

OR – 1: INTRODUCTION TO OPERATIONAL RESEARCH AND LINEAR PROGRAMMING

Introduction to Operational Research (OR): Origin & Development, Different Phases of OR study, Methodology of OR, Scope and Limitations of OR, Applications of OR.

Linear Programming: Linearly independent / dependent vectors, Basis, Convex sets, Extreme points. Graphical method. Simplex method, Artificial variable techniques- Two Phase Method; M-Charnes Method, Special cases in LPP.

Duality: Definition of the dual problem, Primal-dual relationships, Economic Interpretation of Duality, Dual simplex Method.

Sensitivity analysis: Changes in cost and resource vector

WEEK – WISE LAYOUT

Origin & Development, Different Phases of OR study, Methodology of OR, Scope and Limitations of OR, Applications of OR.

[2] Chapter 1, Pages 1-12.

Linearly independent / dependent vectors, Basis, Convex sets, Extreme points.

[1] Chapter 2: Pages 40-46, 54-55, 57-65.

Application to real world problems, Graphical method, Simplex method.

[3] Chapter 2: Pages 11-44

[3] Chapter 3: Pages 81-103.

Artificial variable techniques - M-Charnes Method, Two Phase Method.

[3] Chapter 3: Section 3.4.2, Pages 103-112.

Special cases in LPP.

[3] Chapter 3: Section 3.4.1, Pages 113-122.

Definition of the dual problem, Primal-dual relationships, Economic Interpretation of Duality.

[3] Chapter 4: Section 4.3, Pages 151-173.

Dual Simplex Method.

[3] Chapter 4: Section 4.4, Pages 174-179.

Changes in cost and resource vector.

[3] Chapter 4: Section 4.5, Pages 181-189.

Text Book Readings:

[1] **G. Hadley:** Linear Programming. Narosa, 2002 (reprint).

[2] **A. Ravindran, D. T. Phillips and James J. Solberg:** Operations Research- Principles and Practice, John Wiley & Sons, 2005.

[3] **Hamdy A. Taha:** Operations Research-An Introduction, Prentice Hall, 8th Edition, 2008.

Additional Readings:

[1] **F.S. Hillier. G.J. Lieberman:** Introduction to Operations Research- Concepts and Cases, 9th Edition, Tata McGraw Hill. 2010.

LIST OF PRACTICALS

1. To solve Linear Programming Problem using Graphical Method with
 - (i) Unbounded solution
 - (ii) Infeasible solution
 - (iii) Alternative or multiple solutions.
2. Solution of LPP with simplex method.
3. Problem solving using M-Charnes method.
4. Problem solving using Two Phase method.
5. Illustration of following special cases in LPP using Simplex method
 - (i) Unrestricted variables
 - (ii) Unbounded solution
 - (iii) Infeasible solution
 - (iv) Alternative or multiple solution
6. Problems based on Dual simplex method.
7. Problems based on sensitivity analysis.

NOTE: Practicals are to be performed using software: Excel-solver, LINDO, LINGO, Mathematica, TORA, etc.