M.A/M.Sc Mathematics Semester 1st

Effective from academic session 2010 ⟹ **Repetition for 2012 with minor change**

TOPOLOGY

Course No. MM-CP-105

Unit I

Review of countable and uncountable sets, Schroeder-Bernstein theorem, Axiom of Choice and its various equivalent forms, Definition and examples of metric spaces, Open and Closed sets, Nets in topological spaces, convergence of nets, completeness in metric spaces, Baire's Category theorem, and applications to the (1) Non-existence of a function which is continuous precisely at irrationals (ii) Impossibility of approximating the characteristic of rationals on [0, 1] by a sequence of continuous functions.

Unit II

Completion of a metric space ,Cantor's intersection theorem, with examples to demonstrate that each of the conditions in the theorem is essential, Uniformly continuous mappings with examples and counter examples, Extending Uniformity continuous maps, Banach's contraction principle with applications to the inverse function theorem in R.

Unit III

Topological spaces; Definition and examples, elementary properties, Kuratowski's axioms, continuous mappings and their characterizations, pasting Lemma, convergence of nets and continuity in terms of nets, Bases and sub bases for a topology, Lower limit topology, concepts of first countability, second countability, separability and their relationships, counter examples and behavior under subspaces, product topology and weak topology, compactness and its various characterizations.

Unit IV

Heine-Borel theorem, Tychnoff's theorem, compactness, sequential compactness and total bounded ness in metric spaces. Lebesgue's covering lemma, continuous maps on a compact space. Separation axioms T_i (i=1,2,3,31/2,4) and their permanence properties, connectedness, local connectedness, their relationship and basic properties, Connected sets in R. Urysohn's lemma. Urysohn's metrization theorem. Tietize's extension theorem, one point compactification.

Recommended Books:

1. G.F.Simmons : Introduction to topology and Modern Analysis
2. J. Munkres : Topology
3. K.D. Joshi : Introduction to General topology
4. J.L.Kelley : General topology
5. Murdeshwar ; General topology
6. S.T. Hu : Introduction to General topology