

St. Xavier's College (Autonomous), Ahmedabad

Syllabus of Semester – III of the following departments under Faculty of Computer Science based on Under Graduate Curriculum Framework to be implemented from the Academic Year 2026-27.

DEPARTMENT OF COMPUTER SCIENCE

BSC IT
(Hons.)
Category –
IV

Multi-Disciplinary Course : Mathematical Foundation of Computer Science

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credit Distribution of The Course			Eligibility Criteria	Prerequisite(s) of the Course (if any)
	Lecture	Tutorial	Practical / Practice		
Mathematical Foundation of Computer Science MDC259C	4	0	0	10 + 2 from a recognized board in any stream	Nil

Learning Objectives

The course is designed to:

1. Develop understanding of ethical theories and professional standards in IT.
 2. Create awareness of privacy, intellectual property, and cybersecurity issues in the data-driven world.
 3. Equip learners with advanced Excel tools for data analysis, visualization, and modeling.
 4. Enable ethical interpretation and communication of analytical results.
1. Prepare students for responsible data-driven decision-making in professional environments.

Learning Outcome

At the end of the course, students will be able to:

- Explain ethical principles, theories, and professional codes in IT. (*Understand*)
- Evaluate ethical issues in data privacy, surveillance, intellectual property, and cybersecurity. (*Analyze*)
- Apply ethical frameworks to real-world data handling and analytics scenarios. (*Apply/Evaluate*)
- Use advanced Excel functions, data tools, and dashboards for analysis and reporting. (*Apply*)
- Develop business models using What-If analysis, Solver, and financial functions. (*Apply/Create*)
- Demonstrate ethical responsibility while collecting, analyzing, and presenting data. (*Evaluate/Create*)

Syllabus of MDC : Mathematical Foundation of Computer Science

UNIT - I	Group Theory • Binary Operations • Algebraic Structure • Group • Order of a Group • Abelian Group • Cyclic Group • Order of an element • Sub-group • Lagrange's Theorem (without proof) • Permutation group $\langle \mathbb{Z}_n, +_n \rangle$ & $\langle \mathbb{Z}_p, *_p \rangle$	15 Hours
UNIT - II	Relation and Ordering • Introduction to relations • Binary relation on a set • Total no. of distinct Relation from a set A to B • Graph of relations and relation matrix • Property of relations • Equivalence relations • Equivalence classes (sets) • Partition of a set • Partial ordering and partial ordered set • Comparable elements • Chain • Cover of an element • Hasse diagram • Least, Greatest, Maximal, Minimal elements • Upper and lower bounds of Posets	15 Hours
UNIT - III	Lattice and Boolean algebra • Introduction to lattice • Definition of lattice as a Posets • Properties of lattice • Sub-lattice • Complete lattice • Bounded lattice • Distributive lattice • Complemented lattice	15 Hours

- Definition and important properties of a Boolean algebra
- Sub-Boolean algebra
- Isomorphic Boolean algebras (graphically)
- Atoms and anti-atoms
- Boolean expressions and their equivalence
- Minterms and maxterms

Canonical forms

UNIT - IV

Graph theory

15 Hours

- Introduction
- Abstract definition of Graph and Basic Terminology
- Simple Graph, Multi Graph
- Degree of a Vertex
- Types of Graphs
- Sub-graph and Isomorphic Graphs
- Path and Reachability
- Node Base
- Matrix Representation of Graphs
- Tree and Basic Terminology
- Binary and Complete Binary Tree
 - m-ary Tree, Different representations of Tree

Essential / Recommended Readings:

Discrete Mathematics Publisher: Oxford University Press

By Swapankumar Chakaborty, Bikas Kanti Sarkar

Suggestive Readings:

1) Discrete Mathematics

Publisher: Cengage Learning By D.S. Malik, M.K.Sen

Discrete Mathematics & its Application

Publisher: Tata McGraw Hill

By Kenneth H. Rosen,

2) Discrete Mathematics

Publisher: Tata McGraw Hill By J.P. Tremblay, R. Manohar

3) A Text book of the Discrete mathematics

Publisher: S. Chand Publication

By Swapan Kumar, Sarkar

4) Discrete Mathematical Structure (Latest Edition)

Publisher: Prentice Hall of India Pvt. Ltd.

By Bernard Kolman, Robert C Busby, Sharon Roa

