Lesson Plan for the session 2024-25

Paper: Business Mathematics

Class: B.Com Semester 1st

Teacher name: Saroj Bala

July

Discussion about the basic concepts of the previous class. Set Theory: Representation of sets, equivalent sets, power set, complement of a set.

August

Venn Diagrams: Union and intersection of sets, De-Morgan's laws; Logical statements and truth tables.

September

Logarithms: Laws of operation, log tables; Arithmetic and geometric progression.

October

Matrices and Determinants: Definition of a matrix, order, equality, types of matrices; Operations on matrices: Addition, multiplication and multiplication with a scalar and their simple properties. Determinant of a square matrix (upto 3 x 3 order): Properties of determinants, minors, co-factors and applications of determinants in finding the area of triangle, adjoint and inverse of a square matrix, solutions of a system of linear equations by examples.

November

Compound interest and annuities: Different types of interest rates, types of annuities, present value and amount of an annuity (including the case of continuous compounding), valuation of simple loans and debentures, problems related to sinking funds.

Lesson Plan for the session 2024-25

Paper: Business Mathematics

Class: B.Com Semester 2nd

Teacher name: Saroj Bala

January

Differentiation; derivative of simple functions and other functions (excluding trigonometric functions) having applications in business studies; Maxima and minima of Revenue, Cost, Demand, Production, Profit functions and other functions related to business and commerce.

February

Integration: Definite and indefinite (simple functions excluding trigonometric functions), basic rules of integration, application of integration in commercial and business problems.

March

Binomial Theorem; Permutations and Combinations.

April

Linear Programming: Formulation of linear programming problems (LPP) and their solution by graphical and simplex methods, Applications of linear programming in solving problems related to business and commerce.

Revision and Class Test.

Lesson Plan for the session 2024-25

Subject : Mathematics

Paper: Calculus

Class: B.A/B.Sc Semester 1st

Teacher name: Saroj Bala

July

Discussion about the basic concepts of the previous class.
Definition of limit and continuity of a real valued function, Basic properties of limits.
Practicals.

August

Types of discontinuities, Differentiability of functions, Application of L'Hospital rule to indeterminate forms, Successive differentiation, Leibnitz theorem, Taylor's and Maclaurin's series expansion with different forms of remainder.
Practicals.

September

Asymptotes: Horizontal, vertical and oblique asymptotes for algebraic curves, Asymptotes for polar curves, Intersection of a curve and its asymptotes, Curvature and radius of curvature of curves (Cartesian, parametric, polar & intrinsic forms), Newton's method, Centre of curvature and circle of curvature.
Practicals.

October

Multiple points, Node, Cusp, Conjugate point, Tests for concavity and convexity, Points of inflexion, tracing of curves, Reduction formulae.
Practicals.

November

Rectification, intrinsic equation of a curve, Quadrature, Area bounded by closed curves, Volumes and surfaces of solids of revolution.
Practicals.
Revision and Class Test

Lesson Plan for the session 2024-25

Paper: Algebra and Number Theory

Class: B.A/ B.Sc Semester 2nd

Teacher name: Saroj Bala

January

Symmetric, Skew symmetric, Hermitian and skew Hermitian matrices, Elementary operations on matrices, Rank of a matrix, Inverse of a matrix, Linear dependence and independence of rows and columns of matrix, Row rank and column rank of a matrix, Eigen values, Eigen vectors and characteristic equation of a matrix, Minimal polynomial of a matrix, Cayley-Hamilton theorem and its use in finding the inverse of a matrix, Unitary and orthogonal matrices.
Practicals

February

Relations between the roots and coefficients of general polynomial equation in one variable, Solutions of polynomial equations having conditions on roots, Common roots and multiple roots, Transformation of equations, Nature of the roots of an equation, Descarte's rule of signs.
Practicals

March

Solutions of cubic equations (Cardon's method), Biquadratic equations and their solutions. Divisibility, Greatest common divisor (gcd), Least common multiple (lcm), Prime numbers, Fundamental theorem of arithmetic.
Practicals

April

Linear congruences, Fermat's theorem, Euler's theorem, Wilson's theorem and its converse, Chinese Remainder theorem, Linear Diophantine equations in two variables.

Revision and Class Test

Lesson Plan for the session 2024-25

Subject : Mathematics

Paper : Differential Equations

Class: B.A/ B.Sc Semester 3rd

Teacher name: Saroj Bala

July

Discussion about the basic concepts of the previous class. Basic concepts and genesis of ordinary differential equations.

