Name of Teacher: AJAY KUMAR Class: BSC/B.A. 1st Year/ 1st Semester

Paper: Algebra Session: 2023-2024

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| Sr.No. | Months | Weeks | Topics |
| 1 | July | 3rd Week Last Week | 1. Symmetric, Skew symmetric, Hermitian and skew Hermitian matrices.
2. Elementary Operations on Matrices. Rank of matrices, Inverse of a matrix.
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| 2. | August | 1st Week 2nd Week3rd Week Last Week | 1. Linear dependence and independence of rows and columns of matrices. Row rank and column rank of a matrix.
2. Eigenvalues, Eigenvectors and the characteristic equation of a matrix. Minimal polynomial of a matrix.
3. Cayley Hamilton Theorem and its use in finding the inverse of a matrix.
4. Applications of matrices to a system of linear (homogeneous and non– homogeneous) equations. Theorems on consistency of a system of linear equations.
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| 3. | September | 1st Week 2nd Week3rd Week Last Week | 1. Unitary and Orthogonal Matrices, Bilinear and Quadratic forms.
2. Canonical Form of a bilinear form. Matrix notation of Bilinear and Quadratic Form
3. Linear Transformation of a Quadratic form. Lagrange’s method of Diagonalization.
4. Factorable Quadratic Form. Sylvester’s Criterion
 |
| 4. | October | 1st Week2nd Week3rd Week Last Week | 1. Relations between roots and coefficients of general polynomial equation in one variable. Synthetic Division.
2. Remainder Theorem and factor Theorem. Solutions of polynomial equations having conditions on roots.
3. Common roots and multiple roots. Transformation of equations and test.
4. Nature of the roots of an equation, Solutions of cubic equations (Cardan’s Method)
 |
| 5. | November | 1st Week2nd Week3rd Week Last Week |  1. Solution of Biquadratic equations (Descarte’s Method, Ferrari’s Method) 2. Descarte’s rule of signs for Polynomial. Location of roots in an interval.3.Revision4.Revision |

Incharge

Name of Teacher: AJAY KUMAR Class: BSC/B.A. 1st Year /1st Semester

Paper: Calculus Session: 2023-2024

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| Sr.No. | Months | Weeks | Topics |
| 1 | July | 3rd Week Last Week | 1. $ϵ-δ$ Definitions of continuity of a function. Basic properties of limits,
2. continuous functions and classification of discontinuities.
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| 2. | August | 1st Week 2nd Week3rd Week Last Week | 1. Successive differentiation, Leibnitz Theorem. Maclaurin and Taylor series expansions.
2. Asymptotes in Cartesian coordinates, intersection of curve and its asymptotes, Asymptotes in polar coordinates.
3. Curvature, radius of curvature for Cartesian curve, parametric curves, polar curves.
4. Revision of syllabus covered in first three weeks and test
 |
| 3. | September | 1st Week 2nd Week3rd Week Last Week | 1. Newton’s Method. Radius of curvature for pedal curves. Tangential polar equations. Centre of curvature Circle of curvature. Chord of curvature, Evolutes.
2. Test for concavity and convexity. Singular points. Points of inflexion. Multiple points. Cusps, nodes & conjugate points. Species of cusps
3. Tracing of curves in Cartesian, parametric and polar co-ordinates.

4. Revision of syllabus covered in first three weeks |
| 4. | October | 1st Week2nd Week3rd Week Last Week | 1. Reduction formulae. Derivation of reduction formulae by connecting with other integral.
2. Rectification, length of curves in Cartesian, parametric and polar curves.Common roots and multiple roots. Transformation of equations and test.
3. Intrinsic equations of curves from Cartesian, parametric and polar curves.
4. Quadrature and Sectorial Area.
 |
| 5. | November | 1st Week2nd Week3rd Week Last Week | 1. Area bounded by closed curves. Area enclosed by curves in polar form. Volumes and Area of solids of revolution.

 2. Volume bounded between two solids. Volume formula for parametric curves. Theorems of Pappu’s and Guilden and revision3.Revision4.Revision |

 Incharge

Name of Teacher: AJAY KUMAR Class: BSC/B.A. 2nd Year/ 3rd Semester

Paper: Advance Calculus Session: 2023-2024

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| Sr.No. | Months | Weeks | Topics |
| 1 | July | 3rd Week Last Week | 1. Continuity, Sequential Continuity, properties of continuous functions.
2. Uniform continuity, chain rule of differentiability,
 |
| 2. | August | 1st Week 2nd Week3rd Week Last Week | 1. Lagrange’s mean value theorem and their geometrical interpretation.
2. Taylor’s Theorem with various forms of remainders
3. Darboux intermediate value theorem for derivatives.
4. Revision of syllabus covered in first three weeks
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| 3. | September | 1st Week 2nd Week3rd Week Last Week | 1. Indeterminate forms, Limit and continuity of real valued functions of two variables.
2. Partial differentiation,Total Differentials
3. Composite functions & implicit functions.
4. Change of variables. Homogenous functions & Euler’s theorem on homogeneous functions.
 |
| 4. | October | 1st Week2nd Week3rd Week Last Week | 1. Taylor’s theorem for functions of two variables
2. Differentiability of real valued functions of two variables, Implicit function theorem.
3. Maxima, Minima and saddle point variables Lagrange’s method of multipliers
4. Revision of syllabus covered in first three weeks
 |
| 5. | November | 1st Week2nd Week3rd Week Last Week | 1. Jacobians, Beta,Gama functions2. Double and Triple integrals, Dirichlets integrals, change of order of integration in double integrals3. Revisions4.Revvision |

