Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
MCA 13	Discrete Mathematics	3	1	--	3	1	--	4
		Examination Scheme						
		ISE		MSE	ESE			
		10		30	100 (60% Weightage)			

Pre-requisite Course Codes	Basic Knowledge of Mathematics.	
Course Outcomes	CO1	Develop mathematical and logical thinking
	CO2	Analyze number of logical possibilities and probability of events.
	CO3	Formulate problems of graphs, trees and recursive relation.
	CO4	Construct Grammars, languages and theoretical designs

Module	Unit	Topics	Ref.	Hrs.
1		**Mathematical Logic**	1,3	5
	1.1	Propositions and logical operations, Conditional Statements		
	1.2	Methods of Proof , Mathematical Induction,		
	1.3	Mathematical Statements , Logic and Problem Solving		
2		**Set, Relation and Function**	1,2,3	7
	2.1	**Set Theory:** Definition of Sets, Venn Diagrams, complements, Cartesian products, power sets, counting principle, cardinality and countability (Countable and Uncountable sets), proofs of some general identities on sets, pigeonhole principle.		
	2.2	**Relation:** Definition, types of relation, composition of relations, domain and range of a relation, pictorial Representation of relation, properties of relation, partial ordering relation, Relations and digraphs, Paths in Relations and Digraphs, Properties of Relations , Equivalence Relations, 3Operations on Relations, Partially Orders Sets, Hasse diagram, Lattice		
	2.3	**Function:** Definition and types of function, composition of functions, recursively defined functions.		
3		**Graph and Tree**	2,4	4
	3.1	Graph terminology, types of graph connected graphs, components of graph, Representation of Graph		
	3.2	Adjacency matrix, Adjacency list		
	3.3	Euler graph and Circuits, Hamiltonian path and circuits		
	3.4	Subgraphs and Subgraph isomorphism, Tree		

4		**Combinatorics and Recurrence Relation**	**1,2,4**	**8**
	4.1	Recursive mathematical definitions, basics of counting		
	4.2	Introduction to permutations and combinations, inclusion-exclusion		
	4.3	Recurrence relation - Fibonacci series, Tower of Hanoi		
	4.4	Lines in a plane Homogenous linear equations with constant coefficients, Particular Solution, Total Solution		
	4.5	Divide and Conquer Recurrence Relations (Fast Multiplication of Integers, Fast matrix Multiplication)		
5		**Regular Grammar (RG)**	**5,6**	**8**
	5.1	Regular Grammar		
	5.2	Regular Expression (RE): Definition, Equivalence and		
	5.3	Equivalence of RG and FA and Conversions,		
	5.4	Equivalence of RE and FA and Conversions.		
6		**Finite Automata**	**5,6**	**10**
	6.1	Deterministic and Nondeterministic Finite Automata (DFA and NFA), Definitions, Languages, Transitions (Diagrams, Functions and Tables)		
	6.2	Eliminating epsilon transitions from NFA,DFA		
	6.3	NFA applications: Reductions and Equivalence		
	6.4	FSM with output: Moore and Mealy machines.		
			Total	**42**

References:

[1] Kenneth H. Rosen, "Discrete Mathematics and Its Applications", McGraw Hill, 4th Edition

[2] Kolman, Busby, Ross, "Discrete Mathematical structures", PHI, 4th Edition

[3] Tremblay and Manohar, "Discrete Mathematical Structure" , Tata McGrow Hill

[4] C. L .Liu, "Elements of Discrete Mathematics", TMH 20002nd Edition.

[5] J.E.Hopcraft, R. Motwani and J.D.Ullman, "Introduction to Automata Theory languages & Computation", Pearson Education Asia.

[6] K.L.P.Mishra, N. Chandrashekharan, "Theory of Computer Science", PHI