

KOE075	OPERATIONS RESEARCH	3L:0T:0P	3Credits
--------	----------------------------	-----------------	-----------------

Unit	Topics	Lectures
I	Introduction: Definition and scope of operations research (OR), OR model, solving the OR model, art of modelling, phases of OR study. Linear Programming: Two variable Linear Programming model and Graphical method of solution, Simplex method, Dual Simplex method, special cases of Linear Programming, duality, sensitivity analysis.	8
II	Transportation Problems: Types of transportation problems, mathematical models, transportation algorithms, Assignment: Allocation and assignment problems and models, processing of job through machines.	8
III	Network Techniques: Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem. Project Management: Phases of project management, guidelines for network construction, CPM and PERT	8
IV	Theory of Games : Rectangular games, Minimax theorem, graphical solution of $2 \times n$ or $m \times 2$ games, game with mixed strategies, reduction to linear programming model. Quality Systems: Elements of Queuing model, generalized poisson queing model, single server models.	8
V	Inventory Control: Models of inventory, operation of inventory system, quantity discount. Replacement: Replacement models: Equipments that deteriorate with time, equipments that fail with time.	8

Text Book:

1. Wayne L. Winston, "Operations Research" Thomson Learning, 2003.
2. Hamdy H. Taha, "Operations Research-An Introduction" Pearson Education, 2003.
3. R. Panneer Seevam, "Operations Research" PHI Learning, 2008.
4. V.K.Khanna, "Total Quality Management" New Age International, 2008.

KOE079	Fuzzy Logic	3L:0T:0P	3Credits
--------	-------------	----------	----------

Course Objectives

1. To develop the fundamental concepts such as fuzzy sets, operations, and fuzzy relations.
2. To learn about the fuzzification of scalar variables and the defuzzification of membership functions.
3. To learn three different inference methods to design fuzzy rule based system.
4. To develop fuzzy decision making by introducing some concepts and also Bayesian decision methods.
5. To learn different fuzzy classification methods.

Course Outcomes:

After successful completion of the course, the students are able to

1. Familiarity about the basic ideas of fuzzy sets, operations and properties of fuzzy sets and about fuzzy relations.
2. Understanding the basic features of membership functions, fuzzification process and defuzzification.
3. Designing fuzzy rule based system.
4. To know about combining fuzzy set theory with probability to handle random and non-random uncertainty, and the decision making process.
5. To gain the knowledge about fuzzy C-Means clustering.

Unit	Topics	Lectures
I	Classical sets: Operations and properties of classical sets, Mapping of classical sets to the functions. Fuzzy sets - Membership functions, Fuzzy set operations, Properties of fuzzy sets. Classical and Fuzzy relations: Cartesian product, crisp relations-cardinality, operations and properties of crisp relations. Fuzzy relations-cardinality, operations, properties of fuzzy relations, fuzzy Cartesian product and composition, Fuzzy tolerance and equivalence relations	8
II	Fuzzification and Defuzzification : Features of the membership functions, various forms, fuzzification, defuzzification to crisp sets, 1-cuts for fuzzy relations, Defuzzification to scalars. Fuzzy logic and approximate reasoning, Other forms of the implication operation.	8
III	Fuzzy Systems: Natural language, Linguistic hedges, Fuzzy (Rule based) system, Aggregation of fuzzy rules, Graphical techniques of inference, Membership value assignments: Intuition, Inference, rank ordering.	8
IV	Fuzzy decision making: Fuzzy synthetic evaluation, Fuzzy ordering, Preference, and consensus, Multi objective decision making, Fuzzy Bayesian, Decision method, Decision making under Fuzzy states and fuzzy actions	8
V	Fuzzy Classification: Classification by equivalence relations-crisp relations, Fuzzy relations, Cluster analysis, Cluster validity, C-Means clustering, Hard C-Means clustering, Fuzzy C-Means algorithm,	8

Text Books

1. Timothy J.Ross - Fuzzy logic with engineering applications, 3rd edition, Wiley,2010.
2. George J.Klir, Bo Yuan - Fuzzy sets and Fuzzy logic theory and Applications, PHI, New Delhi, 1995.

Reference Book (s):

S. Rajasekaran, G.A. Vijayalakshmi - Neural Networks and Fuzzy logic and Genetic Algorithms,Synthesis and Applications, PHI, New Delhi, 2003.

Web Link: <https://nptel.ac.in/courses/108104157>