August

Order and degree of a differential equation, Solutions of differential equations of first order and first degree, Exact differential equations. Integrating factor, First order higher degree equations solvable for x, y and p, Lagrange's equations, Clairaut's form and singular solutions. Orthogonal trajectories of one-parameter families of curves in a plane.
Practicals

September

Solutions of linear ordinary differential equations with constant coefficients, linear non-homogeneous differential equations. Linear differential equation of second order with variable coefficients. Method of reduction of order, method of undetermined coefficients, method of variation of parameters. Cauchy-Euler equation.
Practicals

October

Solution of simultaneous differential equations, total differential equations. Genesis of Partial differential equations (PDE), Concept of linear and non- linear PDEs. Complete solution, general solution and singular solution of a PDE. Linear PDE of first order. Lagrange's method for PDEs of the form: Plx.y. 2) p+Q(x, y, z) q- R(x, y, z), where p oz/ex and q-dz/dy.
Practicals

November

Integral surfaces passing through a given curve. Surfaces orthogonal to a given system of surfaces. Compatible systems of first order equations. Charpit's method. Special types of first order PDES. Jacobi's method. Second Order Partial Differential Equations with Constant Coefficients.
Practicals
Revision and Class Tests.

Lesson Plan for the session 2024-25

Subject : Mathematics

Paper : Analytical Geometry & Vector Calculus

Class: B.A./B.Sc. Semester 4th

Teacher name: Saroj Bala

January

General equation of second degree: Classification of conicsections; centre, asymptotes, axes, eccentricity, foci and directrices of conics. Tangent at any point to a conic, chord of contact, pole of line to a conic, director circle of a conic. Polar equation of a conic, tangent and normal to a conic, confocal conics.

Practicals

February

Sphere: General form, Plane section of a sphere. Sphere through a given circle. Intersection of two spheres, tangent plane and line, polar plane and line, orthogonal spheres, radical plane of two spheres and co-axal system of spheres.Cone: Equation of a cone, right circular cone, quadric cone, enveloping cone. Tangent plane and condition of tangency.

Practicals

March

Cylinder: Right circular cylinder and enveloping cylinder. Central Conicoids: Equation of tangent plane. Director sphere. Normal to the conicoids. Polar plane of a point. Enveloping cone of a conicoid. Enveloping cylinder of a conicoid, confocal conicoid, reduction of second degree equations.

Practicals

April

Scalar and Vector product of three vectors, four vectors. reciprocal vectors, vector differentiation and derivative along a curve, directional derivatives; Gradient of a scalar point function, divergence and curl of vector point functions, their geometrical meanings and vector identities. Vector integration: line integral, surface integral and volume integral. Theorem of Gauss. Green, Stoke and problems based on these.

Practicals

Revision and Class Tests.

Lesson Plan for the session 2024-25

Subject : Mathematics

Class B.A./B.Sc. Semester 5th

Teacher name: Kavita

Paper 1: Real Analysis

July

Basic concepts of the previous class.
Riemann integral.

August

Integrabililty of continuous and monotonic functions, The Fundamental theorem of integral calculus. Mean value theorems of integral calculus.

September

Improper integrals and their convergence, Comparison tests, Abel's and Dirichlet's tests, Frullani's integral, Integral as a function of a parameter. Continuity, Differentiability and integrability of an integral of a function of a parameter.

October

Definition and examples of metric spaces, neighborhoods, limit points, interior points, open and closed sets, closure and interior, open and closed sets, closure and interior, boundary points, subspace of a metric space, equivalent metrics, Cauchy sequences, completeness, Cantor's intersection theorem, Baire's category theorem, contraction Principle.

November

Continuous functions, uniform continuity, compactness for metric spaces, sequential compactness, Bolzano-Weierstrass property, total boundedness, finite intersection property, Continuity in relation with compactness, connectedness , components, continuity in relation with connectedness. Revision and Class Tests.

Lesson Plan for the session 2024-25

Subject : Mathematics

Class: B.A./B.Sc. Semester 5th

Teacher name: Kavita

Paper 2: Groups and Rings

July

Discussion about the basic concepts of the previous class.

Definition of a group with example and simple properties of groups.

August

Subgroups and Subgroup criteria, Generation of groups, cyclic groups, Cosets, Left and right cosets, Index of a sub-group Coset decomposition, Largrage's theorem and its consequences, Normal subgroups, Quotient groups.

September

Homoomorphisms, isomophisms, automorphisms and inner automorphisms of a group. Automorphisms of cyclic groups, Permutations groups. Even and odd per mutations. Alternating groups, Cayley's theorem, Center of a group and derived group of a group.

October

Introduction to rings, subrings, integral domains and fields, Characteristics of a ring. Ring homomorphisms, ideals (principle, prime and Maximal) and Quotient rings, Field of quotients of an integral domain.

