Course code	Course Name	L-T-P-Credits	Year of Introduction
ME471	Optimization Techniques	3-0-0-3	2016

Prerequisite - ME372 Operations Research

Course Objective:

- To learn the various optimization techniques for effective decision making.

Syllabus:

Linear programming – integer programming– network models – goal programming – dynamic programming – nonlinear programming – nontraditional optimization.

Expected Outcome:

- The students will be able to understand optimization techniques and apply them in solving practical problems

Text Books:

1. Miller, D. M. and Schmidt, J. W., Industrial Engineering and Operations Research, John Wiley & Sons, Singapore, 1990.
2. Paneerselvam, R., Operations Research, Prentice Hall of India, New Delhi, 2008.
3. Pannerselvam, R., Design and Analysis of Algorithms, Prentice Hall of India, New Delhi, 2007.
4. Taha, H. A., Operations Research, Pearson, 2004.

Reference Books:

1. Banks, J., Carson, J. S., Nelson, B. L., and Nicol, D. M., Discrete-Event System Simulation, Third Edition, Pearson Education, Inc., 2001
2. Goel, B. S. and Mittal, S. K., Operations Research, Pragati Prakashan, Meerut, 1999.
3. Ravindran, Phillips and Solberg, Operations Research Principles and Practice, Willey & Sons, 1987
5. Srinivasan, G. "Operations Research-Principles and Applications", latest edition, PHI Pvt. Ltd.

Course Plan

Module	Contents	Hours	End Sem. Exam. Marks
I	Review of linear programming– revised simplex method	1	15%
		1	
	Dual simplex method	1	

		1	
	Sensitivity analysis – changes affecting feasibility – changes affecting optimality	**1**	
		1	
		1	
II	Integer programming – importance – applications	**1**	**15%**
	Branch and bound technique	**1**	
		1	
	Gomory's cutting plane method	**1**	
		1	
	Solution to travelling salesman problem	**1**	
		1	
FIRST INTERNAL EXAMINATION			
III	Network models – minimal spanning tree problem	**1**	**15%**
	PRIM's algorithm	**1**	
	Kruskal's algorithm	**1**	
	Shortest route problem –applications	**1**	
	Systematic method	**1**	
	Dijkstra's algorithm	**1**	
	Floyd's algorithm	**1**	
IV	Goal programming – goal programming formulation-application.	**1**	**15%**
		1	
	Simplex method for solving goal programming	**1**	
		1	
	Dynamic programming – terminologies – forward and backward recursion –applications	**1**	
	Shortest path problems	**1**	
		1	
SECOND INTERNAL EXAMINATION			
V	Nonlinear programming – convex, quasi-convex, concave and unimodal functions – theory of constrained optimization	**1**	**20%**
		1	
		1	
	Lagrangean method	**1**	
		1	
	Kuhn-Tucker conditions	**1**	
		1	
VI	Nontraditional optimization – computational complexity- Introduction to metaheuristics – areas of application	**1**	**20%**
		1	
	Genetic algorithm (GA) – terminologies – steps and examples	**1**	
	Tabu search (TS) – steps and examples	**1**	
	Simulated annealing (SA) – steps and examples	**1**	
	Ant colony optimization (ACO) – steps and examples - Particle Swarm Optimization (PSO)-Steps and examples	**1**	
		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.