CBCS Syllabus as per NEP 2020 for F.Y.B.Sc.(Comp) Mathematics (2023 Pattern)

Name of the Programme : B.Sc.(Computer Science)
Program Code : USCS
Class : F.Y.B.Sc. (Computer Science)
Semester : II
Course Type : Skill Enhancement Course (SEC)
Course Code : COS-126-SEC
Course Name : Mathematics for Computer Science
No. of Teaching Hours : 60
No. of Credit : 02

Course Objectives:

1. Solve system of linear equation using multiple methods.
2. Learn how to create matrices, perform basic matrix operations.
3. Learn how to create plots, graphs and charts to represent and analyze data.
4. Apply Scilab to real-world problems and practice problem-solving skills.
5. Learn how to perform prime factorization, greatest common divisor (GCD), least common multiple (LCM).
6. Learn the basic principles of set, basic set equalities, the basic concepts of relations and functions.
7. Learn how to write an argument using logical notation and determine if the argument is valid or invalid.

Course Outcomes:

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

CO1. Students will be able to understand the basic principles of set, basic set equalities, the basic concepts of relations and functions.
CO2. Students will be able to write an argument using logical notation and determine if the argument is valid or invalid.
CO3. Students will be able to apply these mathematical concepts in the study of computer science.
CO4. Students will be able to apply logical reasoning to solve a variety of problems.
CO5. Student will be able to solve linear equations.
CO6. Student will be able to identify the special properties of matrices.
CO7. Able to use Scilab and Maxima Software to solve problems.

Topics and Learning Points

Teaching Hours

Theory: **12**

1) Introduction to Matrices and operations on them.
2) Logical methods.
3) Graphs of functions.
4) Fundamental of Algebra
5) System of Linear Equation.

Practicals: **48**

1. Introduction of Scilab with some basic commands.
2. Graph Plotting in 2-D and 3-D using Scilab.
3. Basic operations on matrices using Scilab.
4. Solution for system of linear equation using Scilab.
5. Basic Commands for logic using Scilab.
6. Introduction of Maxima using basic commands.
7. Polynomial, Sets, Function and Inverse of a Function in Maxima.
8. Basic Commands for Numbers, Complex Number, Prime Numbers in Maxima.
9. Graph plotting in 2-D and 3-D using Maxima.
10. Basic operations on matrices using Maxima.
11. Solution for system of linear equation using Maxima.
12. Basic Commands for logic using Maxima.

Reference Book:

1. Edwin L. Woollett, *Maxima by example: A step by step introduction to computer algebra using Maxima*
2. Tejas Sheth, Satish Annigeri and Rajesh Jakhotia, *Scilab: A practical introduction to programming and problem solving.*
3. Gilbert Strang, Linear Algebra and its applications (4th Edition).

Choice Based Credit System Syllabus (2023 Pattern)

(As Per NEP 2020)

Mapping of Program Outcomes with Course Outcomes

Class: F.Y.B.Sc.(Computer Science). (Sem II)
Subject: Mathematics
Course: Discrete Mathematics **Course Code:** COS-161-MN(MT)
Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

	Programme Outcomes (POs)						
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	1			2		
CO 2	3	2					
CO 3	2	3					
CO 4	3	3					3
CO 5	2	3			1		3
CO 6	2	3			1		
CO 7	2	3				1	

Justification for the mapping

PO1: Computer Knowledge
CO1: Student will demonstrate a thorough understanding of propositional logic by effectively applying propositional equivalences to simplify logical expressions, showcasing their practical competence in computer knowledge.
CO2: Student will exhibit proficiency in using predicates and quantifiers to formalize mathematical statements, allowing them to apply these skills effectively across diverse domains in computer knowledge, demonstrating their versatile competence.
CO3: Student will adeptly classify and apply various types of relations, including equivalence and partial ordering relations, within the context of computer knowledge, showcasing their ability to recognize and utilize these essential concepts effectively.
CO4: Student will master relation representation through digraphs and matrices, along with a profound understanding of relation composition in computer knowledge, demonstrating their comprehensive grasp of these fundamental concepts.
CO5: Student will develop a solid understanding of lattices, encompassing completed, bounded, and distributive lattices, enabling them to effectively apply these concepts in computer knowledge and problem-solving scenarios.
CO6: Student will possess the skills to successfully formulate and solve linear recurrence relations with constant coefficients, empowering them to tackle algorithmic and computational challenges in computer knowledge effectively.
CO7: Student will be equipped with the capability to find both homogeneous and particular solutions for recurrence relations, thereby demonstrating their proficiency in addressing complex computational problems in computer knowledge.

PO2: Design / Development of solution

CO1: Student will demonstrate a thorough understanding of propositional logic, showcasing their ability to apply propositional equivalences to simplify logical expressions, a skill crucial for effective problem-solving in the design and development of solutions.
CO2: Student will exhibit proficiency in using predicates and quantifiers to formalize mathematical statements, enabling them to apply these skills effectively across diverse domains in the design and development of solutions, emphasizing their versatility in problem-solving.
CO3: Student will adeptly classify and apply various types of relations, including equivalence and partial ordering relations, in the design and development of solutions, demonstrating their ability to utilize these fundamental concepts for effective problem-solving and system design.
CO4: Student will master relation representation through digraphs and matrices and comprehend relation composition, equipping them with essential tools for designing and developing solutions effectively.
CO5: Student will gain a solid understanding of lattices, encompassing completed, bounded, and distributive lattices, enhancing their ability to design and develop solutions with well-structured and efficient data representations and algorithms..
CO6: Student will acquire the skills to proficiently form and solve linear recurrence relations with constant coefficients, enabling them to design and develop solutions with optimized algorithms and resource management..
CO7: Student will be capable of finding both homogeneous and particular solutions for recurrence relations, equipping them with the expertise needed to optimize and fine-tune algorithms in the design and development of solutions.

PO5: Ethics
CO1: Student will demonstrate a thorough understanding of propositional logic, including the ability to apply propositional equivalences to simplify logical expressions, thereby enhancing their ethical decision-making and critical thinking skills.

CO5: Student will gain a solid understanding of lattices, including completed, bounded, and distributive lattices, providing them with a valuable framework to analyze ethical principles and moral reasoning in a structured and comprehensive manner.

CO6: Student will possess the skills to form and solve linear recurrence relations with constant coefficients, which can aid in ethical decision-making by facilitating the analysis of complex moral dilemmas and their consequences.

PO6: Individual and Team work

CO7: Student will possess the capability to find both homogeneous and particular solutions for recurrence relations, facilitating individual and team work in tackling complex problems and optimizing solution development.

PO7: Innovation, employability and Entrepreneurial skills
CO4: Student will master the representation of relations using digraphs and matrices, and understand relation composition, equipping them with essential problem-solving and analytical tools crucial for innovation, employability, and entrepreneurial success in various contexts.

CO5: Student will gain a solid understanding of lattices, including completed, bounded, and distributive lattices, enhancing their capacity for innovative problem-solving, employability, and entrepreneurial success through structured decision-making and effective organizational skills.