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

Programme	**Master of Science**	Year of Regulation	**2018-19**
Department	**Mathematics**	Semester	**IV**

Course Code	Course Name	Pre-requisite	Credit Structure				Marks Distribution			
			L	T	P	C	INT	MID	END	Total
MA 550	**Operations Research**	**NIL**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives	The objective of the course is to introduce quantitative tools and techniques, which are frequently applied to business decision-making and to provide quantitative approaches for better decision making.	Course Outcomes	CO1	Able to identify and develop operational research models from the verbal description of the real system.
			CO2	Able to analyse and solve linear programming problems by simplex method and duality.
			CO3	Able to analyse and solve Transportation Models and Assignment Models.
			CO4	Able to develop mathematical skills to analyse and solve integer programming and network models arising from a wide range of applications.
			CO5	Able to design new simple models, like: CPM, MSPT to improve decision-making and develop critical thinking and objective analysis of decision problems.
			CO6	Able to understand the relation between game theory and linear programming.

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	CO2															
3	CO3															
4	CO4															
5	CO5															
6	CO6															

SYLLABUS

No.	Content	Hours	COs
I	Formulation of linear programming problem, theory of simplex method, simplex algorithm, Charne's M-method, two phase method, computational complexity of simplex algorithm, duality in linear programming, dual simplex method, sensitivity analysis.	10	CO1 CO2
II	Transportation problem, MODI method, degeneracy, unbalanced problem; assignment problem, Hungarian method.	08	CO3
III	Definition of network models, Minimal spanning tree algorithm, shortest-route problem, network representation, critical path (CPM) computations, PERT calculation, distinction between PERT and CPM, linear programming formulation.	06	CO4 CO5
IV	Integer linear programming, traveling salesman problem (TSP); Dynamic programming problem: cargo loading problem, replacement problem, rectangular games, two persons zero sum games, pure and mixed strategies, 2xn and mx2 games, relation between theory of games and linear programming.	12	CO1 CO4 CO6
Total Hours		**36**	

Essential Readings

1. H. A. Taha, "Operations Research: An Introduction", Pearson Education, 10th edition, 2019.
2. M. S. Bazaara, J. J. Jarvis and H. D. Sherali, "Linear programming and Network flows", Wiley India Pvt. Ltd, 2nd edition, 2008.

Supplementary Readings

1. F. S. Hillier, G. J. Lieberman, B. Nag and P. Basu, "Introduction to Operations Research", 9th edition, McGraw Hill Education, 2009.
2. N. S. Kambo, "Mathematical Programming Techniques", Affiliated East-West Press Pvt. Ltd, 2008.