 Incharge

Name of Teacher: AJAY KUMAR Class: BSC/B.A. 2nd Year/ 3rd Semester

Paper: Numerical Analysis Session: 2023-2024

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| Sr.No. | Months | Weeks | Topics |
| 1 | July | 3rd Week Last Week | 1. Finite Difference operators and their relations, difference table, finding the missing terms and effect of error in a difference tabular values.
2. Interpolation with equal intervals: derivations of Newton’s forward interpolation formulae and their applications, Interpolation with equal intervals: derivations of Newton’s backward interpolation formulae and their applications
 |
| 2. | August | 1st Week 2nd Week3rd Week Last Week | 1. Interpolation with unequal intervals: derivations of Newton’s divided difference & Lagrange’s Interpolation formulae and their applications.
2. Central Difference interpolation formulae: derivations of Gauss’s forward and Gauss’s backward interpolation formulae.
3. Sterling,Bessel formulae and their applications. Numerical Differentiation: Relation between difference operator and derivative operator.
4. Revision of syllabus covered in first three weeks
 |
| 3. | September | 1st Week 2nd Week3rd Week Last Week | 1. Derivative of a function using interpolation formulae (as studied in Sections – I & II). Numerical Integration: Newton-Cote’s Quadrature formula
2. Trapezoidal rule, Simpson’s one- third rule and Simpson’s three-eighth rule, Chebychev formula, Gauss Quadrature formula.
3. Solution of Algebraic and Transcendental equations: Bisection method, Regula-Falsi method, Secant method,
4. Newton-Raphson’s method, Newton’s iterative method for finding pth root of a number. Simultaneous linear algebraic equations: Gauss-elimination method
 |
| 4. | October | 1st Week2nd Week3rd Week Last Week | 1. , Gauss-Jordan method ,Triangularization method (LU decomposition method). Iterative method
2. Jacobi’s method, Gauss-Seidal’s method, Relaxation method
3. Eigen Value Problems: Power method, Jacobi’s method.

4. Given’s method, House-Holder’s method. Numerical solution of ordinary differential equations: Single step methods |
| 5. | November | 1st Week2nd Week3rd Week Last Week | 1. Picard’s method.Taylor’s series method, Euler’s method, 2. Modified Euler’s method, Runge-Kutta Methods. Multiple step methods; 3. Predictorcorrector method, Milne-Simpson’s method and revision4. Revision |

 Incharge

**Lesson Plan**

Name of Teacher: AJAY KUMAR Class: BSc/B.A. 3rd Year/Semester 5th

Paper: Groups and Rings Session: 2023-2024

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| Sr.No. | Months | Weeks | Topics |
| 1. | July | 3rd Week Last Week | 1. Definition of a group. Examples of abelian and non abelian groups.
2. The group 𝑍𝑛 of integers under addition modulo 𝑛 and the group of (𝑛) of units under multiplication modulo 𝑛, Generator of a group, Cyclic groups.

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| 2. | August | 1st Week 2nd Week3rd Week Last Week | 1. Permutations groups, Alternating groups, Cayley’s theorem.
2. Subgroups, Subgroup criteria, cosets, Left and right cosets, properties of cosets.Index of a sub-group, coset decomposition, Lagrange’s theorem on groups and its consequences.
3. Normal subgroups, Quotient groups,
4. Homomorphisms, isomorphisms, automorphisms on group.
 |
| 3. | September | 1st Week 2nd Week3rd Week Last Week | 1. Center of a group and class equation of a group and derived group of a group.
2. Introduction to Rings, subrings.
3. Integral domains and Fields, Characteristics of a ring.Ring homomorphisms.
4. Theorems on Ring homomorphisms,Ideals (Principle, Prime and Maximal).
 |
| 4. | October | 1st Week2nd Week3rd Week Last Week | 1. Quotient rings, Field of quotients of an integral domain.
2. Euclidean rings, Polynomial rings, Polynomials over the rational field.
3. The Eisenstein’s criterion of irreducibility of polynomials over the field of rational numbers.
4. Revision of syllabus covered in first three week and test
 |
| 5. | November | 1st Week2nd Week3rd WeekLast Week | 1. Polynomial rings over commutative rings.
2. Principal ideal domain, unique factorization domain
3. Revision
4. Revision
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 Incharge

