

B.A. (VS) MATERIALS MANAGEMENT

DSE 6.2: Mathematical Applications for SCM

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE, REQUISITES OF THE COURSE

Course Title & Code	Total Credits	Lectures	Tutorial	Practical	Eligibility criteria	Pre-requisite of the course
Mathematical applications for SCM DSE – 6.1	4	3	1	-	Class XII	Nil

Learning Objectives: The course aims to familiarize the learners with the basic mathematical tools with special emphasis on applications to business and economic situations.

Learning outcomes

After completion of the course, learners will be able to:

1. Assess the applicability of matrices as mathematical tools in representing a system of equations.
2. Apply differential calculus to solve simple business problems.
3. Evaluate business problems involving complex linear relationships between decision variables and their determining factors.
4. Explain mathematical formulation and solution of problems related to finance including different methods of interest calculation, future and present value of money.
5. Develop programming for business problems involving constrained optimisation.

Unit 1: Matrices and Determinants

9 hours

Overview of Matrices. Solution of a system of linear equations (having a unique solution and involving not more than three variables) using matrix inversion method and Cramer's Rule
Leontief Input Output Model (Open Model Only).

Unit 2: Calculus-I**6 hours**

Concepts and rules of differentiation. Concept of Marginal Analysis: Marginal Revenue, Marginal Cost. Concept of Elasticity of demand and supply. Application of Maxima and Minima problems: Revenue, Cost, Profit, Economic Order Quantity, Optimal trade in time.

Unit 3: Calculus-II**12 hours**

Partial Differentiation: Partial derivatives up to second order. Homogeneity of a function and Euler's theorem. Production Function: Returns to factor, Returns to scale. MRTS and Elasticity of Substitution. Application of Maxima and Minima problems involving two independent variables. Integration: Nature of commodities and partial elasticity of demand, Applications of marginal analysis, Consumer Surplus and Producer Surplus.

Unit 4: Mathematics of Finance**9 hours**

Rates of interest: nominal, effective and their inter-relationships in different compounding situations. Compounding a sum using different types of rates. Applications relating to Depreciation of assets and average due date. Types of annuities: ordinary, due, and deferred - Discrete and continuous. Perpetuity. Determination of future and present values using different types of rates of interest. Applications relating to Capital Expenditure and Leasing.

Unit 5: Linear Programming**9 hours**

Formulation and Assumptions of LPP, Solution by Simplex Method- maximization and minimization cases. Shadow prices of the resources. Special Cases: Identification of unique and multiple optimal solutions, unbounded solution, infeasibility and degeneracy.

Exercises:

The learners are required to:

1. assess the use of matrices in evaluating competing alternatives in logistics and SCM.
2. Apply differential calculus to solve hypothetical business problems in logistics and SCM.
3. evaluate business problems as an application of linear programming in logistics and SCM

4. gather information about various deposit and loan schemes of banks to find out interest rate differentials, and compounded value.
5. gather information about annuity schemes in the investment markets like periodic home mortgage payments, insurance payments and pension payments, life insurance products as an annuity.
6. identify the decision-making variables and assess their functional relationship with other variables affecting the decision in a hypothetical business and economic situation in logistics and SCM .
7. develop programming for hypothetical business problems involving constrained optimisation in logistics and SCM.

Suggested Readings:

- Anthony, M., & Biggs, N. (1996). *Mathematics for Economics and Finance*. Cambridge: Cambridge University Press.
- Ayres, F. J. (1963). *Theory and Problems of Mathematics of Finance*. New York: McGraw Hill Publishing.
- Budnick, P. (1986). *Applied Mathematics for Business, Economics, & Social Sciences*. New York: McGraw Hill Publishing.
- Dowling, E. (2011). *Introduction to Mathematical Economics*. New York: McGraw Hill Publishing Kapoor.
- Ghosh & Sinha (2018). *Business Mathematics and Statistics*. Oxford University Press.
- S.K. Sharma and Kaur, G. (2019). *Business Mathematics*. New Delhi: Sultan Chand & Sons (P) Ltd.
- Singh, J. K. (2017). *Business Mathematics*. New Delhi: Himalaya Publishing House.
- Thukral, J. K. (2009). *Mathematics For Business Studies*. New Delhi: Mayur Paperbacks.
- V. K., & Sancheti, D. C. (2014). *Business Mathematics, Theory & Applications*. Delhi: S. Chand Publishing.

Notes:

- **Suggested readings shall be updated and uploaded on the college website from time to time.**
- **Examination scheme and mode shall be prescribed by the Examination branch, University of Delhi from time to time.**