Mathematical Foundations for Computer Applications			
Course Code	**1MMC101**	Scheme	2026
Type of Course	**BSC**	Semester	I
Teaching Hours/Week (L:T:P)	3: 2: 0	CIE Marks	50
Total Hours of Pedagogy L /T/P/SL&TW	42: 28: 0: 50	SEE Marks	50
Credits	**4**	Total Marks	100
Examination type (SEE)	Theory	Exam Hours	3

Course Outcomes

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

CO1: Apply sets and their operations algebraically to solve real-world problems.

CO2: Apply the properties of equivalence relations, partial orders, and invertible functions to solve computational and logical problems.

CO3: Analyze basic concepts of mathematical logic for analyzing propositions and proving theorems.

CO4: Examine the basics of graph theory and their various properties.

CO5: Apply graph theory concepts to solve real world problems in Computer Networking, Telecommunication Infrastructure, Transportation etc.

Module-1: Relations and Functions

Basic Structures: Sets, Cartesian product of sets, relations, Zero-one matrices and directed graphs, properties of relations, Equivalence relations. Partial orders, Function- types and properties, Composition of function, Invertible Function

Number of Hours:8

Module-2: Combinatorics and Matrices

Operations on sets, Laws of set theory, countable and uncountable sets, addition principle, Principle of Inclusion and Exclusion, Pigeonhole principle.

Solution for the system of equation by Cramer`s rule.

Matrices: Eigenvalues and Eigenvectors.

Number of Hours:8

Module-3: Mathematical Logic

Mathematical Logic, Propositional Logic, Applications of Propositional Logic, Propositional Equivalences, Predicates, Introduction to Proofs.

Number of Hours: 9

Module-4: Graph Theory

Introduction to Graphs: Types of graphs, Incidence and degree, Paths and circuits, Isomorphism, sub-graphs, walks, paths and circuits, Shortest-Path Problems, connected graphs, disconnected graphs and components.

Eulerian and Hamiltonian graphs: Euler graphs, Hamiltonian paths and circuits, Travelling salesman problem. Directed graphs, types of digraphs, Digraphs and binary relation, Graph Coloring: Coloring- Chromatic number.

Number of Hours:9

Module-5: Probability Distribution

Random variable and probability distribution

Concept of random variable, discrete probability distributions, continuous probability distributions, Mean, variance and co-variance, Binomial and Poison distribution.

Number of Hours:8

Textbooks:

1. Kenneth H Rosen, "Discrete Mathematics and its Applications", McGraw Hill publicatio 7th edition.
2. Narsingh Deo, Graph theory with the applications to engineering & Computer Science, Dovers Publications, 2016
3. J.A. Bondy and U.S.R. Murty. Graph theory with Applications, Springer, 1 st edition, 2008
4. "Graph Theory with Applications to Engineering and Computer Science" by Narsingh Deo

Reference books / Manuals:

1. Frank Harary, Graph Theory, Narosa Publishing House, Latest edition.
2. J.K Sharma "Discrete Mathematics", Mac Millian Publishers India, 3rd edition,2011.
3. Garry Chartand and Ping Zhang, Introduction to Graph Theory, Tata McGraw-Hill, 2006.

Web links and Video Lectures (e-Resources):

1. https://archive.nptel.ac.in/courses/111/106/111106086/
2. https://onlinecourses.nptel.ac.in/noc20_cs82/preview

Assessment Structure (both CIE and SEE)

The weightage assigned to Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) shall be **50% each**. A student shall secure a minimum of 50% of the maximum marks prescribed for CIE and a minimum of **40%** of the maximum marks prescribed for SEE to be eligible for passing.

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to a subject/course only if he/she secures not less than **50% of the aggregate marks** obtained in CIE and SEE taken together.

Continuous Internal Evaluation:

Continuous Comprehensive Assessments (CCA)+ Internal Assessment Test (IA) = Continuous Internal Evaluation CIE [25+25=50 marks]

A minimum of **two Internal Assessment Tests (IA)** shall be conducted. Each test shall be conducted for a maximum of **25 marks**. The average of the two test marks shall be the marks secured by a student in IA.

In addition, **Continuous Comprehensive Assessment (CCA)** shall be conducted for a total of **25 marks**.