

Course Code MAT2002	Discrete Mathematics and Graph Theory		Course Type : LT Credits:4	
Prerequisite:	Basics of algebra			
Objectives:				
To provide fundamental ideas on Discrete Mathematics and Graph theory required for the study of Computer Science				
Expected Outcomes:				
By the end of the course, students should be able to <ul style="list-style-type: none">• appreciate the power of discrete mathematics and Graph theory and use them to design mathematical model• analyze the problems connected with data analysis that arise in their respective engineering courses.• Emphasize the study of computational and algorithmic aspects of Graph Theory				
Student Learning Outcomes (SLO):		a,e,j,k		
Module No	Module Contents	No. of lectures	SLOs	
1	Set Theory and Boolean Algebra Relations and Functions, Partial Order Relations, Lattices, Boolean Algebra, Laws of Boolean Algebra, Boolean Functions- Normal Forms, Application of Boolean Algebra to Switching Circuits.	9	a,e,j,k	
2	Predicate Calculus Introduction -Statements and Notation – Connectives – Tautologies, Logic - Equivalence - Implications, Laws of Statement Calculus. The Theory of Inference for the Statement Calculus. Predicate and Quantifiers- Nested quantifiers-Rules of Inference for Predicates, Rules for Inference for Quantified Statements.	7	a,e,j,k	
3	Fundamentals of graphs Graphs – introduction – isomorphism – sub graphs – walks- paths - circuits – connectedness – components – Euler graphs – Hamiltonian paths and circuits.	9	a,e,j,k	
4	Trees, Fundamental circuits and Cut sets Trees – properties of trees – distance and centers in tree – rooted and binary trees - spanning trees – spanning trees in a weighted graph. Cut sets – properties of cut set – fundamental circuits and cut sets	9	a,e,j,k	
5	Matrix representation of graphs Incidence matrix – sub matrices – circuit matrix – path matrix – adjacency matrix. Chromatic number	9	A,e,j,k	

	Directed graphs, Graph Theoretic algorithms Digraphs – types of digraphs – directed paths and connectedness – Euler graphs – adjacency matrix of a digraph - tournament. Algorithms - connectedness and components – spanning tree – fundamental circuits – cut vertices – directed circuits – shortest path algorithm.		
6	Guest Lectures by experts on contemporary topics	22	
	.	45	
Mode of Teaching and Learning: # Class room teaching # Use of mathematical software (such as MATLAB, MATHEMATICA, SAGE, ETC.) as teaching aid # Minimum of 2 lecture periods by experts on contemporary topics			
Mode of Evaluation and assessment: Digital Assignments, Continuous Assessment Tests, Final Assessment Test and unannounced open book examinations, quizzes, student’s portfolio generation and assessment, innovative assessment practices			
Text Books:			9+3 hours
1.	Kenneth H. Rosen, Discrete Mathematics and its applications, 6 th Edn., Tata McGraw Hill,(2003)		
2.	Narasing Deo, Graph theory with application to Engineering and Computer Science, Prentice Hall India (2010).		
3.	Fundamentals of Discrete Math for Computer Science- A Problem-Solving Primer by Tom Jenkyns and Ben Stephenson , Springer-Verlag , 2013.		
4	Mathematics of Discrete Structures for Computer Science by Gordan J.Pace, Springer-Verlag , 2012.		
Reference Books:			
1.	West, D.B, Introduction to Graph Theory, second ed., <i>Prentice-Hall</i> , Englewood Cliffs, NJ, (2001).		
2.	Discrete Mathematical Structures by Kolman, R.C.Busby and S.C.Ross, 6 th Edition, PHI , 2009.		
3.	E.M.Reingold, J.Nievergelt, N.Deo, Combinatorial Algorithms: Theory And Practice, Prentice Hall, N.J (1977).		
4	Richard Johnsonbaugh, “Discrete Mathematics”, 5 th Edition, Pearson Education, 2001.		
Recommendation by the Board of Studies on		19 June 2019	
Approval by Academic council on			
Compiled by		Dr. Manisha Jain, Dr. Reena Jain and Dr. Anant Kant Shukla	