	National Institute of Technology Meghalaya An Institute of National Importance	**CURRICULUM**

Programme	**Bachelor of Technology**	Year of Regulation	**2018-19**
Department	**Mathematics**	Semester	**VII**

Course Code	Course Name	Pre-Requisite	Credit Structure				Marks Distribution			
			L	T	P	C	INT	MID	END	Total
MA 471	**Non-linear Optimization**	**MA 372**	**2**	**0**	**0**	**2**	**50**	**50**	**100**	**200**

Course Objectives	To provide fundamental understanding of nonlinear optimization. To describe application of nonlinear optimization	Course Outcomes	**CO1**	Able to understand the concept of convex set and convex function, and to solve convex optimization problems.
			CO2	Able to verify optimality conditions and to apply to solve unconstrained optimization problems.
			CO3	Able to use Lagrange multipliers and Karush-Kuhn-Tucker conditions to solve constrained optimization problems
			CO4	
			CO5	
			CO6	

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	**2**				**2**										
2	CO2	**2**				**2**										
3	CO3	**2**				**2**										
4	CO4															
5	CO5															
6	CO6															

SYLLABUS

No.	Content	Hours	COs
I	**Convex Analysis:** Introduction to nonlinear programming problem, convex sets, convex functions, maxima and minima of convex function, Convex optimization problems	**06**	**CO1**
II	**Unconstrained optimization:** First-order and second-order optimality conditions, line search methods, method of steepest descent, Newton's method, conjugate direction method and quasi-Newton methods.	**09**	**CO2**
III	**Constrained optimization:** Equality and inequality constraints, method of Lagrange multipliers, Karush-Kuhn-Tucker conditions, Sensitivity Analysis; Quadratic Programming	**09**	**CO3**
Total Hours		**24**	

Essential Readings
1. M. S. Bazaara, H. D. Sherali and C. M Shetty, "Nonlinear Programming: Theory and Algorithms", Wiley India, 3rd edition, 2017.
2. E. K. P. Chong and S. H. Zak, "An Introduction to Optimization", Wiley India, 4th edition, 2017.
Supplementary Readings
1. D. G. Luenberger and Yinyu Ye, "Linear and Nonlinear Programming", Springer India, 3rd edition, 2010
2. F. S. Hillier, G. J. Lieberman, B. Nag and P. Basu, "Introduction to Operations Research", 9th edition, McGraw Hill Education, 2009.