UG Department: **Chemical Engineering**
Course Code: **CH409** Course Name: **Operations Research**
Credit: **3** L-T-P: **3-0-0**
Version: **1** Approved on:
Prerequisite Course: **Nil**

Introduction: Nature and meaning of operations research, general methods for solving operations research problems, main characteristics of operations research in decision making, Role of computers in operations research.

Linear Programming Problem: Formulation of LP problem, graphical solution of LP problem, general formulation of LP problem, slack and surplus problem, standard form of LP problem, matrix form of LP problem, some important definitions, assumptions in LPP, limitations of LP, Applications of LP.

Simplex Method: Definition and notations, computational procedure, artificial variable technique- two phase method, Big-M method, disadvantages of Big M method over two phase method, degeneracy problem, method to resolve degeneracy, special cases- alternative solution, unbounded solutions, non-existing solution, solution of simultaneous equations by simplex method, flow chart of simplex method.

Duality in Linear Programming: Concept of duality, primal-dual problems, rules for converting any primal problem into its dual, duality theorems, primal and dual correspondence, duality and simplex method, shadow prices in LP, advantages of duality.

Dual Simplex Method: Computational procedure of dual simplex method, advantages of dual simplex over simplex method, different between simplex and dual simplex methods.

Assignment Problem: Introduction, mathematical formulation of assignment problem, fundamental theorems, Hungarian method, unbalanced assignment problem, variations of assignment problem- maximal assignment problem, restriction on assignment, traveling salesman problem- formulation and solution procedure.

Transportation Models: Introduction, mathematical formulation, feasible, basic feasible and optimum solutions, tubular representation, loops in table, IBFS to transportation problem, moving towards optimum solution, degeneracy in transportation problem, unbalanced transportation problem, time minimizing transportation problem, transshipment problem.

Network Scheduling by PERT/CPM: Introduction, Networks and basic components, Rules of network construction, Time calculations in networks, Critical Path Method (CPM), PERT, PERT calculations, Negative float and negative slack, Advantages of network.

Books

1. Taha, H.A., " Operations Research, an introduction", 6th edition, Prentice Hall, 1997.
2. Rao, S.S., “Engineering Optimization: Theory and Practice,” 3rd ed., New Age International, New Delhi, 2000.
3. Sharma, S.D., “Operations Research”.
4. Kanti Swaroop, “Operations Research”.