15MA203	DISCRETE MATHEMATICS FOR INFORMATION TECHNOLOGY	L	T	P	C
		4	0	0	4
Co-requisite:	NOT APPLICABLE				
Prerequisite:	15MA102				
Data Book / Codes/Standards	NOT APPLICABLE				
Course Category	B CORE	MATHEMATICS			
Course designed by	Department of Mathematics				
Approval	-- Academic Council Meeting -- , 2016				

PURPOSE	To acquire knowledge in discrete mathematical structures as applied to Information Technology students.	
INSTRUCTIONAL OBJECTIVES		**STUDENT OUTCOMES**
At the end of the course, student will be able to		
1.	To understand mathematical logic and reasoning to count or enumerate objects in systematic way.	a e
2.	To understand set theory, relations and functions to read , understand and construct mathematical arguments.	a e
3.	To understand recurrence relation, generating functions and algebraic systems and their applications in coding theory.	a e
4.	To understand how to apply graph theory to solve real world problems like travelling salesmen problem and networks, problem.	a e
5.	To understand grammers, finite state machine and Finite State Automata.	a e

Session	Description of Topic	Contact hours	C-D-I-O	IOs	Reference
	UNIT I: MATHEMATICAL LOGIC	**12**			
1.	Proposition – Connectives – Truth Tables	2	C,I	1	1,2,3,4,6,7
2.	Conditional and bi conditional propositions	1	C,I	1	1,2,3,4,6,7
3.	Tautology and contradiction using truth table	1	C,I	1	1,2,3,4,6,7
4.	Tautology and contradiction without using truth table	1	C,I	1	1,2,3,4,6,7
5.	Duality Law	1	C,I	1	1,2,3,4,6,7
6.	Algebra and laws of Algebra of propositions – Tautological Implication	1	C,I	1	1,2,3,4,6,7
7.	Theory of Inference – Direct method of proof	1	C,I	1	1,2,3,4,6,7
8.	Proof using CP Rule	1	C,I	1	1,2,3,4,6,7
9.	Rules of Inference – Inconsistency of premises.	2	C,I	1	1,2,3,4,6,7
10.	Indirect method of proof	1	C,I	1	1,2,3,4,6,7
	UNIT II: COMBINATORICS	**12**			
11.	Pigeonhole Principle – Generalized Pigeon hole principle	2	C,I	2	1,2,3,4,6
12.	Mathematical induction	2	C,I	2	1,2,3,4,6
13.	Generalized Mathematical induction	1	C,I	2	1,2,3,4,6

14.	Recurrence relation – Formation of Recurrence Relation	2	C,I	2	1,2,3,4,6
15.	Solving Homogeneous Recurrence Relation	1	C,I	2	1,2,3,4,6
16.	Non Homogeneous Recurrence Relation	2	C,I	2	1,2,3,4,6
17.	Generating Function Method to solve Recurrence relation	2	C,I	2	1,2,3,4,6
	UNIT III: GROUP THEORY AND CODING THEORY	**12**			
18.	Group – Definition, examples	1	C,I	3	1,2,3,6
19.	Properties of Groups	1	C,I	3	1,2,3,6
20.	Subgroups – Cyclic groups – Properties	2	C,I	3	1,2,3,6
21.	Group Homomorphism – Cosets	1	C,I	3	1,2,3,6
22.	Normal subgroups and properties	2	C,I	3	1,2,3,6
23.	Lagrange's Theorem	1	C,I	3	1,2,3,6
24.	Encoders and Decoders – Group code	2	C,I	3	1,2,3,6
25.	Hamming codes – Error correction - Decoding Group codes	2	C,I	3	1,2,3,6
	UNIT IV: GRAPH THEORY	**12**			
26.	Basic Definitions – Special Graphs	1	C,I	4	1,2,3,4
27.	Matrix Representation of Graphs	1	C,I	4	1,2,3,4
28.	Properties of graphs using Matrix representation	1	C,I	4	1,2,3,4
29.	Paths, Circuits - Shortest path: Definition & Examples	1	C,I	4	1,2,3,4
30.	Shortest path algorithm: Warshall's Algorithm	2	C,I	4	1,2,3,4
31.	Eulerian and Hamiltonian Graphs	1	C,I	4	1,2,3,4
32.	Tree	1	C,I	4	1,2,3,4
33.	Properties of trees	2	C,I	4	1,2,3,4
34.	Spanning Trees	1	C,I	4	1,2,3,4
35.	Minimum Spanning Tree - Krushkal's Algorithm	1	C,I	4	1,2,3,4
	UNIT V: FORMAL LANGUAGES AND AUTOMATA THEORY	**12**			
36.	Phrase structure Grammar – Types of Grammar	2	C,I	5	1,2,3,4,6
37.	Backus-Naur Form-Finite state machine-Input and output string for FSM	2	C,I	5	1,2,3,4,6
38.	Finite state Automata – Definition-Language Accepted by FSA	2	C,I	5	1,2,3,4,6
39.	Deterministic FSA	2	C,I	5	1,2,3,4,6
40.	Non deterministic FSA	1	C,I	5	1,2,3,4,6

41.	Language Accepted NFA	2	C,I	5	1,2,3,4,6
42.	Conversion of an NFA to an equivalent DFA.	1	C,I	5	1,2,3,4,6
	Total contact hours	60			

LEARNING RESOURCES	
Sl. No.	**TEXT BOOKS**
1.	J.P. Tremblay, R.Manohar, "Discrete Mathematical Structures with applications to Computer Science" Tata McGraw-Hill Publishing company pvt.Ltd.,New Delhi,35th edition,2008
2.	Veerajan T., Discrete Mathematics with Graph Theory and Combinatorics", 10th edition,Tata McGraw Hill Companies,2010
	REFERENCE BOOKS/OTHER READING MATERIAL
3.	Dr.M.K.Venkataraman, Dr.N.Sridharan N.Chandrasekaran, "Discrete Mathematics", The National Publishing company,2003
4.	Kenneth H.Rosen, "Discrete Mathematics and its Application", Fifth edition, Tata McGraw-Hill Publishing company pvt.Ltd., New Delhi,2003
5.	Narsing Deo, "Graph Theory with applications to Engineering and Computer science", Prentice-Hall of India pvt. Ltd.,New Delhi, 2004
6.	Bernard Kolman, Robert C. Busby, Sharon Culter Ross, Nadeen-ur-Rehman "Discrete Mathematical Structures ", Pearson Education,5th edition,2004
7.	Alan Doerr and Kenneth Levasseur, "Applied Discrete Structures for Computer Science", Galgotia Publications (P) Ltd, 1992.

Course nature		**Theory**					
Assessment Method (Weightage 100%)							
In-semester	**Assessment tool**	Cycle test I	Cycle test II	Cycle Test III	Surprise Test	Quiz	**Total**
	Weightage	**10%**	**15%**	**15%**	**5%**	**5%**	**50%**
					End semester examination Weightage :		**50%**