

M.A./ M.Sc. MATHEMATICS (FINAL)
2011-2012

Note- There will be five papers in all. Paper-I: Topology and Functional Analysis and Paper-II: Discrete Mathematics will be compulsory. Each paper will be assigned six hours per week.

PAPER-I
TOPOLOGY & FUNCTIONAL ANALYSIS

TIME: 3 hours

Max. Marks: 100

UNIT-I

Topological spaces: open sets, closed sets, Closure of a set, Limit point of a set, Derived set, Boundary of a set. Kuratowaskis theorem, Open bases, Open subbases, second countable space, separable space, Lindel of theorem, continuous functions in topological spaces, continuity in Metric spaces.

UNIT-II

Compact Topological spaces: Continuity and compactness, compactness and base, Compactness and subbase, Product of compact spaces, Tychonoff theorem compactness, sequentially compactness and Bolzano-Weirstrass Property and their equivalences in Metric spaces.

Seperation Axioms: T_0 - space, T_1 - space, Hausdroff space, Regular and completely regular and normal spaces separation Axioms and compactness.

UNIT-III

Connectedness: Connectedness and continuity, Product of connected topological spaces, Components, connectedness in metric spaces.

Approximation: Weirstrass approximation theorem, function algebra, $C(X, R)$ and $C(X, C)$ the real Stone-Weirstrass theorem, Complex Stone-Weirstrass theorem.

UNIT-IV

Normed linear spaces; Banach spaces; Continuous linear transformations, Hahn-Banach theorem; the natural embedding of a normed linear space into its second conjugate, the open mapping theorem; the closed graph theorem, the uniform boundedness theorem.

UNIT-V

Hillbert spaces; Schwartz's inequality: orthogonal complements, Orthonormal sets, conjugate space, Riesz representation theorem, Adjoint of an operator, self adjoint operator, Normal operator, Matrix representation of a linear operator.

Books recommended:

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| 1. George F. Simmons | : Introduction to Topology and modern analysis, McGraw Hill Book Co. |
| 2. S.I.Hu | : Elements of Real Analysis. |
| 3. H.L.Royden | : Real analysis. |
| 4. W.J.Thron | : Topological structure. |
| 5. J.Kelley | : General Topology. |