



MANIPAL UNIVERSITY JAIPUR
School of Computing and Information Technology

Department of Mathematics & Statistics
Course Hand-out

Linear Programming Problems and Vector Calculus | MA 1417 | 4 Credits | 3 | 0 | 4

Session: January 18– June 18 | Faculty: Dr Laxmi Poonia | Class: B.Sc. (Hons.)

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

- [1416.1]. Demonstrate an understanding the applications of linear programming. Constructs and apply the solution methods for linear programming models. Using the graphical method and interpret the solution for two or more linear inequalities in two unknowns and develop skills of constructing the constraints and the objective function for a linear programming problem from everyday life.
- [1416.2]. Use the simplex method to solve maximum and minimum linear programming problems from everyday life. Understand the meaning of duality and their role in the design of algorithmic solutions to linear programming problems.
- [1416.3]. Explain the transportation model and the solution methods, algorithms of transportation models. Recognizes and develops the assignment model solution methods which can be helpful to increase employability of students.
- [1416.4]. Study the Flux and motion of fluid in the vector field.
- [1416.5]. Solve the problems of Integration of vectors by application of vector theorems.

A. SYLLABUS

Introduction: Mathematical formulation, Graphical method of solution, Theory and application of the simplex method, Charne's M-technique, two phase method. **Duality:** Primal, Dual, Dual programming problem, Fundamental theorem of duality with proof. **Transportation Problems:** North-west corner rule, Matrix-minima method, Vogel's approximation method, MODI method for optimal solution. **Assignment Problems:** Hungarian method, Travelling salesman problem. **Vector Calculus:** Differentiation. Gradient, Divergence and curl, line integral, surface integral, and volume integral. Green, Gauss and Stokes Theorems (without proof) and their applications.

B. TEXT BOOKS:

1. G. Hadley, Linear Programming, Narosa Publishing House, 1995.
2. R. K. Gupta, Linear Programming, Krishna Prakashan, 2010.
3. Shanti Narayan, P. K. Mittal, A Textbook of Vector Analysis, S. Chand & Co., 2013.
4. S. I. Gass, Linear Programming: Methods and Applications, McGraw Hill, New York, 1985.
5. S. D. Sharma, Operation Research, Kedarnath and Ram Nath Publication, 2006.
6. Hamdy A. Taha, Operations Research: An Introduction, PHI, 2006.
7. J. E. Marsden, A. Tromba, Vector Calculus, W. H. Freeman, 2003.

