

Semester VII

Module Code: MATH-401
Module Title: **Set Theory**
Module Rating: 3 Cr. Hours

Cardinality

- Equivalent sets, finite and infinite sets
- Denumerable sets
- Countable and uncountable sets
- Cardinal numbers, addition and multiplication of cardinals, Cartesian product as sets of functions
- Different types of infinity (Cantor's contribution)

Ordinality

- Partially ordered sets, Hasse diagrams
- Totally ordered sets
- Maximal and minimal elements
- Upper and lower bound
- Well-ordered sets
- Transfinite induction
- Ordinal numbers
- Multiplication of ordinal numbers

Axiom of Choice


- Well ordering theorem
- Zorn's lemma

Paradoxes in Set Theory

- Cantor's paradox, Russell's paradox and others.

Recommended Books

1. A. A. Fraenkel, *Abstract Set Theory*, (North-Holland Publishing, Amsterdam, 1966).
2. Patrick Suppes, *Axiomatic Set Theory*, (Dover Publications, Inc., New York, 1972).
3. P. R. Halmos, *Naive Set Theory*, (Van Nostrand, New York, 1960).
4. B. Rotman and G. T. Kneebone, *The Theory of Sets and Transfinite Numbers*, (Oldbourne, London, 1968).
5. Douglas Smith, Maurice Eggen and Richard St. Andre: *A Transition to Advanced Mathematics*, (Brooks/Cole, 2001).


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