

## OPERATIONS RESEARCH

<b>Course code</b>		<b>Year</b>	IV	<b>Semester</b>	I
<b>Course category</b>	Management Course- II	<b>Offering Branch</b>	ME	<b>Course Type</b>	Theory
<b>Credits</b>	2	<b>L-T-P</b>	2-0-0	<b>Prerequisites</b>	Nil
<b>Continuous Internal Evaluation</b>	30	<b>Semester End Evaluation</b>	70	<b>Total Marks</b>	100

**Course Outcomes:** Upon successful completion of the course, the student will be able to

	Statement	Skill	BTL	Units
<b>CO1</b>	Analyze linear programming problems by formulating models and comparing graphical and simplex solution approaches.	Analyze	L4	1
<b>CO2</b>	Analyze transportation, assignment, and sequencing problems to evaluate and select optimal operational strategies.	Analyze	L4	2
<b>CO3</b>	Analyze replacement scenarios and competitive situations using game theory to determine effective decision strategies.	Analyze	L4	3
<b>CO4</b>	Analyze queuing systems and inventory models to assess system performance and optimize service and stock control policies.	Analyze	L4	4
<b>CO5</b>	Analyze multistage decision processes and simulation models to interpret system behavior and support real-life decision-making.	Analyze	L4	5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
<b>CO1</b>	3	3	2	2	2						2	3	2
<b>CO2</b>	3	3	3	2	2	1					2	3	2
<b>CO3</b>	2	3	2	3	2	2					2	3	2
<b>CO4</b>	3	3	3	3	3	2					2	3	2
<b>CO5</b>	3	3	3	3	3	2					3	3	2

Syllabus		
UNIT	Contents	Mapped CO
<b>I</b>	<b>INTRODUCTION</b> - definition- characteristics and phases – types of operation research models – applications. <b>LINEAR PROGRAMMING:</b> Linear programming problem formulation – graphical solution – simplex method – artificial variables techniques -two-phase method, big-M method – duality principle	<b>CO1</b>
<b>II</b>	<b>TRANSPORTATION PROBLEM:</b> Formulation – Basic Feasible Solution, optimal solution, unbalanced transportation problem – degeneracy. <b>ASSIGNMENT PROBLEM</b> – formulation – optimal solution - variants of assignment problem- travelling salesman problem. <b>SEQUENCING</b> – Introduction – flow –shop sequencing – n jobs through two machines – n jobs through three machines – job shop sequencing – two jobs through ‘m’ machines	<b>CO2</b>
<b>III</b>	<b>REPLACEMENT:</b> Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement. <b>THEORY OF GAMES:</b> Introduction – mini. max (max. mini) – criterion	<b>CO3</b>

	and optimal strategy – solution of games with saddle points – rectangular games without saddle points – 2 x 2 games – dominance principle – m x 2 & 2 x n games -graphical method.	
IV	<p><b>QUEUEING THEORY:</b> Introduction – single channel – poisson arrivals – exponential service times – with infinite population and finite population models– multichannel – poisson arrivals – exponential service times with infinite population single channel.</p> <p><b>INVENTORY CONTROL:</b> 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 demand and continuous demand and no set up cost. ABC &amp; VED Analysis</p>	CO4
V	<p><b>DYNAMIC PROGRAMMING:</b> Introduction – Bellman’s principle of optimality – shortest path problem.</p> <p><b>SIMULATION:</b> Definition – types of simulation models – phases of simulation– applications of simulation – inventory problems</p>	CO5

### Learning Resource

#### Text books:

1. Operations Research-An Introduction/Hamdy A Taha/Pearson publishers
2. Operations Research –Theory & publications / S.D.Sharma-Kedarnath/McMillan publishers India Ltd

#### Reference books

1. Introduction to O.R/Hiller & Libermann/TMH
2. Operations Research /A.M. Natarajan, P. Balasubramani, A. Tamilarasi /Pearson Education.
3. Operations Research: Methods & Problems / Maurice Saseini, ArthurYaspan& Lawrence Friedman/Wiley
4. Operations Research / R.Pannerselvam/ PHI Publications.
5. Operations Research / Wagner/ PHI Publications.
6. Operation Research /J.K.Sharma/MacMilan Publ.
7. Operations Research/ Pai/ Oxford Publications
8. Operations Research/S Kalavathy / Vikas Publishers
9. Operations Research / DS Cheema/University Science Press
10. Operations Research / Ravindran, Philips, Solberg / Wiley publishers

#### E-Resources & other digital Material:

1. <http://nptel.ac.in/courses/112106134/>
2. <http://nptel.ac.in/courses/112106131/>