NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF COMPUTER APPLICATIONS

COURSE PLAN – PART I			
Name of the programme and specialization	**B.Tech [Minor Course]**		
Course Title	**Mathematical Foundations of Computer Science**		
Course Code	**CAMI10**	**No. of Credits**	**3**
Course Code of Pre-requisite subject(s)	**-**		
Session	**July 2023**	**Section (if, applicable)**	**-**
Name of Faculty	**Dr. Vinay Raj**	**Department**	**Computer Applications**
Official Email	**vinayraj@nitt.edu**	**Telephone No.**	**9963850192**
Name of Course Coordinator(s) (if, applicable)	**Dr. Michael Arock**		
Official E-mail	**michael@nitt.edu**	**Telephone No.**	**0431 250 3736**
Course Type (please tick appropriately)	**Minor Course**		

Syllabus (approved in BoS)

Set Theory: Sets and operations-properties - power set - methods of proof – relations -types of relations - functions – types of functions – properties of functions.

Mathematical Logic: Propositions and logical operators — Equivalences and implications – connectives –PCNF-DCNF.

Groups, Rings and Fields: Introduction-Algebraic Structures- Groups- Abelian Group, Order- Cyclic Group- Rings- Fields.

Basic Number Theory : Basic Notions-Prime Number Theorem- GCD- Euclidean algorithm, Solving $ax + by = d$, Congruence- The Chinese Remainder Theorem- Modular Exponentiation- Fermat and Euler- Primitive Roots- Inverting Matrices Mod n- Square Roots Mod n.

Graph Theory: Definitions and basic results - Representation of a - Trees - Cycles - Properties - Paths and connectedness - Sub graphs - Graph Isomorphism - Operations on graphs – cut sets - Spanning Trees- Euler circuits- Hamiltonian graphs.

References:

1. Kenneth H. Rosen, "Discrete Mathematics and Its Applications", 7th Edition, McGraw-Hill, 2012.
2. Mahima Ranjan Adhikari and Avishek Adhikari, "Basic Modern Algebra with Applications", Springer, 2014.
3. Kolman, Busby and Ross, "Discrete Mathematical Structures", 6th Edition, PHI, 2009.

COURSE OBJECTIVES
• *To acquire skills in solving mathematical and logical problems.* • *To comprehend mathematical principles and logic.* • *To understand fundamental concepts and tools in discrete mathematics with emphasis on their applications to computer science*

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
Understand sets, relations, functions and determine their properties	**1, 2, 3, 4, 5**
Ability to apply mathematical logic to solve problems	**1, 2, 3, 4, 5**
Understand the concepts of discrete structures, groups and rings.	**1, 2, 3, 4, 5**
Use the concepts of number theory to solve real world problems	**1, 2, 3, 4, 5**
Able to model and solve real world problems using graphs and trees	**1, 2, 3, 4, 5**

COURSE PLAN – PART II

COURSE OVERVIEW

This course will discuss fundamental concepts and tools in discrete mathematics with emphasis on their applications to computer science. Topics include propositional logic, sets, functions, relations, algebraic structures, Number theory and trees and graphs.

COURSE TEACHING AND LEARNING ACTIVITIES (Add more rows)

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1 - 3 hrs	Mathematical Logic: Propositions and logical operators	C & T
2	Week 2 - 3 hrs	Equivalences and implications	C & T
3	Week 3 - 3 hrs	connectives –PCNF-DCNF.	C & T
4	Week 4 - 3 hrs	Set Theory: Sets and operations-properties - power set	C & T
5	Week 5 - 3 hrs	methods of proof – relations -types of relations - functions – types of functions – properties of functions.	C & T
6	Week 6 - 2 hrs + Assessment I	Groups, Rings and Fields	C & T

7	Week 7 - 3 hrs	Introduction-Algebraic Structures-Groups- Abelian Group	C & T
8	Week 8 - 3 hrs	Order- Cyclic Group- Rings- Fields.	C & T
9	Week 9 - 3 hrs	Academic Break	-
10	Week 10 - 3 hrs	Basic Notions-Prime Number Theorem-GCD- Euclidean algorithm	C & T
11	Week 11 - 3 hrs	Solving ax + by = d, Congruence- The Chinese Remainder Theorem- Modular Exponentiation	C & T
12	Week 12 - 2 hrs + Assessment II	Fermat and Euler- Primitive Roots-Inverting Matrices Mod n- Square Roots Mod n.	C & T
13	Week 13 - 3 hrs	Graph Theory: Definitions and basic results - Representation of a - Trees - Cycles - Properties	C & T
14	Week 14 - 3 hrs	Paths and connectedness - Sub graphs - Graph Isomorphism - Operations on graphs	C & T
15	Week 15 – 3 hrs	Spanning Trees- Euler circuits-Hamiltonian graphs	C & T
16	Week 16 – 3 hrs	Revision	C & T

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle Test 1	As per Schedule	1 hr	20
2	Cycle Test 2	As per Schedule	1 hr	20
3	Assignment / Test 3	Week 10-13	-	10
4 CPA	Compensation Assessment*	As per Schedule	1 hr	20

5	Final Assessment *	As per Schedule	3 hrs	50

***mandatory; refer to guidelines on page 4**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

The students through the class representative may give their feedback at any time to the course chairman which will be duly addressed.

The students may also give their feedback during class committee meeting

COURSE POLICY (including compensation assessment to be specified**)**

Students absent for both the cycle tests with a valid reason may be given CPA and It will cover the portion of cycle tests 1 and 2.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

The students can get their doubts clarified at any time with their faculty member with prior appointment

FOR APPROVAL

Course Faculty _____ **CC- Chairperson** _____ **HOD** _____