November

Euclidean rings, Polynomial rings, Polynomials over the rational field, The Eisenstein's criterion, Euclidean rings, Polynomial rings, Polynomials over the rational field, The Eisenstein's criterion.Revision and Class Tests.

Lesson Plan for the session 2024-25

Subject : Mathematics

Class: B.A./B.Sc. Semester 5th

Teacher name: Saroj Bala

Paper 3: Numerical Analysis

July

Basic concepts of the previous class.
Finite Differences operators and their relations.

August

Finding the missing terms and effect of error in a difference tabular values, Interpolation with equal intervals: Newton's forward and Newton's backward interpolation formulae. Interpolation with unequal intervals: Newton's divided difference, Lagrange's Interpolation formulae, Hermite Formula. Practicals

September

Central Differences: Gauss forward and Gauss's backward interpolation formulae, Sterling, Bessel Formula. Probability distribution of random variables, Binomial distribution, Poisson's distribution, Normal distribution: Mean, Variance and Fitting. Practicals

October

Numerical Differentiation: Derivative of a function using interpolation formulae as studied in Sections –I & II.

Eigen Value Problems: Power method, Jacobi's method, Given's method, House-Holder's method, QR method, Lanczos method. Practicals

November

Numerical Integration: Newton-Cote's Quadrature formula, Trapezoidal rule, Simpson's one- third and three-eighth rule, Chebychev formula, Gauss Quadrature formula.

Numerical solution of ordinary differential equations: Single step methods-Picard's method. Taylor's series method, Euler's method, Runge-Kutta Methods. Multiple step methods; Predictor-corrector method, Modified Euler's method, Milne-Simpson's method.

Revision and Class Tests.

Lesson Plan for the session 2024-25

Subject : Mathematics

Class: B.A./B.Sc. Semester 6th

Teacher name: Saroj Bala

Paper 1: Real and Complex Analysis

January

Jacobians, Beta and Gama functions, Double and Triple integrals, Dirichlets integrals, change of order of integration in double integrals.

February

Fourier's series: Fourier expansion of piecewise monotonic functions, Properties of Fourier Co-efficients, Dirichlet's conditions, Parseval's identity for Fourier series, Fourier series for even and odd functions, Half range series, Change of Intervals.

March

Extended Complex Plane, Stereographic projection of complex numbers, continuity and differentiability of complex functions, Analytic functions, Cauchy-Riemann equations. Harmonic functions.

April

Mappings by elementary functions: Translation, rotation, Magnification and Inversion. Conformal Mappings, Mobius transformations. Fixed pints, Cross ratio, Inverse Points and critical mappings. Revision and Class Tests.

Lesson Plan for the session 2024-25

Subject : Mathematics

Class: B.A./B.Sc. Semester 6th

Teacher name: Kavita

Paper 2: Linear Algebra

January

Vector spaces, subspaces, Sum and Direct sum of subspaces, Linear span, Linearly Independent and dependent subsets of a vector space. Finitely generated vector space, Existence theorem for basis of a finitely generated vactor space, Finite dimensional vector spaces, Invariance of the number of elements of bases sets, Dimensions, Quotient space and its dimension.

February

Homomorphism and isomorphism of vector spaces, Linear transformations and linear forms on vactor spaces, Vactor space of all the linear transformations Dual Spaces, Bidual spaces, annihilator of subspaces of finite dimentional vactor spaces, Null Space, Range space of a linear transformation, Rank and Nullity Theorem.

March

Algebra of Liner Transformation, Minimal Polynomial of a linear transformation, Singular and non-singular linear transformations, Matrix of a linear Transformation, Change of basis, Eigen values and Eigen vectors of linear transformations.

April

Inner product spaces, Cauchy-Schwarz inequality, Orthogonal vectors, Orthogonal complements, Orthogonal sets and Basis, Bessel's inequality for finite dimensional vector spaces, Gram-Schmidt, Orthogonalization process, Adjoint of a linear transformation and its properties, Unitary linear transformations. Revision and Class Tests.

Lesson Plan for the session 2024-25

Subject : Mathematics

Class: B.A /B.Sc. Semester 6th

Teacher name: Kavita

Paper 3: Dynamics

January

Velocity and acceleration along radial, transverse, tangential and normal directions. Relative velocity and acceleration. Simple harmonic motion. Elastic strings.

February

Mass, Momentum and Force. Newton's laws of motion. Work, Power and Energy. Definitions of Conservative forces and Impulsive forces.

March

Motion on smooth and rough plane curves. Projectile motion of a particle in a plane. Vector angular velocity.

April

General motion of a rigid body. Central Orbits, Kepler laws of motion. Motion of a particle in three dimensions. Acceleration in terms of different co-ordinate systems. Revision and Class Tests.