PVP 19

OPTIMIZATION TECHNIQUES

Course Code	19ME2701A	**Year**	IV	**Semester**	I
Course Category	IDE-2	**Branch**	-	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Operations Research
Continuous Internal Evaluation :	30	**Semester End Evaluation:**	70	**Total Marks:**	100

Course Outcomes		
Upon 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 (H: High, M: Medium, L: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
Average* (Rounded to nearest integer)	2	3	3	2		2		2		2		2	2	2

Syllabus

Unit No	**Contents**	**Mapped CO**
Unit-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.	CO1
Unit-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,	CO2
Unit-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
Unit-IV	**Dynamic Programming:** Multistage decision processes, Concepts of sub optimization- calculus method and tabular methods, Linear programming as a case of D.P	CO3

Unit-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 Resource
Text books:
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 books
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/