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LESSON PLAN (Odd Sem.)

SESSION : 2023-24

CLASS – B.Com 1st Sem.

Subject : BUSINESS MATHEMATICS

Week 1: Matrices- Definition of a matrix, Types of matrices; Algebra of matrices, Calculation of values of determinants up to third order; Adjoint of a matrix

Week2: Matrices- Finding inverse of a matrix through ad joint; Applications of matrices to solution of simple business and economic problems

Week3: Differential Calculus- Mathematical functions and their types – linear, quadratic, polynomial; Concepts of limit and continuity of a function;

Week4: Differential Calculus- Concept of differentiation; Rules of differentiation – simple standard forms.

Week5: Applications of differentiation – elasticity of demand and supply; Maxima and Minima of functions (involving second or third order derivatives) relating to cost, revenue and profit.

Week6: Linear Programming-formulation of LPP: Graphical method of solution; problems relating to two variables including the case of mixed constraints

Week7: Linear Programming -cases having no solution, multiple solutions; unbounded solution and redundant constraints

Week8: simplex method - solution of problems up to three variables, including cases of mixed constraints, duality; Transportation Problem.

Week9: Basic Mathematics of Finance- Simple and compound interest Rates of interest

Week10: Basic Mathematics of Finance Rates of interest – nominal, effective and continuous – their interrelationships;

Week11: Basic Mathematics of Finance Compounding and discounting of a sum using different types of rates,

Week12: Revision

Week13: Revision

Week14: Revision

Week15: Revision

Week16: Revision

Lesson Plan- B.A (MATHEMATICS-ALGEBRA)

Semester-1 [REDACTED]

Month: August-November

Weeks	Topics
1	Definition and types of matrices-types with examples, Rank of a matrices. Inverse of a matrix. Linear dependence and independence of rows and columns of matrices.
2	Row rank and column rank of a matrix. Rank of a matrices. Inverse of a matrix Eigen values, eigenvectors and the characteristic equation of a matrix.
3	Minimal polynomial of a matrix. Cayley Hamilton theorem and its use in finding the inverse of a matrix.
4	Applications of matrices to a system of linear (both homogeneous and non-homogeneous equations.)
5	Theorems on consistency of a system of linear equations.
6	Unitary and Orthogonal Matrices, Bilinear and Quadratic forms.
7	Relations between the roots and coefficients of general polynomial equation in one variable.
8	Solutions of polynomial equations having conditions on roots.
9	Common roots and multiple roots. Transformation of equations.
10	Nature of the roots of an equation Descartes' rule of signs.
11	Solutions of cubic equations (Cardon's method).
12	Biquadrate equations and their solutions.
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS-CALCULUS)

Semester-1

Week	Topic
1	Definition of the limit of a function. Basic properties of limits, Continuous functions and classification of discontinuities.
2	Differentiability. Successive differentiation.
3	Leibnitz theorem. Maciaurin and Taylor series expansions.
4	Asymptotes in Cartesian coordinates, intersection of curve and its asymptotes, asymptotes in polar coordinates. Curvature, radius of curvature for Cartesian curves, parametric curves, polar curves.
5	Newton's method. Radius of curvature for pedal curves. Tangential polarequations. Centre of Curvature. Circle of Curvature.
6	Chord of curvature, evolutes. Tests for concavity and convexity. Points of inflexion. Multiple points. Cusps, nodes & conjugate points. Type of cusps.
7	Tracing of curves in Cartesian, parametric and polar co-ordinates
8	Reduction formulae.
9	Rectification, intrinsic equations of curve.
10	Quadrature (area) Sectorial area. Area bounded by closed curves.
11	Volumes and surfaces of solids of revolution.
12	Revision
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS- SOLID GEOMETRY)

Semester-1

Weeks	Topics
1	General equation of second degree. Tracing of conics. Tangent at any point to the conic.
2	Pole of line to the conic, director circle of conic. System of conics. Confocal conics.
3	Polar equation of a conic, tangent and normal to the conic.
4	Sphere: Plane section of a sphere. Sphere through a given circle. Intersection of two Spheres
5	Radical plane of two spheres. Co-oxal system of spheres. Cones. Right circular cone, enveloping cone and reciprocal cone.
6	Cylinder: Right circular cylinder and enveloping cylinder.
7	Central Conicoids: Equation of tangent plane. Director sphere
8	Normal to the conicoids. Polar plane of a point.
9	Enveloping cone of a coinoid. Enveloping cylinder of a coinoid.
10	Paraboloids: Circular section, Plane sections of conicoids.
11	Generating lines. Confocal conicoid.
12	Reduction of second degree equations.
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS- ADVANCED CALCULUS)

Semester-3

Weeks	Topics
1	Continuity, Sequential Continuity, properties of continuous function, chain rule of differentiability. Mean value theorems; Rolle's theorems
2	Theorem and Lagrange's mean value theorem and their geometrical interpretations
3	Taylor's Theorem with various forms of remainders, Darboux intermediate value theorem for derivatives, Indeterminate forms
4	Limit and continuity of real valued functions of two variables. Partial differentiation
5	Total Differentials; Composite functions & implicit functions. Change of variables
6	Differentiability of real valued functions of two variables. Schwarz and Young's theorem.
7	Homogenous functions & Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables.
8	Differentiability of real valued functions of two variables. Schwarz and Young's theorem. Implicit function theorem
9	Maxima, Minima and saddle points of two variables. Lagrange's method of multipliers.
10	Curves: Tangents, Principal normals, Binormals, Serret-Frenet formulae
11	Locus of the centre of curvature, Spherical curvature, Locus of centre of Spherical curvature, Involutives, evolutes, Bertrand Curves.
12	Surfaces: Tangent planes, one parameter family of surfaces, Envelopes.
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS- PARTIAL DIFFERENTIAL EQUATION)

