## CS 501: MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE (3-0-0:3):

Statements and proofs, proposition logic, resolution proof system, predicate logic, congruences, Fermat's theorem, Euler function, Chinese remainder theorem.

Groups, homomorphism theorems, cosets and normal subgroups, Lagrange's theorem, ring, field, linear algebra: vector space, basis, matrices and linear transformations, eigen-values, orthogonality.

Counting, probability, discrete random variable, continuous random variable, moment generating function, Markov's inequality, Chebyshev's inequality, geometric and binomial distributions, The tail of the binomial distribution. Graphs, Euler tours, planar graphs, hamiltonian graphs, Euler's formula, applications of Kuratowski's theorem, graph colouring, chromatic polynomials, trees, weighted trees, the max-flow min-cut theorem.

Theory of linear programming, Fourier-Motzkin elimination method, simplex method, geometry of linear programs.

**Text Books and References**


1. Donald F. Stanat and David F. McAllister, "Discrete mathematics in Computer Science".
2. George B. Dantzig, Mukund N. Thapa: "Linear Programming 1: Introduction", Springer.
3. Kenneth Hoffman, Ray Kunze, Linear Algebra" PHI Learning.
4. I.N.Herstein, "Topics in Algebra", JOHN Wiley & SONS.
5. Sheldon M. Ross, "Introduction to Probability Models", Elsevier.
6. Douglas B. West, "Introduction to Graph Theory", Prentice Hall of India.
7. H. Cormen, C. E. Leiserson, R. L. Rivest, C Stein, "Introduction to Algorithms", Prentice Hall India.