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| **Subject Name:** | | | | | | | | | | Discrete Structure and Combinatorics | | | | | | | | | | | | | | | | | | | | | | | | | | | | **Subject Code:** | | | | | | | | | | | | TMC 104 | | |
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| **Course Name:** | | | | | | | | | | Master of Computer Applications (MCA) | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | | | | | | | | |  | | |
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| **1** | **Contact Hours:** | | | | | | | | | | | | 45 | | | | | |  | | | | | | | | | | | | | | | | | | | | **L** | | 3 | | | | **T** | | | | 0 | | **P** | 0 |
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| **2** | **Examination Duration(Hrs):** | | | | | | | | | | | | | | | | | | | | | | | |  | **Theory** | | | | 0 | | 3 |  | **Practical** | | | | | | 0 | | | 0 | | |  | | | | | | |
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| **3** | **Relative Weightage:** | | | | | | | | | | | | | | |  | | | | | | **CWE:** | | | | | | | 25 | | **MTE:** | | | | 25 | | **ETE:** | | | | | 50 | | | | | |  | | | | |
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| **4** | **Credits:** | | | | | | | 0 | | | 4 | | |  | | | | | | | | | | | | | | |  | |  | | | |  | |  | | | | |  | | | | | |  | | | | |
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| **5** | **Semester:** | | | | | | | | **\*** | | | |  | | | |  | | | |  | | |  | | |  | | | | | | | | | | | | | | | | | | | | | | | | | |
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| **6** | **Pre-Requisite:** | | | | | | | | | | | | Basic Set Theory and Elementary Algebra | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| **7** | **Subject Area:** | | | | | | | | | | | | Mathematics | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| **8** | **Objective:** | | | | | | | | | | | To familiarize students with the concepts of Mathematics needed in Computer Science. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| **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. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| **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, Rules of Inference, Predicates and Quantifiers; Mathematical Induction. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 7 | | | | | | | | |
| **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** | | | | | | | | |
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| **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 | | | | | | |