

## Linear Programming Exam Syllabus

Basic concepts of linear and affine algebra, convex sets and their facial properties. Affine sets, supporting hyperplanes and extreme points. Presentation of a compact convex set as convex hull of its extreme points.

Fundamental theorem of linear programming and its consequences. The correspondence between the basic feasible solutions of linear programs and extreme points of the corresponding polyhedral set. The simplex method and the revised simplex algorithm. Degeneracy and Bland anti-cycling rule. Duality theory; weak and strong duality theorems. Two main variants of simplex method such as dual simplex and primal-dual algorithm. Transportation problem, a complete theory including the triangularity of the basis. The revised simplex transportation algorithm. Max-Flow network problem and algorithm, Maximum Flow- Minimum Cut Theorem.

Complexity of linear programming and Karmarkar's interior method; A complete proof of the convergence and the complexity for the algorithm.

Note: The first and the last paragraphs are only for PhD students.

### **Text :**

David G. Luenberger, Linear and Nonlinear Programming, London, Addison Wesley, 1984.

### **References :**

1. G. B. Dantzig, Linear Programming and Extensions, Princeton University Press. Princeton , N.J. 1998.
2. Chavatal Vasek , Linear Programming, N.Y., W. H. Freeman,1983.
3. K. G. Murty , Linear Programming, N.Y. Wiley,1983 .