**Lesson Plan**

Name of Teacher: AJAY KUMAR Class: B.A./B.Sc.3rd Year/5th Sem

Paper: Sequence and Series Session: 2023-2024

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| Sr.No. | Months | Weeks | Topics |
| 1. | July | 3rd Week andLast Week  | 1. Boundedness of the set of real numbers; least upper bound, greatest lower bound of a set
2. Neighborhoods, interior points, isolated points, limit points, Open sets, closed set, interior of a set, closure of a set in real numbers and their properties
 |
| 2. | August | 1st Week 2nd Week 3rd Week Last Week  | 1. Sequence: Real sequences and their convergence, theorem on limits of sequence, bounded and monotonic sequences.
2. Cauchy’s sequence, Cauchy general principle of convergence, subsequences, subs sequential limits.
3. Infinite series: Convergence and divergence of Infinite Series, Comparison Tests of positive terms Infinite series ,Cauchy’s general principle of Convergence of series
4. Revision of syllabus covered in first three weeks September month and test
 |
| 3. | September | 1st Week 2nd Week 3rd Week Last Week | 1. Convergence and divergence of geometric series, Hyper Harmonic series or p-series. D-Alembert’s ratio test.
2. Fourier’s series: Fourier expansion of piecewise monotonic functions, Properties of Fourier Coefficients, Dirichlet’s conditions.
3. Parseval’s identity for Fourier series, Fourier series for even and odd functions, Half range series,
4. Revision of syllabus covered in first three weeks of September month.
 |
| 4. | October | 1st Week  2ndWeek 3rd Week  Last Week  | 1. Change of Intervals. Riemann integral: Definition and examples
2. Darboux’s Theorem and condition of existence of Riemann’s integral.
3. Integrabililty of continuous, monotonic functions and discontinuous functions
4. Revision of syllabus covered in first three weeks of October month.
 |
| 5. | November  | 1st Week  2ndWeek 3rd Week Last Week | 1. Properties of integrable functions. Continuity and differentiability of integrable functions .
2. Primitive. The Fundamental theorem of integral calculus, Mean value theorems of integral calculus
3. Revision
4. Revision
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 Incharge

**Lesson Plan**

Name of Teacher: AJAY KUMAR Class: B.A./B.Sc. 3rd Year/Semester 5th

Paper: Number Theory & Trigonometry Session: 2023-2024

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| Sr.No. | Months | Weeks | Topics |
| 1. | July | 3rd Week Last Week | 1. Linear Diophantine equation, prime counting function, Statement of prime number theorem, Goldbach conjecture
2. linear congruences, complete set of residues,

 Chinese remainder theorem |
| 1. | August |  | 1. The Fermat’s little theorem, Wilson’s theorem, Number, theoretic functions
2. Sum and number of divisors, totally multiplicative functions.
3. Möbius inversion formula, the greatest integer function.
4. Revision of syllabus covered in first three weeks and test.
 |
| 2. | September | 1st Week 2ndWeek 3rd Week Last Week  | 1. Euler’s phi-function, Euler’s theorem, reduced set of residues, some properties of Euler’s phi-function.
2. Order of an integer modulo n, primitive roots for primes, Composite numbers having primitive roots
3. Euler’s criterion, the Legendre symbol and its properties, Quadratic reciprocity, quadratic congruences with composite moduli.
4. Revision of syllabus covered in first three weeks
 |
| 3. | October | 1st Week 2ndWeek 3rd Week Last Week  | 1. Exponential, Logarithmic,
2. Circular functions; sin(nx), cos(nx), tan(nx).
3. Circular functions; sinn x , cosn x, tann x.
4. Hyperbolic and inverse hyperbolic functions - simple problems
 |
| 4. | November  | 1st Week 2ndWeek 3rd Week Last Week  | 1. Gregory’s series,
2. Summation of Trigonometric series,
3. Trigonometric expansions of sine and cosine as infinite products (without proof )
4. Revision
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 Incharge

**Lesson Plan**

Name of Teacher: AJAY KUMAR Class: B.Com. 1st Year/Semester 1st Paper: Business Mathematics Session: 2022-2023

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| Sr.No. | Months | Weeks | Topics |
| 1. | July | 3rd weekLast week | 1. Matrices and Determinants: Concept of matrix, types, and Algebra of matrices;
2. Properties of determinants; calculation of values of determinants;
 |
| 1. | August | 1st Week 2ndWeek &3rd Week Last Week  | 1. Adjoint of a matrix, Elementary row and column operations;
2. Finding inverse of a matrix through adjoint and elementary row and column operations;
3. Solution of a system of linear equations having unique solution and involving not more than three variables;
 |
| 3. | September | 1st Week & 2ndWeek 3rd Week & Last Week  | 1. Linear inequalities: graphical solution of linear equalities in two variables,
2. Linear programming-formulation of equation: graphical method of solution. solution of system of linear inequalities in two variables
 |
| 4. | October | 1st Week & 2ndWeek 3rd Week & Last Week  | 1. Linear programming-formulation of equation: graphical method of solution.
2. Pproblem relating to two variables including the case of mixed constraints; cases having no solution, multiple solutions, unbounded solution and redundant constraints;
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| 4. | November  | 1st Week 2ndWeek 3rd Week Last Week  | 1. Logarithms and Anti-logarithms;
2. Permutations;
3. Combinations.
4. Revision
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