

Category IV

BSc. Physical Sciences/ Mathematical Sciences with Operational Research as one of the three Core Disciplines CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

DISCIPLINE SPECIFIC CORE COURSE – 3: MATHEMATICAL MODELLING FOR BUSINESS

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Mathematical Modelling for Business (DSC-3)	4	3	0	1	Passed 12th class with Mathematics	Linear Programming

Learning Objectives

To acquaint students with different mathematical modelling techniques applicable in various businesses viz., inventory control, marketing management, and network flow analysis.

Learning outcomes

On successful completion of the course, students will be able to:

- Explain the meaning of Inventory control, its various forms, and the functional role of Inventory.
- Calculate the Economic Order Quantity (EOQ) for various Deterministic Inventory models.
- Comprehend inventory models with All Units Quantity Discounts
- Gain an understanding of the basic concepts and issues in marketing and their application in business decisions.
- Gain an understanding of network analysis and related mathematical models.
- Use standard methodologies for solving network flow problems.

SYLLABUS OF DSC-5

Unit I: Introduction to Inventory Management

(18 Hours)

Concept and significance of inventory management, Different types of costs in the inventory system. Deterministic continuous review models: Economic order quantity (EOQ) model with

and without shortages, Finite replenishment rate Inventory models without and with planned shortages. Determination of reorder point for all the models. Inventory models with All Units Quantity Discounts.

Unit II: Fundamentals for Marketing Management (15 Hours)

Nature, Scope, and Importance of Marketing, Basic concepts, Marketing Environment, Consumer Behaviour, Market Classification based on Competitive Conditions, Product Mix, Pricing Strategies, Media allocation for advertisement, Brand switching analysis, Concept of Measurement of Elasticity of Demand, Factors Affecting Elasticity of Demand, Income Elasticity of Demand, Cross Elasticity of Demand, Advertising Elasticity of Demand.

Unit III: Network Analysis (12 Hours)

Understanding of network components, Construction of network diagram, Introduction to Network flow problems and their applications: Shortest path problem, Travelling salesman problem, minimum spanning tree.

Practical component (if any) - (30 Hours)
Practical/Lab to be performed on a computer using OR/Statistical packages

- To find optimal inventory policy for deterministic inventory models without shortages.
- To find optimal inventory policy for deterministic inventory models without shortages.
- To solve all units quantity discounts model.
- Finding shortest path in a network.
- Solving a travelling salesman problem.
- Finding minimum spanning tree in a network.
- Problems based on media allocation for advertisement.
- Problems based on Brand switching analysis.

Essential/recommended readings

- Bazaraa, M. S., Jarvis, J. J., & Sherali, H. D. (2011). *Linear programming and network flows*. John Wiley & Sons.
- Hadley, G., & Whitin, T. M. (1963). *Analysis of inventory systems*. Prentice-Hall.
- Waters, D. (2008). *Inventory control and management*. (2nd Edition). John Wiley & Sons.
- Kotler P., & Keller, K. L. (2008), *Marketing management* (13th ed.). New Delhi: Pearson Education, Ltd.

Suggestive readings: Nil

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.