Course Title	**Design Optimization**	Course Code	**MEXXXX**			
Dept./ Specialization	Mechanical Engineering	Structure (LTPC)	3	1	0	4
To be offered for	UG / PG	Status	Core ☐		Elective ▪	
Faculty Proposing the course	Dr. Siva Prasad AVS	Type	New ☐		Modification ▪	
Recommendation from the DAC - Yes		Date of DAC	01 – 06 – 2021			
External Expert(s)	Professor Shankar Krishnapillai, Department of Mechanical Engineering, IIT Madras.					
Pre-requisite	Calculus, Differential Equations	Submitted for approval	46th Senate			
Learning Objectives	The objectives of this course are to train the students • To formulate an engineering design problem as an optimization problem • To apply or adopt a suitable method for arriving at optimal solution					
Learning Outcomes	At the end of the course, the students are expected to be capable of • Developing mathematical models to solve real life engineering problems. • Formulate optimization problems to arrive at a desired solution • Participate in advanced research on optimization methods and its applications.					
Contents of the course *(With approximate break-up of hours for L/T/P)*	Introduction to Optimization–Definitions of objective functions, constraints, feasibility conditions, examples on formulation of optimization problems – 4L + 1T Analytical methods in Single and Multivariable Optimization with and without constraints – (6L + 2T) Linear Programming – Simplex method and two-phase simplex method – (4L + 1T) Non-linear programming: 1D minimization methods – Direct & Indirect search methods – (4L + 2T) Non-linear programming: Multivariable unconstrained minimization problems - Direct & Indirect search methods – (6L + 2T) Non-linear programming: Multivariable constrained minimization problems - Direct & Indirect search methods; Examples using MATLAB programming – (12L + 4T) Applications of calculus of variations to optimal control, Non-traditional optimization methods – (6L + 2T)					
Text Book	1. S. S. Rao, Engineering Optimization: Theory and Practice, 4th edition, John Wiley & Sons, 2009.					
Reference Books	1. P. Y. Papalambros and D. J. Wilde, Principles of Optimal Design: Modeling and Computation, 2nd edition, Cambridge University Press, 2000. 2. K. Deb, Optimization for Engineering Design, 2nd edition, PHI Learning Pvt. Ltd., 2009. 3. P. Venkataraman, Applied Optimization with MATLAB Programming, 2nd edition, John Wiley & Sons, 2009. ISBN: 047008488X. 4. D. G.Luenberger, Linear and Nonlinear Programming, 3rd edition, Springer, 2008.					