Semester Lecture Plan

Name of the college: Government College of Arts, Science and Commerce, Sanquelim - Goa		
Name of Faculty: Bhakti Gawas	**Subject: Computer Science**	
Paper code: CSC-201 Mathematical Foundations for Computer Science	**Program/Course: S.Y.B.Sc.**	**Division:**
Academic year: 2025 - 2026	**Semester: III**	**Total Lectures: 45**

Course Objectives:

1. Students will be able to construct truth tables for complex propositional expressions, identifying tautologies, contradictions, and contingent statements. They will also gain the ability to write programs that effectively evaluate propositional expressions using logical operators.
2. Students will develop the skills to translate English sentences into predicate logic, determining the validity of predicate logic expressions. They will also be capable of implementing programs to evaluate predicate logic statements. This objective focuses on building a strong foundation in predicate logic and logical inference.
3. Students will acquire the ability to perform set operations, analyze properties of binary relations, and implement closure operations on relations. They will also identify various types of functions from given examples. This objective emphasizes the practical application of mathematical concepts in sets, relations, and functions.
4. Students will demonstrate proficiency in solving problems related to graph representations and implementing basic graph algorithms such as DFS, BFS, and Dijkstra's Algorithm. This objective aims to develop students' skills

Course Learning Outcome:

On completion of the course, students will be able to:

CO1. Understand truth tables for complex propositional expressions, identify tautologies, contradictions, and contingent statements and write programs to evaluate propositional expressions using logical operators.

CO2. Apply to translate English sentences into predicate logic, determine the validity of predicate logic expressions, and implement programs to evaluate predicate logic statements.

CO3. Perform set operations, analyze properties of binary relations, and implement closure operations on relations.

CO4. Solve problems related to graph representations and implement basic graph algorithms.

Month	Lectures From:	To:	No. of lectures allotted	Topic, Subtopic to be covered	Learning outcome	ICT Tools	Reference books
July	14/07/2025	19/07/2025	3	Unit 1: Mathematical Logic: Statements and notations, Connectives, Well-formed formulas, Truth Tables	1. Construct truth tables for complex propositional expressions, identifying tautologies, contradictions, and contingent statements. 2.Evaluate propositional expressions using logical operators.	Laptop, LCD Projector, PowerPoint Presentation	Donald F. Stanat and David F. McAllister, Discrete mathematics in Computer Science.

July/August	21/07/2025	26/07/2025	3	Tautology, converse, inverse and contrapositive, equivalence, implication	1. Define and identify tautologies in propositional logic. 2. Construct truth tables to verify if a given statement is a tautology.		
	28/07/2025	02/08/2025	3	Logical identities, Normal forms. Predicates: Rules of inference, Consistency,	1. prove equivalence of statements. 2. Convert logical expressions into CNF and DNF.		
August	04/08/2025	09/08/2025	3	Predicate calculus: Free and bounded variable Quantifiers: Universal Quantifiers,	1. Define predicate calculus and explain the role of variables in predicates. 2. Translate every statement into formal logic using the universal quantifier.		
August	11/08/2025	16/08/2025	3	Existential Quantifiers. Strings and their Properties	1. Apply existential quantifiers in constructing logical arguments and proofs. 2. Understand basic string operations (concatenation, substring, prefix, suffix, reversal, length).		
August	18/07/2025	23/07/2025	3	Unit 2:	1. Perform standard set operations (union, intersection, complement, difference, Cartesian product). Apply Venn	Laptop, LCD Projector, PowerPoint Presentation	Donald F. Stanat and David F. McAllister, Discrete mathematics in Computer Science.

				Sets: Sets and Subsets, Sets with One Binary Operation, Sets with Two Binary Operations	diagrams to visualize and solve set-related problems. 2. Analyze properties of a binary operation: **closure, associativity, commutativity, identity element, inverse element**.		
August	25/08/2025	01/09/2025	00	Ganesh Chaturthi Vacation			
September	02/08/2025	06/09/2025	2	**Relations:** Relations, Properties of binary Relations, Types of relations: equivalence,			
September	02/08/2025	06/09/2025	3	compatibility and partial ordering relations, Hasse diagram. Lattices and its properties, Closure of Relations			
September	08/09/2025	13/09/2025	3	**Functions:** introduction to Functions, types of functions. **Graph Theory:** Representation of Graph, DFS, BFS,			
September	15/09/2025	20/09/2025	3	Dijkstra's Algorithm Spanning Trees, planar Graphs, Trees			

September	15/09/2025	20/09/2025	3	Unit 3: **Automata, Computability, and Complexity** Complexity Theory			
September	22/09/2025	27/09/2025	3	Automata Theory			
September/October	29/09/2025	04/10/2025	3	Computability Theory			