INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

OPTIMIZATION TECHNIQUES								
VII Semester: CSE (CS)/CSE(DS)								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACCD23	Elective	L	T	P	C	CIA	SEE	Total
		3	0	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 48		
Prerequisites: There are no prerequisites to take this course								

I. COURSE OVERVIEW:
The course covers an in-depth introduction to optimization methods and their applications in engineering, science, economics, and operations research. It covers theoretical foundations, solution techniques, and practical approaches for solving optimization problems. The course is designed to equip students with the skills to model, analyze, and solve real-world optimization problems using both classical and modern techniques.

II. COURSE OBJECTIVES:
The students will try to learn:

I	The learning of fundamentals of linear programming through optimization.
II	The understanding and application of optimization techniques to industrial applications
III	The application of dynamic programming and quadratic approximation to electrical and electronic problems and applications.

III. COURSE OUTCOMES:
After successful completion of the course, students should be able to:

CO1	Recall the theoretical foundations of various issues related to linear programming modelling to formulate real-world problems as a L P model.
CO2	Demonstrate the Transportation problem, formulation, optimal solution.
CO3	Explain the theoretical workings of dynamic programming method to find shortest path for given network
CO4	Develop a suitable queuing system to control important performance measures dynamically
CO5	Identify appropriate method for application of simulation to solve inventory and queuing problems for real world applications
CO6	Illustrate the Quadratic approximation methods for constrained problems.

IV. COURSE CONTENT:

MODULE -I: LINEAR PROGRAMMING (10)

Definition, characteristics and phases, types of models, operations research models, applications, linear programming problem formulation, graphical solution, simplex method; Artificial variables techniques: Two phase method, Big-M method.

MODULE –II: TRANSPORTATION AND ASSIGNMENT PROBLEMS (10)

Transportation problem, formulation, optimal solution, unbalanced transportation problem, degeneracy, assignment problem, formulation, optimal solution, variants of assignment problem, traveling salesman problem.

MODULE-III: SEQUENCING AND THEORY OF GAMES (10)

Sequencing: Introduction, flow-shop sequencing, n jobs through two machines, n jobs through three machines, job shop sequencing, two jobs through m machines. Theory of games: Introduction, terminology, solution of games with saddle points and without saddle points, 2 x 2 games, dominance principle, m x 2 and 2 x n games, graphical method.

MODULE-IV: DYNAMIC PROGRAMMING (09)

Introduction: Terminology, Bellman‘s principle of optimality, applications of dynamic programming shortest path problem, linear programming problem.

MODULE-V: QUADRATIC APPROXIMATION (09)

Quadratic approximation methods for constrained problems: Direct quadratic approximation, quadratic approximation of the Legrangian function, variable metric methods for constrained optimization.

V. TEXTBOOKS:

1. A Ravindran, “Engineering Optimization‖, John Wiley & Sons Publications” , 4th Edition, 2009.
2. Hillier, Liberman, “Introduction to Operation Research‖, Tata McGraw Hill”, 2nd Edition, 2000.

VI. REFERENCE BOOKS:

1. Dr. J K Sharma, “Operation Research‖, Mac Milan Publications”, 5th Edition, 2013.
2. Ronald L. Rardin, “Optimization in Operation Research‖”, Pearson Education Pvt. Limited, 2nd Edition 2005.
3. N V S Raju, “Operation Research‖, S M S Education”, 3rd Edition, 2005.

VII. ELECTRONIC RESOURCES:

1.http://www2.informs.org/Resources/
2.http://www.mit.edu/~orc/
3.http://www.ieor.columbia.edu/
4.http://www.universalteacherpublications.com/univ/ebooks/or/Ch1/origin.htm
5. http://www.wolfram.com/solutions/OperationsResearch/

VIII. MATERIAL ONLINE:

1. Course template
2. Tech-talk topics
3. Assignments
4. Definition and terminology
5. Tutorial question bank
6. Model question paper – I
7. Model question paper – II
8. Lecture notes
9. Early lecture readiness videos (ELRV)
10. Power point presentations