Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ILE913	Operations Research(OR)	3	--	--	3	--	--	3
		Examination Scheme						
		ISE	MSE		ESE			
		10	30		100 (60% Weightage)			

Pre-requisite Course	Linear Algebra Analysis of Algorithms	
At the end of successful completion of the course, students will be able to		
Course Outcomes	CO1	Translate real world problems into mathematical formulation
	CO2	Solve problems based on linear programming, Transportation model and Integer programming
	CO3	Design a dynamic system as a queuing model and compute important performance measures
	CO4	Solve problems using dynamic programming
	CO5	Solve network models like the shortest path, minimum spanning tree, and maximum flow problems
	CO6	Develop the mathematical formulation of real world problems using Game theory

Module No.	Unit No.	Topics	Ref.	Hrs.
1		**Introduction to Operations Research :** Introduction to OR Modeling Approach and various real life situations **Linear Programming:** Introduction to linear programming, Formulation of the problem, Graphical method, Simplex method, Duality and Sensitivity analysis **Transportation Model:** Definition of the transportation model, non-traditional transportation models, Transportation algorithm, Assignment model **Integer Programming** Formulations, Zero-one problem-additive algorithm, Gomary's cutting plane algorithm, Branch and bound algorithm for IP	1,2,5,8	14
2		**Dynamic Programming:** Introduction, recursive nature of computations in Dynamic programming, forward and backward recursion, Dynamic programming applications	1,7	6

3		**Network Models:** Minimum spamming trees, Shortest path problems, Maximum flow problems, Minimum cost flow problem, CPM and PERT	1,5,6,8	6
4		**Queuing model:** Introduction, Basic Definitions and Notations, Axiomatic Derivation of the arrival and Departure (Poisson Queue), Pure Birth and Death Models, Poison Queue Models	1,2,6	6
5		**Non linear Programming:** Gradient Method, Kuhn Tucker conditions, Quadratic Programming, Convex programming	1,3,7	5
6		**Game Theory:** Introduction, Two Person zero sum Game, Saddle Point, Mini-Max and Maxi-mini Theorems, Games without saddle point, Graphical Method, Principle of Dominance.	3,5,7	5
			Total	**42**

References:

[1] Hamdy A. Taha, "Operations Research: An Introduction", Prentice-Hall of India, 6th Edition.

[2] F.S. Hiller, G. J. Lieberman, "*Introduction to Operations Research,*", McGraw Hill, 8th Edition.

[3] Kanti Swarup, P. K. Gupta, Man Mohan " *Operations Research,*", S. Chand & Sons, 14th Edition.

[4] Gupta P. K. and. Hira D.S., "*Operations Research*", S. Chand & Company, 5th Edition.

[5] Billey E. Gillett, "*Introduction to Operations Research A Computer-Oriented Algorithmic Approach* ", Tata McGraw Hill Edition

[6] Wayne L. Winston, "*Operations Research Applications and Algorithms*", Cengage Learning, 4th Edition

[7] J. K. Sharma, "*Operations Research Theory and Applications*", MacMillan, 2nd Edition

[8] S. D. Sharma, "*Operations Research",* Kedar Nath and Ram nath