

Course Code	Course Title	L	T	P	C
BAMAT208	Operations Research	3	0	2	4
Pre-requisite	NIL	Syllabus Version			
		1			
Course Objectives					
1. The application of Operations Research for critically analyze a problem, identify, formulate and solve problems in any engineering field using operations research principles, considering current and future trends. 2. The students will develop problem modeling and solving skills and learn how to make intelligent decisions from the point of view of optimization. 3. The students will use optimization techniques to enhance systems and to manage enterprise resources using current tools, frameworks and reusable resources.					
Course Outcomes					
1. Apply operations research techniques like L.P.P, scheduling and sequencing in industrial optimization problems. 2. Solve allocation problems using various OR methods. 3. Analyze various OR models like Inventory, Network, Queuing, Decision etc., and apply them for optimization. 4. Understand the concepts of integer linear programming. 5. Gain knowledge on current topics and advanced techniques of Operations Research in a wide range of applications in industries.					
Module:1	Linear Programming Problems	11 hours			
An overview and scope of Operations Research and Introduction to Linear Programming (LP) - Illustration of LP Problems - Formulation exercises on LP Problems - Graphical Method of solving LPP - Simplex Method - Unboundedness - Multiple Optimum Solutions - Degeneracy. Primal and Dual problem -Dual problem properties-Solution techniques of Dual problem -Dual Simplex method - Artificial Variables: Big-M Method - Sensitivity Analysis.					
Module:2	Special Types of Linear Programming Problems	10 hours			
Introduction: Transportation Problem-Balanced-Unbalanced-Methods of basic feasible solution - Optimal solution-MODI method. Assignment problem-Hungarian Method -Sensitivity Analysis. Formulation of IPP, Method of solving IPP - Cutting Plane Method - Branch and Bound Method - Applications.					
Module:3	Network Analysis	7 hours			

Basic concepts-Construction of Network-Rules and precautions-CPM and PERT Networks-Obtaining of critical path. Probability and cost consideration. Advantages of Networks.		
Module:4	Theory of Games	7 hours
Introduction-Terminology-Two Person Zero-Sum game-Solution of games with saddle points and without saddle points-2 X2 games-dominance principle - mX2 and 2Xn games-Graphical method.		
Module:5	Queuing Theory	8 hours
Queuing theory Basic characteristics of queuing models Arrival and service distribution steady state solution of M/M/1 and M/M/C models with associated distribution of queue length and waiting time - M/G/1 queue-steady results using embedded Markov chain Methods - Concepts, Transition Probabilities - Steady-State Probabilities - Applications.		
Module:6	Contemporary Issues	2 hours
Research and Analytical problems on various applications of the industrial issues.		
Case studies are involving the application of Artificial Intelligence and Machine Learning.		
Total Lecture Hours:		45 hours
Text Book(s)		
1. Kanti Swarup, P.K.Gupta and Man Mohan , " Operations Research ", Sultan Chand and Sons, 20 th Edition, 2022 2. Hillier FS and Libermann GJ , " Introduction to Operations Research ", McGraw Hill, 12 th Edition, 2024		
Reference Books		
1. Hamdy A. Taha, " Operations Research ", Pearson Education, 10 th Edition, 2019 2. P. K. Gupta and D. S. Hira, " Operations Research ", S Chand Publishing, 7 th Edition, 2015		
Indicative Experiments		
1. Introduction to the software (R/LINGO/CPLEX/ or any suitable software packages) and general Syntaxes	3 hours	
2. Plotting and visualizing curves and surfaces - Symbolic computations	3 hours	
3. Evaluating LPP using Simplex Method	3 hours	
4. Evaluating LPP using Big M Method and Sensitivity Analysis	3 hours	

5. Evaluating Transportation Problems and Sensitivity Analysis in Transportation Problems	3 hours
6. Evaluating Assignment Problems	3 hours
7. Evaluating Integer Programming Problems	3 hours
8. Evaluating problems about transition probabilities and steady-state probabilities	3 hours
9. Evaluating problems about Game theory	3 hours
10. Applying optimization techniques to real world problems	3 hours
Total Laboratory Hours:	30 hours
Mode of Evaluation: Continuous Assessment Test, Quiz, Final Assessment Test, Lab Continuous Assessment, Lab Final Assessment, Seminar, Presentation	
Recommended by Board of Studies :	26-09-2025
Approved by Academic Council : No. 80	20-11-2025