Department Name: Mathematics

Semester - IV

Course Title:Linear Programming problems	Course Code:24MJMA4S
Total Contact Hours: 3Hrs/Week	No. of Credits:2
L:T:P-1:0:2	
Internal Assessment Marks:10	Duration of SEE: 1.5 Hours
Semester End Exam Marks: 40	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Define Linear Programming and explain basic terminology.
2. Formulate mathematical model of a real-life problem
3. Solve LPP by Graphical method
4. Solve LPP by Simplex method
5. Solve LPP using FOSS like Maxima/Python/Excel Solver.

Unit	Description	Hours
1	**Linear Programming: Basic Concepts** Introduction, Basic terminology: decision variables, non-negativity conditions, Slack variable, Surplus variable, objective function, constraints, feasible region, Basic solution, Basic feasible solution, optimal solution; Requirements for a linear programming problem (LPP), Assumptions in LPP, Areas of Applications of LPP, Mathematical formulation of LPP: Examples of Production allocation problem, Diet problem, Blending problem, Media selection problem, Inspection problem, Investment problem, Product mix problems etc.; Advantages and limitations of LPP.	7
2	**Solving Linear Programming Problems:** **Graphical method of solving LPP**: Statement of theorems (Corner Point Method) without proof, Problems-Production allocation problem, Diet problem, Blending problem, Media selection problem, Inspection problem, Investment problem, Product mix problems etc. Discussion of Special cases: infeasibility, unbounded solutions, multiple optimal solutions. **Simplex Method of solving LPP**: General form of LPP, Canonical and standard form of LPP, theory of the Simplex method, Algorithm of Simplex method, Big-M-Method, Two-Phase Method, Problems.	7
3	**Programs using Scilab/Maxima/Python/ Excel Solver:** 1. Program to solve a Diet Problem using graphical method 2. Program to solve anInvestment Problem using graphical method 3. Program to solve a Product Mix Problem using graphical method	

	4. Program to solve a Production allocation Problem using graphical method 5. Program to solve a Diet Problem using Simplex method 6. Program to solve an Investment Problem using Simplex method 7. Program to solve a Product Mix Problem using Simplex method 8. Program to solve a Production allocation Problem using Simplex method 9. Program to solve a Production allocation Problem using Big-M mehod. 10. Program to solve a Production allocation Problem using Two-Phase method.	

References

1. Prem Kumar Gupta & D S Hira: Operations Research (S Chand & Co.)
2. Dr. U S Rana: Mathematics for Degree Students (B.Sc. Third Year)(S Chand & Co.)
3. Richard Bronson &GovindasamiNaadimuthu:Schaum's Outline of Operations Research (McGraw Hill Publications)
4. Hamdy A. Taha: Operations Research: An Introduction (Pearson Publications)
5. Dimitris Bertsimas & John N. Tsitsiklis: Introduction to Linear Optimization (Dynamic Ideas & Athena Scientific Publications)