

OPTIMIZATION TECHNIQUES-EL 1
Semester III (Production Engineering) SUB CODE: MEMPR302-B
Teaching Scheme (Credits and Hours)

Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
3	0	2	5	4	3	70	30	20	30	150

LEARNING OBJECTIVES:

The objective of this course is

To learn various techniques of optimization and applying it to real life problems.

LESSON PLANNING

SR.NO	CHAPTER NO	DATE/WEEK	%WEIGTAGE
1	1	1 st 2 nd 3 rd	20
2	2	4 th 5 th 6 th	20
3	3	7 th 8 th 9 th	20
4	4	10 th 11 th 12 th	20
5	5	13 th 14 th 15 th	20

Total hours (Theory): 45, Total hours (Practical):30, Total hours: 75

DETAILED SYLLABUS

Chap . No.	Topic
1	Statement of Optimization Problem: Linear Programming: Simplex Method Revised Simplex Method, Sensitivity Analysis, Parametric Programming, and Transportation Problem.
2	Nonlinear Programming: Approach, Convergence and Scaling of Design variables; Unconstrained Optimization Direct Search Methods: Random Search, Univariate. Simplex Method; Indirect Search Methods: Steepest Descent, Conjugate Gradient, Newton, Quasi Newton, DFP Methods
3	Nonlinear Programming Constrained Optimization Direct Methods: Lagrange Multipliers, Kuhn-Tucker conditions, Beal's method, Indirect Method: Penalty Function and Applications
4	Introduction to Dynamic Programming: Concept of Sub optimization and the principle of optimality; Linear and Continuous Dynamic Programming with Applications; Introduction to Integer Programming; Cutting Plane Method; Branch and Bound method; Introduction to Genetic Algorithms, particle swarm optimization
5	Sequencing and Scheduling: Project Scheduling by PERT-CPM; Probability and cost consideration in Project scheduling; Queuing Theory, Single and multi server models; Queues with combined arrivals and departures; Queues with priorities for service.

LIST OF PRACTICALS

Sr. No.	Practical Content
1	PROBLEM SOLVING BY LPP IN MATLAB
2	PROBLEM SOLVING BY SIMPLEX METHOD IN MATLAB
2	PROBLEM SOLVING ON TRANSPORTATION
3	PROBLEM SOLVING BY STEEPEST DESCENT METHODS IN MATLAB
5	PROBLEM SOLVING BY CONJUGATE GRADIENT IN MATLAB
6	PROBLEM SOLVING BY NEWTON IN MATLAB
7	PROBLEM SOLVING BY QUASI NEWTON IN MATLAB
8	PROBLEM SOLVING BY DFP METHODS IN MATLAB
9	PROBLEM SOLVING OF NONLINEAR PROGRAMMING CONSTRAINED SITUATION OPTIMIZATION BY LAGRANGE MULTIPLIERS
10	PROBLEM SOLVING OF NONLINEAR PROGRAMMING CONSTRAINED SITUATION OPTIMIZATION BY KUHN-TUCKER CONDITIONS
11	PROBLEM SOLVING OF NONLINEAR PROGRAMMING CONSTRAINED SITUATION OPTIMIZATION BY BEAL'S METHOD
12	PROBLEM SOLVING OF NONLINEAR PROGRAMMING CONSTRAINED SITUATION OPTIMIZATION BY PENALTY FUNCTION AND APPLICATIONS
13	PROBLEM SOLVING BY DYNAMIC PROGRAMMING
14	PROBLEM SOLVING BY GENETIC ALGORITHMS
15	PROBLEM SOLVING BY PARTICLE SWARM OPTIMIZATION TECHNIQUE
16	INTRODUCTION TO INTEGER PROGRAMMING; CUTTING PLANE METHOD; BRANCH AND BOUND METHOD

INSTRUCTIONAL METHOD AND PEDAGOGY (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all units while conducting teaching & examination.
- Attendance is compulsory in lectures and Tutorial.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- One internal exam of 30 marks is conducted as a part of Mid semester evaluation.

STUDENTS LEARNING OUTCOMES:

At the end of the course

The students will gain an experience in the implementation of optimization techniques for minimization of cost or maximization of production.

Reference Book:

1. Rao S.S. Engineering Optimization Theory and Practice, New Age Int. Pub., 3rd Ed., 1996.
2. Haug,E.J.and Arora, J.S., Applied optimal design Wiley Inter Science Publication, NY, 1979.
3. Douglas J. Wilde, Globally optimal design Jhon 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. Prem Kumar Gupta, "Operations Research", S Chand publications, 2008
8. Maurice cleric, Particle Swarm optimization, ISTE Publications, 2006.