

**DEPARTMENT OF MATHEMATICS  
NATIONAL INSTITUTES OF TECHNOLOGY  
KURUKSHETRA - 136119**

**No. MA/2023/**

**Dated: 30/11/2023**

**NOTICE: End Term Exam Reappear (MAIR-24)**

Branch : CS, IT  
Course Code : MAIR-24  
Date of Exam : 12/12/2023  
Time of Exam : 2:00 PM to 5:00 PM  
Year of the exam : 2<sup>nd</sup> Year  
Venue : Modelling and Computational Laboratory  
(Department of Mathematics)

Enclosure: Copy of the Syllabus

Course Coordinator  
(Dr. Pragati Sharma)

**Prof Inch. (CCN) :** Please display on the Institute Website.

CC: HOD Mathematics  
Associate Dean Examination  
Dean Academic  
Department Notice Board

**Course Code: MAIR 24**

**Course Title: Discrete Mathematics (for CS & IT)**

**Number of Credits: 4**

**Pre-requisites:**

**Course Type: EPR**

**Course Learning Objectives**

Enable the students to write the algorithms for the real life problems and logical development of and analysing the solutions.

**Course Outcomes**

At the end of this course, the students are expected to better understand algebraic concepts and logic required for programming and developing algorithms & software packages.

**Unit I Discrete Probability**

9L hours

Introductory Examples, Basic definitions, Engineering applications of probability, Set theory, Sample space & Events, Probability Multiplication principle, Product of sums principle, Cross product of sample spaces, Theorem of Total probability, Conditional Probability, Mutual Exclusion and Independent Events, Principle of Inclusion and Exclusion, Bayes' Rule.

**Unit II Discrete Random Variable & Distributions**

9L hours

Random variables and their event spaces, probability Mass function, Distribution function, Discrete Uniform Distribution, Bernoulli Trial & Binomial distribution, Poisson distribution, Geometric distribution, Mean & Variance of random variables.

**Unit III Relations and Logic**

9L hours

Binary Relation and their properties, Equivalence relations and partitions, partial ordering relations, functions and Pigeon hole principle, Propositions. Logic

**Unit IV Algebraic system**

9L hours

Definitions and elementary properties of algebraic structures, semi groups, monoids and sub monoids, groups, and subgroups, Homomorphism and Isomorphism of monoids and Groups, Definition and Examples of Rings and subrings, types of rings, Commutative Ring, Integral Domain, Division Ring, Relation of Isomorphism in the set of rings, Field, its characteristics and subfield.

**Unit V Graphs and Trees**

9L hours

Introduction, Basic Terminology, Multigraphs and Weighted Graphs, Paths and Circuits, Shortest Paths in Weighted Graphs, Eulerian Paths and Circuits, Hamiltonian Paths and circuits, Planar Graphs, Trees, Rooted Trees, Path Lengths in Rooted Trees, Binary Search Trees, Spanning Trees and Cut-sets, Minimum spanning Trees.

**Reference Book**

1. Joe L. Mott, Kandel and Baker, Discrete Mathematics for Computer Scientists, PHI, 2008
2. J. P. Tremblay and R Manohar Discrete Mathematical Structures with applications to Computer Science, Tata McGraw Hill (2001).
3. Kolman, Bobby Ross, Discret Mathematics Structures, PHI, 2001
4. C.L. Liu,; Elements of Discrete Mathematics. 1986.
5. Gary Haggard, J. Schlipf, S. Whitesides, Discrete Mathematics for Computer Science, Cengage Learning; 2005.