



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

OPERATIONS RESEARCH								
III Semester: OE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		CIA	SEE	Total
BPSE31	Elective	3	-	-	3	40	60	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			
Prerequisite: -								

I. COURSE OVERVIEW:

Operations Research (OR) is a discipline that helps to make better decisions in complex scenarios by the application of a set of advanced analytical methods. It couples theories, results and theorems of mathematics, statistics and probability with its own theories and algorithms for problem solving. Applications of OR techniques spread over various fields in engineering, management and public systems. This course includes the following topics: Linear Programming, Transportation problems, Assignment and Theory of games problems. Advanced topics on waiting line and simulation.

II. COURSE OBJECTIVES:

The students will try to learn:

- I. The description, characteristics of operation research and mathematical model of real time problem for optimization.
- II. Establish the problem formulation by using linear, dynamic programming, game theory and queuing models.
- III. Apply stochastic models for discrete and continuous variables to control inventory.
- IV. Visualize the computer-based manufacturing simulation models.

III COURSE OUTCOMES:

After successful completion of the course, students will be able to:

- CO1 Recall the basics of operation research
- CO2 Explain the characteristics and scope of OR
- CO3 Select optimal problems solving techniques for a given problem using LP
- CO4 Solve transportation, travelling sales man and Assignment problems
- CO5 Demonstrate and solve simple models of Game theory.
- CO6 Choose appropriate simulation model for practical application

IV. COURSE CONTENTS:

MODULE -I: INTRODUCTION AND ALLOCATION (10)

Development, definition, characteristics and phases, types of operation research models, applications; Allocation: linear programming, problem formulation, graphical solution, simplex method, artificial variables techniques, two-phase method, big-M method.

MODULE -II: TRANSPORTATION AND ASSIGNMENT PROBLEM (09)

Transportation problem: Formulation, optimal solution, unbalanced transportation problem, degeneracy; Assignment problem, formulation, optimal solution, variants of assignment problem, traveling salesman problem

MODULE -III: SEQUENCING AND REPLACEMENT (10)

Sequencing: Introduction, flow, shop sequencing, n jobs through two machines, n jobs through three machines, job shop sequencing, two jobs through “m” machines.

Replacement: Introduction: Replacement of items that deteriorate with time, when money value is not counted and counted, replacement of items that fail completely, group replacement.

MODULE – IV: THEORY OF GAMES AND INVENTORY (09)

Theory Of Games: Introduction, minimax (maximin) criterion and optimal strategy, solution of games with saddle points, rectangular games without saddle points, dominance principle, $m \times 2$ and $2 \times n$ games, graphical method; Inventory: Introduction, single item, deterministic models, purchase inventory models with one price break and multiple price breaks, shortages are not allowed, stochastic models, demand may be discrete variable or continuous variable, instantaneous production, instantaneous demand and continuous demand and no set up cost, single period model.

MODULE -V: WAITING LINES AND SIMULATION (10)

Waiting Lines: Introduction, single channel, poison arrivals, exponential service times, with infinite population and finite population models, multichannel, poison arrivals, exponential service times with infinite population single channel Poisson arrivals; Simulation: Definition, types of simulation models, phases of simulation, applications of simulation, inventory and queuing problems, advantages and disadvantages, brief Introduction of simulation languages.

V. TEXTBOOKS:

1. J. K. Sharma, “Operations Research”, Macmillan, 5th edition, 2012.
2. R. Pannerselvan, “Operations Research”, PHI Publications, 2nd edition, 2006.

VI. REFERENCE BOOKS:

1. A. M. Natarajan, P. Balasubramani, A. Tamilarasi, “Operations Research”, Pearson Education, 1st edition, 2013.
2. Maurice Saseini, Arthur Yspan, Lawrence Friedman, “Operations Research: Methods & Problems”, 1st edition, 2013.
3. Hamdy A. Taha, “Introduction to O.R”, PHI, 8th edition, 2013.
4. Harvey M. Wagner, “Operations Research”, PHI Publications, 2nd edition, 2013.

VII. ELECTRONICS RESOURCES:

1. <http://people.brunel.ac.uk/~mastjjb/jeb/or/contents.html>
2. <https://pe.gatech.edu/degrees/online-masters-degrees/operations-research>
3. <http://nptel.ac.in/courses/112106134/1>

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Assignments

4. Definition and terminology
5. Tech Talk Topics
6. Model question paper-I
7. Model question paper-II
8. Lecture notes
9. Power point presentations