MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act,1956

## COURSE CONTENT

| QUANTITATIVE TECHNIQUES FOR MANAGEMENT | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **II SEMESTER** | | | | | | | | |
| **Course Code** | **Category** | **Hours/Week** | | | **Credits** | **Maximum Marks** | | |
| | | **L** | **T** | **P** | **C** | **CIE** | **SEE** | **Total** |
| **20MBA0010** | **CORE** | 4 | 0 | - | 4 | 40 | 60 | 100 |
| **Contact Classes:**45 | **Tutorial Classes:** Nil | **Practical Classes:** Nil | | | | **Total Classes:** 45 | | |
| **Prerequisite:** Basic concepts of quantitative techniques | | | | | | | | |

### COURSE OVERVIEW:

This course introduces Operations Research (OR) and its importance in managerial decision-making using scientific and quantitative techniques. It explains the scope, applications, and model building process of OR in solving business problems. The course covers optimization tools such as Linear Programming, Transportation, and Assignment Models for effective resource allocation. It also includes Decision Theory and Network Analysis (PERT & CPM) for project planning and decision-making under risk and uncertainty. Additionally, Queuing Theory and Game Theory are studied to analyze waiting line systems and competitive business situations.

### COURSE OBJECTIVES:

- To understand the fundamental concepts, scope, and applications of operations research in managerial decision-making.
- To apply linear programming techniques and transportation models for optimizing resource allocation problems.
- To analyze assignment problems using appropriate methods such as the Hungarian method and evaluate their variations.
- To evaluate decision-making techniques under certainty, risk, and uncertainty, including decision trees and network analysis methods like PERT and CPM.
- To examine queuing theory and game theory concepts for solving real-world service and competitive decision problems.

### COURSE OUTCOMES: After Completion of the course, students should be able to

1. Explain operations research, its scope, applications, problem-solving methods, model types and development process
2. Describe the structure, assumptions, applications of Linear Programming and Transportation Problem.
3. Use the Hungarian Method and other techniques for settling assignment problems.

4. Evaluate decisions under uncertainty, risk and certainty using decision trees for planning projects efficiently with PERT-CPM methods.
5. Analyze various queuing models and game theory concepts, service structures, queue disciplines for optimizing resource allocation through strategic decision-making.

**Unit – I: Introduction to Operations Research**: 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 short comings of OR Model.

**Unit – II: Linear Programming Method:** Structure of LPP, Assumptions of LPP, Applications 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.
**Transportation Problem:** Mathematical Model of transportation problem, Methods for finding Initial feasible solution: Northwest corner Method, Least Cost Method, Vogel's approximation Method, Test of optimality by Modi Method, unbalanced Supply and demand, Degeneracy and its resolution.

**Unit – III: 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.

**Unit – IV: Decision Theory:** Introduction, ingredients of decision problems. Decision making – under run certainty, cost of uncertainty, under risk, under perfect information, decision tree, construction of decision tree. Network Analysis – Network Diagram, PERT, CPM, Critical Path determination, Project Completion Time, Project Crashing.

**Unit – V: Queuing Theory:** Queuing Structure and basic component of an Queuing Model, Distributions in Queuing Model, Different in Queuing Model with FCFS, Queue Discipline, Single and Multiple service station with finite and infinite population. Game theory, Saddle point, Value of the Game. Latest Amendments in Quantitative Techniques.

## TEXT BOOKS:


- S. D. Sharma, Operations Research, Kedarnath Ramnath and Company, 2008.
- R. Pannerselvam, Operations Research, Prentice Hall International, 3e, 2015.
- J. K. Sharma, Operations Research: Theory and applications, 5e, Macmillian, 2013.
- Anderson, Sweeney, Williams, Camm, Martin, Quantitative Methods for Business, 12e, Cengage Learning, 2013.
- Hamdy A. Taha, Operations Research: An Introduction, 9 e, Pearson, 2013.
- Prem Kumar Gupta, D.S. Hira, Operations Research 5e, S. Chand ,2012

## REFERENCE BOOKS:


- Quantitative Analysis for Business Decisions – Harold Bierman, Charles P. Bonini & Warren H. Hausman — Publisher: R. D. Irwin.

1. Quantitative Analysis for Business Decisions – K. Shridhara Bhat — Publisher: R. Pannerselvam, Operations Research, Prentice Hall International, 3e, 2012

- Himalaya Publishing House.
- Quantitative Analysis for Business Decision I – B. A. Vasu & D. Manikanthan — Publisher: Vikas Publishing House.
- Quantitative Analysis for Decision Makers – Mik Wisniewski, Farhad Shafti & Wee Meng Yeo — Publisher: Pearson.
- Operations Research and Management Quantitative Methods for Planning and Decision Making in Business and Economics – Franz W. Peren & Thomas Neifer — Publisher: Springer
-


## ELECTRONIC RESOURCES:

1. https: //tn.upi.edu/pdf/Operations_Management.pdf
2. https:// notendur.hi.is/~kth93/3.20.pdf
3. https:// ebooks.cambridge.org/ebook.jsf?bid=CBO9781139150002
4. https:// www.ebook777.com/operations-research-11th-edition/

## MATERIALS ONLINE:

1. Course template
2. Tutorial question bank
3. Tech talk and Concept Video topics
4. Open-ended experiments
5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. PowerPoint presentation
11. Drishya Siksha Sangrah (DSS) Videos