INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS								
II Semester: MBA								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
CMBE19	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		4	**-**	**-**	**4**	40	60	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		
Prerequisite: Basic concepts of management								
SDGs Mapped: SDG 4 (Quality Education), SDG 9 (Industry, Innovation and Infrastructure)								

I. COURSE OVERVIEW:

The main objective of the course is to help develop and enhance quantitative approach & knowledge. This means good quantitative skills, as well as confidence in the usage of statistical methods and their interpretations, focusing on improved decision-making abilities based on quantitative sources.

II. COURSES OBJECTIVES:

The students will try to learn:

I. The fundamental concepts, scope, and applications of Operations Research (OR) in managerial decision-making, along with the process of developing and applying OR models for problem-solving.

II. How to formulate and solve Linear Programming Problems (LPP) using graphical and simplex methods, and understand the role of duality and limitations of LPP in real-world applications.

III. How to apply mathematical models for solving Assignment and Transportation problems using standard methods such as the Hungarian Method, VAM, and MODI, and analyze optimal solutions for business operations.

IV. The decision-making techniques under various conditions of uncertainty and risk, and understand the basic concepts of Queuing Theory and Game Theory for optimizing managerial performance.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

CO1 Understand the nature, scope, and applications of Operations Research and different types of OR models.

CO2 Analyze and formulate Linear Programming Problems (LPP) and solve them using graphical and simplex methods.

CO3 Develop solutions for assignment problems, including variations, using Hungarian and simplex methods.

CO4 Apply transportation problem techniques, including initial feasible solution methods and optimality tests.

CO5 Evaluate decision-making under uncertainty, risk, and perfect information using decision trees.

CO6 Apply queuing and game theory models to solve problems involving waiting lines and strategic decision-making.

IV. COURSE CONTENT:

MODULE - I: Introduction to Operations Research (08)
Nature and Scope of Operations Research: Origins of OR, Applications of OR in different Managerial Areas, Problem Solving and Decision-making, Quantitative and Qualitative Analysis. Defining a Model, Types of Models, Process for Developing an Operations Research Model, Practices, Opportunities and Shortcomings of using an OR Model.

MODULE - II: Linear Programming Method (08)
Structure of LPP, Assumptions of LPP, Application Areas of LPP, Guidelines for Formulation of LPP, Formulation of LPP for Different Areas, Solving of LPP by Graphical Method: Extreme Point Method, Simplex Method, Converting Primal LPP to Dual LPP, Limitations of LPP.

MODULE - III: Assignment Model (10)
Assignment Model: Algorithm for Solving Assignment Model, Hungarians Method for Solving Assignment Problem, Variations of Assignment Problem: Multiple Optimal Solutions, Maximization Case in Assignment Problem, Unbalanced Assignment Problem, Travelling Salesman Problem, Simplex Method for Solving Assignment Problem.

Transportation Problem: Mathematical Model of Transportation Problem, Methods for Finding Initial Feasible Solution: Northwest Corner Method, Least Cost Method, Vogels Approximation Method, Test of Optimality by Modi Method, Unbalanced Supply and Demand, Degeneracy and its Resolution.

MODULE – IV: DECISION THEORY (10)
Introduction, ingredients of decision problems, decision making under uncertainty, cost of uncertainty, under risk, under perfect information, decision tree, construction of decision tree.

MODULE – V: QUEUING THEORY (09)
Queuing structure and basic components of a queuing model, distributions in queuing model, Differences in queuing model with FCFS, queue discipline, single and multiple service station with finite and infinite population, Game Theory, Suddle Point, Value of the Game.

I. TEXTBOOKS:

1. Stacho, Juraj. "Introduction to operations research", 10th edition, 2021.
2. Stevenson J. William, "Operations Management", Tata McGraw-Hill, 14th edition, 2019
3. Barry Render, Ralph M. Stair, Jr., Michael E. Hanna, "Quantitative Analysis for Management", Pearson Education, 11th edition, 2017.
4. B Mahadevan, "Operations Management: Theory and Practice", Pearson Education India, 3rd edition, 2015.

II. REFERENCE BOOKS:

1. Anand Sharma, "Quantitative Techniques for Decision Making", HPH, 1st edition, 2010.
2. Prem Kumar Gupta, "Introduction to Operations Research", S.Chand, 5th edition, 2012.
3. K.L Schgel, "Quantitative Techniques and Statistics", 3rd revised edition, 2012.
4. Hillier / Lieberman, "Introduction to operations research", TMH, 9th edition, 2012.
5. Hamdy A Taha, "Operations Research: An Introduction", Pearson, 9th edition, 2013.

III. WEB REFERENCES:

1. http://web.itu.edu.tr/topcuil/ya/OR.pdf
2. http://textofvideo.nptel.iitm.ac.in/112106134/lec1.pdf

IV. E-TEXT BOOKS:

1. https://www.goodreads.com/shelf/show/operations-research
2. https://books.google.co.in/books/about/Operations_Research.html?id=P9h42uyE72YC
3. https://www.bbau.ac.in/dept/UIET/EME-601%20Operation%20Research.pdf
4. http://eprints.stiperdharmawacana.ac.id/51/1/%5BJohn_Buglear%5D_Quantitative_Methods_for_Business_%28BookFi%29.pdf