Subject Code : P8MA11

CC XI - FUNCTIONAL ANALYSIS

UNIT I

Algebraic Systems: Groups – Rings – The structure of rings – Linear spaces – The dimension of a linear space – Linear transformations – Algebras – Banach Spaces : The definition and some examples – Continuous linear transformations – The Hahn-Banach theorem – The natural imbedding of N in N^{**} - The open mapping theorem – The conjugate of an operator

UNIT II

Hilbert Spaces: The definition and some simple properties – Orthogonal complements – Orthonormal sets - The conjugate space H^* - The adjoint of an operator – Self-adjoint operators – Normal and unitary operators – Projections

UNIT III

Finite-Dimensional Spectral Theory: Matrices – Determinants and the spectrum of an operator – The spectral theorem – A survey of the situation

UNIT IV

General Preliminaries on Banach Algebras: The definition and some examples – Regular and singular elements – Topological divisors of zero – The spectrum – The formula for the spectral radius – The radical and semi-simplicity

UNIT V

The Structure of Commutative Banach Algebras : The Gelfand mapping – Applications of the formula $r(x) = \lim || x^n ||^{1/n}$ - Involutions in Banach Algebras – The Gelfand-Neumark theorem

TEXT BOOK(S)

Introduction to Topology and Modern Analysis, G.F.Simmons, McGraw-Hill International Ed. 1963.

UNIT – I - Chapters 8 and 9
UNIT – II - Chapter 10
UNIT – III - Chapter 11
UNIT – IV - Chapter 12
UNIT – V - Chapter 13

REFERENCE(S)

[1] Walter Rudin, Functional Analysis, TMH Edition, 1974.
[2] B.V. Limaye, Functional Analysis, Wiley Eastern Limited, Bombay, Second Print, 1985.
[3] K. Yosida, Functional Analysis, Springer-Verlag, 1974.
[4] Laurent Schwarz, Functional Analysis, Courant Institute of Mathematical Sciences, New York University, 1964.