

*Textbook* : Differential Equations (with Applications and Historical Notes).  
by G.F. Simmons, Published TMH, 1994.

#### **M203 - FUNCTIONAL ANALYSIS** SX-5203

UNIT I : Banach Spaces : The definition and some examples, continuous linear transformation, The Hahn Banach theorem, The natural embedding of  $N$  in  $N^{**}$ . The open mapping theorem (Chapter 9, Sections 46-50).

UNIT II : The conjugate of an operator, Hilbert Spaces : The definition and some simple properties, Orthogonal complements, Orthonormal sets. (Chapter 9, Sections 51, Chapter 10, Sections 52-54).

UNIT III : The Conjugate space  $H^*$ , the adjoint of an operator, Self-adjoint operators and Unitary operators, projections (chapter 10, Sections 55-59).

UNIT IV : Finite - dimensional Spectral Theory : Matrices, Determinants and the spectrum of an operator, The spectral theorem, A survey of the situation. (Chapter 11, Sections 60-63).

*Textbook* : Introduction to Topology and Modern Analysis, by G.F. Simmons, McGraw Hill book Company, Inc. - International Student Edition.

*Reference* :

1. Functional Analysis, by B.V. Limaye, Wiley Eastern Limited, Bombay, 1981.
2. First course in Functional Analysis, C. Goffman and George Pedrick, Prentice-Hall of India Private Limited, New Delhi - 110 001, 1919.

#### **M204 - MEASURE AND INTEGRATION** SX-5204

UNIT I : Outer Measure - Measurable sets - A Non-measurable set - Lebesgue Measure - Measurable functions - Little woods three principles - (Chapter 3 of Textbook).

UNIT II : Measure spaces - Measurable functions - Integration - General convergence theorems - Signed Measure - Radon Nikodym theorem and its applications. (11.1 to 11.6 of Textbook).

UNIT III :  $L_p$  - Spaces - Minkowski - Holder inequalities Convergence and completeness - Approximation in  $L_p$  - Bounded Linear functionals (6.1 to 6.5 of Textbook).

*Textbook* : H.L. Royden, Measure Theory, Macmillan publishing Company, 3rd edition.

*Reference Books* :

- P.R. Halmos, Measure Theory, Graduate texts in Maths, Springer Verlag - 1979.  
W. Rudin : Real and Complex Analysis, Tata - McGraw Hill 1987, 3rd edition.

#### **M205 - COMPLEX ANALYSIS** SX-5205

UNIT I : The field of Complex Numbers, Complex Plane, polar representation and roots of Complex numbers, Lines and half-lines in the Complex plane,