Course Type	Course Code	Name of Course	L	T	P	Credit
DC	**EMSC502**	**Modelling for Decisions**	3	1	0	4

Course Objective
This course shall expose the candidates to various quantitative models for decision-making that aim at finding optimum or close to optimum results. Major emphasis shall be on problem formulation and selection of appropriate techniques for solution and interpretation of results.

Learning Outcomes
Upon successful completion of this course, students will: • Understand how to formulate a mathematical model for a business or an industrial engineering problem. • Get familiar with the various types of Operations Research Tools and techniques and their solution procedure. • Get familiar with some application software like MS Solver, for solving OR problems.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Linear programming–Examples from industrial cases, formulation & definitions. Graphical Method and Simplex Algorithm–slack, surplus & artificial variables, computational details, big-M method, identification and resolution of special cases through simplex iterations.	9L+3T	Understand the fundamental concept of decision problems, the mathematical formulation of a decision problem and Its solution procedure
2	Transportation problems: TP-Examples, Definitions–decision variables, supply & demand constraints, formulation, Balanced & unbalanced situations, Solution methods–NWCR, minimum cost & VAM, Loop Formation, stepping stone method, test for optimality (MODI method), degeneracy & its resolution	6L+2T	Understand the concept of Transportation models and its applications
3	Assignment problems: AP-Examples, Definitions–decision variables, constraints, formulation, Balanced & unbalanced situations, Solution method–Hungarian, degeneracy & its resolution	6L+2T	Understand the concept of assignment problems and its applications
4	Queuing Theory: Definitions–queue (waiting line), waiting costs, characteristics (arrival, queue, service discipline) of queuing system, queue types (channel vs. phase), Kendall's notation, Little's law, steady state behavior, with examples–single and parallel servers and Their performance measures with finite & Infinite queue length	6L+3T	Understand the concept of waiting line models and its applications
5	Simulation Methodology: Definition and steps of simulation; random number generator; Monte Carlo Simulation, Discrete Event System Simulation; Application in Scheduling, Queuing systems.	5L+2T	To get familiar with the simulation methods for problem solving
6	Game Theory: Game theory to determine strategic behavior, Elements of cooperative and non-cooperative games, Two-person zero-sum game, graphical solution method, Linear programming formulation (application)	5L+1T	To get familiar with the concept of game theory
7	Decision Theory: Decision Making under risk and uncertainty, Pay-off matrix, Opportunity Cost Matrix; Decision trees	5L+1T	To get familiar with the concept of decision theory
	Total	42L+14	

Text Books:

1. Operations Research: An Introduction- H. A. Taha, Macmillan, N. Y.
2. Quantitative Methods for Business: David R. Anderson, Dennis J. Sweeney, Thomas A. Williams, Jeffrey D. Camm, & James J Cochran, Cengage Learning India Pvt. Ltd.
3. Principles of OR with Application to Managerial Decisions: H. M. Wagner, Prentice Hall.

Reference Books:

1. Introduction to Operations Research: F. S. Hiller and G. J. Lieberman, Addison Wesley.
2. Operations Research and Management Science, Handbook: Edited by A. Ravi Ravindran, CRC Press, Taylor & Francis Group.