**LESSON PLAN**

**CLASS: - M.Sc. (Maths) SEMESTER:- 3rd Sem (2025-26)**

**Name : - Dr. Pushpander Kadian Designation: Professor**

**Paper: Ordinary Differential Equations**

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| Time Period | Syllabus to be covered |
| August, 2025 | Preliminaries, ε-approximate solution, Cauchy-Euler construction of an ε-approximate solution of an initial value problem, Equicontinuous family of functions, Ascoli-Arzela Lemma, Cauchy-Peano existence theorem. Lipschitz condition, Picards-Lindelof existence and uniqueness theorem for dy/dt =f(t,y), Solution of initial-value problems by Picards method, Dependence of solutions on initial conditions |
| Sept, 2025 | Linear systems, Matrix method for homogeneous first order system of linear differential equations, Fundamental set of solutions, Fundamental matrix of solutions, Wronskian of solutions, Basic theory of the homogeneous linear system, Abel-Liouville formula, Non- homogeneous linear system. Strum Theory, Self-adjoint equations of the second order, Abel formula, Strum Separation theorem, Strum Fundamental comparison theorem. |
| Oct, 2025 | Nonlinear differential systems, Phase plane, Path, Critical points, Autonomous systems, Isolated critical points, Path approaching a critical point, Path entering a critical point, Types of critical points- Center, Saddle points, Spiral points, Node points, Stability of critical points, Asymptotically stable points, Unstable points, Critical points and paths of linear systems. Almost linear systems. |
| November, 2025 | Nonlinear conservative dynamical system, Dependence on a parameter, Liapunov direct method, Limit cycles, Periodic solutions, Bendixson nonexistence criterion, Poincore- Bendixson theorem(statement only), Index of a critical point. Strum-Liouville problems, Orthogonality of characteristic functions. |

Dr. Pushpander Kadian’

Professor

**LESSON PLAN**

**CLASS: - M.Sc. (Maths) SEMESTER:- 1st Sem (2025-26)**

**Name : - Dr. Pushpander Kadian Designation: Professor**

**Subject/Paper: - Analytical Number Theory**

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| Time Period | Syllabus to be covered |
| August, 2025 | Distribution of primes, Fermat and Mersenne numbers, Farey series and some results concerning Farey series, Approximation of irrational numbers by rationals, Hurwitz theorem, Irrationality of e and π. |
| September, 2025 | The arithmetic in Zn, The group Un, Primitive roots and their existence, the group Up\*n (p odd) and U2\*n, The group of quadratic residues Qn , Quadratic residues for prime power moduli and arbitrary moduli, The algebraic structure of Un and Qn . |
| October, 2025 | Riemann Zeta Function ζ(s) and its convergence, Application to prime numbers, Diophantine equations ax + by = c, x2+y2 = z2ζ(2) and ζEuler product, Evaluation of and x4+y4 = z4 , The representation of number by two or four squares, Waring problem, Four square theorem, The numbers g(k) & G(k), Lower bounds for g(k) & G(k). |
| November, 2025 | Arithmetic functions k(n), U(n), N(n), I(n), σ(n), τ(n), φ(n), Definitions and examples of σ(n) ,τ(n), φ (n) and simple properties, Perfect numbers, Mobius inversion formula, The Mobius function. The order and average order of the function |

Dr. Pushpander Kadian’

Professor