Semester-3

Weeks	Topics
1	Partial differential equations: Formation, order and degree, Linear and Non-Linear Partial differential equations of the first order:
2	Solution of Lagrange's linear equations, Charpit's general method of solution
3	Compatible systems of first order equations, Jacobi's method.
4	Linear partial differential equations of second and higher orders, Linear and non-linear homogenous and non-homogenous equations with constant co-efficients
5	Partial differential equation with variable co-efficients reducible to equations with constant Coefficients.
6	Their Complimentary functions and particular Integrals, Equations reducible to linear equations with constant co-efficients.
7	Classification of linear partial differential equations of second order, Hyperbolic, parabolic and elliptic types,
8	Reduction of second order linear partial differential equations to Canonical (Normal) forms and their solutions
9	Solution of linear hyperbolic equations, Monge's method for partial differential equations of second order.
10	Cauchy's problem for second order partial differential equations, Characteristic equations and characteristic curves of second order partial differential equation,
11	Method of separation of variables: Solution of Laplace's equation, Wave equation (one and two dimensions),
12	Diffusion (Heat) equation (one and two dimension) in Cartesian Co-ordinate system.
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS- STATICS)

Semester-3

Weeks	Topics
1	Composition and resolution of forces.
2	Parallel forces
3	Moments and Couples
4	Analytical conditions of equilibrium of coplanar forces.
5	Friction
6	Centre of Gravity
7	Virtual work
8	Forces in three dimensions
9	Points of central axis
10	Wrenches
11	Null lines and planes
12	Stable and unstable equilibrium
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS- GROUPS AND RINGS)

Semester-5

Weeks	Topics
1	Definition of a group with example and simple properties of groups, Subgroups and Subgroup criteria, Generation of groups,
2	Cosets, Left and right cosets, Index of a sub-group Co set decomposition
3	Lagrange's theorem and its consequences, Normal subgroups, Quotient groups.
4	Homomorphisms, Isomorphisms, Automorphism and inner Automorphism of a group.
5	Automorphism of cyclic groups, Permutations groups. Even and odd permutations.
6	Alternating groups, Cayley's theorem, Centre of a group and derived group of a group.
7	Introduction to rings, subrings, integral domains and fields,
8	Characteristics of a ring. Ring homeomorphisms, ideals (principle, prime and Maximal)
9	Quotient rings, Field of quotients of an integral domain.
10	Euclidean rings, Polynomial rings, Polynomials over the rational field,
11	The Eisenstein's criterion, Polynomial rings over commutative rings
12	R unique factorization domain implies so is $R[X_1, X_2, \dots, X_n]$
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS- NUMERICAL ANALYSIS)

Semester-5

Weeks	Topics
1	Finite Differences operators and their relations. Finding the missing terms and effect of error in a difference tabular values
2	Interpolation with equal intervals: Newton's forward and Newton's backward interpolation formulae. Interpolation with unequal intervals
3	Newton's divided difference, Lagrange's Interpolation formulae, Hermite Formula
4	Gauss forward and Gauss's backward interpolation formulae, Sterling, Bessel Formula
5	Probability distribution of random variables, Binomial distribution, Poisson's distribution
6	Normal distribution: Mean, Variance and Fitting.
7	Numerical Differentiation: Derivative of a function using interpolation formulae as studied in Sections -I & II.
8	Eigen Value Problems: Power method, Jacobi's method, Given's method,
9	House-Holder's method, QR method, Lanczos method.
10	Numerical Integration: Newton-Cote's Quadrature formula, Trapezoidal rule, Simpson's one- third and three-eighth rule, Chebychev formula, Gauss Quadrature formula.
11	Numerical solution of ordinary differential equations: Single step methods-Picard's method. Taylor's series method, Euler's method, Runge-Kutta Methods.
12	Multiple step methods; Predictor-corrector method, Modified euler's Method, Milne-Simpson's Method.
13	Revision
14	Revision
15	Revision

B.A (MATHEMATICS- REAL ANALYSIS)

Semester-5

Weeks	Topics
1	Riemann integral, Integrability of continuous and monotonic functions,
2	The Fundamental theorem of integral calculus.
3	Mean value theorems of integral calculus, Improper integrals and their convergence,
4	Comparison tests, Abel's and Dirichlet's tests, Frullani's integral,
5	Integral as a function of a parameter. Continuity
6	Differentiability and integrability of an integral of a function of a parameter.
7	Definition and examples of metric spaces, neighborhoods, limit points, interior points, open and closed sets
8	Open and closed sets, closure and interior, boundary points,
9	Subspace of a metric space, equivalent metrics,
10	Continuous functions, uniform continuity, compactness for metric spaces, sequential compactness
11	Bolzano-Weierstrass property, total boundedness, finite intersection property, continuity in relation with compactness
12	Connectedness, components, continuity in relation with connectedness.
13	Revision
14	Revision
15	Revision