OPERATIONS RESEARCH

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INTENDED AUDIENCE : Any student who wants to learn the basic concepts of Operations Research
INDUSTRIES APPLICABLE TO : All industries who have to minimize cost of production or maximum output

COURSE OUTLINE :
Optimization is the most important sub area of the discipline Operations Research. Optimization problems arise in all walks of human activity- particularly in Engineering, Business, Finance and Economics. The simplest optimization problems are linear in nature which may be subject to a set of linear constraints. This course will equip the student with the expertise to mathematically model real life optimization problems as Linear Programming (Optimization) Problems and subsequently educate the student to solve these models with the help of the available methods.

ABOUT INSTRUCTOR :
Prof. Kusum Deep, is a full Professor, with the Department of Mathematics, Indian Institute of Technology Roorkee, India. She is Gold Medalist, International and national scholarship holder and has many awards , including best paper awards, to her credit. With a vast experience in the teaching she has authored a text book on Optimization Techniques. In research she is an Internationally renowned personality having supervised 18 PhDs and published over 110 research papers in good quality journals and equal number of papers published in proceedings of International Conferences. She is a Senior Member of Operations Research Society of India, IEEE, Computer Society of India, Indian Mathematical Society and Indian Society of Industrial Mathematics. She is on the Expert Panel of the Department of Science and Technology, Govt. of India. She is the Executive Editor of International Journal of Swarm Intelligence, Inderscience. She is the Founder President of Soft Computing Research Society, India and the secretary of Forum of Interdisciplinary Mathematics. She has a number of research projects and consultancy projects. She has travelled widely including Australia, United Kingdom, Russia, Korea, Iraq, Singapore, The Netherlands and France.Her areas of specialization are nature inspired optimization techniques and their applications to engineering, science, finance and industry. Her contribution is noteworthy in Genetic Algorithms, Memetic Algorithms, Particle Swarm Optimization, Grey Wolf Optimization, Artificial Bee Colony, Gravitational Search Algorithm, Ant Lion Algorithm, Biogeographical Based Optimization, Glowworm Optimization, Harmony Search Algorithm, and their applications to solve real life problems.

COURSE PLAN :

Week 1: Introduction to OR Models, More OR Models, Graphical Method for LPP, Convex sets, Simplex Method
Week 2: Big M Method, Two Phase, Multiple solutions of LPP, Unbounded solution of LPP, Infeasible solution of LPP
Week 3: Revised Simplex Method, Case studies and Exercises-I, II & III, Primal Dual Construction
Week 4: Weak Duality Theorem, More Duality Theorems, Primal-Dual relationship of solutions, Dual Simplex Method, Sensitivity Analysis-I
Week 5: Sensitivity Analysis-II, Case studies and Exercises - I & II, Integer Programming Goal Programming
Week 6: Multi-Objective Programming, Dynamic Programming, Transportation Problem, Assignment Problem, Case studies and,Exercises
Week 7: Processing n Jobs on Two Machines, Processing n Jobs through Three Machines, Processing two jobs through m machines, Processing n jobs through m machines, Case studies and Exercises
Week 8: Two Person Zero-Sum Game, Theorems of Game Theory, Solution of Mixed Strategy Games, Linear Programming method for solving games, Case studies and Exercises