

Course code	Course Name	L-T-P-Credits	Year of Introduction
ME372	Operations Research	3-0-0-3	2016
Prerequisite -Nil			
Course Objectives:			
<ul style="list-style-type: none"> To understand the role of operation research in decision making To impart the various operation research techniques for effective problem solving. 			
Syllabus:			
Operations research models, linear programming, transportation problem, assignment problem, sequencing problem, network analysis, queuing theory, inventory control, decision theory, game theory – simulation.			
Expected Outcome:			
<ul style="list-style-type: none"> The students will be able to understand operations research techniques and apply them in solving practical problems in industry. 			
Text Books:			
<ol style="list-style-type: none"> Miller, D. M. and Schmidt, J. W., Industrial Engineering and Operations Research, John Wiley & Sons, Singapore, 1990. Paneerselvam, R., Operations Research, Prentice Hall of India, New Delhi, 2008. Pannerselvam, R., Design and Analysis of Algorithms, Prentice Hall of India, New Delhi, 2007. Srinivasan, G. "Operations Research-Principles and Applications", Latest edition, PHI Pvt. Ltd., 2010. Taha, H. A., Operations Research, Pearson, 2004. 			
Reference Books:			
<ol style="list-style-type: none"> Banks, J., Carson, J. S., Nelson, B. L., and Nicol, D. M., Discrete-Event System Simulation, Third Edition, Pearson Education, Inc., 2001. Goel, B. S. and Mittal, S. K., Operations Research, Pragati Prakashan, Meerut, 1999. Ravindran, Phillips and Solberg, Operations Research Principles and Practice, Willey & Sons, 1987. 			
Course Plan			
Module	Contents	Hours	End Sem. Exam. Marks
I	Basics of operations research–OR models–applications.	1	15%
	Linear programming – problem formulation	1	
	Graphical method	1	
	Simplex method	1	

	Big-M method	1	
	Two-phase method	1	
	Duality in linear programming	1	
II	Transportation problem – formulation – balanced & unbalanced transportation problems	1	15%
	North west corner rule – least cost method	1	
	Vogel’s method –stepping stone method	1	
	MODI method	1	
	Assignment problem – formulation – optimal solution, Hungarian algorithm	1	
	Variants of assignment problems	1	
	Traveling salesman problem.	1	
FIRST INTERNAL EXAMINATION			
III	Sequencing problem– terminology and notations – assumptions – problems with n jobs through two machines	1	15%
	Problems with n jobs through three machines	1	
	Problems with n jobs through m machines.	1	
	Network analysis – basic terms – network construction – time analysis	1	
	Critical path method (CPM)	1	
	Programme evaluation and review technique (PERT)	1	
	Cost considerations in network analysis – crashing	1	
IV	Introduction to queuing theory–terminologies– classification of queuing models	1	15%
	Single server problems	1	
	Multi server problems	1	
	Inventory control – variables – deterministic inventory models – purchasing model without shortages	1	
	Manufacturing model without shortages	1	
	Purchasing model with shortages	1	
	Manufacturing model with shortages	1	
SECOND INTERNAL EXAMINATION			
V	Decision theory – steps in decision theory approach – decision making conditions	1	20%
	Decisions under conditions of risk	1	
	Decisions under uncertainty conditions	1	
	Decision tree analysis	1	
	Game theory – games with saddle points	1	
	Games without saddle points – 2 x 2 games	1	

	Graphical method for $m \times 2$ & $2 \times n$ games	1	
VI	Simulation – types of simulation – phases of simulation – applications– advantages and disadvantages	1	20%
	Design of simulation, models & experiments, model validation	1	
	Generation of random numbers	1	
	Monte Carlo simulation	1	
	Queuing simulation model	1	
	Inventory simulation model	1	
	Simulation languages	1	

Question Paper Pattern

Maximum marks: 100

Time: 3 hrs

The question paper should consist of three parts

Part A

There should be 2 questions each from module I and II

Each question carries 10 marks

Students will have to answer any three questions out of 4 (3x10 marks =30 marks)

Part B

There should be 2 questions each from module III and IV

Each question carries 10 marks

Students will have to answer any three questions out of 4 (3x10 marks =30 marks)

Part C

There should be 3 questions each from module V and VI

Each question carries 10 marks

Students will have to answer any four questions out of 6 (4x10 marks =40 marks)

Note: Each question can have a maximum of four sub questions, if needed.