

# Sri Adichunchanagiri First Grade College Channarayapatna

## DEPARTMENT OF MATHEMATICS

LESSON PLAN FOR THE ACADEMIC YEAR 2023-24

Programme: B.Sc (NEP)

Course/Paper Name: Algebra-I and calculus-I

Semester:I

Total Hours:60

Sl. No.	Theory	Methodology/pedagogy	Month and Year
1	Unit-I: Matrix: Recapitulation of Symmetric and Skew Symmetric matrices, Algebra of Matrices; Row and column reduction to Echelon form. Rank of a matrix; Inverse of a matrix by elementary operations; Solution of system of linear equations; Criteria for existence of non-trivial solutions of homogeneous system of linear equations. Solution of non-homogeneous system of linear equations. Cayley- Hamilton theorem, inverse of matrices by Cayley-Hamilton theorem (Without Proof).	PPT Slides and white Board	3 <sup>rd</sup> and 4 <sup>th</sup> week of September 2023

2.	Unit-II: Theory of equations: Euclid's algorithm, Polynomials with integral coefficients, Remainder theorem, Factor theorem, Fundamental theorem of algebra (statement only), Irrational and complex roots occurring in conjugate pairs, Relation between roots and coefficients of a polynomial equation, Symmetric functions, Transformation, Reciprocal equations, Descartes' rule of signs, Multiple roots, Solving cubic equations by Cardon's method, Solving quadratic equations by Descarte's Method.	PPT Slides and white Board	1 <sup>st</sup> and 2 <sup>nd</sup> week of October 2023
3	Unit-III: Polar Co-ordinates: Polar coordinates, angle between the radius vector and tangent. Angle of intersection of two curves (polar forms), length of perpendicular from pole to the tangent, pedal equations. Derivative of an arc in Cartesian, parametric and polar forms, curvature of plane curve-radius of curvature formula in Cartesian, parametric and polar and pedal forms- center of curvature, circle of curvature.	PPT Slides and white Board	2 <sup>nd</sup> and 3 <sup>rd</sup> week of November 2023
4	Unit-IV: Successive Differentiation and Integral Calculus-I: nth Derivatives of Standard functions Leibnitz theorem and its applications. Recapitulation of definite integrals and its properties. Reduction formula with definite limits.	Seminar and White Board	1 <sup>st</sup> and 2 <sup>nd</sup> week of December 2023

**Course/Paper Name: Algebra-II and calculus-II**  
**Semester:II** **Total Hours:60**

<b>Sl. No.</b>	<b>Theory</b>	<b>Methodology/pedagogy</b>	<b>Month and Year</b>
1	Unit-I: Number Theory: Division Algorithm, Divisibility, Prime and composite numbers, Euclidean algorithm, Fundamental theorem of Arithmetic, The greatest common divisor and least common multiple. Congruences, Linear congruences. Simultaneous congruences, Euler's Phi-function. Wilson's, Euler's and Fermat's Theorems and their applications.	PPT Slides and white Board	1 <sup>st</sup> and 2 <sup>nd</sup> week of March 2024
2.	Unit-II: Differential Calculus-I: Limits, Continuity, Differentiability and properties. Properties of continuous functions. Intermediate value theorem, Rolle's Theorem, Lagrange's Mean Value theorem, Cauchy's Mean value theorem and examples. Taylor's theorem, Maclaurin's series, Indeterminate forms and evaluation of limits using L'Hospital rule.	PPT Slides and white Board	3 <sup>rd</sup> and 4 <sup>th</sup> week of March 2024

3	<p>Unit-III: Partial Derivatives: Functions of two or more variables-explicit and implicit functions, partial derivatives.</p> <p>Homogeneous functions- Euler's theorem and extension of Euler's theorem, total derivatives, differentiation of implicit and composite functions, Jacobians and standard properties and illustrative examples. Taylor's and Maclaurin's series for functions of two variables, Maxima-Minima of functions of to variables.</p>	PPT Slides and white Board	2 <sup>nd</sup> and 3 <sup>rd</sup> week of April 2024
4	<p>Unit-IV: Integral Calculus-II: Line integral: Definition of line integral and basic properties, examples on evaluation of line integrals. Double integral: Definition of Double integrals and its conversion to iterated integrals. Evaluation of double integrals by changing the order of integration and change of variables. Computation of plane surface areas using double integrals. Triple integral: Definition of triple integrals and evaluation-change of variables, volume as triple integral.</p>	Seminar and White Board	2 <sup>nd</sup> and 3 <sup>rd</sup> week of May 2024

**Course/Paper Name: Real Analysis-I and Complex Analysis**  
**Semester:V** **Total Hours:60**

Sl. No.	Theory	Methodology/pedagogy	Month and Year
1	Unit I : Rings and Fields Rings – definition and properties of rings- integral Domains- Fields-theorems and problems, Subrings- Criterion for sub rings- theorems and problems on sub Rings, Ideals -Algebra of Ideals-theorems- Principal Ideals – examples and standard properties following the Definition, Divisibility in an integral domain- theorems And problems, Units and Associates- theorems and Problems. Quotient rings- examples and theorems- The Field of quotients- theorems and problems.	PPT Slides and white Board	3 <sup>rd</sup> and 4 <sup>th</sup> week of September 2023
2.	Unit II : Polynomial rings and Homomorphism Homomorphism – Definitions and example, Kernel of a Homomorphism- examples and related Theorems. Isomorphism of a ring- examples and related Theorems. Automorphism- problems.Fundamental Theorem of Homomorphism of Rings,Prime and Maximal idealsin a commutative Ring – definition and examples. Polynomials over rings and fields (some standard properties),division algorithm (proof and problems), Greatest common divisor - Euclidian algorithm Problems): reducible and irreducible polynomials Eisenstein’s criteria for reducibility – problems; Rational roots of a polynomial – Test – problems;Over Problems):	PPT Slides and white Board	1 <sup>st</sup> and 2 <sup>nd</sup> week of October 2023

3	<p>Unit-III: Complex integration  Complex integration- definition, Line integral, Properties and problems.  Cauchy's Integral Theorem- proof using Green's theorem- direct Consequences.  Cauchy's Integral formula with Proof- Cauchy's generalized formula for the derivatives With proof and applications for Evaluation of simple line integrals.  Cauchy's Inequality- Proof, Livouville's theorem- Proof.</p>	PPT Slides and white Board	2 <sup>nd</sup> and 3 <sup>rd</sup> week of November 2023
4	<p>Unit-IV: Transtormations  Delinition, Jacobian of a transformation- Identity Transformation- Reflection- Translation- Rotation And Magnification- Inversion- Inverse points- Linear Transformation- Definitions- Bilinear Transtormations- Cross- ratio of four points- Cross-ratio Preserving property- Preservation of the Family of straight lines and circles- Conformal Mappings-Etc.</p>	Seminar and White Board	1 <sup>st</sup> and 2 <sup>nd</sup> week of December 2023