

INSTITUTE	FACULTY OF MANAGEMENT STUDIES
PROGRAM	BACHELOR OF BUSINESS ADMINISTRATION
SEMESTER	5
COURSE TITLE	OPERATIONS RESEARCH
COURSE CODE	04BB1501
COURSE CREDITS	4

Course Outcomes: After completion of this course, student will be able to:

- 1 Develop the skill and ability to translate a given real-life situation into linear programming problem.
- 2 Apply graphical method in solving linear programming problem and understand the concept of duality.
- 3 Apply transportation method in solving business problems.
- 4 Apply assignment method in appropriate situation to resource allocation problems.
- 5 Analyze the problems such as queue management using the tools of queuing theory and Simulation.

Pre-requisite of course:NONE

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	Basics of Operations Research (OR), Linear Programming Problem (LPP) 1 – Formulation Introduction, Concepts, Definition, Characteristics, Potential Applications, Steps in OR Problems, Basic Operations Research Techniques, Role of Computers in OR, Introduction to Linear Programming, Applications of LPP, Requirements and Assumptions Underlying LPP, Generalized Linear Programming Problems, LPP Model Formulation – Maximization and Minimization Problems (Max 3-Variables and 4-Constraints)	8

Contents : Unit	Topics	Contact Hours
2	Linear Programming Problem (LPP) 2 – Graphical Method, Concept of Duality Concept of Feasible Region, Solution of LP Problems using Graphical Method, Maximization and Minimization Problems (Max 4-Constraints), Special Cases in LPP – Multiple or Alternate Optimum Solutions, Unbounded Solution and Infeasible Solution, Introduction to Duality, Relation between Primal Problem and Dual LPP, Conversion of Primal Problem to Dual LPP (Note: Max 3 -Variables and 3-constraints, Mixed-constraints and Unrestricted Variables)	12
3	Transportation Problem (TP) Introduction, Structure of TP, Solution of TP – Initial Feasible Solution (IFS) using North West Corner Method (NWCN), Least Cost Method (LCM) and Vogel’s Approximation Method (VAM), Finding Optimal Solution using MODI Method, Types of Transportation Problem – Balanced and Unbalanced, Minimization and Maximization, Case of Degeneracy and Prohibited or Restricted Route, Unique Optimum Solution and Multiple Optimum Solutions (Note: Max 4X4 Transportation Matrix, MODI Method - Maximum One Iterations after IFS, Degeneracy to be covered at Conceptual Level, Not to be Included in Numerical)	10
4	Assignment Problem (AP) Introduction, Structure of AP, Solution of AP using Hungarian Method, Types of Assignment Problems - Balanced and Unbalanced, Minimization and Maximization, Restricted Assignment, Unique Optimum Solution and Multiple Optimum Solutions, Travelling Salesman Problem (Note: Max 5X5 Assignment Matrix, Maximum Two Iterations after Row and Column Minimization)	8
5	Probabilistic Operations Research Models (Waiting Line Models, Digital Simulation) Queuing Models – Concepts, General structure of a queuing system, Single-channel queuing model: Poisson-distributed arrivals and exponentially distributed service times with infinite source population M/M/1 queuing models, Digital Simulation - Introduction, Areas of Applications, Steps involved in Monte Carlo Simulation, Application of Simulation Method, Advantages and Disadvantages of Simulation, Application in Queuing, Inventory, Profitability and Investment problems	10
Total Hours		48

Textbook :

- 1 Operations Research, J K Sharma, TRINITY Press, 2014
- 2 Quantitative Analysis for Management, Barry Render et.al, Pearson, 2012

References:

- 1 Quantitative Techniques for Management, Quantitative Techniques for Management, N D Vohra, Tata McGrawHill, 2014
- 2 Operations Research, Operations Research, V K Kapoor, S.Chand and Sons, 2010

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
10.00	20.00	25.00	25.00	10.00	10.00

Instructional Method:

- 1 THEORY

Supplementary Resources:

- 1 <https://pubsonline.informs.org/journal/opre>
- 2 <https://www.theorsociety.com/resource-centre/teaching-resources/>
- 3 <https://www.loc.gov/classroom-materials/transportation/>
- 4 <https://education.theiet.org/secondary/teaching-resources/transportation-problems/>