

**OBJECTIVES:**

- To find the optimal solution of an optimization problem
- It graphically displays interdependent relationships between group's steps and tasks as they all impact a project.

**Learning Outcomes:** After learning this course, the student will be able:

1. To know the scope of Operations Research
2. To link the OR techniques with business environment and life sciences
3. To convert real life problems into mathematical models
4. To find a solution to the problem in different cases
5. To inculcate logical thinking to find a solution to the problem

**COURSE:**

**UNIT-I: Introduction of OR** – Origin and development of OR – Nature and features of OR – Scientific Method in OR – Modeling in OR – Advantages and limitations of Models-General Solution methods of OR models – Applications of Operation Research. Linear programming problem (LPP) -Mathematical formulation of the problem - illustrations on Mathematical formulation of Linear programming of problem. Graphical solution of linear programming problems. Some exceptional cases - Alternative solutions, Unbounded solutions, non-existing feasible solutions by Graphical method.

**UNIT-II: General linear programming Problem (GLP)** – Definition and Matrix form of GLP problem, Slack variable, Surplus variable, unrestricted Variable, Standard form of LPP and Canonical form of LPP. Definitions of Solution, Basic Solution, Degenerate Solution, Basic feasible Solution and Optimum Basic Feasible Solution. Introduction to Simplex method and Computational procedure of simplex algorithm. Solving LPP by Simplex method (Maximization case and Minimization case)

**UNIT-III: Artificial variable technique** - Big-M method and Two-phase simplex method, Degeneracy in LPP and method to resolve degeneracy. Alternative solution, Unbounded solution, non-existing feasible solution and Solution of simultaneous equations by Simplex method.

**UNIT-IV: Duality in Linear Programming** –Concept of duality -Definition of Primal and Dual Problems, General rules for converting any primal into its Dual, Economic interpretation of duality, Relation between the solution of Primal and Dual problem (statements only). Using duality to solve primal problem. Dual Simplex Method.

**UNIT-V: Post Optimal Analysis-** Changes in cost Vector **C**, Changes in the Requirement Vector **B** and changes in the Coefficient Matrix **A**. Structural Changes in a LPP.

**Reference Books:**

1. S.D. Sharma, Operations Research, Kedar Nath Ram Nath & Co, Meerut.
2. Kanti Swarup, P.K. Gupta, Manmohn, Operations Research, Sultan Chand and sons, New Delhi.
3. J.K. Sharma, Operations Research and Application, Mc. Millan and Company, New Delhi.
4. GassS.I: Linear Programming. Mc Graw Hill.
5. HadlyG: Linear programming. Addison-Wesley.
6. Taha H.M: Operations Research: An Introduction: Mac Millan.