

# Introduction to Operations Research - Video course

## COURSE OUTLINE

The course covers topics on linear programming, Graphical and Algebraic solutions, Simplex Algorithm, Duality, Understanding the dual, Solving LPs using Solver, Transportation problem & Assignment problem

## COURSE DETAIL

| Unit No. | Topics  |
|----------|---|
| 1        | <b>Linear Programming – Terminology and formulations</b> <ul style="list-style-type: none"> <li>• LP through an example</li> <li>• Terminology</li> <li>• Additional Example 1</li> <li>• Additional example 2</li> </ul>                                     |
| 2        | <b>Graphical and Algebraic solutions</b> <ul style="list-style-type: none"> <li>• Graphical solution</li> <li>• Graphical solution – Example 2</li> <li>• Algebraic Solution</li> <li>• Understanding the methods together</li> </ul>                         |
| 3        | <b>Simplex Algorithm</b> <ul style="list-style-type: none"> <li>• Algebraic form of simplex</li> <li>• Tabular form of simplex</li> <li>• Minimization problems</li> <li>• Types of LPs and simplex solutions</li> <li>• Matrix method for simplex</li> </ul> |
| 4        | <b>Duality</b> <ul style="list-style-type: none"> <li>• Dual of an LP</li> <li>• Writing the dual</li> <li>• Duality Results</li> <li>• Primal Dual relationships</li> </ul>  |
| 5        | <b>Understanding the dual</b> <ul style="list-style-type: none"> <li>• Significance of the dual</li> <li>• Interpretation of the dual</li> <li>• Dual problem and the simplex table</li> <li>• Dual Simplex algorithm</li> </ul>                              |
| 6        | <b>Solving LPs using Solver</b> <ul style="list-style-type: none"> <li>• Revisiting the formulation examples</li> <li>• Three types of LPs</li> <li>• Dual solution</li> <li>• Sensitivity analysis</li> </ul>  |



NP-TEL

# NPTEL

<http://nptel.ac.in>

## Management

### Additional Reading:

- "Operations Research: Principles and Applications" by G.Srinivasan, PHI Learning Private Limited.
- "Operations Research: An Introduction" by Hamdy A. Taha, Pearson.
- "Operations Research: Principles and Practice" by Ravindran, Phillips and Solberg, Wiley India
- "Operations Research: Concepts and Cases" by Hillier and Liberman, McGraw-Hill,

### Coordinators:

**Prof. G. Srinivasan**  
Department of Management  
Studies IIT Madras

|   |   |  |
|---|---|--|
| 7 | <b>Transportation problem</b> <ul style="list-style-type: none"><li>• Balanced transportation problem</li><li>• Starting solutions</li><li>• Vogel's approximation method</li><li>• Optimization</li><li>• Modified Distribution method</li><li>• Dual of the transportation problem</li><li>• Additional points and interpretation</li><li>• Solving the transportation problem using solver</li></ul> |  |
| 8 | <b>Assignment problem</b> <ul style="list-style-type: none"><li>• Balanced Assignment problem</li><li>• The Hungarian algorithm</li><li>• Dual of the assignment problem</li><li>• Additional points and interpretation</li><li>• Solving the assignment problem using solver</li></ul>   |  |