OPTIMIZATION TECHNIQUES

Course Code	19ME4801D	**Year**	IV	**Semester**	II
Course Category	Program Elective-VI	**Branch**	ME	**Course Type**	Theory
Credits	3	**L – T – P**	3 – 0 – 0	**Prerequisites**	Nil
Continuous Internal Evaluation	30	**Semester End Evaluation**	70	**Total Marks**	100

Course Outcomes		**Level**
After successful completion of the course, the student will be able to		
CO1	Apply various Classical optimization techniques	L3
CO2	Select suitable Numerical method for optimization of Engineering Problems.	L4
CO3	Analyze multi stage decision making process through dynamic programming	L4
CO4	Enumerate fundamentals of Integer programming technique	L3

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3-High, 2: Medium, 1: Low)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3	3	2		2		2		2		2	2	2
CO2	2	3	3	2		2		2		2		2	2	2
CO3	2	3	3	2		2		2		2		2	2	2
CO4	2	2	3	2		2		2		2		2	2	2

Syllabus

Unit No.	**Contents**	**Mapped COs**
I	**Introduction to optimization**: Introduction, engineering applications of optimization, statement of an optimization problem-design vector, design constraints, constraint surface, objective function, classification of optimization problems, optimization techniques. **Classical Optimization techniques:** Introduction, single variable optimization, multi variable optimization with no constraints, multi variable optimization with equality constraints-Lagrange multiplier method.	CO 1
II	**Non-linear programming, I**: One Dimensional Minimization Methods: Introduction, unimodal function, elimination methods- unrestricted search, exhaustive search, interval halving method, Fibonacci method, golden section method, interpolation method,	CO1
III	**Non-linear programming II:** Direct Search Method- Nelder- Mead Simplex method, Indirect search methods- steepest descent method (Cauchy's method), Newton Method, Marquardt Method	CO2
IV	**Dynamic Programming:** Multistage decision processes, Concepts of sub optimization- calculus method and tabular methods, Linear programming as a case of D.P	CO3

V	**Integer Programming**: Introduction, Graphical Representation, Gomory's cutting plane method, Balas algorithm for zero-one programming, Branch-and- bound method, Penalty Function method; Basic approaches of Interior and Exterior penalty function methods.	CO4

Learning Recourse(s)
Text Book(s)
1. S.S.Rao, Engineering optimization theory and practice, , 3rd Edition, New age international,2007. 2. Van Wylen, Fundamentals of Classical Thermodynamics, .John Wylie.
Reference Book(s)
1. H.A.Taha, Operations Research, , 9th Edition, Prentice Hall of India, 2010. 2. F.S.Hillier, and G.J.Lieberman, Introduction to Operations Research, , 7th Edition, TMH, 2009.
e- Resources & other digital material
1. https://nptel.ac.in/courses/111/105/111105039/ 2. https://nptel.ac.in/courses/106/108/106108056/ 3. https://nptel.ac.in/courses/111/104/111104071/ 4. https://nptel.ac.in/courses/112/105/112105235/