Faculty Name: Mrs. Shveta Mahajan.

TOPIC	DURATION	TEACHING TOOLS
Definition of groups, rings and fields with examples. Definition of a vector space, subspaces with examples.	January	Participative learning using practical examples from real life
Direct sum of subspaces. Linear span, Linear dependence, Linear independence of vectors. Linear combination of vectors. Basis of a vector space.	February	- Group teaching - learning through problem-solving - Expeditionary Learning
Finitely generated vector spaces. Existence theorem for basis. Invariance of the number of elements of the basis set. Dimension of sum of two subspaces. Quotient space and its dimension	March	Participative learning using practical examples from real life
Linear transformation. Algebra of linear transformation. Rank- Nullity theorem, Isomorphism and Isomorphic spaces. Finitely generated vector spaces. Existence theorem for basis.	April	Participative learning through quiz and assignments

Course Outcomes:

CO.1	At the end of the Semester, Students are able to express the algebraic concepts such as binary operation, groups, rings and fields.
CO.2	Students are able to define a vector space and subspace of a vector space.
CO.3	Students are able to check the linear dependence and linear independence of vectors.
CO.4	Students are able to describe the concepts of basis and dimension of vector spaces.
CO.5	Students are able to investigate properties of vector spaces and subspaces using linear transformation.
CO.6	Students are able to perform algebra operations between linear transformations.
CO.7	Students are able to find the matrix representing a linear transformation.

Teaching Plan**Session 2025-26****Even Semester****CLASS: B.Sc. (Non Med,Eco, C.Sci)/ B.A. B.Ed. Sem VI****SUBJECT: Numerical Analysis****Faculty Name: Mrs. Sonia Sharma.**

TOPIC	DURATION	TEACHING TOOLS
Error generation, propagation, error estimation and error bounds, Solution of non-linear equations, Bisection method, Iteration method, Newton's Method, Generalized Newton's Method, Method of false position,	January	• Calculator • Practice Method • Iterations • Geometric understanding
Muller's method, Rate of convergence of these methods. Solution of linear system of equation; Direct method, Gauss elimination variant (Gauss Jordan and Crout reduction), Triangular Method, Iterative Method, Jacobi's Method, Gauss Seidel Method. Finite Differences: Forward, Backward, Central, Divided differences, shift operator, relationship between the operators and detection of errors by use of difference operator	February	• Step by step understanding and calculation • Visualization
Interpolation with divided difference, Newton's formula, Lagrangian Method, Finite difference interpolation, Gauss formula, Stirling formula, Bessel's formula, Error Estimation, Extrapolation. Numerical differentiation, Method based on interpolation. Numerical Integration, Trapezoidal rule, Simpson's rule, Weddle rule, Romberg Integration	March	• Participative learning thorough finding numerical Solutions
Gaussian integration method, Gaussian legendre integration. Double numerical integration. Numerical solution of ordinary differential equations, Initial value problem, Taylor's method, Euler's methods, Picard's method, Milne's Method, Runge-Kutta Method. Predictor- Corrector's Method	April	• Participative learning through solving big calculations.

Course outcome

CO.1	At the end of the Semester, Students are able to perform computation for solving a system of equations.
CO.2	Students are able to know how to find the roots of transcendental equations.
CO.3	Students are able to learn how to interpolate the given set of values.
CO.4	Students are able to understand the curve fitting for various polynomials.
CO.5	Students are able to learn numerical solution of differential equations.
CO.6	Students are able to compute numerical integration and differentiation, numerical solution of ordinary differential equations.

Teaching Plan
Session 2025-26
Even Semester
CLASS: B.A.B.Ed. Sem VI
SUBJECT: Pedagogy of Mathematics
Faculty Name: Sonia Sharma

TOPIC	DURATION	TEACHING TOOLS
Meaning and Nature of Mathematics – Science of logical reasoning, Mathematical language and Symbolism	January	• Explanation method
Pure and Applied Mathematics (axioms, Postulates, Patterns and language of Mathematics) Scope and significance of Mathematics in present day curriculum. Integration of Mathematics with other subjects(physical science, Economics, Bio Science and Fine Arts). Aims of teaching Mathematics	February	• Practical approach • Assignment
Objectives of teaching Mathematics at different stages of School (Middle level-6 th , 7 th ,8 th , Secondary level- 9 th ,10 th , Senior secondary level - +1,+2) w.r.t. Blooms Taxonomy of educational objectives.	March	• Group work
Values of teaching Mathematics. Management of math in small group and in large group based on behaviorism , cognitivism and constructivism learning theories.	April	• Analytical approach

