20FM019   OPTIMIZATION TECHNIQUES

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
-	-	-	-	-	-	-	-	-

Course Description & Objective:

To familiarize the students with the modeling of Agriculture engineering systems and obtaining the optimum solution.

Course outcomes:

Upon completion of the subject, students will be able to

1. analyze real-life problems, especially, logistics problems, through the use of mathematical modeling techniques;

2. gain familiarity with various modeling techniques to build mathematical models for real problems;

3. employ some optimization methods and techniques and apply them to some practical problems.

SKILLS:

Application of optimization techniques for agricultural produce

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UNIT - I

Introduction& Linear Programming Problems- Introduction: Engineering applications of optimization, statement of an optimization problem, classification of optimization problems. Linear programming: Simplex method, Applications of linear programming, Two-phases of simplex method, Big-M method.

UNIT - II

Transportation & Assignment Problems: Allocation problems: Formulation - Optimal solution, unbalanced transportation problems. Assignment problem – Formulation – Optimal solution – Variations i.e., non (m x n) Matrix.

UNIT - III

Classical optimization techniques: Single variable optimization with and without constraints, multivariable optimization without constraints, multi – variable optimization with constraints – solution, by method of constrained variation method of Lagrange multipliers, Kuhn – Tucker conditions.Non linear programming unconstrained optimization techniques: (Numerical methods foroptimization)Direct search methods – Random search methods; Univariate method Pattern Directions, Hookeand Jeeves' method, Powell's method, Nelder Mead's Simplex search method.

UNIT - IV

Non Linear programming unconstrained optimization techniques:Indirect search methods: Gradient of a function, Steepest descent method, Newton's method.Davidon-Fletcher – Powell method, types of penalty methods for handling constraints.

UNIT - V

Non – traditional optimization algorithms: Genetic algorithms (GA) – working principle,reproduction, crossover, mutation, advanced GA operators. GA for constrained optimization, multimodalfunction optimization.Simulated annealing, working principle, Metropolis algorithm, differences and similarities betweenconventional and non-conventional algorithms, introduction to Neural networks and fuzzy logic as anoptimization tool.

Text books:

1. S.S.Rao, "Engineering Optimization", 3rd Edition, New Age Publishers, 2008.
2. Kalyanmoy Deb, "Optimization for Engineering Design", 1st Edition, PHI Publishers, 2009.

Reference books:

1. JasbirArora, "Optimal Design", McGraw Hill (International) Publishers.
2. D.E.Goldberg, "Genetic algorithms in Search, Optimization and Machine Learning", 1st Edition, John Wiley Publishers, 2009.
3. Kalyanmoy Deb, "Multi Objective Optimization Using Evolutionary Algorithms", 1st Edition, PHI Publications

ACTIVITIES:

o Analysis of chilly production using optimization techniques