KHAJA BANDANAWAZ UNIVERSITY
EDUCATING HUMANITY
(A Religious Minority University)
(University established by an Act No.18 of Karnataka State Legislature)

ಖಾಜಾ ಬಂದಾನವಾಝ್ ವಿಶ್ವವಿದ್ಯಾಲಯ

خواجہ بندہ نواز یونیورسٹی

KHAJA BANDANAWAZ UNIVERSITY

FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS

Syllabus For Mathematics (Ph.D. Entrance Test)

- **Part A: Pure Mathematics**
- **Part B: Applied Mathematics**

Part A: Pure Mathematics

1. Real Analysis: Sequences and series of real numbers, Limits, continuity, differentiability, Riemann integration, Metric spaces, compactness, completeness, Convergence of functions: pointwise, uniform.

2. Complex Analysis: Analytic functions, Cauchy-Riemann equations, Cauchy's theorem and integral formula, Taylor and Laurent series, Singularities and residues, conformal mappings

3. Abstract Algebra: Groups, subgroups, normal subgroups, quotient groups, Rings, ideals, ring homomorphisms, Fields, field extensions, Galois theory, Vector spaces, linear transformations, Modules over rings.

4. Linear Algebra: Systems of linear equations, Matrix theory, determinants, Eigenvalues and eigenvectors, Diagonalization, Jordan form, Inner product spaces, orthogonality

5. Topology: Open and closed sets, basis and sub-basis, Continuity, compactness, connectedness, Fundamental group and covering spaces (introductory), Homeomorphisms and topological invariants

Part B: Applied Mathematics

1. Ordinary Differential Equations (ODEs): First and second order ODEs, Systems of linear differential equations, Stability analysis, Series solutions and special functions

2. Partial Differential Equations (PDEs): Classification: elliptic, parabolic, hyperbolic, Method of characteristics, Separation of variables, Fourier and Laplace transforms

3. Numerical Analysis: Error analysis and stability, Numerical solutions of ODEs and PDEs, Interpolation, numerical integration, Matrix computations and iterative methods

4. Discrete Mathematics: Graph theory, combinatorics, Logic and set theory, Algorithms and complexity (basic)