Course outcome

CO.1	At the end of the Semester, Students are able to understand the nature of Mathematics.
CO.2	Students are able to appreciate the contribution of famous Mathematicians in mathematics.
CO.3	Students are able to understand Aims and objectives of teaching of Mathematics.
CO.4	Students are able to understand the value of Mathematics and it's relation with other school Subjects.
CO.5	Students are able to understand learning theories and their application in mathematics education.
CO.6	Students are able to improve their competencies in secondary level mathematics.

Teaching Plan
Session 2025-26
Even Semester

CLASS: B. Sc.(Economics/Non Medical) Sem II
SUBJECT: Statistical Analysis Using Excel (Theory)

Faculty Name: Sonia Sharma

TOPIC	DURATION	TEACHING TOOLS
Introduction to Statistics, function of statistics, collection of data, presentation of data, tabulation of data, charting of data, introduction to excel/SPSS, graph in Excel, measures of central tendency, mean, median- meaning and computation, mode-meaning and computation, weighted, average mean	January	• Calculation method • MS Excel
Geometric mean and harmonic mean. Measures of dispersion, types of dispersion- range, quartile deviation, mean deviation, standard deviation, co-efficient of variation.	February	• Group method • calculation • Ms Excel
Skewness-Karl Pearson co- efficient of skewness, Bowley's co-efficient of skewness and Kurtosis. Correlation, Types of correlation, positive, negative, linear, methods of correlation -Karl Pearson's Co-efficient, rank correlation coefficient.	March	• Practice Method • calculation method • Ms Excel
Regression analyses: Linear Regression, regression Y on X, regression X on Y, Regression Co- efficient, Relation between regression coefficients and correlation. Difference between regression and Correlation, Calculation of these of these using MS Excel.	April	• Ms Excel • Numerical calculation

Course outcome

CO.1	At the end of the Semester, Students are able to understand terms of excel.
CO.2	Students are able to understand the functions of statistics.
CO.3	Students are able to learn how to interpolate the given data.
CO.4	Students are able to understand use excel formula to find Mean , median , mode etc.
CO.5	Students are able to calculate measures of dispersion numerically as well as using excel formula.
CO.6	Students are able to calculate Skewness, Correlation, Regression their coefficients numerically as well as using excel.

Teaching Plan
Session 2025-26
Even Semester

CLASS: B. Sc.(Economics/Non Medical) Sem II
SUBJECT: Statistical Analysis Using Excel (Practical)
Faculty Name: Mrs. Sonia Sharma

TOPIC	DURATION	TEACHING TOOLS
1. Introduction of basics of excel and functions such as ‘sum’, ‘countif’, ‘max’, ‘min’, ‘sort’ etc. 2. To prepare result from the data on marks and number of credits in a given number of courses of a class based on total marks, marks obtained, percentage of marks obtained, grades, and determine SGPA for each students. 3. Create frequency distribution table, plot histogram, bar chart, pie chart, etc.	January	• Practical approach • MS Excel
4. Plotting two dimensional graphs, 5. To find measures of central tendency for a given data.	February	• Ms Excel • test
6. To find measures of dispersion for a given data. 7. To find measures of skewness and Kurtosis for a given data. 8. To find Karl Pearson Co- efficient of correlation and rank correlation coefficient for a given data. 9. To find regression coefficient for bivariate data and plotting regression lines.	March	• Practice Method • Calculation • Ms Excel
Revision	April	• Ms Excel • Practical test

Course outcome

CO.1	At the end of the Semester, Students are able to understand terms of excel.
CO.2	Students are able to understand the functions of statistics.
CO.3	Students are able to learn how to interpolate the given data.
CO.4	Students are able to understand use excel formula to find Mean , median , mode etc.
CO.5	Students are able to calculate measures of dispersion numerically as well as using excel formula.
CO.6	Students are able to calculate Skewness, Correlation, Regression their coefficients numerically as well as using excel.