

- Gupta, A. (2018). *Financial Accounting for Managers: An Analytical Perspective*. Delhi, India: Pearson Education.
- Gupta, M., Kaur, H., & Gupta, R. (2020). *Financial Reporting and Analysis*. Delhi, India: JSR Publishing House LLP.
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- Lal, J. & Sucheta, G. (2018). *Financial Reporting and Analysis*. Mumbai, India: Himalaya Publishing House.
- Narasimhan, M. S. (2016). *Financial Statement and Analysis*. Uttar Pradesh, India: Cengage Learning India.
- Sah, R. K. (2019). *Concept Building Approach to Corporate Accounting*. Uttar Pradesh, India: Cengage Learning India.
- Soffer, L. C., & Soffer, R. J. (2002). *Financial Statement Analysis: A Valuation Approach*. London, United Kingdom: Pearson Education.
- Myer, J. N. (1969). *Financial Statement Analysis*. Prentice-Hall.
- Tulsian, P. C., & Tulsian, B. (2016). *Corporate Accounting*. Delhi, India: S. Chand Publishing.
- Tulsian, P. C., & Tulsian, B. (2017). *Financial Management*. Delhi, India: S. Chand Publishing.

Note: Suggested readings will be updated by the Department of Commerce and uploaded on the Department's website.

Discipline Specific Elective Course- 4.5 (DSE-4.5): Decision Science

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DSE 4.5 – Decision Science	4	3	1	0	Pass in Class XII with Mathematics/Accountancy	NIL

Learning Objectives

The course aims to familiarise the learners with basic mathematical tools, emphasising applications to business and economic situations.

Learning outcomes

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

1. Analyse quantitative techniques that play an important role in managerial decision-making.
2. Compare programming for business problems involving constrained optimization.
3. Examine, schedule, and coordinate the activities of a large-scale project using PERT and CPM.
4. Describe programming to assign sources and jobs to destinations and machines.
5. Examine how competitive choices in a business are made and how the business strategies are developed to reduce the customers' wait time.

SYLLABUS OF DSE – 4.5

Unit 1: Linear Programming (9 hours)

Formulation of Linear programming problems (LPPs) with more than two variables. Solution of LPPs by simplex method - maximization and minimization cases. The dual problem: Formulation, the relationship between Primal and Dual LPP, Primal and Dual solutions (excluding mixed constraints LPPs). The economic interpretation of the dual.

Unit 2: Assignment and Transportation (9 hours)

Assignment Problem, Hungarian Method of Assignment, Unbalanced Assignment Problems, Transportation Problem, Method to find the initial solution: North-west corner method, Least cost Method, Vogel's approximation method, Finding optimal solution: Stepping-stone method and Modified Distribution Method.

Unit 3: Sequencing and Game Theory (9 hours)

Introduction of sequencing, Notations, Terminology, and Assumptions, Processing n jobs through two and three machines, Introduction of Game Theory, Two-Person Zero-Sum Game, Pure Strategies (Minimax and Maximin Principles): Game with a saddle point. Mixed Strategies, Rule of Dominance.

Unit 4: Queuing Model and Replacement Theory (9 hours)

Introduction of Queuing Model, Structure of a Queuing System, Performance Measure of a Queuing System, Model I: $\{(M/M/1): (\text{Infinite/FCFS})\}$, Introduction of Replacement, Replacement of items whose efficiency deteriorates with time.

Unit 5: Project Management: PERT and CPM (9 hours)

Introduction, Basic Difference PERT and CPM, Phases of Project Management, PERT/CPM Network Components and Precedence Relationships, Critical Path Analysis, Critical Path, Project Scheduling with uncertain activity times, Estimation of project completion time.

Exercises:

The learners are required to:

1. Identify the decision-making variables and assess their functional relationship with other variables affecting the decision in a business situation.

2. Establish the production sequence of a hypothetical manufacturing company.
3. Solve business problems as an application of linear programming/assignment/ transportation.
4. Estimate the time when an asset of a company should be replaced.
5. Use a hypothetical case of a project and plan, schedule, and coordinate the activities.

Note: Learners may use software packages.

Suggested Readings:

- Anthony, M., & Biggs, N. (1996). *Mathematics for Economics and Finance*. Cambridge, United Kingdom: Cambridge University Press.
- Budnick, P. (1986). *Applied Mathematics for Business, Economics, & Social Sciences*. New York, United States: McGraw Hill Publishing.
- Dowling, E. (2011). *Introduction to Mathematical Economics*. New York, United States: McGraw Hill Publishing.
- Hamdy, A. T. (2017). *Operational Research*. Pearson.
- Kapoor, V.K. (2013). *Operations Research: Quantitative Techniques for Management*. Delhi, India: Sultan Chand and Sons.
- Levin R. I., Rubin D.S., Stinson J.P., & Gardner E.S. Jr. (1986). *Quantitative Approaches to Management*. New York, United States: McGraw Hill International Editions.
- Vohra, N.D. & Arora, H. (2010). *Quantitative Techniques in Management*. Delhi, India: McGraw Hill.
- Tulsian, P.C. & Pandey, V. (2002). *Quantitative Techniques: Theory and Problems*. India: Pearson Education.

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