**Lesson Plan**

Name of Teacher: Dr. Vinod Gill Class: B.A. 1st Year/Semester 1st

Paper: Algebra Session: 2020-2021

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

Signature

**Lesson Plan**

Name of Teacher: Richa Kumari Class: B.A. 1st Year/Semester 1st

Paper: Calculus Session: 2020-2021

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| Sr.No. | Months | Weeks | Topics |
| 1. | November | 1st Week  2nd Week  3rd Week  Last Week | 1. Definitions of continuity of a function. Basic properties of limits, continuous functions and classification of discontinuities. 2. Successive differentiation, Lebnitz Theorem. Maclaurin and Taylor series expansions. 3. Asymptotes in Cartesian coordinates, intersection of curve and its asymptotes, Asymptotes in polar coordinates. 4. Curvature , radius of curvature for Cartesian curve, parametric curves, polar curves. |
| 3. | December | 1st Week    2nd Week  3rd 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. Reduction formulae. Derivation of reduction formulae by connecting with other integral. |
| 4. | January | 1st Week  2nd Week  3rd Week  Last Week | 1. Rectification, length of curves in Cartesian, parametric and polar curves. 2. Intrinsic equations of curves from cartesian, parametric and polar curves. 3. Quadrature and Sectorial Area. 4. Area bounded by closed curves. Area enclosed by curves in polar form. |
| 5. | February | 1st Week  2nd Week | 1. Volumes and Area of solids of revolution. Volume bounded between two solids. Volume formula for parametric curves. Theorems of Pappu’s and Guilden. 2. Revision |

Signature

**Lesson Plan**

Name of Teacher: Mrs. Richa Kumari Class: B.A. 2nd Year/Semester 3th

Paper: Advanced Calculus Session: 2020-2021

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

Signature

**Lesson Plan**

Name of Teacher: Dr. Vinod Gill Class: B.A. 2nd Year/Semester 3rd

Paper: Numerical Analysis Session: 2020-2021

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| Sr.No. | Months | Weeks | Topics |
| 1. | August | 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. | September | 1st Week  2nd Week  3rd Week  Last Week | 1. Interpolation with equal intervals: derivations of Newton’s forward interpolation formulae and their applications. 2. Interpolation with equal intervals: derivations of Newton’s backward interpolation formulae and their applications. 3. Interpolation with unequal intervals: derivations of Newton’s divided difference & Lagrange’s Interpolation formulae and their applications. 4. Central Difference interpolation formulae: derivations of Gauss’s forward and Gauss’s backward interpolation formulae. |
| 3. | October | 1st Week  2nd Week  3rd Week  Last Week | 1. Sterling,Bessel formulae and their applications. Numerical Differentiation: Relation between difference operator and derivative operator. 2. Derivative of a function using interpolation formulae (as studied in Sections – I & II). Numerical Integration: Newton-Cote’s Quadrature formula. 3. Trapezoidal rule, Simpson’s one- third rule and Simpson’s three-eighth rule, Chebychev formula, Gauss Quadrature formula. 4. Solution of Algebraic and Transcendental equations: Bisection method, Regula-Falsi method, Secant method, Newton-Raphson’s method, Newton’s iterative method for finding pth root of a number. |
| 4. | November | 1st Week  2nd Week  3rd Week  Last Week | 1. Simultaneous linear algebraic equations: Gauss-elimination method, Gauss-Jordan method, Triangularization method (LU decomposition method). Iterative method. 2. Jacobi’s method, Gauss-Seidal’s method, Relaxation method Eigen Value Problems: Power method, Jacobi’s method. 3. Given’s method, House-Holder’s method. Numerical solution of ordinary differential equations: Single step methods-Picard’s method. 4. Taylor’s series method, Euler’s method, Modified Euler’s method, |
| 5. | December | 1st Week  2nd Week | 1. Runge-Kutta Methods. Multiple step methods; Predictorcorrector method, Milne-Simpson’s method 2. Revision |

Signature

**Lesson Plan**

Name of Teacher: Dr. Vinod Gill Class: B.A. 3rd Year/Semester 5th

Paper: Groups and Rings Session: 2020-2021

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| Sr.No. | Months | Weeks | Topics |
| 1. | August | Last Week | 1. Definition of a group. Examples of abelian and non abelian groups. The group 𝑍𝑛 of integers under addition modulo 𝑛 and the group of (𝑛) of units under multiplication modulo 𝑛. |
| 2. | September | 1st Week  2nd Week  3rd Week  Last Week | 1. Generator of a group. Cyclic groups. Permutations groups. 2. Alternating groups, Cayley’s theorem. Subgroups 3. Subgroup criteria, Cosets, Left and right cosets, properties of cosets. 4. Index of a sub-group, Coset decomposition, Lagrange’s theorem on groups and its consequences. |
| 3. | October | 1st Week    2nd Week  3rd Week  Last Week | 1. Normal subgroups, Quotient groups, Homomorphisms, isomorphisms, automorphisms on group. 2. Center of a group and class equation of a group and derived group of a group. 3. Introduction to Rings, Subrings, Integral domains and Fields. 4. Characteristics of a ring. Ring homomorphisms, Theorems on Ring homomorphisms. |
| 4. | November | 1st Week  2nd Week  3rd Week  Last Week | 1. Ideals (Principle, Prime and Maximal) and Quotient rings 2. Field of quotients of an integral domain 3. Euclidean rings, Polynomial rings, Polynomials over the rational field. 4. The Eisenstein’s criterion of irreducibility of polynomials over the field of rational numbers |
| 5. | December | 1st Week  2nd Week | 1. Polynomial rings over commutative rings. Principal ideal domain, unique factorization domain. 2. Revision |

Signature

**Lesson Plan**

Name of Teacher: Mrs. Richa Kumari Class: B.A. 3rd Year/Semester 5th

Paper: Sequence and Series Session: 2020-2021

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

Signature

**Lesson Plan**

Name of Teacher: Mrs. Richa Kumari Class: B.A. 2nd Year/Semester 3th

Paper: Number Theory & Trigonometry Session: 2020-2021

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| Sr.No. | Months | Weeks | Topics |
| 1. | August | Last Week | 1. Linear Diophantine equation, prime counting function. |
| 2. | September | 1st Week  2nd Week  3rd Week  Last Week | 1. Statement of prime number theorem, Goldbach conjecture,linear congruences, complete set of residues. 2. Chinese remainder theorem, Fermat’s little theorem, Wilson’s theorem. 3. Number theoretic functions, sum and number of divisors, totally multiplicative functions. 4. The Möbius inversion formula, the greatest integer function. |
| 3. | October | 1st Week  2nd Week  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. 4. Quadratic reciprocity,quadratic congruences with composite moduli. |
| 4. | November | 1st Week  2ndWeek  3rd Week Last Week | 1. Exponential, Logarithmic, Circular functions; sin(nx), cos(nx), tan(nx). 2. Circular functions; sinn x , cosn x, tann x. 3. Hyperbolic and inverse hyperbolic functions - simple problems. 4. Gregory’s series, Summation of Trigonometric series, |
| 5. | December | 1st Week  2nd Week | 1. Trigonometric expansions of sine and cosine as infinite products (without proof 2. Revision |

Signature