

NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTEL Video Course - Mathematics - Linear programming and Extensions

Subject Co-ordinator - Prof. Prabha Sharma

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Linear Programming Problems

Lecture 2 - Vector space, Linear independence and dependence, basis

Lecture 3 - Moving from one basic feasible solution to another, optimality criteria

Lecture 4 - Basic feasible solutions, existence & derivation

Lecture 5 - Convex sets, dimension of a polyhedron, Faces, Example of a polytope

Lecture 6 - Direction of a polyhedron, correspondence between bfs and extreme points

Lecture 7 - Representation theorem, LPP solution is a bfs, Assignment 1

Lecture 8 - Development of the Simplex Algorithm, Unboundedness, Simplex Tableau

Lecture 9 - Simplex Tableau & algorithm, Cycling, Bland's anti-cycling rules, Phase I & Phase II

Lecture 10 - Big-M method, Graphical solutions, adjacent extreme pts and adjacent bfs

Lecture 11 - Assignment 2, progress of Simplex algorithm on a polytope, bounded variable LPP

Lecture 12 - LPP Bounded variable, Revised Simplex algorithm, Duality theory, weak duality theorem

Lecture 13 - Weak duality theorem, economic interpretation of dual variables, Fundamental theorem of duality

Lecture 14 - Examples of writing the dual, complementary slackness theorem

Lecture 15 - Complementary slackness conditions, Dual Simplex algorithm, Assignment 3

Lecture 16 - Primal-dual algorithm

Lecture 17 - Problem in lecture 16, starting dual feasible solution, Shortest Path Problem

Lecture 18 - Shortest Path Problem, Primal-dual method, example

Lecture 19 - Shortest Path Problem-complexity, interpretation of dual variables, post-optimality analysis-changes in $\{a_{ij}\}$

Lecture 20 - Assignment 4, postoptimality analysis, changes in b , adding a new constraint, changes in $\{a_{ij}\}$

Lecture 21 - Parametric LPP-Right hand side vector

Lecture 22 - Parametric cost vector LPP

Lecture 23 - Parametric cost vector LPP, Introduction to Min-cost flow problem

Lecture 24 - Mini-cost flow problem-Transportation problem

Lecture 25 - Transportation problem degeneracy, cycling

Lecture 26 - Sensitivity analysis

Lecture 27 - Sensitivity analysis

Lecture 28 - Bounded variable transportation problem, min-cost flow problem

Lecture 29 - Min-cost flow problem

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- Lecture 30 - Starting feasible solution, Lexicographic method for preventing cycling ,strongly feasible solution
- Lecture 31 - Assignment 6, Shortest path problem, Shortest Path between any two nodes, Detection of negative cycle
- Lecture 32 - Min-cost-flow Sensitivity analysis Shortest path problem sensitivity analysis
- Lecture 33 - Min-cost flow changes in arc capacities , Max-flow problem, assignment 7
- Lecture 34 - Problem 3 (assignment 7), Min-cut Max-flow theorem, Labelling algorithm
- Lecture 35 - Max-flow - Critical capacity of an arc, starting solution for min-cost flow problem
- Lecture 36 - Improved Max-flow algorithm
- Lecture 37 - Critical Path Method (CPM)
- Lecture 38 - Programme Evaluation and Review Technique (PERT)
- Lecture 39 - Simplex Algorithm is not polynomial time- An example
- Lecture 40 - Interior Point Methods