

Lesson Plan (2023-24)
July to December-2023
Name of the Assistant Professor- Dr. Amit Kumar
Subject- Mathematics

Class	B.A. 5 th Sem	B.A. 3 rd Sem	B.A. 5 th Sem	B.C.A. 3 rd Sem
Paper/ Month	Real Analysis	Advanced Calculus	Groups and Rings	Computer Oriented Numerical Methods
July-August (Section- 1st)	Riemann integral, Integrability of continuous and monotonic functions, the fundamental theorem of integral calculus, Mean value theorems of integral calculus.	Continuity, Sequential continuity, properties of continuous functions, Uniform continuity, Chain rule of differentiability, Mean value theorems: Rolle's theorem and Lagrange's mean value theorem and their geometrical interpretations, Taylor's theorem with various form of remainders, Darboux intermediate value theorem for derivatives, Indeterminate forms.	Definition of a group with example and simple properties of groups, Subgroups and Subgroup criteria, Generation of groups, cyclic groups, Cosets, Left and right cosets, Index of a subgroup, Coset decomposition, Lagrange's theorem and its consequences, Normal subgroups, Quotient groups.	Computer Arithmetic: Floating - point representation of numbers, arithmetic operations with normalized floating - point numbers and their consequences, significant figures, Error in number representation - inherent error, truncation, absolute, relative, percentage and round - off error, Iterative Methods: Bisection, False position, Newton - Raphson method, Iteration method, discussion of convergence, Bairstow's method.
September (Section -2nd)	Improper integral and their convergence, Comparison tests, Abel's and Dirichlet's tests, Frullani's integral, Integral as a function of a parameter.	Limit and continuity of real valued functions of two variables, Partial differentiation, Total differentials, Composite functions and implicit functions, Change of	Homomorphisms, isomorphisms, automorphisms and inner automorphisms of a group, Automorphisms of cyclic groups, Permutation groups, Even and odd permutations.	Solution of simultaneous linear equations and ordinary differential equations; Gauss-Elimination methods, pivoting, Ill - conditioned equations, refinement of solution, Gauss -



<p>October (Section -3rd)</p>	<p>Continuity, Differentiability and integrability of an integral of a function of a parameter.</p> <p>Definition and examples of metric spaces, neighbourhoods, limit points, interior points, 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.</p>	<p>variables, Homogeneous functions and Euler's theorem on homogeneous functions, Taylor's theorem for functions of two variables, Differentiability of real valued functions of two variables, Schwarz and Young's theorem, Implicit function theorem, Maxima, Minima and saddle points of two variables, Lagrange's method of multipliers.</p>	<p>Alternating groups, Cayley's theorem, Centre of a group and derived group of a group.</p> <p>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.</p>	<p>Seidal iterative method, Euler method, Euler modified method, Taylor - series method, Runge - Kutta methods, Predictor - Corrector methods, Interpolation and Approximation: Polynomial interpolation: Newton, Lagranges, Difference tables, Approximation of functions by Taylor Series, Chebyshev polynomial: First kind, Second kind and their relations, Orthogonal properties.</p>
<p>November -December (Section- 4th)</p>	<p>Continuous functions, uniform continuity, compactness for metric spaces, sequential compactness, Bolzano-Weierstrass property, total boundedness,</p>	<p>Curves: Tangents, Principal normals, Binormals, Serret - Frenet formulae, Locus of the centre of Curvature, Spherical curvature, Locus of centre of spherical</p>	<p>Euclidean rings, Polynomial rings, Polynomials over the rational field, The Eisenstein's criterion of irreducibility, Polynomial rings over commutative rings, Unique factorization</p>	<p>Numerical Differentiation and integration: Differentiation formulae based on polynomial fit, pitfalls in differentiation, Trapezoidal and Simpson Rules, Gaussian Quadrature.</p>



	finite intersection property, continuity in relation with compactness, connectedness, components, continuity in relation with connectedness.	curvature, Involutes, Evolutes, Bertrand curves. Surfaces: Tangent planes, one parameter family of surfaces, Envelopes.	domain, R unique factorization domain implies so is $R \{X_1, X_2, \dots, X_n\}$	
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