

Devi Ahilya University, Indore, India Institute of Engineering and Technology				B.E. IV Year (Mechanical Engineering)					
Subject Code and Name	Instruction Hours Per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
4ME105 OPERATIONS RESEARCH	4	-	-	Max	100	50	-	-	150
Duration of Theory Paper 3 Hour				Min	35	25			60

Objectives and Pre requisites: To develop the skills of decision making in dynamic business situations through quantitative analysis using different mathematical models like linear programming, Transportation, Assignment, Queuing etc. and Strategies formulation with the help of game theory and simulation etc.

COURSE CONTENT

UNIT-1

Introduction

History and development of Operations Research, Scientific Methods, Characteristics, Scope, Models in Operations Research.

Linear Programming: Formulation, graphical methods, simplex method, Big- M- method

UNIT-2

Linear programming models

Assignment Models: Definition, Mathematical Representation, Formulation and Solution, Alternate optimal solution
Transportation Model: Definition, Formulation and solution, Alternate optimal solution, Stepping stone method, Modified distribution (MODI) or u-v method

Sequencing Models: Processing n jobs through two machines, m machines, and processing two jobs through m machines, Traveling salesman problem, and minimal path problem.

UNIT-3

Waiting Line and Dynamic programming Model

Models: Introduction, classification, state in queue, probability distribution of arrival and service times. Single server model (M/M/I). Multiple server model (MMS), Birth and death process.

Dynamic Programming: Introduction, Distribution characteristic, Dynamic programming approach, Optimal subdivision problem.

UNIT-4

Game Theory and Simulation

Theory of Game, Competitive game, Two persons, zero sum games, maximin and minimax Principles. Saddle point. Method of Dominance, graphical and algebraic method of solution by transforming into linear programming problem. Bidding problem. Building a simulation model, Monte-Carlo simulation and application.

UNIT-5

Network Analysis

Network diagram, Time estimation, Basic steps in PERT and CPM, PERT computation, CPM computation, critical path, Float, Cost analysis, Crashing the network.

BOOKS RECOMMENDED:

- [1] Taha, *Operations Research*, Tata Mc.Graw Hill.2002
- [2] Wagner, *Operations Research*, PHI. New Delhi, 2003
- [3] Ravindram & Philips, *Operations Research*, Tata Mc.Graw Hill.2005
- [4] Gupta & Hira, *Operations Research*, S. Chand. 1e, 2008
- [5] Vohra N.D, Kataria S.K, *Quantitative Techniques for Management*. Tata Mc.Graw Hill, 2004.