Course Name: OPERATIONS RESEARCH **Course Code: MAT603**
Credit: 4

Course Objective: The objective of this course is as follows:

1. The main objective of the course is to introduce the concept of linear programming to find the optimal solution.
2. Develop the intuition among the learners mind to solve various real life problem.

SYLLABUS:

Linear Programming

Introduction to Linear Programming, Linear Programming Problems and Mathematical Formulation, Graphical Solution, Lines and Hyper Plane, Convex Set, Extreme Points of convex set, Convex Combination of vector Convex Hull. Basic solution and basic feasible solution. Fundamental Theorem of Linear Programming, Simplex Method, Big-M Method, Two Phase Method, Degeneracy, Concept of Duality, Dual Simplex Method, Revised Simplex Method.

Real life problem

Sensitivity Analysis, Integer Linear Programming, Branch and Bound Method, Transportation, Test of Optimality, Degeneracy in Transportation Problem, Balanced and Unbalanced Transportation Problem, North West Corner method, Vogel's approximation method, Transhipment Problem.

Dynamical Programming

Dynamical Programming, Decision Tree and Bellman's Principle of Optimality, Decomposition, Non Linear Programming, Quadratic Programming, Kuhn-Tucker Condition, Dynamic Programming. Quadratic Programming, Bell's Method. Goal Programming, Assignment Problem.

Course learner outcomes: After completing this course, our learners will be able to

1. Recall, apply and analyze the basic properties of linear programming.
2. Define, illustrate and interpret about Simplex method.
3. Understand, analyze and apply assignment and transportation models.
4. Remember, comprehend, apply and analyze the theory in real life problems.

UNIT SCHEDULE

BLOCK I: LINEAR PROGRAMMING

Unit 1: Introduction to Linear Programming & Operation Research.

Unit 2: Simplex method.

Unit 3: Big-M method

Unit 4: Two phase method and Degeneracy.

Unit 5: Duality

BLOCK II: REAL LIFE PROBLEM

Unit 6: Sensitivity Analysis.

Unit 7: Integral Programming.

Unit 8: Transportation.

BLOCK III: NON LINEAR PROGRAMMING

Unit 9: Non-Linear Programming.

Unit 10: Quadratic Programming.

BLOCK IV: DYNAMICAL PROGRAMMING

Unit 11: Integer Linear Programming Problems.

Unit 12: Dynamic Programming.

Unit 13: Wolfe's modified Simplex Methods, Bell's Method.

Unit 14: Goal Programming

REFERENCES

1. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali: *Linear Programming and Network Flows* (4^{th} edition). John Wiley and Sons, 2010.
2. Hamdy A. Taha: *Operations Research: An Introduction (10^{th} edition). Pearson*, 2017.
3. Paul R. Thie and Gerard E. Keough: *An Introduction to Linear Programming and Game Theory* (3^{rd} edition), Wiley India Pvt. Ltd, 2014.

SUGGESTED READINGS

1. .G. Hadley, *Linear Programming*, Narosa Publishing House, 2002.

2. Frederick S. Hillierand Gerald J. Lieberman: *Introduction to Operations Research* (10^{th} edition). McGraw-Hill Education, 2015.