

Department of Management Studies,  
Indian Institute of Technology (Indian School of Mines), Dhanbad – 826004

Class: **5<sup>th</sup> / 6<sup>th</sup> Semester B.Tech. (Management Basket)**

Course Type	Course Code	Name of Course	L	T	P	Credit
Basket	MSC 301	Operations Research	3	0	0	9

Course Objective
This course shall acquaint students with various quantitative models for managerial decision making which aim at finding optimum solutions. Major emphasis shall be on problem formulation, solution procedure and interpretation of results.
Learning Outcomes
<p>Upon successful completion of this course, students will:</p> <ul style="list-style-type: none"> <li>• Understand how to formulate a mathematical model for a business or an industrial engineering problem.</li> <li>• Get familiar with the various types of Operations Research Tools and techniques and their solution procedure.</li> <li>• Get familiar with the some application software like MS Solver for solving OR problems.</li> </ul>

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	<b>Linear Programming</b> Examples from industrial cases, formulation & definitions. Graphical Method and Simplex Algorithm – slack, surplus & artificial variables, computational details, big-M method, identification and resolution of special cases through simplex iterations.	12	Understand the fundamental concept and mathematical structure of a LP model and its solution procedure
2	<b>Transportation problems</b> Examples, Definitions – decision variables, supply & demand constraints, formulation, Balanced & unbalanced situations, Solution methods – NWCR, minimum cost & VAM, test for optimality (MODI method), degeneracy & its resolution.	6	Recognize, formulate and solve a transportation problem involving large number of shipping routes
3	<b>Assignment problems</b> Examples, Definitions – decision variables, constraints, formulation, Balanced & unbalanced situations, Solution method – Hungarian, degeneracy & its resolution.	6	Understanding of assignment models and its applications

4	<b>Queuing Theory</b> Definitions – queue (waiting line), waiting costs, characteristics (arrival, queue, service discipline) of queuing system, queue types (channel vs. phase), Kendall’s notation, Little’s law, steady state behaviour, Poisson’s Process & queue, Models with examples – single and parallel server and its performance measures;	6	Identify and examine situations that generate queuing problems and discuss how to model such situations
5	<b>Decision Theory</b> Decision Making under risk and uncertainty, Pay-off matrix, Opportunity Cost Matrix; Decision trees;	4	Understand to make decision under uncertain business environment
6	<b>Inventory Models</b> Inventory management Techniques; various cost components; Basic inventory models and problems.	3	To get familiar with inventory concepts and solve inventory related problems.
7	<b>Machine replacement analysis</b>	2	Realize the need to study economical replacement of machines and equipment
	<b>TOTAL</b>	<b>39</b>	

**Text Books:**

1. Operations Research – H. A. Taha (Pearson Education)
2. Operations Research – J.K Sharma ( McMillan Publishers)

**Reference Books:**

1. Principles of OR with Application to Managerial Decisions: H.M.Wagner (Prentice Hall).
2. Introduction to Operations Research – Hiller & Liberman (Tata McGraw Hill)