Subject Name: Discrete Structure and Combinatorics **Subject Code:** TMC 104

Course Name: Master of Computer Applications (MCA)

1 Contact Hours: 45 **L** 3 **T** 0 **P** 0

2 Examination Duration(Hrs): **Theory** 0 3 **Practical** 0 0

3 Relative Weightage: **CWE:** 25 **MTE:** 25 **ETE:** 50

4 Credits : 0 4

5 Semester: [*] [ ] [ ]
Autumn Spring Both

6 Pre-Requisite: Basic Set Theory and Elementary Algebra

7 Subject Area: Mathematics

8 Objective: To familiarize students with the concepts of Mathematics needed in Computer Science.

9 Course Outcome:

CO 1 Be able to construct simple mathematical proofs and possess the ability to verify them

CO 2 Have substantial experience to comprehend formal logical arguments.

CO 3 Be skillful in expressing mathematical properties formally via the formal language of propositional logic and predicate logic.

CO 4 Be able to specify and manipulate basic mathematical objects such as sets, functions, and relations and will also be able to verify simple mathematical properties that these objects possess.

CO 5 Be able to apply basic counting techniques to solve combinatorial problems.

CO 6 Gain experience in using various techniques of mathematical induction (weak, strong and structural induction) to prove simple mathematical properties of a variety of discrete structures.

10 Details of the Course:

Unit No.	CONTENT	CONTACT HOURS
1	Sets, Relations and Functions: Countable and Uncountable sets, Relations and their types and compositions, Partial order relations and Hasse's diagram; Composition of functions, Inverse of functions, recursively defined functions.	**7**
2	Propositional Logic and Mathematical Induction Basic logical operations, Tautologies, Contradictions, Algebra of proposition, Logical implication, Logical equivalence and Validity; Normal forms,	7

	Rules of Inference, Predicates and Quantifiers; Mathematical Induction.	
3	Combinatorics and Discrete Numeric Functions Fundamental Principles, Factorial Notations, Permutations and Combinations; Pigeonhole principle, Binomial Theoram and Multimonial coefficients; Discrete Numeric Functions, Recurrence relations and Generating Functions.	10
4	Group Theory Semi group, monoid, Group, Abelian Group, Subgroup and their properties, Cyclic group, Cosets, Lagrange's theorem, Permutation groups, Homomorphism, Isomorphism and Automorphism of Groups; Ring, Integral Domain and Field.	11
5	Graph Theory Defination and applications of Graph; types of graph; SubGraph, isomorphic graph, Eulerian and Hamiltonian graph; Operation and representation of graphs; Planar graph and Coloring of graphs;	10
	TOTAL	**45**

11 Suggested Books:

Sl. NO.	**NAME OF AUTHERS/BOOKS/PUBLISHERS**	**YEAR OF PUBLICATION**
1	S Lipschutz and M. Lipson, Discrete Mathematics, TMH.	2009
2	J. P. Tremblay and R. Manohar, Discrete Mathematical Structure with Application to Computer Science, TMH.	1997
3	K. H. Rosen, Discrete Mathematics and Its Applications, TMH.	2007
4	D. Alan & L. Kenneth, Applied Discrete Structures for Computer Science, Galgotia Pub. Pvt. Ltd.	2000
5	J. L. Gersting, Mathematical Structure for Computer Science, W. H. Freeman& Macmillan.	1993