

OPTION (B). THEORY OF APPROXIMATION AND LINEAR OPERATION

(Questions will be set from each unit/section)

Units	Topics
I	Approximation in normed spaces, Uniqueness, strict convexity, Uniform Approximation, Chebyshev polynomials, Approximation in Hilbert space, Cubic Spline Interpolation.
II	Spectral theory in normed linear spaces, resolvent set and spectrum, spectral properties of bounded linear operators. Properties of resolvent and spectrum. Spectral mapping theorem for polynomials. Spectral radius of a bounded linear operator on a complex Banach space. Elementary theory of Banach algebras.
III	General properties of compact linear operators. Spectral properties of compact linear operators on normed spaces. Behaviours of Compact linear operators with respect to solvability of operator equations. Fredholm type theorems. Fredholm alternative theorem. Fredholm alternative for integral equations.
IV	Spectral properties of bounded self-adjoint linear operators on a complex Hilbert space. Positive operators. Monotone sequences theorem for bounded selfadjoint operators on a complex Hilbert space. Square roots of a positive operator. Projection operators. Spectral family of a bounded self-adjoint linear operator and its properties, Spectral representation of bounded self adjoint linear operators. Spectral theorem.
V	Unbounded linear operators in Hilbert space. Hellinger-Toeplitz theorem. Hilbert adjoint operators. Symmetric and self-adjoint linear operators. Closed linear operators and closures. Spectrum of an unbounded self-adjoint linear operator. Spectral theorem for unitary and self-adjoint linear operators. Multiplication operator and Differentiation Operator.