University Open Elective – V

UOE 051 Optimization Techniques

Teaching Scheme				Evaluation Scheme			
Lect.	**Tut.**	**Pract.**	**Credits**	**Component**	**Exam**	**WT %**	**Pass %**
2	-	-	2	Theory (100)	FA	100	40

Course Description:
This course deals with Fundamental optimization methods, operations research, heuristic optimization techniques, evolutionary or population-based hyperi metaheuristics, parallel optimization techniques. Application of these methods to complex science engineering domains

Course Learning Outcomes
After successful completion of the course, students will be able to

1. Optimize performance of given problem under a set of resource constraints
2. Identify suitable mathematical programming techniques to optimize performance of given problem
3. Apply suitable mathematical programming techniques to optimize performance of given problem under a set of resource constraints where either objective function or set of constraints may be linear or non-linear.
4. Apply artificial intelligence (AI) techniques (meta-heuristics) to improve the efficiency of manufacturing systems.

Course Content

1. **Linear Optimization**

Simplex Method Revised Simplex Method. Sensitivity Analysis. Duality, and Queuing Theory

2. **Nonlinear Optimization**

Introduction, Lagrange Method, Kuhn-Tucker conditions, Quadratic programming, separable programming, chance constrained programming or stochastic programming

3. **Introduction to Integer programming and decision theory**

Introduction to Integer Programming; Cutting Plane Method; Branch and Bound method. Decision theory, Decision under certainty, Decision under risk, Decision under uncertainty, Decision Tree

4. **Introduction to Dynamic Programming**

Concept of Sub optimization and the principle of optimality: Linear and Continuous Dynamic Programming with Applications in capital budgeting, reliability improvement, cargo loading and minimizing total tardiness in single machine scheduling problem etc.

Reference Books

1. Rao S.S. Engineering Optimization Theory and Practice, New Age Int. Pub., 3rd Ed., 1996.
2. 2.Haug, E. J. and Arora, J.S., Applied optimal design Wiley Inter Science Publication, NY, 1979
3. Douglas J. Wilde, Globally optimal design John Wiley & Sons, New York, 1978
4. Johnson Ray C., Optimum design of mechanical elements, John Wiley & Sons, 1981.
5. S.D. Sharma, "Operations Research", Khanna Publications, 2001.
6. David Goldberg, Genetic Algorithms, pearson publications, 2006.
7. Gen, M. and R. Cheng, Genetic Algorithms and Engineering Optimization, Wiley Interscience, 1999